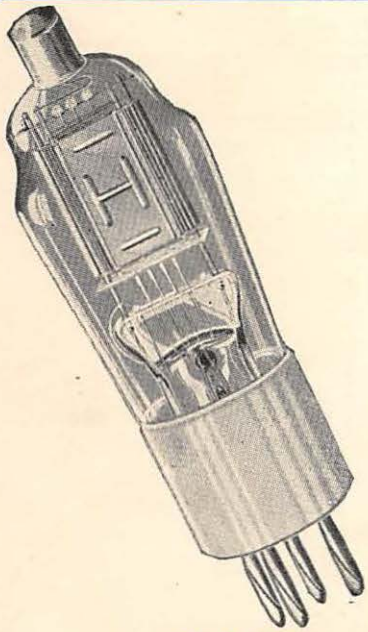
THE T&R
# BULLETIN
A JOURNAL FOR
## RADIO EXPERIMENTERS

Vol. 14 No. 3 SEPTEMBER 1938 (Copyright) Price 1/6

# Good Valves for U.H.F.



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BRITISH MADE

Readers particularly interested in the higher frequencies may not be aware that the Hivac special short-wave types offer considerable advantages over those of the more usual construction. While this improvement in performance makes their inclusion well worth while in any battery operated short-wave receiver, the gain is most marked above 28 Mc.—below 10 metres. Here, on the receiving side, the SG220 SW and D210 SW will give smoother oscillation and better sensitivity, and a "straight" 56 Mc. receiver becomes a relatively simple matter owing to the manner in which lay-out is facilitated by the construction of these valves. The first-named is a screen-grid type, and the latter a triode detector ; both have top grid connections, and are priced at 12s. 6d. and 5s. 6d. respectively.

For low-power transmission, the PX230 SW is worthy of consideration. It is a power triode, also with top grid and a ceramic base—this feature is common to all Hivac valves in the SW category—and is therefore an attractive proposition for the man who works from batteries and wants to get the highest possible efficiency in a simple circuit. This type costs 12s.

*(Vide: The Short-Wave Magazine*

Further information and data sheets can be obtained from Messrs. The High Vacuum Valve Co., Ltd., 111-117 Farringdon Road, London, E.C.1

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**The new NC-100 A.** is an eleven-tube Superhet covering 540-30,000 kc. in 5 Ranges, and having built-in power supply providing all voltages, including excitation for separate external speaker. Switched Beat Oscillator, A.V.C. and Stand-by. An S Meter is fitted and the Receiver has a 10-watt High Fidelity Audio System. It is fitted with a new and exclusive dial, giving all the advantages of the HRO type, but with a pointer directly calibrated in kilocycles (no charts being necessary). Delivery ex stock. **Price complete with Speaker** **£36 : 15s.**

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**The new NC-44** Communication Receiver combines capable performance with exceedingly low price. It employs seven tubes in a superheterodyne circuit with a 6K8 first detector and oscillator having exceptional stability and conversion gain, two 456 kc. IF stages, diode second detector, AVC with ON-OFF switch, CW oscillator and 25L6G beam tube output (2 watts UPO). A coil switch with silver-plated contacts selects the four ranges from 30 Mc. to 550 kc. A full vision dial is calibrated directly in frequency, and a separate electrical bandspread dial makes accurate tuning easy. There are separate controls for RF and Audio Gain. Self-contained power supply. The receiver is supplied with tubes and speaker. A six-volt battery model is also available, designated as Type NC-44B, and is supplied with tubes and speaker, but less batteries. *Delivery promised by Works, September.* (*BOOK YOURS NOW.*) **Price with Tubes and Speaker Chassis - - - - - -** **£16**

*National NC-510*

**The new NC-510** is a specialised communication receiver covering the 28 to 60 Mc. range. The use of acorn tubes in the RF, First Det. and Oscillator circuits, together with a new rotary system of automatic coil changing, and the National 1560 kc. IF channel, provides "HRO performance" on this range for the first time. Circiut details include CW oscillator, beam power tube, variable selectivity, straight line frequency tuning, a new AVC circuit, and many other important features (such as the stabilised HF oscillator), which will be found in no other receiver. *Delivery commences October.*

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## 53, VICTORIA STREET,
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# THE T. & R. BULLETIN

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## CONTENTS



## THE METRE WAVE-LENGTHS

IN this issue Mr. W. A. Scarr, M.A., who has been experimenting on the ultra-highs for many years, expounds several interesting and important theories and advances a possible reason for the American DX which has taken place on 56 Mc. during May and June for the past two or three years. Important contributions also appear from Messrs. Groom and Heightman, both of whom have been conducting extended ground wave experiments. Articles of this type mean a very great deal to the Amateur Movement, for they prove conclusively that, in spite of the tendency to work DX aimlessly, there are many who use their stations for scientific purposes.

What of the wave-lengths around 1 metre? Something tells us that in this part of the spectrum will be found the solution of many present-day problems, none perhaps more pressing than Television. By the creation of a chain of relay stations working on about 1 metre we believe it would be possible to institute a nation-wide television service. We visualise the Alexandra Palace transmissions being picked up at 30 or 40 miles north of London, relayed to a local area on 1 metre, and re-broadcast to a second relay station working on 7 metres for further local distribution and further relaying. In about three "hops" the Industrial Midlands could be given a commercial television service.

The metre wave-lengths also appear to offer a very suitable transmitting medium for A.R.P. work. If an emergency arose the need for strictly localised transmissions would be of paramount importance.

We radio amateurs would be well advised to spend some time this coming winter investigating the characteristics of our own immediate locality in so far as the ultra-highs are concerned. To-day many members have authority to experiment on frequencies between 224 and 240 Mc. and between 448 and 480 Mc., but very little *real* information of value has so far been reported upon in these columns. Is it too much to suggest that next year some of our treasured trophies may be awarded to those who have broken new ground around 1 metre? Let's get busy before it is too late. Verb sap!

J. C.

# Concerning the Reception of Ultra-High Frequency Signals within the first Skip Distance

By D. W. HEIGHTMAN (G6DH).

## EXTENDED GROUND WAVES

For some years the R.E.S. 28 Mc. Groups have been studying the " Extended Ground Wave " phenomenon. It is generally agreed that the term is a misnomer, but a correct name can only be found when the final solution of the problem is reached. At this stage it is interesting to review the present state of our knowledge on the subject, and this is done in the first of these articles by G6DH. In the second, GM6RG gives an account of recent experiments carried out with a view to clearing up the matter.

MUCH discussion has taken place in amateur circles as to the likely reasons for what are popularly known as " extended ground wave " signals, but, as yet, no definite conclusions have been reached on the subject. It is the purpose of these notes to review briefly our observations on the subject to date. The writer considers that a better word for these signals would be " Pre-skip " signals, and they will be referred to thus herein.

Consider the average winter day on, say, the 28 Mc. amateur band—the first skip is in the region of 1,000 to 1,200 miles (*i.e.*, for signals bent in the usual F layer), and only the more distant European, etc., signals are heard at high signal strengths. The ground wave range of the average amateur station is in the region of 40 miles, yet we are able to hear signals, without any definite or apparent skip, from any distance between the ground wave range and the first skip distance.

The characteristics of these signals are: (1) Generally low in strength ; (2) comparatively consistent, although sometimes fading (generally at slow rates and not deep) ; (3) little apparent relation between strength and distance, *i.e.*, a signal from 100 miles may be about the same strength as one from 300 miles ; (4) sometimes accompanied by echoes, both of short and longer duration (up to 1-5th sec.) ; (5) receivable only when the frequency is open for longer distances, *i.e.*, not at night ; (6) disappear almost completely during the summer months (coinciding with the lack of long distance signals). The writer was not certain until recently of characteristics (5) and (6), but the observations described below have confirmed these facts.

In order to obtain more information on the subject regular daily observations were made on the fundamental on 13.77 Mc. and the harmonic on 27.54 Mc. of FSE, which is situated 200 miles south-east of the writer's station. This signal is audible all day and all night on 13 Mc., consequently one can be sure that the station is working before checking the harmonic. Again, as it is generally working throughout the 24-hour period, continual observations can be made.

The graphs accompanying these notes show the average signal strength of FSE between the hours of 0880 and 1800 G.M.T. Some relation is apparent between the 13 and 27 Mc. signals. It will be seen, however, that the 27 Mc. signals fail with the approach of summer conditions. A query arises—are the fundamental and harmonic signals bent by the same medium in like manner ?

It has been noted that the 13 Mc. signal can be quite strong even when other European signals from somewhat longer distances are weak, indicating that it is not propagated in the same way as the latter signals, particularly at night.

An important point was shown by the observations, *i.e.*, that the 27 Mc. signal was not audible at night, and that it gradually appeared each morning, soon after sunrise, remained audible all day, and disappeared again at night, an hour or so after sunset. A very definite relation between general conditions for longer distances and the reception of the signal were observed. On a good day, the signal appeared possibly an hour or more earlier and went out later, while on a poor day it was much later coming in (say, 1000 instead of 0800), and vanished earlier.

What are the possible ways by which these signals can be propagated ?

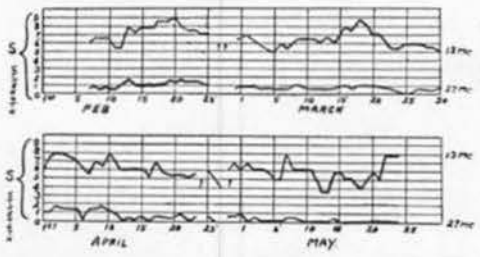
(1) By bending in the lower atmosphere, *i.e.*, apart from ionised layers and dependent on air conditions, etc.

(2) By scattering, *i.e.*, by being re-radiated from the usual ionised layers so as to become non-directional.

(3) By bending in an ionised layer or layers lower than the E layer. This layer or layers would have to be of considerable thickness and consistent characteristics to account for the signals in question.

(4) By travelling round the world before being received and being bent in the usual outer F layer.

Condition (1) is ruled out because the signals are




*Graphs showing average daily signal of FSE at G6DH for the period February to May 1938.*

not receivable at night, and are independent of weather conditions; (2) is very unlikely for signals of as high frequency as 28 Mc., especially as these Pre-skip signals are so consistent. Consequently, (3) and (4) are the most probable ways by which the signals are propagated, and it is possible that both are contributory. The case for (4) is stated in the T. & R. BULLETIN (December, 1936, p. 265), and there is still considerable evidence in support of same; *viz.*, recent tests by GM6RG.

To confirm that the signals do travel round the world, it will be necessary to use both uni-directional aerials for transmitting and receiving stations situated at, say, 200 to 300 miles apart. If, then, it is found, at certain times of day, possible to pick up the signals when the transmitting and receiving aerials of the two stations are " back to back," it could be safely assumed that the signals are encircling the globe. If the signals can be heard when the aerials are pointed at one another, propagation must be as per condition (3).

It remains, therefore, for us to carry out tests as above in order that we shall be nearer to the solution of the problem. Those interested in aerials could be helpful by designing a compact, uni-directional, rotatable, receiving aerial suitable for frequencies of the order of 30 Mc.

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# Round the World on 28Mc.

By BRYAN GROOM (GM6RG).

DURING the last few months the rotatable array at GM6RG has been used in a series of experiments, the results of which are so interesting that a request has been received for details of them, so once more out comes the log-book, and an effort will be made to prove that the unusual results are not due to ground wave or to " scattering," but are, in fact, transmissions right round the world.

The experiments were started at the request of Mr. W. N. Craig, GM6JJ, who reported that he had copied the signals of GM6RG at a time when this station was in contact with SV1CA, and the beam was pointing S.E. by E. GM6JJ is about thirty-five miles N. by West from here (Galashiels). Transmission was commenced with the beam aimed at GM6JJ, who reported on 7 Mc. that he had heard nothing. The beam was then turned round through E. to S.E. by E., at which point the signals were copied solidly. On further rotation of the beam the signals dropped out at S. and came back very weakly at N.W. The time of the tests was 17.30 G.M.T. Tests at 23.00 yielded negative results.

A few days later, on May 30, similar tests were made with G6GO, who could not receive the signals at all when the beam was aimed N. or S. The signal strength was maximum with the beam pointing N.W., and was slightly less in other directions.

In the meantime very careful tests had been made with other stations in most parts of the world, and all reported a great increase of strength when the beam was aimed at them. It amounted in most cases to an increase from unintelligibility to S9. GM5FT, of Selkirk, some four miles away, co-operated in another test. The S meter on his HRO receiver gave a reading only when the beam was aimed at him. In other directions he could still copy speech, but signal strength was negligible. This all goes to prove that the array has a sharp pattern free from spurious lobes.

Then came tests with G6BW. They were carried out in the same way as those with GM6JJ, G6BW reporting progress on 7 Mc. The receiver at GM6RG was left on so that when G6BW broke in, his transmission was copied at once. The tests were made at various times of the day and night, but in every case no signals could be received when the beam was aimed near North or South. Quite wide changes were noticed in the direction necessary for the transmission of the best signal. On May 3, at 13.30 G.M.T., the signals were S8 with the beam N.W. by N., and around S3/4 at all other points except N. of N.W., South, and N. of E., at which positions no signal was audible. One of the most noticeable features was a drop from S4 to zero in the last fifteen degrees going from West to South, and the sudden reappearance of the signal at S.E. at S3. This was checked thrice. At 08.30 the same day, G6BW had found it impossible to receive GM6RG at all.

Further tests were made on May 7, and similar results were obtained. The log-book reads: " Signals zero at South, N. of S.E., and N. of N.W. by W.; signals best at S.W. and next best at S.E. and W." On May 9, signals were very weak, being only audible at all with the beam aimed either S.W. or S.E.

During the tests on the 7th, a W4 station listened throughout (unknown to us), and subsequently informed us that at his station our signals were S1 to zero at any point East of S., commenced to build up at a point West of S., were S9 at N.W. by W., and weakened as the beam was rotated further North. This is just as it should be for the Great Circle route to W4 is about fifteen degrees North of West.

A station hearing any of these tests would have no difficulty in knowing the direction of the array as a running commentary is always kept up, stating the direction as it is changed.

These results seem fairly strong evidence in favour of the " round the world " hypothesis, but it is agreed that further tests on the lines suggested by G6DH will be necessary before the final word can be said.

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## Correction

Mr. R. W. Addie (G8LT) draws attention to the fact that in the circuit diagram which accompanied his frequency meter article published on page 73 of the August issue, the .01 μF by-pass condensers from the H.T. line, screen and filament of the valve, should not be taken to the valve cathode (which is at R.F. potential), but should be connected direct to earth. The screen by-pass condenser should go to earth and not to H.T. plus. It is also emphasised that the grid leak has a value of 0.1 megohm, and not 1 megohm. In the circuit diagram the decimal point is printed rather indistinctly.

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## G3GP on 56Mc

Will those members who logged 56 Mc. signals on August 14 from G3GP please communicate with Mr. C. H. Targett, 97, Whitehill Road, Gravesend? The call G3GP is allotted to the Gravesend and District Radio Society.

# The 'Utility' Two Valve Transmitter

By J. N. WALKER (G5JU)

## PART 2

### Construction

A transmitter built for lasting service should have a solid foundation: hence the chassis chosen for the one under consideration is made of sheet iron, welded at the sides and having bent-over flanges underneath to allow of fixing in a rack. The holes were drilled to specification with the metal in the rough and spraying (glossy outside, matt inside) carried out later. The final result is a strong, rigid chassis presenting a first class commercial appearance. Additional holes (¼ in. diameter) must be made at appropriate points where wires pass through the chassis.

The photographs show the layout clearly, consequently it is unnecessary to describe in detail the mounting of the opponents, which are placed so that the wiring is kept short.

Care must be exercised when mounting the *Clix* 7-pin valve-holder; aluminium or lead washers being inserted on the fixing screws. The nuts on the latter should not be very tight, otherwise there is a likelihood of the ceramic material breaking. This also applies to the other valve and coil holders and to the four midget insulators used to support C3 from the chassis. This condenser is earthed at one point only by a strip from the terminal on the frame to a bolt on the chassis, thus avoiding circulatory currents.

Before mounting C1, the corner of the outer moving vane should be bent slightly so that it touches a fixed vane at full capacity. This condenser is mounted on a metal bracket, as one end is connected to the chassis in any case. An insulated bracket is superfluous but may be used if no other is available.

The oscillator anode condenser, C2, is a type recently introduced by *Eddystone* and is ideal for the position it occupies. An insulated bracket is essential for it and also for the neutralising condenser C4. It is well to see that no metal part of either condenser touches the bracket holding screws, a condition which is liable to occur at certain positions.

The neutralising condenser, as purchased, is single spaced, and is of too large a capacity for convenient adjustment. This should be rebuilt with double spacing, three fixed and two moving vanes being used. The rear ganging extension should preferably be replaced by a flat nut.

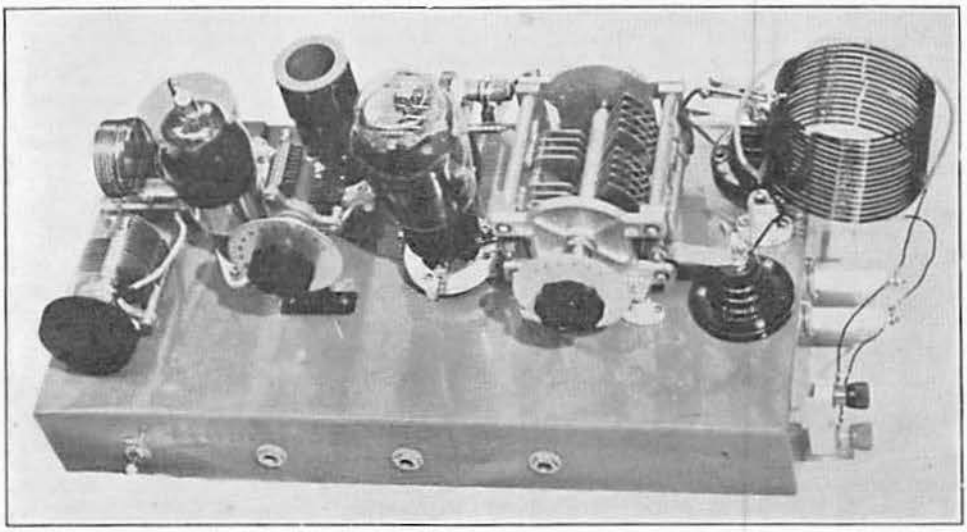


*Fig. 2.*
*Plan View of the Utility Transmitter. Note the special aerial coupling arrangement.*

The cathode coils and holder are home made and it is also necessary to wind the oscillator anode coils on the formers, therefore particulars of these follow.

The cathode coil base and holder could be made of ebonite but as the associated condenser (C1) has Trolitul insulation, it was decided to use this material, especially as it is reasonable in cost, has lower losses, and is very easy to drill and cut. The sheet is first cut into strips measuring 2 ins. by ½ in. and filed up true. The base has two holes, 3/16 in. diameter, 1½ ins. apart, drilled to take No. 8 *Clix* sockets, to which soldering tags are fitted. A central hole is also drilled for mounting purposes. The coil holder holes are ¼ in. diameter to take *Clix* No. 21 valve pins. Only one base and two holders are required for operation on 7 and 14 Mc. from 3.5 and 7 Mc. crystals, but it is advisable to

make up a number, as they will prove useful in other apparatus.

The coils are made of 18 S.W.G. enamelled wire, wound on a 1½ ins. diameter former. Strips of celluloid are slipped between the former and the wire and a coat of "Durofix" spread on top of the strips. If left to set overnight, the coils can be slipped off and will be found to be strong and rigid. Nine turns, close spaced, are required with a 3.5 Mc. crystal and six turns, slightly spaced, when a 7 Mc. crystal is used.

One side of the crystal holder is wired to one side of the coil holder, the other side of the latter going to the tag on the moving condenser vanes. This connection should not be made through the chassis.

The oscillator anode coils, as previously mentioned, are wound on *Eddystone* DL9 four-pin formers. Fig. 2 indicates the method of winding and gives details of coils for 3.5, 7 and 14 Mc. operation. Enamelled wire should be used and the turns of L2 for 7 and 14 Mc. should be very slightly spaced. No spacing is required for the other windings. L3 in each case will commence ½ in. below the upper winding. The ends are brought down through the pins and tip-soldered. A touch of Durofix along the "ribs" will ensure that the windings do not move.

Little requires to be said about the sub-chassis construction. The upright type condensers are bolted on to the chassis, as also are one end of the majority of the tag type condensers (C9 is an exception). Choke 2 is partly supported by an *Eddystone* insulating pillar, all the other components being held in the wiring.

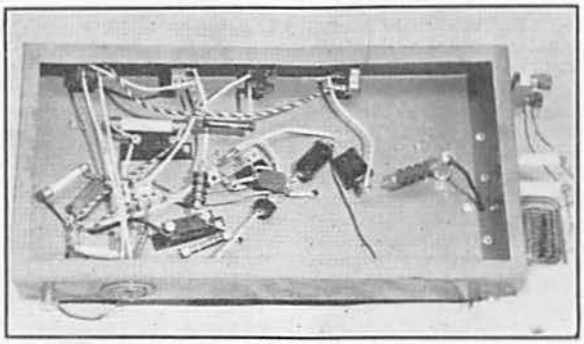


*Fig. 3.*
***Underside View of the Utility Transmitter. Connections are made via an Eddystone 6-pin socket.***

There would be little point in building a neat transmitter if straggly leads were used for the power supplies. These are avoided by fitting an *Eddystone* 6 pin socket on the chassis. The leeds to the plug are twined together to form a single cable.

A terminal is mounted at the rear of the chassis for earthing purposes.

One pole of the double-pole mains switch is in the high tension supply to the APP4g, the other in the supply to the 015/400, so that, with this switch off, the transmitter is "dead" as far as H.T. is concerned. This is convenient when changing coils, etc. Further the switch can be used as the main on and off, where the H.T. transformer incorporates the L.T. supply to the valve heaters.

### Wiring Up

The radio frequency circuits may be wired up with 18 S.W.G. enamelled (not tinned) wire, except between C3 and the large stand-off insulators, where thick wire or strip is advisable. Tinned wire may be used for other parts of the circuit, and should be insulated with *good quality* systoflex sleeving—not with the poor quality type, detectable by its smell, which is like linoleum.

It is important to note that where connections are made on the chassis, the metal must be scraped bare. Further, whilst the chassis will give stability, both physical and electrical, it should not be relied on for return paths. For this purpose a thick wire should be run underneath from each point connected to it, ending up at the earthing terminal.

### Anode Coils and Coupling Arrangement

The coils used are of "*R.V. Inductance*" make, the sizes being as follows:—

3.5 Mc. 24 turns, 16 S.W.G., 4 ins. diam., very small spacing.

7 Mc. 14 turns, 14 S.W.G., 3 ins. diam., one wire diameter spacing.

14 Mc. 9 turns, 14 S.W.G., 3 ins. diam., one wire diameter spacing.

The ends are formed into loops and spaced to fit the large stand-off insulators, which are 3½ ins. apart. A piece of wire is soldered on as near the centre as possible, for connection to the H.T. clip.

On the side of the chassis, immediately below the centre of the anode coil, are bolted two *Eddystone* 1½ ins. pillar insulators, soldered to which is a single turn loop of a diameter considerably larger than the tank coil. This loop to some degree must be flexible and can be made of 18 S.W.G. covered with sleeving. A link to an artificial aerial unit may be connected directly to the pillars, but they are not strong enough to take the pull of an aerial feeder, so an additional *Bulgin* Aerial-Earth block is bolted on for this purpose.

It only remains to fit suitable knobs to the variable condensers.

A very exact dial reading, to a fraction of a degree, is not necessary on a transmitter, but some indication of dial setting is, of course, desirable. The new miniature knob dials introduced recently by *Eddystone* fill the bill admirably, the dial reading being taken against an imaginary point vertically above the centre of the dial. If a panel is fitted, short extension controls will enable the dial markings to be read against indicator points on the panel.

It is not proposed to give details in this article of a suitable power supply as this will be dealt with later.

### Adjustment

The transmitter has been designed chiefly for operation on 7 and 14 Mc. and several combinations of coils and crystals are possible. These will be detailed first, and mention made later of the use of the transmitter on 3.5 and 28 Mc.

With a 3.5 Mc. crystal in position, the 6 turn coil will be inserted in the cathode circuit of the APP4g, and the 7 Mc. coil in the anode circuit. C1 should be set at about three quarters capacity, and the second valve removed from its socket. If the valve is not oscillating, the anode current will be about 30 mA, but further adjustment of C1 will

reduce this to 20 mA. On tuning through resonance with C2, the current will dip to a low value (in the region of 6 mA), and a loop and bulb held over L2 should light brilliantly. It may be possible to increase the output by further slight adjustment of C1 but, if the crystal fuse bulb glows, the capacity of C1 should be reduced.

The same procedure is carried out to obtain a 14 Mc. output, a 7 Mc. crystal and appropriate coils being used. The capacity of C1 will probably be less than formerly.

If a 7 Mc. output is wanted from a 7 Mc. crystal, it is only necessary to short cut C1 and tune C2 to resonance, indicated by a very considerable dip in anode current. As the valve has a mutual conductance of 10 mA/volt, no difficulty should be experienced in obtaining oscillation and a high radio frequency output, either with tri-tet or straight C.O. operation.

As, during these initial tests, the output valve has not been in position, the oscillator stage has been working without a load, but on inserting the 015/400 in its socket, the grid circuit will be completed and this will impose a load across L3 consequently the anode current of the oscillator will increase considerably. A bias battery must of course be connected in circuit, a 120 volt Exide (Drydex) H.T. battery probably being the most convenient. About 60 volts should be applied with an anode voltage of 350, and more or less if a different anode voltage is used.

The next step is to neutralise the Power Amplifier and this must be done before H.T. is applied to the stage. The 7 Mc. tank coil is placed in position and the oscillator adjusted to give an output on this frequency. With the neutralising condenser (C4) at full capacity, and the meter inserted to read the anode current to the oscillator, an upward swing of the meter needle will be observed as the tank condenser (C3) is tuned through resonance. Reducing the capacity of the neutralising condenser gradually will result in a position being reached at which no movement of the needle will be visible. At this point, the voltage reaching the grid *via* the neutralising condenser is equal but opposite in phase to that impressed *via* the grid-anode capacity of the valve; self-oscillation cannot then occur.

The high tension voltage may now be applied to the P.A. and if the anode circuit is out of resonance, a large current will flow, falling back to a low value on adjusting C3. A neon lamp held against the tank coil will strike brilliantly. A loop and bulb should not be held close otherwise the lamp will probably burn out.

### The Coupling Loop

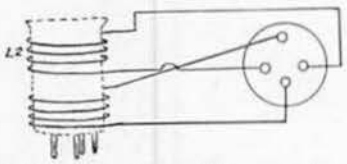
If the transmitter is being adjusted in conjunction with an artificial aerial (as is very desirable in the first place) the power can be transferred to the latter by using the loop as part of the actual circuit. The inductance of the loop will add to that already present in the A.A. unit, but will not have any considerable effect.

Alternatively, a similar loop could be arranged around the coil of the A.A. unit and joined up to the terminals on the transmitter by means of a length of twin flex. This method is the one to adopt when it is desired to feed aerials of the end-on type and those with Zepp or Windom feeders. A separate aerial tuning circuit is required and one end of it must be kept at earth potential by connecting it to a convenient point—the chassis itself, for example.

Where low impedance (72 to 120 ohms) feeder is in use, it is only necessary to connect the house ends of the feeder cable to the terminals of the coupling loop for a practically perfect match to result. The connections for twin feeder of higher impedance (up to 600 ohms) are the same, except that, instead of one coupling turn, two or more (best determined by experiment) will be necessary.

The coupling is varied by increasing or decreasing the diameter of the loop around the tank coil and should be adjusted so that the anode current increases to the desired input. No advantage is to be gained by coupling so tightly that most of the R.F. in the tank circuit disappears, because although under this condition the anode current will be high, much of the increased input is being dissipated as heat inside the valve. For maximum efficiency, the anode voltage should be high, the coupling to the aerial loose, and the anode current comparatively low.

If the aerial is resonant to the frequency of the transmitter, the position of the tank condenser C3 will be the same with the aerial on or off. If on re-adjusting C3 the anode current dips at increased capacity, it indicates that the aerial is too short and *vice versa*.




***The windings on the oscillator anode coils are connected to the pins as shown above.***

*COIL DATA*

| *Band* | *L2* | *L3* |
|---|---|---|
| *3.5* | *33 turns 20 swg* | *35 turns 28 swg* |
| *7* | *14 turns 18 swg* | *20 turns 28 swg* |
| *14* | *7 turns 18 swg* | *12 turns 28 swg* |

### Keying

Two plugs are specified, one being for the milliammeter and the other for the key, which is inserted in the second jack, so breaking the feed to the screen of the APP4g. Although the makers do not state it, it would appear that the valve has been designed somewhat on the lines of a "beam power tube," since the screen grid current is much lower than with ordinary pentodes. This being the case, the key only breaks a small amount of power, as a result smooth, clickless keying is obtained without a filter becoming necessary. In common with the majority of high efficiency pentode valves, the APP4g will probably continue to oscillate weakly with the key up, but this is not a disadvantage as under such conditions it will give smoother keying than if the crystal had to abruptly commence and cease oscillating.

### Operation on Various Bands

With one 7 Mc. crystal, the transmitter may be operated on the two bands for which it has been chiefly designed *viz.*, 7 and 14 Mc., with the second valve always running as a straight amplifier. On 7 Mc. the APP4g will be used as a straight Crystal

(*Continued on page* 194)

# An Inexpensive Rotating Beam for 56Mc.

By W. F. Holford, M.A. (G5NG)

SINCE very little seems to have been done (or at any rate published, beyond bare specifications) with folded aerials, these appeared to offer the best field for experiment, and possessed many obvious advantages when it came to considering 56 Mc. propagation. Long aerials are clumsy, unless one lives in the depths of the country, and are certainly unsightly.

