A SINGLE SIGNAL SUPERHET

THE T. & R.

BULLETIN

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THE T. & R. BULLETIN

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Vol. 11

No. 10

MUTUAL ASSISTANCE

THE old proverb, "one good turn deserves another," never had a truer meaning than it has to-day, when we present in this issue several outstanding contributions which have been brought to fruition only through the co-operation of the Radio Trade.

The assistance which we have received from the firms whose products are advertised in this journal is particularly gratifying to those who have for years endeavoured to persuade the trade to give attention to the special needs of British amateurs. Faced with the problem of obtaining maximum efficiency from their transmitters and receivers, our Home Members have spared no expense in purchasing the most suitable gear. Unfortunately for a year or two that gear had to be imported from abroad, but thanks to the co-operation of certain well-known manufacturers, we are now able to obtain British valves and components which are as good as, if not better than, those produced elsewhere.

Last month our Calibration Manager reviewed a British-made condenser dial suitable for a high precision frequency meter. The workmanship displayed by the makers far surpasses anything obtained from foreign markets.

In this issue there is described a mains-operated single signal superhet which has been built entirely from British components. That this receiver will command universal notice goes without saying, for it has been designed, constructed, calibrated, and tested by two of the Empire's best known amateurs, Mr. G. G. Samson, G5ZZ, ex-ZL4AI, and Mr. H. A. M. Whyte, G6WY. There are strong reasons for believing that a British manufacturer has already laid his plans for producing this set commercially at a price which will be many pounds lower than that charged for foreign single signal receivers.

Under our R.E.S. notes there appears an article from the pen of the Section Manager, describing a 56 Mc. crystal controlled exciter unit employing British components and valves. Already a final amplifier is on the stocks, and when this is completed we shall at least have the satisfaction of being able to say that British amateurs, backed by British manufacturers, are making substantial technical progress in the development of the very high frequencies.

Also within the pages of this issue there is published an article dealing with a high-power driven amplifier for work on the 28 Mc. band using the new British R.F. Pentodes.

Finally, that indefatigable worker, Mr. G. McLean Wilford, begins the first of a series of articles on Transmitter Design. We had the opportunity of a pre-view of his article and after reading it felt justly proud of the fact that a British amateur had given so much invaluable information to his colleagues.

(*Continued on Page* 430.)

A STUDY OF AMATEUR RECEIVER REQUIREMENTS

By G. G. Samson (G5ZZ).

PART II.

Foreword.

THE writer wishes to apologise for the delay in the publication of this article. Much interest having been aroused by a receiver designed for G6WY, and built from British components, it was suggested that this part of the article should include a more or less constructional description of this receiver. This entailed re-writing the article, which could not be completed until the receiver had been perfected and thoroughly tested.

Theoretical Discussion.

The most important properties of an amateur receiver are :

(1) Selectivity.
(2) Stability.
(3) Sensitivity.
(4) Ease of operation.

(1) *Selectivity.*

All amateurs are familiar with the fact that the use of a superheterodyne receiver gives the simplest method of obtaining a high degree of selectivity. For this reason the superheterodyne principle was used in this receiver.

A superheterodyne receiver in its essentials consists of a first detector stage, a high frequency oscillator, an intermediate frequency amplifier, a second detector, and (for C.W. reception), an I.F. beat oscillator.

If the intermediate frequency is 460 kc., and it is desired to receive a signal on 7,000 kc., the first detector is tuned to 7,000 kc., and the H.F. oscillator to 7,460 kc., thus giving a beat of 460 kc., which passes through the remaining stages of the receiver.

If, now, the detector is tuned to 7,920 kc., with the oscillator on 7,460 kc., another beat of 460 kc. will be obtained.

If the selectivity of the first detector is poor (and it always is), when the detector is tuned to 7,000 kc., a beat will still be produced by a signal on 7,920 kc. This is called an image. Alternatively if the detector tuning remains constant, and the oscillator tuning is varied, the signal will be heard on two settings of the oscillator—460 kc. above, and 460 kc. below signal frequency. It is desirable for a signal to be heard on only one spot on the dial. If twice the intermediate frequency is greater than the greatest frequency band it is desired to cover, this will become possible. For amateur purposes, an I.F. of 260 kc. would, therefore, be quite suitable. The greater the I.F., however, the greater the image selectivity of the receiver, and thus an even higher I.F. is desirable. Manufacturers of broadcast components have standardised on an I.F. of 460 kc., which is a very satisfactory value on both the above counts, and was consequently used in the receiver described.

Even with an I.F. of 460 kc., the image selectivity of the first detector is poor on amateur frequencies (the selectivity decreases rapidly with increase in frequency). It is therefore necessary to add to the receiver some kind of pre-selection. In broadcast practice, this usually takes the form of a stage of tuned R.F. amplification, partly for the extra gain obtained, but also for the following reason.

The noise level of a receiver depends upon the noise level of the first valve, since the signal input to this valve is low, and hence the ratio of valve hiss to signal strength is greater than for any following valve, where, although the hiss is the same, the signal input is much higher. Now for medium frequencies, the gain of a modern R.F. valve varies approximately as the square of the anode current. The valve hiss, however, varies directly as the anode current. The noise level of an R.F. amplifier, which has a high anode current and a high gain, will be lower than for a first detector, which has a low anode current and a low gain.

On high frequencies this effect is not so pronounced owing to the fact that on, say, 14 Mc., the gain of the valve varies approximately as the anode current, instead of as the square of the anode current, and hence the valve noise level is practically the same for high and low gain. On short waves the use of an R.F. stage is justified by the fact that the oscillator introduces a certain amount of hiss into the first detector. If the signal input to the first detector is low, the hiss level will be high. The use of an R.F. stage raises the signal input to the first detector, and so lowers the noise level.

On high frequencies even an R.F. stage will not give sufficient pre-selection. In several foreign commercial receivers, two stages of R.F. amplification are therefore used. This makes a cumbersome set for an amateur to construct, and so in this receiver additional selectivity is obtained by making the R.F. stage regenerative.

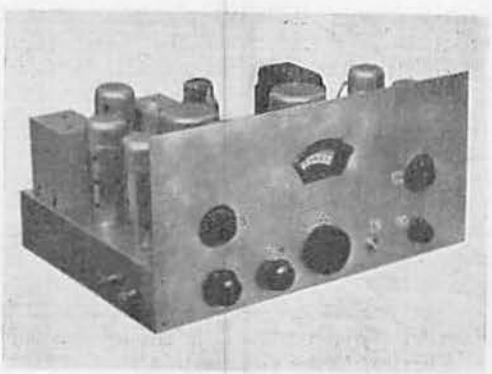


Fig. 2.
Front view of the Single Signal Super-heterodyne Receiver designed by the Author. The controls are described in the text.

(*a*) *The I.F. Amplifier.*

The bulk of the selectivity of a superheterodyne receiver is obtained in the I.F. amplifier. In order to obtain maximum selectivity from this amplifier, the losses should be kept at a minimum, and the L/C ratio of the tuned circuits kept as high as possible. The better types of I.F.T. on the market are wave wound with Litz wire in order to keep the distributed capacity and R.F. resistance at low values. The use of air-dielectric trimmers lowers the dielectric loss, and, what is perhaps more important, lowers the changes in frequency caused by variations in temperature and humidity.

Even with such I.F.T.'s, however, a two-valve I.F. amplifier has insufficient selectivity for amateur use. Part I of this article showed how a crystal filter could be used to increase the selectivity of such an amplifier.

The selectivity of an I.F. amplifier can be improved, as pointed out in *QST* several years ago, by the use of regeneration. Regeneration introduces into a circuit what may be described as negative resistance. The effective circuit resistance of a valve on the point of oscillation is very low, and consequently the selectivity (and the gain) is high. As many amateurs do not wish to go to the expense necessary in order to obtain the selectivity figures given in Part I, the receiver described employs a single regenerative I.F. valve, the selectivity of the receiver being approximately 50 db. down 3 kc. off resonance.

2. *Stability.*

For satisfactory operation, the stability of a receiver must be greater than its selectivity. Considering the 30 Mc. band, the stability, of the receiver being considered, must be better than

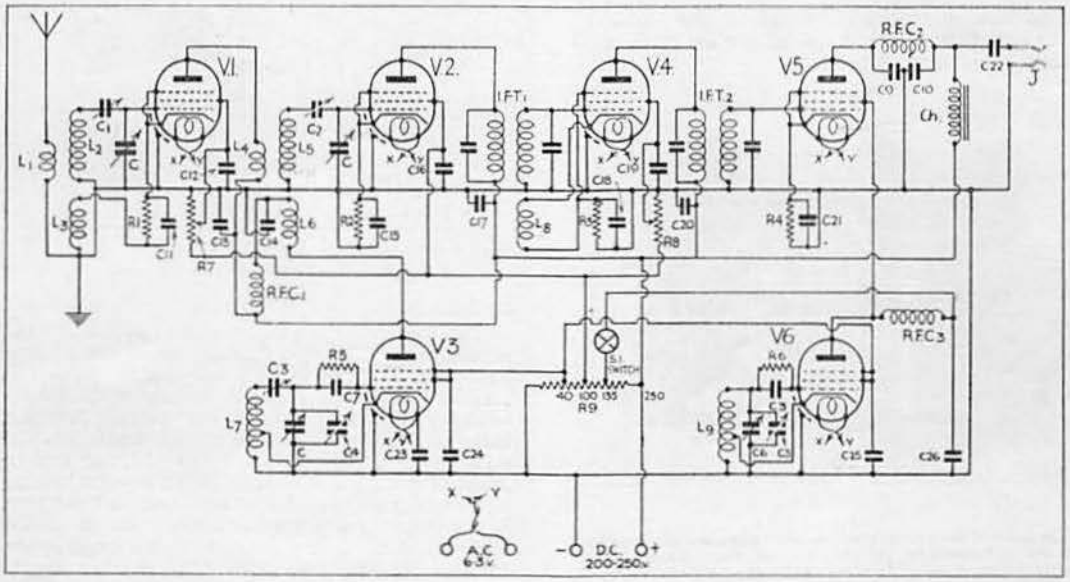


Fig. 1.
Circuit Diagram of Single Signal Super-heterodyne Receiver.

C	..	*3 gang 150 μμF Eddystone.*
C1-C5	..	*Trimmers with extension shaft, knobs and dials 65 μμF Eddystone.*
C6	..	*.0005 μF Mica Preset.*
C7	..	*100 μμF T.C.C. Type M.*
C8-C10	..	*250 μμF ditto.*
C11, C12	..	*.01 μF T.C.C. Tubular.*
C14-C20	..	*.01 μF ditto.*
C22-C25	..	*.01 μF ditto.*
C13, C26	..	*1 uF ditto.*
C21	..	*4-5 μF T.C.C. 25-volt Electrolytic.*
R1, R3	..	*300 ohms 1 watt Dubilier.*
R2	..	*10,000 ohms ditto.*
R4	..	*5,000 ,, ditto.*
R5, R6	..	*25,000 ,, ditto.*
R7, R8	..	*100,000 ohms Potentiometer with insulated spindle, Varley.*
R9	..	*15,000-20,000 ohms voltage divider with three variable taps.*
IFT 1 & 2	..	*Intermediate Frequency Transformer with air dielectric trimmers, 460 kc. Eddystone.*
RFC 1	..	*Short wave pig-tail type R.F. choke, Eddystone.*
RFC 2 & 3		*Medium wave chokes, Eddystone.*
CH	..	*Output choke, Varley.*
J	..	*Phone jacks, Bulgin.*
S	..	*Snap switch, rotary type, Bulgin.*

Additional Components :—

1	..	*Eddystone Dial and Knob.*
1 yard	..	*Shielding braid to slip over wiring.*
6	..	*Clix 6-pin American type valve sockets.*
5	..	*American type valve shields.*
4	..	*2½-in. coil cans and bases.*
2	..	*4-pin Eddystone sub-panel coil sockets.*
1	..	*5-pin ditto.*
1	..	*6-pin ditto.*
1	..	*4-pin Eddystone coil former (for beat oscillator) add for each band required :*
1	..	*4-pin*
1	..	*5-pin* } *Eddystone coil formers. (The 5 and*
1	..	*6-pin* } *6-pin to be slotted, for frequencies of 14 Mc. and higher.)*
2	..	*Flexible couplings, Eddystone. (It is necessary to pack up the shafts of the Eddystone trimmers to fit these couplings.)*
2	..	*Eddystone extension couplings with shafts and panel bushings.*
2	..	*Eddystone panel bushings.*
1	..	*Insulated bushing for power leads.*
Valves :—		
V1, 3, 4 & 6		*Type 78, Brimar, Standard Telephones and Cables, Ltd.*
V2	..	*Type 77, ditto.*
V5	..	*Type 89, ditto.*

3 kc. in 30 Mc., *i.e.*, 100 parts in 10^6. More selective receivers may require a stability of up to 15 parts in 10^6.

Without temperature compensation, such stability cannot be obtained over long intervals of time. For amateur purposes, however, it is sufficient to obtain such a stability over an interval of about five or ten minutes.

The stability of the receiver depends mainly upon the H.F. and beat oscillators. The stability of an oscillator may be subdivided as follows:

(*a*) Mechanical stability; (*b*) static stability: (*c*) dynamic stability.

Mechanical stability is obtained by using high-class components and mounting them rigidly so that they are not affected by vibration. The wiring should be rigid, and of soft-drawn copper.

Static stability depends upon the variations in circuit constants due to temperature changes. Stability is obtained by using as large a capacity as possible in the tuned circuit of the oscillator. This capacitance should be an air dielectric condenser of good construction.

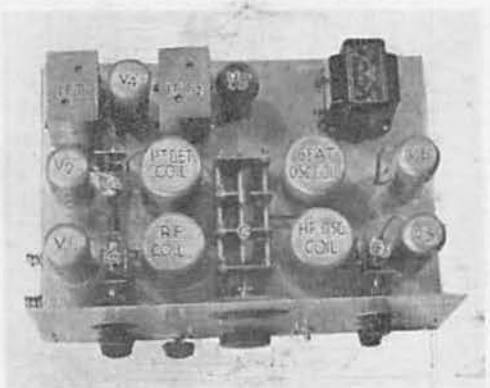


Fig. 3.
Plan view of the completed receiver showing the position of all components on the top of the chassis. The symbols used coincide with those shown below Fig. 1.

The use of a large capacitance in the tuned circuit (and consequently a low value of inductance) improves the dynamic stability, which depends upon fluctuation in load, emission, and applied voltages. The electron-coupled oscillator is noted for its high dynamic stability. (*Note:* The static stability of an E.C.O. is no better than every other type of oscillator, and so the precautions of (*b*) must be taken.) At high frequencies, however, even the coupling due to the anode-grid capacity of a screen grid valve is sufficient to cause slight dynamic instability. To overcome this effect, it is desirable to use the second harmonic of the oscillator. If the oscillator is coupled to the mixer valve by the usual method of capacity coupling, however, the fundamental frequency will be fed into the mixer valve at much greater strength than the second harmonic, tending to overload this valve and increase the noise level. In this receiver, therefore, the H.F. oscillator is inductively coupled to the grid of the mixer valve, the coupling coil being made roughly resonant for the desired harmonic, and consequently has a fairly low impedance to the fundamental frequency. The adjustment of this coupling coil is critical and by no means easy, but the high stability and low noise level are ample compensation for the trouble taken.

The beat oscillator operates at a frequency of 460 kc. At this frequency sufficient stability is obtained by using the fundamental frequency. For simplicity it is coupled to the accelerator grid of the second detector, which is an L.F. pentode.

No audio stage is used as the receiver is intended for headphone use, although the output is sufficient to operate a small speaker on most signals.

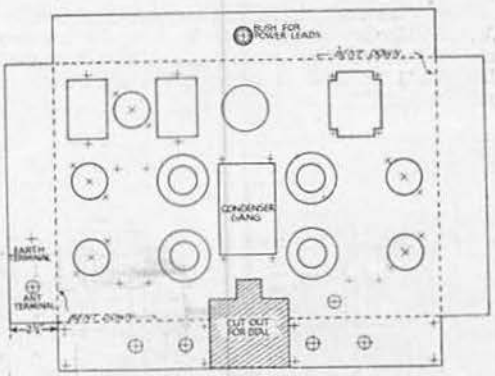


Fig. 5a.
A layout sketch of the Chassis.

3. *Sensitivity.*

The sensitivity of the receiver is good. The regeneration in the R.F. stage gives much more gain than is usual on high frequencies. The I.F. amplifier has a gain approximately equal to two ordinary I.F. stages, and the second detector, being a pentode, also adds to the total. As the noise level of the receiver is low, full use can be made of its high sensitivity. G6WY reports hearing signals of good readable strength on this receiver, which were completely inaudible on a O-V-I receiver. The writer has had similar experiences. In general, on weak signals the receiver should have a gain of at least three R divisions over a O-V-I receiver, *i.e.*, an R2 signal on an O-V-I becomes R5 or better on the superhet. This holds particularly for the higher frequency bands, such as 14 and 28 Mc.

4. *Ease of Operation.*

Once the receiver has been properly lined up,

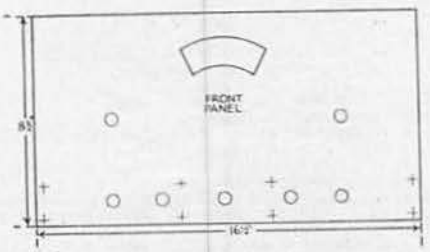


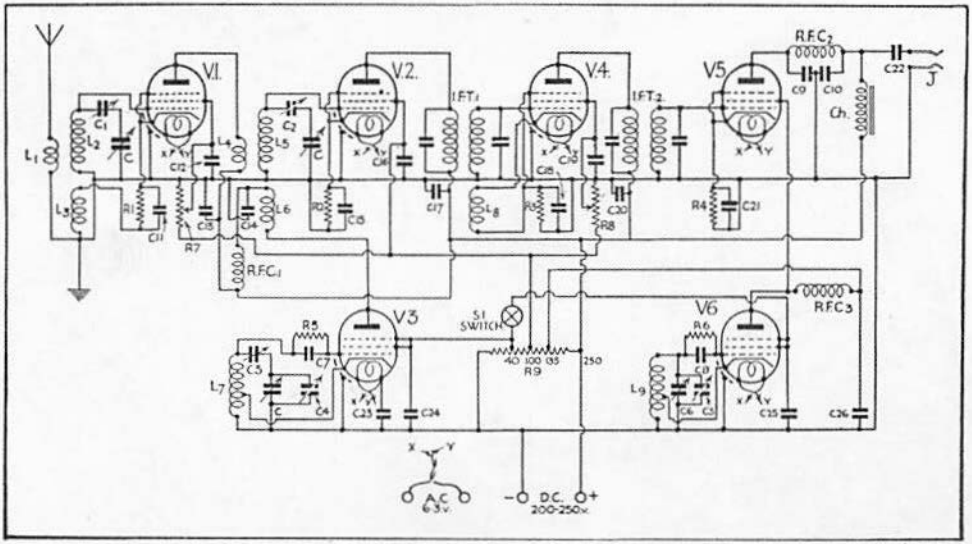
Fig. 5b.
A layout sketch of the front panel. These sketches are not to scale but, as explained by the Autnor, they form the basis of the constructional work.

A STUDY OF AMATEUR RECEIVER REQUIREMENTS

PART II.

Due to an error in preparing the original diagram of the Single Signal Super-heterodyne Receiver, published on page 385 of the April, 1936, issue of T. & R. BULLETIN, the connections to the grids of V1, V2 and V3 were shown wrongly. The position of the switch was also incorrect.

Readers are requested to substitute the corrected diagram which appears below for the one previously published.



it is very simple to operate. The coils for any particular band are plugged in, and the band setting dials B and C (Fig. 2) are set to pre-determined readings. A signal is tuned in by rotating dial A, and the beat control G adjusted to give a pleasing note to the ear. The whole band may then be covered simply by rotating the main tuning knob A. If image interference appears, the R.F. regeneration control D is brought up until the interference vanishes, and if greater selectivity is required, control E is adjusted until the I.F. stage is on the point of oscillation. In most cases, the tuning is simply a rotation of dial A.

The series padding condensers, C1, C2, and C3, can be adjusted in such a manner that any desired band can be spread over the whole dial, or over a small section of the dial, as required. The ability to obtain full band spread makes tuning on the more crowded bands comparatively simple.

is mounted behind the front panel. Immediately to the left of the condenser gang are the R.F. and detector coils ("R.F." and "Det." in Fig. 3), each of which has its own easily detachable shield can.

On the extreme left of the chassis are the R.F. and 1st detector valves, V1 and V2, and between the coils and the valves are the series band setting condensers, C1 and C2, which are ganged by means of an *Eddystone* extension (3" type cut down to fit). On the right of the condenser gang, the H.F. and beat oscillator coils and valves, and the H.F. padding condenser C3 are arranged in a similar manner.

Along the back of the chassis from left to right are the first intermediate frequency transformer, the I.F. valve, the second I.F.T., the second detector, and the output choke.

On the rear right-hand side of the chassis is the

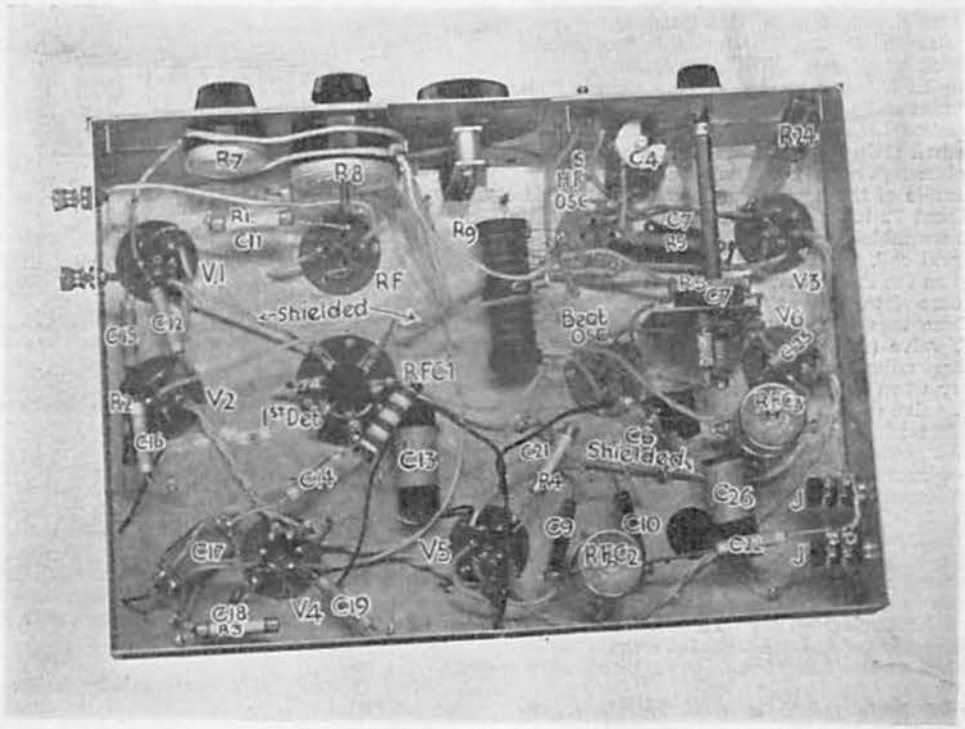


Fig. 4.
A close-up of the underside wiring, showing the position of all components. The symbols used coincide with those shown below Fig. 1.

Constructional Discussion.

The construction of the receiver follows, as far as possible, modern commercial receiver design, with the exception that, for reasons of cheapness and simplicity, plug-in coils were used instead of band switching.

All components are mounted on an aluminium chassis $16\frac{1}{2}" \times 11" \times 2\frac{1}{2}"$, to which is attached an aluminium panel $8\frac{1}{2}"$ high. The main tuning gang condenser C in Fig. 1, is mounted on the centre line; a "cut-out" being provided in the front of the chassis to take the *Eddystone* tuning dial, which

phone jack, and on the front left-hand side are the aerial and earth terminals. The H.T. and L.T. leads are taken through a bush in the rear centre of the chassis. A terminal strip could be used if desired.

As may be seen from Fig. 4, all coil and valve sockets are of the sub-chassis mounting type, and practically all the wiring is underneath the chassis. The point-to-point system of wiring is used in order to keep the leads as short as possible. All fixed condensers and resisters are supported in the wiring, and wherever possible, terminal connections

have been avoided, since these inevitably work loose and cause trouble. For this reason, only components with solder tags should be used.

All components are marked on the photographs by the symbol given them in Fig. 1, with the exception of the front panel controls, which are (Fig. 2) : A, main tuning ; B, R.F. and 1st detector band setting ; C, H.F. oscillator band setting ; D, R.F. regeneration, *i.e.*, image selectivity ; E, I.F. regeneration, *i.e.*, selectivity ; F, beat oscillator switch (" off " for 'phone reception) ; and G, beat oscillator control.

To construct the receiver, first obtain all necessary components. Obtain a sheet of paper, draw out to full scale the size of the chassis, place the components in the positions shown in the photographs, and mark out on the paper the positions of all holes required. The drawing can then be dimensioned and any local sheet metal factory will be able to make a chassis complete with all necessary holes. The drawings should be *similar* to Fig. 5, which is *not* drawn to scale. The brackets supporting condensers C1 and C2 should be accurately constructed or ganging will be impossible.

Before I.F.T.1 is mounted on the chassis, the regeneration coil L8 should be wound on it. With an *Eddystone* I.F.T., the cover should be removed and a small strip of 1-16" Paxolin, to which two small solder tags have been fixed, should be screwed to the inside of the brass support next to the grid coil. About 12 turns of No. 36 D.S.C. wire should then be scramble-wound about $\frac{1}{2}$" from the outside of the grid coil, the two ends being connected to the tags on the Paxolin strip. A hole is then drilled in the base-plate, so that two leads may be taken from these tags to the cathode and suppressor of the I.F. valve (see Fig. 1).

Further adjustment of L8 will probably be necessary when the receiver is being lined up. If the I.F. valve cannot be made to oscillate, reverse the leads from L8. If violent oscillation, which cannot be controlled by adjusting R8, is obtained, it will be necessary to remove turns from L8 until the valve oscillates with the control about three-quarters scale. It is unlikely that more turns will be required, but, if no oscillation is obtained, they should be added.

The wiring of the receiver should not present any difficulties to the average amateur, and a reference to Fig. 4 should clear up any difficulties. All heater wiring is run in twisted pairs, the heater pins of the I.F. valve socket being used as a distribution point.

Screened leads should be used for the anode connections of both oscillators and the R.F. valve. These may be clearly seen in Fig. 4. Earthing tags are attached to the chassis wherever required.

The coils are wound upon *Eddystone* formers, the slotted type being used for all frequencies from 14 Mc. upwards. The 7, 3.5, and 1.7 Mc., and the beat oscillator coils are close-wound on plain formers. The beat oscillator coil should have 150 turns of No. 36 S.W.G., tapped 12 turns from the " earth " end. The other coil data is given in the table. The coupling of the R.F. regeneration coil L3, to the grid coil L2 is critical, and depends upon the aerial used with the receiver. It should be adjusted so that oscillation is obtained with R7 at about $\frac{3}{4}$ position. The coils are wound from the base of the formers in the following order : R.F. coil—L3, L2, and L1 ; and detector coil : L6, L5, L4. The spacing between windings is about $\frac{1}{4}$".

Valves.

American type valves are used in the receiver. The 6.3 volt type are specified, but the equivalent 2.5 volt may be used if desired, in which case they will be : V1-58, V2-57, V3-58, V4-58, V5-2A5, V6-58.

