October 1950

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Vol. XXVI No. 4 **Contents** OCTOBER 1950

Forthcoming Events

REGION 1

Ashton-under-Lyne.—December 3, 3 p.m., New Jerusalem Schools.
Blackpool.—December 12, 7.30 p.m., Chamber of Trade Buildings, Queen Street.
Bolton.—December 5, 8 p.m., Y.M.C.A.
Bury.—November 23, 7.30 p.m., Y.M.C.A., The Rock.
Darwen & Blackburn.—December 1, 15, 7.30 p.m., Y.M.C.A., Limbrick, Blackburn.
Liverpool.—December 16, 2.30 p.m., 29 Derby Lane, Old Swan.
Manchester.—December 4, 7.30 p.m., Reynold's Hall, School of Technology, Sackville Street.
Oldham.—Alternate Wednesdays, 7.30 p.m., Civic Centre, Clegg Street.
Preston.—November 24, 7.30 p.m., Three Tuns Hotel, North Road.
Rochdale.—December 3, 3 p.m., Drill Hall, Baron Street.
Southport.—November 20, 8 p.m., 38a Forest Road.
Wirral.—November 22, December 6, 8 p.m., Y.M.C.A., Whetstone Lane, Birkenhead.

REGION 2

Barnsley.—November 24, December 8, 7.30 p.m., King George Hotel, Peel Street.
Bradford.—November 21, December 5, 7.30 p.m., Cambridge House, Little Horton Lane.
Catterick.—Wednesdays, 7 p.m., Loos Lines, Catterick Camp.
Darlington.—Thursdays, 7.30 p.m., 25 Coniscliffe Road.
Doncaster.—December 13, 7.30 p.m., Black Bull, Market Place.
Gateshead.—Thursdays, 7.30 p.m., Y.M.C.A., Sutherland Hall, Durham Road.
Hull.—November 29, 7.30 p.m., R.E.M.E. Barracks, Walton Street.
Leeds.—Fridays, 7.30 p.m., Swarthmore Educational Settlement, Woodhouse Square.
Middlesbrough.—Thursdays, 7.30 p.m., All Saints' Hall, Grange Road.
Newcastle.—November 20, 8 p.m., British Legion Rooms, 1 Jesmond Road.
Rotherham.—7 p.m., Oddfellows' Hall, Westgate.
Scarborough.—Thursdays, 7.30 p.m., c/o L.N.E.R. Rifle Club, West Parade Road.
Sheffie'd.—November 22, 8 p.m., Dog & Partridge, Trippet Lane; December 13, 8 p.m., Albreda Works, Lydgate Lane.
S'aithwaite.—Fridays, 7.30 p.m., 3 Dartmouth Street.
Spenborough.—November 29, 7.30 p.m., Temperance Hall, Cleckheaton.
Wakefield.—November 29, 7.30 p.m., Service House, Providence Street.
York.—Wednesdays, 7.30 p.m., Community House, Falsgrave Crescent.

REGION 3

Birmingham South.—November 19, December 3, 10.30 a.m., Stirchley Institute.
Birmingham (M.A.R.S.).—November 21, 6.45 p.m., Imperial Hotel.
Coventry.—November 17, 7.30 p.m., Priory High School, Wheatley Street.
Coventry (C.A.R.S.).—November 20, December 4, 7.30 p.m., B.T.H. Social Club.
Malvern (M. & D.R.S.).—December 6, 8 p.m., Sherry Lounge, Foley Arms Hotel.
Stourbridge (S. & D.A.R.S.).—November 24, Corn Exchange Vaults; December 5, King Edward VI School.

REGION 4

Derby (D. & D.A.R.S.).—Wednesdays, 7.30 p.m., Club Room No. 4, School of Art, 119 Green Lane.
Leicester (L.A.R.S.).—November 20, December 4, 7.30 p.m., Holly Bush Hotel, Belgrave Gate.
Loughborough.—December 13, 7.30 p.m., Science Lab., Limehurst School.
Mansfield (M. & D.A.R.S.).—December 3, 3 p.m., Swan Hotel.
Northampton (N.S.W.C.).—Fridays, 6 p.m., Clubroom, 8 Duke Street.
Nottingham.—November 27, 7.30 p.m., Lord Nelson Hotel, Hockley.
Peterborough.—December 5, 7.30 p.m., St. John Ambulance H.Q., Cowgate.
Retford.—December 3, 3 p.m., Community Centre, Chapel Gate.
Spalding.—November 30, 7.30 p.m., 10 South Parade.
Worksop.—December 4, 7.30 p.m., King Edward Hotel.

REGION 5

Chelmsford.—December 5, 7.30 p.m., Smith's Radio Shop, Moulsham Street.
Southend.—November 22, 7.45 p.m., 29 Station Road, Leigh-on-Sea.

REGION 7

Barnes & Richmond.—December 12, 7.30 p.m., 22 Lowther Road, Barnes.
Brentwood.—December 8, 22, 8 p.m., Drill Hall, Ongar Rd.
Chingford.—November 23, December 7, 8 p.m., A.T.C. H.Q., Pretoria Road.
Croydon (Surrey R.C.C.).—December 12, 7.30 p.m., "Blacksmiths Arms," South End, Croydon.
Dulwich & New Cross.—December 4, A.G.M., "Kentish Drovers," Rye Lane, S.E.15.
East Ham.—December 5, 19, QTH from T.R:
East London.—November 19, "Novel Uses for Valves," J. R. Erskine; December 17, 3 p.m., A.G.M. and Sound Films (YL's invited), Ilford Town Hall.
Edgware (E. and D.R.S.).—Wednesdays, St. Michael's School.
Enfield.—December 17, 3 p.m., George Spicer School, Southbury Road.
Gravesend.—Wednesdays, 7.30 p.m., 30 Darnley Road.
Guildford.—November 16, 3 p.m., Royal Arms Hotel, North Street. (Note.—No meeting December.)
Hayes & Uxbridge.—December 1, 7.30 p.m., "The Vine," Uxbridge Road.
Hoddesdon.—December 7, 21, 8 p.m., The Salisbury Arms.
Holloway (G.R.S.).—Mondays, Wednesdays and Fridays, 7.30 p.m., Grafton School, Eburne Road, N.7 (one minute from the "Nag's Head").
Ilford.—December 14, 8 p.m., QTH from D.R.

(Continued on Page 145)

R·S·G·B

BULLETIN

For the advancement of Amateur Radio

VOLUME XXVI No. 4 OCTOBER 1950

TRANSMITTER PERFORMANCE

WITH the approach of the winter season, and the long, dark evenings, there is always a tendency for the Amateur Radio enthusiast to look more critically at the equipment which has served him well enough during the summer months. For it is the lot of the amateur never to be completely satisfied for long with his apparatus. No matter how successful his results, there is always the lurking thought that they could be better.

Since the resumption of activity in 1946, amateur transmitter *technique* has advanced steadily: variable frequency control; rotating aerial arrays; band-switching and wide-coverage multiple tuners; more efficient screening and filtering: plus the realisation that results depend not only on the individual items of apparatus but also on the ease with which they can be controlled as a station. But amateur transmitter *performance* has not always shown an equal advancement. The adoption of V.F.O.; the increase in average power; the use of high-gain and unneutralised tetrodes, and other changes have too often been followed by a deterioration in the "quality"—used in its widest sense—of the transmissions: chirp, clicks, drift, ripple-modulation, over-modulation and splatter are probably more common today than they were in 1939.

So the next time that restless urge to improve your station makes itself felt, ask yourself the following questions: How do my signals sound at the receiving end? Do my transmissions cause trouble to local amateurs? Is my transmitter completely free from instability, clicks and parasitics? Are my signals broader than is absolutely necessary for communication purposes? Is my receiver stable enough to ensure that stations are not lost between transmissions? Are my change-over arrangements rapid enough to eliminate needless calling?