The problem soon boiled down to one of mechanical difficulties, and it is the simple solution of these that is offered now.

A rotating beam was indicated, as narrow as possible, provided compass points were marked on the dial. The Reinhartz double loop is compact, easily pushed up beyond trees or chimney pots, and it seems could be made very light; no small consideration this, when it has to be lifted 40 feet up. Wind resistance could also be reduced to a minimum.

No claim for electrical efficiency is made so far as experiments are being carried out with feeder lines, but it gives an 18 per cent. increase over a dipole, and a 6-1 ratio from back to front. For reception, car intereference with a low dipole is a very serious problem, but is reduced by an amazing amount when using this method.

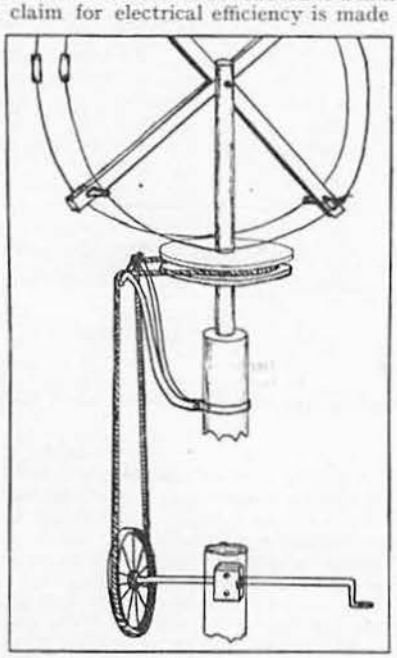


*Fig. 1.*
***The construction of the 56 Mc. Rotating Beam.***

A coaxial cable would solve feeder problems, but as 100 yard lengths are the shortest sold, the price, for one only, is prohibitive.

### Construction

A 30-inch cross of 1¼ in. by 1 in. pine was made by halving at the centre, and a slot cut in an 18-inch support of 2 in. by 2 in. (Fig. 1). By shaping the bottom of the slot with a file, and pinning at the centre, a tight fit with no play was obtained. A half-inch hole 12 in. long was drilled in the bottom to fit over a length of pipe, driven 6 inches into the top of the mast. One meta! washer gave a smooth bearing. An old ebonite lead-in tube 18 in. by 2 in., with ¼ in. walls was used, but wood is as good for the support.

Three discs of ¼ in. wood, one soft 6 in. in diameter and two oak 7½ in. in diameter, were fitted 2 in. from the bottom of the support, with a screw at each end of a diameter to hold it tight. This forms the pulley for a continuous rope to rotate the loops.

Twenty-four inches of ½ in. by ⅛ in. iron (an old coal scuttle handle) was fitted with one bolt as a bracket near the top, and a 12-inch piece of dowelling was clipped in this for the rope to run over. (Fig. 1.)

A 6-inch wheel from a pram (don't ask where that came from!) was fixed to a 30-inch length of iron rod (from a car bonnet hinge), and this rod is passed through a hole in a hard wood block near the bottom of the mast, and through the side of the French window-frame. A car window winder makes a neat job on the inside and one complete rotation moves the loop 360°. A compass card under the handle gives the bearing.

### The Aerial

The aerial itself was made possible by the discovery that steel cored copper wire is now available cheaply, and two 8 feet lengths of 12 S.W.G. made two very stiff loops. The open ends are 1 inch apart and cemented into two small pieces of trolitul that happened to be available, but celluloid or glass tube would do as well. (Fig. 2.)

Eight stand-off insulators were screwed to the ends of the wooden cross, and small brass clips (springs from lamp batteries) hold the two loops firmly in place under the terminals.

At present a waterproof cable, twin rubbered flex, covered Empire cloth, covered American cloth, as used for car lighting, is being tried. This has worked well up to 14 Mc.; spaced feeders are heavy and clumsy to mount. A matching stub is not being used, as this cable draws into 100 ohms. Up to 14 Mc. power loss is reasonable, and climatic

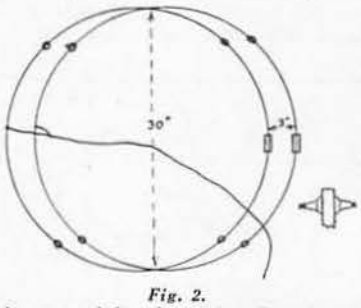



*Fig. 2.*
***The loops used for the 56 Mc. Rotating Beam.***

conditions do not bring changes, as with flex or even some open lines; and this cable is also comparatively light.

The mast rests on the ground and is wired to the wall by screw-eyes in a corner where two walls meet. It is fairly easy to drop for changes.

If one is not too critical about small kinks, which do not show in the corner, a 38 feet mast can cost but 5s., and the aerial is 4 feet up above.

In case references are not available for a Reinhartz loop, the following information is given :—

56 Mc. 8 ft. 0½ in. wire, 30 inches diameter, loops spaced 3 in.

28 Mc. 16 ft. 1 in. wire, 60 inches diameter, loops spaced 3 in.

Loop ends approximately 1 in. apart.

A narrow beam, in a direction away from the open end of the loop for transmitting is given.

**Results**

A month's test with a constant input of 7 watts has obtained an average report of 54 at 20 miles, with a back coverage of S1 using a frquency of 57488 kc. Short range tests have given reports of S6.

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# A Modified W8JK Beam Aerial

By J. N. WALKER (G5JU).

The principles on which the out-of-phase beam aerial (known as the "W8JK") depends, have been previously published, as also have details of the construction, wire lengths, spacings, etc. It will be apparent from the diagrams and texts of articles dealing with this type of aerial, that a matching stub is required, connected at the centre of any one pair of elements. Usually, also a 600-ohm feeder line is shown attached to the matching stub at the appropriate points, and the writer has seen no description of any other method of feeding the array.

When a 600-ohm line, or one of near impedance, is used, it is, of course, essential to use some form of matching at the aerial end, and this is the part played by the stub, which forms an efficient matching transformer. The writer, however, dislikes both 600-ohm lines and matching stubs, because they add extra adjustments and complications. They also tend to be heavy, due chiefly to the weight of the spacing bars, necessitating strong supports; the aerial is bound to sag more than would otherwise be the case, and the windage is greatly increased, an important point with stations in exposed parts.

That the 8JK aerial is a really good one, provided it is erected so that the broadside beams it radiates

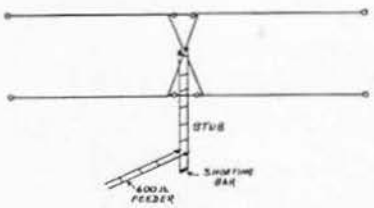



*Fig. 1.*
***The original W8JK beam developed by Kraus.***

travel in the desired directions, no one will dispute. One was therefore designed for use on 56 Mc., but as 75 ohm feeder line is now almost exclusively used by the writer, modifications were necessary to permit of its use.

The original W8JK aerial is shown in Fig. 1, and it will be seen that the matching stub is connected to the centres of the cross-over sections. It may be argued that 75 ohm line may be employed by connecting it to the bottom of the matching stub. This is not the case, as the impedance at the shorting bar points is nearer 40 ohms, owing to the folding up of the wires comprising the matching stub. It is interesting to note that concentric tube feeders would probably match in at this point, but they are too expensive for the average amateur, and do not confer any great benefit with low to medium power.

The 75 ohm line will match in at the centre of either of the radiating arms of the aerial, but it is necessary to connect in both, in order to obtain the out-of-phase excitation which causes the 8JK to act in the way it does. The result of so connecting the feeders is shown in Fig. 2, and it will now be seen that, instead of two wires in line (with a bend), we have two ⊐ shaped sections. This makes the construction of the aerial an even simpler matter than in the case of the original, and the final design is given in Fig. 3, which shows all necessary measurements and spacings. Some modification of dimensions may be necessary to make the aerial resonate most strongly at the particular frequency at which transmission is carried out.

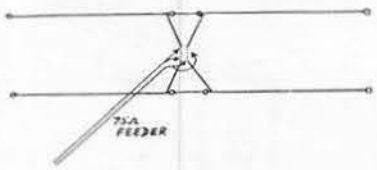



*Fig. 2.*
***A modified arrangement using 75 ohms feeder.***

Extra elements may be added to the aerial illustrated, in order to narrow down the beam, and such elements will be connected in the normal manner, the wires crossing over at the junctions.

The feeder may then be taken away at any angle, and attached to supports, without special insulation, and without noticeable losses. The length, within reason, makes but little difference. At the house end a single turn, formed out of the feeder itself, is looped round the tuned circuit to which it is desired to couple, and again forms a practically perfect match. Coupling may be varied by either altering the diameter of the loop or the distance of loop from the coil.

It is well worth while using the 8JK aerial on the receiver as well as on the transmitter. Switching over can be easily accomplished by the use of a *Bulgin* D.P.D.T. mains switch (type S126). Due to the fact that the feeder only carries a low radio-frequency voltage, the losses at the switch and other points are very small.

During transmissions no R.F. voltage should show on the feeder, when a neon lamp is held against

it ; should this occur it is due to the actual feeder length carrying an even number of half-waves, and the trouble can be overcome by either altering the length of the feeder, or by earthing the joint which has been made at the centre of the coupling loop.

It will be seen that by using the 75 ohm feeder, not only has much better matching been secured, with lower losses, but adjustments throughout have been greatly simplified. The chief drawback is that the aerial is a one-band affair, but the improved results cancel this out. If the combined feeder and one half the aerial is made of such a length as to become a half-wave on a lower frequency, the aerial may be used as an " end-on " at this frequency, the twin wires in the feeder being shorted out and used as one wire. Or the whole may be used as a counterpoise on the 3.5 and 1.7 Mc. bands only, in all these latter cases, extra insulation will be necessary at the points where the feeder is supported.

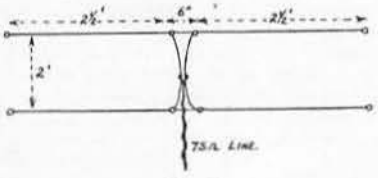



*Fig. 3.*
***The special 56 Mc. beam array described.***

The 75 ohm feeder may be used on any frequency with equally beneficial results, and the writer has in actual use aerials on 56, 28, and 14 Mc. fitted with it, with a noticeable improvement in results. In all cases the feeder must be connected at the centre of a half-wave. It will generally be found that a single half-wave wire gives good omni-directional radiation, but extra half-waves may be added if desired. The spacing at the feeder connection should be made as short as possible, as it is difficult to match the 75 ohms surge impedance if a space of four or five inches is made where the aerial is cut; the impedance is then more likely to be 100 ohms or so. A single egg insulator, with the aerial wires twisted round it, and the feeder soldered on, one end to each wire, is quite sufficient.

## First-Class Operators' Club

Firstly, a few words about the present standard of British amateur operating. Any critical observer listening on the " local " bands during the past year or so cannot fail to have noticed the general all-round improvement. Two years ago a few G2s, 5s, and 6s stood out almost alone, especially on 7 Mc., but the advent of the G8 series brought a considerable number of new first-class operators into prominence. The present year is a still further improvement from an operating viewpoint, and plenty of G3s are to be heard, not necessarily sending fast, but operating well. For our part we are not greatly concerned with code speed, useful as it may be at times—what we want to see is good operating technique. By this we mean the use of correct procedure, elimination of superfluous signalling, full use of the appropriate Q codes, etc.

Talking of the Q codes we notice a tendency fo amateurs to limit their use to a few common abbreviations such as QRA, QRM, QRU, etc., and few people exploit them to their full advantage. May we draw attention to the following little-used but very useful signals :—

QRH ... Your frequency varies.
QRJ ... Your signals are too weak to copy.
QRV ... I am ready.
QSQ ... Send each word once only.
QRL ... I am busy.

An examination of the complete lists will reveal many other signals which can be used with advantage. Certain amateurs are misusing QSK. This signal means " Continue with the transmission of all your traffic, I will interrupt you if necessary," and as such has no genuine amateur application.

It is evident from our correspondence that many amateurs are still confusing fast and accurate code work with good operating. We get letters from people stating that their code speed is say 25, 30, or even more w.p.m., but on investigation many of them prove quite hopeless operators. The fact that a man drives a car at 80 m.p.h. does not necessarily imply that he is a good driver, and similarly the ability to achieve high code speeds does not always imply a good operator. Of course a good operator should be able to attain considerable speed, but speed alone is merely a part of his abilities. It is quite possible to find men engaged in certain land-line work who are really wonderful code men, but who would fail emphatically in a test of good operating.

The several correspondents who have anxiously enquired about the absence of G6s from the F.O.C. lists will be glad to note that we have now enrolled half a dozen of these elusive gentlemen. Furthermore, we shall enrol more in the future. It may interest readers to know that F.O.C. are investigating the abilities of well over 100 British Amateurs. Of these, G5s predominate, closely followed by G8s and G2s in that order, with G6s fourth and G3s " also ran." Those who find any interest in the foregoing order of precedence may also be interested in the fact that the letter " Q " appears in the call-signs of many of the best operators!

Members elected during August are : G6GL, G6ZO, G6QB, G5XC, ON4XX.

Please address correspondence to : Radio G5BW, Willingdon, Eastbourne.

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

| Call. | Dominion Radio Districts. | Colonies. | Total. |
|---|---|---|---|
| G5SR | 24 | 15 | 39 |
| G8IL | — | — | 37 |
| G5HH | 23 | 12 | 35 |
| G6ZO | 20 | 11 | 31 |
| G5ND | 22 | 9 | 31 |
| G8HA | 22 | 8 | 30 |

The above are the calls and present scores of B.E.R.T.A. aspirants. Please send in the number of *confirmed* contacts. Only 30 or more will be listed.

# The Economy Crystal Controlled 56 Mc. Transmitter

By J. H. CANT (G6FU).

WITH the present-day interest in the study of propagation on the 56 Mc. band many amateurs will welcome a design of a crystal-controlled transmitter, built as a separate and compact unit, which is not costly to make. The one to be described will meet this demand, and is of further interest in that it can be used without alteration either at home or as a portable. Other advantages it possesses are simplicity of construction and comparatively high efficiency. The normal input is in the region of 10 watts, and much more can be accomplished with a stabilised output of 4 or 5 watts than with a self-excited oscillator of similar rating. The unit will also prove of interest as an exciter for a power amplifier running up to 50 watts.

Only two valves are used, both being indirectly heated double triodes. One section of the first valve (a 6E6) is used as a crystal oscillator, and the other section as a doubler to 28 Mc. The second valve is an RK34 used as a push-pull doubler to 56 Mc.

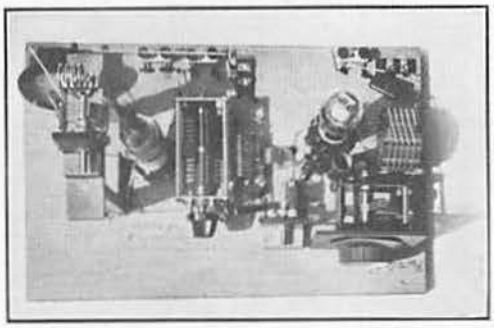
### Construction

The accompanying photograph shows the simple layout adopted, and, as the constructional details are clearly shown, no difficulty should be experienced in this direction.

The base is of wood and measures 17"×11". All the R.F. wiring is visible above it, whilst the only components below are condenser C9, chokes 2 and 3, and resistance R3.

On the extreme right is the crystal oscillator stage consisting of an old *Burndept* 70 μμF. condenser (any one of suitable size and type may be substituted), with a coil of five turns on a 2¾" former. The choke across the crystal is home-made, and consists of a 2" winding of 28 S.W.G. enamelled wire on a ¾" diameter ebonite former. A normal short-wave choke may be used instead, but care is required to ensure that the valve does not break into self-oscillation. The choke can be seen alongside the crystal, and the anode by-pass condenser C5 behind the coil.

The crystal is a standard 14 Mc. type, manufactured by *Brookes Measuring Tools*, but the holder (known as type 7B) is a special one, incorporating an air-gap, which has been found by the makers to greatly assist reliability, and to give improved output. It is advisable to give the manufacturers as much latitude as possible when specifying the frequency. A better crystal results, as, during the final stage of manufacture, a peak may occur, giving a very good output, whilst further rubbing, to bring the crystal to a definite frequency, may result in a falling off.



*A view of the completed transmitter showing location of components.*

Capacitative coupling to the grid of the doubler section is effected by means of a 50 μμF. mica condenser, but an improvement will result if a *T.C.C.* ceramic cup type is substituted. The anode coil of the doubler is of six turns of 16 S.W.G. self-supporting, soldered directly in place as shown, and tuned by a 40 μμF. *Eddystone* micro-condenser.

The somewhat unusual method employed of inductive coupling to the next stage is one which, in practice, gives very good results. The spacing, centre to centre, of the two coils is 1½", but this is not very critical. The grid coil is similar to the doubler anode coil, and has 15 turns, resulting in a voltage step-up.

The coil is soldered direct to the tags on the stators of the *Eddystone* 1087 condenser, and is further supported by the centre tap lead, which is made of thick wire, and passes through the baseboard.

Both valve holders are mounted on high pillars, which enable the various associated condensers and resistances to be attached to the pins with very short connections.

The output tank circuit is mounted on a platform 6" high, which enables a short connection to be made to the strapped anodes of the RK34 valve. The coil is an *Eddystone* 4 turn, and the condenser, as shown, a 40 μμF. micro-condenser, which was on hand. It would be advisable, however, to fit a 20 uuF. type in place of this in order to make tuning less critical. The .0002 μF. mica by-pass condenser goes from the " earthy " side of the tank circuit to the cathode of the RK34 (to which also one side of the heater is connected) and on to the frame of the grid tuning condenser. This amounts, in effect, to one point earthing, and will prevent undesirable circulatory currents.

Two junction strips will be noticed at the back. The one on the right is for the insertion of a milliammeter to read the crystal oscillator current—when this stage is working normally the strip is shorted out. The strip in the centre enables the current taken by the doubler section of the 6E6 valve to be read, and is also used for the key connections. The key filter shown in the circuit diagram is external to the actual transmitter. The milliammeter reading the total current taken by the RK34 is left permanently in circuit.

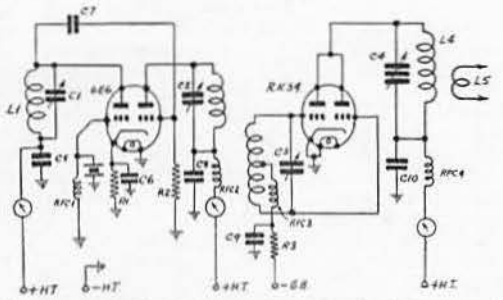
The three pairs of terminals at the rear are for the power supplies, and are, respectively, LT, GB, and HT (plus and minus to each).

### Operation and Adjustment

Provided the building instructions are followed fairly closely it can be confidently stated that tuning procedure will be perfectly normal, and the

output excellent. The transmitter is absolutely stable, and, although extension controls are fitted to C2 and C4, these are more for convenience than from necessity.

The power supplies required are 1.6 amperes at 6.3 volts for the heaters, and 100 mA. at 300 volts for the anodes, so that a moderately small mains power pack can easily be made to fill the bill. At G6FU a 6-volt car battery is used both for the heaters and to energise a *Mallory* Vibrapack, the latter supplying sufficient H.T. current (at 300 volts) with some to spare. This arrangement is ideal for portable work.




*The conventional circuit employed in the "Economy" 56 Mc. Transmitter.*

*C1.—70 μμF. Type 900/100 Eddystone.*
*C2.—45 μμF. Type 900/40 Eddystone.*
*C3.—25 × 25 μμF. Type 1087 Eddystone.*
*C4.—18 μμF. Type 1094 Eddystone.*
*C5, 6, 8, 9.—.01 μF. Type M. T.C.C.*
*C10.—.0002 μF. T.C.C.*
*C7.—50 μμF. Ceramic T.C.C.*
*R.1.—500 ohms. Type AR500 Bulgin.*
*R.2.—50,000 ohms. 1 watt Polar-N.S.F.*
*R.3.—5,000 ohms. 1-watt Polar-N.S.F.*
*Ch.1, 2.—Short-wave chokes. Type 1010 Eddystone.*
*Ch. 3, 4.—Ultra-short-wave chokes. Type 1011 Eddystone.*
*Insulating Pillars.—Type 1028 Eddystone.*
*Terminal Saddles.—Type 1046 Eddystone.*
*Valveholders.—National American 7-pin (Q.C.C.)*
*Valves.—V.1 6E6, V.2 RK34. Raytheon.*
*Crystal.—Standard 14 Mc. Brooke's Measuring Tools.*

The actual readings of the current taken by each stage will doubtless interest the reader, and are as follows:—Crystal Oscillator—18 to 20 mA.; Frequency Doubler—25 to 30 mA.; Final Push-Push Doubler, with aerial connected, and using 120 volts negative grid bias—31 mA. Cut-off with 300 volts on the anodes of the RK34 occurs at 30 volts negative bias, so that four times "cut-off" is being used. This condition is essential if a power doubler is to run at good efficiency. With no aerial load connected, the RK34 will drive up to a maximum of 37 mA., dipping to 14 at resonance.

The aerial used with this transmitter consists of a 7 Mc. half-wave end-on, the length (between 66 and 70 ft.) being cut so that it resonates exactly at the crystal frequency. It is normally tapped 1½ turns up the coil, resulting in the anode current increasing to slightly more than double its "no-load" value. A small neon lamp can be "struck" on the aerial, whilst a .3 amp. bulb in a loop lights to full brilliancy with the aerial load connected.

Many C.W. contacts have been made with this transmitter, which should appeal to those who are on the threshold of taking an active interest in 56 Mc. work. Modern equipment of this kind is the only type really suitable if reliable and consistent results are to be obtained.

# Vive La QRP

By J. Balderston (G2OB)

COME on, you fellows who use 10 watts or less; what about a brotherhood of QRP DX workers? Let us get together and tell the world what we can do, with or without supply mains. Many QRO operators flatly refuse to believe our accomplishments because they have either never tried to work with low power, or have tried and failed! DX is not a question of absolute miles, but simply a matter of distance in relation to the power input. Reduce the input sufficiently at two stations with a geographical separation of only *one mile*, and the contact may still fall within the category of DX. On the other hand, if the input is high enough, two stations separated by the greatest possible distance permitted by the earth's magnitude, may be in QSO without being able to call it a DX contact.

(We disagree. The contraction DX infers long distance work.—Ed.)

The secret of good QRP DX is sheer efficiency, both in the transmitter and in the aerial system, particularly in the latter, but efficiency is often at its peak in the shack, where simplicity is the keynote. Many real high spots of DX have been touched by those working with single valve battery driven C.O.'s in conjunction with simple aerials, thus proving the possibilities of a small rig when tuned to concert pitch. A 50 watt station may lower its input to 5 watts and hold contact, but this type of DX is not in the same category as "raising" an equally distant station from a 5 watt test call.

Speaking of inputs, what about the men who proudly claim to have worked other stations when the P.A. input was *zero*? This may seem to be DX with a vengeance, but actually it is nothing of the kind. It would be *if* the input to the aerial was also zero, but we have yet to find an aerial that will yield an output without an input! What really happens in such cases is that the aerial is still being fed by means of a parasitic transference of energy from a preceding stage, therefore the ability to work with zero P.A. input is often only the proof of a badly lined-up transmitter.

It always pays to think twice before claiming DX unless we have at our disposal accurate means of checking the true total input to the aerial. With a single valve C.O. employing a *Cossor* 220-P and an input of exactly 2 watts (measured by an Avometer), the writer has contacted G8RL (Rugby) with the connection between lead-in and transmitter entirely removed. G8RL made the quite pardonable mistake of assuming for the moment that the station was operating without an aerial, whereas it was actually only *apparently* without it, because no matter whether the energy transference was inductive or capacitative (or both), there is no question of doubt that the aerial was still obtaining RF power generated by the transmitter as the physical removal of the aerial would conclusively have proved.

Similar results occur when we change over from the main external aerial to a diminutive indoor arrangement, so that before we can safely say what we can do with the indoor aerial, we must entirely remove all other radiating systems. Results will then undergo a drastic change.

(*Continued on page* 194.)

# Notes on Good Operating

By R. B. WEBSTER (G5BW).

IT has often been said that good wireless operators are born—not made. Without accepting this statement completely, it may be said that some have an inherent aptitude for the art which the majority can never hope to attain. Anyone who doubts the truth of this will be fully convinced after a few days listening on the amateur bands. With the Cairo Conference recently in session, perhaps a few notes on the art of operating may not be out of place, as it is certain that a continuation of the present deplorably low standard will in no way better the prospects of retaining our present privileges.

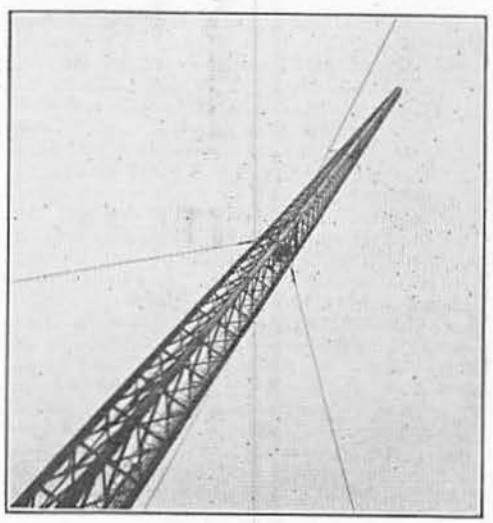
The amateur who can " do his stuff " practically and theoretically is an asset to his country at any time, whereas many of the incompetent operators who inflict themselves upon the amateur bands are merely a nuisance. Many of them just manage to swot up the bare 12 w.p.m. for the Post Office test and then go straight on to 'phone and stay there for the remainder of their natural life. In the event of any national emergency arising, the Government will want good code operators, and the ability to chatter in Americanese into a microphone will be at a discount. Unfortunately, a great many operators do not recognise good operating when they hear it. The writer hopes that after reading this article they will, at least, be able to detect the phenomenon on the amateur bands, should they come across any.

Many are of the opinion that they know all that there is to be known regarding operating technique, but, judged by professional standards, the number of really first-class " G " operators is not worth taking account of. Naturally one does not expect the average amateur to achieve professional competence, but there is no reason whatever why we should not effect a big improvement on the present low standard. If the writer's qualifications to lay the law down on this subject are doubted, his several years' experience on the North Atlantic passenger service and his three years as an instructor successfully training students for the P.M.G. First-Class Certificate, must be put forward as an excuse.

Before good operating can be discussed with understanding, it would be well to set up a standard by which the rest can be judged. The considered opinion of the writer is that the finest operators in the world are those at the U.S. Naval Coast Stations. Following them in order of merit are U.S. Navy sea-going operators and certain U.S. commercial coast stations, British North Altantic liner operators and foreign liner operators on the same run. Those who can appreciate really good operating and can read 30 w.p.m. and over should tune in to NAU, NSS or NBA on about 24 metres. It must be borne in mind, however, that fast sending alone, no matter how accurate, does not in itself constitute good operating. An operator who does not make full and intelligent use of the " Q " codes and official abbreviations, cannot rate himself as good, no matter how many words per minute he can send or receive. Superfluous signalling and good operating can never go together, and it is only by the proper use of the " Q " codes that superfluous signals can be eliminated. The average amateur QSO should never last more than about three minutes, unless special tests are involved, but how often does one hear G4AA and G7BB laboriously plugging away for well over fifteen minutes? At the end of that time they have exchanged RST, QRA, the WX and " vy vy 73 dr ob."

### Test Calls

Most amateurs call far too long, whether they are sending " Test " or calling another station, and, regarding this, it must be noted that prolonged and repeated " Test " calls are an infringement of licence conditions. In the matter of calling, the writer is of the opinion that it is impracticable to adhere to the regulations laid down on this subject in the P.O. Handbook, as these rules are intended for ships and were made when all ships used broadly tuned spark transmitters on 600 metres. Let us consider a Test call; a good method would be to send " Test " five or six times de G9AB, this to be repeated, say, four or five times, and finally the appropriate " Q " signal indicating where you intend to start listening. If you intend starting at L.F. end of the band and tuning toward the H.F. end, the correct signal is QLH. If it is intended to reverse the procedure, the signal should be QHL. A station situated at either end of the band will then know whether a short or a long call will be needed to raise you. Everybody seems to have a different opinion as to what constitutes a long or a short call, and the writer now gives his own method of answering a " Test " call. On 7 Mc. he has three crystals on hand, one at each end of the band and one in the middle. Let us suppose that a station is heard calling " Test " and that the L.F. crystal is in use. The procedure is to call the



*Height.*
***Rearing its head to the clouds. One of the 820-ft. masts at Rugby.***

station about four to six times at about 12 w.p.m., sign twice, give the QSA (1 to 5), and then go over. If no reply is heard, it is first of all ascertained that no station using a lower frequency is calling him. This confirmed, it can then be assumed that he has started searching from the H.F. end of the band. After a short interval a second call is made, and if that is not successful, the attempt is abandoned for the time being. When the frequency in the centre of the band is in use the call is sent about 15 times at about 12 w.p.m. and it is found that this generally brings a reply. Once communication has been established it is quite sufficient to send call signs once only, at the beginning and end of each transmission.

In the writer's opinion a new " Q " signal could be introduced with advantage, " QMS ? what is the maximum speed at which you can receive me under the present conditions ? " The answer would be, QMS, followed by a figure, for example, QMS20, meaning, " I can receive you at 20 w.p.m. under the prevailing conditions." It appears that the practice of sending " doubles " is dying out, but there are still many offenders. Never send double unless specifically requested to do so. It is good practice to give the calling stations QSA before signing over. If QSA5 is given, he knows he can go ahead normally, but if only QSA2 or 3 he knows that he must send slowly and distinctly. In this case it may be necessary to send doubles, but this should only be done on receipt of the appropriate signal, QSZ.