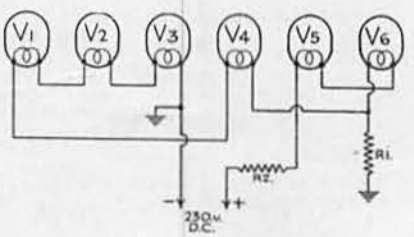


Fig. 6.

If 6.3-volt valves are used, the receiver may be operated from D.C. mains, the heater wiring for such an arrangement is shown above.
R1, 3.5 ohms to carry .1 amp.
R2, 480 ohms to carry .4 amp.
(This may be a 100-watt 220-volt lamp used to light the room.)

If 6.3 volt valves are used, the receiver may be operated from D.C. mains, the heater wiring being shown in Fig. 6. For A.C. mains operation, a power pack is required, giving 200-250 volts D.C., and 6.3 volts A.C. at 2 amps. (or 2.5 volts at 6 amps.). All heaters are wired in parallel for A.C. operation. Brimar valves are specified, since these are of English manufacture. All components, therefore, are English.

Operation.

After all wiring has been carefully checked, the heater and anode supplies should be connected. The voltages, on the voltage divider R9, should be checked. If a 460 kc. oscillator is available, it should be coupled to the plate of the first detector.

COIL TABLE.

Band.	R.F. Coil.			1st Detector.			Wire.
	L1	L2	L3	L4	L5	L6	
28 Mc.	3	4	$2\frac{1}{2}$	3	$3\frac{1}{2}$	2	No. 28 D.C.C. Spaced
14 Mc.	6	$10\frac{1}{2}$	3	8	$10\frac{1}{4}$	6	No. 28 D.C.C. Spaced
7 Mc.	10	$20\frac{1}{2}$	1	11	19	12	No. 28 D.C.C. Close
3.5 Mc.	24	$33\frac{1}{2}$	1	24	32	15	No. 36 D.C.C. Close
1.7 Mc.	24	78	2	24	80	20	No. 36 D.C.C. Close

A milliammeter capable of reading up to 50 milliamperes should be connected in the plate lead to V5, and the trimmers of I.F.T.1 and I.F.T.2 adjusted to give maximum reading, with the beat oscillator switch " off." The beat oscillator should then be switched on, and with C5 in mid position, the pre-set condenser C6 should be adjusted until an audible beat is heard in the phones. This is tuned to zero beat, and C6 is locked in position, adjustment of the beat note then being made by C.5.

The above adjustment should be made with the I.F. regeneration control backed off so that no oscillation is obtained in this stage. If the I.F. oscillates violently, it should first be adjusted as described previously. With the I.F. and beat oscillator successfully lined, switch on a crystal oscillator in one of the amateur bands and endeavour to tune it in on the receiver. For 7 Mc., set dial B at approximately 30 degrees (100 degrees dial), and dial C at approximately 40° to 50°. Set the main tuning dial at the setting you would expect the crystal to occupy in the band, and with a screwdriver, adjust C4 until the signal is heard (with the beat oscillator switched on). *Note:* Several image spots will probably be heard. The loudest should be selected, and then dial B should be tuned to give maximum signal strength. If the signal does not peak up upon tuning dial B, an image has been tuned in. Slightly alter the setting of dial C, and retune condenser C4. When properly adjusted, the band should occupy practically the whole dial. The amount of band spread can be altered by changing the setting of dials B and C.

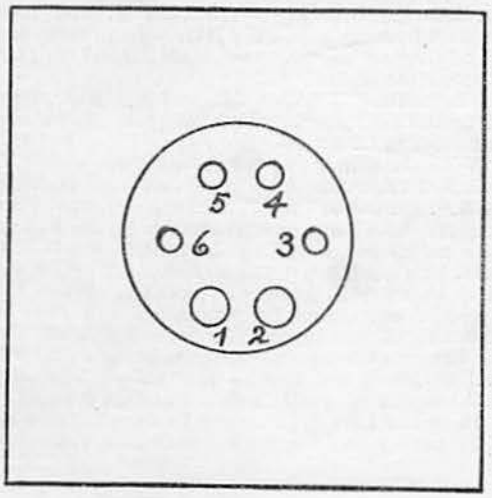


Fig. 7.
Socket connections of American type valves looking at pins.

(a) Types 57, 58, 77, 78, 89.
1, 2.—Heaters.
3.—Cathode.
4.—Suppressor.
5.—Screen.
6.—Anode.
Grid is top cap of valve.

(b) Types 42, 2A5.
1, 2.—Heaters.
3.—Cathode.
4.—Grid.
5.—Screen.
6.—Anodes

(c) Types 2A6, 75.
1, 2.—Heaters.
3.—Cathode.
4, 5.—Diode plates.
6.—Anode.

Although lining the receiver may seem tricky at first, after the correct setting of dial C has been obtained it will be found very simple. The setting of Dial C is very sharp, and so each time the wave band is changed the position of a known crystal should be checked on dial A to see that the correct setting has been obtained.

On first listening upon the receiver, some amateurs may think it is noisy. It should be remembered, however, that the receiver gives a large output for headphone work, and so should be compared with an O-V-2, rather than an O-V-1.

If the signal strength is too great for comfortable headphone reception, a potentiometer may be connected across the output, the phones being connected across the moving arm and earth.

Although component values have been carefully chosen to avoid trouble from parasitic oscillations, this trouble may arise, owing to the fact that electron-coupled oscillators are particularly prone to this fault. Parasitic oscillations are usually indicated by either a very rough oscillation all over the dial, or by the same signal being received every five or ten degrees of the main tuning dial.

This may be cured by lowering the screen voltage to the H.F. oscillator and/or by reducing the ratio of cathode to grid turns on the H.F. oscillator coil.

The receiver has been designed with a view to future additions. A reference to Fig. 2 shows that the rear right-hand corner of the chassis is occupied only by the *Varley* output choke. Underneath the choke is a hole which may be used for mounting another valve if a second I.F. stage is added, so that a crystal gate may be added to the I.F. input. The crystal may be mounted on top of the first I.F.T. and the balancing condenser and switch underneath the chassis. Alternatively, an L.F. stage can be mounted in the spare space, in which case, if a Type 75 valve is used for V5 and the 89 for the L.F. valve, A.V.C. may be obtained for phone reception.

Readers who desire further information on such arrangements are requested to write to Headquarters, and if sufficient interest is shown, the writer will publish the additional information in a later issue of the BULLETIN.

The writer wishes to thank Mr. H. A. M. Whyte (G6WY) for coil data and suggestions. G6WY spent considerable time in making the correct coils for all amateur bands, and the information he has passed on should be invaluable to any amateur building this receiver.

Appendix.

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

The writer has been requested by Mr. Samson to terminate this article with a few comments concerning the practical operation of the receiver herein described.

It has been mentioned earlier that on one occasion DX 14 Mc. signals were received at comfortable strength on the super—at a time when no signs of the signals could be heard on the straight receiver previously in use. This test is confirmed, with the additional comment that an indoor aerial was used on the superhet and a full 132 ft. aerial on the straight receiver.

Recent tests with the new receiver have proved that removing the earthed screen from the lead carrying R.F. from the H.F. oscillator to the 1st

(*Continued on page* 430.)

TRANSMITTER DESIGN

By G. McL. Wilford (G2WD). *

PART I.

Scope.

FROM time to time many questions have been asked by members regarding the best type of transmitter to build when starting operations on the amateur bands. In many cases sets which are described in The T. & R. Bulletin are too complicated and expensive for the beginner. It has, therefore, been decided to study this problem in detail, and that which follows is the first of three articles, each of which will deal with a different portion of a transmitter. The articles will cover the following ground :—

Part I. Oscillators and/or Drivers.
Part II. Frequency Doublers and Buffer Amplifiers.
Part III. Power Amplifiers.

Thus, at the end of the series members will be in possession of complete data from which a transmitter of as many stages as may be desired can be constructed. The individual member will be able to plan a progressive transmitter, knowing that, as he becomes licensed for increased power, he can add more stages, or use a different combination of valves. It is also to be hoped that fully-licensed members will find something of interest because, as far as is practicable, the latest information will be given in each part.

The articles will contain practical advice, leaving out all but simple theory.

Filament Circuits.

When any filament circuit is shown with a centre-tapped resistor it may be omitted if the transformer has a centre tap on the filament winding. If a *storage battery* is used to light the filament of the valve, the centre-tapped resistor may be dispensed with and the connection which goes to its midpoint can be connected to the negative terminal of the battery. By-pass condensers are not usually necessary when a storage battery is used.

Crystal Oscillators.

It is stated in the P.O. Licence that " where a station is not crystal controlled a reliable instrument of the Piezo-crystal or other approved type shall be used to measure the frequencies of the emissions from the station."

As reliable crystals are not expensive, it is proposed to describe crystal oscillators first ; other types will be dealt with later in the article.

Triode Oscillators.

The most simple form of crystal oscillator is that using a triode valve, such as the LS5 or LS5B. An oscillator of this type is shown in Fig. 1. It should be mentioned at this point that no coil or condenser values will be given with the circuits, but suggested sizes will be given at the end of each article.

The operation of the circuit can be explained briefly in the following manner : The action of tuning the grid circuit LC to a frequency slightly higher than that of the crystal produces interaction or feed back between the grid and plate of the valve, as there is a definite capacity between these two elements. This causes the grid circuit to excite and the crystal, therefore, will oscillate. The output obtained in the plate LC circuit will depend on the type of valve being used, or, to put it another way, upon the radio frequency voltage developed, due to the oscillation of the crystal. The plate voltage will also vary with the type of valve, but usually a voltage of 200 is quite sufficient to obtain a good output. In general, it may be said that the triode as a crystal oscillator is not so efficient as other types which will be described later.

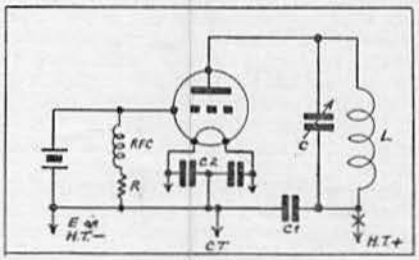


Fig. 1.
Triode Crystal Oscillator Circuit.

The greatest danger in almost any form of crystal oscillator is that of crystal heating, and consequent fracture due to the plate voltage being too high, thereby allowing too much current to pass through the crystal.

The method of tuning this, and any other, type of crystal oscillator in which the plate circuit *only* is used is as follows :—

With the filament of the valve lighted and H.T. switched on, condenser C is rotated until evidence of R.F. current in the LC circuit is indicated by a loop and flash lamp, or neon lamp or by the reading of a milliammeter which is inserted in the H.T.+ lead. Incidentally, the milliammeter is by far the most accurate indicator of resonance. When the valve is not oscillating, the meter will show a standing current of, say, 30 ma's, but when the LC circuit is brought into resonance the current will fall to about one-third of this value. The loop and lamp or neon will impose a certain amount of load on the LC circuit, as can be demonstrated by first tuning the circuit to resonance and then

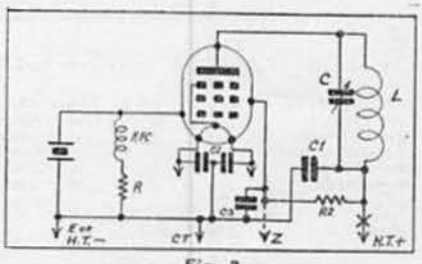


Fig. 2.
Pentode Crystal Oscillator Circuit.

* Head of Transmitter Design Section R.E.S.

placing the neon at the plate end of the coil; the plate current will be seen to rise about 5 or 10 milliamps.

In general, it is better to use at least two milliammeters, one reading 0/20 and one reading 0/100, the lower value being used in the grid excitation circuit and the other in the plate circuit. (*The former is a very important meter and will be referred to again later.*) For the insertion of these meters into circuit, single closed-circuit jacks can be fitted at suitable points in the H.T. or grid bias supply leads. The jacks are connected as shown in Fig. 3. The valve now being in oscillation and the LC circuit tuned for maximum R.F. output, the oscillator is ready to be coupled to the next stage. The coupling will be described in the next article.

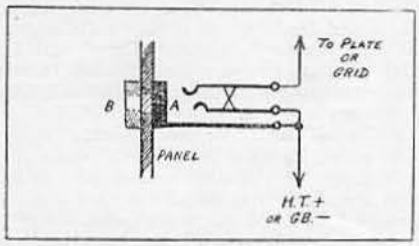


Fig. 3.
Method of Connecting Meter Jacks.
If a metal panel is used A and B must be insulated from it.

Pentode Oscillators.

The next type of crystal oscillator to be described is that using a pentode valve, which, it will be remembered, has two extra elements, *i.e.*, a suppressor grid tied internally to the filament, and a screen grid. The screen grid is the only extra element which will be considered at this point. As the screen grid reduces the grid-plate inter-electrode capacity of the valve, the crystal current is less, consequently much higher plate voltages may be used than is possible with triodes.

Pentodes will, in general, give a very much greater R.F. output than triodes. The screen voltage should not exceed 100 volts, but it is a matter for experiment to discover what voltage for a given plate voltage will give the greatest R.F. output. The screen voltage may be obtained by means of a dropping resistance R2, or by connecting a 100-volt supply from the power-pack voltage divider to the point Z and omitting the resistance R2.

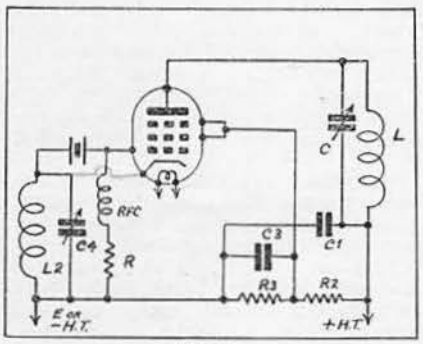


Fig. 4.
Tritet Oscillator Circuit, with suppressor grid brought out to separate pin.

The by-pass condensers C1, 2 and 3, may be of any value from .002 to .006 μF. C1 and C3 are most important, though, if R2 is dispensed with, C3 must still remain, to by-pass the point of attachment from the other power pack voltage divider. The grid leak R in both triode and pentode oscillators may be of the 10,000 ohms 1-watt type, though here, again, experiments will sometimes show that a higher value will give greater output.

The plate voltage may be raised to about 350 to 400 volts, but in general 300 volts will be found ample to give sufficient output to drive any valves, commonly used in amateur transmitters. The method of tuning a pentode oscillator is exactly similar to that employed for a triode.

In recent years many different types of crystal oscillator have been developed in which the oscillator valve is made to perform two functions: (1) an oscillator; (2) a doubler, tripler or even a quadrupler.

This means that, instead of using several doubler stages, the grid circuit of the crystal oscillator valve may be operated at the fundamental crystal frequency and its plate circuit be so proportioned that a frequency two, three or four times greater may be obtained from that circuit. The most popular oscillator of this type is the Tritet which is shown in Figs. 4 and 5.

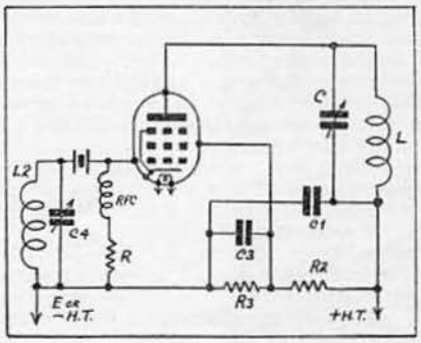


Fig. 5.
Tritet Oscillator using a pentode valve with interna suppressor grid.

Before proceeding further with a description of this oscillator, we must repeat a warning.

On no account must the plate tank circuit be tuned to the fundamental frequency of the crystal in the grid cathode circuit L2 C4 for, due to high feed-back current, there is the greatest possible risk of fracturing the crystal.

However, operation at the fundamental frequency of the crystal is quite safe if the grid-cathode tank is shorted out, the valve then operates as a straight pentode. Referring to Figs. 4 and 5, it will be seen that one is for a pentode with all the elements brought out to separate pins, the other for a normal pentode, *both being of the indirectly heated type, which is absolutely necessary for the correct operation of this circuit.* It will be seen that the valve in this type of crystal oscillator has two separate and distinct tuned circuits. (1) The normal plate LC circuit and (2) the grid-cathode crystal circuit L2 C4. This form of oscillator will, in one valve, perform two separate functions. The circuit L2 C4 is tuned to a slightly higher frequency than

the crystal and the other circuit LC may then be tuned to 1, 2 or 3 times the crystal frequency. This means that, when using, say, a 3.5 Mc. crystal, outputs can be obtained on the following bands :—

(1) with L2 C4 shorted=3.5 Mc., LC.
(2) ,, L2 C4 tuned to 3.5=7 or 14 Mc. LC.

and so on according to the crystal frequency. This oscillator, therefore, will dispense with at least one doubler stage. The method illustrated of obtaining the screen voltage is different to that shown in Figs. 1 and 2 and makes use of two 10,000-ohm 10-watt resistances or one 20,000-ohm 10-watt rating to form a centre-tapped voltage divider. A potentiometer could be very well used here, as it would give *exact* screen voltage which, in general, should not be much over 100 volts. This method could, of course, be used in the earlier C.O. circuits described. In all circuits which employ screen grid valves the screen voltage is most important as wrong values will not give as great an output as when the correct voltage is used. It will repay the constructor many times over if various voltages are tried and the one which gives the greatest output (this will vary for different valves) noted for future reference. Time devoted to this part of the circuit is always well spent.

The dropping resistor can also be used here as it has been found from experience that in circuits using screen grid valves the same power pack should be used to supply both plate and screen voltages, because the voltages will vary in proportion as the load on the power supply varies, which might not be the case if the screen voltage was taken from another power supply. The circuit values of Figs. 4 and 5 are similar to those of Figs. 1 and 2, with the following exceptions :—

The valves being indirectly heated, no by-pass condensers are used, though it may sometimes be found better to earth one side of the heater through a .002 μF condenser.

The resistance R is in this case 100,000 ohms 2 watts, but here, again, 50,000 ohms 2 watts may be quite satisfactory ; C4 may be either .00035 or .0001 μF. Coil sizes for both these values are given later.

In general, the plate tanks of all crystal oscillators may be either high C or low C, but with the Tritet the grid cathode circuit works best when a high C value is used.

Some advice concerning the adjustment of the Tritet oscillator follows : As the valve acts as both an oscillator and frequency doubler the first operation is that of tuning the grid-cathode circuit (a milliammeter is most necessary in this case). With C4 at any setting the plate tank condenser C is first tuned until the milliammeter shows a different reading from that obtained when the H.T. is switched on ; reduce C slightly, leave C and tune on C4 ; tune this condenser until the milliammeter shows a pronounced dip indicating resonance in the plate circuit. Now vary C4 until the milliammeter shows a minimum reading, the oscillator is then ready to be coupled to the next stage. When this is coupled up, it may be found necessary to retune C4 slightly, but this point will be more fully discussed when the Buffer doubler stage is reached. The tuning procedure is exactly the same for operation on the crystal frequency as when the Tritet is used in its dual capacity as oscillator and doubler. A Tritet oscillator is a most useful start for any amateur, for it will be seen that for low-power work a very efficient transmitter may be constructed to work on several bands with a 3.5 Mc. crystal.

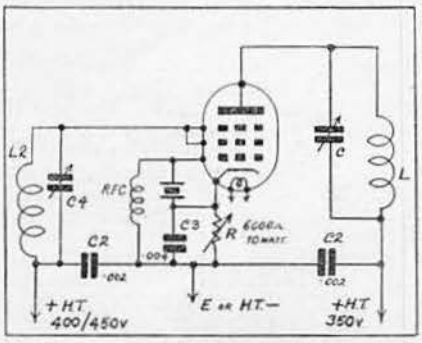


Fig. 6.
Dynatron Frequency Multiplier Circuit.

Special Crystal Oscillators and Drivers.

It is now proposed to give a description of several other exciter units which are useful and efficient for the first stage of a transmitter.

The first is the " Dynatron Frequency Multiplier " which has already been fully described in the Bulletin. * This circuit works excellently as an oscillator plus harmonic generator and is in many ways superior to the Tritet, as there does not appear to be the risk of crystal fracture when operating both circuits on the crystal frequency. As has been previously stated, harmonics up to the 8th are quite strong enough from a 3.5 Mc. crystal to drive one of the new RFP 15's or an R.C.A.802 valve.

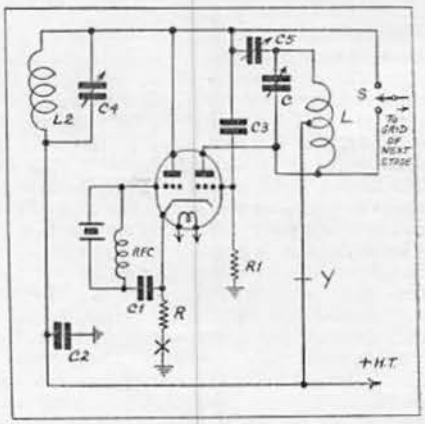


Fig. 7.
The " Jones " Exciter Unit with regeneration.

For reference, the circuit is shown in Fig. 6.

The next special unit is one developed by Frank Jones, of " *Radio*," and uses a class B Twin triode valve, namely, the 6A6 for 6-volt working, or the 53 for 2.5-volt working. Both these valves have similar characteristics, being indirectly heated, which again is a necessity for this class of circuit. There is at present no British equivalent for these valves.

* T. & R. Bulletin, March, 1936.

The circuit diagram is given in Fig. 7. As the valve consists of two complete triodes in one bulb with a common cathode, there are naturally two tuned circuits, one, L2 C4, which operates at the crystal frequency and the other, LC, which operates at some harmonic of the crystal frequency. The component values for this exciter are (excluding the two tuned circuits to be given later) C1, C2, .01 μF, C3, .0001 μF Mica, C5 30 μμF max. The others may be non-inductive tubular condensers. R is 400 ohms 10 watts, R1 is 50,000 ohms 2 watts. C5 is a regeneration condenser which is useful when the higher harmonics are required in the LC tank circuit. It is, however, not necessary for ordinary work. Fig. 8 shows the circuit without this condenser. From experimental results obtained by its inventor, a very much greater output is obtained than with a Type 59 in the "Tritet" circuit.

It may be pointed out that Figs. 7 and 8 have some resemblance to Figs. 4, 5 and 6, all of which have two tuned tank circuits for working on the crystal fundamental, and on some harmonic in the output circuit. The switch S provides a convenient method of changing from output at the crystal frequency to the harmonic output from the LC circuit, but this is not absolutely necessary: see the simplified circuit, Fig. 8. This exciter can be run with anode voltages up to 400, but 350 is a better average figure.

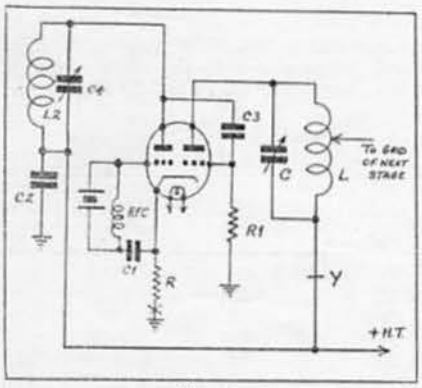


Fig. 8.
The "Jones" Exciter without regeneration.

The method of tuning is more or less the same as for the previous methods employing two tuned circuits, though with this exciter it is better to leave the H.T. off the output half of the valve to begin with. A milliammeter inserted at the point "X" in the cathode-earth lead will give indication of oscillation, and when this is found to be correct the H.T. may be applied to the other half of the valve. A milliammeter inserted at the point "Y" will give evidence of oscillation in the harmonic output tank. When this is correct the exciter may be coupled to the next stage.

A word of warning is now in order regarding these harmonic exciters.

In all cases where the output circuit is tuned to an harmonic of the crystal an absorption wavemeter is a necessity, for in many cases the third harmonic is as powerful as the second, and if the correct harmonic is not picked out, it will be impossible to get the next stage working.

A calibrated absorption wavemeter is the only device which enables the correct harmonic to be recognised; with a heterodyne wavemeter it is difficult to decide which is the correct harmonic by aural means.

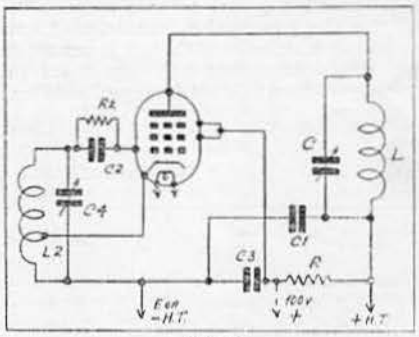


Fig. 9.
An Electron-coupled Oscillator Circuit.

The final exciter unit to be described is the electron coupled oscillator illustrated in Figs. 9 and 10. It will be noted that this circuit is in many ways similar to the Tritet. It has very good frequency stability and almost equal to that of a crystal. It has also the added advantage that the cathode-grid circuit can be definitely calibrated on, say, the full range of the 3.5, 7 and 14 Mc. bands, a feature which enables a station to change frequency very easily. (See article, "A Frequency Meter Monitor," T. & R. Bulletin, December, 1935.) The circuit values are as follows: C1 .002 μF, C2 100 to 250 μμF, C3 .003 μF, C4 .0005 μF, C .0001 μF. R is 50,000 ohms 2 watts or of such a value as will drop the H.T. volts to 100 for the screen. The grid leak value R2 will vary, depending on the class of valve to be used. For the type 59 it should be 50,000 ohms 1 watt.

The tuning of this oscillator is similar to that of the Tritet, but in this case a calibrated absorption wavemeter is almost a necessity. As an alternative the oscillator may be calibrated over the 3.5, 7 and 14 Mc. bands by checking stations of known frequency and making a graph for various other frequencies in the amateur bands. When this has been done, and the valve allowed to warm up, very

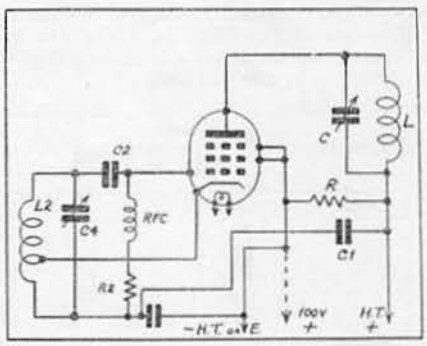


Fig. 10.
Another form of Electron-coupled Oscillator. It will be noted that an R.F. choke and resistance are shunted across the grid tuned circuit.

stable transmissions can be expected with rapid QSY when desired. The plate output circuit is tuned as before to the 2nd harmonic of the fundamental.

The E.C. oscillator is also useful as a "tripler," but it is not good practice to take out any higher harmonic than the second or third.

The information given in these pages will, it is hoped, give the prospective transmitting amateur a few ideas to commence with, but it cannot be too strongly emphasised that time spent on getting the oscillator-driver unit working perfectly *by itself* will be amply repaid when the next stage of the transmitter is reached. No methods of coupling to the next stage have been mentioned, but these will be considered in the next section, dealing with Buffers and/or Doublers.

With regard to coil and condenser specifications: where the transmitter is to take up a small space, 1½-in. diameter coils wound on standard 1½-in. ribbed coil formers are satisfactory because the field from the coil is not as great as when using larger-diameter forms. Coils wound on air can, of course, be used.

Condenser and Coil Data.

TABLE 1.

Pentode and Triode Oscillator Plate Coils.

Figs. 1, 2, 4, 5, 9 and 10.