If you are completely honest with yourself, it is most unlikely that you will be satisfied with all your answers to these questions. Perhaps they will have reminded you of the tendency of that 807 to "take off" on the top section of the 3.5 Mc/s. band; or those occasional T8c reports; or the ragging which the "locals" gave you at the last meeting about key clicks on 14 Mc/s.; or the splatter when you push the modulation up; or the long, half-forgotten resolve to get down to real break-in working for the next contest session.

Why not, then, make these questions the basis for this year's alterations? Instead of puzzling-out some new means of pushing a few more watts into the aerial, first make certain that you are using your present power to the best advantage. Stable, narrow and clean signals are far more effective than a broadside of power spread over half the band. A *de-luxe* band-switched exciter may seem very attractive, but in practice may represent little more improvement to station performance than could be effected by a re-grouping of your present change-over arrangements. An efficient monitor and a careful check on parasitics may not seem so impressive as a new high-power modulator; but they may raise your status in the district far higher!

Help clean up the amateur bands this winter by improving the quality and tone of your own transmissions, and by giving critical, but helpful, reports! —J.P.H.

AMATEUR TELEVISION

THE P.M.G.'s surprise announcement, made in the House of Commons on October 25th, that he had decided to licence transmissions by amateurs of television signals in the 2300, 5650 and 10,000 Mc/s. bands was warmly welcomed. The statement, made in answer to a question by well-known radio amateur Mr. Charles I. Orr-Ewing, Member for Hendon North, brought to a successful issue a campaign which had been sponsored over a period of several months by the Council of the R.S.G.B.

It would be absurd to suggest that the frequencies which have been allocated are the most suitable for the job but a vital point of principle has been established—amateurs are once again to be allowed to transmit TV. The change of viewpoint in the higher circles at St. Martin-le-Grand may well have been brought about by the Postmaster General personally for it is known that he has a high appreciation for those who strive to keep the United Kingdom in the forefront of scientific endeavour.

It is heartening to know that the Amateur Radio Movement in Great Britain is capable of making its voice heard even within the precincts of the Mother of Parliaments. —J.C.

A PANORAMIC CONVERTER for the 144-146 Mc/s. band

By B. H. BRIGGS (G2FJD)*

ALTHOUGH the number of V.H.F. stations is now greater than ever before, there are inevitably times when, due to poor conditions or low activity, the bands are more or less devoid of signals. The task of keeping watch for stations which may appear is difficult, because it is necessary to tune over the band very slowly and carefully. Intermittent signals such as a C.W. transmission are particularly easy to miss.

Those who have spent many hours searching the bands must have realised the need for a device which would make the task easier and permit other activities to be carried on at the same time. A panoramic receiver is the obvious solution. With such a receiver it is only necessary to glance occasionally at the screen of the cathode ray tube to see whether any signals are present on the band. It would be possible to go one stage further and arrange an alarm system, which would ring a bell when a signal appeared anywhere within the range of frequencies swept by the receiver. However, it is difficult to design such a system which would not be set off by ignition interference and other random impulses and for amateur purposes it is probably not worth while, though it provides an interesting field for experiment. A simple alarm system, for strong signals only, will be mentioned later.

The principles of panoramic reception have been discussed in a previous article (1). The purpose of the present article is to describe a practical design for a panoramic converter for the 144-146 Mc/s. band. (A possible addition to enable the 432-438 Mc/s. band to be covered will also be suggested.)

A block diagram showing the principles of a panoramic converter was given in the earlier article (see Fig. 7, page 91, September, 1950, issue). It was pointed out there that the 144 Mc/s. band is of a convenient width to be covered by a panoramic receiver, because for a 25 c/s. repetition rate the optimum band-width comes out at about 7 kc/s. which is similar to that normally used for receivers working at that frequency. Thus the main receiver used in conjunction with the converter can be quite conventional, whilst the converter itself need only differ from normal practice in that provision must be made for the local oscillator frequency to be swept by means of a saw-tooth waveform. When the saw-tooth waveform is switched off, the arrangement becomes a normal 144 Mc/s. receiver.

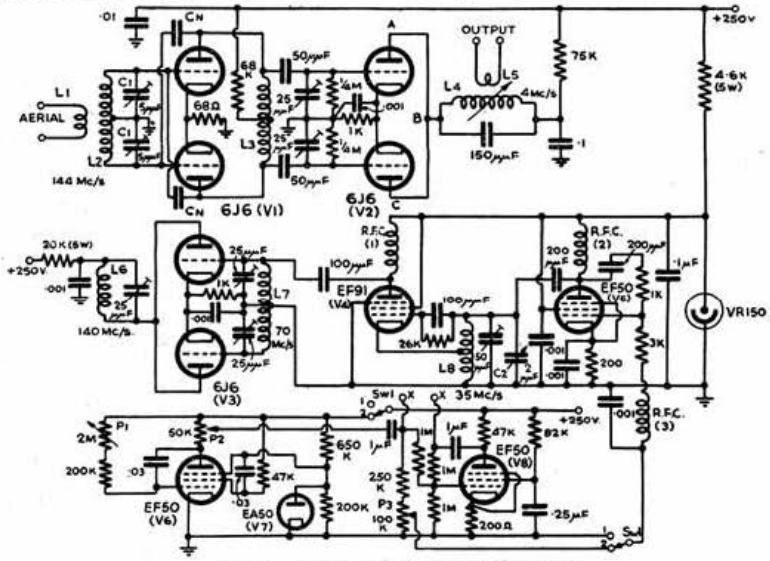

Fig. 1. Circuit of Panoramic Converter

C1 5μμF. *Philips* trimmers.
CN Neutralizing condensers (see text).
C2 Main tuning control. This condenser consists of a standard midget variable with all but one fixed and one moving plate removed. (Capacity approximately 2μμF.).
R.F.C. (1) *Eddystone* U.S.W. Choke.
R.F.C. (2), (3) *Eddystone* S.W. Choke.
S *Yaxley* switch, two-pole two-way.
Position (1) Normal reception.
Position (2) Panoramic reception.
L1 to L8 For Coil Data, see separate table.

Note.—L3 and L6 are inductively coupled.

In the device to be described care has been taken to ensure that the performance is in no way inferior to that normally considered desirable in receivers for this frequency.

Circuit Description

The complete circuit of the panoramic converter is shown in Fig. 1. This may be divided into three sections. First, the H.F. and mixer section, comprising the two valves V1 and V2; second, the oscillator, reactor valve, and frequency-multiplier section (valves V4, V5 and V3, respectively); third, the sweep waveform generator section, comprising the valves V6, V7 and V8.

The H.F. and Mixer Section

This part of the circuit is quite conventional, in fact any standard 144 Mc/s. circuit could be used (2). The arrangement shown consists of a 6J6 neutralised push-pull R.F. amplifier followed by a

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6J6 mixer with the push-pull-grid parallel-anode connection. The I.F. output is at 4 Mc/s. The tuning of the H.F. and mixer stages is pre-set, and is peaked in the centre of the band (145 Mc/s.). Both manual tuning and the panoramic frequency sweep are carried out by variations of the local oscillator frequency only. There is, therefore, some falling-off of sensitivity at the edges of the band, but the effect is not serious. On the panoramic trace this appears as a decrease of the amplitude of the receiver noise at each end of the range. Fig. 2 (a) shows this effect.

If desired, the tuning of the H.F. and mixer circuits could be brought out to the front panel as an additional control; the response could then be peaked at any desired part of the band.

The Oscillator, Reactor Valve, and Frequency Multiplier Section

The oscillator valve (V4) is an EF91 operating on 35 Mc/s. The tuned circuit consists of the coil L8, a pre-set 50 $\mu\mu$F. trimmer, and a 2 $\mu\mu$F. variable condenser which is fitted with a slow-motion drive and forms the main tuning control. From the anode of the oscillator valve, the harmonic at 70 Mc/s. is picked out, and by the use of a centre-tapped tuned circuit, is used to drive a 6J6 (V3) push-push doubler (push-pull grids, parallel anodes). The output from the 6J6 at 140 Mc/s. is fed to the mixer by inductive coupling between the coils L3 and L6.