**Break-in**

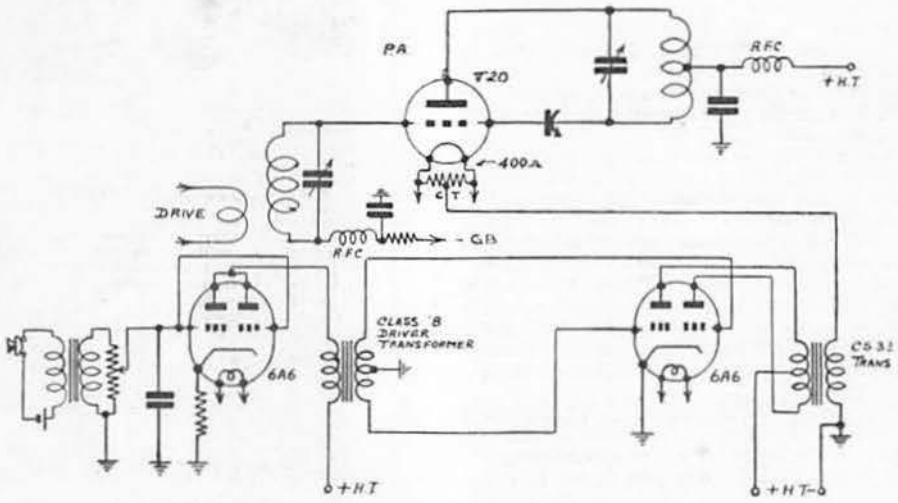
No article would be complete without a reference to " break in " working, and it is to be regretted that so few stations employ this method of working. Two intelligently operated stations can, using this method, exchange more information in five minutes than can be done in fifteen minutes using ordinary methods of working. Every station should endeavour to use a simple form of break-in, whether they operate on 'phone or C.W. By the use of this method, interference is kept down to the minimum.

In conclusion, the author hopes that readers will see what a difficult matter it is to impart the principles of good operation through the medium of an article and that practical coaching must remain the best and most desirable method of teaching. Good operating can be defined as that which exchanges the greatest amount of information in the shortest time, on the lowest power, without causing unnecessary QRM.

# Composite Modulation

AN interesting system of modulation is in use at G8FP, the circuit diagram of which is given on this page. The arrangement is a mixture of grid-control and choke-control, both phased correctly so that an increase in bias and a drop in high-tension voltage and *vice versa* occur simultaneously. It is found to give a high percentage of modulation with quite low audio power. Other advantages claimed are freedom from R.F. feedback and a considerable improvement in speech quality over grid modulation.

The P.A. must, of necessity, be supplied with heater current from a separate winding on the mains transformer, otherwise the filament supply to all the other valves would be modulated or, if the other valves had by-pass condensers all modulation would be short circuited to earth.




*CIRCUIT OF COMPOSITE MODULATION.*

*The D.C. resistance of the secondary winding of CS33 is 200 ohms, which is equal to the resistance CT to either leg of P.A. valve.*

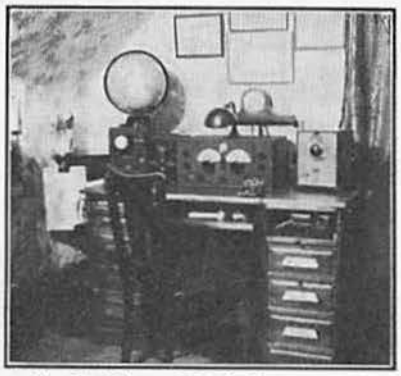
# British Empire Amateur Stations No. 2

VE5BI (VANCOUVER).

THE photograph shows the Canadian station VE5BI, operated by B. W. Naylor, in Vancouver, B.C. The transmitter is a standard rack (home-made) mounted affair, consisting of, from top to bottom, a final amplifier unit, complete band-switched exciter unit, keying filter units and relay, meter panel, exciter power supply unit and grid block power supply unit, time delay valves, final high voltage unit and relay, also time delay relay.

The exciter unit uses 3.5 Mc. crystals and delivers approximately 75 watts of R.F. power on four or more frequencies on 7 or 14 Mc., For 28 Mc. operation the final is used as a power doubler.

Band changing is simplified, as it is only necessary to set the exciter switch at desired frequency



*Operating Position at VE5BI, Vancouver, Canada.*

and change the final coil to change bands, while to change frequency in the same band it is only necessary to reset final tuning dial and move exciter switch to desired frequency.

Provision is made for band switching up to ten frequencies, but at the present only four fundamental frequencies are used.

This layout has been in operation for approximately two years and has proved very satisfactory. In spite of the fact that cheap receiver type condensers are used in the exciter unit (crystal oscillator padding condensers are mica type) stability is very good. Re-tuning of the exciter unit has not been found necessary more often than once in approximately ten months. Low-drift crystals are, of course, used, and this, coupled with the fact that a conventional 47 type oscillator with very low crystal current is used, no doubt explains the stability obtained.

The valve line-up is as follows: 47 crystal oscillator, RK23 doubler, 841A buffer/doubler, HK354 final. Aerial input is from 200 to 500 watts on 14 and 7 Mc., but seldom more than 300 is used. As a power doubler on 28 Mc., an output of 100 watts is usual.

On the photograph, reading from left to right, can be seen the home-made 3-inch oscilloscope, control box for transmitter, receiver, etc., RME receiver and frequency meter.

The aerials in use are doublets, half-wave semi-vertical for 7 Mc. and a full wave horizontal for 14 Mc. Twisted feeders are used for coupling to the final tank circuit by a one-half turn link (found to be perfectly satisfactory) and this is hinged so as to vary the aerial output between wide limits by simply changing the coupling of link loop.

E.O.1 cable is used for feeders, and has been found satisfactory in spite of the somewhat extensive rains to which Vancouver is subject.

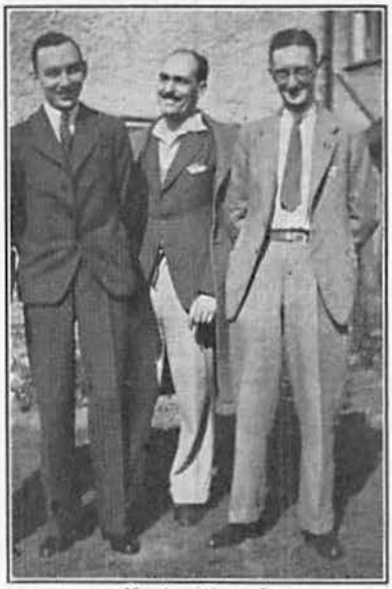
For 28 Mc. operation the 14 Mc. aerial is end-fed, and is capacity coupled to the tank circuit.

The location is a bad one for 28 and 14 Mc. operation, due to large numbers of cars continually passing. In summer on fine days, from 40 to 250 cars a minute have actually been counted! The crystal filter and Lamb Noise Silencer help to overcome the terrific QRM, but it is not possible to copy weak signals during the hours when 28 Mc. DX signals are best received.

Activity has been at rather a low ebb for the past year owing to private business, and except for a weekly schedule with VK4GK (which has been kept for almost six years) the station has been on the air very little.

## Reports Wanted

G3KH (Leicester) on his 14050 kc. C.W. transmissions. All reports will be acknowledged if sent to 49, Turnbull Drive, Narborough Road South, Leicester.



*Notting-Hams!*
*From left to right, G6VU, 6CW, 2IO.*

# The 1938 VK-ZL DX Contest

By W. G. Ryan (VK2TI), Contest Manager.

DURING 1938 Australia is celebrating her 150th birthday, and the New South Wales Division of the Wireless Institute of Australia, in co-operation with the New Zealand Association of Radio Transmitters Inc., will organise and control the 1938 VK-ZL. Amateurs throughout the world will, no doubt, be interested to learn that the Government of New South Wales has recognised the Contest as part of the Sesqui-Centenary Celebrations and has made available a monetary grant to publicise and make available trophies for the Contest.

The Contest is divided into three sections, *viz.*, Senior Transmitting, Junior Transmitting, and Receiving. The Senior Section embraces a power limit of 150 watts input to the final stage. The Junior Section is limited to 25 watts input to the final stage, and this limitation is an endeavour to cater for the interests of the QRP enthusiast.

Three trophies have been provided for each Transmitting Section. In addition, certificates will be awarded to the highest scoring section in each country. In making these awards, each W, G, VE, ZL, and VK prefix will rank as separate countries. In order to obtain a certificate, it is necessary for the contestant's score to exceed 100 points.

A plea is made to all participants to send in a log irrespective of the number of contacts made. As an inducement a special verification card will be sent to all amateurs who forward a log.

### Rules—Senior Transmitting Contest

1.—The Wireless Institute of Australia, New South Wales Division, Contest Committee, shall be the sole adjudicators, and their rulings will be binding in cases of dispute.

2.—The nature of the Contest requires the world to contact VK and ZL. Six cypher serials are to be exchanged. The first three characters to be the RST of the station received, and the last three the number of the QSO. For example, VK2RA may be in contact with W6TI and would send 579055. This would mean that VK2RA was receiving W6TI at RST 579, and that W6TI was VK2RA's 55th QSO in the Contest.

3.—The Contest is to be held from 1200 G.M.T. Saturday, October 1, 1938, to 1200 G.M.T., October 2, 1938, and repeated over same time period during next week-end, namely, 1200 G.M.T. Saturday, October 8, to 1200 G.M.T. Sunday, October 9, 1938.

4.—The Contest is open to all licensed transmitting amateurs throughout the world. Unlicensed ship and Expedition stations are not permitted to enter the Contest.

5.—Power input to the final stage is limited to 150 watts. Where the national regulations of any country do not permit the use of this power, participants must not exceed the power allowed them by the said national regulations.

6.—Only one contact with a specific station on each of the bands will be permitted during the Contest.

7.—All amateur frequency bands may be used.

8.—Only one operator is allowed to work any station. Where more than one person has operated a station, individual logs must be forwarded under the call sign of each operator, and each operator will be considered a separate competitor.

9.—*Scoring.* Twelve points will be scored by the first contact with a station outside VK-ZL, 11 points for the second and 10 points for the third, and so on until the twelfth which will score 1 point. Thus the first twelve contacts will score 78 points, and each additional contact after the twelfth will count one point. In all cases contacts are irrespective of the band used. This will apply to all countries except Great Britain and the U.S.A.; in these countries twelve or more (as above) contacts will be permitted with stations having the following prefixes: G2, 3, 5, 6, 8, GW, and GM, and W 1, 2, 3, 4, 5, 6, 7, 8, 9. The points by contacts in the above manner will be added together and multiplied by the total number of countries worked on all bands which will give the final score. Each W and G District will not constitute a separate multiplier.

10. *Scoring* by competitors beyond VK-ZL. Twelve points will be scored for the first contact with a VK-ZL prefix Zone, 11 for second, 10 for third, and so on to the twelfth contact, which will count one point. Thus the first twelve contacts with a particular prefix Zone will score 78 points. Each additional contact after the twelfth will count one point. This will apply to each prefix Zone worked. The points scored in the above manner will be added, and the total multiplied by the total number of VK-ZL Prefix Zones worked on all bands. Prefix Zones are VK 2, 3, 4, 5, 6, 7, 8, 9 and ZL 1, 2, 3, 4.

11.—No prior entry is required, but each contestant is to submit a log at the conclusion of the contest, showing date, time (G.M.T.), band, station worked, cyphers exchanged, points claimed for the QSO, together with a declaration that the rules of the Contest have been followed, and that the power limit has not been exceeded.

12.—A large percentage of reports under T8 will render the participant liable to disqualification.

13.—Out-of-Band operation will also be a ground for disqualification. In all cases the National Regulations of each country must be observed by the various competitors.

14.—Entries from ZL Stations must reach N.Z.A.R.T. not later than November 26, 1938. All overseas logs must reach Contest Committee, W.I.A. (N.S.W. Division), G.P.O. Box No. 1734 J J, Sydney, N.S.W., not later than December 31, All VK logs must reach Contest Committee not later than December 2, 1938.

### Rules—Junior Transmitting Contest

1.—The Contest will be held from 1200 G.M.T., Saturday, October 22, 1938, till 1200 G.M.T., Sunday, October 23, 1938, and repeated during the same time period during the following week-end.

2.—Power input to the final stage will be limited to 25 watts.

3.—All other rules as set out for the Senior Contest will apply to the Junior.

### Rules—Receiving Contest

1.—The General Rules for the Receiving Section

are the same as for the Transmitting Contests, and it is open for any short-wave listener in the world.

2.—Only one operator is permitted.

3.—The dates, times, scoring of points, logging of stations and bands used for the duration of the Contest are the same as for the Transmitting Contest.

4.—The Contest will cover both sections of the Transmitting Contest; that is to say, it will be held over the first and last two week-ends of October, 1938.

5.—To score points, the call sign of the station being called, the readability, strength and tone of the calling station must be entered in the log together with band, time, date. Logging of CQ or Test calls will not count. *Note:* Overseas stations must be logged when calling VK-ZL by Australian or New Zealand listeners. Overseas listening stations must log VK-ZL Stations when they are calling overseas stations.

6.—Australian and New Zealand Stations will count their score as per Rule 9 of Transmitting Section.

7.—Overseas Stations will count their score as per Rule 10.

8.—Entries must be sent in as per Rule 14.

**Awards**

Three handsome Trophies are available for competition in each of the Transmitting Sections, and will be competed for as follows:

*First:* For that station outside VK-ZL that has the highest score in the world. This trophy will become the outright property of the winning station.

*Second:* For that station in Australia or New Zealand who obtains the highest score. The winner will retain this trophy for all time.

*Third:* For that District of Australia or New Zealand whose first six participants aggregate a greater score than any other district. This trophy will also be won outright, and its property will be vested in that Division of the Institute or Branch of the N.Z.A.R.T. which has the highest aggregate.

In addition to these trophies, handsome certificates will be awarded to the highest scoring station in each country. All G, W, VE, ZL, and VK Districts to be considered countries when these awards are being made. The only proviso to these awards is that a contestant must score at least 100 points.

Each participant who forwards a log will receive a verification card of Australia's 150th Anniversary Celebrations and Souvenir of the 1938 VK-ZL Contest.

# September and Sunspots

By PERCY G. MURDEN, F.R.A.S., F.C.S., F.R.G.S.

THE query raised by Mr. A. H. Fergus in the August BULLETIN as to why sun-spots at or near the sun's equator should give more effect than those not so situated tempts the writer to remind readers that an excellent opportunity for observation may present itself to those who are interested in sun-spots and terrestrial relationships towards the end of September. The sun-spot zones will then be normally presented to the earth. It is well known that magnetic storms occur most frequently at the spring and autumn equinoxes, distribution of the storms throughout the year not being equal.

It is not intended that this statement is an answer to Mr. Fergus's interesting enquiry, because so many other matters have to be taken into account. We all know that the presence of a large spot on the sun does not necessarily mean that a magnetic storm will follow; and conversely magnetic storms of great severity have frequently accompanied very small spots on the sun. To some extent a magnetic storm associated with a sun-spot probably depends as to whether the electrically charged particles which stream out from the disturbed region (as distinct from sun-spots themselves) encounter the earth's atmosphere. If the electrical particles do not reach the earth then one may assume that a magnetic storm would not follow. As it happens, there is usually a time lag of about 30 hours between the meridian passage of a spot associated with a solar disturbance and the commencement of the storm, so one has time to arrange for observation after the sun-spot has been seen. It has been held that although some magnetic storms tend to recur after a period of 27.3 days (which is the sun's synodic period of revolution) the most intense storms often result from a solar disturbance which, although violent, may not survive a further rotation of the sun, even though the sun-spot itself may well be seen at the next revolution.

As to what a sun-spot really is, the theory of Hale and extended by Bjerknes is the one which is generally accepted. Bjerknes contends that all spots of the same cycle spring from a "single vortex ring whose axis follows approximately a parallel of latitude." The situation of this ring is a little below the surface of the photosphere and the tendency is for the ring to arch towards the upper atmosphere. At the two points where the ring intersects the photosphere a pair of sun-spots appears. The opposite direction of rotation results in bipolarity of the spots. One may pause to consider to what extent the polarity of a spot may influence a magnetic storm or otherwise.

The observation of sun-spots is a fascinating hobby, and when coupled with a knowledge of radio becomes a useful study. It is essential when charting sun-spots that the observer should determine where the sun's equator is situated in order that the sun-spots may be assigned their true longitude and latitude. In the first place it must be remembered that the diameter of the sun which coincides with the ecliptic is not constant, and, in addition, the sun itself rotates on an axis which causes its equator to incline at an angle of about 7 deg. to the ecliptic. On June 6 and December 6 the sun's equatorial plane cuts the ecliptic in longitude 75 degrees and 255 degrees respectively. The sun's equator is therefore projected on the disc as a diameter. On September 8 and March 8 the equator is in form of a semi-ellipse being about 7 degrees above and below the centre of the disc respectively. These positions appear to be the most favourable for auroral manifestations.

# Experimental Section

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

### General

AS Individual members of R.E.S. are being approached by the G.M.s with a view to transference from Individual to Group Members, a few words will not be out of place on the subject.

A person joining as an Individual, under the rules, has to send in a report of activity, but whilst he may be attached to a Group, he cannot gain the many advantages that accrue to a full Group member. There are cases where lack of time makes it imperative that a member must remain as an Individual, but to those who *can* spare the time, an appeal is made to transfer to full Group membership, as the advantages must be obvious to all concerned. There has been a ready response amongst the Propagation Groups, and to date those approached direct have transferred, without exception.

There are still a few members of the latter Group who have not been allocated to Sub-groups, and to them we should mention that two notices have appeared in the BULLETIN, whilst a circular has been sent by the G.M., asking each one of them to state which branch of Propagation he is interested in. Any member not yet placed in a Group should please take notice of this fact, as without this information it is impossible to allocate them. A post card to the Group Manager will be sufficient. G2ZC.

### Receiver Group

The Ultra High Frequency Sub-group are working on theoretical problems, whilst the Straight Receiver Group are studying R.F. regeneration, wavechange switching and tuning packs consisting of pre-set bandsetters.

A special appeal to members is issued as the Receiver Design Group is the smallest of the four main groups in the Experimental Section, and more members are urgently required, in order to bring them up to full strength. The receiver is perhaps the amateur's most important piece of apparatus, and although much ground has already been covered, we have by no means, as yet, reached the ideal.

G5HF.

### Aerial Group

Mr. E. R. Radford (G2IM) has been appointed Group Manager, and will take up his duties on or about September 12. As a certain amount of reorganisation is necessary, members are asked to await further developments, but group formation routine will follow with as little delay as possible. G2IM's full address is now 1, Gibbs Green, Edgware, Middlesex.

### Transmitter Group

Letter Budgets are now circulating in practically all the Transmitter Design Groups, and the quality of them is very good. It is evident that individual members who do not contribute to these Budgets are missing much useful information concerning subjects in which they are particularly interested. Many individual members are already contributing and others are urged to follow suit.

A number of interesting articles have already been written, and will probably be published shortly. In this connection, members may like to know that an article need not necessarily be typed, although this is preferable, of course. 2CIL is to be complimented on the article he has written dealing with a type of 56 Mc. receiver on which little information has previously been available.

The number of members wishing to join the Special Subject Group, as recently suggested, is at present few, and the G.M. would like to have a few more names of those interested.

G5JU.

### Propagation Group

All Propagation Groups are active. The monthly journals "Aurora" and "Barometric News," issued by the Auroral and Barometric Groups, are most interesting and instructive.

Magnetic storms on July 10 and 15 seem to have been connected with the poor radio conditions round these dates. Bad flutter fade was noted on the 3.5 Mc. band by a number of observers, but there is some doubt as to whether 1.7 Mc. was affected.

G6DH supplies further information regarding the fading of 28 Mc. signals apparently caused by passing aircraft, and reports on this subject will be appreciated. Does the same thing happen on 56 Mc. ?

There was an auroral display visible in many parts of Scotland early in the morning of August 4. How did you find conditions round this date ? Please send your reports to GM6JJ.

The following is the first list to be published of the Propagation Groups as formed to date :—

*Auroral Group :* BRS3227 (G.C.), G8RT, G8WI, G5JH, 2FCY, 2FBI.

*Barometric Group :* G6FU (G.C.), G6JN, G5CI, 2DGQ, G3JF, BRS981, G2HB.

*Fading Group :* G2JT (G.C.), G6JK, 2AAV, G5QZ, G2UV, G2HB, BRS3101, 2BAU, BRS1946, G6KR, BRS3163, G3KX, FN1C.

56 *Mc. Group "A" :* G2XC (G.C.), 2FBW, BRS3295, G5NG, G5UK, GW5GL, G8BB, G6CX, G6PK.

56 *Mc. Group "B" :* 2AAH (G.C.), 2DDB, G5TN, G6TG, BRS3101, 2AXP, SU1RD, GM6ZV, G2FO.

*Magnetic Group :* G8DA (G.C.), BRS2977, 2BQB, 2BGF, BRS2227, G2UP, GM5TY, GM8TT.

1.7 *and* 3.5 *Mc. Group :* G5JI. (G.C.), G8NL, GW2BG, G3GH, G5KT, G6HR, G8LO, G2FO.

28 *Mc. Group "A" and "B" :* As previously published.

28 *Mc. Group "C" :* GM6JJ (G.C.), GM8MJ, 2FBW, BRS2780, ON4AU, G8PX, G5CG 2APF.

GM6JJ.

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## Calls Heard

*Eric Trebilcock (BERS195), Powell Creek, North Australia. August* 1-17, 1938.

7 Mc. cw:—g2sg, 2zp, 3ih, 5lp.

14 Mc. cw :—g2gf, 2jt, 2kq, 2ma, 3bs, 5hi, 5ka, 6pb, 6xl, 6yp, gi2uo, gm6md, 8hw, 8kq.

28 Mc. cw :—vu2fs, ze1jj, 1jz.

# COSMIC

JUNE, 1938. ALL TIMES G.M.T. BY COURTESY OF

| Day | MAGNETIC: Recorded at Cheltenham, U.S.A. | Average Mag. Character. h. h. 0 to 12 | h. h. 12 to 24 | Recorded at Kakioka, Japan. | W=Mount Wilson. J=Tokyo, Japan. Number of Groups. | Spots. | MEUDON, Sunspots. Activity. | Quadrant. | Days from C.M. | Calcium Hydrogen Faculæ Activity. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Quiet. | 0.1 | 0.1 | Rather calm. | W 8 | 60 | — | | | — |
| | | | | | J 9 | 76 | | | | |
| 2 | Quiet till 1812, then moderately disturbed, irregular oscillations. | 0.1 | 0.9 | Rather calm. | W 10 | 75 | Medium. | | | Medium. |
| | | | | | J 7 | 58 | | | | |
| 3 | Moderately disturbed, irregular oscillations till 0300, then quiet. | 0.3 | 0.1 | Calm. | W 10 | 90 | Medium. | | | Medium. |
| | | | | | J 9 | 113 | | | | |
| 4 | Quiet. | 0.0 | 0.0 | Calm. | W 10 | 65 | Medium. | | | Medium. |
| | | | | | J 8 | 128 | | | | |
| 5 | Slightly disturbed. | 0.4 | 0.1 | Rather calm | W 11 | 80 | Medium. | | | Fairly strong. |
| | | | | | J 8 | 74 | | | | |
| 6 | Quiet. | 0.0 | 0.2 | Rather calm. | W 10 | 90 | — | | | — |
| | | | | | J 8 | 72 | | | | |
| 7 | Quiet till 2203, then moderately disturbed irregular oscillations. | 0.0 | 0.5 | Storm of sudden commencement. | W 13 | 110 | Fairly strong. | | | Fairly strong. |
| | | | | | J 13 | 130 | | | | |
| 8 | Moderately disturbed irregular oscillations. | 1.2 | 1.1 | Slight disturbance. | W 12 | 120 | Fairly strong. | N.E. | 4 | Strong. |
| 9 | Moderately disturbed irregular oscillations till 0900, then slightly disturbed. | 0.6 | 0.6 | Slight disturbance. | W 11 | 140 | Fairly strong. | N.E. | 3 | Fairly strong. |
| 10 | Slightly disturbed. | 0.5 | 0.6 | Rather calm. | — | — | Fairly strong. | N.E. | 2 | Strong. |
| 11 | Moderately disturbed. | 0.6 | 0.6 | Rather calm. | J 10 | 70 | — | | | Fairly strong. |
| 12 | See below.† | 0.8 | 1.1 | Slight disturbance. | W 11 | 110 | Medium. | | | Fairly strong. |
| 13 | Moderately disturbed, irregular oscillations. | 1.3 | 0.8 | Slight disturbance. | W 11 | 175 | Medium. | | | Fairly strong. |
| 14 | Moderately disturbed, irregular oscillations till 0220, then quiet. | 0.6 | 0.1 | Rather calm. | W 11 | 185 | — | | | — |
| 15 | Quiet. | 0.0 | 0.0 | Calm. | W 9 | 155 | Medium. | | | Fairly strong. |
| 16 | Quiet till 0700, then slightly disturbed. | 0.1 | 0.3 | Rather calm. | W 10 | 78 | Medium. | | | Fairly strong. |
| 17 | Quiet. | 0.0 | 0.1 | Calm. | W 9 | 60 | Medium. | | | Fairly strong. |
| 18 | Quiet. | 0.1 | 0.0 | Calm. | W 4 | 75 | Medium. | | | Medium. |
| | | | | | J 7 | 66 | | | | |
| 19 | Quiet. | 0.1 | 0.3 | Rather calm. | — | — | — | | | — |
| 20 | Quiet till 2000, then slightly disturbed. | 0.0 | 0.1 | Calm. | W 7 | 75 | Medium. | | | Medium. |
| 21 | Slightly disturbed. | 0.5 | 0.5 | Rather calm. | W 8 | 75 | Fairly strong. | N.E. | 2 | Medium. |
| 22 | Slightly disturbed till 1000, then quiet. | 0.5 | 0.0 | Calm. | W 7 | 105 | Fairly strong. | N.E. | 1 | Medium. |
| | | | | | J 7 | 119 | | | | |
| 23 | Quiet. | 0.0 | 0.0 | Calm. | W 6 | 80 | Fairly strong. | N.W. | 1 | Fairly strong. |
| | | | | | | | | N.W. | 1 | |
| 24 | Quiet. | 0.1 | 0.1 | Calm. | W 6 | 75 | Fairly strong. | N.W. | 2 | Medium. |
| | | | | | J 5 | 114 | | N.W. | 2 | |
| 25 | Quiet. | 0.0 | 0.0 | Calm. | W 6 | 70 | Medium. | N.W. | 3 | Fairly strong. |
| | | | | | | | | N.W. | 3 | |
| 26 | Quiet. | 0.1 | 0.1 | Rather calm. | W 8 | 80 | Medium. | N.W. | 4 | Medium. |
| | | | | | J 7 | 75 | | N.W. | 4 | |
| 27 | Quiet. | 0.0 | 0.1 | Calm. | W 11 | 85 | Fairly strong. | | | Fairly strong. |
| | | | | | J 12 | 88 | | | | |
| 28 | Quiet. | 0.0 | 0.0 | Calm. | W 10 | 75 | Fairly strong. | | | Fairly strong. |
| 29 | Slightly disturbed. | 0.0 | 0.2 | Rather calm. | W 12 | 120 | Medium. | | | Fairly strong. |
| 30 | Slightly disturbed. | 0.2 | 0.3 | Rather calm. | W 8 | 170 | — | | | — |
| | | | | | J 8 | 206 | | | | |

† June 12. Magnetic elements were moderately disturbed till 1100, then quiet till 1756, then moderately disturbed, characterised by sudden changes of horizontal intensity at 1756, with a range of about 74 gammas, and at 1840 with a range of about 135 gammas.

* Ast. Man. R.E.S.

‡ East Limb broad prominence, breadth 320,000 km., height 60,000 km.

## Cosmic Notes

The following notes cover the period from July 25 to August 29 in the case of sunspots, and to August 16 for magnetic data.

### Sunspots

The groups of spots which crossed the central meridian early in July recrossed at the end of the month, viz., on July 28 to 30. Further spots were observed with C.M.P., August 5 to 7, and August 10. No observations were possible during the period August 21 to 28, but on August 29 there appeared to be no large spots on the sun's western hemisphere.