Frequency.	Condenser. μμF	Coil Diameter in inches.	Turns.
1.7 Mc.	250	2½	35
3.5 ,,	100	1½	35
	250	1½	17
7 ,,	100	1½	11
	250	1½	7
14 ,,	50	1½	8
	100	1½	6
	250	1½	3
28 ,,	50	1½	4
	100	1½	2

Notes.—Turns are to be closely wound and wire gauge to be No. 14 s.w.g. enamel or No. 16 s.w.g. D.C.C.

It is recommended that 50 or 100 μμF condensers be used in preference to those with higher capacities, especially on 14 and 28 Mc.

TABLE 3.

Jones Exciter Unit Output Coils.

Fig. 7.

Band.	Condenser. μμF	Diameter in inches.	Turns.	Wire.
3.5 Mc.	100	Not required, switch S in up position.		
7 ,,	100	1½	16	22 s.w.g. S.W.D.
14 ,,	100	1½	8	18 ,, ,,
28 ,,	100	1½	4	16 ,, S.T.W.D.
7 ,,	50	1½	20	18 ,, Length 2 ins.
14 ,,	50	1½	9	18 ,, ,, 1¼ ins.
28 ,,	50	1½	4½	18 ,, ,, ¾ in.

Note :—S.W.D. indicates turns are spaced wire diameter. S.T.W.D. indicates turns are spaced three times wire diameter. Length indicates the space taken up by the winding.

The *crystal coil* for Fig. 7 using a 3.5 Mc. band crystal and 100 μμF condenser consists of 28 turns 1½-in. diameter spaced wire diameter.

Fig. 8.

Crystal.	Condenser C & C4.	Turns.	Coil.	Wire.
3.5 Mc.	50	32	L2	18 s.w.g. C.W.
7 ,,	50	18	L2	18 ,, Length 1⅝ ins.
	50 (14 Mc.)	9	L.	18 ,, ,, 1¼ ins.
3.5 ,,	50	32	L2	18 ,, C.W.
	50 (14 Mc.)	18	L.	18 ,, Length 2 ins.
7 ,,	50	18	L2	18 ,, ,, 1⅝ ins.
	50 (28 Mc.)	4	L.	16 ,, S.W.D.

Notes :—Diameter of coil 1½ ins. C.W. indicates close wound.

TABLE 4.
Electron Coupled Oscillator Cathode Coils.
Figs. 9 and 10.

Band.	Condenser μμF.	Turns.	Winding and Tap.
1.7 Mc.	350	28	24 s.w.g. C.W., tap 9 turns from bottom
3.5 ,,	350	14	24 ,, C.W., tap 6 turns from bottom
7 ,,	250	35	24 ,, Length 1¼ ins., tap 4 turns from bottom.
14 ,,	250	14	18 ,, Length 1¼ ins., tap 2 turns from bottom

Note :—Diameter of coil is 1½ ins.

TABLE 2.
Tritet Oscillator Cathode Grid Coils.
Figs. 4 and 5.

Crystal.	Condenser. μμF	Turns.
1.7 Mc.	350	28
3.5 ,,	350	15
7 ,,	350	8
1.7 ,,	100	85
3.5 ,,	100	35
7 ,,	100	18

Note.—Turns to be closely wound on 1½-in. diameter former with No. 22 s.w.g. D.S.C., or 22 s.w.g. enamel.

• • •

In publishing the above data the author wishes to make it clear that the information is in general correct for the frequencies stated, but due to length of leads, circuit arrangement, layout, etc., the number of turns may require to be varied slightly to suit individual requirements.

(To be continued.)

NEWS FROM THE STATES

BY YARDLEY BEERS (W3AWH).

THE 3.5 Mc. Tests proved that the band is still first rate for DX. In short, the tests were a success, and thanks are due to G5VL and others who arranged them. It was a great thrill to hear the Europeans roll through, especially in the early evening, when we normally use the band for very local work. Unquestionably, though, the 0500 G.M.T. period was better because of less QRM on this side and an average increase in signal strength from one to two points on the R scale. In spite of the QRM, stations seemed to be raised more easily than on 7 Mc., and the steadiness of the signals made QSO's a pleasure. In the late period the more consistent stations, of which there were a number, were usually R7 here. Co-operation in observing silent periods was on the whole fairly good, but you Britishers should have heard the Bedlam that broke loose afterwards! There were, however, a few misguided individuals who called " Test RSGB " in silent periods, and a number who disregarded the Test entirely. Unfortunately many of the latter were in the British 'phone band, where co-operation was most greatly needed. Furthermore, at the end of the week, a few Continental stations transmitted during only the first five minutes of the period, with the result that heavy QRM persisted for the remaining ten minutes from W stations calling them. Yet the silent periods attained their purpose very well, even though the first night the writer was so accustomed to QRM that he failed to hear a single station, but when the QRM returned he immediately began to QSO G stations!

W3EDP reported the band full of VK's, ZL's, and K6's, the latter being R7, at 1100 G.M.T. He also heard many Europeans, including stations in OK and OH, yet he reports conditions were not very good.

Two of us listened-in during the R.S.G.B. 1.7 Mc. Contest, but poor conditions and a high level of QRN removed hope of hearing any Transatlantic DX.

The regenerative H.F. amplifier has been very popular among those who-build-their-own in recent months, though as far as the writer knows, none have been included in commercially manufactured receivers. The writer has recently built a one-stage pre-amplifier for his superheterodyne, and has found it a great aid in improving selectivity and sensitivity.

The Collins type antenna network, which was so popular a year or so ago, seems to have fallen into general disfavour in the U.S.A. Requiring more time to tune than the inductive type, it is at a disadvantage if rapid changes in frequency are required, especially when one wishes to QSY while a wanted DX station is calling CQ. Furthermore, at least locally, it has been found to cause a greater emission of sub-harmonics, more BCL QRM, and often prevents the proper neutralisation of the final amplifier.

If the reader should hear any raucous cries from this side of the " Big Pond " at about the time this article appears, he can be assured that we are undergoing the first spasm of our annual headache! In short, the 'phone men will be demanding a larger portion of the amateur bands as a prelude to the annual meeting of the A.R.R.L. directors in May, while the C.W. people will be objecting as strongly as they can. So what?

A PUSH-PULL 100 WATTS DRIVEN AMPLIFIER FOR 28 Mc. OPERATION

By J. Clarricoats (G6CL)

Prologue.

THE writer, having criticised both himself and certain of his colleagues in a recent Editorial, feels that the earliest opportunity should be taken to correct any impression that may have been gained that it is not possible *to-day* to operate a high power driven amplifier on the 28 Mc. band, using British valves and components. Shortly after the publication of the Editorial in question, attention was directed to the fact that one or two members, notably Messrs. Clark, G5FV, and Hunter, G6ZV, had in past days successfully driven triodes on 28 Mc., but it seems to have been generally admitted that with few exceptions power frequency doublers held sway at most stations. Maybe laziness was partly responsible for this state of affairs, because most of us object to making radical alterations when we possess a reasonably efficient transmitter for 7 and 14 Mc. work. However, whatever the reason, it was not until recent months that driven power amplifiers became fashionable for 28 Mc. operation.

The Power Amplifier Valve.

The introduction last November by the 362 *Valve Co.* of a British Radio Frequency Pentode, with its short grid base, seemed to offer possibilities, especially as we knew from past experience that lack of drive from 28 Mc. doubler stages was one of the reasons against the successful operation of many triodes under power amplifier conditions. The small amount of drive required for the operation of the American RK20 R.F. Pentode had already whetted our appetites for a British equivalent, especially as one or two of our members had begun work on 28 Mc. using this class of valve.

The Circuit.

Bearing in mind recent discussions and published statements concerning the improved efficiency resulting from the use of link coupling between stages, it was decided to depart for the first time from capacity coupling to the final amplifier.

The first three stages were the same as had been used during past years for 7 and 14 Mc. work, except that a 7090 kc. crystal was used instead of one oscillating in the 3.5 Mc. band. The valves were *Mullard* PM 24M's, old-fashioned pentodes with 350 volts on the plates and 150 volts on the screens.

The R.F. output from the second doubler (viz. 28 Mc.), as expected, was found to be much less than from the same stage when working from 3.5 Mc. through to a 14 Mc. doubler. A flash lamp bulb and single turn lit at half brilliancy when held close to the tuned circuit.

The link consisted of one turn of wire at the doubler end and one turn at the grid end, the doubler turn being placed in between the first and second turns from the hot end of the coil, and the grid turn centrally between the two halves of the grid coil.

The grid coil consisted of four turns wound on a standard *Q.C.C.* valve base coil former, the circuit being tuned by means of a *Polar* split stator condenser having an effective capacity of 75 μμF.

The final stage consisted of a pair of RFP 60's in push-pull.

A *Cyldon* 100 μμF effective split stator condenser and a four-turn copper tube inductance 2 ins. diameter formed the plate tank circuit.

A considerable amount of experimental work was carried out in order to ascertain the correct suppressor grid voltage for c.w. operation, and a figure of 60 volts positive was finally selected.

Bias was obtained by means of a fixed and variable resistance in series with the grids, and although definite figures are of little value, it can be mentioned that under full load conditions, a resistance of about 15,000 ohms gave the best results. This figure corresponded to a grid current of about 7 milliamps., or approximately 100 volts bias. For operation on 14 Mc. a bias resistance value of 25,000 ohms seemed more suitable.

Screen voltage was obtained from a fixed potential divider, but it seems clear that it would be preferable to use a variable potentiometer in this circuit in order to regulate output. The arrangement adopted was the same as that illustrated on page 446, June, 1935, T. & R. Bulletin. The resistances were supplied by *Electradix*, and were of the 20,000 ohm. 50 watt type, two being connected in parallel for R1. Under operating conditions, viz. 1,000 v. at 100 mas., the screen current was found to be about 40 mas. for the pair. Incidentally, a milliammeter in the screen lead provides a very excellent means of checking the resonance of circuits.

For the reason that few contributors mention the off load current values they obtain under operating conditions, it has been considered desirable to record them on this occasion! On 28 Mc. with 500 volts applied to the plates, the resonance current in the final plate circuit was 25 mas. compared with 10 mas. on 14 Mc. With 1,000 volts applied, the minimum rose to 50 mas. compared with 20 mas. on 14 Mc.

Aerial Coupling.

For the past 18 months a Collins Coupler of the usual type adopted by those operating with feeder systems has been in use for 7 and 14 Mc. work, but

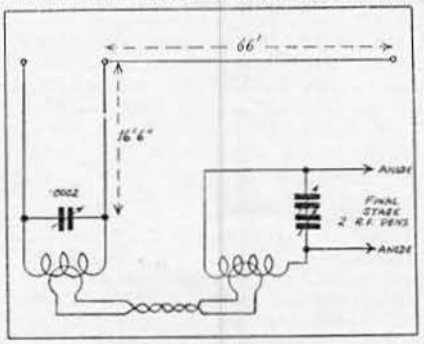


Fig. 1.
The link coupling arrangement used for 28 Mc. operation. The feeder coil consists of 4 turns 2¼ in. diameter.

initial tests showed that the device was not altogether satisfactory for operation on 28 Mc. After a series of experiments, it was decided to adopt a method of link coupling which may be old, or it may be new, whichever the case the fact remains that many members have shown an interest in the scheme, and, therefore, no apology is offered for mentioning it here.

It should, however, be first of all explained that the Collins network is a fixture on the wall at G6CL, and, therefore, it was desirable that the modifications made for 28 Mc. operation should not seriously affect the arrangements for 7 and 14 Mc. work.

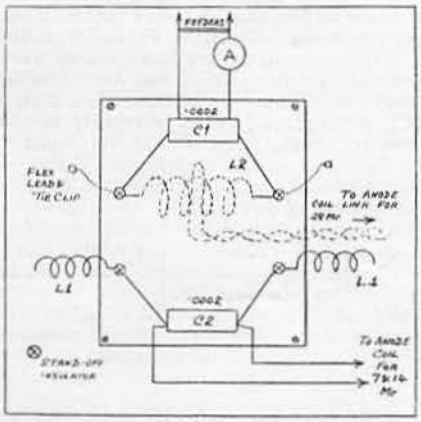


Fig. 2.
The method of arranging the aerial coupling for 7, 14 and 28 Mc. L1 are standard 9 turns copper tube inductances, five turns only being used for 14 Mc. The coil L2 is inserted for 28 Mc. operation and the link placed between its turns. Stand-off insulators are used to support the coils and condensers.

The method of effecting the link is illustrated in Fig. 1. It will be seen that a four-turn coil is placed across the feeder condenser, and one single turn of link is taken by means of a flex pair to another single turn of link, coupled between the turns of the plate coil in the final stage. The system is adjusted by tuning the feeder condenser until maximum current is indicated in the final amplifier plate circuit meter. Low power is always used for the initial adjustments. Bearing in mind the off load figures quoted above, the coupling device is adjusted to give a 100 per cent. increase in plate milliamps., which means 50 mas. at 500 volts, and 100 mas. at 1,000 volts. A very small degree of coupling is necessary to obtain this percentage of transfer. Tighter coupling and greater efficiency may be possible with increased grid drive, but under existing conditions an input of 100 watts is considered satisfactory for two valves in push-pull.

A word or two regarding the aerial and aerial current readings may be of interest. The top of the aerial is 66 ft. long and the feeders are 16½ ft. long to the condenser at the end of the feeder lines. With a thermo-couple ammeter in the live feeder at the home end, the following R.F. currents are normally obtained with an input of 100 watts:—

7 Mc., 1.4 amps.; 14 Mc., 1.8 amps.; 28 Mc., 0.3 amps.

These figures are quoted as an indication of the values one may expect to obtain using the system described.

Results.

To record results in a technical article may not be considered good practice, but as we have said on an earlier occasion, the proof of the pudding is in the eating. On the 28 Mc. band since January 1 over 150 DX contacts have been made, and only on very few exceptions have reports been lower than QSA 5 R5. Most of the U.S.A. stations worked have reported signals at R8/9. All Districts have been worked, besides numerous other DX places.

On 14 Mc., results have been even more satisfying, but we can hear in the background the still small voices of many of our readers saying, "Well, so you should be able to work DX with that power," so we will leave it at that.

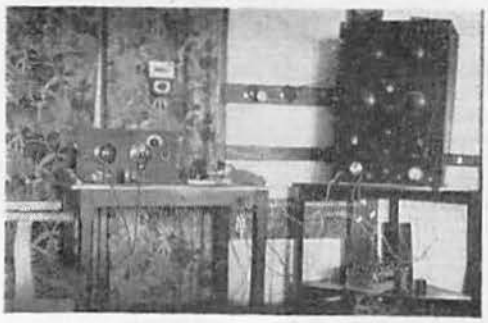
The purpose of this article will have been achieved if we have vindicated ourselves for any wrong impression that earlier remarks had made on the minds of our members.

Our concluding thought must be one of grateful acknowledgment of the assistance given to the radio amateurs of Great Britain by the 362 *Valve Company*, who have had the courage to take off their coats in a praiseworthy attempt to fulfil one of our most urgent needs—valves suitable for amateur requirements.

TRUE STORIES NO. I

Remember Miss Corry's achievement when she worked all continents on 28 Mc. in a few hours: well, here's a photograph of VU2LJ located at Doom Dooma, Assam, and one of the six stations to help her make history. Mac's a wily bird and succeeds in working unbelievable DX from that Tea Estate of his with ridiculously low power.

Finger wet, finger dry, he assures us that those tall stories about getting R8 from ZS and R9 from W8, with 7 watts input are honest to goodness; knowing Mac we believe him.



Its not much good describing in detail the gear in the picture because we'll bet our last ounce of baccy, that he's pulled it to bits long ago, but for the sake of posterity (dreadful word) we'll just mention that the valve in the final *was* a TC04/10, the doubler *was* a B406, and the C.O. a RCA 12A. The volts on the P.A. varied (shush!) between 260 and 270. The modulation gear is underneath —somewhere. Wherever it is the box of tricks works extremely well, because phone from VU2LJ has percolated (sounds a bit queer from a Tea Estate) into most corners of the globe.

THE DECEMBER 3.5 Mc. TRANS-ATLANTIC TESTS

By H. J. Powditch (G5VL).

PUBLICATION of this report has been somewhat pelayed because of the arrangement made earlier with the A.R.R.L., whereby they would collect and forward to the writer a summary of reports from North American stations.

European stations are not included in the list of Calls Heard published at the conclusion of this article, but it is interesting to record that several prominent stations, notably D4ARR, HB9AQ, and PA0ASD were well received on the other side.

As is often the case on the 3.5 Mc. band, conditions across England varied a good deal, and it seems that stations in the East and West Midlands were slightly better situated for T.A. work than those in other localities. G6RB was particularly unlucky, suffering from ice-shorted feeders for some time.

The support given to the Tests by U.S.A. and Canadian amateurs was remarkable, and as a result many more stations called Europe than we were able to log. Most of the reports sent to the A.R.R.L. speak of the over-keen response. The QRM thus caused on the American side undoubtedly reduced the number of T.A. contacts.

European "spitch" and "moospitch" was one of our greatest difficulties, but even so, judging by the long list of stations heard in the States and Canada, "a good time was had by all."

It was rather disappointing to find so few G's taking an active interest in these tests, when it is borne in mind that 3.5 Mc. is one of our most popular bands.

Ultra low power for T.A. work was demonstrated by G2DQ, who, with an input of only 7½ watts, established a phone contact with VE1EI. G5KG, our versatile DX worker, made 18 contacts, nine on phone with 10 watts input. G6PF had over 50 contacts, 2ZQ averaged 15 an hour whilst working, 6RB totalled 30 in spite of bad local conditions, 5BD got over 20 times, whilst 2IN, 2RL, 2SA, 5FV, and 6CL were among others who were successful. Our phone stations experienced no great difficulties, 5VL and 6LL having many QSO's.

Empire stations, excluding a few VE's and VO's, were in general conspicuous by their absence, but it is of importance to note that G6RB heard ZE1JE, and 5BD worked VK2LZ. This station has since heard VK4EI, and again worked 2LZ. Just before the tests G2ZQ worked VK3EG.

Several members mentioned in their reports that the signal strength of the DX stations was superior

(*Continued on page* 430.)

Summarised Reports.

"A" indicates 2 or 3 reports. "B" 4 or 5 reports. "C" 6 to 10 reports. "D" 11 to 15 reports. "f" is phone reception.

First Series of Tests.	December 15 to 18.	23.45 till 02.00 G.M.T.						
Heard in W1	G2DQ (B)	2IC (A)	2PL (B)	2ZF	2ZQ (D)			
	5BD (A)	5GB	5GV	5JU (A)	5KF			
	5KG (D)	5RV (B)	5VL (f) (B)	6BH	6GH	6MD (A)		
	6PF (C)	6RB (D)	6RH	6WY				
Heard in W2	EI4J (A)	G2DQ (A)	2ZQ (B)	5BD (A)	5FV (A)			
	5JU	5KG (C)	5VL (f)	6LL (f)	6PF (A)			
Heard in W3	G2DQ (A)	2PO	2ZQ (B)		5BD (A)			
	5FV	5JF	5KG	6PF				
Heard in W8	G2AI	2PO	2DQ	2ZQ (B)	5FV (B)	5KG	6KJ	
	6PF	6RB (A)						
Heard in VE1	G2IN	5KG	5VL (f)	6LL (f)				
Heard in VE2	G2DQ	2PF	6MD	6RB	5FV	6RB		
Heard in VE3	G2ZQ	5FV						
Heard in VO	G2ZQ (A)	2IC (A)	5KG (A)	5FV (A)	5BD (A)			
	6RB (A)	6PF	5VL (f) (A)					
Second Series of Tests.	December 19 to 22.	05.00 to 08.00 G.M.T.						
Heard in W1	G2DF	2DQ (D)	2DQ (f)	2PL (C)	2SA	2ZP (A)		
	2ZQ (C)	5BD (B)	5JZ	5KG (A)	5VL (f) (A)			
	6CL (A)	6RG	6JF	6KI (A)	6LL (f)	6PF (D)		
	6RB (D)							
Heard in W2	G2DQ (A)	2PL	2ZQ (B)	5BD (A)	5KG	5VL (f)		
	6LL (f)	6PF (B)	6RB (A)	6WF				
Heard in W3	G2DQ (B)	2PL	2ZQ (A)	5BD	6PF (A)	6RB (A)		
Heard in W4	G6PF	6RB						
Heard in W7	G2ZQ	6PF						
Heard in W8	G2DQ (B)	2PL (A)	2ZP	2ZQ (B)	5BD (A)	5KG (A)		
	5VL (f)	6CJ	6GF	6PF (C)	6RB			
Heard in W9	G2DQ (A)	2ZQ (A)	5BD (A)	5MP	5VL (f)	6PF (A)		
	6RB (A)							
Heard in VE1	G2DQ	5VL (f)	6LL					
Heard in VE2	G2ZQ	6PF	6CJ	5BD	5KG			
Heard in VE3	G2PL	5BD	6PF					
No details of times given.								
Heard in W1	G5OG	6ZC						
Heard in W3	G2AX							

A VARIABLE COUPLING DEVICE

By "Tee-Why."

THERE can be little doubt nowadays that the most efficient coupling between the various stages of a transmitter is that provided by so-called "link coupling." Difficulty sometimes arises, however, in arranging the coupling coil in its most effective position for different frequency bands.

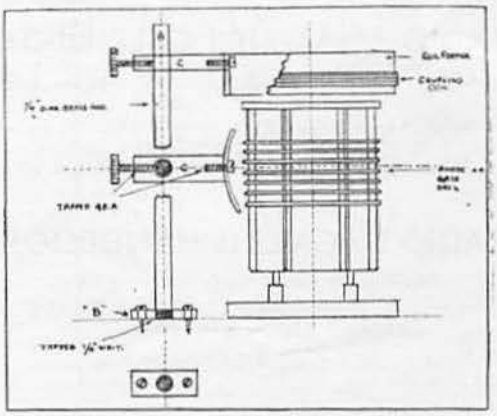
The device to be described permits an almost infinite number of coupling positions to be obtained and, further, once the optimum position is ascertained, it can be calibrated roughly for future adjustment.

The sketch is really self-explanatory and shows the main idea, but the device could easily be elaborated to suit individual preferences.

"A" is a ¼ in. diameter brass rod of a suitable length, which is screwed at one end ¼ in. whitworth to fix into the baseplate "B" made from ½ in. by ¼ in. brass about 1¼ in. long. "C," the movable member, is cut from ½ in. by ⅜ in. or ½ in. by ½ in. brass drilled 9-32 in. to slide on the shaft "A." It is drilled and tapped 4 B.A. at each end as shown. The coupling coil former is secured to the "long" end by a 4 B.A. screw and a similar screw with knurled head (taken from an old "phone" terminal) serves to lock the sliding member in any desired position. Once these positions have been found, the shaft "A" can be marked.

The scheme is equally applicable to coils mounted horizontally as it is only necessary to arrange an upright to which the base "B" may be screwed. When arranged for horizontal mounting it may be advisable to substitute ¼ in. square rod for the shaft "A." This will prevent the outer coil from falling on to the inner if the locking screw should become loose. In this case it will, of course, be necessary to file a square hole in the sliding member.

The device has proved exceedingly useful in the



case of a grid-modulated transmitter with link coupling between the buffer and the P.A. When modulating it is necessary to reduce the drive to the P.A. and with the usual method of winding the coupling coil on the same former as the P.A. grid coil, this reduction was obtained by lowering the anode voltage of the buffer.

The coupling device performs this reduction of drive very simply. The shaft is marked as suggested earlier, and it is a matter of a few moments to change the coupling for either "fone" or C.W.

Protection of Quartz Crystals in Tri-Tet and other Oscillator Circuits

During the course of some experiments with a tri-tet oscillator, it occurred to the writer that some check on crystal current would be advisable to prevent damage to the crystal. The point was first raised when a peculiar "hissing" sound issuing from the crystal holder was noticed, and demanded investigation.

An R.F. current meter was not available, so a 60 ma. fuse bulb was wired in series with the cathode lead from the crystal. The action of this bulb was illuminating—and not only in the literal sense! When the oscillator anode condenser was varied over a few degrees, the bulb glowed with an intensity varying from dull red to brilliant white (it was possible to "blow" the lamp if care was not used), and *there was no apparent increase or decrease in the oscillator output* as judged by the anode and grid milliammeters of the driven amplifier. It was obvious that maximum output did not mean maximum crystal current, and with the fuse bulb in circuit, the oscillator can be adjusted to give greater output with a minimum of crystal current, with the consequent advantage of less frequency drift, and the knowledge that the crystal is not being overrun.

This crystal current indicator has been of such assistance that the writer would not omit it from any oscillator. It seems also to be of more use than an R.F. meter, since the warning flash of the bulb when the crystal current reaches dangerous heights is immediately noticed. A crystal could be ruined before the increased reading of a meter was noticed. Besides, the cost of the bulb is negligible and is cheap insurance against a spoiled crystal.

T. Y.

Empire Calls Heard

H. S. Bradley (New York), October 16, 1935 to January 25, 1936 :—

Telephony : vk2as, 2bg, 2fy, 2lz, 2qr, 2uc, 2xg, 2xm, 2xu, 3kx, 5fm, 5jb, 5mz, 5su, 6fo, 7jb, 7kv, vo1i, vp2at, 2cd, 2km, vp3bg, 3mr, 4tk, 5ac, 6fo, 6mo, 6ub, 9o, 9r, vq4cro, ze1jr, zs1c, zt1r, zs4j, zs6af, 6am, zu6p.

R.S.G.B. SALES DEPT.

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G.M. : 28 Mc.

L. O. Rogers (G2HX), "Audwen," Estcourt Road, Gloucester.

G.M. : 56 Mc.

A. J. E. Forsyth (G6FO), "Westview," Appledore, near Bideford, Devon.

G.M. : Joint Group with Propagation

G. A. H. Eckles (G5GC), 57, Sutton Road, Beverley High Road, Hull.

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G.M. : 28 Mc.

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G.M. : Literature

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F. W. Benson (2BWF), 53, Corona Drive, Thorne, Doncaster.

No. 7 : MICRO-WAVES

S.M. : Dr. C. G. Lemon (G2GL), 19, Lena Gardens, Hammersmith W.6.

ONCE again the subject of this editorial is 56 Mc. work. No apology is made for this, because information received from the various groups working on this frequency shows only too clearly that very little advance is being made by the majority of members. The self-excited, or at best master-oscillator power apmlifier, type of transmitter is practically the only one in use, and much the same applies to the receiving side. Possibly this is due to the fact that frequency stability on 56 Mc. has not been considered feasible. The publication this month of details for the construction of an exciter unit giving a reasonable output removes the excuse for this lack of progress. It is regrettable that so few of our members have had sufficient energy to discover for themselves how simple a matter the design of such a unit may be.

In a month or so details will be published of the final power amplifier unit for work with the exciter unit described in this issue. With the completion of this second article sufficient information will have been provided to build both a stable transmitter and receiver. R.E.S. will be very pleased to hear from any member who builds these sets.

G6PA.

56 Mc. Tests from Bristol.

Mr. J. N. Walker (G5JU), our 56 Mc. Transmitter Design Group Manager, is transmitting c.w. every Sunday, at 1100 G.M.T. or B.S.T. Co-operation is sought, and all reports will be welcome.

The Dellinger Effect*

In a letter received from ZB1E, he states : "The 'wipe-out' took place here in Malta on December 18, at about 18.00 G.M.T., and it lasted for approximately half an hour. The 'wipe-out' was complete on the 14 Mc. band, and only a few R1 signals were heard on 7 Mc. On the H.F. broadcast bands the 'wipe-out' was complete on 12 Mc., and just a trace of carrier on the 9 Mc. band."