The reactor valve (V5) is an EF50. The impedance-dividing network producing the 90° phase shift consists of a resistance from anode to grid (1,000 ohms) and a condenser from grid to earth. The latter is formed by the grid-to-cathode capacity of the valve (about 10 $\mu\mu$F.). The saw-tooth sweep waveform is applied to the grid of the reactor valve *via* a high frequency choke and a 3,000 ohms resistance. With the main tuning control in the centre of its scale, the sweep range of the oscillator is 30 to 30.5 Mc/s. when the whole 144 Mc/s. band is being covered. The output of the 6J6 doubler then varies from 140 to 142 Mc/s.

By means of the change-over switch (Sw. 1) the sweep voltage can be removed from the reactor valve and the grid earthed to D.C. (position 1 of the switch). The reactor valve is then inoperative and tuning is carried out on the main tuning control in the usual way. It should be noted, however, that the reactor valve is still producing across the oscillator circuit a certain (fixed) reactance, and it is important that this reactance should be really fixed in value and not modulated at 50 c/s., otherwise all signals will appear to have a 50 c/s. frequency modulation impressed on them. The circuit is extremely sensitive to stray 50 c/s. pick-up because a voltage of the order of one volt on the grid of the reactor valve is sufficient to change the receiver tuning by 2 Mc/s. Thus a stray hum voltage of only 1/20,000th volt would cause a frequency modulation of 100 c/s., which would still be noticeable. The most important point is to connect the contact (1) on the switch Sw. 1 to the earth point used for V5 and not to any arbitrary point on the chassis. Further, the wiring associated with V5 should be as short as possible, whilst the H.T. supply used to operate the converter should be very well smoothed. The H.T. voltage for V4 and V5 is stabilised by means of a VR150 neon tube, which helps to remove any remaining 50 c/s. ripple.

It might be considered better to insert a switch in the lead from the anode of the reactor valve to the tuned circuit so that, in normal reception, the reactor valve would be completely disconnected from the circuit. This is difficult to do for practical reasons and is also undesirable, because a large change of oscillator frequency would be produced by the removal of the stray capacities associated with the reactor valve. The circuit shown has the advantage that if the main tuning control is adjusted until a selected signal appears at the centre of the panoramic display, and if the sweep is then switched off, the signal will be heard without further retuning.

Fig. 2(a)

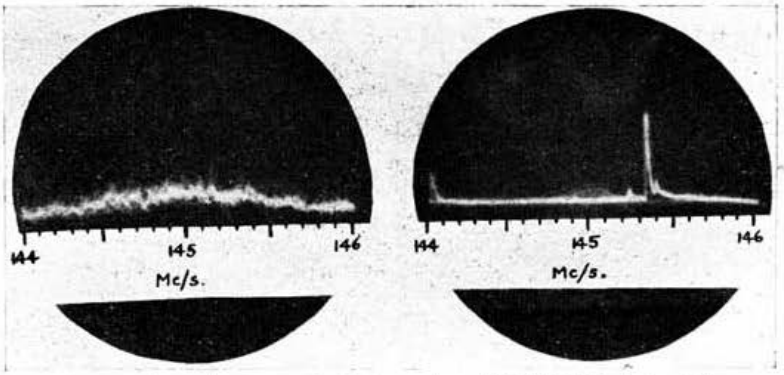


Fig. 2(b)

Photographs of the Panoramic Display, using a VCR517 Cathode Ray Tube.
(a) No signals, gain high, showing receiver noise, and demonstrating the slight variation of sensitivity due to the pre-set tuning of the H.F. circuits. (b) Showing actual signals.

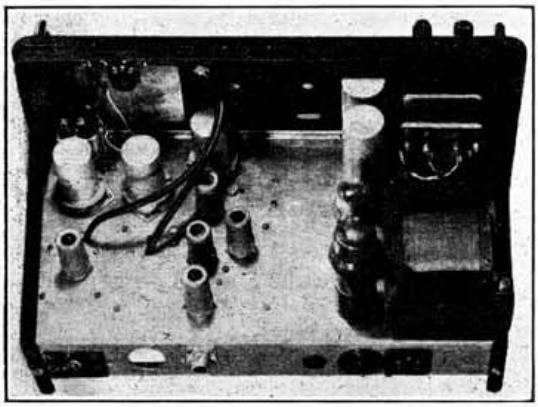
The Sweep Waveform Generator

If a normal oscilloscope is available, it is possible to use the internal time base to operate the panoramic sweep. In this case the valves V6, V7 and V8 of Fig. 1 will not be needed. The time-base waveform should be fed *via* a condenser to contact (2) of the switch Sw. 1. However, it is better to provide a panoramic receiver with its own saw-tooth waveform generator. Most oscilloscope time bases are designed to operate best at the higher sweep frequencies and are often non-linear and erratic in operation at the low sweep-speeds needed for panoramic reception.

In the circuit of Fig. 1, the saw-tooth waveform is produced by a Miller-transitron oscillator ([3]) consisting of the EF50 (V6) and EA50 diode (V7). This saw-tooth voltage is applied both to the reactor valve and to the X-plates of the cathode ray tube. For the latter purpose it is desirable to have push-pull signals for application to the two X-plates, in order that a good focus may be preserved. The waveform is therefore paraphased by the anode follower valve V8 ([4]), and push-pull deflecting voltages are produced at the two outputs marked XX. The amplitude of the horizontal deflection is controlled by the potentiometer P2,

which is a pre-set control. The sweep frequency is controlled by P1, which may also be pre-set if desired. When the switch Sw. 1 is in position 1, the H.T. voltage is removed from the transitron time-base valve. If this valve were allowed to continue oscillating during normal reception there would be a danger of signals being modulated at the sweep frequency due to ripple on the H.T. line.

The fraction of the sweep voltage applied to the reactor valve is controlled by the potentiometer P3. This control determines the frequency band covered which, with the component values given, can be varied from zero to a maximum of about 3 Mc/s.



Rear view of the converter. The main valve sequence runs directly away from the coaxial 2-metre aerial socket towards the front panel. (V1, V2, V3, V4, V5, in that order.) The two EF50s on the left are the sweep waveform valves (V6 and V8), and the miniature valve on the left is the 420 Mc/s. mixer (at present in the experimental stage). A power pack is included on the same chassis.

A Cathode Ray Display Unit

Again, it is possible to make use of a normal oscilloscope, if desired, but it is better to construct a special cathode ray tube unit for the panoramic receiver. When it is realised that a band 2 Mc/s. wide is being displayed on the tube, and each signal occupies only about 7 kc/s., it will be seen that if full advantage is to be taken of the available resolution a large cathode ray tube and a good focus are desirable. Surplus radar indicator units containing a VCR517 or VCR97 type tube are readily available, and it is possible to convert one of these into a display unit which is superior to most commercial oscilloscopes for the present purpose. The VCR517 tube produces a bright trace of pleasant colour and has a very good focus. The long after-glow is no disadvantage.

A suitable circuit for a display unit, which includes a one-valve amplifier to feed the signals to the Y plates is shown in Fig. 3. Signals may be taken directly from the second detector of the main communication receiver. The circuit should be self-explanatory except for one feature. The signals which come out of the EF50 amplifier consist of positive pulses of about 100 μsec. duration and are fed to one Y plate of the cathode ray tube and also to the grid of the tube. This has the effect of increasing the brightness of the spot at the time when it is moving rapidly, and makes the signals more easily visible.

In practice, the signals taken from the second detector of the main receiver may be either positive or negative, depending on the particular circuit employed. In Fig. 3 it is assumed that they are negative. There is no difficulty in dealing with the other case ; it is only necessary to connect the 0.1 μF. brightening condenser between the Y plate and the *cathode* of the tube instead of between Y plate and grid. In either case, the connections to the Y plates should be arranged so that the signals produce an upward deflection of the trace.

The focus and brightness controls and the main potential divider network are as in the original indicator unit. The mains transformer and selenium rectifier were mounted inside the same unit. Although some trouble was originally experienced from the field of the mains transformer, this was successfully overcome by using two mumetal screens around the cathode ray tube instead of the usual single screen.