# DATA

**"SCIENCE SERVICE," U.S.A.** DE-CODED BY J. C. ELMER, A.C.G.I., D.I.C. (G2GD).*

## SOLAR

| France. | | | | | Japan.§ | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Protuberances on Disc. | | | | Protuberances on edge | Prominences. | | | | |
| Activity. | Quadrant. | Days from C.M. | Lat. | Activity. | East No. | East Limb. Area Units. | West No. | West Limb. Area Units. |
| — | | | | — | 5-6 | 5-15 | 7-8 | 5-15 |
| Fairly strong. | | | | Feeble. | 11-12 | 15-25 | 5-6 | 5-15 |
| Fairly strong. | | | | Medium. | 7-8 | 15-25 | 7-8 | 5-15 |
| Fairly strong. | | | | Medium. | 9-10 | 25-35 | 3-4 | 5-15 |
| Fairly strong. | | | | Medium. | 7-8 | 15-25 | 7-8 | 15-25 |
| — | | | | — | 7-8 | 25-35 | 9-10 | 15-25 |
| Fairly strong. | | | | Fairly strong. | 5-6 | 15-25 | 9-10 | 5-15 |
| Fairly strong. | | | | Fairly strong. | — | — | — | — |
| Strong. | | | | Fairly strong. | — | — | — | — |
| Strong. | | | | Strong. N.W. 6. | — | — | — | — |
| Fairly strong. | | | | Fairly strong. | 11-12 | 15-25 | 5-6 | 5-15 |
| Strong. | | | | Medium. | — | — | — | — |
| Fairly strong. | | | | Feeble | — | — | — | — |
| — | | | | — | — | — | — | — |
| Fairly strong. | | | | Medium. | — | — | — | — |
| Medium. | | | | Feeble. | — | — | — | — |
| Medium. | | | | Strong. | — | — | — | — |
| Feeble. | | | | Very strong. | ‡3-4 | 45-55 | 3-4 | 15-25 |
| — | | | | — | — | — | — | — |
| Fairly strong. | | | | Medium. | — | — | — | — |
| Fairly strong. | | | | Feeble. | — | — | — | — |
| Fairly strong. | | | | Feeble. | 5-6 | 5-15 | 11-12 | 5-15 |
| Fairly strong. | N.E. | 2 | Low or Medium | Medium. | — | — | — | — |
| Fairly strong. | N.E. | 1 | Low or Medium | None. | — | — | — | — |
| Strong. | N.E. | 0 | Low or Medium | Feeble. | — | — | — | — |
| Strong. | ? N.E. | 1 | Low or Medium | Feeble. | 7-8 | 5-15 | 13-14 | 15-25 |
| Strong. | ? N.E. | 2 | Low or Medium | Feeble. | 7-8 | 5-15 | 7-8 | 5-15 |
| Strong. | N.W. | 3 | Low or Medium | Feeble. | — | — | — | — |
| Strong. | N.W. | 4 | Low or Medium | Feeble. | — | — | — | — |
| — | | | | — | 7-8 | 15-25 | 5-6 | 15-25 |

## KENNELLY-HEAVISIDE LAYERS

Bureau of Standards, Washington, at 1700.

| June 1. | | June 8. | | June 15. | | June 22. | | June 29. | |
|---|---|---|---|---|---|---|---|---|---|
| Frequency kc/s. | Hght. km. | Frequency kc/s. | Hght. km. | Frequency kc/s. | Hght. km. | Frequency kc/s. | Hght. km. | Frequency kc/s. | Hght. km. |
| 2500 | 120 | 2500 | 110 | 2500 | 110 | 2500 | 110 | 2500 | 110 |
| 3500 | 120 | 3500 | 120 | 4000 | 120 | 3500 | 120 | 3500 | 120 |
| 3980 | 130 | 3850 | 150 | 4050 | — | 4000 | 160 | 3850 | 150 |
| 4000 | 210 | 3900 | 300 | 4100 | 230 | 4130 | 210 | 3900 | — |
| 4400 | 200 | 4200 | 210 | 4200 | 180 | 4400 | 220 | 3950 | 210 |
| 4600 | 200 | 4600 | 240 | 5000 | 330 | 4800 | 300 | 4050 | — |
| 5000 | 340 | 4800 | 320 | 5400 | 490 | 5000 | — | 4100 | 260 |
| 5400 | 440 | 5000 | 630 | 6200 | 350 | 5200 | 580 | 4250 | 180 |
| 6200 | 380 | 5200 | 610 | 7200 | 390 | 5400 | 470 | 4800 | 280 |
| 6600 | 410 | 5400 | 670 | 7200 | 420 | 6000 | 560 | 5200 | 570 |
| 7200 | 440 | 5600 | 330 | 8000 | 430 | 6200 | 520 | 5600 | 450 |
| 7200 | 580 | 6000 | 740 | 8000 | 650 | 6400 | 490 | 6400 | 420 |
| 7600 | 480 | 6200 | 820 | 8400 | 480 | 7000 | 690 | 7000 | 450 |
| 8000 | 590 | 6400 | — | 8800 | 650 | 7200 | — | 7000 | 520 |
| 8200 | — | | | 9000 | — | | | 7200 | 470 |
| | | | | | | | | 7200 | 720 |
| | | | | | | | | 7800 | 550 |
| | | | | | | | | 8000 | — |

Tokyo, Japan, at 0300.

| | | at 0600 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4000 | No obs. | 4000 | No obs. | 2000 | No obs. | 4000 | 150 | 4000 | 130 |
| 6000 | 390 | 6000 | 150 | 4000 | 130 | 6000 | 150 | 6000 | 130 |
| 8000 | 410 | 8000 | 500 | 6000 | 460 | 8000 | 150 | 8000 | 470 |
| 10000 | 530 | 10000 | 680 | 8000 | 560 | 10000 | 150 | 10000 | — |
| 12000 | — | 12000 | — | 10000 | ?120 | 12000 | 250 | | |
| | | | | 12000 | — | 14000 | — | | |

§ Japan. In the columns referring to number of prominences on each day, the actual number is either of the two figures given. The units of area are the sums of the products of height in units of 100 seconds of arc and breadth along limb expressed in degrees. The actual figure lies between the two limits given each day.

July Data will appear next month.

and it is therefore probable that no large spots crossed the sun's central meridian during the preceding days. Observations from August 1 to 10 were made by 2CBL during the writer's absence on holiday.

### Magnetic Data

A quiet period from July 24 to 28 was followed by a disturbance reaching the magnitude of a storm on the morning of 30th. Disturbed conditions continued until August 6, another storm occurring on the evening of August 3 and the following morning. A moderate disturbance was reported on August 11. G2XC.

# R.A.F. Civilian Wireless Reserve

FOR the benefit of those members who were unable to attend Convention, we publish below the text of the speech made by Air Commodore C. W. Nutting, O.B.E., D.S.C., Director of Signals, Royal Air Force at the meeting on Saturday, September 3.

" MR. PRESIDENT, LADIES AND GENTLEMEN,—I must first thank the Council for inviting me to attend your Convention this afternoon and to say how grateful I am to be given this opportunity of speaking to you about the Wireless Reserve which is being formed for the Royal Air Force.

" I feel somewhat diffident in taking up your time and that of the Convention to listen to a speech from me, as I know you have much other business to cover, but when your Council so kindly granted this facility, I could not forgo the opportunity of explaining to you all, in a broad manner, the reason for the formation of this Reserve and what it means to the Royal Air Force.

" Sir Kingsley Wood, the Secretary of State for Air has, as you will have seen in the press, already made a public announcement regarding this reserve. He is extremely interested in the matter and very much regrets that owing to very pressing prior engagements he is unable to accept your President's invitation to attend this afternoon. I know how much he appreciated being asked and how he would like to meet you all.

" You are, of course, all aware of the big expansion of the R.A.F. which is now taking place, and, being very interested in wireless, you must realise that this extension involves many communication problems. I do not think I should be exaggerating if I said that the Communication System of the Royal Air Force is amongst the biggest and most complex systems in existence to-day. To operate such a system, as you can imagine, calls for a large staff of highly skilled personnel. The normal regular signals personnel of the R.A.F. would have to be supplemented very considerably should we, by some grave misfortune, be involved in a war. It takes a considerable time to train a person in signals matters, as you quite well know, and it is on this subject that I am addressing you to-day.

" When I was faced with this very considerable problem, the radio amateur enthusiasts of this country very naturally came to my mind. I think it very natural that my thoughts turned to you for although I suppose I cannot claim to be an amateur, I certainly know their worth and capabilities, and I can claim that I have had many contacts with the amateurs covering a period of many years. For one thing I saw your President, Mr. Watts, in action during the International Radio Conference held at Cairo early this year, and a fine sight it was to see him defending the amateur frequencies harmonic after harmonic against all comers from all over the world. There were many occasions when he and his colleague from the United States roped me in to talk about amateurs and the facilities which should be accorded. Since then I have had a heart to heart talk with your Secretary, Mr. Clarricoats, who told me he had an idea that a reserve scheme would be popular with members of the R.S.G.B.

" My own interest and connection with wireless goes back many years, about 28 years in fact. This takes one back before radio telephony or even continuous waves, and I might also say I was brought up on that museum piece " coherer." Now radio people, whether amateur or professional, are a very cliquey set. They seem to speak a common language or jargon of their own. For this reason the term " ham " is probably known to you. I am not sure, but I believe this term originated in the United States of America. In any case it is almost as old as wireless itself, for I heard of it the first time in a wild part of South America over 25 years ago from an American who some of you may have heard of. It was one, Mr. Godley, who was here some years ago spreading aerials over half a country in an endeavour to improve communications between British and American amateurs. I was not sure in those days whether the term ' ham ' was considered an honour or a reproach. In any case I feel this afternoon that I am almost entitled to appeal to you as ' fellow hams.' When one looks back on the progress in wireless, particularly on the shorter waves, which has been made, there is not the least doubt that the art owes a considerable debt to the amateur. Therefore you, as members of one of the most important Amateur Radio Societies in the world, will realise that your expert knowledge can become an important factor in the defence of our Empire. It is for this reason I welcome the opportunity of speaking to this very representative body and to ask for your co-operation in helping to meet our problems.

" On my part, I hope we shall be able to offer you more scope in your radio activities and possibly enlarge your interests, and, not least, to offer a little material assistance.

" As regards the scheme itself, I do not wish to prolong this speech by going into too many details, but I would like to give you just a broad outline of what is proposed as the onset. This preliminary scheme is not being made too rigid, as we are hoping that members will themselves contribute ideas which will increase its efficiency. First of all, it should be clear that this reserve is being formed on a civilian basis in order that we may accept members and commence training as early as possible. It is the intention that this reserve should be a part of the R.A.F.V.R. as soon as possible, and this will, of course, mean that members will be carrying the obligations of that reserve as well as its privileges. We want men between the ages of 18 and 55 who do not already belong to a similar service organisation and who are in possession of a General Post Office transmitting licence. We hope as soon as these members are organised to recruit others who have a desire to place their technical training at the service of their country, that is those who hold licences for British receiving stations. We want to begin with fully licensed amateurs because they already possess transmitters and because they will require less training. Very soon we anticipate some of these men will be able to train others in operating and procedure and other matters. It is intended that the training should be

under my control from the Air Ministry and I shall be assisted by a small staff, together with a Committee comprising certain chosen members drawn from various parts of the country representing particular areas into which it is proposed to divide Great Britain. By this means I hope that when the Corps becomes embodied into the R.A.F.V.R., it will still retain its identity as a Communication Reserve.

" Our first aim must be to ensure that members become proficient in the morse code and can transmit and receive messages in our particular language. By that I mean Air Force language and procedure. This should not be a difficult task, and it is proposed to effect this by broadcasts and correspondence course combined. The next step is to get members acquainted with R.A.F. equipment as far as is practicable, and this I think, can be done by affiliation of members with the nearest R.A.F. Station which they will be able to visit at certain times during the course of the year. We can extend this experience by periodical rallies at certain centres with mobile stations and lectures. When Air Exercises take place, it is intended that members should be given opportunities to take part by doing duty at various R.A.F. units. It is not proposed at present to require a specified period of annual training.

" Regarding the material assistance I mentioned, this will be on a progressive programme, briefly, as follows :—

" The issue of a badge after passing a test of 6 words per minute.

" The issue of crystals for transmitters which are for use with member transmitters where they are used in the training scheme.

" On attaining 12 words per minute, entitlement to a small training allowance of 6d. per hour and members go to a unit and actually participate in training with a unit.

" It is also hoped to obtain a small reasonable travelling allowance in order to enable members to attend at R.A.F. Stations. These items will be limited to a given number per year, but it is hoped that members who are able will come as often as it is conveniently possible.

" Upon attaining 18 words per minute and passing a procedure examination, entitlement grant of £2 towards the care and maintenance of members' own transmitters which are being used in the reserve training scheme.

" You may have noted that the scheme of training lays great stress on morse and procedure, but you must remember that every communication scheme, however complex, has for its sole purpose the object of passing messages quickly and accurately between certain points of the system. However much we may experiment or try out new gear we must never overlook its final function, and it may be somewhat of a disappointment to certain of you who contemplate offering your services that this point is stressed. I am, however, sensibly aware that you are essentially experimentalists and this fact has not been lost sight of and I hope that we shall be able to offer you scope for your experimental activities which will be both of interest to you and extremely useful to the Service. There is no establishment approved for higher ranks, but it is obvious that as the scheme progresses we shall be able to categorise members with their particular bent and capabilities so that should such a time arrive when it may be necessary to select candidates for certain higher posts in the Volunteer Reserve, we shall know where to look.

" In concluding, I sincerely hope that many of you will consider this scheme favourable and that many of you will see your way clear to assist the R.A.F. and the nation by giving it your support."

We are asked by the Air Ministry to state that application for membership in the new Reserve should be made to the Director of Signals Dept., Adastral House, Kingsway, London, W.C.2.

# THE HELPING HAND

By J. N. Walker (G5JU)

## Part XIII.—DOUBLER CIRCUITS

IN taking over the continuation of the series of articles known under the title of "*The Helping Hand*," it gives the present writer pleasure to acknowledge the very able way in which many subjects have been dealt with by G6FO. Considerable ground has already been covered and the paths into the fields of Amatuer Radio made easier. The task of carrying on the series is not a simple one, but it is hoped that useful knowledge will continue to be imparted.

It seems appropriate to commence from the point indicated on page 557 of the April, 1938, BULLETIN, wherein it was mentioned that further articles would deal with doublers, excitation and kindred matters.

Suitable circuits, together with the proceedure to be followed, for obtaining an output on twice the fundamental frequency from the Crystal Oscillator valve, were given in the April issue, so we can now turn to the use of a separate valve specially included as a frequency multiplying stage, either following a straight crystal oscillator, or after a tri-tet oscillator. It is desirable to arrange the first valve so that it may be used in either way, and this can be achieved quite simply by fitting a switch to short circuit the cathode coil (L2, Fig. 4, page 557, April BULLETIN). Alternatively, the condenser tuning the cathode coil can be made to automatically effect the short circuit by bending a moving vane slightly so that it touches a fixed vane at full capacity. The second valve can then be always used as a doubler, giving twice the fundamental frequency in one case, and four times in the other.

The inclusion of a separate doubler stage, although perhaps not essential, confers several advantages. It provides a "buffer" between the crystal oscillator and the power amplifier, a proceedure which is generally recommended by the crystal manufacturers, the reason being that the crystal is protected from a surge produced by the high radio frequency power generated by the power amplifier, should the latter go out of neutralisation. Further, if the crystal oscillator itself is keyed, the power supply providing its high tension must have very good regulation, otherwise the voltage on the anode of the valve will be varying more or less considerably. This in turn will affect to some degree the frequency of the generated oscillations and will prevent the note emitted having the absolute steadiness so desirable in these days of crowded amateur bands and highly selective receivers. If the C.O. is allowed to run continuously, the load on the crystal is much more constant and the note consequently improved. A further advantage is that as a definite power gain will be obtained from the separate doubler stage, it will not usually be necessary for the C.O. to provide much radio frequency power, and a small valve, running at comparatively low power, may be used in the latter stage. The strain on the crystal under these circumstances will be small and there will be little likelihood of heating or fracturing occurring.

So much for the reasons for including a separate doubler stage. The fundamental circuit when a triode valve is used is shown in Fig. 1 (*a*) and that for a pentode or tetrode in Fig. 1 (*b*). It is well to make the coupling condenser C1 variable to begin with, although there is no reason why a fixed one should not be substituted when the best working value has been found. The value of C1 depends partly on the input capacity of the following valve, but more information about the action which occurs will be given when excitation is dealt with. For the moment we can think in terms of a value of 100 μμF. The radio frequency choke should be of the 2.5 millihenry type, comprising four or five small pie-wound coils on a low loss former, similar to that offered by several advertisers in this journal. This choke, which will be found effective over the

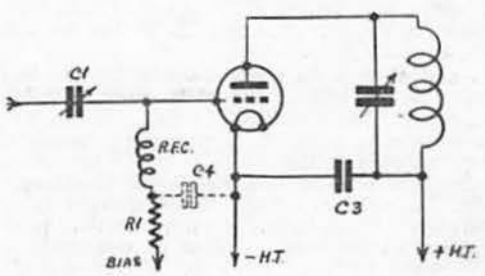



*Fig. 1A.*
***Doubler circuit when using a triode valve.***

majority of the amateur bands, may be omitted with little loss of output if the grid leak R1 is of high resistance, *i.e.*, 100,000 ohms or more.

A by-pass condenser C4 is often inserted between the lower end of the choke and earth, as indicated in Fig. 1. but the necessity for its inclusion is open to discussion. If the choke is doing its work properly there should be no R.F. to by-pass at the junction of the choke and resistance R1 ; if R.F. *does* appear at this point, it would be better to change the choke rather than include C4. The chief objection to the use of C4 is that it is liable to set up parasitic oscillations at a low (radio) frequency, especially if a similar choke is included in the anode circuit (as is often the case), or if a high value of inductance is used in the anode coil L. When this occurs, the choke acts as an aperiodic inductance and is capable of causing the valve to oscillate over a wide range of frequencies. With C4 omitted, the damping action of R1 prevents this trouble.

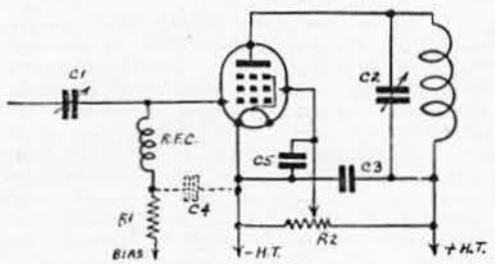



*Fig. 1B.*
***Doubler circuit when using a pentode valve.***

The L/C ratio of the anode circuit should be high, as this helps towards the production of high harmonic content in the output. For 7 and 14 Mc. operation, C2 may be of 40 μμF, maximum capacity and proportionately higher or lower for the other bands.

The by-pass condenser C3 has to be capable of withstanding the full high-tension voltage applied to the anode of the valve (including possible peaks resulting from keying surges), plus a considerable amount of radio frequency voltage. To avoid the possibility of a breakdown, which might cause severe damage to the power supply equipment, it is wise to use in this position a condenser working well within its ratings ; for example, a 500-volt working type is desirable if the anode voltage is between 300 and 400 volts. Its value, and also that of C5, may be .002 μF. for 7 and 14 Mc. ; both condensers should, of course, be of the low-loss mica dielectric type.

If a doubler is to operate efficiently, the bias applied to the grid of the valve must be much higher than that normally specified. In practice it is usual to use between three and four times the cut-off value (*i.e.*, that value at which the anode current is reduced to zero under static conditions), whilst the driving voltage should also be fairly high. This combination results in the valve operating on the lower bend of its characteristic curve, which in turn causes heavy distortion in the output. This condition is just what is required, as heavy distortion in this case means a high proportion of harmonics, and by inserting in the anode of the valve a circuit tuned to its frequency, the particular harmonic required is extracted. The second harmonic is usually the one selected but providing the bias and drive (and therefore the distortion) are high enough, it is possible to obtain a useful amount of power on the third and fourth harmonics. In the case of a pentode particularly, the third harmonic is often as strong as the second but as it would be outside any amateur band (unless a specially ground crystal were used), care must be exercised to ensure that the correct harmonic is selected. For this purpose an absorption type wavemeter is essential.

#### Push-Push Doublers

When the circuit shown in Fig. 1 is used, the valve only passes current during the positive half-cycles of applied radio frequency voltage but as the output is on twice the applied frequency, a complete cycle occurs in the anode circuit. The valve does not operate during the period during which the negative half-cycle is being applied to the grid but the anode circuit must continue to oscillate over a full cycle during this time. All this sounds rather complicated but what it boils down to is that a single positive half-cycle voltage applied to the grid of a single valve frequency doubler must "kick" the valve so strongly as to enable the anode circuit to continue oscillating over two complete cycles, which explains why a doubler must necessarily be much less efficient than a straight amplifier. This state of affairs can be greatly improved upon by using two valves as shown in the circuit Fig. 2, in which the grids are connected in series, so that one valve operates during one half-cycle and the other during the next. As the anodes are connected in parallel, the anode circuit receives an impulse every cycle—twice as many as before—and the available output is consequently greater, other things being equal.

The values of the components in Fig. 2 will be identical with those given for Fig. 1 with the exception of C1. As a symmetrically balanced input voltage is required, the input circuit shown differs from that of Fig. 1, although, if preferred, the latter type may be duplicated for the second valve, provided the previous stage is arranged so that the output voltage swings about a centre zero point. C1 in Fig. 2 should be of the split stator type with the frame earthed, and may have a value of 100 μμF each side (50 μμF. overall) for the lower frequency bands and 50 μμF. each side for the higher frequencies.

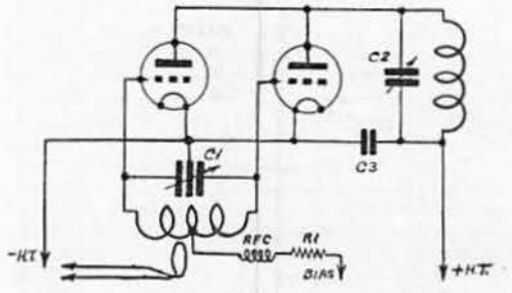



*Fig. 2.*
***The connections of a push-push doubler stage.***

### Choice of Valves

It has already been pointed out that a doubler stage needs a much higher bias than is called for in other classes of service. The actual amount of bias will depend largely on the valve used and there are good reasons why some valves make better doublers than others.

The valve selected should be of the medium to high impedance type, having a high amplification factor, as less driving power is then required. Such a valve will also possess two other desirable characteristics—(1) a short grid base and (2) it will require only a moderate amount of bias, since cut-off will occur at a comparatively small negative voltage. The short grid base will ensure that the valve operates on the lower bend of its characteristic curve, a condition necessary to give a high harmonic content in the output circuit. A variable *mu* valve, with its long grid base, would not function at all as a doubler.

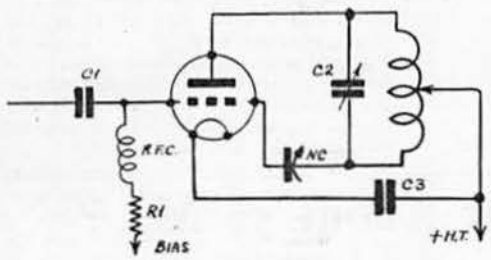



*Fig. 3.*

***A neutralised buffer amplifier circuit of the simplest kind.***

The LS5B valve still compares very favourably as a doubler against its more modern counterparts, whilst the *Mullard* TZ05/20 is another triode which gives good results. The Class B type of triode, requiring little or no bias under normal conditions (audio frequency service) naturally makes a good doubler and advantage can be taken of the double-triode types either to use each section as a separate doubler in itself or preferably to simplify the lay-out and connections of a push-push doubler as shown in Fig. 2. Unfortunately very few British makes, suitable for mains operation, are available, but the *Marconi* B30 and the *Standard Telephones* 4074A have both been tested and can be recommended. The former has a 12-volt and the latter a 6.3-volt heater.

Because of their small driving power requirements and of their capacity to produce harmonic outputs, pentode valves, especially those of the high slope types, are very suitable for incorporating in doubler stages but greater care is necessary as they are prone to parasitic oscillation.

### The Buffer Amplifier

When any of the circuits so far described are used, the output circuit must be tuned to a higher frequency than the input circuit for it is not possible to use the stage as a buffer between the oscillator and the power amplifier (all running on the same frequency), as self oscillation would most certainly occur. The only exception is in the case where a pentode specially designed for radio frequency service is used and then care must be exercised in the layout and the input and output circuits must be screened from each other.

It is often desirable to use the second stage as a buffer amplifier as, for example, when a 7 Mc. crystal is being employed and the final output must also be on 7 Mc. To do this, it becomes necessary to neutralise the valve and Fig. 3 shows the simplest circuit that can be used. It will be seen that it is very similar to Fig. 1 but the neutralising condenser NC has been added, the high tension is fed to the centre of the anode coil instead of to the " earthy " end, as previously, whilst, as both ends of the coil are now at high R.F. potential, an extension spindle is required to control C2. The principles governing neutralisation and the methods of adjusting NC will be given later but for the present it will suffice to say that the capacity of the condenser NC must be slightly greater than the internal grid-anode capacity of the valve, and it must be capable of withstanding the combined high tension and radio frequency voltages. In a buffer amplifier running at comparatively low power, double spacing will be adequate to ensure that " flash over " does not occur.

Whilst the tapping point on L may be at the physical centre of the coil (this, in any case, is often difficult to arrange), it does not follow that it is also the electrical centre, as the latter depends on several other factors, such as the even spacing of the turns, the stray capacities across the coil and the nearness of masses of metal, which affect the inductance. When NC has been correctly set for one particular frequency and with one particular coil, it is very unlikely to be still correct when another coil is substituted for L. This is a definite disadvantage, as it means NC must be adjusted every time the frequency is changed. This difficulty can be avoided by using the balanced circuit given in Fig. 4, and although it is a little more complicated, it is well worth while in the long run. Instead of the single condenser previously used to tune the anode circuit, a split stator (otherwise known as twin-gang) condenser is substituted at C2 and the frame is earthed. As each half of the condenser is of the same capacity for all practical purposes, the radio frequency voltages across it are equally balanced to earth and we are independent of the point of zero R.F. potential on the coil L, which is allowed to " float "; the high tension being tapped on through a high frequency choke. It is

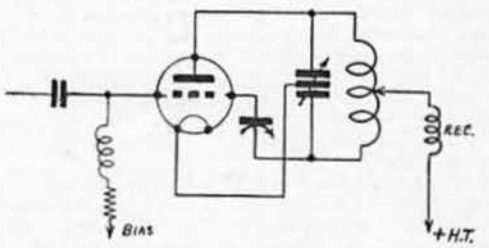



*Fig. 4.*

***The inclusion of a split stator condenser results in a balanced circuit, and the neutralisation will hold good over a wide frequency range.***

immaterial to the operation of the circuit where the actual point is made—it could, if necessary, be made to either end of the coil—but to avoid a high R.F. voltage appearing across the choke (with inevitable, if small, losses) it is best to connect this to the coil at as near the centre as is convenient. The choke must not be omitted or the balance of the circuit is likely to be upset. The overall capacity of C2 should be the same as before, but to obtain it each half of the twin condenser must be double the capacity required.

The circuits indicated in Figs. 3 and 4 are both known as "anode neutralisation" circuits but there is another version described as "grid neutralisation" although it is seldom met with in practice. Briefly, a balanced input circuit is used on the grid side of the valve whilst the anode circuit remains the same as shown in Fig. 3. The neutralising condenser is then connected between the anode and that side of the grid coil remote from the grid. It may be thought that with this type of neutralisation the drive applied to the valve would be less, since the grid-filament part of the valve is only across half the coil. Actually, however, as the total load across the grid coil is less, a greater R.F. voltage is developed across it for the same power to the previous stage and the results obtained are practically identical. Grid neutralisation may be employed when it is more convenient to use a tapped coil and a split stator condenser on the input side of the valve rather than on the output.

Besides giving the advantage of allowing the second valve to amplify on the fundamental frequency, the addition of the neutralising condenser results in the efficiency of the stage being improved when used for doubling. This is because of the regenerative effect introduced, the condenser feeding back to the grid circuit a certain amount of voltage in phase with the driving voltage. This is therefore an additional reason why the circuit of Fig. 3 or 4 is to be preferred to that of Fig. 1. If desired and if the stage is to be used as a doubler only, the capacity of NC may be increased beyond that necessary for complete neutralisation, even to the point just short of which the valve breaks into self oscillation through the increased regeneration. Because of the usual effect of the apparent reduction of resistance and losses, the increase in output is considerable and well worth while.

In this article the pros and cons of the doubler stage have been considered as an entity. In the next article it is proposed to cover the methods available for coupling any two stages, as upon these depend the excitation applied to the grid of the following valve. The subject of excitation will also be discussed generally, in addition to the principles and adjustment procedure of neutralisation.

# What Have We Learnt About 56 Mc. ?

By W. A. Scarr, M.A. (G2WS).

As our season of outdoor activities draws to a close and we begin to make plans for a busy winter in the shack, it is perhaps fitting that we should review our recent work on the ultra-high frequencies and tabulate, mentally at least, the results obtained.

Almost all who have been actively interested in five-metre work have graduated from the simple modulated oscillator and quench receiver (sometimes combined as a transceiver) to more stable arrangements such as long-lines or electron-coupled oscillators and an increasing number are now using crystal-controlled transmitters and straight or super-het. receivers on 56 Mc. It is to be regretted that so many still persist in using old types of unstable oscillators which should have been passed on to the local museums long since.

Reviewing the progress of the past five years or so, we can be reasonably satisfied with the rapid strides which the amateur has made both with the design of apparatus and with the collection of useful data concerning the propagation of signals on these frequencies. The former achievement is of course largely due to the production of valves which will operate efficiently on the ultra-high frequencies. Generally speaking, the amateur has not been slow to grasp the opportunities offered in this way by the manufacturers.

On the other hand it is still true to say that the proportion of amateurs who attempt any *systematic research or experimental work* is very small, and consequently the amount of material available in the form of observations and results is but a fraction of what it could and should be. Even those who collect valuable data often fail to realise the importance of making their results known.

It now seems to be well established that radio signals with frequencies in the region of 60 Mc. can be received at a distance in the following three ways :—

(*a*) By ground wave or direct ray.

(*b*) By lower layer (E or Heaviside) reflection.

(*c*) By upper layer (F or Appleton) reflection.

Let us consider these separately.

### Ground Wave Reception

Ground wave reception is of course concerned with the passage of signals almost parallel to the earth's surface. This phenomenon is common to radio signals of all frequencies, and is illustrated by the reception of signals from nearby broadcast stations on the medium and long-wave bands.

Apparently the distance which ground waves cover on 56 Mc. is not greatly different from the range of similarly powered signals on 28 or 14 Mc., or even lower frequencies. The chief difference lies rather in the fact that the ultra high-frequency signals will not bend to the same extent as those of lower frequency, and consequently they are only receivable at a distance when both receiver and transmitter are in well elevated and unobstructed locations with a clear air-line between.

We have here a close analogy with sound. Low notes and high notes travel similar distances from sources of equal intensity, but the high notes (those of short wavelength) are greatly hampered by any objects in the way. For instance, a high-pitched whistle from a railway engine is partially cut off from a listener as the engine passes behind a signal-box, whilst a low tone reaches the observer almost equally well, whether the intervening space is obstructed or

clear. Another example of the same phenomenon is in the use of large baffle boards for loud-speakers. Without these the low tones are weak as the long sound waves are capable of " curling round " the sides of the speaker, and those from the front of the instrument tend to cancel those from the back.