This is interesting news. From October 24 to December 18 is 55 days, but from December 18 to February 14 is 58 days. Where is the 54-day period now ?

Another point. It is worthy of note that the 'wipe-out' was most complete on the higher frequencies. This evidence is strongly in favour of the cause being a diminution of ionization density due to expansion in the F layer rather than an increase and lowering in the E layer.

While writing on the subject it is perhaps worth while mentioning a theory which has been put forward by G5JH, G.C. of 4C., who has observed that the Dellinger effect seems to occur when there is an odd number of sunspot groups in existence. Assuming pairs have opposite polarity, the odd one would be left in control. This theory is being examined in detail by the Propagation Section, who hope to be able to make a pronouncement upon it in the future—in the meanwhile others may care to follow up this line of research.

G2GD.

*Further notes compiled by Propagation Section R.E.S.

A 56 Mc. CRYSTAL-CONTROLLED TRANSMITTER

PART 1.

Introduction.

DURING the past few years much has been accomplished on the propagation of 56 Mc. signals, but the technical design of transmitters and receivers has not received the attention that it merits. Most amateurs have been content to transmit some sort of signal as far as possible, without worrying very much about the quality of that signal. There are probably several reasons for this lack of energy on the part of most experimenters. In the first place, until quite recently there have been no suitable valves for work on these high frequencies, and in the second very few amateurs have cared to undertake the long and somewhat arduous task of research necessary to discover the requirements for apparatus of a higher technical standard.

The chief problem to be overcome is the question of frequency stability, both in the transmitter and the receiver. In the past, transmitters have been, almost without exception, of the self-excited type, and, as a consequence of their instability, the receiver has had to employ a very unselective tuning device. This has led to the use of the " quenched " receiver, a most unsatisfactory arrangement owing to its inherent high noise level.

It will thus be seen that a vicious circle has prevailed.

The following pages are an attempt to show that the use of Crystal Control on 56 Mc. is by no means an impossible task, once the principles involved are properly understood, in fact, providing apparatus suitable to the task is employed, the matter, so far as the necessary 56 Mc. excitation for a power amplifier is concerned, merely involves choice and suitable layout of the apparatus, and is no more intricate than that for use on lower frequency bands.

For the sake of convenience and clarity the transmitter has been built, and will be described in two parts. Part 1 will deal with the exciter unit, while Part 2 will be devoted to a description of a suitable power amplifier giving appreciable output on 56 Mc.

The Exciter Unit.

Reference to Fig. 1 shows that the unit is very much the same as any C.O. F.D. F.D. exciter employed for lower frequencies. This is, in fact, the case, and the unit could well be employed on a lower frequency by the use of coils of a different size.

The only unusual item is the use of a double tuned circuit in the plate of the C.O. valve. The tuned circuit shown next to the plate of the valve is tuned to 7 Mc., the crystal having a frequency

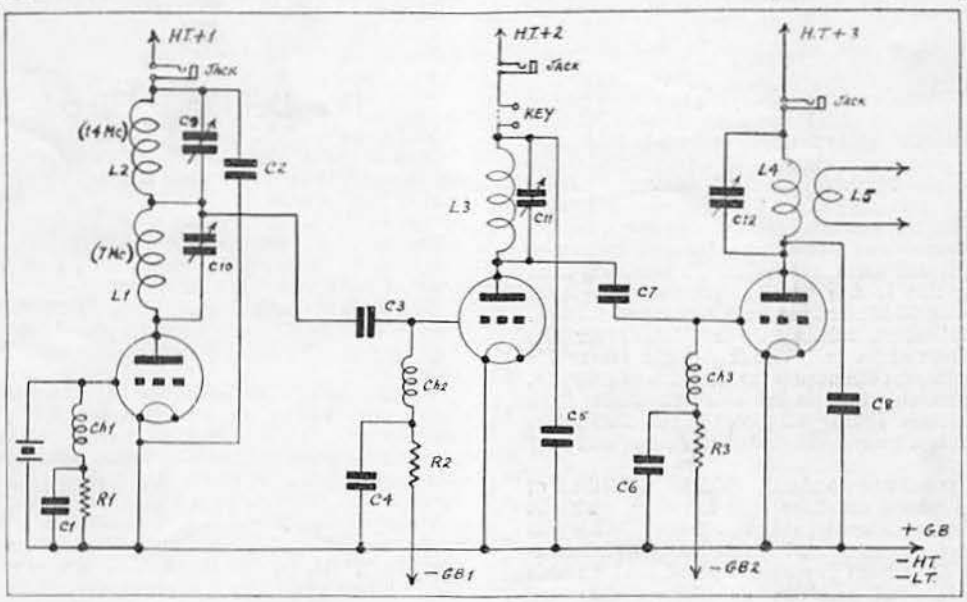


Fig. 1.
A 56-Mc. Crystal-Controlled Transmitter.
(Exciter Unit.)

C. 1.3.4.6.7. Dubilier Type 670 .001 mF.
C. 2.5.8. " " 610 .001 mF.
C. 9.10. Jackson Bros. " Midgets " .00015 µF.
C. 11. " " " .0001 µF.
C. 12. " " " .00005 µF.
Ch. 1.2.3. See Text.
R. 1. Dubilier 40,000-ohm 1-watt type resistance.
R. 2.3. " 100,000-ohm " " "
3 B.T.S. Closed Circuit Jacks. 1 B.T.S. Plug.
Coils: L. 1.2.3.4.5. See Text.
Terminals: Belling Lee. GB — 1.2. GB+HT — HT+ 1.2.3. LT+LT — 2 Red. (Key.)
6 Eddystone No. 1028 Insulating Pillars.
4 " " 1005 Bakelite Knob Dials.
4 " " 1008 Extension Rods.
4 B.T.S. Condenser Brackets, Type UB.
3 Resistance Holders (Dubilier).

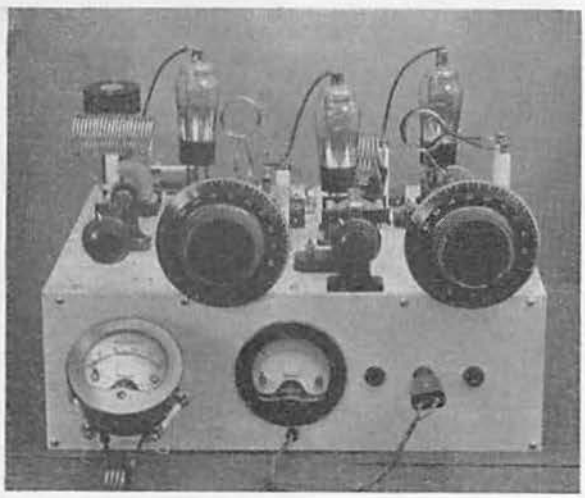
in this band. The other circuit is tuned to double the frequency, *i.e.*, 14 Mc. No originality is claimed for this arrangement, which has appeared previously in the BULLETIN, but it offers a very simple and effective method of drawing an output of double the crystal frequency from the crystal oscillator, thus the saving of a valve is effected.

The 28 Mc. F.D. requires no explanation, as it is quite straightforward; the same applies to the final F.D., which gives a 56 Mc. output. Provision is made here for link-coupling to the grid circuit of the power amplifier. This final doubling stage is capable of giving over a watt of R.F. energy providing the unit is properly adjusted. It may be coupled to an aerial system by means of a transmission line, and associated impedance matching network.

The choice of suitable valves is of the utmost importance, and after considerable experiment three valves produced by the *High Vacuum Valve Co., Ltd.*, for work on ultra high frequencies were chosen. These valves, known as the PX230 SW, have proved to be excellent for the various stages of this transmitter. Owing to the fact that the grid is brought out to a cap at the top of the valve, a very low grid to filament capacity is obtained, which makes for extra efficiency. The valves have a two-volt 0.3 amp. filament, and are rated at 150 volts on the anode; however, they have been in constant use with a plate voltage of 180, and still show no signs of loss of emission.

Construction.

Great care must be taken in the construction of apparatus for use on ultra high frequencies to ensure that all leads carrying R.F. are as short and spaced as far apart from one another as is possible. The components must be of the very best quality if reliable results are to be obtained, and while good results could very possibly be obtained with parts similar to those employed in this transmitter, this cannot be guaranteed. Therefore, the items specified should in all cases be used. All the parts are obtainable from regular advertisers in the BULLETIN. This does not apply to such details as nuts and bolts, aluminium, etc.



A Front View of the 56-Mc. Exciter Unit.

The aluminium for the chassis was obtained from the *British Aluminium Co.*, and is supplied cut to size, and frosted, but not lacquered. For the exciter unit three pieces of aluminium will be required. A base sheet 15 ins. × 11 ins. × $\frac{1}{16}$ in. and two side pieces 15 ins. × 5 ins. Similar pieces are used for the power amplifier to be described later. The constructor who takes a pride in the appearance of his work should have these metal sheets sprayed with clear cellulose lacquer. Unless this is done before operations are commenced many marks will show up, and the finished unit will have a dirty appearance.

The sides are bolted to the base piece by means of four 4 B.A. nickel-headed bolts which bolt on to a piece of aluminium angle 15 ins. long. Two pieces are required for each chassis.

Before the chassis is bolted together the necessary holes are drilled in the side pieces to take the terminals, meter jacks, and the *Ferranti* 0 to 100 mA meter. The hole for the meter can be cut out of the $\frac{1}{16}$th aluminium by means of a fretsaw lubricated with turpentine. A template is supplied with the meter. The bottom corners are strengthened by the use of a length of $\frac{1}{4}$-in. square rod, which is tapped 4 B.A. at each end, and attached to the corners by 4 B.A. bolts. This is made clear in the photograph.

With the chassis complete, work can be commenced on the mounting of the various pieces of apparatus. The accompanying photographs show how the components are arranged, and no difficulty should be experienced in carrying out this operation. For ease, the condensers should be attached to their *B.T.S.* mounts and these should then be bolted to the baseboard. All parts are secured to the baseboard by means of 6 B.A. round-headed bolts, and nuts. For convenience, bolts one-inch long may be used, the surplus length being cut off after fixing.

The *Dubilier* type 610 bypass condensers should be mounted directly under their relevant tuning condensers, and the earthed side of each condenser taken through a hole in the baseboard to one of the mounting bolts and soldered to a tag secured to one of these bolts. The bypass condensers for the grid circuits are the *Dubilier* type 670. The small terminals are removed from these, and the earthed end of each condenser is bolted directly to the baseboard. These condensers are so small that they do not require to be bolted down.

With the tuning condensers and bypass condensers disposed of, the valve-holders may next be mounted. The holes for the filament wires should first be drilled, and then the *Clix* short-wave baseboard valveholders bolted in position. In each case the rear filament pin is connected to the nearest earthed bolt, which will be the bolt securing the nearest holder leg.

The crystal holder, which is a *Brookes* enclosed type, is mounted on a short ebonite strip having two plugs. This strip is, in turn, mounted on two *Eddystone* No. 1028 insulating pillars. Directly below the crystal holder is situated the C.O. R.F. choke, which is a *B.T.S.* Type 103.

The grid leak holders are mounted adjacent to their respective valves. The holders and their resistances are made by *Dubilier*. The last two resistance holders act as a suitable termination for the two R.F. chokes which have wire ends. The

choke in the grid circuit of the 28 Mc. F.D. is a *B.T.S.* Type U.H.F. 1, while that in the grid circuit of the 56 Mc. F.D. is a *B.T.S.* Type U.H.F. No. 2.

Owing to the fact that the grids of the valves are brought out to the top of the glass bulb, it is necessary to provide some mount for the R.F. end of the R.F. chokes, and the coupling condensers. This may be done most suitably by the use of *Eddystone* No. 1028 insulating pillars. The same type of pillars may be used to terminate the link coupling coil.

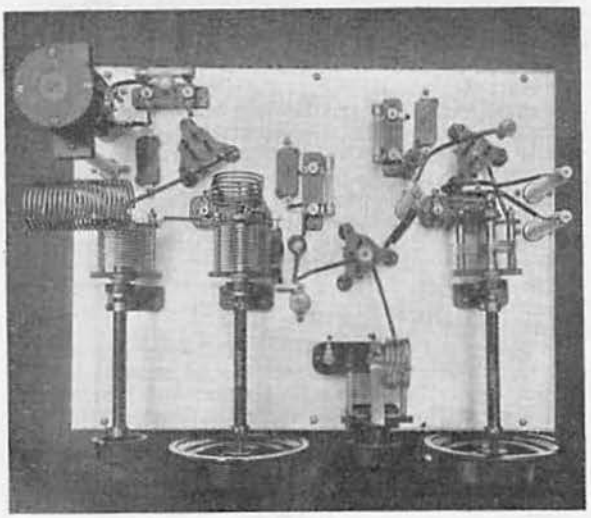
The *Dubilier* Type 670 .001 μμF condensers used to couple the F.D. stages to one another are mounted edgewise to decrease capacity to earth.

The *J.B.* Midget Condensers, which are used in all stages for tuning, act as the mounts for the coils. These coils are so small that the inclusion of separate coil mountings is unnecessary. All coils are wound on a one-inch diameter wooden rod with No. 14 gauge bare copper wire. The rod is then removed, and the turns spaced as required, by passing a small screwdriver round the turns until the correct spacing is obtained.

The 7 Mc. coil consists of 20 turns, the 14 Mc. coil 6 turns, the 28 Mc. coil 5 turns, and the 56 Mc. coil 2 turns. When the coils have been cut to size they should be chemically cleaned by immersion in a bath of spirits of salts for a few minutes. On removal they should be well washed in hot water and, when dry, given a generous coat of liquid celluloid.

Before applying the celluloid, stout soldering tags should be fixed to the ends of each coil, so that they may be mounted directly on the condenser terminals.

The wiring of the unit is best carried out with No. 18 gauge tinned copper wire, and insulated sleeving. All connections should be soldered. Where terminals are available a soldering tag should be used, and the wire soldered to the tag. A far better contact is obtained by this method. It is advisable to tin all valve legs, tags, etc., before mounting. Owing to the fact that the lacquer on the aluminium is inflammable, care must be taken that the soldering iron is kept as far away from it as is possible.



A Plan View of the Exciter, showing position of components on chassis.

It is not necessary to use tags with the *Belling Lee* "B" Type terminals, which are mounted in a row on the back of the chassis. A separate terminal is provided for H.T. supply to each valve; this is not essential, but is advisable, as it is sometimes desirable to increase the voltage on individual stages.

Keying the transmitter is effected by breaking the H.T. supply to the 28 Mc. F.D. Owing to the small power involved, the key clicks are negligible.

Under normal operating conditions the C.O. will draw about 20 mA plate current, the first F.D. 10 mA, and the final F.D. 20 mA. It is not advisable to exceed these figures to any considerable extent.

Operation.

With the exception of the crystal oscillator stage, the operation of this unit is very much the same as that of any other series of F.D.'s.

A 7 Mc. Crystal should be plugged into the crystal sockets, and the 7 Mc. plate tuning condenser adjusted until the plate current of the C.O. is nearly at a minimum. The capacity of the tuning condenser should then be decreased so that the plate current rises to about twice its minimum value. Then the 14 Mc. series circuit should be tuned until the most output is obtained in this tuned circuit. Final tuning of the 7 Mc. circuit will now show still further output.

In all tuning operations the use of an absorption type frequency meter is essential. It is very easy indeed to mistake the harmonic selected in any of the circuits, and only the use of an absorption meter will obviate this chance of error.

Having obtained the best output possible from the 14 Mc. circuit the plate voltage should be applied to the 28 Mc. F.D. and tuning carried out in the usual manner, again checking the output against the frequency meter.

The same procedure is followed for the final stage. Grid bias for both F.D. stages may be in the nature of 35 volts, the grid leaks in each case being 100,000 ohms. If lower value leaks are employed a higher battery bias must be employed.

When the final adjustments have been made the output from this unit should be over one watt R.F. All the measurements of power output from this unit were made with a wattmeter which was constructed from a *Ferranti* 0-50 mA Thermal Milliammeter. This wattmeter merely consists of a resistance in each lead of the meter, the other end of each resistance being terminated in a small two-turn loop, which is coupled to the circuit of which the output is to be measured. It is not claimed that this type of meter gives very accurate readings of power, but it is far in advance of the usual lamp and turn of wire employed at most stations. With a meter reading 0-50 mA and a five hundred ohm metallised one-watt type resistance in each lead, the maximum reading would be 2.5 watts. Intermediate values of power can be calculated using the formula $W = \frac{I^2 \times R}{10^6}$

Where I = Current in mA, R = Value of both resistances.

WHICH WAY?

By Aerial and Propagation Sections R.E.S.

IN the December, 1935, BULLETIN, there appeared an article by G6CJ on the subject of aerials which exhibit directional properties.

The article which follows is an account of some results he obtained using this type of aerial on both the 7 and 14 Mc. bands. It should be borne in mind that these results were obtained over a period of several weeks round about the time of the Autumnal Equinox, 1935.

Here, then, is a summary of the conclusions :—

1.—West Coast American signals came in to England in the early mornings along the short dark path on 7 Mc. In other words, they crossed the Atlantic.

2. West Coast American signals also came in to England in the early mornings along the short dark path on 14 Mc.

3. Signals from New Zealand and Australia came in to England on 7 Mc., arriving from the West in the mornings, East in the evenings—that is to say, along the dark route.

4. Signals can be noticed to " peak " in strength on 7 Mc., just before the time of sunrise over New Zealand and Australia ; in fact, the effect of sunrise can be traced as it travels westwards across the continent, the districts appearing in the following order :—ZL, VK7, VK2, VK3, VK5, VK6.

5. On 14 Mc., signals came in to England from New Zealand and Australia in the manner shown below :—

(*a*) In early mornings some trace of signal was found arriving from across Asia, but the strongest signals came *via* America.

(*b*) From about 1000 to 1100 G.M.T., signals were not so strong, but would come in from either direction.

(*c*) From about 1400 to 1700 G.M.T., signals only came in on days of good " conditions," but when they were heard, they invariably arrived *via* Asia.

So much for facts. Let us now consider these results. It is obvious that statements (1), (3), and (4) can be accepted as confirming expectations ; (5*c*) is interesting, and calls for comment. But statements (2) and (5*a*) are really startling. They imply that the usual darkness " fade-out " expected on the 14 Mc. band was not operating, unless some other explanation is forthcoming. Let us review these statements in detail. First, statement (2). Now the shortest path for signals from the West Coast of America into England is by a route passing well into Arctic regions and arriving from some north-westerly point. The question which arises is, therefore : " Is there ionisation sufficiently strong along this whole path to deflect the signal down again to earth instead of allowing it to penetrate out to space ? " It is well known that ionisation in polar regions may be abnormally intense, probably owing to the bombardment of charged particles from the sun, which are diverted towards the magnetic poles of the earth. So, provided the signals ever arrive at the Arctic regions, it is conceivable that they shall then be deflected downwards. But how to get them there ? One has to bear in mind that it was not during the summer that these phenomena were noted, but round about the autumnal equinox. Prof. Appleton has shown that the intensity of ionisation in the F layer is not at its maximum during summer, but during the month or two preceding winter. The reason for this is to be found in the thermal action of the sun's radiation on the rarefied gases composing the F layer. This radiation raises the temperature of the gas during summer to enormous values, which causes great expansion and, therefore, scarcity of ion density. When summer is passed, cooling and contraction set in, so the ion density increases until such time that re-combination usually associated with winter can set in.

The suggestion, therefore, is very strong that it was this increasing ionisation, possibly augmented by sunspot activity, which supplied just the necessary medium to convey the signals into Arctic regions and out again down to England. If this hypothesis is correct, it might be expected that during the months when winter conditions have fully taken the field, results may be very different. Here, at any rate, is opportunity for research.

Turning now to New Zealand and Australia, statement (5*a*) really is similar to (2). Signals from New Zealand reaching England by the great circle shortest distance, arrive from a direction approximately North-North-East, while Australians arrive approximately East-North-East. But coming *via* America as they did, the directions of arrival are approximately South-South-West and West-South-West respectively. In both these cases, therefore, the waves have been passing almost entirely through paths of complete darkness ; moreover, those from New Zealand would have penetrated well into Antarctic regions.

Statement (5*c*) seems to approach nearer to expectations, though there is still the difficulty of the initial deflection. The times concerned are the early hours of the morning in New Zealand and Australia, when one would expect the 14 Mc. band to have faded out.

In this article a suggested explanation has been put forward, but there may be others. Is it possible that waves may travel by routes other than Great Circle routes ?

Can it be that polarisation as explained in the magneto-ionic theories can have given entirely fictitious results from the methods adopted ?

In order further to study these phenomena, a joint group consisting of members of both the Aerials and Propagation Sections of R.E.S. has been formed, and it is hoped that they will be able to elucidate some of the problems concerned. Possibly others may care to tackle these questions, especially " Individual " members of R.E.S. and those who can throw any light on the magneto-ionic theory as bearing on the problem. All interested are cordially invited to communicate with the Assistant Manager R.E.S.

Report Wanted

G5UG (Leyland) on his 7 Mc. transmissions.

FOLKESTONE RADIO AMATEURS

First Amateur International 56 Mc. Communication

THAT little group of active experimenters passing under the name of "Folkestone Radio Amateurs" has once more set a lead by establishing the first 56 Mc. link between England and the Continent.

The Chairman, G2IC, had been in correspondence with F8WY for some weeks, and a series of tests were arranged for Sunday, March 29. G2FA was scheduled to call France at 12 noon for 15 minutes when the French stations were to call England until 12.30.

At 11.50, however, when checking over their receiver, the operators at 2FA heard F8NW working F8AA at a good R7 QSA5. As soon as the Frenchman stood by they went over and gave him a short call, and then switched back to listen.

To their great joy F8NW immediately came back reporting them R7 QSA5, and contact was established five minutes before the tests were scheduled to commence.

Mutual congratulations and greetings were exchanged with some difficulty as F8NW was only able to speak a little English, and the operators at 2FA were doing their best. It was very amusing to listen whilst each of the ten members of the Club present approached the microphone in turn and tried his hand at French.

F8NW then stood by to give the others a chance, and immediately F8WY was heard calling with a signal, if anything, louder than the first station. F8WY speaks excellent English, and he took control of the tests so far as the French stations were concerned, and arranged for them to call one at a time.

F8ZF put over quite a good R6 signal, but 'phone from F8AA was too weak to read, and his i.c.w. was only R4, although QSA4.

Contact was maintained until 1.15, when the Folkestone station closed down.

The apparatus used at G2FA was a long lines oscillator with a couple of *Tungsram* 15/400 valves in push-pull and an input of 8 watts at 250 volts. The aerial was a vertical di-pole windom fed with a reflector spaced a quarter wave. The receiver was a two-valve self-quenching super-regenerative set with a vertical doublet aerial. The valves a HL2K and a *Mazda* P.220.

Perhaps the most interesting part of the test was that this was no stunt with portable gear, but every station was operating from its proper QRA under ordinary conditions. It was definite fixed station point to point communication which can always be repeated.

(*Editorial Note.*—The success achieved by the English and French stations who took part in this historical achievement is fully deserved. It is hoped that regular 56 Mc. communications with the Continent will continue.)

The Ten Metre Band

By NELLY CORRY (G2YL).

DURING the first two weeks of March conditions were excellent, and stations in all continents were consistent, the band being open as late as 23.00 G.M.T. on several occasions. But on the 17th a change took place, and though S. African and S. American signals continued to come in well, there was an almost complete absence of North Americans. These conditions continued for ten days, and the only W's that did get through were weak, and soon faded out.

Star performance of the month was put up by G6CJ, who made WAC in 3¾ hours on March 8, five continents being worked in two hours. First contact was made at 09.45 G.M.T. with VK3BD, and the following ones with U3AG, LU9AX, ZS1H, VU2AU and W4DCK.

G6DH also deserves hearty congratulations on working VU2AU on 'phone on March 1, thus completing the first European 'Phone WAC on 28 Mc. During the month he made first contacts with HJ, K4, K5, CM and J, and also worked W (all districts), VE (four districts), VK, VU, ZS, LU, OA, SU and OH.

G6NF worked all American and Canadian Districts during the month, a contact with VE5EO on March 5 being, it is believed, the first QSO between Europe and VE5. G6LK scored 960 points on 28 Mc. in the A.R.R.L. Contest, and made the first contact with VS6 on March 1. G6CL worked all W. Districts in two days at the beginning of the Contest, but found conditions very unfavourable for the final week-end. He has been heard by J3FK, ZL4BQ, VU2LJ, VU2AU, and VS6AH.

G5BP, of Hull, found March 5 the best day of the month, and worked all W Districts except the 4th and 6th on this day. He is anxious to hear from any station using break-in on 28 Mc. 2AXX heard PK1MC on March 8; and BRS1847 logged some unusual DX, including XE, CM, K6 and VP1.

From the numerous reports received, it is obvious that an ever-increasing interest is being taken in 28 Mc., and in future if the band goes dead we shall at any rate know that conditions, and not the apathy of transmitters, are to blame.

The month's First Contacts were made as follows:—

G5FV worked OA4B on February 16.
G6DH worked K4DDH on February 29.
G6DH worked HJ3AJH on March 1.
G6DH worked K5AY on March 1.
G6LK worked VS6AH on March 1.
G6DH worked CM2FA on March 3.
G6NF worked VE5EO on March 5.
G6DH worked J3FK on March 10.

* * *

Finland has always appeared to us as being a good country for DX working on 7 and 14 Mc. Proof is now forthcoming that the same happy state of affairs exists there when the 28 Mc. band is used. During January OH7NC, 7ND and 7NF worked all continents except South America, the last-named having contacted VK4EI, 15 times up to February 18.

SOLILOQUIES FROM THE SHACK

By Uncle Tom.

(The Old Walrus will soon be able to go into hibernation, if his nephews persist in writing his copy for him !)

DAH-dah-dit dah-dah, nephews and nieces, or, for those who still prefer self-excitement, chwah-chwah-chwit chwah-chwah ! And *what* a bundle of letters from irate little boys and girls this month ! I somehow thought that last month's parable would stir things up, and, believe me, it did.

But please let me make one thing clear. I did *not* write it. It was, genuinely, sent to me from a nephew.

Now let's clear up some of the mess. Here is a letter from one who signs himself " Your tiny nephew, Jeeby." " I was much interested to read the letter of your rebellious nephew ' Wellwisher,' relating the parable of G2 ? ? and G6 ? ? at the Golden Gates. His only fault was that he did not finish the story, and for your enlightenment I am sending you the final thrilling chapter.

" You will remember that G6 ? ? was accepted and G2 ? ? rejected. Well, when G6 ? ? got inside he was, of course, given every facility to carry on his virtuous experiments on frequency stabilisation. Having at last perfected his device, he asked where the nearest ham was, so that he could have a QSO to test it.

' I've been wondering when you would ask that,' they said. ' You see, you're the first ham to arrive here ! '

" In the meanwhile time G2 ? ? has taken the only alternative and gone down to the nether regions where he was received with open arms. ' Coom in, lad,' they said. ' You're just in time for our Annual Ham Convention. . . .' "

Furthermore, the said nephew tells me that he is sure that G2 ? ? has had a special place reserved for Uncle Tom when his time comes.

That should cheer up little Eddie, who writes a long letter, the theme of which is—Experimental Work : with *what* ? In other words, how many hams have the qualifications, apparatus or money to carry on any genuine experimental work that hasn't already been done in the laboratories of the commercial concerns ?