Adjustments

The lining-up of the various circuits presents no difficulty because, with the component values given, it is impossible to strike a wrong harmonic at any setting of the trimming condensers. The first step is to adjust the main 50 $\mu\mu$F. oscillator trimmer until the oscillator frequency is exactly 30.25 Mc/s. when the main tuning dial is in its central position (the panoramic sweep being switched off). This brings the centre of the band (145 Mc/s.) in the centre of the scale. It should then be found that the oscillator frequency varies from 35 to 35.5 Mc/s. as the tuning dial is moved from one end to the other. If the range is too great or too small it may be adjusted by suitably bending the plates of the 2 $\mu\mu$F. tuning condenser so as to increase or decrease the spacing. These adjustments are best made by listening to the oscillator on a receiver covering the required range.

A strong signal in the 144 Mc/s. band should now be provided either from a transmitter or from a test oscillator, and the panoramic sweep switched on. The test signal will probably be visible on the trace when the main receiver gain is turned well up, even though all the circuits are out of line. If not, a rough adjustment of the trimmers should bring it into view. All trimmers should then be peaked to give a pulse of maximum amplitude on the cathode ray tube, the main receiver gain being progressively reduced as the circuits come into line. The use of the panoramic display in this way makes the lining-up process very simple. The extent of the frequency sweep should now be checked. If a calibrated oscillator covering the range 144-146 Mc/s. is available, this can be done directly. Otherwise the range can be checked by noting the positions of stations whose frequencies are known. The position of the range control for which the receiver just covers the entire band can then be marked for future reference.

The only part of this procedure which may give rise to difficulty is the checking of the frequency of the 35 Mc/s. oscillator, as a receiver covering this range may not be available. In this case it will be necessary to rely entirely on the local 144 Mc/s. test signal. By a " hit and miss " adjustment of all the trimmers, including the 50 $\mu\mu$F. oscillator trimmer, it should be possible to bring

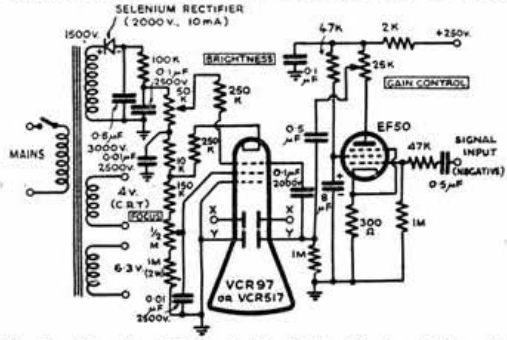


Fig. 3. Circuit of Cathode Ray Tube Display Unit, suitable for use in conjunction with the Panoramic Converter.

this signal into view on the panoramic display. Once the desired response has been found, the lining-up procedure can be carried out without difficulty as before. The frequency range of both the main tuning condenser and the panoramic sweep can then be checked by observing actual signals on the band.

If the beat notes of C.W. signals are found to be modulated with 50 c/s., a slight adjustment of the cathode tap on the oscillator coil should be tried. The potentiometer P1 should be set to give approximately a 25 c/s. repetition rate, and P2 should be set so that the horizontal deflection just fills the available distance across the cathode ray tube face.

For a good method of constructing and adjusting the neutralising condensers of the H.F. stage, reference should be made to the article by E. A. Dedman which appeared in Proc. R.S.G.B. No. 6, 1949 (2).

Performance

It was at first thought that the converter might be unsatisfactory for normal (non-panoramic) reception, because of oscillator drift. The reactor valve is still connected across the tuned circuit even when the sweep is switched off, and any change of slope of this valve will produce a change in oscillator frequency. As the slope depends on both the heater and H.T. supply voltages, it was feared that considerable changes might be produced by mains voltage fluctuations. However, in practice, the single neon-stabiliser for the H.T. supply seems to be sufficient to overcome any trouble from this cause. There is some drift during warming up, but this is not noticeably worse than in other converter circuits which omit the use of a crystal-controlled oscillator.

The panoramic feature is particularly useful when searching for signals with a rotary beam. As the beam is rotated, signals on the display appear and disappear, and from the frequency and direction they can often be identified without switching-off the sweep. When an interesting signal has been found the beam is first rotated to produce the largest possible response on the cathode ray tube; the main tuning control on the converter is then adjusted until the signal appears at the centre of the sweep. The sweep is then switched off and a very small adjustment of the tuning control should bring the desired signal into tune.

In theory, the signal-to-noise ratio of the converter, when used panoramically, should be no worse than when it is used for normal reception (1). This does not, however, make any allowance for the differing properties of the eye and the ear. When a B.F.O. is used for C.W. reception, the ear can detect a signal which is considerably below the receiver noise level, because of its frequency selective properties. The eye has no such facility. Thus it comes about that weak C.W. signals are not visible on the panoramic display. In general, it may be said that any signal which is readable on telephony can be seen, but a signal which is readable only on C.W. cannot be seen. This is unfortunate, but does not destroy the usefulness of the panoramic receiver.

Most signals are subject to fading, and on the panoramic display one can see a signal whenever it peaks above receiver noise, even if it only does so momentarily, because the whole band is being watched at once. Further, the general activity of stations on the band can be seen at a glance and this gives a good guide to conditions, even if the weakest signals cannot be seen. In practice, weak signals can be seen more easily the smaller the frequency band covered, because the pulses representing the signals appear wider on the panoramic display as the frequency sweep is reduced. It is not always necessary to search the entire band; frequently interest centres around a particular section.

Ignition interference appears as a number of pulses running across the trace. These do not usually obscure the signals, so that a watch can be kept even through severe interference, though the signals cannot, of course, be listened to in the usual way.

With the panoramic sweep running, only receiver noise is heard on the main receiver when no signals are present. If a strong signal comes on, the 25 c/s. pulses at the receiver output produce a rough 25 c/s. note on the loudspeaker, thus giving warning of the presence of the signal. This provides a simple alarm system requiring no additional equipment. Further, if the signal is keyed, the keying can be read and the station identified.

Possible Extension for 420 Mc/s.

Some experiments are at present being made with the object of extending the operation to the 420 Mc/s. band. This is mentioned here in order to account for the presence of the additional miniature valve which can be seen in the photograph. This is a 6J6 forming the 420 Mc/s. mixer. The proposed scheme may be of some interest and will be briefly described.

With reference to Fig. 1, the wire associated with V2 marked ABC has been made in the form of a "hairpin" type tuned circuit resonant at 420 Mc/s. Since the valve has a frequency of 140 Mc/s. R.F. injected into its grid circuit, it will operate as a tripler, and a 420 Mc/s. output can be obtained by means of a coupling loop near the hairpin. This can be used as the local oscillator signal for reception in the 420 Mc/s. band. (The operation on 144 Mc/s. is quite unaffected by the presence of the hairpin circuit in the anode of the mixer.)

The 420 Mc/s. output is passed to the additional 6J6 mixer previously mentioned, and is injected into a similar hairpin grid circuit. The I.F. output from this mixer is taken at 12 Mc/s. The tuning scale calibration on the 420 Mc/s. band is then obtained by multiplying the 144 Mc/s. calibration by a factor of three. No attempt will be made to cover the entire 420-460 Mc/s. band but only the section which triples from 144-146 Mc/s. Thus panoramic and normal reception should be possible over 432-438 Mc/s., with the addition of only one extra valve to the converter.

References

(1) *Panoramic Reception*, B. H. Briggs, G2FJD, R.S.G.B. BULLETIN, September, 1950.
(2) *Receivers and Aerials for the 144 Mc/s. Band*, E. A. Dedman, G2NH, Proc. R.S.G.B. No. 6, 1949.
(3) *The Miller Time Base*, B. H. Briggs, G2FJD, R.S.G.B. BULLETIN, June, 1947.
(4) *The Anode Follower*, B. H. Briggs, G2FJD, R.S.G.B. BULLETIN, March, 1947.