Recent tests have shown that ground waves of 56 Mc. signals can be received at distances of 100 or more miles provided that sufficient power is available, and that the receiving and transmitting stations are reasonably well situated geographically. Generally speaking, it would appear that the range of such signals under average conditions is proportional to the power used in the transmitter. Of course, in ideal situations such as the tops of mountains, a great range may be obtained with minute power, but the weak signals generated are never receivable at a distance unless the transmitter and receiver are practically within visual range.

The reception of ground waves from signals in the 14 and 28-Mc. bands is not dissimilar, and amateurs in the Midlands, for example, have often heard signals from the most powerful amateur stations in London on these frequencies.

Little has been done by amateurs in this country to measure the amount of bending that 56 Mc. waves will undergo under various conditions. That these signals can be received beyond the visual horizon is no longer open to doubt. American scientists have calculated the maximum possible bending of 60 Mc. signals and shown the effects of temperature, pressure and humidity gradients on the degree of bending.

Our own observations in this country suggest that the amount of bending is greatest during warm, close weather, and that signals from considerable distances tend to increase in intensity towards dusk, and then to fall off rapidly after a brief peak period.

The presence of weakly ionised layers within a few miles of the earth's surface has recently been suggested by some experimenters. Such a theory would certainly aid us in understanding the passage of signals over a hundred miles or more of hilly country, where the theoretical limits of bending are sometimes exceeded.

There appears to be a wide field for investigation here, and it will be realised that the difference in effect between low-angle reflection and gradual refraction is often obscure, though in this case the causes are quite dissimilar.

In this matter our colleagues in Europe and America have probably greater scope for investigation. The remarkable distances covered by 56 Mc. signals in the United States is certainly not to be explained entirely in terms of superior power or apparatus. The characteristics of a *continental type of climate* seem to provide a more likely explanation. Over large land masses changes in temperature, pressure, and so on, can attain a magnitude and speed quite unknown in insular regions such as the British Isles.

### Layer Reception

Let us now turn to the study of 56 Mc. signals reflected from one or other of the layers of the ionosphere. Signals reflected from the lower, E or Heaviside layer, have usually a range of between 300 and 1,000 miles, while those which pass through this layer and are ultimately reflected from the F or Appleton layer are of the " DX " variety, and give us contacts on various frequencies with stations several thousand miles away.

It is well known that the E layer, existing as it does in a region of relatively high atmospheric pressure, is capable of rapid variations in intensity and, in fact, reaches a very marked peak of density soon after mid-day every day. The maximum density attained is determined by the intensity of the sun's emanations, and consequently it is in this country between about the hours of noon and 16.00 G.M.T. in midsummer that the highest densities of this layer occur.

Now the power of an ionised layer to reflect radio signals can be shown to be proportional to the density of the layer and inversely proportional to the square of the signals' frequency. Consequently the greater the intensity of the layer, the higher the frequencies at which signals can be reflected.

It is for this reason that experimenters maintain a sharp look-out for European signals on 28 Mc. and above, and if these are found to be strong, a watch is kept on 56 Mc.

During this summer (1938) numerous commercial station harmonics have been heard in or near the 56 Mc. amateur band. Those heard by the writer, all on different days, were logged at 11.20, 12.50 and 14.00 G.M.T. On July 2 the Italian station IIIRA was heard during his record-making QSO with G5MQ, the Italian signals being audible between 14.00 and 14.30 G.M.T. approximately.

All the above signals were heard at good strength and on various types of aerials, which supports the theory that they arrived " from the sky," reception being largely independent of the location of the receiving station. Last year signals from F8CT were similarly received by G8JV and others.

Careful watch on the 56 Mc. band each day at these times indicates that the optimum conditions for reflection obtain on warm days following a colder spell, and no signals of this type have been recorded during cool or unsettled weather. Confirmation or otherwise of this point from other observers would be of interest.

The reflection of 56 Mc. waves from the upper, F layer, is a phenomenon of much greater rarity, and one of which the writer has had no direct experience. Nevertheless, there are several instances of DX reception which can only be accounted for in this way. The reception in America last year of 56 Mc. signals from G5BY is one of the best examples to date.

Here again comparison with 28 Mc. conditions suggests that Spring and Autumn are the best times, and also early morning or evening. At these times the F layer, which forms and dissolves much more slowly than the E layer, may be dense, while the lower E layer is sufficiently weak to offer no serious hindrance to the passage of high-frequency signals. Consequently, when DX conditions are particularly good on 28 Mc. and above, the possibility of long-distance transmission on 56 Mc. may exist. Low-angle radiation systems and moderately high power are of course essential to success in any attempt of this kind.

It is hoped that these notes may be of use to those who are interesting themselves in the ultra-high-frequencies for the first time, and also that they will stimulate the present 56 Mc. enthusiasts to ponder on the results of their own experiments and

(*Continued on page* 194.)

# THE MONTH ON THE AIR

A RUNNING COMMENTARY OF RADIO CONDITIONS FOR THE MONTH OF . . . . . AUGUST, 1938

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

WITH more and more interest being shown in DX work the value of the QSL has increased. So many stations have been heard signing queer and unusual calls, and so many territories have produced amateur activity hitherto unknown, that the necessity for confirmation today has reached the stage where it *must* be regarded as an integral part of amateur radio. In this page we endeavour to bring to members the latest news of amateur stations, and to expose those of poor spirit who pretend to be in some elusive country; and we feel that this is of use to all interested in the science of long distance communication, but it does not achieve everything. The QSL card must therefore be regarded as the only *authentic proof* of a contact.

It is unfortunate that there are some who think that this side of amateur radio is a nuisance and who lack the co-operative spirit to help each other. We cannot imagine anything quite so mean as the amateur who ignores a request for a QSL, *especially* when the request is accompanied by a self addressed envelope with postage or coupon enclosed. We note that it appears to be largely the older hands who come under this category; the newcomers seem to have a better understanding of our rights and privileges, and play the game from all its aspects.

We are glad to publish the calls of stations in rare countries who are lending their wholehearted co-operation in sending cards for every new contact, and we must mention as a specific case, the action of Mr. R. Fox, AC4YN, who not only forwarded a card to BERS195 in N. Australia, but a set of photos, Tibetan stamps, and sent back the coupon as well.

Congratulations are due to Mr. C. W. Kirk, 3, Transport Lane, Rosia, Gibraltar, for winning his fight with the authorities. He has persuaded them that amateurs will not prove a nuisance in Gibraltar and has been allotted the first call in that Colony. ZB2A is therefore to be sought after in a few weeks time. Incidentally, ZB2A cannot trace the owners of the unlicensed calls ZB2A, ZB2B and ZB2AB who recently worked a few stations, therefore the cards the QSL Bureau sent to him have not found their rightful owners, as no one will admit to unlicensed operation. Mr. Kirk hopes he will not be inundated with requests for cards for past QSO's with the other ZB2A! Another new call recently heard on 14 Mc. is ZC6AA, whose QRA is T. Fletcher, No. 2, W/T Coy., Royal Signals, Sarafand, Palestine. We recently published the fact that cards for ZC6AA could be sent *via* 2AIJ of Liverpool, but unfortunately, a muddle occurred. An unlicensed operator in Tel Aviv wrote to 2AIJ to say he would shortly commence transmissions signing ZC6AA, but in the meantime another ZC6AA started to use this call, and so any cards sent to 2AIJ should be readdressed to the above QRA. The other "ZC6AA" states he will therefore use the call ZC6AB, and cards for this station should be sent *via* 2AIJ.

GI5WD writes to tell us that ex-VP4CF has now obtained his official licence VP4TP, and his QRA is:—Colin Fraser, 63, Mucurapo Road, Port of Spain. VP4TO is the new call of our old friend Douglas Bagg, G6BD—Trinidad is indeed well represented to-day. VU2CR has also obtained his official licence and been regularly active signing VU2EU on 14380. QSL's for VU2EU should be sent to W. H. E. Metcalfe, 3rd Indian Divn. Sigs., Meerut, U.P.

We are pleased to learn that G2TR worked OX7OU, the Oxford University Expedition in Greenland, at 16.30 G.M.T. on August 27 on 14040. This is believed to be the first 1938 G contact with the Expedition. Other items of interest reported by G2TR are, VP5IS worked on 'phone and PK3WI heard the long way round in our early morning. Another unusual country, Tangier, is being well represented by CN1AF, who is regularly active on 14260 'phone. His QRA is Jose M. Sierra, Rue des Sources 19, Tangier, I.Z. He commenced operation at the beginning of July with 50 watts but has now increased to 500 and so far has QSL-ed all his contacts. We hear from W2BHW that LZ1ID will not be active again until the beginning of September.

VP8AD was worked by G2ZQ and G6WY on August 20 at 21.30 G.M.T. and gave his QRA as R. McClaren, c/o Radio VPC, Port Stanley, Falkland Is. W2BHW reported a contact with VP8AF who stated he was to be found at the same address, and we have also had news of a station signing VP8AG, so it would appear that these stations are operated by the engineers in charge of VPC.

W8OQF corrects us in saying that VP8B has been QRT since 1936. He worked him in February, 1937, and has had his card.

The mysterious YA5XX has been active on 14360, and W2BHW tells us that he is supposed to be an American operating a 4 watt transmitter in a tent on a hill near Herat, Afghanistan. We are somewhat sceptical, however, and will wait for a card before passing judgment. W2IXY reports working CN1AF, VK4HN (Papua), PK6XX in New Guinea (14008), and a new Bolivian 'phone,

CP1BA. It is doubtful whether it will be possible for a G to contact PK6XX as he appears to operate only about noon G.M.T. CO2UF is the new call of the Radio Club of Cuba and can be heard on 14100.

The number of British stations who have W.A.S. is growing. G6QS and G5BJ have sent in their cards to A.R.R.L., while G6WY is anxiously awaiting his card from Nevada. G5BJ has worked W6FUO and W6CW, and G6WY contacted W6CW (14170 'phone). G6QS has written to the A.R.R.L. and asked if it is possible for the 48 cards to be checked by the R.S.G.B. to save the trouble and risk of sending them to America. Other calls heard or worked from G in this State are W6HJZ, W6BYR, W6GUW, W6LCJ. We also learn from *QST* that W6OTU is shortly to be heard on 28,800 or 29,010 kc. 'phone or 14 Mc. CW.

G3AH has worked the Public Schools Exploring Society (Newfoundland), working under the call G8XY. G8XY was on Silver Mountain, and complains that many stations will not work him as they think he is bogus. G2DH writes to say that G6KS has a card from VP9X, but we do not know his full QRA. G2DH has now 90 countries confirmed, recently receiving cards from TI2RC and FI8AC. G6YR has, in common with many, received a card from TF5F and worked K6PLZ (14340) and ZD4AB for new countries to bring him up to 94 in 36 zones. Rarer stations heard in Southport have been HK4LF 14025 (worked by G2ZQ), VP2AB 14400, HI6Q 14030, VP9X 14100, PJ3CO 14300, CE3DG 14400, VQ8AI 14300 and PX1U 14000. He mentions working VQ2GW on 14050.

In the June issue we reported that G8MS worked VQ8AA outside the HF end of 14 Mc. at 04.45 G.M.T. We have now received a letter from the real VQ8AA to say that it was not he whom G8MS worked. A pirate has been using his call, and many cards have arrived at Mauritius for the bogus VQ8AA. VQ8AA requests that all who work him wait for his card. He tells us he is operating CC on 14040 and 14318 only, and asks if anyone has worked XZ1GN in Aden. We know that SU1WM has and, like VQ8AA, received a letter confirming the contact, but we have no further news of this station.

Some news of 7 Mc. conditions during August comes from G5FA. He has heard CM7MV, CM8NW, PY2DK, K4DSE, SU1NH, and worked VO1Y on 7060. On 14 Mc. G5FA reports hearing VP8AD, VP4TP 14300, VK9VG (HF 14), and is trying to get some authentic news about TA1AA by writing to TA-RE-1 from whom he received a report. GM6BM uses 220 v. D.C. mains as his only power supply, yet has W.A.C. and W.B.E. His final consists of two 6L6's, but with this QRP rig he worked 63 DX stations during August, the best being YA5XX, ZC6AQ, XU6MK, FI8AC, J5CC, 2KG, 2JJ, PK1RI, 3AA, 3BM, K6PLZ, W6-7, VE5, LU, ZS and VK.

Eric Trebilcock, BERS195, reports from Northern Australia with details of two unusual calls. XON4RX gave his QTH as a ship on the River Plate in Uruguay, and CR9A, c/o Policia, Macao, but the latter refuses to give further information about himself. During July " 195 " heard ZS5B, EI8J, VK9WL ('phone) and Europeans on 7 Mc., while on 14 Mc. he reports G5BJ at S8 'phone with LY1AP, HA1YL, TF2X as unusual Europeans. Eric tells us that his " calls heard " lists are appreciated, as he receives numerous requests from G's for further details of reception. In his August report he tells us that he is " all set " for DX reception on 28 Mc., and these reports should be of interest to everyone who works on this band. Further 7 Mc. listening surprised him, as he heard OQ5AV, VQ2GW, VR1AM, K6JEG (newcomer on Baker I.), EA8AE, CR7AF, ZE1JP, 1JM, SP1KB and several G's and ZS's. He has now received confirmation from 127 countries with cards from AC4YN, VR6AY, K4ERY, ZK2AA and ST6KR, and suggests that we run an honour roll of listening members of the R.S.G.B. who have confirmations from 100 or more countries according to the R.S.G.B. list.

Further to G5RF's request for U9's who QSL, G6YL informs us that she has a card from U9AV. G8CY reports KA3KK 14300, CR7AF 14290, and XU8NR 14340. G6QS also tells us he has a card from U9BI for a QSO in 1934. G6QX, fresh from his visit to the U.S.A., has started in real seriousness to try for the DX Century Club and has added CE3EE 14410, CR7AF, PK1MF 14380, CN1AA 14320 and XU8CM 14305. His present total is 88 confirmed.

G2MI had an unusual experience. He called VK3DD, and the VK came back to G2MI and G2IM saying that they were on identically the same frequency. A report from an SWL in Ohio was received by G2MI with frequencies of some South and Central American 'phones. We give some :—HK5DB 14020, HR5C 14038, TI2AV 14108, HK3JB 14130, TI1AF 14140, VP1DM 14397, TG5 14075, CP1BA 14148, and we can add HC2HC (portable) 14270. G3JR continues with his 6L6G by adding 6 ZS's, ZD2H, VP1AA, VQ3TOM, FI8AC, VU2AN, HK4LE, MX2D, J's and VE's. Incidentally VE5ZM, heard regularly, is ex-VE5RE and the brother of VE5AAD. G8HA has worked VS7MB, KA1RP, VQ3HJP and J2NF and heard FB8AB (HF 14) and CR7AL.

ZS2BJ (ex-ZT2B) is all ready for 28 Mc. with a directive array consisting of a pair of half-wave radiators fed in phase, backed by a pair of reflectors, so listen for him this season—and he QSL's ! We hope that he will furnish an article on this aerial system for the BULLETIN. G3CY using less than 10 watts has now worked 45 countries, some of the latest being VE5GI, VQ4, ZS, FB8AD, ZC, VU, ZL, VK and CT2, and has at last managed to W.A.C./W.B.E. VU2JM is putting an unbelievable signal through to G considering that he is only using 2 watts, but he is situated on a mountain top !

We have received an interesting report from an SWL (Mr. W. Mayes) in Illinois, and amongst a long list of DX 'phone he mentions that HR2A is back on the air again after a year's absence. His new QRA is Honduras Field of Aviation, Tegucigualipa, Honduras. Mr. Mayes' best includes UX8RB 14080, XU8EF 14100, J5CL (HF 14), VS2AR 14260, PK3AA 14300, PK4JD 14100, KA1UE 14260, 1CS 14310, 1FH 14260, 2OV 14270, 4LH, ZL2BI 14170, XU9RK 14130, 6TL 14340, J7CR 14070 and VS6AG 14084, all on 'phone. Nearer home we hear from some British listeners, and 2BFL states he has heard also HR2A on 'phone and requires details of XX1XX heard on 7 Mc. CW working G8BH. VP9L was heard on 7 Mc. 2DQS of Leicester reports EA2IS, CE1GG, VK4BB ('phone) among

a long list of usually heard stations. BRS3319 also of the same town (Thurnby) as 2DQS has heard CN1AF, OA4AW, HR5C, and TG9AA. HH5PA appears to be back in Haiti. 2DKQ of Stroud reports a very unusual one—YS1AB working G5YV on 14395, and VP8D on 14380 (is this the old call of VP8AD ?) On 7 Mc. 2DKQ heard K5AG, two W6's and W9DB in S. Dak., while 14 Mc. produced OQ5AR (yet another), HI6Z and VP7NT. He asks for details of VP3OJ heard on HF end of 14 Mc. and ZA1AA; the latter is in our opinion a fraud. BRS3213 of S.E. London reports CE3BH, CX2CO and 2AK, VQ2HC 14300, PK2WL and 4CB on 'phone.

G3GU put up a new aerial for S. America and was rewarded by QSO's with PY5QG and CX1BG during the first try-out. The power was only 10 watts and this gave him the coveted W.A.C. He asks if SM2WB in Lapland can count as a separate country. We wondered when this query would arise, but the answer is that Lapland is the northern region of Scandinavia inhabited by Lapps and reindeer. It stretches across SM, LA and OH.

We are interested to learn from W2IXY (*via* G2UT) that the F.C.C. of America has started a drive against irregularities on the amateur bands in U.S.A. There have been many indictments against pirates and a change in the regulations is contemplated in October. One of the chief things they are against is the use of excessive power (!) and the operation of amateur stations by unlicensed persons (that applies in Great Britain as well). We learn that the expression " California Kilowatt " has grown into disfavour and has been substituted by " Australian Kilowatt," apparently with the idea of kidding themselves.

G2AI sends us a report he received from an SWL in Alabama, and it is interesting to record that the SWL wrote " your modulation was typical of all British 'phones—perfectly understandable at all times with a good balance of high and low tones." He goes on to say that he finds British stations are very good at QSL-ing reports.

Finally a few QRA's from G6WY's log. KA1RP, R. G. Pitts, Cuartel de Sepana, Manila, P.I. PK3EM (14260) L. A. E. Monfils, Kemangistraat 15, Soerabaja, Java (incorrect in C.B.) and W6KFC is in Arizona on 14030.

## THE 28 Mc. BAND

By NELLY CORRY (G2YL).

AUGUST started with typical summer conditions, but on and after the 14th of the month the band was more lively, and on several days, particularly at week-ends, DX was varied and plentiful. Probably the best day was August 28, when signals were logged from 25 countries between 0900 and 2100 G.M.T., and all continents were worked.

The only report of Australian signals comes from G6DH, who worked VK5KO on August 28, and heard VK's 5IT, 6SA, and 3CP on July 31, August 7 and 21 respectively. BERS195, of Northern Australia, states that " plenty " of VK's are active at present, so they will probably be coming in regularly in the mornings in a few weeks' time, when the DX season should be at its height. BERS195 has also been hearing ZL's 1FT, 1HY, 1MQ, 3AJ, 4DQ, numerous W's and K6's, and on August 14, VU2FS, ZE1JJ, and ZE1JZ.

Asiatic signals were rarely, if ever, heard on weekdays, but on Sundays the VU 28 Mc. gang were there in earnest, and G6WY had 4 VU QSO's on August 14. Calls heard included VU's 2AN, 2CQ, 2EN, 2FS, 2FV, 2FZ, VS7MB, and U9ML. During August VU2AN worked F, G, VK5, VQ3, VS7, and heard U9, ZE, and ZS. On August 28 he logged G's 5KH, 5LI, 6BW, 6GR, 6QX, 6VK, 6WY, 6YU, and 8UJ around 0900 and 1400-1530 G.M.T., but the only European he was able to raise that day was F8KJ. On July 31 he heard the Hissing Phenomenon at 1307 G.M.T., and wonders if anyone in Europe heard it at the same time ?

African stations were heard on about 15 days in the month, and included VQ3TOM, who made his first contact on this band, and the first VQ3–G 28 Mc. QSO, when he worked G2XC at 0850 G.M.T. on August 14. Bulawayo certainly holds the distinction of being the most " ten-metre-minded " town in the British Empire, thanks to ZE1's JI, JJ, JN, JU, and JZ, who were heard active on 'phone and c.w. during the month. Other African stations logged included several FA's, SU1's CH, GT, KG, SG, ZE1JR, and ZS's 2J, 3F, 6AA, and 6DY.

South American signals were more numerous and consistent than they usually are, even at the spring and autumn peak periods, and PY2CK is becoming almost as well known a call as ZS1H used to be in 1936. Stations reported heard on about 16 days in August were CE3AC, HC1FG, VP3AA, YV1AV, 7 PY's, and 12 LU's. From Central America and the West Indies about 14 different stations were heard, and included CO2WM, CO2WV, VP6MR, VP6YB, and VP9G.

North Americans were heard on at least 12 days during the month, compared with 7 in August, 1937, and every W district except the 7th was reported at some time or another, as well as VO1I and a few VE's. W6's were particularly good on August 14, 16 and 28, and were worked by G2XC, G6KS, G6YL, and others. QSB was sometimes rather heavy on the W's, but their signals were certainly better than ever before in the Northern Hemisphere summer.

European signals were logged from 20 different countries during the month, and on many occasions came in at good strength at the same time as DX stations. G activity appears to be on the increase again, and there should be a run on 28 Mc. W.B.E. certificates this autumn. G6KS worked VU2FV, LU9AX, W6GRL, and Europe on his third day on the band, and heard a good many other DX stations.

Reports from G's 2XC, 5BM, 6DH, 6KS, 6QZ, 6WY, 6YL, 2DQS, BRS25, BRS3179, BERS195, and VU2AN are acknowledged with thanks.

## R.C.A. Manual

*Holiday and Hemmerdinger*, Public Address Engineers, 74-78, Hardman Street, Deansgate, Manchester, 3, have forwarded a copy of the new R.C.A. Receiving Tube Manual. In addition to very comprehensive data and curves for the valves there are four chapters giving information of their application to rectification, amplification, oscillation and frequency conversion. The book, which contains 192 pages, can be obtained for 1s. 8d., post free, from the above address.

# The Second Annual 56 Mc N.F.D.

By J. M. R. Sutton, B.Sc. (GW2NG)

ALTHOUGH this is the year of the R.S.G.B. 56Mc. International Contest, the number of logs submitted from transmitting stations is below that of last year's N.F.D., while the number of logs from receiving stations is slightly above that of last year. This may have been because of the bad weather experienced last year but, on the other hand, it is possibly due to the tendency towards crystal-controlled transmitters! Unless a station possesses a 14 or 28 Mc. crystal, a C.C. transmitter using a 7 Mc. crystal is apt to merit the term "fixed" rather than "portable." This is borne out by the receiving logs which report a large number of fixed stations active on this day. This shows a tendency to operate modern apparatus from a station's own QRA because the difficulties of portability are too great.

It is very encouraging to note that the fifteen transmitting logs submitted show a very high percentage of crystal-controlled, frequency-stabilised or driven-amplifier types of gear. There were six C.C. transmitters, three "Long-lines," one ECO-PA, one Ultra-Audion-PA, while the others were of the self-excited type, being three in all. No details were given of the gear at one station. The same encouraging tendency was evident on the receiving side. Receivers were either straight, or straight with quench injection at will. Some purely quench-type receivers were also used.

The weather (how much has been written on this subject since writing began!) was mixed. Most stations who ventured remarks on this ever-topical subject agree that the overcast and dull skies which were fairly general did not hold out any hope of DX. On the whole, the weather was better than last year, although gusty winds gave trouble with receivers of the 0-v-1 type. Many stations sent in appreciations of the event and again, like the "Oliver Twists" of last year's N.F.D., asked for more!

### The Entries

As in last year's account, a detailed report of the activities of each station is impossible. The logs and accounts were remarkably well prepared, with abundance of detail and circuits, in fact, the accompanying details of gear, etc., were, in some cases, "works of art," and well worthy of inspection as examples of how entries should be sent in. The only complaint that could be made was the late entry of some of the logs.

The same plan is being followed as before—a brief account of the results and gear at each station.

G2JBP with 3CI and 8LQ was located at Walton-on-the-Hill, Surrey, and used small half-watt transceivers on 'phone and MCW. The aerial was a half-wave dipole, 15 ft. high. Contact was made with G2JKP, 5AAP, 6SCP and 2YL. Stations heard were G2NMP, 2NHP, 5AU, 6VA, 6GR, 5RD, 2MV, 2MC, 8IX, 2MR, 5KH and 8NV. A report was received from 2CIL listening near Horsham. 2JB suggests that general use of MCW would have produced more distant contacts and complains of 'phone QRM.

G2JKP, near Tattenham Corner, Epsom Downs, Surrey, with G3CU and BRS3276 (who put in good work with the site and the pole), used two transmitters. The standby was a self-excited 6A6 with push-pull circuit, while the main transmitter was a 6L6 Tritet with 14 Mc. crystal exciting a 6A6 as push-pull power doubler. These outfits were plate-modulated by a single 6L6 choke-coupled. The receiver was a "straight" 0-v-1 with optional quench-injector valve. The aerial system was a horizontal rotary dipole, fixed to a 25-ft. pole and fed with lighting flex. Contacts were made with G2YL, 2JBP, 2MV, 2NHP, 5MAP, 2MC, 6GR, 2NMP, 5KH, 5AU, 6SCP, 5AAP, 8NV, 8IX. Stations heard were G2KI, 2QY, 6SC, 6VA, 5RD, 5WW and 5RDP. 2JK, who suggests that greater distances could have been covered if many weak carriers heard had been keyed, also sends a plea for more CW.

G2LCP was situated at Crown Hill, Langdon Hills, Laindon, Essex, and used an RK34 as a "Long-lines" employing both grid and plate lines, with 9 watts input. The aerials were (i) 66-ft. ZeppW-East, 25-30 ft. high, (ii) rotating beam, both fed *via* a Collins-coupler. The beam was no improvement and was taken down. The receiver was the "Guide" TRF-v-1. The logging of a commercial harmonic in the band at 09.50 raised hopes, but conditions were poor; the two stations contacted could have been worked from home QRA, ten miles farther away. A queer fade-out on G2HG may have been due to low-lying thunder clouds absorbing the indirect ray. Several 'phone stations could not be identified on the "straight" receiver. QSO's were affected with G2HG, 3GP.

G2NMP, the station operated by the West Sussex Short Wave and Television Club, was ensconced on Bury Hill, Sussex. The transmitter was 6L6 Tritet ECO—6L6 PA, modulated with a 6N7 in Class B and was mains-operated from a rotary convertor giving 110 volts A.C. Two aerials were in use, both being 135 ft. long radiators, one N. and S., the other E. and W., on 26-ft. portable poles. Many receivers were in use besides the actual receiver associated with the transmitter, which was a two-valve "straight." Actually there were five regenerative and three "straight," the latter being better on weak signals and the quench on strong 'phone. There was quite a family party, 35 members and visitors being present throughout the day. Stations worked were G2HG, 2OD, 8OS, 8IX, 5CMP, 5MV, 5OJ, 8KZP, 6LK, 2JK, and 5AU. Calls heard were G6VA, 2YL, 2KI, 2XC, 2NH and 8OQ.

G2WSP was situated on Bardon Hill, Charnwood Forest, near Loughborough, 912 ft. A.S.L. with an horizon of 20-30 miles. The transmitter was ECO/doubler—PA, loose-coupled and power was supplied by (*a*) Vibrator H.T. unit giving an input of 4 watts; (*b*) H.T. generator giving an input of 9 watts. The aerial systems were (i) a long V, each limb 48 ft., and included angle 60 degrees, with apex due West and ¼-wave stub, flex-fed; (ii) 33-ft. horizontal wire, N.E.-S.W.; (iii) 33-ft. horizontal wire N.-S. All aerials were used both to transmit and receive and the receiver was 0-v-1 with optional quench-valve. Much valuable data

on the aerials were sent in but is too detailed to be given here. The most distant contact was G5BKP (65 miles). Signal strengths improved during the afternoon but the weather was not calculated to produce DX. Contacts were made with G6CW, 6JQ, 5ML, 6IH, 5BKP, 2MF, 2IO, 8HT, 3IZ. Stations heard were G2AK, GW6AAP and G2VG.

G5ZTP was unlucky both in choice of location and in other ways, for he was compelled to close down at 16.00 B.S.T. due to an accident on his motor-bike while going with a transceiver to test another site. We are glad to hear that he has now quite recovered. The location was the Golf Links, Longridge, instead of Parlike Pike, which has proved excellent in the past. The new location, although more accessible to more complicated gear, proved a failure for transmitting. Transmitters in use were (*a*) 10 watt "Long-lines," with choke-controlled MCW (*b*) 1.8 watts transceiver. Aerials were a 66 ft. Hertz and a midget W8JK stub-matched vertical beam, rotatable, which was suspended from the 40 ft. mast of the Club. The receivers were 5-valve CW or 'phone superhet; three-valve quench. QSO's were made with G6SQ, 2NYP. Stations heard were GW6AAP, G5MQ, 6GL, and 5AD.

G5MAP was erected at Holybourne Down, 1½ miles N. of Holybourne, Hants. This station, which is equipped for regular portable work on 56 Mc., is remarkable for the ingenuity displayed in the power supply and equipment. Everything has been arranged so that the transmitter may be operated from the rear seat of a 10 h.p. Ford. Even the aerial can be rotated from the operating position and the car engine, by suitable gearing, provides power supplies. The detail sent in is too extensive to be given here, but deserves an article to itself. (It will be welcomed.—ED.) The transmitter was 6L6 Tritet with 14 Mc. crystal, link-coupled to a 6N7 push-push doubler, and modulated with another 6L6 and carbon microphone. Regeneration in the doubler stage gives 5-6 watts R.F. output for 10 watts input. The aerial was a horizontal ½-wave dipole, 25 ft. high, fed by twin cab-tyre cable and the receiver was a *National* 1-10. Contacts were affected with G5MCP, 2GG, 8LY, 2NHP, 8IX, 5OJ, 2JKP, 6LK, 2MV, 8OQP (44 miles), 2XC, 5AU and 8OS, after the contest had finished. Stations heard were G2NMP, 2OD, 5KH, 2MC, 6XM, 8KXP, 8MG, and 8NVP. 2BNS proved an efficient chief engineer at the car controls. G2OD and 8LY visited the station.