Yet another one enquires whether I don't think that G6 ? ?, the merchant with a chirp, should have had his Hell on Earth ? He tells me that I can have all the self-excited transmitters in London, and he's surprised at my putting them forward as a good example. When did I do that, please ? I can't remember even having said a good word for them, and I probably never will.

An extraordinary nephew living on the South Coast has the nerve to put forward a good word for Spitch ! I'll quote him : " Who said that Spitch irritates ? Get down to it, and learn enough of the lingo to be able to go after the offenders. There is a secret joy in a QSO during which one can innocently ask for dope on the best method to employ raw A.C. on the mike, besides the rest of the gear.

" Like the poor, they are always with us, so here's one nephew at least who raises three hearty cheers for the brothers Ragchew, Spitch and QRM—*besides* asking the quartermaster to dish out crowns and laurels to the serious experimenters in wireless telegraphy."

Then there is a very long letter from a more serious-minded nephew, who, presumably, throws strong doubts on the accuracy of " Jeeby's " narrative of the final chapter. According to him, the Guardian of the Golden Gate told G6 ? ? that all his experiments could have been done even better with an artificial aerial, and that he was just as pestiferous a nuisance as G2 ? ?, and had better go to the same place. His " Come in, please," was addressed to a third party, G5 ? ?

This G5 ? ? was an extraordinary fellow. When he built a transmitter he always used to test it on an artificial aerial, and, in fact, built and tested several without putting them on the air at all.

He never used phone on 7 Mc., but used 56 Mc. and 1.7 Mc. for all his local phone work. He spoke English, even to Americans, and would never say " Take it away," or " come-in-please-whadderyou-say ? " He built his own S.S. super and spent months matching up the coils. He fitted all the local BCL's with efficient wave-traps.

He used a bug key, but only after practising for six months on an audio oscillator. When he coupled it to the transmitter, he used it for transmitting the Morse Code—dots *and* dashes.

He ragchewed when the opportunity arose ; he QSL'd *and* sent foto for foto. He fraternised with the local novices and lent them a hand, until they felt that even the owner of a 100-watter could be a decent fellow as well.

In short, he was a real ham who would pass all the final exams., and it was he who got the " Come in, please," while G2 ? ?, the brass-pounder, and G6 ? ?, the dabbler, were sent off to listen to R9 spitch for all eternity. Of course, the obvious comment is that G5 ? ? was too good to live, anyway !

Well, now, how do you like all this ? Because the nephew who sends this graphic description of G5 ? ? (which may be a description of himself, for all I know) says, " If you like my style I could probably arrange to do your stuff for you each month, for a small consideration, thus leaving you free to do a little DX and make out some of those unsent QSL's—although whether it would be advisable to give you time to have your foto-for-foto taken I am, not knowing you, unable to judge."

Finally, there's a most charming letter from a nephew in Hong Kong to the Editor. He says, in the course of it, " Why not drown Uncle Tom ? " And why not, indeed ? I believe it's a beautiful death. I'm assured that no one who has been drowned has ever been heard to complain of the discomfort. Go ahead, troops, if you prefer it that way. Take a vote on the subject, and if the majority is in favour—well, I'll save you the trouble and drown myself. Pity Hong Kong's such a long way off, though. However, at one of these Conventions, perhaps . . .

THE 1936 1.7 Mc. CONTEST.

By A. O. Milne (G2MI).

WE have pleasure in announcing the results of the popular 1.7 Mc. Contest held during the week-end January 11 and 12. A good entry has been received, but it is again clear that only about one-third of the total stations active during the Contest period have actually forwarded entries.

Mr. David Mitchell (G2II) takes first place with 74 points, having the narrow lead of only two points over Mr. G. W. Slack (G5KG), who finished second with 72 points. Mr. H. J. M. Box (G6BQ) was third with 69 points.

The Contest this year has been most aptly described as the triumph of the long aerial. Both of the leading stations used either 120-ft. or 240-ft. aerials, and it is certainly no exaggeration to say that their signals were the loudest on the band. G2DQ, G2IN and G6GM also used aerials in excess of 100 ft., and their signals were outstanding for their strength throughout the contest. A number of other stations used 100-ft. aerials.

The results have amply justified the use of an aerial specially designed for the band. Those who made do with their 66-ft. Hertz Windom came well down the list. When we say that, however, it is a merely comparative phrase, as another remarkable feature of the results is the narrow margin between the various scores and the large number of ties. Nevertheless, it is evident that the aerial is the deciding factor, as for that matter, it is on all the other bands if only we would realise it. Aerials are as important to the transmitter as proper diet is to the human body, and both subjects are about equally neglected.

The Winning Stations.

Mr. Mitchell (G2II), our D.R. for North Wales, the winner, used a CO.BA.PA, with 10 watts input. His receiver was the six valve super-heterodyne described in the Bulletin some months ago. G5KG used the same type of transmitter, but his receiver consisted of a tuned R.F. stage, screened grid, detector and pentode. Mr. Box (G6BQ), who keeps third place for Kent, used a CO.PA and a four valve battery receiver; to Mr. Ogden (G5OD) goes the credit for having an all mains straight receiver and using it with headphones!

It is pleasing to remark that in these days of commercial superhets, that no less than six of the eight superhets in use by various entrants, were home made, and only one of the other two was of foreign manufacture. This is certainly a cheering sign.

General Views and Comments.

It is generally agreed that conditions were excellent throughout. Atmospherics were almost absent and fading was non-existent. Apart from Trawler QRM, which, like the poor, is always with us, operating in the band was a delightful experience after the 7 Mc. dog fight. If only a few of the short distance QSO's which at present make the 7 Mc. band a screaming buzzing morass of noise, could be made on this wide and reliable band, how much happier we should be.

The Awards Committee would like to take this opportunity of thanking the many regular users of the band who, with a true sporting spirit, refrained from the use of telephony during the contest. Many even went so far as to "punch" the key for a few hours to give others a few extra points.

The general excellence of both the operating and the actual signals was again a pleasing feature.

The number of foreign stations heard was very small. The star turn was FA8BG, who was contacted by several stations. The ubiquitous F8RJ again supported the event, and, incidentally, informs us that he hopes to be on next year with a kilowatt from PY. W1BB, HB9T and OZ2H were the only other foreign stations heard. EI6F was also worked by several stations.

The Awards Committee are gratified to find that the rules have proved so universally acceptable. Several members, however, have drawn attention to the length of operating period, and this point will receive earnest consideration. One or two members thought that the 20 mile zone limit should have been retained on the ground that its absence gave an unfair advantage to the station in a crowded area. This is not borne out by the results as neither of the two leading stations are in an area where there is a large number of active stations.

It was observed that all distant stations reached a maximum QRK around 5 a.m.; this was particularly noticeable in the case of G5ZX of Glasgow, whose strength was terrific in the Southern Counties just before dawn on the Sunday morning. The best all round period in point of signal strength is between 1 a.m. and 6 a.m.

In conclusion, the Committee would like to thank Messrs. Grossin (F8RJ), Mainprise (G5MP), Perkins (G6KP), and Jones (G6OK) who kindly sent in check logs.

As a point of interest all five members of the Committee were competitors.

Reception Contest.

In response to an appeal from several B.R.S. and A.A. members, it was decided, after some considerable discussion, to once more arrange a Reception Contest in conjunction with the 1.7 Mc. Transmitting Contest. A total of 19 entries have been received, which, although better than in past years, is still a very small percentage of our B.R.S. and A.A. membership.

The leading station is Mr. R. J. Lee (BRS.1173), of Heathfield, Sussex, with 91 points. Mr. P. Malvern, of Cheltenham, was second with 88 points, and Mr. Phipps (2AAZ), of Milton Regis, Kent, third with 53 points. In general the rules were well received; one or two members remarked that the high speed adopted by some of the transmitters was too much for them; this is a matter which we feel we cannot control. The new rule whereby the receiving entrant had to log both sides of a contact, was also criticised as being too difficult. The Awards Committee had in mind when this rule was drafted, two points, first, that it would sustain interest, and second, that most competitors would spend the first hour or so of the contest logging the

Position.	*Name.*	*Call.*	*Town.*	*Points.*
1	D. S. Mitchell	G2II	Colwyn Bay	74
2	G. W. Slack	G5KG	Mansfield	72
3	H. J. M. Box	G6BQ	Gravesend	69
4	L. W. Jones	G5JO	Cambridge	65
5	H. J. Merriman	G6GM	Holsworthy	64
6	A. Ogden	G5OD	Old Colwyn	62
7	C. J. Greenaway	G2LC	Leigh-on-Sea	57
	J. F. Stanley	G6SY	Ashford	57
9	S. Newell	G5RX	Bacup	56
	W. Johnson	G2IN	Southport	56
	J. P. Stove	G5ZX	Glasgow	56
12	H. G. Collin	G2DQ	Wickford	55
	V. J. Bartlett	G5BI	Tredegar	55
14	E. Ingleton	G5IL	Gravesend	50
	A. O. Milne	G2MI	Larkfield	50
16	J. M. S. Watson	G6CT	Westcliff	48
17	W. H. Allen	G2UJ	Tunbridge Wells	45
	A. Watson	G6UJ	Driffield	45
19	P. M. Carment	G5WW	London, N.	44
	W. Lucas	G2OI	Manchester	44
21	F. E. Woodhouse	G2SX	New Barnet	42
22	E. J. Williams	G2XC	Portsmouth	41
23	J. R. Wilson	G2XT	Newcastle	40
24	G. R. Lee	G6GL	West Kirby	39
	B. Christian	G5XD	Bebington	39
	R. V. Allbright	G2JL	Newport, Mon.	39
27	W. A. Scarr	G2WS	Ilkeston	38
28	C. C. Algar	G6AU	Forest Gate	36
	J. G. Carlson	G6GC	South Shields	36
30	A. L. Sherriff	G5CJ	Kendal	35
31	C. V. Wood	G6NN	Barnehurst	34
32	W. H. Matthews	G2CD	Seven Kings	32
	W. M. Vendy	G6VD	Leicester	32
34	R. W. Rogers	G6YR	Southport	31
	K. T. Harvey	G5KT	Bristol	31
36	G. C. Procter	G5PR	Reigate	30
37	T. A. St. Johnston	G6UT	Chingford	29
38	G. A. Eckles	G5GC	Hull	27
39	L. H. Shersby	G2GZ	London, S.E.	24
40	S. H. Leech	G2LK	Cheadle	23
	A. Mathews	G6QM	London, N.	23
42	H. Caunce	G6KS	Liverpool	22
43	W. R. Johnson	G6LQ	Weston-super-Mare	19
	J. Partington	G5PX	Ashton-under-Lyne	19
45	T. L. Herdman	G6HD	Cambridge	17
46	P. G. Tandy	G2DU	Oxford	15
47	H. S. Bennell	G2ND	London, S.E.	14
48	J. H. Goodliffe	G6LF	Sheffield	10
49	J. N. Walker	G5JU	Bristol	9
50	H. C. Spencer	G6NA	Guildford	7

dial positions of the various transmitting stations. This was done by the leading stations, who remark that it was then an easy matter to turn the dial from one calibration to that of the other side of the QSO.

The long hours set for the Contest was again the subject of comment, and this was very apparent in checking the Receiving entries. It was evident as the day wore on that more and more mistakes were made as the operator became fatigued. Nearly all the receiving scores have been considerably scaled down, although this has not actually altered the final positions of the competitors. It is also significant that in general, those stations who are renowned for their fast operating are conspicuous by their absence from the log sheets in the Receiving Contest. It would seem that not nearly enough attention is paid to the Morse Code, by the average B.R.S. and A.A. station.

The final positions of the other 16 competitors are as follows:—4th, S. H. Ledbrooke (BRS.1581) and H. J. Houlding (BRS.720), 51 points; 5th, J. S. Jewers (BRS.1674), 50; 6th, S. B. Thomas (2BTQ), 46; 7th, J. Alexander (2AXX), 44; 8th, K. Aris (2ARI), 41; 9th, B. C. Leefe (2BCF), 39; 10th, J. B. Walker (2BVU), 31; 11th, F. Barrett (2BRF), 30; 12th, J. A. Hay (BRS.1948), 21; 13th, G. W. Herod (BRS.1336), 18; 14th, D. A. J. Hogg (2BCM), 15; 15th, A. G. Dunn (BRS.1936), 13; 16th, H. H. Phillips (BRS.1949), 9; 17th, W. R. Worden (BRS.1934), 5; 18th, A. T. Soper (BRS.1676), 3; 19th, M. G. Bourke (BRS.1784), 2.

We wish to thank Mr. Fleet (BRS.1802), and Mr.

(*Continued on page* 430.)

NEWS AND VIEWS FROM 53.

Longer Aerials for British Amateurs.

Our Home members will be interested to learn that as a result of negotiations with the G.P.O., it has been agreed to amend the current licensing regulations to allow the use of aerials up to 150 feet at British Amateur sending and receiving stations. Accordingly, in the relevant condition in existing licences, the aerial length may be read as 150 feet instead of 100 feet, subject to notification to the contrary in specific cases.

This notice is to be taken as an official intimation of the change. The G.P.O. will not inform individual licensees, although new licenses will, of course, be suitably amended.

We have no doubt that this concession will be much appreciated by members, especially those living outside large towns.

London Meeting

The concluding meeting of the present session will be held at the I.E.E. on Friday, April 24. It is proposed on that occasion to throw the meeting open for an informal technical discussion. Members are invited to inform the Secretary in advance of their willingness to make a contribution to the discussion. Tea will be served at 5.30 p.m., and the meeting will commence at 6.15 p.m.

N.F.D. 1936.

To meet the wishes of members in District 2 (the largest in the country) it has been decided to permit four stations to operate from that District during N.F.D. The Southern pair of stations located in Bradford and Sheffield will be known as No. 2S, and the Northern pair located in Newcastle and Middlesbrough as No. 2N. The stations will, of course, be competitive.

New D.R. for Home Counties.

We have pleasure in confirming that Mr. G. A. Jeapes, G2XV, of Cambridge, has been appointed D.R. for the Home Counties in succession to Mr. G. Featherby, G5FB, who has been compelled to resign the position owing to pressure of business.

It is hoped at an early date to rearrange the counties forming this District, in order to improve representation.

At the request of the members living in and around Peterborough, it has been decided to attach them to the Home Counties District, Mr. Carter, G2NJ, is the Town Representative.

The "Radio" Handbook.

We are tired of answering enquiries and making apologies to our members who have ordered the above handbook. We can only reiterate that we booked our original order in September under the impression that supplies would arrive in December or January. Requests for a promise of delivery have been unanswered. If delivery has not been made by the time this announcement appears we shall be willing to refund money paid for the "Radio" Handbook, or supply a copy of the A.R.R.L. Handbook, 1936 edition, in lieu thereof.

New Certificates.

We reproduce below copies of two new W.B.E. certificates. The first will be awarded to those

members who have qualified for the special 28 Mc. W.B.E., and the second to those who have transmitted telephony to a British Empire station in each of the five continents. The rules governing the

award of these certificates are exactly similar to those which apply for an ordinary W.B.E.

Members are reminded that minimum reports of QSA 3 must be shown on the cards submitted for a claim, whilst a guarantee must be given that licensed power was not exceeded in establishing the contacts.

British Amateur Bands.

We recommend every British transmitting amateur to read this paragraph carefully.

The British amateur bands are as follows :—

1720	...	1995 kc.
3505	...	3730 kc.
7005	...	7295 kc.
14005	...	14395 kc.
28005	...	29995 kc.
56005	...	59995 kc.

We quote below from the latest G.P.O. transmitting licence :—

"*The sending apparatus shall invariably be tuned to the authorised frequency on which it is proposed to send. This frequency* shall *be selected* at least 0.1 *per cent.* inside *the above figures in order to ensure that the frequency shall not vary outside the limits of these bands due to crystal variation and transmitter instability.*"

This means that by the terms of their licences, British transmitting amateurs must *select their requencies within* the following limits :—

1722	...	1993 kc.
3508	...	3730 kc.
7012	...	7288 kc.
14020	...	14380 kc.
28035	...	29965 kc.
56060	...	59935 kc.

Belgium QSL Bureau.

Mr. P. Anthierens, ON4PA, the General Secretary of Reseau Belge, informs us that Baron Bonnaert de la Roche, ON4HM, is now their QSL Manager. His address is Chateau de Marchiennes, Harvengt, near Mons.

Mexico Amateurs.

We are informed by the L.M.R.E. that Mr. M. Medina, XE1N, has been elected President of that Society, with Mr. de Velasco, XE1BN, Vice-President, and Mr. R. Robles, Secretary. One of our members, Mr. G. W. Lord, XE1BG, is on the Executive, and XE1DN, 1HR, 1V and 1GK are other officers.

C.C. Transmitter for 56 Mc.

G5LB informs us that an error in the theoretical diagram of the above transmitter (described in the November issue of the BULLETIN) has just been brought to light. The H.T. feeds and the "cold" ends of the 14 and 28 Mc. coils are shown as being directly connected to a common earth, whereas they should be by-passed only through fixed condensers in the usual manner. The author apologises for this error not being detected earlier and also for any inconvenience which may have been caused to intending constructors.

R.S.G.B. Slow Morse Practices

A list containing dates, times and frequencies of the stations sending slow morse for the benefit of those members wishing to learn or improve their code will be found below. As usual, test matter will be taken from recent issues of the T. & R. BULLETIN. The page number and month of issue will be given at the end of each test—by telephony. A telephony announcement will also be given at the commencement of each test to assist those interested in tuning-in the sending station. It is emphasised that reports will be appreciated and are desired in order to ascertain range of transmission and numbers utilising the service. If, however, replies are desired, stamps should be sent. G6AU, of Forest Gate, is now discontinuing; he wishes to thank all those who have reported on his transmissions and mentions that four new members have been obtained directly as a result of his slow morse schedules. Additional stations are required to step into the breach made by the several stations who have dropped out recently, and those willing to assist in the very good work are asked to offer their services to Mr. T. A. St. Johnston (G6UT), 28, Douglas Road, Chingford, E.4. (Telephone: Silverthorn 2285.)

SCHEDULE OF SLOW MORSE TRANSMISSIONS.

			G.M.T.	kc	Stations
April	19	Sunday	0000 B.S.T.	1769	G5GC
,,	19	,,	1100	7233	G5JL
,,	19	,,	1115	1810	G6GC
,,	22	Wed.	2230	7100	G2LC
,,	26	Sunday	0000	1769	G5GC
,,	26	,,	1100	7233	G5JL
,,	26	,,	1115	1810	G6GC
,,	29	Wed.	2230	7100	G2LC
May	3	Sunday	0000	1769	G5GC
,,	3	,,	1100	7233	G5JL
,,	3	,,	1115	1810	G6GC
,,	6	Wed.	2230	7100	G2LC
,,	10	Sunday	0000	1769	G5GC
,,	10	,,	1100	7233	G5JL
,,	10	,,	1115	1810	G6GC
,,	13	Wed.	2230	7100	G2LC
,,	17	Sunday	0000	1769	G5GC
,,	17	,,	1100	7233	G5JL
,,	17	,,	1115	1810	G6GC

QRA Section

Manager: M. WILLIAMS (G6PP).

NEW QRA's—MARCH

G2FZ.—R. S. CROSS, Holly Tree House, Grange, West Kirby, Ches.
G2MB.—G. STUTTARD, 18, Mayfair Avenue, Great Crosby, Liverpool, 23.
G2MS.—Portable of G5MC.
G2OG.—J. M. HOGG, 3, Nelson Road, Dudley, Worces.
G2RF.—H. D. BRAMWELL, 53, Druids Cross Gardens, Liverpool, 18. This QRA was erroneously published as G2RS in the February list.
G2UA.—D. J. GEORGE, 3, Gosfield Road, Epsom, Surrey.
G2UX.—G. EDWARDS, 14a, Louisville Road, London, S.W.17.
G2VB.—W. D. GILMOUR, 35, Grangecliffe Gardens, London, S.E.25.
G2ZA-ZB.—C. W. WATSON, "Wayside," Plumstead Road, Thorpe, Norwich.
G2ZZ.—W. H. PEEK, 20, Bloomsbury Street, London, E.14.
G5FT.—J. P. BLAIR, 35, Market Place, Selkirk, Scotland.
G5HL.—H. E. M. LAWSON, "Alvesta," Edgefield Road, Loanhead, Midlothian.
G5IV.—C. T. MALKIN, 5, White Hill Terrace, Barnsley, Yorks.
G5MC.—MARLBOROUGH COLLEGE WIRELESS SOCIETY, Marlborough, Wilts.
G5MS.—H. M. SWANN, 97, Heyhouses Lane, St. Annes-on-Sea, Lancs.
G5NF.—C. L. WARD, "Culver," Weydon Hill Road, Farnham, Surrey.
G5NS.—F. BROWN, 33, Hampden Road, Roker, Sunderland.
G5UG.—J. ETHERINGTON, Daisy Bank, Leyland, near Preston, Lancs.
G5ZL.—J. R. FENNESSEY, 90, Leeds Old Road, Bradford, Yorks.
G6AY.—A. HEMBURY, 76, Gayville Road, South Battersea, London, S.W.11.
G6IJ.—J. W. T. MOONEY, 15, Bath Street, Gourock, Renfrewshire.
G6KW.—R. KIRLOW, 486, City Road, Edgbaston, Birmingham.
G6UP.—A. H. S. SCOTT, 5, Kings Court, Kings Road, London, S.W.19.
G6WZ.—J. M. WILKIE, 4, Camphill Avenue, Langside, Glasgow, S.1.
G6YU.—J. HANSON, 77, Siddley Avenue, Stoke, Coventry, Warwickshire.
2ABU.—R. B. TUNNEY, 23, Fir Lane, Lowestoft, Suffolk.
2ACA.—D. SHERLEY-PRICE, 39, Nelson Road, Bournemouth, Hants.
2ACF.—J. M. CUNLIFFE, Fairways, North Road, Hale, Ches.
2ACT.—C. PANNEL, 9, Petworth Road, Haslemere, Surrey.
2ADX.—H. W. SIMPSON, 50, Stoneycroft Crescent, Old Swan, Liverpool, 13.
2AFT.—F. E. HOWLETT, 59, Bryant Road, Strood, Kent.
2AFV.—J. FERGUSON, 2041, Great Western Road, Knightswood, Glasgow, W.3.
2AHM.—J. H. HEMINGWAY, 13, Alexandra Grove, Leeds, 6, Yorks.
2AIV.—J. S. K. STEPHENS, 23, Cobden Avenue, Copnor, Southampton, Hants.
2AJN.—W. D. JOHNSON, "Bradmer," Forest Road, Warsop.
2AJX.—P. E. HUXTABLE, 5, Thorney Hedge Road, London, W.4.

2AKB.—F. A. Jefferies, 1, Lovelace Road, Oxford.
2AMX.—W. H. Morehouse, 7, Kingsway, Waterloo, Liverpool, 22.
2ANR.—E. J. Napier, 44, Cranmer Road, Hayes End, Middlesex.
2AOQ.—D. R. Aston, 15, Beechcroft Avenue, London, N.W.11.
2APS.—R. W. Stiles, 120, Brampton Road, St. Albans, Herts.
2ARS.—A. Scott, 112, Duke Street, Leith, Edinburgh, 6.
2ASA.—F. G. Sadler, 154, The Guinness Trust, Stamford Hill, London, N.16.
2ATI.—H. Atthill, "The Three Gables," Alma Lane, Heath End, Farnham, Surrey.
2ATY.—H. M. Tee, 104, Rectory Road, Burnley, Lancs.
2AUQ.—E. Taylor, 35, Grant Road, Addiscombe, Croydon, Surrey.
2AUT.—J. G. Ross, 207, George Street, Aberdeen.
2AWJ.—F. James, "Liebling," Plot 10, Elms Farm Estate, Botley Road, Oxford.
2AWP.—E. P. Wethey, Throkes, Twatling Road, Barnt Green, Birmingham.
2BFD.—J. D. Cameron, Balgonie, West Linton, Peeblesshire.
2BFN.—B. F. Skinner, 6, Newnham Avenue, Bedford.
2BFQ.—M. E. Edwards, 10, Rosewood Gardens, Wallington, Surrey.
2BHF.—H. Fletcher, 68, Willow Road, Darlington, Co. Durham.
2BIO.—P. H. Openshaw, Brook Villas, Alsager, Ches.
2BJF.—T. L. Rawson, 14, Napier Road, Chorlton-cum-Hardy, Lancs.
2BKS.—H. Stretch, 12, Newcliffe Road, Hr. Blackley, Manchester.
2BOG.—G. Herod, 48, Repton Road, Bulwell, Nottingham.
2BSU.—W. G. R. Wilby, 18, Redland Grove, Redland, Bristol, 6.
2BUL.—G. L. V. Butler, 995, London Road, Thornton Heath, Surrey.
2BWP.—H. W. Palmer, "Canberra," Oxenden Park Drive, Herne Bay, Kent.
2BXH.—P. H. Hellier, 26, George Road, Hay Mills, Birmingham.
2BYS.—W. Boggis, "Glenville," Fairfield Avenue, Scarthoe, Grimsby, Lincs.

The following are cancelled:—2ABS, 2AYS, 2BKT, 2BNU 2BVJ.