Coil Data

L1. 1 turn of insulated wire, wound over the top of L2.
L2. 6 turns, 20 S.W.G. tinned copper, ¼ in. dia. self-supporting (soldered directly on to the valveholder).
L3. 4 turns, 20 S.W.G. tinned copper, ¼ in. dia., self-supporting.
L4. 20 turns, 36 S.W.G. enamelled, close spaced on ½ in. dia. former with dust core tuning.
L5. 3 turns of insulated wire wound over the top of L4.
L6. 3 turns, 20 S.W.G. tinned copper, self-supporting, ¼ in. dia., both leads to this coil are about 1½ in. long to enable the coil to be placed at a distance of about ½ in. from L3 for oscillator injection.
L7. 12 turns, 22 S.W.G. p.v.c. covered wire, self-supporting, wound with the turns touching.
L8. 5 turns, 20 S.W.G. tinned copper, on ¼ in. dia. former, with the turns fixed securely with polystyrene solution. The cathode tap is 2 turns from the earthed end.

NOTE: L2, L3, L6 and L8 have turn spacing equal to approximately one wire diameter. In the case of L2, L3 and L6 the inductance should be adjusted by expanding or compressing the coils so that the trimming capacity required is as small as possible and the trimmer then used for the final adjustment to resonance.

FURTHER NOTES ON T.V.I.

By P. F. CUNDY, A.M.I.E.E. (G2MQ)*

THE editorial published in the May, 1950, issue of the BULLETIN reported the outcome of recent discussions concerning the T.V.I. problem between the Society and the G.P.O. Although the failure to obtain a clear fringe area ruling must be disappointing, it is gratifying to read of the efforts made by the Society in this direction and to note the official recognition of unsatisfactory features in receiver design.

In this article it is not intended to discuss harmonic interference at or near vision frequencies since this has been the subject of a number of previous contributions published in the BULLETIN and *QST*. The degree of harmonic suppression required naturally varies with the strength of the vision carrier, and it is realised that amateurs living in areas of low signal strength have a very difficult problem to contend with. Instead, it is proposed to consider the precautions necessary for those who are more fortunate and live in areas of moderate or strong vision signals.

Transmitter Design

When considering areas of moderate signal strength, say up to 25 miles from the T.V. transmitter, it is quite possible to avoid the use of trap circuits, filtering of leads or special screening, provided that one or two other precautions are observed.

The final amplifier will inevitably generate some energy at T.V. frequencies and the obvious first precaution is to stop this energy from being radiated. A conventional aerial tuning unit, if properly earthed and fed *via* Faraday-screened links is almost as good as a low pass filter and is much more versatile. The aerial circuit should be tuned with a split-stator condenser, and the rotor plates earthed. In order to avoid upsetting the electrical balance, it is advisable not to earth the centre point of the coil, although it may be desirable to connect a neon tube or spark gap between the coil centre and earth as a static discharging device. The link line can be made of co-axial cable with the outer screening continued almost up to the point of junction. The suggested arrangement is shown in Fig. 1.

Reduction of second harmonic (from 21 Mc/s. —when allocated—in the London area and from 28 Mc/s. in the Midlands) demands a well-balanced push-pull final amplifier stage, and even when screened valves (tetrodes or pentodes) are used, neutralisation may be desirable. Triodes of their own accord produce a smaller number of harmonics than do multi-electrode valves because there is not the same sharp point of inflection in the anode current characteristic as that which occurs at the "knee" voltage of a "screened" valve. On the other hand, triodes require very much greater grid driving power, and when the total harmonic power generated in the driver stages plus final amplifier valve(s) is considered, the advantage is found to be on the side of the screen output stage. For similar reasons, tetrode or pentode multiplier and buffer stages are desirable.

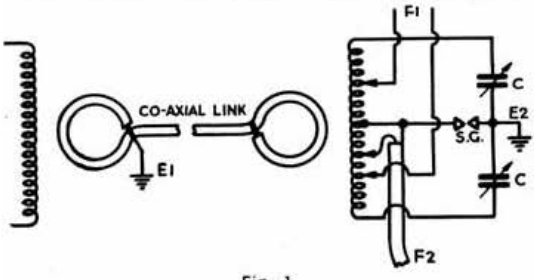


Fig. 1.
Aerial Tuning Unit

E1	Transmitter Chassis.
E2	Separate Low Impedance Earth Connection.
F1	Connection for Balanced Feeder.
F2	Alternative Feeder Connection for Co-axial Cable.
S.G.	Spark Gap (Static Arrestor).
C.C.	Split Stator Condenser.

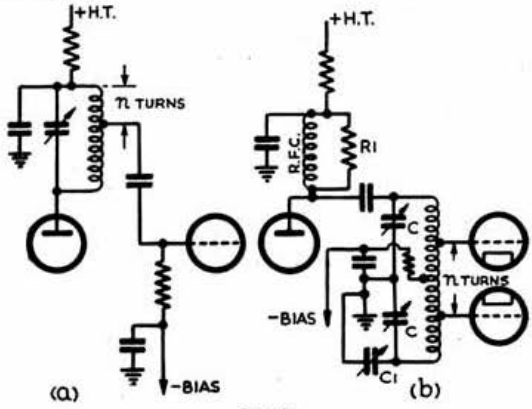


Fig. 2.
Capacity Coupling Circuits.

(a)	Single-ended to Single-ended.
(b)	Single-ended to Push-pull.
n	1/4 to 1/3 of total number of turns.
R1	5,000 to 10,000 ohms. to damp possible resonances in R.F.C.
C.C.	Split Stator Condenser.
C1	Balancing Condenser equal to Anode/Earth capacity of Driving Valve.

Running Conditions of Driver Stages should be adjusted to produce Minimum Off-frequency Radiation.

Link coupling between stages is frequently recommended as a means of preventing unwanted harmonics generated by early stages being passed on but, with suitable precautions, capacity coupling is satisfactory and saves components. It is important, however, to reduce the damping imposed upon the tuned circuits by the effect of the following grid capacities. Since the grid impedance is not constant throughout a cycle, excessive damping results in wave-form distortion and therefore increased harmonic content. Fig. 2(a) shows a suggested coupling circuit between multiplier stages, and Fig. 2(b) a method of coupling the penultimate stage to the push-pull final.

Control of excitation is another desirable feature; excessive grid drive at any stage in the transmitter will increase the unwanted harmonic power without adding anything to the output on the fundamental frequency. The ideal arrangement consists of potentiometers for varying the screen voltages applied to each stage in the exciter unit with either panel or pre-set controls mounted at any convenient point. The setting-up procedure is then as follows: ascertain the amount of grid current required by the final stage; arrange to meter the anode current to all the exciter stages collectively; then adjust the screen vol-

* *52 Highfield Close, Amersham, Bucks.*

tages on the various stages until the required grid current is obtained with the minimum total anode current to the exciters. It will be found that the optimum screen voltage will be very low on the earlier stages, increasing towards the final, and that the first stages will show very small grid currents. This precludes the use of grid leak bias and makes some form of fixed bias essential.

Table I shows the conditions present in the transmitter in use at G2MQ. This transmitter is of the usual open rack and panel construction, and, at a location where the vision field strength is somewhere about 300 micro-volts in a normal "H" type aerial at a height of 25 feet, no interference results with a T.V. receiver located 10 feet from the transmitter. The T.V. receiver in question is, fortunately, not affected by fundamental 14 or 28 Mc/s. radiation.

Interference from Fundamental Radiation

Whenever a case of T.V.I. is reported the first thing the amateur should ascertain is whether the interference is caused by the radiation of harmonics at the T.V. frequency or by the lawful fundamental. Several tests have been devised and applied successfully. For example, it is relatively straightforward to identify interference caused by the fundamental when a rotary beam aerial is in use. If the severity of the interference follows the fundamental beam pattern, harmonics are not likely to be responsible, since the harmonic pattern of a beam would be vastly different to its normal one.