G5CMP was operating on Holmbury Hill, near Holmbury St. Mary, Surrey, and the transmitter was an Ultra-Audion series-tuned oscillator capacity-coupled to a neutralised PA, plate-modulated by a *Mazda* Pen 220A. The input was 4 watts to a *Hivac* Z220, with dry batteries. The aerial was a 67 ft. end-on Hertz, N-S. and the receiver an Ultra-Audion detector—L.F. Conditions were stable until 1600 B.S.T.when QSB set in on northern stations and conditions became poor. Contacts were made with G8OS, 5MAP, 5AU, 2NMP, 5OJ, 8IX, 6LK, 5AAP, and stations heard were G2OD, 2MC, 2MV, 2JKP, 2NHP, 5KH, 5WW, 6XM, 8KZP, 8OQP, 5RDP. G2NMP was the best signal of the day.

G5BKP was at Leckhampton Hill, Cheltenham, and used a "Long-lines" transmitter with two K480 valves in push-pull. The aerial was a "matched-impedance" type with 20 ft. feeders coupled to the transmitter by a two-turn tuned coil. A buzzer was used for I.C.W. The receiver was super-regen. with separate quench-valve. No particular peak period was noticed and activity declined after mid-day. GW6AAP was a consistent signal. Contacts were made with G6IH, 8BP, 5BM, GW6AAP, and G2WSP, and calls heard were G2AK, 5ML, and GW2NF, besides others too weak to be identified.

G5CDP operated from Haddington Hill, near Wendover, and the transmitter was 6V6G 7 Mc. Tritet—6L6 Doubler—4304B power-doubler modulated for I.C.W. or 'phone by two 4033A's in push-pull, with choke control. The aerials were (i) ¼-wave vertical fed by 70 ohm line with ¼-wave matching stub, 12 ft. high; (ii) ½-wave horizontal with reflector, fed by 70 ohm line in centre. Feeder current was 0.25 to 0.30 amps. The receiver was a 7-valve superhet. A slightly different site from last year was chosen and the slope of the hill affected signals, as it cut across the path except in one direction. S9 signals were received from this direction. Stations worked were G2HG only. Stations heard were G5KH, 2MC, 8SK, 2OD, 8NC, 2MV, 6VA, 2NHP, 5RD. G5CDP was heard by 5RD, 2YL and 6ZJP.

GW6AAP on Snowdon summit was in operation from 1815 B.S.T. on June 2 to 1600 B.S.T. on June 3. The transmitter was a 45 Ultra-Audion modulated by a 42, preceded by a 76 speech-amplifier. A separate 1,000 cycle oscillator was used for I.C.W. Although six separate aerial systems were taken to the summit 6AA's two companions were unable to accompany him, and weather proved poor, so only one was used. This was a vertical half-wave fed with various types of lines, and it proved effective in all directions without any marked gain in any particular direction. The aerial was fed from the hotel, while located on the summit, where operation was impossible owing to the removal of shelter huts originally there. The receiver was a two-valve super-regen. using a self-quenching detector. Further transmissions from Snowdon will be C.C. with receiver suitable for C.W., but lack of time prevented this gear being used for N.F.D. Snowdon was in communication with GW2NFP, 5ODP, 6YQP, 2DAP, G8HT, 5MQ, 2XR, 6SQ, 2VG, EI2J, G5BKP. Stations heard were G2NY and police 5-metre stations GTL, GTL1, GTL2, GWB, all at S9. The EI contact was remarkable, for EI2J (98 miles), was received at 57 'phone, using 0.5 watts input to a type 30 valve and working from his car, on a hill behind Dublin, with an 8 ft. aerial secured to the car chassis. In addition to the stations mentioned, 39 reception reports from distances up to 130 miles have been received.

G6QZP, the only station active in his district within a radius of 50 miles, was in operation from the church tower at North Tuddenham, East Dereham, Norfolk, and used a 6L6 Tritet with 14 Mc. crystal driving a 6N7 push-push doubler to 9/10 watts, with 30 per cent. efficiency. The aerial was a W8JK four-element beam rotating in a horizontal plane, on top of the tower's flag mast. It was found impracticable to transport the transmitter to the tower-top, so the aerial was fed by 100 ft. of low impedance feeder, with heavy losses, but this was the only practical arrangement. The receiver was 1-v-1, fully tuned. The only station contacted was G5QO (31 miles).

G8NVP. This mobile station maintained contact

with G5WW on the journey to and from Elstree except for gaps when both stations faded out. The portable transmitter was an LP2 as self-excited oscillator, plate modulated. The aerial was a half-wave dipole and the receiver was a single-valve quench type.

QSO's were made with G2NHP, 5WW, and calls heard were 2JKP, 2MU, 2MCP, 6LK, 6VA, 6YP, 5RDP, 6GR, 5MAP.

The home transmitter was 6L6 7 Mc. Tritet—6L6 Doubler—push-pull T20's PA, with the same aerial system. Stations worked were G5KH, 5WW, 2QY, 6YP, 5RD, 5RDP, 2JKP, and calls heard were 6VA, 5MAP and 2MV.

G8AAP was operated from the Observatory roof at Bidston Hill, near Birkenhead. The transmitter was a mains-transportable with two SP2 valves in a push-pull Hartley circuit, link-coupled to the aerial. MCW was produced from a 2-stage amplifier with anode modulation. A transceiver, battery operated, provided one contact of six miles with G5MQ. The aerial was a vertical half-wave Zepp with ¼-wave feeders. Good loud-speaker signals were received, despite heavy rain. Failure to receive GW2NF was presumed to be due to strong screening from the metal roof and domes. The site, however, was considerably better than the QRA, a mile away, in town. Contacts were made with G5MQ, 6SQ, GW6YQ (15 miles), and stations heard were 2XR, 2VG, 6DP and GW6AA and one police station.

G8OQP was located at Ditchling Beacon, 813 ft. A.S.L., 6 miles N.N.E. of Brighton. The transmitter was a 6J5G 28 Mc. CO link-coupled to a 6L6G doubler, and the doubler was keyed, at an input of 9.88 watts. The aerial was a half-wave dipole with reflector spaced ¼-wave, rotatable, and constructed of ½ in. copper tube and fed by 72-ohm feeders and vertically polarised at all times. A Field-strength meter was used. The receiver was 0-v-1 (Reinartz), and a 66-ft. length of V.I.R. cable 8 ft. from the ground was used as aerial. No contacts were made until 1358 B.S.T., although stations were heard before. G2HG was lower in QRK than usual, showing poor conditions. QSO's were affected with G2HG, 6LK, 8KZP, 5MAP, 8IX and 5OJ. G2OD was the most distant station heard.

**Reception Logs**

BRS1965 at Hodsham Hill, Hodsham, Cheshire, used an 0-v-1 with a half-wave vertical Hertz and a 32-ft. end-on. The half-wave vertical proved infinitely better than the 32-ft. A peculiar effect was that GW6AAP was not heard, while 5MQ in Liverpool reported excellent reception of Snowdon from a much worse QRA. Stations heard were G5MQ, 6TL, 3LF, 3BY, 2VG, 8HT, 6SQ and 3DA.

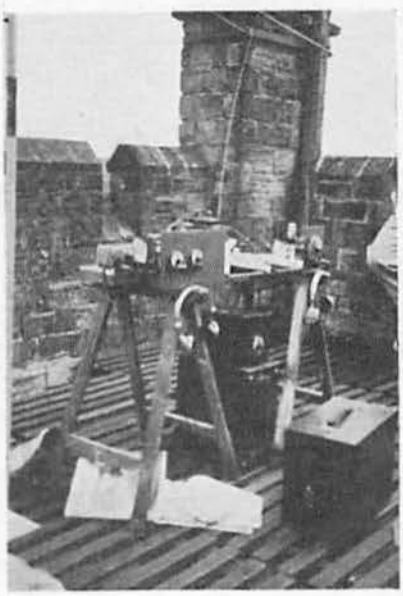
2AAH, one mile east of Goodwood Racecourse, near Chichester, Sussex, 500 ft. A.S.L., sent in a most comprehensive log covering every moment of the day. He used a TRF-v-1 with EC detector, and sent in diagrams of aerial mast and receiver. His aerial was a horizontal doublet, E-W, at a height of 12 ft. Everything pointed to conditions being below average, as better signal strengths have been received from the same stations on a more efficient aerial at Chichester, which is badly screened by the South Downs. Best DX was G2OD, of Ascot. He received G2KI, 2NMP, 6XMP 5CMP, 2OD, 5MAP, 8RO, 6LK, 5OJ, 2XC, 8KZP, 8OQP.

2CIL, who was on the roof of the Beacon Tower, Colgate, near Horsham, by permission of Brig.-Gen. Clifton Brown, M.P., sent in a remarkable log which ran to seven foolscap pages and well repays inspection. The receiver, a Det-LF, with optional quench, was an experimental resonant line (Lecher wires as used for 112 Mc. reception). A forthcoming article is promised for R.E.S., so details of the receiver will not be given here. The aerial was half-wave, with half-wave reflector spaced ¼-wave and coupled *via* ¼-wave (400 ohms) dipole feeder, spaced 2 ins. A tuned aerial coupler was used. A bare summary of the log reads G5CMP, 5LU (pirate ?), 6VA, 5MAP, 2MV, 5KH, 2NMP, 2OD, 2NHP, 6LK, 8OS, 5AU, 5RD, 2JGP, 6YP, 2JBP, 8IX, 8OQP, 5OJ, 2MC, 2JKP, 6GR, 8LY, 8NVP, 5RDP, 8KZP and 5AAP.

G2KI at St. Margaret's-on-Thames, heard G6LK, 2MV, 2HG, 2QY, 6XMP, 2NHP, 5AU, 6VA, 5KH, 8IX, 2JK, 5CDP. He is now using a 4304A instead of *Amperex* 800, and made contact with 6LK on June 2 with a half-wave doublet, but his mast came down in a recent gale and is being dismantled.

G2YL was unable to get her RK34 to drive the T20 sufficiently, so toured Epsom with 5LA, looking for personal QSO's with portables, but only found 2JBP and 6SCP, both on Walton Heath. QSO's were affected with 2JKP and 2JBP, and stations heard were 5CDP, 2NHP, 2NMP, 5MAP, 2OD, 2QY, 2HG, 6XM, 5KH, 2KI, 6FU, 6VA, 8IX, 6SC, 5AU, 6GR, 8NV and 5RD.

2DFG, 2DGR and BRS3322 sent in logs for April 24, 30, May 8, 15, 22, June 19 and 26 at Devil's Dyke, Shoreham Hills, and Ditchling Beacon, and these make interesting reading. BRS3322 and 2DFG were at Devil's Dyke, Brighton, on N.F.D. BRS3322 used an 0-v-1, with half-wave



*2CIL on Beacon Tower, Colgate, Sussex. This receiving station put up a very fine performance during the Field Day, and the operator qualified for an award.*

dipole, plus reflector, and 2DFG used 0-v-2 with Reinartz rotary beam. They heard G2NMP, 6LK, 5MAP, 8KZP, 5OJ, 2MC, 2MV, and 6VA on phone, while 2NMP, 8OQP, 6LK, 5MAP, 8KZP, 5OJ, 2JK, 8IX, 2MV, 2OD and 2HG were heard on CW.

G5US, Manchester, worked G6TL on July 3 with 'phone both ways, and heard G5MQ, Liverpool, working portables.

G2SZ, in Norbury, using a three-valve quench and two aerials (*a*) horizontal, folded two half-wave dipoles, with low impedance line (QST October, 1937), directional for E-W reception, (*b*) horizontal ½-wave dipole, direction N-S, heard G5KH, 5AU, 6VA, 2HG, 2MV and 5MB.

G6AH, Seven Kings, Essex, relied on a two-valve "straight" and a 14 Mc. doublet, and heard G2HG, 6FU, 5LB, 2LCP, 3GPP, 8OQP, 2NMP, 2MV and 5KH.

BRS2601 was at his QRA in Ewell, Surrey, and was using an 0-v-Pen with a half-wave horizontal dipole, NW-SE, with feeders tapped direct on to the grid-coil. He heard 2KI, 2NHP, 5KH, 2HG, 8IX, 2QY, 5LB, 2NMP, 6XM, 2YL, 8MG, 5RD, 5MAP, 5CM, 2MV, 2OD, 6PK, 6SC, 2JKP, 2LCP and 6FU, although he was only able to listen from 1000 to 1300.

G6NM, at Wilmslow, Cheshire, with a single-valve quench and a ¼-wave Marconi aerial attached to the metal fireplace in the shack, heard G6AAP, 8HAP (?) and GTLI.

G6UT, at Little Hollingbury, Essex, near Bishop's Stortford, using a three-valve quench, heard G5KH, 8SK, 5VT and other stations whose calls could not be obtained because they were not used! (over to Bert, Ernie, Bill, etc.!!).

G8TN and G6QN sent in an article entitled "56 Mc. goes 7 Mc." They used two receivers on high ground near Ranmore, Surrey, one 6QN's three-valve quench, the other a "straight" 0-v-1 of 8TN's. A 30-ft. end-on aerial was used, secured to a bush 8 ft. above ground. Stations heard on the "quench" were G8IX, 5AA, 5HA, and on the "straight" were 8OQ, 8HA, 5RD, 6VA, 2MC, 2HG, 2NM, 2JKP, although the last station was only S4 despite the fact that it was very near to their QRA. 6VA's QRK dropped by half when he changed the plane of his aerial from horizontal to vertical. Complaints of QRM were rife, hence the title of this very interesting article, which has materially helped to swell the useful reports.

#### Conditions

Most stations agree that conditions never seemed likely to produce DX. The sky, at most locations, was cloudy and overcast, and there were bright periods only at intervals. 2NM reports conditions most favourable from 1100 to 1300 G.M.T., when they fell off, to improve again at 1800. 2WS reports average conditions, with the more distant stations improving in the afternoon. 5CM remarks on stable conditions until 1600 B.S.T. when QSB set in on northern stations with poor conditions for the remainder of the contest. GW6AA sends in an interesting observation. At Snowdon summit conditions improved tremendously from 1300 to 1600 B.S.T., practically all stations heard previously improving by two S-points. This has been noticed on previous Field Days, with the peak arising about 1730. Can anyone explain this? G6QZ found conditions poor and the cloud formations there did not really scatter until 1600 G.M.T.

G8AAP noticed a fade of one to two points on 6SQ, while 8OQ was of the opinion that conditions were down. 2AAH reported conditions not too good with no further stations heard at his higher altitude QRA than at his home station. The C.C. stations were easier to receive on a swaying aerial. 2CIL found that signals at visible distances (2NMP, 6LK, 5OJ, 8KZP, etc.) were scattered, being received at almost the same strength with the receiving aerial beamed on the station or end on to the station. He propounds the theory that the strength of the sun has a definite effect on the bending and attenuation of ground waves, although, at the same time, suggests the varying strength of most stations was due to the use of rotating beams. Signals *via* the River Mole valley (2MC, 5RD, 8NVP, 5RDP, 6YP) were received between 1130 and 1730 B.S.T., while 2OD and 8IX were received over Netley Heath and Leith Hill. No QSB was noticed at this station at any time.

It seems that there was more variation of aerial systems (both as regards direction and type) than last year—due to better weather, and so some of the results at receiving stations may be attributed to this experimenting with aerials. The concensus of opinion seems to point to average or below average conditions.

#### Aerial Systems

Again, vertical and horizontal half-wave types, including the doublet and dipole, were well to the fore and about sixteen of this type were in use. Multi-wave (long) aerials were also in favour, there being seven of these in all. Four rotating beams, of various types, two Zepps, one V-type, one matched-impedance, and one 14 Mc. doublet were also used. This list includes transmitting and receiving aerials. Brief notes on results follow.

G2LCP found radiation in the westerly and south-westerly directions good. No reports were received from a southerly direction, because the station was on the north flank of the hill. This was due to the screening effect of the Laindon Hills. Radiation northward should have been present, but only G2UK (7 miles) heard signals in this direction.

G2WSP found his long-V aerial effective for stations within 20 miles, though not in the optimum direction for the system. Later, the 33 ft. aerials were used, as most stations heard were N. and S., or N.E. and S.W. A station near Sheffield was contacted on the N.E.-S.W. aerial, but reported an improved signal when the N.-S. aerial was used. Sheffield was due North. The strength of GW6AAP on Snowdon varied during the day.

G5CMP altered the slope of his 67 end-on Hertz from South to North at 1630 B.S.T., but did not contact any more stations.

G5CDP found that the highest point of a hill is not necessarily the best, but that the slope of the hill in the direction required is a more important factor.

GW6AAP was experimenting with the most satisfactory method of feeding aerials on the summit from a location some distance down the side. His aerial gave satisfactory coverage.

2AAH suggests little advantage in a portable site for receiving when a better aerial can be used

## NEW MEMBERS

HOME CORPORATES.

H. B. DENT (G2MC), 15, The Glen, Pinner, Middx.
A. E. SUTTON (G3BN), 29, Rossall Road, Rochdale, Lancs.
B. R. ARNOLD (G3FP), 20, Westbury Road, Croydon, Surrey.
R. W. CAVILL (G3GN), "The Thorpe," Riverside, Laleham-on-Thames, Middx.
E. H. D. COATES (G3NA), 52, Prout Grove, Neasden, N.W.10.
W. J. DAVIE (G3OR), 3, Chestnut Avenue, Whiteley Village, Walton-on-Thames, Surrey.
G. E. COOPER (G3PP), 61, Ringstead Crescent, Crosspool, Sheffield 10.
WM. O'DONNELL (GM3QA), 5, Chapel Street, Hamilton, Lanarkshire.
A. W. CHILDS (G6YZ), 24, Horsell Moor, Woking, Surrey.
A. G. BOON (2BAG), Gordon Villa, Ash Lane, Rustington, Sussex.
REV. D. J. LANE GRIFFITHS (2BGR), 98, Colum Road, Cardiff, Glam.
D. R. COCKINGS (2BIC), Avondale, Easemore Lane, Redditch, Worcs.
D. S. BABBAGE (2DBY), "Northcote," 30, Bodley Road, New Malden, Surrey.
R. L. PLUCK (2DIC), 9, Prospect Road, Southborough, Tunbridge Wells, Kent.
J. R. PETTY (2DPJ), 79, Glebe Road, Sheffield, 10.
T. S. WHITE (2DPX), 16, Eland Road, Langwith Junction, Mansfield, Notts.
J. HARE (2FBQ), "Hextol," Broom Lane, Whickham, Newcastle-on-Tyne.
WM. YORK (2FBR), 31, Woodford Road, Forest Gate, London, E.7.
H. B. HAWORTH (2FCU), 19, York Avenue, Darwen, Lancs.
N. V. NICHOLS (BRS3376), 14, Douglas Road, Luton, Beds.
W. D. OLIPHANT (BRS3377), "Jaraeldo," Burkitt Road, Woodbridge, Suffolk.
F. J. MERRIMAN (BRS3378), 42B, Raleigh Street, Walsall, Staffs.
P. G. MURDEN (BRS3379), 320, Bowes Road, New Southgate, London, N.11.
G. M. CAVENDISH (BRS3380), Crakemarsh Hall, Uttoxeter, Staffs.
J. G. RATCLIFF (BRS3381), The Warren, Dorridge, Warwickshire.
H. M. J. DAYER-SMITH (BRS3382), 53, Shakespeare Drive, Shirley, Birmingham.
E. P. WILLS (BRS3383), Rose Cottage, Dolton, N. Devon.
WM. SULLIVAN (BRS3384), 38, Nantcock Hill, Bassaleg Road, Newport, Mon.
D. P. L. MAY (BRS3385), 223, Thornton Road, Thornton Heath, Surrey.
E. H. LAISTER (BRS3386), 22, Church Hill, Winchmore Hill, London, N.21.
D. MATTINGLY (BRS3387), 13, Mountfield Road, Church End, Finchley, London, N.3.
D. B. RUSSELL (BRS3388), Belmont Hotel, High Street, Burnham-on-Sea, Som.
T. G. MILLER (BRS3389), 54, Magpie Hall Road, Chatham, Kent.
T. A. LEWIS (BRS3390), Elm Tree Cottage, Warmsworth, Doncaster, Yorks.
C. FORBES (BRS3391), 10, St. Peter's Buildings, Gilmore Place, Edinburgh, 3, Scotland.
T. W. BAKER (BRS3392), "St. Kilda," Palace Avenue, Paignton, Devon.
A. A. PEDEN (BRS3393), 5, Broom Crescent, Ochiltree, Ayrshire, Scotland.
L. C. DOVE (BRS3394), "Lingfield," Maidstone Road, Chatham, Kent.

DOMINION AND FOREIGN.

U. D. M. DIAS (CT2BM), Vila Porto, Santa Maria, Azores Islands.
FANS HERMANSEN (OZ4HF), Aakirkeby, Bornholm, Denmark.
A. F. MOY (VQ4KTB), Box 928, Nairobi, Kenya Colony.
H. F. J. POWELL (VQ3HJP), Aeradio Station, Dar Es Salaam, Tanganyika.
R. H. SUMMERS (W8OQF), 54, Fairwood Avenue, Pleasant Ridge, Royal Oak P.O., Michigan, U.S.A.
R. D. PHILLIPS (ZL4FW), 60, Royal Terrace, Dunedin, C.2, New Zealand.
R. GARWOOD (BERS449), 10th Heavy Battery, 4th Heavy Regiment, R.A., Fort Tigne, Malta.
E. G. LAMBERG (BERS450), 5, Fourth Street, Parkhurst, Johannesburg, South Africa.
S. G. OAKLEY (BERS451), No. 1 Bungalow, No. 2 (Indian) Wing, R.A.F., Risalpur, N.W.F.P., India.

## British Isles Calls Heard

*Eric Trebilcock* (*BERS*195), *Powell Creek, North Australia, July* 1-28, 1938.

7 Mc. CW: ei8j, g5dw, 8kw.

14 Mc. phone: g2jm, 5bj, 6pc.

14 Mc. CW: ei5f, 5j, g2by, 2km, 3bu, 5dy, 5my, 5nd, 5ns, 5ov, 5qy, 5xd, 5zt, 6lc, 6kp, 6ku, 6td, 6yg, 6yr, 8fc, 8iw, 8kp, 8ob, gi5wd, 8ts, gm6hz, 8sv.

## New Appointments

The Lord President of the Council has appointed Professor R. H. Fowler, O.B.E., M.A., F.R.S., at present Plummer Professor of Applied Mathematics in the University of Cambridge, to be Director of the National Physical Laboratory with effect as from October 1, 1938.

Professor Fowler will succeed Dr. W. H. Bragg, who has been elected to the Cavendish Professorship of Experimental Physics in the University of Cambridge.

## Trade Notices

*A. F. Bulgin & Co., Ltd.*, Abbey Road, Barking, Essex, have forwarded for review three new items which will have an appeal to readers.

The Type P104 Cable Connector consists of a circular fibre disc through which are inserted four spun over nickel plated brass prongs arranged on centres to allow fitting into a standard English 4-pin valve base. The cable ends would normally be soldered direct into the pins.

The Type P106 2-pin plug consists of a phenol fibre circular disc through which are mounted a pair of ¼" nickel plated brass rods spun over at the ends. The bottom end is flattened and pierced to facilitate soldering. A neat twin preset or trimmer condenser Type SW100 is also available.

## The Ham and the Expensive Bottle

It was—

*In his dreams for many years.*
*In his hopes for many months.*
*In his budget for many weeks.*
*In his shack for several days.*
*In his TX for several hours.*
*On the air for several minutes.*
In *the air for several seconds.*
*And on his mind for the rest of his life.*

G6WQ *via* G2CD.

## 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 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.

# BOOK REVIEWS

ELECTRON OPTICS IN TELEVISION. By I. G. Maloff and D. W. Epstein. 299 pages and 197 illustrations. Published by McGraw-Hill Publishing Co., Ltd., London. Price 21s. net.

The most important application of electron optics is television, and the authors develop in this book the theory of the subject and its application to the cathode-ray tube used in television.

The book is divided into three sections. The reader is first presented with a very clear outline of the television scheme, and is introduced to the requirements and terminology of the science.

Part 1 is devoted to a development of the theory of emission and electron optics. The authors have concentrated on electrostatic lenses employing co-axil cylinders, but other lens types are covered in addition to treatments of pure magnetostatic and combined electrostatic-magnetostatic focusing. An interesting chapter deals with defects in focusing arising from faulty construction of the tube, aberations, and space-charge effects.

Part 2 is concerned with the practical application of the theory, and problems arising in the design of tubes. After a consideration of the electron gun, a quantitative treatment is given to the deflection of electron beams. Various screens are investigated analytically, and also the ratings, classifications, and characteristics of tubes.

The book continues with a treatment of some of the apparatus associated with a television cathode-ray tube. In this section are found various types of oscillator, discharge tubes, magnetic deflecting yokes, and a description of the " inverse " method of calculating valve performance.

The concluding chapter describes modern methods of production of a vacuum and gives clear diagrams and illustrations of this step in the manufacture.

The authors have had first-hand experience of the subject at the Research Laboratories of the R.C.A., and in this book have produced a very valuable treatise on an important subject. The style is fluent, and the mathematical treatment no deeper than the subject warrants.

The book is recommended to those with an interest in this subject as a first-rate production in every way.

T. P. A.

HOW TO PASS RADIO LICENCE EXAMINATIONS. By Charles E. Drew. 201 pages, 73 illustrations, and many tables. Published by Chapman & Hall, London. Price 10s. net.

The aim of this book is to prepare readers for the commercial radio-telegraph and radio-telephone operators' examinations in the U.S.A. It will be, however, of more general interest, as the requirements for commercial operating are, more or less, internationally standardised. The apparatus described is American, of course, but the greater part of the text is concerned with principles and procedure.

The treatment of the subject is mainly by question and answer. The author states a question, and then gives what may be considered a specimen answer. This catechetic method of learning may have its advantages, but it also has its defects. It has a tendency to instil knowledge without learning, the acquisition of facts without a deeper understanding of them. Admitting that commercial operators require a rather superficial knowledge of technical matters, and even taking the title of this book in its narrowest meaning, one still feels that a sound understanding of basic principles is all-important.

The book opens with important excerpts from the F.C.C. Rules and Regulations, and passes on to transmitters. A well illustrated and informative section on this subject is followed by circuit diagrams of commercial arc, spark, CW and telephone transmitters, and, later, a very complete legend, explanation of the function of each part, and operational notes are supplied. Communications receivers for CW get similar treatment, but without full circuit diagrams.

Then rather belatedly appears a section on " General Principles of Electricity." Here one may well imagine the *reader* putting a question or two, such as, " You explain the meaning of wattless component of a current by showing a triangle in which the sides represent currents ; how can a line represent an alternating current, and what do the arrowheads mean ? " This vital section is covered in 25 questions, and deals with units, capacitance, resistance, inductance, phase, Ohm's Law, power factor, resonance, meters, etc. This is indeed the age of speed, but the *tempo* slows again in a very practical and valuable section on the care of storage batteries. Power supply apparatus is treated in rather similar fashion with much information on the maintenance side and a little theory to back it up.

The section on radio communication laws and regulations is obviously of the greatest importance, and is covered very well. It deals with such things as urgency and other calls, message counts and charges, traffic frequencies, the authority of the ship's master, etc.

A clear schematic diagram of a 250 watt broadcast station precedes a very interesting chapter covering radiotelephone transmitters and receivers, but the Heising system, which was described in the telegraph section, falls back on the " constant current " explanation. The reader will probably want to know how a constant current in a modulation choke can produce a voltage across the choke.

Further details are given about power apparatus in this section, and the regulations governing radiotelephone operating.

The Q code, abbreviations, formulae, and several interesting maps of beacon systems are given.

Despite these points of criticism, perhaps minor ones, the book is a useful and very attractive production, the diagrams being particularly clear and helpful. It should be of great assistance to those for whom it is designed, and of general interest to all commercial operators. T. P. A.

## Technical Articles

Technical articles are urgently required in order to maintain the present size of " The Bulletin." Members willing to contribute are asked to write to Headquarters giving a synopsis of the proposed contribution.

# Contemporary Literature

By L. Fryer (GM2FR).

S.W. & T. 441-Line Television Receiver (Part IV). C. W. Palmer, E.E. *Short Wave and Television* (Amer.), June, 1938.

A detailed description of the sweep circuits used in the 441-line receiver designed for the magazine.

* * *

The HK-54 200-Watt Transmitter. George W. Shuart (W2AMN). *Short Wave and Television* (Amer.), June, 1938.

The author describes a compact 200-watt outfit. The circuit is a straightforward 6L6 crystal oscillator, 6L6 buffer doubler and HK54 final amplifier.

The power supply for the oscillator and doubler stages and the filament transformer of the HK54 are mounted, together with the entire R.F. portion, on a chassis measuring 17 ins. by 13 ins. by 2 ins. The article is well illustrated by photographs and a circuit diagram, all necessary data being given.

* * *

Push-Button Control for Transmitter (Part 3). H. G. McEntee (W2FHP). *Short Wave and Television* (Amer.), June, 1938.

This is the concluding article of the series and describes the construction of a complete remote control system and an oscilloscope for use with a medium-power transmitter.

* * *

Gang Tuning for the Multi-Stage Transmitter. Don. H. Mix (W1TS). *QST*, June, 1938.