NEW QRA's—APRIL

G2FP.—O. Read, 26, Pamela Road, Exeter, Devon.
G2KC.—N. L. Avery, 82, Hatherley Road, Winchester, Hants.
G2KC.—B. E. P. Sadler, 40, Loxley Road, London, S.W.18.
G2TN.—A. L. Daines, 24, Pier Road, Rosherville, Gravesend, Kent.
G2TR.—J. Scholefield, 210, Camberwell Grove, London, S.E.5.
G2UK.—A. C. Gee, Eastwood Lodge, Eastwood, Southend-on-Sea, Essex.
G5FD.—F. D. Clough, 94, High Street, Old Chesterton, Cambridge.
G5LK.—L. G. Knight, Ourome, Madeira Walk, Reigate, Surrey.
G5NQ.—R. W. Newton, 8, Selbourne Gardens, Perivale, Middlesex.
G5OI.—M. A. Brookes, Coniston, Lichfield Road, Four Oaks, Birmingham. Also at Warwick School, Warwick.
G5PN.—A. G. French, 29, Framfield Road, Uckfield, Sussex.
G5QS.—J. Kilpatrick, 9, Leicester Terrace, Manor Drive, Halifax, Yorks.
G5XI.—B. C. Leefe, 16, Carlton Drive, Leigh-on-Sea, Essex.
G5XW.—E. C. Taylor, 35, Grant Road, Addiscombe, Croydon, Surrey.
G5YO.—J. Reid, 5, Holmfield Avenue, South Shields, Co. Durham.
G6HQ.—R. Williams, Dee Cottage, South Parade, Parkgate, Cheshire.
G6HU.—J. Hunter, 63, Aintree Crescent, Barkingside, Essex.
G6IS.—J. P. Male, Custom House, Greenock, Scotland.
G6NP.—W. Gill, Oak Mount, Heckmondwike, Yorks.
G6RF.—D. E. Herbert, 19, Seaton Avenue, Mutley, Plymouth, Devon.
G6RH.—R. Holmes, 13 Wellington Road Bexley, Kent.
G6RM.—B. J. Reichman, 81, Hanover Terrace, Brighton, 7, Sussex.
G6TD.—J. R. Tuck, 8, St. Ann's Road, Coventry, Warwickshire.
G6TV.—N. Davis, 13, Carre Street, Sleaford, Lincs.
2AAS.—H. E. Sutton, The Wong, Horncastle, Lincs.
2ACC.—C. A. Harley, 85, Fisherton Street, Salisbury, Wilts.
2ACO.—C. A. Clare, 127, Coronation Avenue, Oldfield Park, Bath, Somerset.
2ACV.—Miss C. Hall, North Waltham, Micheldever, Hants.
2AFC.—F. H. Wright, 214, Battersea Bridge Road, London, S.W.11.
2AJG.—J. G. R. Riddle, Galloway House Gardens, Garlieston, Wigtown, Scotland.
2AKM.—K. M. Spiller, Franklin House, Camford, Wimborne, Dorset.
2AMF.—P. A. Tremaine, Burghey Brook, Witham, Essex.
2AMH.—H. Fenton, 25, Abbey Road, Blackpool, S.5, Lancs.
2AMT.—A. R. Moate, 37, Welbeck Road, Doncaster, Yorks.
2AOS.—H. O. Sills, "Elmhurst," Briar Gate, Long Eaton, Notts.
2APS.—R. D. Stiles, Poste Restante, Head P.O., St. Albans, Herts.
2ASJ.—J. Sands, 23, Wish Road, Hove, 3, Sussex.
2AUB.—H. de L. Banting, 39, Lime Grove, London, W.12.
2AUO.—G. Austin, 26, Woodland Avenue, Goole, Yorks.
2AWQ.—E. Walker, 2, Harbord Road, Sheffield, 8, Yorks.
2AWZ.—L. G. Willard, "Egerton," Tangmere, near Chichester, Sussex.
2AXL.—J. W. Mason, 64, Chipchase Road, Linthorpe, Middlesbrough.
2BBJ.—L. Harget, 3, Wade Avenue, Wade Estate, Harlington, near Doncaster, Yorks.
2BBP.—W. T. Pickard, 125, Oakwood Avenue, Flanshaw Park Wakefield, Yorks.
2BDS.—H. Davies, 19, Uplands, Pontardawe, Swansea, Glam.
2BGS.—P. B. Briscombe, 48, Fieldside, Northstead, Scarborough Yorks.
2BKI.—A. Cuckson, 57, Carlton Avenue, Worksop, Notts.
2BMK.—G. C. Manning, 42, Norton Road, Knowle, Bristol, 4.
2BON.—B. O'Brien, "Caldy," Irby Road, Heswall, Ches.
2BRA.—S. Bradbury, 15, Hollingwood Mount, Lidget Green, Bradford, Yorks.
2BVC.—V. D. Morse, 162, Newcombe Road, Handsworth, Birmingham.
2BZG.—W. H. Graham, 157, Sileby Road, Barrow-on-Soar, near Loughborough.

The following are cancelled:—2AAR, 2AFX, 2AMO, 2ANH, 2ASO, 2AUQ, 2AVL, 2BCF, 2BYZ.

NEW MEMBERS.

HOME CORPORATES.

W. F. Geraghty (G2KW), c/o 12, Trafalgar Road, Cambridge.
A. E. Gill (G2MH), 106, Cowick Lane, Exeter, Devon.
W. H. G. Davy (GI2UO), 76, Ravenhill Park, Belfast, N. Ireland.
P. W. Barnes (G2XB), The Broadway, Dunton Green, Kent.
524661 E. Knowles (G2XK), 13 Hut, 1 Wing, R.A.F., West Camp, Cranwell, Lincs.
S. G. Morgan (G6SM), "Miraflores," Alexander Road, Coulsdon, Surrey.
J. Millie (2AJM), 79, Omar Crescent, Buckhaven, Fifeshire, Scotland.
B. A. H. Youngman (2BQY), 48, The Vale, London, N.W.11.
W. F. Wilson (BRS2317), 4, Stratford Street, Leeds, 11, Yorks.
G. Gray, B.Sc. (BRS2318), Mooredge, Carluke, Lanarkshire, Scotland.
T. Paterson (BRS2319), 25, High Street, Carluke, Lanarkshire, Scotland.
D. R. Robinson (BRS2320), Claremont, Harston, Cambridge.
R. H. B. Candow (BRS2321), 1, Gowrie Street, Dundee, Scotland.
Rev. E. D. Geddes (BRS2322), St. Barnabas Vicarage, Douglas, Isle-of-Man.
F. J. Stone (BRS2323), 40, Park Road, Twickenham, Middlesex.
F. C. Ballam (BRS2324), Kenilworth, Finaghy Park, Belfast, N. Ireland.
M. L. McCracken (BRS2325), 28, Knocklofty Park, Belfast, N. Ireland.
C. P. Abraham (BRS2326), 24, Ravensbury Avenue, Morden, Surrey.
R. Waring (BRS2327), 57, Savoy Street, Oldham, Lancs.
F. A. E. Porter (BRS2328), 19, Trafalgar Street, Cambridge.
J. L. Shattock (BRS2329), 25, Norton Way North, Letchworth, Herts.
H. A. Woods (BRS2330), "Avondale," 3, Thirlmere Road, Preston, Lancs.
T. Christie (BRS2331), 50, Tweedholm Avenue, East, Walkerburn, Peebles-shire.
G. R. Wigg (BRS2332), Horsehills Farmhouse, Norwood Hill, near Horley, Surrey.
W. B. Pallett (BRS2333), The Brow, Wylam, Northumberland.
R. T. Batchen (BRS2334), 15, Charterhall Road, Edinburgh, Scotland.
Dr. M. A. Woods (BRS2335), 102, Groomsport Road, Bangor, Co. Down.
J. R. Brinkley (BRS2336), 66, Marlborough Avenue, Broomhill, Glasgow, W.1, Scotland.
R. Webster (BRS2337), Launt House, Carlton Road, Worksop, Notts.

DOMINION AND FOREIGN.

R. E. Davies (VE3UG), 252, Westlake Avenue, East York, Ontario, Canada.
R. L. Moore (VU2DV), St. John's College, Agra, India.
H. W. Green (ZT6Y), P.O. Box 511, Benoni, Transvaal, South Africa.
Rene Morin (VQ8AG), c/o E. H. L. Mazery, Esq., 5, Avenue Wellington, 4, Bornes, Mauritius.
G. P. Baron (DE1752G), 24a, Wilhelmstrasse, Hindenburg-Oberschl., Germany.
J. H. Bryce (BERS344), c/o Moller Line, 12, The Bund, Shanghai.
P. F. Clarke (BERS345), Post Office, Box 116, Ayr, North Queensland, Australia.

56 Mc. DX Schedule.

W6DOB is using 200 watts on 56.1 Mc. and transmits on Sundays every second 15 minute period from 17.00 to 21.00 G.M.T., and listens in between.

TRADE NOTICES.

The *High Vacuum Valve Company, Ltd.*, have advised us that they are now marketing a range of short wave valves which have been especially designed for amateur use.

The operating data for the standard types follows :—

Type.	Fil. Volts.	Fil. Current.	Amp. Factor.	Mutual Cond. in m/a.	Imped. ohms.	A.C. Power Output.	Retail Price.
D210 SW	2.0	0.1	16	1.35	12,000	—	5/6
SG220 SW	2.0	0.2	500	1.5	333,000	—	12/6
PX230 SW	2.0	0.3	6.5	3.5	1,850	450	12/0

A range of special short wave midget valves has also been prepared, data for which follows :—

Type	Fil. Volts.	Fil. Current.	Amp. Factor.	Mutual Cond.	Imped. ohms. in m/a.	A.C. Power Output.	Retail Price.
XSG ...	2.0	0.066	360	0.6	600,000	—	15/6
XD ...	2.0	0.066	16	0.75	23,000	—	10/6
XL ...	2.0	0.066	12	0.85	14,000	—	10/6
XP ...	2.0	0.066	5	1.0	5,000	—	12/6
XY ...	2.0	0.13	—	1.25	—	—	15/6

* * *

Messrs. Stratton & Co., of Birmingham, advise that their existing ranges of 942 Scientific condensers and 900 Microdensers are being superseded by new types.

The replacing condensers in the Microdenser range have been especially designed for ultra high frequency and general short-wave use. These condensers will be all brass construction, both sets of vanes being soldered. The dielectric loss will be lower than any other condenser. Calit, a material with properties approaching quartz, will be used for insulation. A ¼ in. spindle will be used, extended at back for ganging.

The new Scientific condenser will be similarly manufactured, a special patented insulated and screened pigtail ensuring absolutely noiseless operation.

The following is a list of types available :—

Type 900 *Microdensers.*

Min. Cap.	Max. Cap.	Price.	Listed as
6.75 μμF	22.5 μμF	3/9	20 μμF
7.25 ,,	45.5 ,,	4/3	40 ,,
8.55 ,,	103 ,,	5/0	100 ,,

Type 942 *Scientific.*

Min. Cap.	Max. Cap.	Price.	Listed as
13.5 μμF	192 μμF	7/6	180 μμF

The above are average figures and guaranteed to an accuracy of ± 2 per cent.

* * *

Here is good news for users of battery-operated sets.

Exide have introduced a new series of four wireless batteries, to be known as the "Hycap" series. These differ from the common "Mass" type batteries in that they have a much larger number of plates, and are capable of giving greater discharge currents, with the result that in over 70 per cent. of sets used to-day from 35 per cent. to 90 per cent. more listening hours per charge can be obtained.

The addition to the greatly increased number of listening hours available per charge, these "Hycap" batteries also have other great advantages, one of which is that they can be recharged in approximately half the time of the "slow discharge" type of battery, so that there is no longer the necessity of having to wait days whilst a battery is recharged.

Following are the details of these four new cells :—

OCG3-C. 2 volts, 15 ampere hours (20-hour rate). Dimensions : 3¼ ins. width × 3 ins. length × 6¾ ins. height. Price, 8s. 6d.

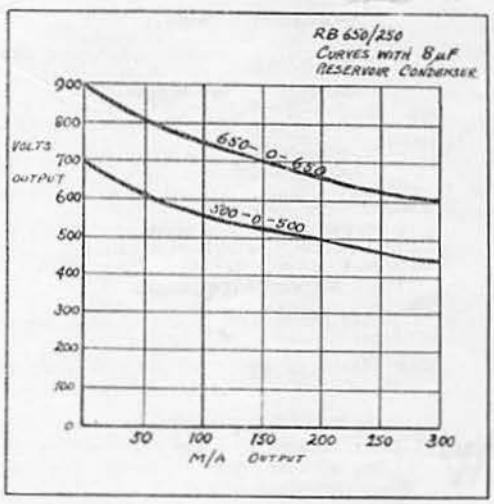
GFG4-C. 2 volts, 24 ampere hours (20-hour rate). Dimensions : 3⅜ ins. width × 3¾ ins. length × 7 9/16 ins. height. Price, 10s. 6d.

GKG5-C. 2 volts, 36 ampere hours (20-hour rate). Dimensions : 3 15/16 ins. width × 3 15/16 ins length × 7½ ins. height. Price, 12s. 6d.

CZG6-C. 2 volts, 60 ampere hours (20-hour rate). Dimensions : 5 ins. width × 4 13/16 ins. length × 8 ins. height. Price, 15s. 6d.

* * *

The 362 *Valve Company* have recently produced a useful size full-wave rectifier giving 250 ma. at 650 volts. The rectifier is listed at 15s., and is coded RB 650/250. The filament is 4 volts 1 amp.



A load curve is reproduced for this rectifier and also for the 500-0-500 type. The latter gives an output of 200 ma's at 500 volts. In both cases the curves were taken using an 8 μF reservoir condenser.

A SILENT KEY

We have learnt with much regret of the passing at an early age of Mr. E. J. Gleeson, EI5D, of Killaloe, Co. Clare, I.F.S.

Mr. Gleeson was an old member of the Society and his death has left a gap in the ranks of the early Irish Free State radio experimenters.

To his relatives and friends we offer our deepest sympathies.

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), Durham, and Northumberland (Middlesbrough is in this district.)
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. J. J. CURNOW (G6CW), "St. Anns," Bramcote Lane, Wollaton, Notts.

DISTRICT 5 (Western).
(Hereford, Oxford, Wiltshire, Gloucester.)
Mr. R. A. BARTLETT (G6RB), 31, King's Drive, Bishopston, Bristol, Glos.

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

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

DISTRICT 8 (Home Counties).
(Beds., Bucks., Cambs., Herts. and Hunts.)
Mr. G. JEAPES (G2XV), 84, Perne Road, Cambridge.

DISTRICT 9 (East Anglia).
(Norfolk and Suffolk.)
MR. H. W. SADLER (G2XS), Redways, Wootton Road, Gaywood, King's Lynn, Norfolk.

DISTRICT 10 (South Wales and Monmouth).
Capt. G. C. PRICE (G2OP), The Mount, Pembroke Dock.

DISTRICT 11 (North Wales).
(Anglesey, Carnarvon, Denbighshire, Flintshire, Merioneth, Montgomery, Radnorshire.)
MR. D. S. MITCHELL (G2II), "The Flagstaff," Colwyn Bay, Denbighshire.

DISTRICT 12 (London North).
Mr. S. BUCKINGHAM (G5QF), 9, 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), 28, Douglas Road, Chingford, E.4.

DISTRICT 15 (London West and Middlesex).
MR. H. V. WILKINS (G6WN), 81, Studland Road, Hanwell, W.7.

DISTRICT 16 (South-Eastern).
(Kent and Sussex).
MR. A. O. MILNE (G2MI), "Southcot," Larkfield, Kent.

DISTRICT 17 (Mid-East).
(Lincolnshire and Rutland.)
REV. L. C. HODGE (G6LH), The Bungalow, Skirbeck Road, Boston Lincs.

DISTRICT 18 (East Yorkshire).
(East Riding and part of North Riding.)

SCOTLAND.
MR. JAMES HUNTER (G6ZV), Records Office, 51, Camphill Avenue Langside, Glasgow.

NORTHERN IRELAND.
MR. W. GRAHAM (GI5GV), 5 Ratcliffe Street, Donegal Pass, Belfast.

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

DISTRICT NOTES.

WITH an increase in home membership coinciding with the introduction of the Town Representatives scheme, Council have considered it desirable to prepare a circular for the guidance of all those who are responsible for the preparation of District notes for this Journal.

This circular has already been issued to our District Representatives, Town Representatives and Scribes, and in order that all members shall become acquainted with the arrangements now in force, extracts from the circular are published below.

Town Representatives and Scribes will appreciate it if members will send in concise reports of general interest rather than recitals of DX worked or heard, unless this is of an unusual character.

It should be clearly understood that the chief purpose of the notes is to *impart information to members;* it is imperative therefore that comments such as "G . . . is QRT," "G . . . is busy with exams.," "G . . . is active" should be omitted as being of no general interest.

Town Representatives are responsible for furnishing their D.R., or District Scribe (if such person has been appointed) with the material upon which the District Notes will be based.

To assist T.R.'s we tabulate below a list of the features which should be covered in their reports.

1. Brief reports of meetings held between the 20th of one month and the 19th of the next.

2. Advice regarding forthcoming lectures, meetings, visits, etc.

3. A list of members who have reported active.

4. Brief comments upon any outstanding achievements performed by local members.

5. A brief comment upon any new technical development.

When preparing this information, T.R.'s should use one side of the paper only. The report should be headed:

T.R. Report from (Name of Town)
(Month) 1936.

Where possible the reports should be typewritten, using double spacing.

D.R.'s and District Scribes will accept reports up to the 22nd of each month. They will then prepare their main report from the information supplied and will add to it such comments as they

consider are of interest to the members in their District.

Reports must reach Headquarters not later than the last day in each month. Persons contributing material for the notes are requested to refrain from the use of " Radioese " and contractions, except when the latter are of a recognised type. When referring to transmitters and receivers the contractions TX and RX should not be used. In describing a type of transmitter the following abbreviations are acceptable, C.O., F.D., P.A. (dots between letters).

In making mention of the various amateur bands, frequency, not wavelength, should be used. The bands should be referred to as 1.7 Mc. (not 1.75 Mc.), 3.5 Mc., 7 Mc., 14 Mc., 28 Mc., 56 Mc., 112 Mc., 224 Mc.

Attention is also directed to the Editorial published in January wherein was explained that the correct abbreviation for " Megacycles " is " Mc." and not " mc." or " MC."

In order that the notes shall not become too extensive the Council have decided that in future each D.R. shall be allotted 250 words, which represents roughly 4 ins. of type. An exception to this will be permitted in the case of Districts 1, 2, 7, 13, and Scotland, where a space of 500 words will be allotted. This latter arrangement has been made in view of the large number of members in the Districts concerned.

It is hoped that as a result of the issuance of the circular and the publication of this information, District Notes will in future be more interesting and useful than hitherto.

DISTRICT 1 (North-Western)

Liverpool.—Thirty-two members attended the March meeting, at which G2OA delivered an informal talk on " Amateur Radio during the Past Nine Years." Starting with the simple self-rectifying transmitters in use in 1927-8, and the frequencies then available for amateurs, he continued with a short résumé of the changes which have since taken place.

N.F.D. is well in hand, but the names of all operators must be in the possession of the T.R. by April 18. Those intending to act as operators—please note !

Various members commented on the 1.7 Mc. controversy, and to encourage activity it is hoped to offer a small prize for the best work done on this band during the year. G2II asks the T.R. to suggest to those members active on this band that power should be reduced for local contacts.

G2II and 2IN are to be congratulated on their work on 1.7 Mc.—2IN for making W and 2II for making W and VE contacts.

The T.R. (G2RF) will be at his QRA every Thursday evening to receive visiting members. The Crystal Register is still incomplete, so please send particulars to 2RF.

The morse practice classes are to be discontinued during the summer, but G2DC has very kindly promised to make arrangements to give special practice to any member about to undertake P.O. test.

Best wishes from all members to G6KY, who is leaving the district.

2BON, of " Caldy," Irby Road, Heswall, wants names of any members interested in forming a local society in West Wirral.

Numerous local stations are active with tests of a general nature, but special reports are as follows: 2JT has completed a comprehensive research programme on valve keying systems, 6FW joins the ranks of 1.7 Mc. stations and is busy with modulation tests, 6CX testing current-fed antenna on 7 Mc. with " Collins " coupling unit.

See District Calendar for next meeting.

Southport.—In an effort to get the local members together, G5ZR and 5NU organised a meeting of local members early in February. These meetings are to be held on the first Friday of every month. For next meeting see District Calendar. Each member who can do so is to take a turn in providing a suitable meeting place. It is hoped that these meetings will revive interest and receive plenty of support, and members are asked to do all they can to encourage them.

BRS2140 is engaged on receiver design, G5ZR and 5NU on ultra HF research, BRS2146 reports R-9 W phone on 3.5 Mc., and 5YR, 6SX, and 6KY also report active.

Rochdale.—Owing to difficulty in arranging times to suit all local members, no meetings have been held as yet, but the T.R. has arranged to be at home every Sunday between 10.00 and 12.30 G.M.T. to see members who care to visit him.

Nothing of importance seems to have been done this month except that G6QA has at last worked ZL, using 10 watts to the P.A.

BRS1152 reports that on Sunday, March 15, WI telephony was received R-9 plus on 14 Mc., while at the same time W2XAD on 19.56 metres was very weak and fading badly. Other stations reporting active are G6AX, 6OA, 5XF, BRS1680, and 1152.

Chester.—BRS2198, of 23, Raymond Street, Chester, reports that there is no sign of activity in his area. If any members in Chester are active, will they please report to him with a view to getting together.

Warrington.—G2DF reports little activity in this section, but there is one new member in BRS2194. 2DF is active on 7, 14, and 1.7 Mc., and hopes to form a local Short Wave Club. Will those interested please report to him at 26, Pinewood Avenue, Warrington ?

Blackpool.—Weekly meetings continue and are well attended. At one meeting G5AD exhibited 56 Mc. gear in which great interest was shown, and it is proposed to organise a series of tests in the near future. 2BFW has applied for full licence, and is building C.O.P.A in anticipation. 5AD asks for reports on his daily 56 Mc. transmissions. 6MI, 5TH, 2AMH, 2ARL, and BRS1921, 2269, and 2087 have all reported active.

Nelson.—The local Short Wave Radio Society has now taken a room, which will be open daily. Meeting days for R.S.G.B. members will be decided upon, and details will be published in next month's BULLETIN.

We welcome three new members: 2AVG, BRS 2272 and 2307.

Manchester.—There was a record attendance of 53 members at the last Manchester meeting, when Mr. Parsons, of Stratton & Co., Ltd., gave a very

FORTHCOMING EVENTS

APR. 16.—District 6 (Plymouth Section), 7 p.m., at G6RF, 19, Seaton Avenue, Mutley, Plymouth.
APR. 16.—District 10, 7.30 p.m., at Queen's Hotel, Newport.
APR. 17.—District 14, Southend and District Radio Society Dinner and Ham-fest. 7.30 p.m., at London Hotel, High Street, Southend-on-Sea.
APR. 19.—District 6 (Bridgwater Section), 3 p.m., at Bristol Arms Hotel, Bridgwater.
*APR. 22.—District 15, 7.30 p.m., at G6WN, 81, Studland Road, Hanwell, W.7. Talk by the D.R. on "RFP60" and display of district films.
APR. 23.—District 6 (Exeter Section), 7 p.m., at G5WY, 95, Fore Street, Exeter.
APR. 23.—District 10 (Cardiff Section), 8 p.m., at Barry's Hotel, Cardiff.
APR. 23.—District 13, 8 p.m., at Brotherhood Hall, West Norwood.
APR. 24.—London Meeting at I.E.E., 6.15 p.m.
APR. 25.—Radio Transmitters Union, 7.30 p.m., at Ferndale Hall, Ferndale Street, Belfast, N.I.
APR. 26.—Western Provincial Meeting at Queen's Hotel, Newport. Assemble at 12 noon.
*APR. 26.—District 4 (Notts and Derby Section), 3.30 p.m., at Rutland Hotel, Ilkeston.
APR. 27.—District 14 (Southend Section), 8 p.m., at G5VQ, 149, Westbourne Grove, Westcliff-on-Sea.
APR. 28.—District 14 (East London Section), 8 p.m., at G6UT, 28, Douglas Road, Chingford, E.4.
APR. 29.—Scotland "A" District, 7.30 p.m., at the Institute of Engineers and Shipbuilders, 39, Elmbank Crescent., Glasgow.
APR. 30.—District 4 (Leicester Section), 8 p.m., at G2XD, 3, Montrose Road, Aylestone, Leicester.
MAY 3.—District 7, 2.30 p.m., at The Hand and Spear Hotel, Weybridge (adjoining Station).
*MAY 6.—District 1 (Manchester Section), 7.30 p.m., at Brookes Café, 1, Hilton Street, off Oldham Street, Manchester.
MAY 6.—S.L.D.R.T.S. Meeting, at Brotherhood Hall, West Norwood.
MAY 10.—District 6, Conventionette, Exeter. Details to be arranged. Assemble at 12 noon at G5WY, 95, Fore Street, Exeter.
MAY 12.—District 12, 7.30 p.m., at Wander Inn Café, North Finchley.

* Sale of disused apparatus at these meetings.

interesting talk, illustrated by lantern slides, on "Short Wave Communications." A hearty vote of thanks was passed, and Mr. Parsons was asked to convey to Messrs. Stratton & Co. the appreciation of the Manchester Section for their kindness in arranging the talk.

The following stations report active: G2WQ was WAC and WBE in one day with a new valve; 2AOA is working on Infra Red Rays; 5CH in new QRA; G6V visited F8LA, who conveys 73 to all No. 1 District G's; 2OI helping W's score points in A.R.R.L. tests; 2BK working W's, VK's and ZL's on 14 Mc. Others active on various bands are 6ZU, 5WR, 5YD, 2ATM, 1680, 6AX, 1579, 2262, 1987, 2AYV, 2ABR, 2034, 2GA, 2051, 2145, 2151, 5PX, 2LK, 2BJT, 2BHO, 2BPJ, 1997, 2BZX, 6TL, 6ZS, 5VN, 2BF, 6KS.

The location for N.F.D. this year will be Grants Hill, outside Bury. Will any member who has ML or other type of generator giving about 400 volts at 100 ma, and is willing to loan same for N.F.D. please write G2OI? BRS men are asked to contribute by getting their receivers working well on 1.7 and 3.5 Mc. and bringing them along for N.F.D. Members having junk to sell are asked to bring it along to the next meeting and help defray expenses.

DISTRICT 2 (North-Eastern)

The Provincial meeting was held at York on March 29, and is reported in detail below. The D.R. wishes to repeat for the benefit of new members that it is requested they will send in to their Town Representative each month by the 22nd, a short report of activity, to enable the T.R.'s to forward a resumé to the Scribe for inclusion in District Notes. The T.R.'s at present are: Bradford, 6KU; Stockton-on-Tees, 2FO; Sheffield, 2JY; Huddersfield, 5VD; Darlington, 6MF; Tynemouth, 2LD; Leeds, 2AHM. Reports from T.R.'s follow:—

Huddersfield.—The first area meeting was held at the QRA of the T.R., and much interest was shown in his "Comet" Pro and Preselector. The following report active: G5QN, 2ACD, 2AHA, BRS1478, 2186, 2195. Meetings are to be arranged frequently. Congratulations to BRS2195, who is now 2ALU.

Sheffield.—Attendance at meetings is improving, now being about 20, and more being recruited. The local G.P.O. inspector, Mr. Bottom, has given an excellent talk to the members on Interference and its Cures, and this is to be followed by a visit to the G.P.O. on April 16. At the last meeting, a demonstration of the HRO receiver was given by 5HK, a midget portable transmitter by 2AS, and a report presented of the club's one-valve portable transmitter of the electron coupled type, which obtains T9 reports. Best wishes to 2AWX who is now 5UA, and BRS2039 now 2BOU. Slow Morse practice is given by 5TO and 6LF each Sunday at 11.30 and 23.00 G.M.T. BRS1625 reports noticing the Dellinger effect last summer on the dates given in the BULLETIN. The following are active: G6LZ, 5UA, 2AS, 2DJ, 2GN, 5FZ, 2AVC, 2BGN, 2BOU, 2BSF, BRS1800, 1944, 2124, 2282, 2293.

Stockton.—There is much activity in Tees-side, particularly on receivers. G2FO is busy with

mains S.S. Superhet, 6ZT with mains receiver, 6MF has erected 40-ft. mast and building S.S. Super. 5XT is similarly engaged, and 2BQO is using an untuned RF receiver. G6CV is active, and we welcome BRS2301 as a new member.

Bradford.—Arrangements are being made to operate a 7 and 14 Mc. station during N.F.D. Individual reports follow: BRS1353 becomes 2BRA, BRS2317 is new member in Leeds, as is also BRS2191; best wishes to both. BRS1908 now much better after illness and active again. New members are asked to get in touch with the T.R.'s, who will keep them informed of all activities in their area, and notices of meetings, etc., will be published in the notes each month.

North-Eastern Provincial District Meeting.

The joint provincial meeting of Districts No. 2 and 18 was held at York on March 29. A record attendance of 80 assembled despite rather inclement weather, many members travelling 50 miles to be present. The proceedings commenced at 1 p.m. with the gathering of members and the renewal of friendships previously made and introductions to new ones. This was adjourned at 1.30 p.m. to partake of lunch, following which the business meeting was held. A welcome to the President and Secretary was given by the D.R. (G6PY), who expressed great satisfaction with the attendance which was representative of most parts of the combined districts. The Secretary (G6CL) then gave us a very interesting talk, which forms an excellent link between H.Q. and the individual member. Matters of general policy, membership, licensing, T.R.'s, contests, and other matters were fully discussed by him. Consideration was given to the division of No. 2 district, and the remarks and suggestions made will be helpful to Council in making a decision on the matter.