If the aerial is not rotatable a substitution test may be tried. Check the aerial feeders with a sensitive absorption wavemeter such as illustrated in Fig. 21 and Fig. 22 of the R.S.G.B. publication *Transmitter Interference;* any indication of current at a frequency near to television frequencies must be eliminated before the test can proceed. Usually it will be found that if a suitable aerial tuning unit or low pass filter is employed there will be no measurable feeder current at T.V. frequencies. If the interference ceases when the aerial is substituted by a dummy load, this again suggests that fundamental radiation is the cause of the trouble. This test is of value only in areas of reasonable T.V. signal strength. Harmonic currents which are too weak to be observed on this class of indicator could cause interference in areas of very low field strength.

A third check can be made by comparing results on different T.V. receivers. It may be found that the trouble is confined to one or two types of set or even to certain models; if other types at comparable distances are free of trouble, harmonics are unlikely to be causing the interference; on the other hand, if the majority of sets are in trouble and they are of several different types and makes, the radiated signal must fall under grave suspicion.

Causes of Fundamental Interference

Two well-known causes of interference by fundamental radiation are described in the May Editorial. These are cases (a) a receiver having a second channel within an amateur band and (b) a receiver with its intermediate frequency in an amateur band and with insufficient protection. It is rather doubtful whether lack of selectivity (case (c)) can be classed as a fault; the very nature of T.V. reception precludes the use of high selectivity, and no ordinary receiver can be expected to attenuate, say, a 28 Mc/s. signal very greatly at the first grid circuit. Whether or not the unwanted signal will cause interference depends upon whether or not the wanted and unwanted signals preserve their separate identity at the anode of the first stage. If they are inter-modulated, the selectivity of later circuits will not separate them; if they are not inter-modulated, then one can reasonably expect the unwanted signal to be attenuated below the interference level by the time the detector is reached.

By far the most common cause of cross-modulation is low acceptance of the early stages which in turn is due to the use of insufficient screen voltage with consequent low bias and limited grid swing. One well-known make of T.V. receiver has a string of five R.F. amplifier stages, each using the CV138 class of valve. Each screen is separately series fed and decoupled from the one ahead of it. The screen of the first valve is thus fed through five decoupling resistors in series and the manufacturer's service data sheet gives the "normal" screen potential as only 60 volts, yet this class of valve is intended for 250 V. screen operation. A receiver of this type is known to cross-modulate with interfering signals at 14, 28 and 144 Mc/s. when located 150 yards from the source of interference.

Another type of set uses a valve of the VR65 class in its first stage, and this is resistance capacity-coupled to a tuned circuit in the grid of the next stage. As is normal practice with R.C.-

(Continued on Page 132)

TABLE I

Output on 14 Mc/s.				
Condition	Exciter	Doubler KT8	Buffer KT8	Final 829B
Va	V.F.O. Output on 7 Mc/s. Output power 0.5 watt.	350	350	650
Vg_2		140	155	220
Ia		10 mA.	17 mA.	150 mA.
Ig_2		0.5 mA.	1 mA.	16 mA.
Fixed Bias		−35	−35	−120 V.
Ig_1		15 μA.	25 μA.	6 mA.
Grid leak		100,000 ohms.	10,000 ohms.	2,000 ohms.

Output on 28 Mc/s.				
Condition	Exciter	Doubler KT8	Doubler KT8	Final 829B
Va	V.F.O. Output on 7 Mc/s. Output power 0.5 watt.	350	350	650
Vg_2		160	190	220
Ia		18 mA.	26 mA.	150 mA.
Ig_2		1 mA.	1.5 mA.	16 mA.
Fixed Bias		−35	−35	−120 V.
Ig_1		5 μA.	45 μA.	6 mA.
Grid leak		100,000 ohms.	10,000 ohms.	2,000 ohms.

A Lightweight Double Triplex Beam

By A. R. YATES (G3LB)*

IN the course of the perennial search for an easy-to-erect 14 Mc/s. aerial which would give results comparable with those of rotary beams, many types of both orthodox and unorthodox design have been tried at G3LB and at the stations of two colleagues—G3AWZ (Ripon) and G3AO (Manchester). The first glimmerings of eventual success came when G3AO tested the "Double Triplex" developed by W8JK and W8LO, a parallel element end-fire array using three-wire dipoles, described in the January, 1947, issue of *CQ*. Unfortunately the aerial proved extremely heavy and it was eventually decided to forego some DX rather than place an undue strain on the heart every time the wind blew!

Recently, however, *Edison Swan Electric Co., Ltd.* marketed two new cables—the twin wire type 300/TU/10 and the three-wire type 300/VK/10—which have solved the problem of weight. A "Double Triplex" array using these cables instead of spaced 14 S.W.G. copper wire, was erected at G3AO and—when the results became apparent—at G3AWZ and G3LB. All three aerials have proved most satisfactory.

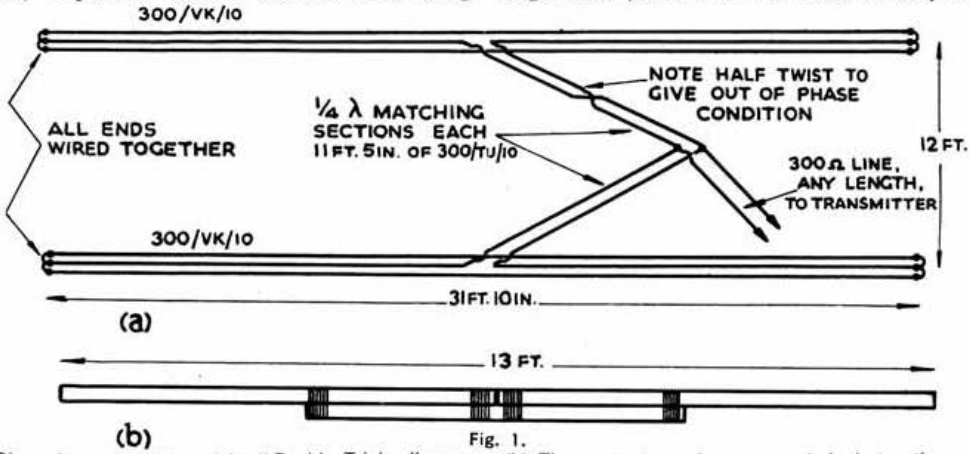


Fig. 1.

(a) Dimensions of a lightweight "Double Triplex" array for 14 Mc/s. (b) Three stout garden canes, lashed together, make suitable spreaders.

Construction

Constructional details of the aerial and suitable spreaders are given in Fig 1, which is self-explanatory. Around all soldered joints a strip of the black insulating material, used in the cable, can be easily moulded with the aid of a hot soldering iron, to form an insulated watertight connection. A simple clamp in which to hold the cable is shown in Fig 2. The array is so light that it may be suspended by strong cord, if suitable rope is not available. Coupling to the transmitter follows normal procedure although some experimentation may be necessary with the number of turns of the link coil (five turns have proved satisfactory). Tank tuning should also be checked to ensure that no detuning of the P.A. stage takes place when the aerial is coupled.

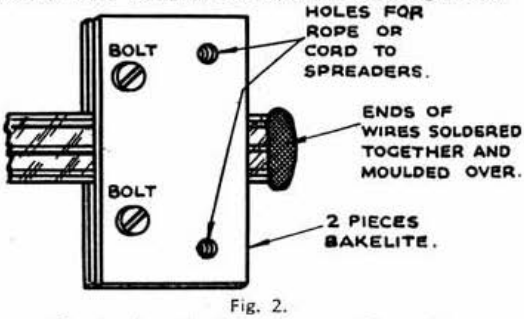


Fig. 2.
Simple clamp insulator for supporting cable.

The following explanation will prove of assistance when designing similar arrays for frequencies other than 14 Mc/s. Two half-wave elements fed 180 degrees out of phase and 1/6th of a wavelength apart have a centre impedance of approximately 16½ ohms. By using three closely spaced wires of similar diameter the impedance is raised nine times to the order of 150 ohms. To match this to a 300 twin feeder, two ¼-wave matching sections are employed. This shows an impedance of 600 ohms at the end, so that when the two sections are connected in parallel, it forms a perfect match for the 300-ohm feeder to the transmitter. The length of the matching section is derived from the formula:

$$\frac{246}{f\ (\text{Mc/s.})} \times \text{Velocity factor of the feeder cable}$$

The velocity factor of 300/TU/10 cable is 0.66 which gives a length of 11ft. 5in. for 14 Mc/s.