The author describes a simple system which reduces the number of necessary controls and enables the operator to select any frequency within a band.

* * *

The Extended Double-Zepp Antenna. Hugo Romander (W2NB). *QST*, June, 1938.

A discussion on the question of improved gain and horizontal directivity of simple aerial structures. The types treated are the Doublet, the Doublet-Zepp, and the Extended Double Zepp. The questions of Aerial Impedance, Feed Lines, Aerial adjustments, Line-current measuring devices, Parasitic elements and larger Colinear arrays are also dealt with.

* * *

A C.W. and 'Phone Station Freqmeter-Monitor and Modulometer with Cathode-Ray Tube. S. Leibowitz (W8BXN). *QST*, June, 1938.

The author describes the instrument used in his station to perform all necessary monitoring operations from one place on the operating table.

The instrument has finger-tip control. By a throw of a switch the following instruments are available: electron-coupled frequency-meter monitor, cathode-ray modulometer showing the trapezoidal pattern of the modulated wave and percentage modulation, and a moving element output meter for observing and controlling modulation peaks.

As an instrument for laboratory or test work it has the following uses: calibrated R.F. generator in the amateur bands, independent cathode-ray oscilloscope, output meter and decibel meter.

A New Type of Frequency Checking Device. George Grammer. *QST*, June, 1938.

A description of a signal generator giving 10 kc. intervals throughout the high-frequency spectrum. The circuit consists of a 100 kc. electron-coupled oscillator, followed by a harmonic amplifier with provision for feeding the output of a built-in 10 kc. multivibrator to the injection grid of the harmonic amplifier.

The valves used are: oscillator, 6K7; harmonic amplifier, 6L7; multivibrator, 6N7; and for the built-in power supply, an 80.

* * *

The Pentagrid Tube as a Combined Second Detector and Beat-frequency Oscillator. G. C. F. Whitaker. *QST*, June, 1938.

The author discusses a fundamental limitation in the use of a Pentagrid as indicated by the title ("When the beat-frequency oscillator is switched off to receive a modulated signal, a marked drop in sensitivity occurs"), and remedies this by a revised circuit which uses the standard arrangement for C.W. reception, but switches to grid-leak detection when receiving modulated signals. Circuit diagrams and component values are given.

* * *

A Simple One-Tube Receiver. T. M. Ferril, jun. *QST*, June, 1938.

A description of a receiver built expressly for the beginning amateur.

The receiver uses a dual valve, the 6F8G, operating on 3-volt heater supply and a 45-volt H.T., the circuit being a normal grid-leak detector with transformer-coupled L.F.

* * *

A Final Amplifier Tuning-Matching Coupling System. S. L. Seaton. *QST*, June, 1938.

The writer describes a method by means of which final tank tuning, as well as matching between the final-amplifier tank and the aerial-transmission-line combination, is effected with only two controls.

* * *

A 6L6G Speech Amplifier and Modulator. *Television and Short-wave World* (Brit.), July, 1938.

A unit using a low-voltage high-current circuit, giving high-quality reproduction with a maximum undistorted output of at least 14 watts.

The amplifier, which has been designed by G18TS for use at his station, consists of a 6J7 resistance coupled to a 6C5, which is, in turn, transformer coupled to a pair of push-pulls 6L6's.

* * *

A High-and Low-voltage Continuity Tester. *Television and Short-wave World* (Brit.), July, 1938.

A description of an interesting testing set designed by the engineering staff of Murphy Radio, Ltd. The instrument is essentially an ohm meter, with a range from 0.5 ohm to 25 megohms. Details for home construction and the circuit diagram are given.

(*Continued on page* 194.)

# 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 Malden, 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, Norfolk.

**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, Merionetn, 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. W. A. Clark (G5FV), "Lynton," Hull Road, Keyingham, E. Yorks.

**DISTRICT 19 (Northern).**
(Northumberland, Durham, and North Yorks.)
To be appointed

**SCOTLAND.**
Mr. James Hunter (GM8ZV), Records Office, 51, Campbill Avenue, Langside, Glasgow.

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

New Members are cordially invited to write to their local District Representative.

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## DISTRICT 1 (North-Western).

Birkenhead.—The T.R. regrets the non-appearance of notes for some months, but this has been due to the fact that none have been received. The Wirral Amateur Transmitting and Short Wave Club which continues to hold its monthly meetings is now publishing its own magazine "Local QRN," and is to be congratulated on its excellence. G8NH has WAC. Stations known to be active include 8NH, 2FZ, 8AA, 3CK, 2AHG and 6GL.

*Blackpool and Fylde.*—In view of the fact that the Society caters for the transmitting side of radio rather than the S.W.L.'s interests, it has been decided to change the name from Blackpool and Fylde Short Wave Radio Society to Blackpool and Fylde Radio Transmitters' Society. Meetings will continue to be held on the first Thursday in each month.

G6PO, late of Bolton, has returned to Blackpool. Other active stations are 3IC, 3IM, 3JY, 3KL, 5MS, 6MI, 6WQ, 8AK, 8GG, 8TI, 2COR, 2CWW, 2CMC and BRS2269.

*Bury.*—There has been little activity during the past month owing to the holidays, but the usual monthly meeting was held at the T.R.'s house, and six members attended. G2GA is now on 1.7 Mc. after an absence of several years, and would appreciate reports. 8NF would like reports on his 3.5 Mc. signals, and schedules with reliable stations for comparison of signal strengths according to local weather conditions. 8NL, 3CJ, 8QS, 2BGF and BRS3008 are also active.

*Liverpool.*—Twelve members attended the July meeting. It has been proposed that a Club Room shall be established and equipped with transmitting and receiving apparatus, access being available at any time. The views of all members in the section are awaited with interest.

No individual reports have been received, but

many members are building crystal controlled transmitters for 56 Mc. Two local members have been heard working on 14 Mc. telephony across town when DX conditions were particularly good, and it is hoped that this practice will cease.

A new feature has been introduced in the monthly meetings, and has proved both interesting and valuable. Each member present states the nature of his activities during the previous month, and mentions any difficulties which he has encountered. At the conclusion of his remarks a short discussion follows with a view to solving his problems.

### DISTRICT 2 (North-Eastern)

Local societies in most towns are now beginning their winter session, and it is hoped that members will give them full support. T.R.s are asked to remember that reports should be sent in to G6KU about the 23rd of each month. The Courtney Price Trophy has been awarded to Mr. F. W. Garnett (G6XL), and to him we offer our hearty congratulations. It may be opportune to mention that an old Leeds member, Mr. Scarr (G2WS), has been awarded the 1930 Committee Cup.

*Bradford.*—The winter syllabus of the Bradford Radio Society is being arranged and an invitation to attend is extended to all. BRS3312 now 2FFH, and is busy building a transmitter.

*Barnsley.*—Club meetings will commence at the end of September. Congratulations to Mr. D. Flavell (2CGD), who is now G3PG.

*Sheffield.*—Meetings will commence at the Angel Hotel on September 22, and a good attendance is requested. Suggestions will be welcomed, and the usual raffles will again be introduced.

### DISTRICT 3 (West Midlands)

We are glad to see that members have responded to our appeal made last month for more notes, and in particular we thank G3QG, of Stourbridge, for sending in the first report from Worcestershire.

*Coventry.*—We welcome 6FW to Coventry, and also record a visit from SU1WM, who was given the opportunity of visiting several local stations. G5PP and 6TD, who have been working from Meriden (the geographical centre of England) with the call 5PPP, have obtained the G.P.O.'s consent to erect a special long aerial suspended from 60-ft. lattice masts. 2LU, 2ZT and 5GR have been operating from the N.F.D. site with dry battery H.T. The gear, tent and three operators were transported in an Austin 7!

*Shrewsbury.*—Congratulations to 2CJO, who has been issued with the call 3PX.

*Stourbridge.*—Congratulations also to 3QG, formerly 2BKG, who is working C.W. and 'phone on 7150 kc. with an input of 3½ watts. He asks for reports. 6OI is on 28 Mc., and 2UV is active.

*Rugby.*—The following were present at a meeting held in Rugby on August 24: G2JN, 2XM, 3DI, 3IS, 3FQ, 6FP, 8FJ, 8RL, 8VN, BRS3045, 3100, BERS182 and VK7WJ. It was decided to give demonstrations of apparatus and lectures at future meetings, and to run a low-power contest commencing at midnight on September 23 and ending at midnight on October 21. C.W. on 7 Mc. only is to be used, and the input limited to 2 watts, the H.T. supply being 120 volts dry battery. One point will be given for every 50 miles contacted. Small prizes will be given to the transmitter gaining the most points and to the listener who logs the largest number of stations, calling or working, the transmitters taking part. All reports from listeners will be acknowledged. Transmitters who have entered the contest are G2JN, 3DI, 3FQ, 3IS, 8RL and 8VN. The next meeting will be held at the Brotherhood House, Castle Street, Rugby, on September 21, at 7.30 p.m.

G3DI and G3IS are active on 7 Mc. The latter's call has been pirated by someone giving his QRA as Lincoln. G3FQ, who is on 7 and 14 Mc., had a 'phone contact on 7 Mc. with W7BVO, using 10 watts input. He is testing a 14-Mc. folded square doublet, fed at the bottom end. G6FP is active during week-ends at Nottingham. G8RL, who is using 25 watts C.W. and 'phone on 7 Mc., employs a Sky Champion receiver. Mr. A. A. Goldie (BERS 182), on leave from India, is staying near Rugby, and on his return in a few months' time will apply for a VU call. Mr. J. C. Lithgaw (VK7WJ), is also staying in Rugby.

*Cannock.*—6SW hopes to be on 7 and 14 Mc. soon with a new aerial. 2YV has been on 14 Mc. 2FAH and 2FAP will shortly be applying for full calls. The Cannock and District Amateur Radio Society has been formed with 6SW as Chairman, and 2YV as Secretary. The Club has ten members.

### DISTRICT 5 (Western)

It is hoped that District 5 will be well represented at the Weston-super-Mare meeting which takes place on October 9. The programme, details of which appear elsewhere, will be a very interesting one, including as it does the showing of the "R.S.G.B. Scrap Book for 1938" films. At the time of writing the venue had not been decided upon, but those intending to take part are requested to get in touch with their respective D.R.s, who will be able to give them full particulars well before the actual date.

Activity throughout the District is normal for the time of year. The Bristol T.R. (G5UH) requests members to let him have regular reports, and he would like to see more of the "old-timers" at the monthly meetings which have now resolved themselves into interesting lectures and discussions.

Mr. D. F. Davies (ex-2CDL) is congratulated on obtaining his full call G3RG. Mr. A. J. Webb (2AJW) has left Bristol to take a position in London, and has our good wishes.

### DISTRICT 6 (South Western)

We are pleased to report that District 6 now has among its members another lady transmitter, Miss Bryan having been granted the call sign G5YL. she certainly deserves her permit, as she has worked hard to master the intricacies of radio, and congratulate her most heartily.

We were all naturally disappointed at finding No. 6 so low in the N.F.D. list, and it rather looks as though we are up against special difficulties of our own. In no district could the members have worked harder, either before or during the event. We thank all who took an active part, and wish them better luck next time.

*Exeter.* There was an attendance of 14 at the monthly meeting held at the Y.W.C.A. on August 3. A debate took place between G2FP and 8QL on the respective advantages or otherwise of the tritet as compared with the normal CO and FD.

*North Devon.* A welcome visitor during the past month was G6FO, who, during his brief stay, visited each station to renew old acquaintance. G3GH, whose QRA is becoming famous as a rendezvous for members visiting the district, had a full house during the evening of August 1, those present, in addition to several non-radiating members, being G6FO, 6GM, 8US, 8FP, and 5HK.

56 Mc. activity has been initiated by G3GH, who, pending the granting of a permit, is carrying out receiver tests with GW2OP at his summer QRA near Tenby, Pembrokeshire. G3BO, who has erected a 40 ft. mast, G8US, who is working 1.7 Mc. C.W., G6GM, 21D, 3AM, 2DOW, BRS2970 and 3169 all report active.

## WEST OF ENGLAND AND SOUTH WALES CONVENTIONETTE

*SUNDAY, OCTOBER 9, 1938*

AT

**GLASS'S RESTAURANT, REGENT ST., WESTON-SUPER-MARE**

| | |
|---|---|
| Assemble ... ... ... ... | 12 noon |
| Lunch ... ... ... ... | 1 p.m. |
| Short Business Meeting ... | ... 2.30 p.m. |
| Tea ... ... ... ... | 4.30 p.m. |
| Display of 1938 Films ... | ... 5.30 p.m. |

Inclusive charge 5/6

Reservations to G5JU or G6FO not later than Sept. 30.

*Torquay.* A special meeting was held at G5SY on August 26, to discuss the possibility of holding one or more 56 Mc. Direction Finding Field Days. Those present, in addition to the D.R., were: G2FP, 2CWR, BRS2927, 3171, and 3392. It was decided to hold tests on Sunday, September 18, and Sunday, October 1. As this issue should be out before the first of these events takes place, the D.R. would like to hear from all who can take part. A transmitter will be situated on high ground somewhere between Dartmouth and Exeter. Starting at 1300 B.S.T., a signal will be sent out for five minutes. There will then be a pause of ten minutes, when there will be a further five-minute transmission. This sequence of five minutes on and ten minutes off will be continued until 1700 B.S.T. All members taking part will then proceed to the Market Square, Newton Abbot, in order to compare notes. Various plans are being devised for the D.F., but the most hopeful appears to be the use of a loop of between 20 and 25 cm. diameter in place of the grid coil of a straight receiver.

*Plymouth.* Most members are active in this area.

No report has been received this month from Taunton.

### DISTRICT 7 (Southern).

The first monthly meeting of the winter season will be held at "The Tumble Down Dick" Hotel, High Street, Farnborough, Hants., on Sunday, October 2, starting at 2.30 p.m. sharp.

Mr. Frank Wadman (G2GK) has been elected the new T.R. for Kingston and District, and notes from members in that area should be sent direct to him at "Widecombe," 20, Dale Road, Walton-on-Thames.

*Oxford.*—Activity has been rather curtailed by holidays but G8LV, 8PX, 5HS, 5LO, 3HC are active. G5LO has heard the following stations on 56 Mc.:—G8MG, 8PX, 5MAP, 2GG, 2OD, 2MV. A "Q" type aerial gives best results.

*Kingston.*—The new T.R. hopes to visit all members in his area. G8HA is using a 134 foot end-fed aerial on 14 Mc. 2CXI is testing C.C. on 56 Mc. G2GK's new transmitter has produced good results, the expanded metal construction proving effective. G6PK has relinquished managership of 56 Mc. group for T.V.A.R.T.S. G3OR is a new call in Walton-on-Thames. G2GK, 3AV, 3BF, 3MF, 3OR, 5LC, 6PK, 8HA, 8HY, 8SM, 2CXI, 2DOK, 2DOP, BRS3004, 3297, are active.

*Portsmouth.*—G6NZ has temporarily left the area; we shall certainly miss him very much. A meeting for the purpose of electing a new T.R. will be held early this month, but in the meantime all notes should be sent to G2XC, "Rochdale," London Road, Purbrook, Portsmouth. Meetings will be held as usual on the first Thursday in each month.

### DISTRICT 8 (Home Counties).

At a meeting held at the Lion Hotel, Bedford, on August 5, Mr. G. A. Jeapes, G2XV, informed those present that he was compelled with regret to relinquish his office as D.R., owing to unforeseen business pressure. This news was received with much dismay, and a vote of sincere thanks for his past efforts on behalf of the District was proposed by Mr. H. R. Jeakings, G5FO, supported by Messrs. H. W. Scott, G5DR, and W. Carter, G2NJ.

As a result of advice from the District, Mr. S. J. Granfield, G5BQ, has been invited by Council to accept office as from September 1, which offer he has accepted.

The retiring D.R. feels sure that Mr. Granfield will receive the full support of the members in his district, and he hopes that everyone will endeavour to make his task as light as possible.

The following stations are known to be active within the District: G5JO, 5BQ, 2XV, 2PL, 5DQ, 5FO, 5DR, 8SY, 5OV, 8FF, 3BK, 3CY, 2UQ, 3DY.

Notes for the October issue should be sent to Mr. Granfield, 47, Warren Road, Milton Road, Cambridge.

### DISTRICT 9 (East Anglia).

According to the reports received this month activity seems to be very low, possibly due to holidays.

*Ipswich.*—There has been little outstanding activity to report, except G3IN, who has been working DX with an input of only 2 watts. Other stations active include G2JD, 2DT, 2AN, 3NQ, 6TI, 8KB, 8AG, 8AN and 8MU. We are sorry to lose G2DT, who has been promoted to Cambridge; we wish him every success at his new QRA.

*Norwich.*—G6QZ is active on 28 Mc. and will shortly continue his 56 Mc. transmissions.

The next District Meeting will be held in Norwich as soon as a suitable Sunday rendezvous can be found. The D.R. would be pleased to hear from any member who can offer suggestions.

### DISTRICT 10 (South Wales and Monmouthshire)

An analysis of the N.F.D. results, published in the August BULLETIN, gives us the following individual placings: G2JLP (1.7 Mc.), 4th; GW5KJP (3.5 Mc.), 10th; GW8CTP (7 Mc.), 4th; GW5BIP (14 Mc.), 8th. In view of the fact that there were 27 entrants, and our final placing on points was eighth, the indication is that the general ability, efficiency, and team-work of the District is up to a good standard. It takes something to get a high place in N.F.D. these days, and all concerned can feel they did well for No. 10.

The attendance at the Cardiff meetings is being well maintained, those present on August 18 being G2JL, 2UH, 2XZ, 5AB, 5BI, 5TJ, 5VX, 5XN, 8AM, 8NP, 8WU, 2BQB, 2CDM, 2DOS, and 2DSD. At this and the previous gathering on July 21, many matters of general interest were discussed.

With regard to the proposed October Conventionette at Weston, an announcement may appear elsewhere in this issue. In any case, all concerned will be notified of the arrangements in good time, and it is hoped that there will be a worthy turn-out from all over the West of England.

As Convention marks the opening of the season, the D.R. would like to hear regularly from all T.R.s, and also asks to be informed in advance of any local meetings which may be scheduled, in order to be in attendance if it is possible.

Good luck to everyone, and let us hear all the news of DX interest or experimental value.

## FORTHCOMING EVENTS

| | |
|---|---|
| Sept. 16 | District 12, 7.30 p.m., at the Orpheum Cinema, Temple Fortune, N.W.11. |
| ,, 21 | District 14 (East Essex section), 8 p.m., at G2LC, 24, Percy Road, Leigh-on-Sea. |
| ,, 21 | Scotland "E" District, 7.30 p.m., in Fleury Meng's, 48, Newmarket Street, Ayr. Special attraction. 1937 N.F.D. films and other film of radio interest. |
| ,, 21 | District 15, 7.30 p.m., at 2BVX, 35, Green Lanes, Terriers, High Wycombe. A paper will be given, subject to be announced at meeting. |
| ,, 22 | District 13, 8 p.m., at Brotherhood Hall, West Norwood. |
| ,, 22 | District 12 (Watford Section), 7.30 p.m., at 2BUP, 50, Oundle Avenue, Bushey. |
| ,, 23 | Display of 1938 Films at I.E.E., London. Ladies invited. Tea from 6 p.m. Commence at 6.45 p.m. |
| ,, 27 | District 14 (East London Section), 8 p.m., at G8AB, 35, Priory Road, Loughton. |
| ,, 28 | Scotland "A" District, 7.30 p.m., in room "A" Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, Glasgow. |
| ,, 30 | Northern Ireland, 7.30 p.m., at Thompson's Restaurant, Donegal Place, Belfast. |
| Oct. 2 | District 7, 2.30 p.m., at Tumble-Down Dick Hotel, High Street, Farnborough. |
| ,, 2 | District 12 (Welwyn Section), 7.30 p.m., at G6XN, 13, Mandeville Rise, Welwyn Garden City. |
| ,, 5 | S.L.D.R.T.S., 8 p.m., at Brotherhood Hall, West Norwood. |
| ,, 6 | District 14 (Colchester Section), 7.30 p.m., at G8PZ, 19-21, Artillery Street, Colchester. |
| ,, 7 | District 8, meeting in Cambridge. |
| ,, 13 | District 10, 8 p.m. at the Globe Hotel, Duke Street, opposite Castle, Cardiff. |

***The Cardiff group, GW5BIP, with their 14 Mc. N.F.D. gear.***

### DISTRICT 12 (London North and Hertford)

With the commencement of district meetings this month we look forward to another year of activity, and it is hoped that the large attendances will be maintained. The D.R. was very pleased to meet so many old friends at Radiolympia and would like to take this opportunity of welcoming Capt. Thorpe (ex-ZS1AH) to the District.

G2QY, who is on 56 Mc., using a crystal-controlled transmitter, gets reliable contacts up to 36 miles and good reports from 50 miles. G3MS has had his first contact with W.

*Central Herts.*—G2YN is active with D.F. contests, both with G8LM, the Murphy Radio Society call, and with his old confrères, the Southend Radio Society. The T.R. (G5UM) wishes he would try his skill on some of the local pirates, as they persistently use his call on 7 Mc., a band for which he is not licensed, and on 'phone, which he never uses.

G3JX (Harpenden) has been doing well with a 6L6G as a 28 Mc. P.A., and has worked PY. G2KQ is testing sloping aerials with which he has W.A.C.

All central Herts amateurs are asked to note that the local meetings will be resumed on the first Friday in October, full details appearing under "Forthcoming Events."

### DISTRICT 13 (London South).

The usual monthly meeting was held at the Brotherhood Hall on August 18, and was well supported in spite of the fact that the BULLETIN was not published until after this date, and there-

fore, the announcement of the meeting was not as generally known as we would have wished.

Activity within the District appears to be at a low ebb owing to holidays, but the usual increase in activity is expected with the approach of the winter season. The D.R. was very pleased to meet so many South London amateurs and other old friends at the Exhibition and Convention. G3GU, 2GZ and 2WV are still continuing their aerial experiments. The two latter have both erected di-pole low-loss feeder aerials and some very interesting results have been obtained.

Will members please note that a full District Meeting and Jumble Sale will be held in October. The next meeting will be held on September 22.

We would apologise for the shortness of these notes, due in the main to the Exhibition, which at the time of writing was occupying most of the D.R.'s spare time.

**LONDON MEETING**

*Friday, September 23rd, 1938*

at

**I.E.E., SAVOY PLACE,**

**Victoria Embankment**

Tea, 6 p.m. Commence 6.45 p.m.

DISPLAY OF SOCIETY FILMS

## DISTRICT 14 (Eastern).

*East Essex.* A number of stations are rebuilding, including G5XI, 5UK, 5VQ, and 2LC. Those active include 2SO, 2KH, and 3OA, the latter is doing well, using dry batteries on both phone and C.W. 2ALH, of Laindon, will shortly receive his full call. Congratulations to G3NP, of Pitsea (late 2BXB).

*Chelmsford.* The following are active. G5RW, 5RV, 2KG, 3BS, 8AD, and 6LB, the latter now at Binacre, finds his location better than at Wanstead. An informal hamfest was recently held at G3BS, and was well attended by Essex members. Thanks are due to Mr. and Mrs. Mappin for providing the necessary catering. G5RV has worked over 100 countries and now awaits only two cards to qualify for DX Century honours. G3BS is also piling up his DX.

*East London.* Offers of QRAs are invited for future meetings. G3KZ, of Manor Park, is shortly moving to a new QRA. 2DHA, of Thaxted, has passed his morse test and now awaits his full call.

## DISTRICT 15 (London West, Middlesex and Buckinghamshire).

Congratulations to G6CJ and his merry men in winning a N.F.D. replica. We are sorry the District just missed first place, but it speaks well of the enthusiasm shown to see our score near the top each year.

The D.R. writes as follows: "On behalf of Mrs. 6WN and myself I should like to thank everyone responsible for sending us good wishes on the occasion of our marriage and also the wedding presents. The latter were very much appreciated, and it is our hope that you may all have the pleasure of seeing them in our new home some time in the near future."

Please note that the D.R.'s address should have read 539, Oldfield Lane in the last issue.

Reports are few this month, and there is nothing outstanding of interest except that G6WN is having difficulty with the local council over the erection of aerial masts. The following are active: G2LA, 2KI, 2NN, 3JG, 3QR, 3GQ, 3RD, 5VB, 6GB, 6LW, 8HN, 2CAL, G2RL, 6JK, 8JK, 8VZ, 2AKZ and 2BAO. Congratulations to 2BGQ, who is now G3RD.

## DISTRICT 16 (South-Eastern).

*Ashford.*—Meetings are well attended. G2QT is still getting out well and his latest is an S9 report from VK on 'phone. Active: G2JV, 8RK and 2DCL.

*Brighton and Hove.*—No material for notes received by 2CTO this month. Will all members please report to him before September 20?

*Gravesend.*—G3GP, the Club's 56 Mc. portable station, was in the field on August 14, but no contacts were effected. Active: 2IZ, 2TN, 5IL, 6PG, 6VC (all on 56 Mc.), 2KL, 5SU, 6BQ and 8HK on other bands.

*Heathfield.*—Hearty congratulations to BRS1173 on finishing third in the receiving section of the B.E.R.U. Contest.

*Tunbridge Wells.*—6ML has moved from Uckfield and is now testing aerials at his new QRA at Rusthall. 2UJ and 5KV are co-operating on 56 Mc. The former now has a half-wave horizontal 8JK beam 45 ft. above ground. His receiver sensitivity has been further improved and 5RD has been heard on 'phone, but CW activity on the band is very low at the present time. Also active: 6OB, 2AKQ and 2DIC.

*West Sussex.*—The Sussex Short Wave and Television Club has been formed from the "West Sussex." 2ZV is having great success on 56 Mc., and is on the band every night at 22.00 B.S.T. He has a nightly sked. with 2OD on 'phone, and the average signal strength over a considerable period has been S7 both ways, while a QSO has been effected on CW with 5RD at 70 miles. The best DX so far recorded by 2ZV is 6FO in Newport, Mon. Signals have been heard in both directions at strengths up to S5, but no QSO has so far resulted. 6FO has also been heard by 2DDD in Angmering. The distance is 125 miles.

## DISTRICT 17 (Mid-East)

*Grimsby.*—Although reports are scarce this month it is known that 56 Mc. activity is growing, and it is hoped that reports will soon be received from those stations now carrying out tests on this band.

*Horncastle.*—2AAS sends in his usual report together with an offer to stand by for tests from any 56 Mc. transmitter in the District.

*Mablethorpe and Sutton.*—G2FT, 5CY, 5BD and 5LL all report activity. 5CY and 5LL are co-operating in tests on 56 Mc.

*Cranwell.*—Activities here have been curtailed owing to annual leave, but the District join in offering their congratulations to the operators of the Cranwell N.F.D. Transmitter which was successful in winning a replica.

*Boston.*—The only news from the Boston area comes from G8GI, who paid a welcome visit to the scribe. 8GI still awaits schedules on 1.7 Mc.

### DISTRICT 18 (East Yorkshire)

Again no notes have been forwarded from this District, but we have been asked to mention that G6CP is in hospital with a broken leg as a result of an accident whilst at work. His friends wish him a speedy recovery.—ED.

## Northern Ireland

There has been little activity owing to holidays. GI5UR has worked for the first time PJ, OY, CX and also UX1CP in Franz Josef Land. 5HV hopes to be on the air again in a few weeks after rebuilding. 3KV is active on CW and 'phone since receiving his full ticket. 6YW is building modulator unit. 3IA is testing aerials, and is on CW and 'phone. Congrats. to GI8GK on his recent marriage. 8TS has been getting ready for 56 Mc. field days.

GI2KN transmits only on 7 Mc., but will gladly arrange listening skeds on all bands from 56 Mc. downwards.

We are sorry to lose GI2SB and 2DQL, both of whom have our sincere good wishes on taking up appointments in England.

Several Ulster members had the pleasure of representing GI at Convention and the joyful responsibility of bringing back the N.F.D. trophy for this session.

Don't forget the tea and after-meeting at Thompson's Restaurant, Belfast, on Friday, 30th inst., when the Shield will be on view. As previously, members will order tea "à la carte" to suit their taste. Similar District meetings are arranged next year on the *last Fridays* in January, March, June and September.

## Scotland

News is exceedingly scarce this month, due, no doubt, to holidays.

"*A*" *District.* The usual monthly meetings will resume on Wednesday, September 28, as before in Room "A," Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, Glasgow, at 7.30 p.m. There may be also an additional meeting each month later in the season, but details are lacking at time of writing. Mr. J. Roy, 2ARO, is now GM3OM.

"*B*" *District.* Meetings have resumed, and a programme for the coming season has been drawn up. Among the forthcoming attractions are visits to the local Telephone Exchange and Electricity Generating Station, a talk on "Amateur Radio in the Past" by GM6IZ, and a debate on the power question. A local low power contest is also on the programme. GM3CG, 3GG, 5YN, 6VO, 8AS, and 8SV report active on 7 or 14 Mc. GM6IZ reports WBE on 28 Mc., and GM6BM has at last received cards for WBE and WAC. Four BRS have applied for A.A., while 2AJB has passed his morse test and awaits call. GM2OX is active on 1.7 Mc., and would like to see more local activity on this band.

"*C*" *District.*—A very well-attended meeting was held at Jollys, Broughty Ferry, on August 30. GM3IX, 6KO, 6RT, 5SC and 8HM are active, the two latter have qualified for W.A.C. and 5SC, also for W.B.E. 8CF has a 33-ft. dipole for reception and a 67-ft. Windom for transmitting. The combination proves satisfactory for break-in work. BRS2798, 3321 are also active.

Eight of the ten members present at the above meeting intend to attend the Scottish Convention. District "C" members will meet at GM5SC at 9 a.m. on September 18.

"*D*" *District.* The only stations heard active are GM3BA, 5GK, 6FN, 6NO, 6LZ, and 6UU.