The President (G6UN) spoke on general Society matters, and mentioned the spirit of co-operation existing between the Society and the G.P.O., and referred to the work of the R.E.S. section of R.S.G.B. in an appreciative way. Mention was made of the satisfactory manner which the T.R. arrangement was functioning in this area, and expressions of thanks were offered to the T.R.'s and Scribe. In a short address, giving a resumé of the state of affairs in District 18, the D.R. (G6OO) asked to have appointed a successor to the post as he wished to tender his resignation, due to pressure of business. Thanks for his past services were given him, and nominations for the D.R. were made and will go to the Council for confirmation.

The meeting was then opened for discussion and questions, which were replied to by the appropriate officers. Tea was taken at 5.30 p.m., and informal discussion then took place between members until about 7.30 p.m., when the members began to return to their homes after having attended the finest meeting ever held in the District. It is hoped that the succeeding ones may keep up the high standard now attained, and many thanks are offered to the President, Secretary, D.R., T.R.'s, and all who contributed to make a most enjoyable day.

DISTRICT 3 (West Midlands).

Two reports were missed last month: 2AWP announced his promotion from BRS1740, and gave details of his proposed C.O., P.A. rig, in which he intends to use an Osram D.E.T.8 and to essay forth on Suppressor Grid Modulation. BRS1954 gave a long list of DX heard on 28 Mc., by means of his 2-valve super Regen!! Next month we may have the pleasure of listing the DX stations who have heard his RX! G5OI reports on the transmitter he and G6PW have been experimenting with a P.P. T.P.T.G. They are not yet satisfied with the results. His frequencies are 7043.4 and 14086.8 kc., and he will welcome reports.

The arrangements for N.F.D. have been left in the hands of the Coventry Group, who have formed a committee to deal with the matter of lifting the Trophy this year.

Oswestry and District. — All stations report activity. G6WB is obtaining excellent results on a 59, fed by batteries, and coupled by means of a Collins network. With 8 watts input he has worked the Philippines and has no difficulty in covering Europe. 6US has been active on 3.5 Mc. each week-end, but business prevents activity at other times. 2APW is busy with a new transmitter and modulator.

Hanley.—The first meeting of the local club was held at the Saracens Head Hotel, Hanley, recently, when the following elections were made:—President, Col. F. E. Wenger (G2VG); Chairman, A. H. Wilson (G2WN); P. Openshaw (2BIO) was appointed Secretary. 2VG's generous offer of a room and apparatus for use of the local members, on his home premises, was gratefully accepted.

Wolverhampton.—G5LK has been elected Chairman of the new local S-W.R.S. The first general meeting was held on March 25, at which a membership of 40 was reported. An interesting series of lectures has been arranged. 2BAW, 2BSL, and 2ABW are new A.A.'s, whilst the return of ex-5WW as G5WH is announced. Our congratulations to them all. G6UI, 6PC, and 2HQ all report trouble with 40-metre crystals "doubling" to 30 metres when using 59's in the Tritet circuit. Faults in the crystals are suspected but full data will be reported later. G5IQ and 5WO are now active on 7 and 14 Mc., with satisfactory results, whilst 2NO is at last on the air on the same bands, or to be more correct, he was, as we anticipate he has pulled the rig all to bits again by now!

DISTRICT 4 (East Midlands).

The March meeting was held at Mansfield on Sunday, 29th, when 30 members enjoyed a most interesting afternoon visiting the works of Messrs. Whitley Electrical Radio Co., Ltd. Our thanks are due to Mr. A. H. Whitley, Governing Director, and his Staff Managers, Messrs. Reynolds, James, Lynn, Lakin and Barnes, for their most instructive tour.

The next meeting will be held at the Rutland Hotel, Ilkeston, on Sunday, April 26, at 3.30 p.m. when a junk sale will be held. Members who so desire, may visit the station of G2WS at "Wharfdale," Heanor Road, Ilkeston, between 2.30 and 3.30 p.m.

It is desired that as many members as possible should transmit on the 56 Mc. band between the hours of 2 and 4 p.m. on Sunday, April 19, and report results at the meeting on the following Sunday.

Northamptonshire.—The inaugural meeting of the Wellingborough and District Short-Wave and Television Society was the occasion for a gathering of the clans and amateurs from Bedford, Peterborough, Northampton, and Kettering combined, to give this new Society a real good send off. Over fifty members were enrolled on the first night. Mention must be made of the fact that all the preliminary work was done by 5LP and done well too.

G5YF seems to be the only one doing anything in the Kettering area; he has moved his station into a shed in the garden and is working only on 56 Mc. now.

Leicester.—Four members attended the last meeting held at G6IM. The next meeting is to be held on April 30th at 2XD, 3, Montrose Road, Aylestone, Leicester, at 8 p.m. 2BIT is active on 56 Mc. and hopes to join forces with 2WS. 2XD reports active on 7 Mc., but is having trouble with his 14 Mc. gear; he is a new member and we welcome him into the Society. 6VD, after being QRT for some time, is active again on 7 and 14 Mc.

DISTRICT 5 (Western).

Increasing activity is noticeable on 28 Mc., and, judging by reports received from various quarters, some excellent work has been done. G6VF recently got going, and has contacted SU, W and ZS. G2HX continues his good work, and has worked VK, W6 and W7. G6RB, after a struggle, worked his first W6 on 28 Mc.

Enthusiasm seems to be working up for NFD, and arrangements are well under way for both A. and B. stations.

Bristol.—At the last meeting a very interesting lecture on the Fundamentals of Radio was given by G5FS, and should prove of great help to BRS and AA men.

Swindon.—Great activity is reported in this section. Morse practice classes are being run, and a short-wave receiver competition has been well supported. Recently visits were made by members to G2HN and G6LM: it is hoped that a party will visit the Bristol monthly meeting in April.

Gloucester.—The last meeting was very well supported, and preliminary arrangements completed for the NFD A. station. Two further AA licences have recently been granted 2BIU and 2BYU.

DISTRICT 6 (South-Western)

Once again the month has proved a very successful one from all points of view. Individual activities seem to be at their peak, and the local meetings are progessing extremely satisfactorily. We also have to congratulate two of our members on getting their two letter calls. These are 6RF, the T.R. for Plymouth, and 2FP, of Exeter. Arrangements are going forward in connection with the district Conventionette, and also with regard to N.F.D. The former has been fixed for May 10, at Exeter, and we shall be pleased to see members from other districts who can be present at this function. The transmitting gear, and the sites, have been practically settled upon for N.F.D.

The following are brief reports on the local meetings and other activities.

Torquay.—The monthly meeting here was very well attended, and it is interesting to note that there were present representatives from nine towns. The T.R., BRS1918, is still away, so the D.R. took on his work. Discussions centred round N.F.D. and Conventionette. Many points were settled.

Penryn.—The chief point of interest is that a regular meeting place has been obtained, chiefly through the good work of BRS2252. A meeting was held here, but too late to be dealt with as part of the monthly report of the T.R. Dates of future meetings have not been definitely fixed yet but will be soon.

Most members here report active, and 2AQB, 2AZW, 2BPB, 2BXT, and BRS2252 are all doing good work.

The question of having a T.R. for the Newquay area has been raised by a member in that region. There appear to be sufficient members to warrant it, so why not see about it, OM's?

Exeter.—A total of four turned up at the last meeting. Not good enough, OM's, you know! 5WY is having trouble with his RK20 outfit; he wants to key in the buffer stage, but gets a fair degree of self-oscillation in the PA stage. He would like to know if this is common.

Bridgwater.—Here the chief point appears to be the appointment of G5AK as Scribe. Thank you very much, OM, and we hope you will have a very happy time.

The next meeting is on April 19, and not on the 12th as indicated in last month's Calendar. The D.R. hopes to be able to attend this meeting.

DISTRICT 7 (Southern.)

Reading and District.—Ten members were present at the local meeting on March 18 to hear a lecture on 56 Mc. transmitters and receivers. Welcome is extended to two new Berkshire members, BRS2259 and BRS2311. G2NM, 2WK, 2YB, 5AO, 6GT, and 6WO all report active. G5HH is trying out a 2BI aerial. G2IT has worked ZS, using low power and 2-volt valves. G5TP has worked LU which gives him WAC. He also made what is believed to be the first contact with OS1BR. The next local meeting will be held on April 15 when Field Day Work is to be the main topic of the evening.

Portsmouth and District.—At the March meeting of the South Hants R.T.S. held at Fareham, 22 members were present. A large number of lantern slides, and talks by G6NZ and G2XC showed the development of Radio Communication from the early days to modern world-wide systems. The Society transmitter has been commenced, and the N.F.D. fund started. Donations welcomed! Next meeting, May 6, subject "Radio Measurements."

BRS1907 and G2VH are making 56 Mc. aerial measurements with sensitive thermo couples, and promise interesting results. G2XC is experimenting with drive-output ratios. G5OT (ex VO48) demonstrated his "Skyrider" recently. He has 50 watts now. BRS1240 is now 2AIV. BRS1964, 2BCM, and 2BHR are all "morsing." BRS2105 completed a new all a.c. receiver. BRS1319 trying out a heptode. G6WS is to make counterpoise tests. G6NZ is shortly coming on 3.5 Mc. with 50 watts.

Kingston and District.—G6BI is active building 56 Mc. super het and would like to get in touch with others using similar receivers *re* the I.F. stage used. G5ZK has completed new tritet C.O. P.A. transmitter, and has been trying suppressor grid modu-

lation, but is not very satisfied with results up to the present. G2NH is getting out very well on 28 Mc. using an indoor aerial. Full wave with ½-valve feeders. G2YL is back from her cruise, and had an fb time. She wishes to thank VP5PZ, 5AC, 5IS, 6MR, 6YB, 7NB, CT3AB, 3AN, and X3AJ for their hospitality.

Farnham and District.—BRS2164 now has her A.A. call and is 2ACV. She is busy mastering Morse. G5NF is on 1.7. Mc. 2BAU is building a 56 Mc. crystal controlled transmitter.

Guildford and District.—G5CM has started up on 28 Mc. with Ultra Audion using 10 watts to a UX210. He has contacted W, and is getting good results on 14 Mc. with the same transmitter. G5RS has a new 3 valve a.c. receiver going, and is chiefly active on 28 Mc. Has been QSO W5, 6 and 7, and is very pleased with the results on this band. G2GK was in for the ARRL tests, and, like the rest of us, did not think much of the new quota rule and the 14 Mc. QRM. He was one of the few G's to work VE5 in the N.W. territory. BRS1847 logged 67 telephony station on 28 Mc. in one evening! G6LK reports 20,000 points in A.R.R.L. tests. G6GS scored over 4,000 points in same contest and says he had a good time. He also worked KA and VS6 on 14 Mc. while waiting for a Yank who had not worked his G quota.

G5WP made some interesting remarks on the experimental side of our hobby as opposed to the DX side, and a lively argument ensued at the March meeting at Guildford. Thanks to G6LK bringing a portable receiver along, we were all able to hear the King's speech.

The next meeting will be held on Sunday, May 3 at the Hand and Spear Hotel, Weybridge. The D.R. would like to hear from any South Coast member who could help in fixing up a Conventionette in July, on a Sunday, and in a town not too difficult of access to the majority of our members. Ryde, I.O.W., Southsea, and Bournemouth are in view. Any suggestions?

DISTRICT 8 (Home Counties).

It is with great pleasure that I accept office as D.R., and sincerely hope that members will give me all possible help to again put this area "on the map."

Preparations for N.F.D. are going ahead, and by the time these notes appear details will have been "cut and dried."

A warm welcome is extended to those members in the Peterborough area of District 4, who, at their own wish, have been transferred to this district.

Arrangements for the P.D. Meeting at Cambridge on June 28 are progressing, and it is hoped to fix up an interesting programme. In order to ensure its success it will be necessary for the D.R. to know in good time how many are coming; the cost will be approximately 5s. per head, which will include luncheon and tea.

2AXS has received notification of his acceptance for full ticket and now awaits his morse test.

Reports received from members in the district this month are *nil*. This state of affairs must definitely be altered. Please let me have your news items on or before 23rd of each month, because this district must go "on the map" as well as it goes on the air.

G2XV.

DISTRICT 9 (East Anglia).

An interesting gathering was held in Norwich on March 8. During the afternoon a visit was made round the City's electricity station, through the kind co-operation of G2MN, and this was followed by tea and an informal meeting. Arrangements for N.F.D. were discussed and sites at similar places to last year are expected to be chosen.

A further meeting will be held at the same address, i.e., Marchesi, Prince of Wales Road, Norwich, on Sunday, May 10, commencing at 3 p.m., and it is requested that members intending to be present will notify either 2XS or 2MN by May 3, in order that bookings for tea may be fixed up.

Activity in the district seems to be on the increase and most stations are known to be working although only 6TI, 2MN and 6QZ report. We are very glad to know that Mr. Firmin, 2AFZ, of Lowestoft, has been allotted a full call and hope this will be the forerunner of good work in the Lowestoft area.

DISTRICT 10 (South Wales and Monmouth).

The District Scribe is now in Cardiff during the week, and the new QRA is c/o 19, Wellfield Place, Cardiff, or phone Cardiff 7797 during the day.

Newport.—The last meeting here was fairly well attended, and a new member, BRS2305, was welcomed. We were sorry to lose G2IP from this end of the district, but Swansea is now richer by one good "ham," while the other Bristolian, G5XV, still attends the local meetings quite regularly.

Re the District Meeting on April 26, a visit has been arranged to the Newport Power Station, and all members interested are asked to communicate with G2XX not later than April 20.

WESTERN PROVINCIAL DISTRICT MEETING

SUNDAY, APRIL 26, 1936

at

QUEEN'S HOTEL, NEWPORT

Assemble ...	... 12 noon
Luncheon ...	...1.15 p.m.
Business Meeting	...2.15 p.m.
Tea	...4.30 p.m.
Station Visits	...5.15 p.m.

Inclusive charge, 5s.

Reservations to Mr. R. V. Allbright (G2JL), 2, Palmyra Place, Newport, before April 22.

A visit has been arranged to the East Power Supply Station, Newport. Reservations to be made in advance, as numbers are restricted to 50.

Cardiff.—A well-attended meeting was held on March 26 when a permanent clubroom was discussed, and it was unanimously decided to go ahead with this matter. The usual morse practice was held. 2ASL is now only awaiting his morse test. G5BI is on 1.7 Mc. at week-ends only. Other members active in this area include G2JL, 2XM, 2XX, 6BK, 2NG, 6PF, 2ABI, 2BAQ, 2BBO, 2BHZ, 2BMA, 2BSN, BRS1855, BRS2304, 2305. The T.R. BRS1949 is now 2BQB.

Port Talbot.—The D.S. paid a visit to G5VX on March 25 and found great activity in this area, where he met 2QL, 6JW and 2AVV, and Mr. S. Waters, who is joining R.S.G.B. and applying for a call sign. G2QL and 6JW are the DX workers, but are hoping with 5VX to get going on 1.7 Mc. soon.

Swansea.—On March 18 Mr. Jennings, of G.E.C., gave the Swansea meeting a much appreciated lecture on valve manufacture, construction, and application.

G2WO has applied for a 3.5 Mc. permit. 5PH is experimenting with Tourmaline control. BRS2212 is now 2BVV, while at Llanelly, 5KJ is going well on 28 Mc., where he is well on the way for a W.A.C.

Other stations active include G2SN, 2OP, 2WO, 5FK, 5LV, 5TW, 2BVV, and BRS2035.

The T.R. and D.S. would like to thank 2WO, 5PK and 2BVV for their active co-operation in getting the notes together.

Don't forget April 26.

DISTRICT 12 (London North).

At the March district meeting an interesting talk on practical work with the new RFP60 valves was given by Mr. J. Clarricoats, G6CL. By means of diagrams and graphs the most efficient method of operating these valves was explained, and an analysis of stations worked shows a marked improvement over other types.

The district site for " A " station has been chosen and the address is Frith Lane, Mill Hill (adjoining Mill Hill Station, L.N.E.R.). Several sites have been viewed for " B " station but nothing definite has been fixed.

2BIW reports activity on the higher frequencies, including experiments with receivers on 112 Mc. He would appreciate co-operation with any station working on these frequencies. The following report active : G5BB, 5BO, 5CD, 2BVD.

DISTRICT 13 (London South)

There was a record attendance at the March District meeting, when a display of N.F.D. 1935 films was given. Owing to pressure of time at the meeting, Field Day discussions were postponed until April 23. One of the most important matters then to be arranged is that of transport to the two stations and it would be of great assistance if all those members who are able to put cars at the disposal of the D.R. would communicate with him at the earliest possible opportunity. We would mention here that the two sites have now been fixed at Ide Hill and Westerham.

We are very surprised to note that interesting reports are conspicuous by their absence. Where are all the usual experimenters this month ? The following have reported active : G2GZ, 2LW, 2UW, BRS1357, 1675, 2015, 2218. We welcome 2UX back to the District and hope to see much of him in the future. 2JB and 6HM are now both W.B.E., and 2VB is very anxious to receive reports on his transmissions. BRS2185, who is a new member, was present at the March meeting, and to him, as well as to all other new members, the D.R. would like to offer a very hearty welcome. Don't forget your reports by the 22nd of the month ! 6AN reports having had no success with a Collins Coupler, and is now turning to other methods.

There would appear to be a certain amount of dissatisfaction among one or two members of District 13 because they have not been asked to take a post as an official operator at the " B " Station during N.F.D. It must be clearly understood that only three, or at most four, operators are required for this position, and those selected have been chosen very carefully as being most likely to secure a large number of contacts. It should be remembered that this event is a contest, and we do hope that everyone will realise that everything possible is being done to make success a certainty. To those members who are not official operators we would say, " Yours is just as important a job, and the District cannot enter the competition without your support and active assistance on the day." If every member of the District was allowed to operate, think of the chaos !

DISTRICT 14 (Eastern).

Southend-on-Sea.—At the March meeting, held at 2BNR, Southend-on-Sea, there was an attendance of 19, including five from the Chelmsford area. The event of most importance at the moment is the Southend and District Radio Society Dinner, to be held on Saturday, April 18 ; details appear elsewhere. This area is much more active now.

Southend & District Radio Society Annual Dinner

●

SATURDAY, APRIL 18, 1936

AT

LONDON HOTEL, HIGH STREET, SOUTHEND-ON-SEA

7.30 for 8 p.m.

●

Tickets, 4s. 6d. single, 8s. 6d. double, from Hon. Sec., Mr. F. S. ADAMS, "Chippenham," Eastern Avenue, Prittlewell, or on entry.

G6CT is testing a Collins coupler ; 5VQ, Goyder Lock, 2SO has rebuilt and put up a " Zepp " aerial ; both he and G2MY will be on fone soon. 5XI is relying on his hand generator for power supply. 5RW, using 2 watts, has worked fone with CT. G2LC and 6IF are using fone on 7 Mc. All would appreciate reports. 2BNR and BRS1647 are working on the N.F.D. transmitter. 2AHX awaits his morse test. At the next meeting to be held at G5VQ, Westcliff-on-Sea, final arrangements will be made and entry forms distributed in connection with the Local Great Circle Contest next May. The N.F.D. site for the district " B " station, G6CTP will be Gusted Hall, near Hockley, Essex, and the probable operators will be G6CT, 6IF, 5VQ, 2LC, 2SO, 5XI and 2UK.

East London Section.—The attendance at the March meeting held at G6UT, Chingford, was 10. Arrangements for the N.F.D. station, G6UTP, were made, and once more the site chosen is " Rookwood Hall," Abbess Roothing, through the courtesy of

Mr. Rowe and the Misses Rowe ; response for help so far has been poor.

Congratulations to 2AQC, now G6ID, and 2ANK, now G6NG, both of Dagenham. It is with regret that we record the loss of G5DY's wife, who passed away suddenly. The many members visiting the station will miss her welcome.

BRS2292 has reported ; 2AVH is devoting his time to morse. G5DY, with only 10 watts, has worked VK2BQ on fone. Congratulations to BRS2042, now 2AMF, 2BNC has installed two 50-foot masts. The following members supported the 1.7 Mc. Contest: G2DQ, 2CD, 2LC, 6AU, 6CT and 6UT. Offers of meeting-places are asked for May and June meetings.

Chelmsford.—With a view to forming a Chelmsford section, will members living within a 10-mile radius write to G6LB, Mr. L. J. Fuller, 85, High Street, Chelmsford, promising him their support ? If this is obtained a meeting will be arranged.

DISTRICT 15 (London West and Middlesex)

Thanks to the twenty members who attended the North Harrow meeting, the area exchequer was generously increased by both the keen bidding at the junk sale and also by the collection.

Should there still be members who intend to operate during N.F.D., will they notify the D.R. *at once* because entries have to reach headquarters by the 18th. More help with transport would still be welcomed.

Twickenham.—G2VV has daily schedule with ZL2OQ. 6GB worked VK on telephony with 9 watts, 2LA, 2KX, and 5VB report active.

Hayes.—G5JL has new transmitter working, 2ANR testing T.P.T.G., P.A., 2BCN trouble with P.A., BRS2142 hearing good DX on 14 Mc. Morse classes suggested, and T.R. would like to hear from those interested.

G6CO had power transformer go up in smoke, 6VP says 14 Mc. is marvellous, but directional aerial not so good in daylight, 6WN found 28 Mc. had improved, and had about thirty contacts, 2AUB busy with transmitter, got about 350 points in B.E.R.U. reception contest, 2BAI spent little time on transmitter and heard two new countries, BRS1226 busy with commercial H.F. work.

The Thames Valley Amateur Radio and Television Society (will be referred to as T.V.A.R.T.S. in future in these notes). At their March meeting at the Lecture Hall, Twickenham Public Library, the members listened to an interesting lantern lecture on " British Wireless Services " by Mr. F. Addey, B.Sc., M.I.E.E., which was much appreciated.

DISTRICT 16 (South-Eastern).

Preparations for N.F.D. are well in hand, and it is suggested that the Ashford, Folkestone and Sussex groups should send what help they can to Tunbridge Wells, whilst the Bromley, Medway Towns and other North Kent groups should assist the Gravesend station.

The scribe has had the pleasure of visiting the Heathfield and Tunbridge Wells Groups recently. N.F.D. arrangements were discussed at the latter place.

Headcorn.—G2IC visits G5FJ every Thursday evening, and during these visits a long lines oscillator is used for 56 Mc. tests. It is hoped to establish a link with Folkestone direct or *via* Ashford.

Bromley and District.—G5LB's 56 Mc. C.C. tests are being directed more towards getting a really stable signal than high QRK. 2GB receives an excellent T9 signal from him on a straight receiver. 2AW, who has used a successful P.A. on 56 Mc., prefers a power F.D. for efficiency ; he has noticed a fade-out on 6WQ with night-fall on two occasions. 2QR is now C.C. on 56 Mc. Is 2AW's regular 50 mile QSO with 5RD at R8 on 56 Mc. a record for shack-to-shack working ?

Tunbridge Wells.—The whole of the time at the last meeting was devoted to a discussion on the 7 and 14 Mc. N.F.D. station. G2UJ, 2PQ, 5OQ, 5KV and 6OB are all active. G2PQ has his portable CW/fone transmitter working on 1.7 Mc. ; this occupies an ex-army Mark III transmitter case and employs an interesting crystal-controlled circuit. H.T. is provided by a small accumulator-driven generator. On a recent Sunday 2UJ worked 2PQP from Ashdown Forest when the portable station was using a makeshift aerial 15 feet high at one end and 5 feet the other, and the car as a counterpoise.

Medway Towns.—Subject to confirmation by R.S.G.B. the Captain Plugge Challenge Cup has been won by G6BQ, of Gravesend. Congratulations O.M. ; G6QC was the runner-up. G2CM, 2MI, 2VA, 2AFT, 5FN, 5UU, 6QC, 6VV and BRS2058 are all active.

Gravesend.—The inaugural meeting of the local club was held on February 28 last, when G5IL was elected chairman and 2BDL secretary. Meetings will be held every fortnight on Monday evenings in co-operation with the M.A.T.S. A local QSO schedule has been arranged for 10 a.m. Sundays on 1.7 Mc. G2IZ, 2KL, 2TN, 5SU, 5IL, 6PG and 2BDL report active.

Ashford.—The group are busy on 56 Mc., but have nothing special to report.

Folkestone members are busy on 1.7 and 56 Mc. They have received QSL's from F8WY (R6W5) and F8AA (R6 W3/5) on 56 Mc. transmissions.

Brighton.—At the meeting held on March 13, Mr. Swan, a prospective B.R.S. member, explained a receiver costing 30s. with which he has heard American police patrols. The practice of temporary exchange of apparatus was commenced. Next meeting, 7 p.m., April 17, at G2HV. Active : G2HV, 6CX, 6SU, 2ASC, 2BCQ, BERS218, BRS1571, 1852, 2074. Congratulations to BRS2152, who is now G6RM, and to BRS2000, now 2AJS. 2ASC is making experiments upon the interaction of the fields due to different stages of a transmitter.

Heathfield.—The Heathfield Radio and Television Society recently paid a visit to the Tunbridge Wells Radio Society. 2AFX, of Uckfield, is now G5PN. BRS1173 receives congratulations on finishing second in the VK/ZL contest.

Eastbourne.—G2AO, 2KV and 2BIU report.

Hastings.—A directional aerial has been erected for 56 Mc. tests from 6HH, the club station.

Arrangements have been made for a District 56 Mc. test to take place between 11.00 and 13.00 B.S.T. Sunday, May 4. Those interested are asked to communicate with BRS1173, 8, Theobalds Green, Heathfield.

DISTRICT 17 (Mid-East).

Grimsby.—G6AK is testing Type 210's and W3EDP aerial. 2VY plans new aerial arrangements. 6UG also testing Type 210's. 5GS another to give W3EDP aerial a try-out. 2BVU awaits full call. The following are active :—2AZH, 2BFC, 2BWV, 1021, 1871.

Sleaford.—Regular meetings are being held every Monday at 5.30 p.m. The shack 14 Mc. aerial has given several VK contacts. The club power supplies and aerials will be available for members operating their own gear as follows :—Mondays, 6TV and BRS Popay ; Tuesdays, 2XK and 1814 ; Wednesdays, 5PZ and 2270 ; Thursdays, 6AC and 2141 ; Fridays, 2LR and 2261. Saturdays and Sundays, all members. Everyone will be sorry to learn of the death of BRS2243 and will extend their condolences to his family. 2155 progresses well in hospital, and hopes to be active shortly.

Boston.—G6GH adds VQ3, ZL and CM to his list of DX. Congratulations to 2030, who is now 2AAS. The D.R. got his broadcast over successfully, and had an interesting time with B.B.C. engineers. He thanks 6GH and 2BJY for concocting Notes last month.

Brigg.—2AFU advances towards his full licenc and has completed his 58 Tritet transmitter and the monitor.

The crystal register is practically complete, and every member should have a copy by the end of the month. New members are asked to send in their frequencies for publication in these notes.

Everyone is asked to make a note of the date of our Annual Conventionette to be held at Cranwell on Sunday, July 19.

Northern Ireland

At the last meeting of the Radio Transmitters' Union, a morse-sending competition was held, the entry fees being devoted to the N.F.D. fund. Entrants were expected to send a ten-word group at a speed of ten words per minute, the test being made on an Audio frequency oscillator. GI5SJ and GI5GV tied for first place with 60 seconds each, and on the " replay " GI5GV won with 59 4/5 seconds. The prize was a copy of the " Handbook."

GI5UR reports having scored over 2,400 points in the recent A.R.R.L. Contest with over 80 contacts. GI5UR and 6XS are now licensed to use 25 watts. 6WG, 5HV and 5SQ report active.