* 7 Skellbank, Ripon, Yorkshire.

FURTHER NOTES ON T.V.I

(Continued from Page 131)

coupled pentodes, the screen resistor is about six times the value of the anode resistor and is in fact 68,000 ohms. Again, the first valve has only about 60 volts on its screen.

The cure for these cases is either to fit filters or traps to protect the first valve from the unwanted signal, or to modify the T.V. receiver so that the R.F. stages have full screen voltage. Since it is unwise to alter the circuit of a T.V. receiver belonging to someone else, the filter method is, in practice, the only one possible. Together with second channel and I.F. breakthrough, this is a design "fault" that should also become a "stock item" with the G.P.O. and treated in a similar way.

MODERN AMERICAN RECEIVERS

The Hallicrafters SX71—Double Conversion Superhet

BEFORE the war, when British amateurs who wished to buy commercially manufactured equipment were forced—by the lack of suitable home products—to depend largely upon American supplies, details of new receivers were eagerly awaited. But since the import of new equipment was stopped by currency restrictions, many of us have lost touch with commercial receiver developments in the United States with the result that the type numbers heard over the air or given on QSL cards have little or no meaning. Here then, to keep up-to-date, are brief details of some of the models now being sold to American amateurs by *Hallicrafters*, *National* and *Collins*. Members will find the information useful not only as a guide to general trends but also as an indication of suitable valve types for various stages. The use of miniature valves such as the 6AG5, 6AK5, 6BA6, 6BE6 and 6C4, and the popularity of double conversion superhet circuits are particularly noticeable Prices range from $39.95 to about $375.00 (approx. £14 to £130) although there are models intended chiefly for commercial purposes costing as much as $875.00 (£310).

Hallicrafters

One of the latest additions to the wide range of communications receivers made by *Hallicrafters* is the SX71 ($179.50). This is a double conversion superhet covering 538 kc/s. to 35 Mc/s. and 46 to 56 Mc/s. in five bands. The first I.F. is 2075 kc/s. followed by three second I.F. stages at 455 kc/s. It features separate main and bandspread tuning dials with direct calibration for the amateur bands. The line up is: 6BA6 (R.F.); 6C4 (osc.); 6AU6 (mixer); 6BE6 (2nd conv.); 3 × 6SK7 (I.F.); 6H6 (noise limiter and A.V.C.); 6SC7 (B.F.O. and A.F.); 6AL5 (det.); 6K6GT (output); VR150 regulator. There is a three position selectivity control including —as with all "SX" types—a crystal filter.

The SX42 ($275.00), introduced in 1947, provides continuous coverage from 540 kc/s. to 110 Mc/s. in six bands, including F.M. reception between 27 and 110 Mc/s. Both the main and bandspread tuning controls have logging scales on the knob, in addition to direct calibration. There is a six position selectivity control, with dual I.F. channels (455 kc/s. and 10·7 Mc/s.) to facilitate F.M. reception. The line up is: 2 × 6AG5 (R.F.); 7F8 (converter); 6SK7 (I.F.); 6SG7 (I.F.); 7H7 (I.F.); 7H7 (F.M. limiter and A.M. det.); 6H6 (F.M. det.); 7A4 (B.F.O.); 6H6 (A.N.L.); 6SL7 (A.F.); 2 × 6V6 (p.p. output); VR150 (regulator). The SX62 is a "S.W.L." version of the SX42 with a large open dial replacing the bandspread tuning: in addition it has a 500 kc/s. crystal calibrator.

Less expensive are the SX43 ($159.50), S-40A ($79.95), S-53 ($69.95) and the S-38A ($39.95). The SX43 has a single R.F. stage using the miniature 6BA6 and covers 540 kc/s. to 55 Mc/s. (A.M.) plus 44–55 Mc/s. and 86–109 Mc/s. (F.M.); reflecting the American use of V.H.F. F.M. broadcasting. The S-40A follows the pre-war S20 tradition: it covers 540 kc/s. to 43 Mc/s. in four bands, with a single stage of R.F. amplification (6SG7). The S-53 with miniature valves has a 48–54·5 Mc/s. band in addition to the normal range of 540 kc/s. to 31 Mc/s. The I.F. is 2 Mc/s. to reduce second channel interference; there being no R.F. stage. The S-38A is a straightforward four valve set covering 540 kc/s. to 32 Mc/s. The line up is: 12SA7 (conv.); 12SK7 (I.F. and B.F.O.); 12SQ7 (Det. A.V.C.); 35L6GT (output).

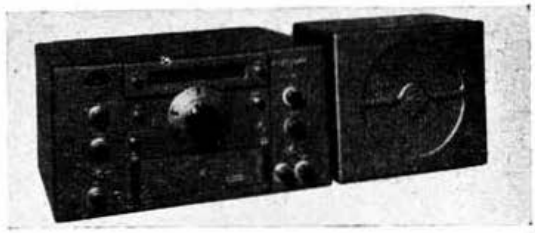
National

The latest HRO (the HRO-50) bears little resemblance to the original receiver. The famous HRO dial is retained but there is now, in addition, a direct reading linear scale. The plug-in coil system has also survived and coils are available to cover 50–420 kc/s. and 480 kc/s. to 35 Mc/s. A built-in crystal calibrator and miniature R.F. and mixer valves are among the new features. The line up is: 2 × 6BA6 (R.F.); 6BE6 (mixer); 6C4 (oscillator) with OB2 (voltage regulator); 2 × 6K7 (I.F.); 6H6 (det./A.V.C.); 6J7 (B.F.O.); 6H6 (noise limiter); 6SJ7 (A.F.); 6SN7 (phase inverter/"S" meter amplifier); 2 × 6V6 (p.p. output); 6AQ5 (crystal calibrator); 6SK7 (N.F.M. adapter I.F. amplifier); 6H6 (ratio detector).

Other *National* models include the NC-183 ($268.00) which covers 540 kc/s. to 31 Mc/s. and 48–56 Mc/s., in five ranges. There are separate main and bandspread tuning dials including direct calibration on the amateur bands and two 6SG7 R.F. stages. The NC-173 ($189.50) has a similar range but with one R.F. stage. Low price models are the NC-57 ($89.50) and NC-53 ($57.50). A V.H.F. receiver, the HFS, covers 27–250 Mc/s.

Collins

One of the few receivers designed *exclusively* for amateur work is the *Collins* 75A-1 ($375.00). This is a double superhet with tunable first I.F. and permeability tuning throughout. There are six bands, four



The HRO 50—Latest in a long line of famous National Co. Receivers.

of them 1 Mc/s. wide and two 2 Mc/s. wide to give uniform calibration. The bands are: 3·2–4·2 Mc/s.; 6·8—7·8 Mc/s.; 14–15 Mc/s.; 20·8–21·8 Mc/s.; 26–28 Mc/s.; and 28–30 Mc/s. The line up of this very interesting receiver is: 6AK5 (R.F.); 6SA7 (1st mixer); 6AK5 (crystal oscillator); 6L7 (2nd mixer); 6SJ7 (V.F. oscillator); crystal filter;

The Collins 75A—A Double Superhet

2 × 6SG7 (I.F.); 6SJ7 (A.V.C.); 6H6 (det. and limiter); 6SJ7 (B.F.O.); 6SJ7 (A.F.); 6V6 (output). Another *Collins* receiver—the 51J-1—also employs permeability tuning, with 30 bands each exactly 1000 kc/s. wide: but the cost ($875.00) places it beyond the reach of all but a few!