"*E*" *District.* The first meeting of the District will take place on Wednesday, September 21, at 7.30 p.m., at Fleury Meng's, 48, Newmarket Street, Ayr. A special attraction will be the screening of the 1937 N.F.D. films and another film with a definite radio interest. A large attendance is hoped for. Mr. G. Percy, 2BXR, is now GM3OL. BRS 1295 sends his usual monthly report.

"*F*" *District.*—News is scarce but 2AJP, who is now GM3OM, has worked some good DX with 8 watts to W8JK aerial. We sympathise with GM6RV on the loss of the little finger of his right hand.

"*G*" *District.* No news is to hand with the exception of a report from GM5FT, who is now licensed for 28 and 56 Mc.

*GI5URP during N.F.D. Left to right: GI3KV, 3IA, 8GK, 2GHU, 5UR.*

## Reports Wanted

VS3AD (Malaya) on his 1775 kc. C.W. transmissions. All reports will be acknowledged.

## Egyptian Notes

At present activity in Egypt is very low due to most of the operators being away on vacation. Those here are overhauling their gear ready for another DX season.

The Heliopolis Club still await their licence and the gear is now nearing completion.

The writer spent a very interesting two weeks at Alexandria and was pleased to meet the SU1A group once more. A trip round their stations under the able guidance of 1SG, 1JM and 1TM, terminated at 03.30.

Ex-SU1HB now at Karachi has a T20 and T55 on order. We all wish him a pleasant time in VU and hope to hear him on the air soon. The writer is now QRT and getting ready for his return to G.

SU2TW.

# BRITISH EMPIRE NOTES AND NEWS

## Australia (Western)

By VK6WZ.

NOTABLE during August was the General Meeting of the W.A. Division of W.I.A., at which a good attendance of transmitting and student members spent an interesting evening. Business was speeded up in accordance with the new Council's scheme for brightening meetings, and included the nomination and election of five members to the Committee of the new Transmitters' Development Section. They were 6LW, 6NL, 6CP, 6BB, and 6WZ. T.D.S. is intended for the guidance and mutual benefit of active transmitting members, and it is hoped to get things moving very soon.

6BE and 6YB—two new amateurs—were declared full members. The surprise of the evening was provided by ZS1CU (Mr. G. H. Grey), who gave a most entertaining account of his experiences in various parts of the world as radio op. His copy of the " Handbook " went the rounds for autographing and it soon became a problem to find fresh space.

6WS gave a brief account of his method of tracing QSO's by means of a large wall map, and 6BW gave the main lecture of the evening—a talk on talkie projection, which was greatly appreciated and enjoyed.

Most VK6 activity has taken place on 7 and 14 Mc. lately, the former used for Sunday morning " rag-chewing," up and down the State, and for night-time, interstate QSO's with a sprinkling of DX contacts to be had at certain times, while the latter yields prolific results for those with the patience to keep watch and sieze the " bright spots." While contacts on C.W. are easy on 7 Mc. between the various VK divisions at night, there appears to be an absence of the extensive interstate phone QSO-ing which was a feature of last winter. ZL, W and K7 together with the " local " PK's represent the scope of signals from outside VK heard on 7 Mc. at night.

14 Mc. reaches its peak during afternoons and early evenings with signals on phone and C.W. from almost every part of the world (except the elusive South American continent), and a handful of VK6's active on this band are doing well.

As far as is known, no VK6 station is working 3.5 or 1.7 Mc.; static is terrific on these channels.

28 Mc. is lively at odd intervals—mainly during mornings, and one or two local stations are active there. Signals are, almost without exception, subject to heavy QSB, and even the best of them fall to quite low levels at times during a transmission.

Activity seems confined to a few " regulars " made up of one or two old-timers and the majority of newcomers, who seem to make good use of their newly acquired licences. 6SA, frequently heard working DX, rarely QRS no matter what he works. 6AF spends a lot of time on 14 Mc., with an 807 in the final. 6PK is on long-service leave and is touring Java, F.M.S., and Ceylon. 6YZ awaits a pair of 866 juniors. 6FL back on the air again at Geraldton, seizes every opportunity to get on 7, 14, or 28 Mc. 6GM is another old-timer to experience a revival, and now has 50 watts into an 800 with 6L6 modulators.

Country stations heard include 6HT at Albany, whose gear has been adapted for A.C. operation, 6EC in the same district, who has had trouble with 6P6s, and power supplies, 6WG, of Wiluna, with phone and C.W., 6AW, the QRP man at Boulder, and 6WL, who does a remarkable job on an entirely battery-operated rig.

In the metropolitan area, 6LW is back with an 807; 6GB is consistent on 7 Mc., as is also his neighbour, 6CP, who is trying a new 14 Mc. aerial; 6NL is heard now and then with a new Morse code from his " side-swiper "! 6WZ is testing a new final with an 807 and striking trouble with a home-made keying relay.

## British West Africa

By ZD2H

*Nigeria.*—Conditions on 14 Mc. during recent months have been reasonably good with low noise level. 7 Mc. is also open and peak conditions are experienced around 0600 G.M.T. ZD2G (ex VQ2RS), who is making rapid progress with his new rig, a 6L6 driving an RK20, is impatiently awaiting gear ordered from England but hopes to be active on 14,030 kc. by the time these notes appear. ZD2H (G2QN) is active nightly on 14,300 kc., reporting the usual DX. He is anxious to contact VK's and ZL's.

*Gold Coast.*—ZD4AA, who has confined his activity to telephony on 14,160 kc., is now on leave, but no doubt additional equipment will accompany him on his return. ZD4AB (ex G2TH) commenced activity on July 10 with 20 watts to a 6L6. Working on 14.340 kc. with a single wire aerial, he has raised much DX and only awaits an Australasian contact for WAC and WBE. VKs' and ZL's please note. He welcomes G contacts, the best time being between 1700-2000 G.M.T. During a recent French QSO a suggestion was made to ZD4AB that QZB4 should be interpreted as meaning " You are my first ZD4 QSO! "

Local members are invited to communicate with A. Tomlinson, Posts and Telegraphs, ZD2H.

* * *

(For the first time since Capt. Wilmot, ZD2A, left the Gold Coast several years ago, we are able to publish notes from British West Africa. We are grateful to Mr. Tomlinson for sending us news and hope all local members will keep in touch with him.—ED.)

## Eire

By EI9D.

EI6F was the first EI in the Senior B.E.R.U. Contest, therefore subject to confirmation by the I.R.T.S. Committee, he is the winner of that Society's B.E.R.U. Cup. We offer him our sincere congratulations. We also heartily congratulate GI on their splendid performance in winning the N.F.D. trophy. Fine work, you fellows, but look out for yourselves because, border or no border, we shall have a good try at taking it from you next year! In EI we are pleased with the success of our station EI6FP. By winning the 1.7 Mc. replica we feel it will spur us on to further effort when, in June next, we again take the cobwebs off the gear and get down to it.

EI5F has now contacted all British Dominion districts, and during the month he made the first EI/ZD4 contact when he was QSO ZD4AB. EI5F

has changed his QRA to No. 2, Maretimo Place, Blackrock, Co. Dublin.

EI6M, Valentia Island, off Kerry, is active on 7 Mc., but has been having some difficulty in getting out with QRP. He is anxious for contacts on that band, and all reports will be welcomed.

The proximity of Convention and arrangements for getting across to London outshone everything else at the time of writing. Anyhow, before this appears in print EI5J and 9D hope to have had a look at London again.

## Malta

By ZB1E.

After a heat-wave which lasted for three days in the second week of August, conditions improved considerably on both the 7 and 14 Mc. bands. DX on the latter band becomes audible at about 15.00 G.M.T., and PK, VK and ZL signals have been heard at a good S5, gradually fading out as the band swings round for South Africans when at 17.00 G.M.T. ZS and ZE come in at S6. As midnight approaches the band swings round further, and Ws start coming in well.

It may be of interest to report a loud hissing noise on the 14 Mc. band which occurred on August 25 at 09.50 G.M.T., which started suddenly and lasted for four minutes, gradually fading out in about another two minutes. This hiss was accompanied by a complete fade-out of the band for a period of three minutes after the cessation of the hiss. In ten minutes the band was again normal. This is the first time that this effect has been heard in Malta.

We regret to report the untimely death of ZB1C (recorded elsewhere in this issue), and feel sure that many 28 Mc. workers will miss his signals. We welcome BERS449 to our fold and amateur radio.

The reunion General Meeting will be held on October 5, at 5.30 p.m., at the usual place.

## Northern India

By VU2AN *via* G5QV.

The 28 Mc. band opened up early for VU on the last day of July and several stations took advantage of the patchy conditions. 14 Mc. is showing signs of DX once more after its summer slumber. A new call is VU2EU on 14,380 kc. owned by W. Metcalfe, 3rd Indian Div. Signals, Meerut. He is using a pair of 6L6's in the final from 220 volt D.C. mains and worked 23 countries and 5 continents in ten days.

VU2ED, who is rebuilding to a pair of 6L6's final, is also on D.C. mains. 2FX, who is hovering round the ninety countries mark, has recently added OQ5AQ, VP8AG, and YA5XX. 2AN, who is troubled with severe thunderstorms, had G contacts on 28 Mc. on August 14 and is hoping for a good season on this band. 2DR reports 107 QSO's with G5QV in just over a year and also states that VU2AM had a trip to W1 during July.

## South Africa

*Division Six.*—ZS6C is constructing a crystal controlled outfit for 56 Mc., utilizing the circuit of G5JU, particulars of which were published in the April issue of THE BULLETIN. 6T is active on 7, 14 and 28 Mc. But his new transmitter is not yet completed. He heard GM6RG recently at S9 on 14 Mc.; and also reports that 28 Mc. D.X. is audible.

(*Continued on page* 194)

# CORRESPONDENCE

## G2YY DE G5BW

*To the Editor*, T. & R. BULLETIN.

DEAR SIR,—With reference to Mr. Young's letter in the August BULLETIN, I regret that he has seen fit to make a personal attack on myself and the F.O.C., and (perhaps understandably) ignored the points raised in my N.F.D. letter. For my part, having drawn attention to what I regard as one of the "chinks in our armour," I was quite prepared to let the matter rest there. Mr. Young's letter, comprising as it does so many completely unfounded statements, makes it essential that I should refute his accusations publicly.

I was not aware that I had set myself up as a "self-styled No. 8 hat authority" on the operating "racket" (if I may borrow Mr. Young's quaint phraseology). I am, however, qualified by training and experience to pass opinions on the subject, and such being the case I hesitate to recommend his method of acquiring the rudiments of operating. My advice to beginners is to listen to stations who you *know* are good operators, not to pick out a "strong clean signal" on 7 Mc. which you may *think* is good sending. Furthermore, strong clean signals, even when they actually are accompanied by good sending, do not necessarily imply that the man at the key is a good operator.

With regard to spending more time with newcomers, since the G8 and G3 series commenced I have had 635 contacts with G8 and 130 with G3. If any of these stations have ever received anything but courtesy and consideration at my hands let them furnish details to the BULLETIN for publication. As for sending "Test" at 25 wpm, I have never exceeded 15 wpm for Test calls since I came on the air.

Mr. Young says that the "Lids of to-day will be the good operators of to-morrow." Unhappily, as far as many of them are concerned, to-morrow never comes. The mere passage of time is rarely sufficient to make a good operator; the main requirement is proper coaching. Referring to the Biblical quotation, somebody has to judge, and in that case let it be a person well qualified to do so. As for being judged, I am quite willing to be—my 7 Mc. frequency is 7,070 kc., and I am active most days.

In conclusion, may I point out that my N.F.D. letter was purely an expression of my personal opinion, and had nothing whatsoever to do with the F.O.C. The opinions of F.O.C. members on the subject of N.F.D. are unknown to me, although I have received sufficient communications from amateurs of standing to convince me that the letter in question was not a solitary voice crying in the wilderness.

Yours faithfully,

R. B. WEBSTER,
G5BW.

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## 56 Mc. Flash

CT1RB informs GW2NG that he will use an automatic sender, with 700 cycles tone CW, every day, from 1400 to 2030 BST and will call "CQ FIVE DE CT1RB." Reports should be sent *via* CT1CO or R.E.P.

## INDEX TO DISPLAYED ADVERTISEMENTS

# QRA Section

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

When sending in new, or changes of QRA, 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

E13G.—D. A. KELLY, 35, Pembroke Park, Dublin, Eire.
G2DI.—D. L. NUNN, 41, Orford Street, Ipswich, Suffolk.
G2KC.—N. L. AVERY, 97, Bellemoor Road, Southampton, Hants.
G2KQ.—R. CAVE, 178, Peartree Lane, Welwyn Garden City, Herts.
G2KZ.—F. H. JACKSON, 68, Wilmslow Road, Withington, Manchester, 20.
G2LV.—V. LEACH, Wychwood Road, Gloucester.
G2QL.—H. J. CLEMENTS, 16, Lynton Road, South Chingford, London, E.4.
G2SY.—WM. ROGERS, No. 1, South Bridge, Northampton, Northants.
G2UK.—Dr. A. C. GEE, Resident Medical Officer, City Isolation Hospital, Nottingham, Notts.
GW2WO.—W. K. WALKER, "Rochford," 151, Dunvant Road, Dunvant, Swansea, S. Wales.
G2XA.—A. BELL, 22, Orchard Road, Anlaby Park Road, Hull, Yorks.
G3BW.—W. H. HODGSON, 53, Hill Top Road, Arrowthwaite, Whitehaven, Cumb.
G3CP.—J. W. TURNPENNY, The Oaks, Chase Road, Brocton, nr. Stafford.
G3FP.—B. R. ARNOLD, 20, Westbury Road, Croydon, Surrey.
G3GI.—A. V. WHITE, 59, Phillips Road, Folkestone, Kent.
G3GN.—R. W. CAVILL, "The Thorpe," Riverside, Laleham-on-Thames, Middlesex.
G3HL.—N. L. COLE, "TREGEAR," Sunnydale, Hinckley, Leics.
G3JN.—A. F. JOHNSON, Officers' Mess, R.A.F., Thornaby-on-Tees, Yorks.
G3JT.—G. H. MARSHALL, 148, Shaw Road, Oldham, Lancs.
G3KA.—F. HARRISON, "Roseneath," Wellspring Road, Gloucester.
G3KG.—A. G. TEARLE, 16, Kenilworth Road, Luton, Beds.
G3KH.—A. H. PARKER, "Sunnybank," 49, Turnbull Drive, Narborough Road South, Leicester.
G3LN.—P. H. ROCK, 258, Yardley Fields Road, Yardley, Birmingham.
G3MB.—JOHN T. FOX, JR., 53, Market Place, Thirsk, Yorks.
G3MR.—J. E. THORNBER, 3, Dean Avenue, Old Trafford, Manchester, 16.
G3NA.—E. H. D. COATES, 52, Prout Grove, Neasden, London, N.W.10.
G3NB.—DON SUTTON, 337, Locking Road, Weston-super-Mare, Som.
G3NL.—G. W. PARKES, 14, Bilford Road, Worcester, Worcs.
G3NQ.—W. J. BARKER, 7, Deber Avenue, Martlesham, nr. Woodbridge, Suffolk.
G3NW.—L. G. SHAW, 12, Borovere Gardens, Alton, Hants.
G3NZ.—J. MCDERMOTT, Shaw Heath Gardens, Mobberley Road, nr. Knutsford, Ches.
G3OI.—A/A R. WILSON, D4 Flight, D Squadron, No. 2 Wing, E. & W.S., R.A.F., Cranwell, Lincs.
GM3OM.—O. M. DERRICK, "Gowanhill," Drip Road, Stirling, Scotland.
G3OQ.—B. SNOWDON, "Rossmoor," Newchurch Road, Cloughfold, Rossendale, Lancs.
G3OR.—WM. J. DAVIE, 3, Chestnut Avenue, Whiteley Village, Walton-on-Thames, Surrey.
G3OS.—F. GREEN, JR., 24, Woods Terrace, Gainsborough, Lincs.
G3PL.—A. G. DUNN, 79, Hayton Grove, Hull, Yorks.
G3PM.—K. GOODING, 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.
G3PO.—L. A. KELSALL, 342, Franklin Road, King's Norton, Birmingham, 30.
G3PQ.—M. P. BAYLISS, 2, Albion Street, Kenilworth, Warwicks.
G3PR.—S. S. JEFFS, 19, Corbyn Road, Bordesley Green E., Birmingham, 9.
G3PT.—R. J. MURRAY, 74, Admiral Street, Liverpool, 8.
G3PV.—E. H. RICKETT, "Oakview," 28, Cross Oak Road, Berkhamsted, Herts.
GW3QB.—E. POWELL, 44, Prichard Street, Tonyrefail, Glam, S. Wales.
G3QF.—Rev. E. D. GEDDES, St. Barnabas' Vicarage, Douglas, Isle of Man.
GM3QH.—JAS. W. HALL, 40, Smithfield Drive, Aberdeen, Scotland.
G3QL.—C. BROWN, Rossian, Crown Lea Avenue, Barnard's Green, Malvern, Worcs.
GM3QM.—JAS. ROY, La Haule, 22, South Erskine Park, Bearsden, Glasgow.
G3RC (ex G5AP).—A. J. HILL, Robin Hood, Catsfield, nr. Battle, Sussex.
G3RK.—H. A. SPASHETT, Smallgate, Beccles, Suffolk.
G3TA.—J. D. LAMBERT, 4, Bridge Road West, Battersea, London, S.W.11.
G5FN.—S. A. C. HOWELL, "Veronique," Broadway, Gillingham, Kent.
G5FV.—J. S. CLARK, 71, Birklands Drive, Hull, Yorks.
G15GV.—W. GRAHAM, 2, Chesterfield Park, Ormeau, Belfast, N.I.
G5HK.—H. S. BECKETT, 580, Redmires Road, Lodgemoor, Sheffield, 10.
G5KW.—Sgt. K. E. S. ELLIS, 119A, Beaufort Street, London, S.W.3.
G5MQ.—E. MENZIES, 38, Linkstor Road, Woolston, Liverpool, Lancs.
G5RI.—F. J. RITSON, Red Lion House, Hexham, Northumberland.
G5XM.—F. ARMSTRONG, 105, Plodder Lane, Farnworth, Lancs.
G5YL.—Miss P. E. M. BRYAN, 43, Exeter Road, Exmouth, Devon.
GM6AM.—E. A. MACKAY, Glencairn, Golf Course Road, Bonnyrigg, Midlothian, Scotland.
G6GD.—H. EDGE, 2, Green Mount, Stamford Road, Bowdon, Ches.
G6GK.—GEO. H. KITLEY, 61, Elmley Street, Plumstead, London, S.E.18.
G6RS.—R. K. SHEARGOLD, "Digswell," The Avenue, Sunbury-on-Thames, Middlesex.
G6TU.—D. C. THURSTON, 40A, Balham Park Road, Balham, London, S.W.12.
G6XC (ex G6VJ).—A. CROSS, 9, Scotsdale Close, Cheam, Surrey.
G6YA.—A. H. RADFORD, 66, Manor Road, Kingston, Portsmouth, Hants.
G6YK.—G. A. EXETER, 170, Stubbington Avenue, North End, Portsmouth, Hants.
G8BK.—G. T. OTTLEY, St. Helens, Grassmere Road, Gloucester.
G8DV.—A. P. MORGAN, 19, Temple Fortune Hill, Golders Green, London, N.W.11.
G8DZ.—A. E. CLIPSTONE, 59, Seymour Road, West Bridgford, Notts.
G18GK.—S. R. WATSON, 53, Knutsford Drive, Cliftonville, Belfast, N.I.
G8GL.—THOS. O. I. PICK, Laburnham House, Culgaith, nr. Penrith, Cumb.
G8HF.—A. G. LAWS, 2, Staddon Park, Plymstock, Plymouth, Devon.
G8JO.—JAMES ORR, 22, Pembroke Terrace, South Shields, Co. Durham.
G8KL.—W. O. STURMEY, 72, Newhampton Road West, Wolverhampton, Staffs.
G8QR.—R. BRAKE, The Manse, Thorns Road, Quarry Bank, Brierly Hill, nr. Birmingham.
G8QV.—F. H. WRIGHT, 17, Rosehill Road, Wandsworth, London, S.W.18.
G8TH.—GEO. W. GUY, 58, Crescent Road, Tilehurst, Reading, Berks.
G8VS.—G. SELLERS, 177, Paley Road, Bradford, Yorks.
2ACT.—FRED S. CLOSE, 44, Sunderland Road, Manningham, Bradford, Yorks.
2AFZ.—DAVID L. LEETE, 15, The Close, Old Southgate, London, N.14.
2AJL.—J. MAWBEY, 20, Claremont Road, Cricklewood, London, N.W.2.
2BCM.—W. C. GREENOCK, 17, Kerrsview Terrace, Dundee, Angus.
2BIL.—G. F. KEEN, 20, St. Leonards Road, West Hove, Sussex.
2BPD.—A. BENFORD, 83, Warren Road, Cricklewood, London, N.W.2.
2CID.—F. HOOSON, 25, Moreland Way, Chingford, London, E.4.
2DHL.—R. COLEMAN, 213, Bedford Hill, Streatham, London, S.W.16.
2DRM.—B. W. W. OLIVER, Stratford Rectory, Saxmundham, Suffolk.
2DXN.—D. WELCHMAN, 188, Frome Road, Trowbridge, Wilts.
2FAP.—C. R. PERKS, Cross Keys Hotel, Hednesford, Staffs.
2FBH.—P. E. CHIPPERFIELD, Browneaves, Cranleigh, Surrey.
2FBW.—L. J. STEVENS, 24, Hall Street, Bristol, 3.
2FCY.—E. H. PAULTON, "Inglewood," The Plantation, Worthing, Sussex.
2FDZ.—J. SIMPSON, 26, Laurel Avenue, Darwen, Lancs.
2FFC.—W. S. WILSON, 31, Smith Avenue, Inverness, Scotland.
2FFO.—R. JOHNSON, 41, Scott Park Road, Burnley, Lancs.
2FFS.—R. F. STANBRIDGE, 185, Church Street, Woking, Surrey.
2FGF.—J. L. ROBINSON, 12, Church Street, Helmington Row, nr. Crook, Co. Durham.
2FGK.—C. G. GROVER, 3, Market Street, Newbury, Berks.
2FGQ.—GEO. M. JENKINSON, 332, Wold Road, Willerby Road, Hull, Yorks.
2FIA.—T. W. JOWETT, "Brandon," 355, Colne Road, Burnley, Lancs.

*Cancelled.*—G2FB, G2ML, GM6AR, G6BB, G6MO, G6VV, GI6XS, G6ZH, G6ZX, G8OU, 2ABA, 2ABH, 2AGK, 2AGX, 2AHP, 2AHH, 2AFC, 2AJP, 2AKN, 2ALX, 2ARI, 2ARO, 2ARS, 2ATB, 2AUC, 2AYZ, 2AZS, 2BAX, 2BCP, 2BLY, 2BNL, 2BPH, 2BPW, 2BRC, 2BRV, 2BVV, 2BXX, 2BZY, 2CBJ, 2CBV, 2CBX, 2CFL, 2CHP, 2CTA, 2CVF, 2CVG, 2CVU, 2CWF.

**'UTILITY' TWO TRANSMITTER**—(*Continued from page* 140.)

Oscillator, and on 14 Mc., as a tri-tet, ample output being available in both cases.

The original transmitter described gave a good account of itself during National Field Day on 3.5 Mc., on which frequency either a fundamental 3.5 Mc. or a 1.7 Mc. crystal may be used, the cathode coil necessary in the latter case consisting of 15 turns 2 ins. diameter. On 3.5 Mc. the L/C ratio in the anode circuit is particularly high and the working capacity of C3 should be set near maximum. The ratio is rather too high for linear telephony modulation. Therefore if telephony is used on this frequency, a larger capacity tank condenser will be desirable.

The output valve may be converted into a doubler by simply increasing the grid bias to double its former value. The neutralising condenser then performs a different function, as the voltage fed back is no longer out of phase but is partly additive. This causes a regenerative effect to take place which increases the efficiency and the output, although both will be less than when the valve is being used only as an amplifier. Operation may therefore be secured on 14 Mc. from a 3.5 Mc. crystal and on 28 Mc. from a 7 Mc. crystal. Advantage may be taken of the latter in order to work on the 28 Mc. band and of the former to obtain a different frequency in the band to that normally used.

**VIVE LA QRP**—(*Continued from page* 145.)

Genuine QRP work is very interesting, for it breathes the atmosphere of the trail-blazing pioneer and imparts that unique form of thrill never truly experienced by many QRO workers. If only half of the well-nigh miraculous low power achievements were published in book form, what interesting reading they would make, and what an inspiration they would provide for the man who feels disheartened by what he terms the limitations of low input. There are very few *real* limitations in amateur enterprise, because problems exist merely to be overcome, and each new day bears witness to the gallant way in which patience, skill, and ingenuity master every difficulty.

**WHAT HAVE WE LEARNT ABOUT 56Mc.**—(*Continued from page* 165).

to challenge some of the theories which have been put forward.

In conclusion the writer would like to acknowledge his indebtedness to a number of 56 Mc. workers whose results and observations have been available, particularly to G6CW, G8JV and G6IH, also to G6DH for his excellent address at the I.E.E. last January, as well as to all those who have recently sent reports to him and notes to THE BULLETIN recording their observations of 56 Mc. signals.

**CONTEMPORARY LITERATURE**—(*Continued from page* 179.)

AN IMPROVED CAPACITY BRIDGE. Moe Joffe (W2BNY). *QST*, July, 1938.

Constructional details and operating data for a capacity bridge using a valve tone generator and output amplifier for better null indications. The valves used are 6F8G (double triode with separate cathodes) and a 6C5. The useful range of the bridge is 1,000 microfarad.

**BRITISH EMPIRE NOTES**—(*Continued from page* 189.)

6BL is on 14 Mc., and has contacted many new ZS stations. He keeps regular week-end schedules with his brother, ZS6DZ. 6BT, who is active on 14 Mc., is designing a "Stream-lined" crystal controlled transmitter to cover from 3.5 to 56 Mc.

ZS6CH located in Florida, a town situated some nine miles from Johannesburg reports that 28 Mc. activity is erratic with W's now audible. 6CS now has an aerial directional for Europe, and has made contacts with six new countries. He requests that ZL amateurs should listen for his 14 Mc. signals, daily at 18.00 G.M.T. 6CY has worked W6 and 9 with his bent Hertz. 6DM has contacted W6 and 9, and has been experimenting with various types of crystal oscillators. He considers the 6L6 gives the best performance. 6DZ is building a Rotary Beam, and hopes to obtain good results. 6EM has completed building his outfit; a 53 into a pair of 6L6's in parallel. 6EN recently returned from a holiday visit to Natal, and reports that "ham spirit" is very evident down there.

Members are requested to forward their news items on or before the 20th of each month.

ZS6DZ, ex ZU6V.

## EXCHANGE AND MART

(*Continued from Back Cover*)

# EXCHANGE AND MART.

BARGAINS BY H. FRANKS, 81, New Oxford Street, London, W.C.2.

H.M.V. Rack Amplifier, 25 watts undistorted, comprising 1,000v transformer, chokes, condensers, Turner meter, 200-250 input, etc.; *breaking up price*, £3. Siemens Halske Ribbon Diaphragm Loud Speaker, handle 12 watts, 240v field, 25s. M.L. Converter, 200 D.C. in., 500-100 Ma out., 30s. Foster Powerpack, comprising 500-0-500 transformer 200 Ma, 7.5 volts, choke, condenser, etc., 35s. Siemens Halske M.C. Meters, 4 in. dials, 0/50v, 0/10v, as new, 12s. 6d. each. Siemens Halske Resistances, 10 megohm, 15 in. long by 2½ in. diameter; List price, £3 10s., *Bargain*, 17s. 6d. *each* (new).

Large quantity of dismantled "Amplifying Gear" to be had at knock out prices to callers. Terms: Cash with order, C.O.D. carriage forward. (Telephone: Temple Bar 2620.)

BARGAIN.—Hammarlund 9-valve Superhet Communication Receiver, with coils covering the amateur bands. Splendid condition. £15 or nearest.—G8IM, 969, Hedon Road, Marfleet, Hull.

COMPLETE STATION FOR SALE.—National 81X, 1938 model, new, take nearest £22; L.S. and National cabinet for above, £2; 150 watts C.W. Transmitter; Auto-Sender, tape and puncher; two Rola M.C. Speakers; Collardo gram turntable; Regentone Type W1A metal Rectifier, etc. What offers? —Box 27, "PARRS," 121, Kingsway, W.C.2.

D.C. MAINS FONE! Rotary Converter, 230-volt D.C. in 230-volt A.C. out, .391 amps., gives 120 watts. Silent, no Q.R.M. in R.X. Double wound. Excellent condition, £2 10s. Unused Commercial Power Pack, metal case, gives 350 volts D.C. at 100 mA., 2.5 volts 2 amps. C.T., 7.5 volts 2 amps. C.T., 6 volts 2 amps. C.T. filament taps, O.K., £3 10s. Also Ferranti Trickle-charger, A.C., 2, 4, 6 volts ½ amp., 10s.—7, Beddington Road, Seven Kings, Essex.

FOR SALE.—Brand new RK20 with holder, never been used; £3 or offers.—GM8RJ, 35, Hermiston Avenue, Springboig, Glasgow, E.2.

G5KT.—ATTRACTIVE NEW DESIGNS QSL's. Finest quality, lowest prices, samples will convince.—State G, AA, 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.

G6GO has spare T20 replacement valve for sale. Guaranteed perfect, 12s. 6d. post free.—G6GO, The White House, Ashby Parva, Rugby.

G8JK FOR QSL'S OF HIGHEST QUALITY At Low Prices. Send for samples.—Trees Avenue, Hughenden, High Wycombe, Bucks.

"HAM-AIDS" signify "the best" of QSL cards.—Samples from G6XT, TILLOTSON BROS., Commercial Street, Morley, Yorks.

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