GI6YW records having paid pleasant visits to G5QY, 6IR and 2AWA.

Arrangements for N.F.D. are well in hand and we hope to announce the personnel and station locations next month.

Scotland.

It would appear that credit was not given where due last month ; the news has just come to hand that G6NX during the Junior B.E.R.U. contest accomplished W.B.E., a very creditable performance, in view of the poor conditions which prevailed during this contest.

Another of the big events of the year is over and the competitors are now regaining much lost sleep ; we refer to the A.R.R.L. DX contest. The only scores to hand are those of G5YG, who amassed the high score of approximately 29,000 points, G6RV over 9,000 points, and G6NX over 4,000 points. Conditions, unfortunately, did not hold up as they promised during the first week-end.

This month the news of changes of status is confined to " A " district. Mr. Troy, BRS1721 being now 2BUJ, Mr. J. G. Kerr, BRS1903—2AZK, and Mr. Henney, BRS2238—2BBF. Mr. Leishman, 2BMP, has passed his Morse test and now awaits his call. In " B " district 2BYF, 2AFA and 2AUT all await their Morse tests, and we wish them luck.

The visit of " C " district to " B " district, which had to be postponed in January due to the condition of the roads, took place on Sunday, March 22. The visitors from " C " comprised G6LD, 5WT, 6RT, 6KO, 6RI, 2BLJ and a BRS. After lunch at the Bonaccord Hotel, Aberdeen, the party split into two sections in order to prevent overcrowding at the various stations visited. After this a short rag-chew took place at the hotel before tea. Thereafter the visitors set out for home, thus completing a day which " B " district enjoyed very much.

At the " A " district meeting on March 25, Mr. Wilson, G2WL, delivered a most interesting lecture on Single Signal Receivers, which was much appreciated by a large attendance of members.

There is no news of " D " district, none having been received.

Preliminary arrangements are being discussed by the various districts regarding the holding of National Field Day. So far no definite arrangements have been fixed.

Activity in Scotland, despite the lack of reports, is brisk, and many stations are to be heard on the air.

DX Forecasts (No. 5).

APRIL 15—MAY 15.

G.M.T.	14 Mc.	7 Mc.
0500	W7	ZL
0600	W6.7 ; K6	ZL ; VK
0700	W6	VK
0800	VK	
0900	VK	
1200	J	
1300	J ; PK	
1400	J ; XU ; W6	
1500	VS1.6 ; W6.7 ; VK	
1600	W6.7 ; VS2.6	
1700	VS7 ; PK1	
1800	VQ4 ; ZE1	J
1900	PY ; VQ4 ; J ; CX1	J
2000	PY ; J ; CX1	PK1 ; ZS
2100	J ; CX1 ; VP4	
2200	HJ ; VPZ ; K4.5 ; LU ; PY ; CX	PY ; LU
2300	VP5.6 ; W7 ; LU ; PY	
2400	LU ; PY ; K4	

Stray

W3EVT has asked us to mention that he is unable to acknowledge the numerous 28 Mc. reports he receives from British listening stations. W3EVT is regularly in contact with Europe, and, therefore, no useful purpose is served by B.R.S. informing him of this fact !

Empire B.E.R.U. News.

B.E.R.U. REPRESENTATIVES.

Australia : I. V. Miller (VK3EG), P.O. Box 41, Tallangatta, Victoria ; Sub Representatives : J. B. Corbin (VK2YC), 15, Yanderra Flats, East Crescent Street, McMahon's Point, Sydney, N.S.W. ; R. Ohrbom (VK3OC), 22, Gordon Street, Coburg, N.13, Victoria ; A. H. Mackenzie (VK4GK), Fire Station, Wynnum, Brisbane ; G. Ragless (VK5GR), South Road P.O., St. Mary's, S.A. ; J. C. Batchler (VK7JB), 21, Quarry Street, North Hobart, Tasmania.

Bahamas, Bermuda and the Eastern Part of the West Indies : P. H. B. Trasler (VP4TA), Point à Pierre, Trinidad, B.W.I.

Burma : W. G. F. Wedderspoon (VU2JB), Government High School, Akyab, Burma.

Canada : C. S. Taylor (VE1BV), Stewiacke, Nova Scotia ; Earle H. Turner (VE2CA), 267, Notre Dame Street, St. Lambert, P.Q. ; W. P. Andrew (VE3WA), 1337, Dougall Avenue, Windsor, Ont. ; A. E. Howard (VE4CJ), 2401, 25th Street West, Calgary, Alberta.

Ceylon : G. H. Jolliffe (VS7GJ), Frocester, Govinna.

Channel Islands : Capt. A. M. Houston Fergus (G2ZC), La Cotte, La Moye, St. Brelades, Jersey.

Egypt, Sudan and Transjordania : F. H. Pettitt (SU1SG), Catholic Club, Mustapha Barracks, Alexandria.

Hong Kong : G. Merriman, (VS6AH), Box 414, Hong Kong.

Irish Free State : Captain G. Noblett, M.C. (EI9D), Barley Hill House, Westport, Co. Mayo.

Kenya, Uganda and Tanganyika : W. E. Lane (VQ4CRH), P.O. Box 570, Nairobi.

Malaya and Borneo : J. MacIntosh (VS1AA), Posts and Telegraphs, Penang, S.S.

Malta : L. Grech (ZB1C), 18, Constitution Street, Zeitun, Malta.

Newfoundland : E. S. Holden (VO1H), Box 650, St. John's, Newfoundland.

New Zealand : C. W. Parton (ZL3CP), 69, Hackthorne Road, Cashmere Hills, Christchurch.

North and South Rhodesia : R. A. Hill (ZE1JB), P.O. Box 484, Bulawayo, S. Rhodesia.

North India : J. G. McIntosh (VU2LJ), Baghjan T.E., Doom Dooma P.O., Assam.

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

South India : J. Shepherd Nicholson (VU2JP), c/o Kanan Devan Hills Produce Co., Ltd., Munnar P.O., Travancore.

Australia.

By VK3EG.

Many of our stations are active on 28 Mc. VK4BB was the first VK to make W.B.E. on this band ; 4EI was the first to contact Europe, Egypt and Hong Kong. 2LZ was first to work G. VK6SA had the first South African contact working ZS1H on October 6, 1935. VK4BB was the first East coast VK to contact Africa, Canada and Jamaica, VK4AP had first QSO with I.F.S. (EI8B).

In the B.E.R.U. Contest ZB1H was a prominent 14 Mc. signal being R8 at times ; G5YG, 6CJ and 6DL were best G's on this band and 2MI best on 7 Mc.

VK4GK and his daughter 4YL did well in the Senior and Junior respectively. VK4EL has been doing star QRP DX work. On January 14 he contacted OA4J on 14 Mc., using an input of 1 watt from a B406. 4BB led the 28 Mc. Section in the VK/ZL contest and ran up a big score in the Junior B.E.R.U.

During the G-VK 3.5 Mc. tests 3EG worked G2ZQ and 6CJ, both R7 signals. G5YR, 6NJ and 6WY were also heard. VK3EG contacted VE1BV the long way round during the B.E.R.U. Contest. VK2OJ is testing directional aerials

New members welcomed are VK3ZC and Mr. Fraser Clarke, of Ayr, North Queensland.

VK5 is quiet, but in the west enthusiasm is definitely increasing.

Canada (Third District)

By VE3WA, *via* G6AZ.

Conditions were very fine here on all bands during the A.R.R.L. contest. The limit of three stations in each country stopped a lot of QRM. 28 Mc. was exceptionally good, and most of the old 14 Mc. gang were heard on this band. Numerous VK stations were heard and ZS2A and ZS1H were worthy representatives of South Africa. On 14 Mc. conditions were unusually good, a few exceptional stations heard being VS6AQ, SU1RO, SU1SG and ZS1AH. SU1SG was R7 for hours, but spent all his time working the Yanks !

7 Mc. was very good for VK and ZL and for a couple of nights Europe came through well.

Ceylon

By VS7GJ.

The period ended March 15 embraced the Junior Transmitting Contest. Conditions this year were

not favourable, stations to the N.W. of Ceylon were conspicuous by their absence.

VS7RA has done good work on 14 Mc. both no 'phone and C.W. VS7RP found reception conditions far better during the Senior contest period.

VS7GJ heard VK4EI and VU2LJ working a G station on 28 Mc., but no G's have been heard here.

VS7GJ is standing by for 28 Mc. work on Sundays from 0900-1100 G.M.T.

Many amateurs make requests for QSL cards, but never send any themselves; surely a one-sided request.

Egypt, Sudan and Trans-Jordania

By SU1SG *via* G5YH.

From Cairo it is reported that SU3TW may shortly be on the air. SU1RO has built a 60-watt modulator and is now engaged in completing a suitable power supply. BERS170 sails for England at the end of this month, where he will take over his old call 2BXI. SU1CH recently journeyed from Cairo to Port Said by car to visit SU1RK, and took with him a small portable 2-watt transmitter with which he kept in touch with SU1RK during the whole journey. SU5NK, whose call on 28 Mc. is SU1JT, is still doing well and works the States regularly on this frequency.

Port Said will shortly be losing its only ham, as SU1RK is leaving for Cairo to go on the staff of the Egyptian Broadcasting Company. In Alexandra SU1WM has been rebuilding; he had previously been suffering from a chirpy note due to self-oscillation in the buffer stage; in the rebuild this trouble has been successfully overcome. SU1SG has qualified for fone WBE by working VE2EE, and scored 18,200 points in the A.R.R.L. contest. ZC6CN has gone over to 14 Mc., and strangely enough is still able to effect local QSO's, which seems to defy preconceived ideas of skip-distance on this frequency. We were afforded an unexpected pleasure by a visit from G5UK, with whom we had a very pleasant rag-chew during the few hours he was able to spend in the shack before continuing his journey.

Hong Kong

By VS6AH *via* G2QO.

The A.R.R.L. Contest was well supported by the VS6 group. The 14 Mc. band yielded the best results. VS6AL is testing aerials; 6AF and 6AG continue 'phone tests on 14 Mc.; 6AX has a home-made superhet which is excellent down to 28 Mc.; VS6BD, our E.L.S., is rebuilding and will shortly resume his schedules. The following are active:—VS6AF, AG, AK, AH, AL, AN, AQ, AS, AX, AZ.

Irish Free State

By EI9D.

Information as to contest results is awaited with interest. EI6G reports having done well in the A.R.R.L. tests.

EI8G is now back on the air. EI8G, using suppression grid modulation, is getting out well with good quality. BRS1587, Mr. Golden, of Westport, is hard at Morse practice and expects to qualify very soon.

The attention of IRTS receiving stations and BRS is drawn to the IRTS slow Morse practices from EI9D. These take place every Saturday at 19.00 G.M.T. on 3,522 kc. and, from reports received, seem to be proving useful.

Kenya, Uganda and Tanganyika

By VQ4CRH.

Conditions on both the 7 and 14 Mc. bands were lively during January, but G's have been very scarce. The first week-end of the B.E.R.U. Senior contest was rather dull from this end, VK's being the happy hunting ground, and all stations in this zone were very quick in reducing their points to one per contact.

VQ4CRO collected nearly all his points from the 7 Mc. band, but had very hard luck to burn out a condenser and resistance in his receiver, which kept him off the air for a few hours.

VQ4SNB appeared to be going strong, but we have no definite news from him as to how conditions were up country.

VQ4CRH did so well on 14 Mc. at the start that the 7 Mc. band was not given a trial.

VQ4LMA and VQ4CRE were not very successful, being rather handicapped with very low power owing to various reasons. They hope to make themselves heard in the Junior.

We extend a hearty welcome to ex-G5FA, who is now resident in Tanganyika with VQ3FAR call sign. We also welcome a new member in VQ4KSL, who is doing remarkably well with a crystal oscillator; using only 60 volts H.T., he received a reply from W6.

Congratulations to VQ4CRO, who has been awarded the Mayer Cup by the Radio Society of East Africa for his outstanding performance on telephony.

VQ4CRE experienced very bad luck last month, having the misfortune of seeing his outfit go up in smoke owing to the over eagerness of his junior op. to assist with the various switches.

Malaya and Borneo

By VS1AA.

VS1AJ has effected modifications to transmitter using type 59 as pentode-tritet oscillator, for 28 Mc. work. Good work was effected in first week of Senior Contest, but time was limited during second week. Static level high. This station has now completed a year's schedule of weekly QSO's with G on 14 Mc.

2AG votes the senior contest great fun, but conditions hopeless for junior. Worked HB9AT during three day schedule. W6 now coming in well on 14 Mc. This station now our E.L.S.

No reports from other transmitters.

Outstanding DX. 1AJ worked OA4J (Peru), while 2AG worked HP1AH (Panama). Both these are believed to be first contacts for Malaya.

1AJ reports QRM from JYN in middle of 14 Mc. band. QRM again bad on 7 Mc. Offenders hard to locate as calls are rarely given.

1AA busy on commercial activity check and doing a little occasionally towards completion of outfit. Broadcast superhet completed and giving good results.

The Letter Budget is now in full swing and is well supported. How about a short monthly report also, O.M.'s?

Malta

By ZB1C *via* ZB1E and G6HY.

ZB1C is now on the air and, with ZB1E and ZB1H, took part in the A.R.R.L. contest. Con-

ditions during the contest were poor and only the 14 Mc. band was used. ZB1G is doing a lot of listening on his new 1.V.1 receiver. The PR.16 receivers have been received by ZB1E and ZB1H Both stations are building for higher power. ZB1E expects to have an input of 200 watts and ZB1H nearly 300 watts. ZB1C is still in favour of his 50-watter. ZB1H is now W.B.E. This month we welcome to our group G6CN. The second meeting in April will be held on the 26th at 3 p.m. at ZB1H, 28 Sda, Nuova, Floriana.

Rhodesia

By ZE1JB.

The new regulations governing Experimental Radio provide for both Amateur and Experimental (Research) Stations. The former may operate in any band allowed by the International Radio-telegraph Conventions and the latter only in the 28 and 56 Mc. bands.

The principal alterations are that all stations except portables or portable-mobiles must be crystal controlled on 7 and 14 Mc. and on all frequencies below 14 Mc. must use adequately filtered D.C. Telephony is not permitted without special permission from the Postmaster-General. Power is in all cases limited to 50 watts input to the final stage.

Another innovation of interest is the calling procedure. A station must call CQ or the sign of the called station not more than three times followed by " de " once and its own call not more than three times. This formula may be repeated not more than eight times. Further, no CQ call may be repeated until 10 minutes have lapsed since the last CQ call. Stations may, however, be called as desired, with no specified interval between calls.

A number of members entered for the A.R.R.L. DX contest, but QRM was terrific and contacts difficult.

ZE1JU has written taking exception to the remarks made in the February BULLETIN on his 28 Mc. transmissions and has asked me to rectify the error. I said that he was using a Colpitts circuit and that this in conjunction with the power supply used at the time caused considerable QRM on both 7 and 14 Mc. Mr. Andrews objects to this because he says it is nothing to do with the circuit. The writer agrees, and if the remarks were construed to mean that the circuit caused QRM they must be withdrawn. What it was intended to convey was that the power supply, a motor generator, was causing QRM when used with the Colpitts (a self-excited rig) which may not have occurred had the rig been crystal controlled. We are assured that Mr. Andrews is no longer using the motor generator and consequently the QRM has ceased.

The writer would like members to remember that these notes are written from information supplied by members and at at present he has to rely entirely on this source as ZE1JB is off the air. The information must therefore be taken at face value.

ZE1JB is now in Salisbury and his QRA is P.O. Box 612 ; it is not likely that he will be on the air for some months. 1JE and 1JF both did well in the B.E.R.U. contest. 1JH is moving into his house at the end of March and should then be able to get going again.

ZE1JJ is on 28 Mc. and is working many American stations. He is constructing a beam antenna. The outfit used is a 2A5 tritet, 59 doubler and a pair of 46 tubes in the final in push-pull with 30 watts input. The receiver is a home-assembled Lafayette. His frequency is 28,200 kc.

ZE1JN, using 18 watts, has worked all continents. He goes on leave in April and hopes to take his outfit with him. 1JS was presented with a YL junior Op. during the last week-end of the contest and has called her " Beruyl ! "

ZE1JT has been trying to obtain good specimens of quartz crystal from local mining men with the ideal of sending them to England for test purposes.

ZE1JU (ex VQ2BH) still continues his good work on 28 Mc. 1JV has returned from leave full of life and new apparatus. 1JY has moved out of town and is now free of QRM from other Bulawayo stations but reports conditions as bad.

With the promulgation of the new regulations it is expected that several new licences, which were being held up pending these regulations coming into force, will be issued.

South Africa

At the request of the South African Radio Relay League we publish below a letter received by them from the secretary to the Acting Governor-General of South Africa :—

Government House,
Cape Town.
January 27th, 1936.

Sir,—With reference to your telegram of the 23rd January, I am directed to inform you that the message of sympathy and loyalty from the South African Radio Relay League Headquarters on the death of His Majesty King George V was transmitted by cablegram through the usual channel for submission to His Majesty The King and the Members of the Royal Family, and that I have received a reply from the Private Secretary, Buckingham Palace, London, desiring me to inform you that the message has been laid before His Majesty and the Members of the Royal Family, who have commanded that an expression of their grateful thanks may be conveyed to the senders.

I am, Sir,
Your obedient Servant,
M. HORE-RUTHVEN,
Secretary to the Acting Governor-General.

The Secretary,
S.A. Radio Relay League Headquarters,
Johannesburg.

South India

By VU2JP.

VU2EB still complains of QRM from VU2CQ, he also mentions that the ban on amateur transmitting in the N.W.F.P. has been lifted and that 2BA was the first to obtain a licence. BERS285 and 288 have also applied. 301 has been working on 56 Mc., using the local auxiliary force gear. VU2JP is also interested in this band, and hopes to begin tests with 301 shortly. He can operate from a point 9,000 ft. above sea-level and is expecting DX results.

VU2AU and 2JP are on 28 Mc., the former worked 40 stations in 10 days, including G, ZS, ZE, VK, VU. He uses an 89 as Tritet and a 6A6 parallel connected doubler, with a 14 Mc. ½-wave windom. Input 6 watts.

EDITORIAL.—(*Continued from page* 383.)

In offering this month's fare we are conscious of the fact that it would not have been made possible without the help of the manufacturers, and although in the past we have urged our members to support our advertisers, we do so even more now on the ground that "one good turn deserves another."

J. C.

SINGLE SIGNAL RECEIVER.—

(*Continued from page* 389.)

Detector considerably increases signal strength, especially on 28 Mc. Increasing the screen voltage on the H.F. oscillator valve also improved signal strength.

It is planned to conduct experiments with a view to using the receiver on 56 Mc., and if results are satisfactory, a further article will be published. The proposed method of achieving the desired result will be to use either a 10 or 15 metre oscillator coil and take out the second or third harmonic to beat with the 1st Detector.

Compared with American commercial receivers tested by the writer, the opinion is expressed that the Samson receiver is more sensitive and has a greater signal to noise ratio. The variable selectivity control is an important feature and enables the user to bring in a signal clear of interference—however severe. The ultimate selectivity is not quite as high as with a crystal gate receiver, but the receiver which has been described has the advantage of the above mentioned feature which is not obtained with the crystal gate types. The constructors give it as their opinion that the extra expense of a crystal does not compensate for the slight extra advantage of extreme selectivity as the degree of selectivity obtained with I.F. reaction is sufficient for all amateur purposes. An R9 signal can be dropped to R2 on the other side of the beat.

As practical proof of the accuracy of this statement the writer would mention that it was necessary on only two occasions during the 1936 B.E.R.U. and A.R.R.L. Contests to ask for a repeat.

* * *

Editorial Note.

With reference to the valves specified by Mr. Samson for use in this receiver, we understand from *Messrs. Standard Telephones & Cables, Ltd.*, that these are American types and are not available on the Home market. They can, however, be obtained abroad through recognised agents.

We are informed that the nearest equivalent S.T. Co. valves are the 8D2 as replacement for the 77, and 9D2 as replacement for the 78. There is no exact equivalent for the 89. It should be understood that the British equivalents have different heaters and bases to the American types.

DECEMBER 3.5 MC. TESTS.—

(*Continued from page* 398)

to that usually noted on 7 Mc. A number asked for a repetition of the tests, and this is being considered.

The writer feels sure that he is voicing the wishes of many G's when he thanks VE1EI for his wholehearted co-operation. This station gave many Europeans their first T.A. contact, and it was he who originally suggested that the tests be organised. Thanks, VE1EI.

Reports were received from numerous stations, notably VO4Y, who said "Don't forget the VO stations when searching 3.5 Mc.," VO1H, VE2AP, who said he will be pleased to confirm the reception of G5BD, 5FV, 5KG, and 6CJ on request, W8EUY, W1SZ, W7BBE, who reported hearing G2ZQ and 6PF, VE1EI, PA0ASD, 0PK, Gi6YW, G2YL, 5CH, 2BJT, 2AKB, 2BSN, 2ANL, 2AXB, BRS207, 1711, and 1173. To all these and any others whose calls may have been overlooked we convey our thanks.

All British reports were summarised and sent to the A.R.R.L. for publication in the March issue of *QST*. Two which arrived late were not included in these lists.

1936 1.7 MC. CONTEST.—(*Contd. from p.* 409.)

F. Capes (2BFC), for check logs, and especially, also, Herr Baron (DE1752G) for a very remarkable log of the Contest drawn up with characteristic painstaking thoroughness, and which will, we feel, prove of great interest to many British Amateurs. We would remind members that the Contest entries of all R.S.G.B. events are available for inspection for purposes of Research.

Hi-Vac Valves for Amateur Bands Two

Members who are using the *Eddystone* Amateur Bands 2-valve Receiver may be interested to know that the *Hi-Vac* valves SG215 and Y220 are quite suitable as substitutes for the valves generally supplied.

For 7 and 14 Mc. operation a voltage of 120 is desirable but the receiver will oscillate strongly if the voltage is reduced to 80.

Difficulty has always been experienced in "persuading" this receiver to function on the 28 Mc. band, but by increasing the H.T. to 180 volts, and removing the earth off the 50 $\mu\mu$F condenser connected to the plate of the SG 215 oscillation to below 9 metres is possible.

A 75,000 ohms 1 watt resistance across the output choke will also improve results on these frequencies. Using a standard coil former the following turn sizes were found satisfactory:—Aerial 2½ turns (loosely coupled); tuning coil 7½ turns. The tapping points can only be found by experiment.

Reports Wanted

G5FD (Cambridge) on his 7 Mc. 'phone and cw. transmissions.

G6BD (Tonbridge) on his 7,165 and 14,330 kc. 'phone and c.w. transmissions.

G5OI (Warwick) on his 7,043.4 and 14,086.8 transmissions.

EXCHANGE AND MART.

A CHANCE OF A LIFETIME! High voltage Condensers of well-known make. Brand new. Example of price: 8F, 1,500 volts working (list price £2), 12s. 6d. Send for list of sizes and prices. —2AYB, W.T.C. RADIO, 2 and 16, Station Road, London, E.17. 'Phone: Walthamstow 2541.

AMATEURS! Your speech quality wonderfully improved by using the new "Woden" Microphone specially designed for transmitters. Price £2 2s.—Lists from WODEN SOUND EQUIPMENTS, Prestwood Road, Wolverhampton.

BARGAINS.—Steel T.X. Cabinets, 36"×18"×12" adjustable Shelf. Rebuilt Typewriters, wholesale prices to Hamms. 5 sugar Peter asks for enquiries. Cash or Terms.—32, Shirley Road, Southampton.

BRITISH S.W.L. REVIEW.—A new monthly monthly publication for the S.W.L., containing up-to-date news on SW BC, commercial and amateur stations. April number now on sale, price 6d., from W. H. Smith & Son, or 6½d. direct from BRITISH SHORT WAVE LEAGUE, Ridgewell, Essex.

CHEAPER THAN YOU COULD MAKE THEM. Fine appearance and sturdy. The R.V. Transmitting Inductances, 1½d. per turn; any diameter, any S.W.G.—Write for descriptive leaflet to R.V. TRANSMITTING INDUCTANCES, Mossgrove, Bridge of Allan, Scotland.

FOR SALE.—211E, Valve Holder, 10v. 3 amps Filament Transformer, unused. Osram LS6A pair .00007 S.W. Condensers. 0-15v. Sifam Meter. .002 Condensers 5,000 VDC Test. Cheap.—Write for dope: G5LC, 3, Summer Avenue, East Molesey, Surrey.

FOR SALE.—General Radio Wavemeter, Calibrated charts 3.5 Mc. to 56 Mc., Type 558P, cost £6 10s.; accept £4. Burne-Jones "Magnum" S.W. Converter one coil 40 m., cost £2; extra 20m. coil 3s. extra; accept £1 the lot. Other bargains.—BRS1098, 20, The Drive, Roundhay, Leeds, 8.

FOR SALE.—16-tube Midwest (1935) Chassis, Valves and Matched Speaker, 230 A.C., a real DX job; all bands from 9 metres to 2,400, every ham band; had little use; reason for sale, buying Scott; £25 cash, no offers.—2AYB, 2, Station Road, Walthamstow, London, E.17. 'Phone: Walthamstow 2541.

FOR SALE.—Mullard D.O.24, 3 hours only. As new, 12s. 6d. Post paid.—G2BY, 9, Teesdale Gardens, Isleworth, Middx.

G5KT.—Attractive new designs QSL Cards. Lowest prices obtainable. Finest quality. Samples will convince.—QRA, 33, Howard Road, Westbury Park, Bristol, 6.

G6DS.—Known the world over for quality. QSL cards, Log Books and Pads. Send for Samples.—QRA, Inglenook, Orlando Drive, Carlton, Nottingham.

G6MN FOR QSL's.—Up-to-date designs and modern type.—Send for samples to G6MN, Worksop.

H.T. GENERATOR, 1,200 volts, 100 mills, 6 volts 4 amps, belt driven. A bargain at 28s. T61D: This one can take it, excellent condition, £3 5s. Two T25D's, 18s. each. Two QCC open Crystal Holders, 2s. 9d. each. American 47, 58, 4s. 6d., cost double. Milliameters at 5s. and 12s.—G6RV, Mossgrove, Bridge of Allan, Scotland.

NEW 2,000v. Everett Edgcumbe Electrostatic Voltmeters. 2½ in. flush; guaranteed, 15s. Two 2,500v. ditto.—50, Cloudesdale Road, London, S.W.17. Streatham 0730.

QSL's.—Attractive Designs and attractive prices —Write for samples.—G6LX, 222, Eastfield Road, Peterborough.

REBUILDING? House your gear in "Parex" Aluminium Cabinets. Chassis, Racks to your specification.—E. PAROUSSI, 10, Featherstone Buildings, W.C.1.

STENTORIAN "Midget" Moving Coil, unused. J.B. Drum Dial, unused. Marconi S22, used few hours. Offers.—2AAS, The Wong, Horncastle, Lincs.

T. & R. SINGLE SIGNAL SUPERHET. All specified parts can be bought from WEBB'S RADIO STORES, 14, Soho Street, off Oxford Street, W.1. Tele.: Gerrard 2089. The official "Eddystone" Service Depot.

Patents and Trade Marks.

GEE & CO. (Established 1905). Patents and Trade Marks throughout the world.—H. T. P. GEE, Mem. R.S.G.B., A.M.I.R.E., etc., 51-52, Chancery Lane, London, W.C.2. (Two doors from Government Patent Office). 'Phone: Holborn 1525 Handbook free.

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