Safety Device

MR. E. NORMAN EVANS, G3FRT, has adopted a simple safety device which indicates whether or not the bleeder resistor in his 1,300-volt power supply is functioning correctly. A 1,000-ohm Post Office relay is placed between the earthy end of the 130,000-ohm bleeder resistor and earth. This serves to operate a 6.3 V. pilot light fed from a spare L.T. supply separate from the H.T. unit. The procedure is then simple—and reasonably sure. Before any tests are carried out which would involve touching an H.T. point, the H.T. unit is switched on. After the customary warming-up period the pilot lamp should light. The unit is then switched off and, if all is well, the pilot lamp will remain lit for several seconds, proving that the H.T. condensers are discharging through the bleeder resistor. For complete security it is recommended that the usual pilot lamp (preferably neon type) should be retained across the primary of the H.T. transformer. Then always check both bulbs and *hands off the rig whilst either light is on.*

Norman Keith Adams Prize, 1950

THE Council has been pleased to award the Norman Keith Adams Prize for the current year to Mr. H. A. M. Clark, B.Sc.(Eng.), A.M.I.E.E., G6OT, for his paper "An Impedance and Power Meter for the 144 Mc/s. Band," published in the July, 1949, issue of the BULLETIN.

Mr. Clark was for several years an Officer of the Society and is currently Chairman of the Technical Committee.

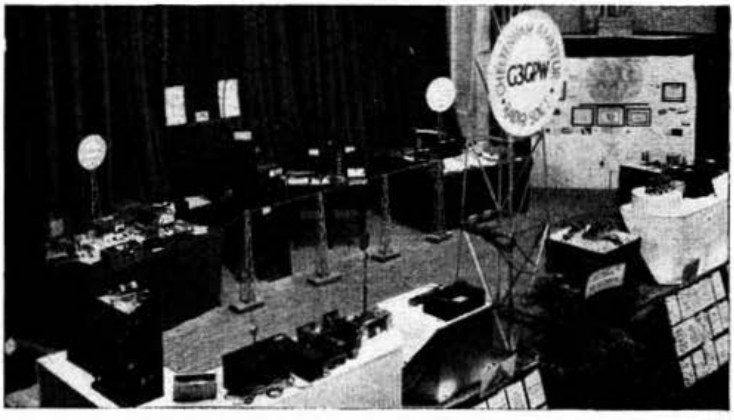
Speed of Radio Waves

THE announcement by the National Physical Laboratory that the speed of light and radio waves has now been confirmed as 186,282 miles per second and not—as previously believed—186,271 m.p.s. has attracted considerable attention owing to its important bearing upon radar, radio and atomic research. Responsible for these far-reaching experiments is Dr. L. Essen whom many R.S.G.B. members will remember for his paper on frequency measurement read at a London meeting and published in the BULLETIN in 1946.

To arrive at the new figure the time of travel of radio waves in a metal tube only seven inches long was determined by means of resonance effects and accurate frequency measurement. The construction of the tube required highly skilled workmanship with dimensions accurate to one-hundred thousandth of an inch. With this tiny tube, Dr. Essen has shown that radio waves travel eleven miles a second faster than was suggested by the results of the U.S. scientist Michelson who, for basically similar experiments, used an evacuated metal tube a mile long.

Quarter Century Wireless Association

DAVID TALLEY, W2PF, whom many members will recall from the war-time Anglo-American amateur gatherings in London, sends details of the *Quarter Century Wireless Association Inc.*, of which he is Treasurer. Since its formation in 1947, the Association has grown to 270 members, all of whom were licensed 25 years ago and are still active. Sole exception is the honorary member, Paul Godley, now living in Upper Montclair, N.J., who no longer holds a licence. Godley made the historic visit to the U.K. during the famous Transatlantic Tests of 1921. The subscription of $1 includes an engraved membership certificate and a handbook of members. W2PF has been an amateur since 1915.



More than 8,300 people visited the three-day Hobbies Exhibition at the Cheltenham Town Hall. A comprehensive display of amateur equipment, organised by the Cheltenham Amateur Radio Society, included a 150-watt station; V.H.F., direction finding and portable equipment. Operation—under the call signs G3LP/A and G3BCU/A—was adversely affected by poor conditions, but nevertheless showed that television reception was not impaired by the transmitter even though the 3-element beam was mounted immediately above the TV aerial!

By T. CHARLES BRYANT (G3SB)*

BEAM TETRODES USED as R.F. AMPLIFIERS

WHEN the beam tetrode was introduced some years before the war, it was thought that at last an amplifier was available which did not require to be neutralized. Most amateurs who employed these valves in their transmitters soon found that this was not so. True, designs have been published from time to time which employ an un-neutralized tetrode (for example the small C.O.-P.A. transmitter using a 6L6 and 807 which was described in several editions of the *Radio Amateurs' Handbook*) but such arrangements require most complete screening and are often difficult for the novice to adjust.

Of the most popular valve types in common use, the 807 was designed for R.F. work and has an anode top cap, enabling the grid and anode circuits to be isolated much more effectively than the 6L6 and 6V6 which are intended for A.F. use. However, even the 807 can give rise to considerable problems and some amateurs feel, after bitter experience, that the use of the valve in un-neutralized amplifiers is hardly worth the trouble involved in adjusting it.

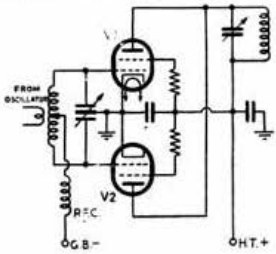


Fig. 1. Neutralized amplifier employing V2 as the neutralizing capacity.

Neutralization of Beam Tetrodes

Most readers will be familiar with the theory and practice of neutralization as applied to triodes: dealt with in the *Amateur Radio Handbook* and other standard text books. Multi-element valves, such as the normal small receiving R.F. pentodes and tetrodes have a very small anode-to-grid capacity (0.01 $\mu\mu$F. or less) and do not require neutralization. When, however, this capacity is increased beyond 0.01 $\mu\mu$F. a degree of neutralization, generally, becomes necessary. Valves of the types under review—because their dissipation is higher than the small receiving types—have, naturally, a higher anode-to-grid capacity on account of the greater physical size of the valve elements. Representative values for the anode-to-grid capacity of the 6L6 and 807 are 0.7 $\mu\mu$F. and 0.2 $\mu\mu$F. respectively.

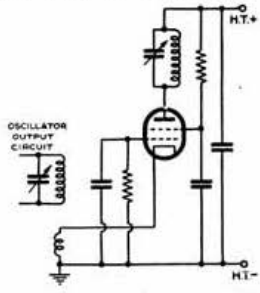


Fig. 2. Inverted amplifier.

There is no objection, electrically, to neutralizing a beam tetrode but a practical difficulty at once arises in finding a suitable condenser on account of the very low anode-to-grid capacity. The usual size condenser employed with a triode is a good deal too large and, in the past, much ingenuity has been displayed in making a suitable neutralizing capacity. One method which often finds favour is to run two pieces of stiff wire near together or to use two very small pieces of metal spaced about one eighth of an inch apart.

More recently, with the low price of ex-Government valves, it has not been unusual to employ a second identical valve to provide the required capacity. Several circuits using this device have appeared recently in the pages of *QST* and elsewhere. There is no theoretical objection to this practice but it requires additional space (which may be at a premium, for example, in the case of portable equipment) and necessitates using two valves where only one is really necessary. Furthermore, valves of different makes may not have identical characteristics even when they are supposed to be similar. A circuit based on this arrangement is shown in Fig. 1. In this case V1 is the amplifier while V2 is used solely as a neutralizing capacity; the heater of V2 is not connected. Should it be desired to use the stage as a frequency doubler, the heater is connected and the stage then works as a push-push doubler.

The Inverted Amplifier

For a short time the inverted amplifier shown in Fig. 2 was popular. Provided that C.W. only is contemplated, and it is not required to multiply the frequency in the anode circuit, this arrangement is satisfactory. However, it is difficult to modulate such a circuit successfully and the arrangement is only effective when used as a straight amplifier. For these reasons, the circuit is not often used although it is worth considering when designing a portable transmitter.

Pierce Oscillator Drive

Provided that crystal control alone is contemplated there is no objection to using a Pierce oscillator followed by an un-neutralized amplifier. This arrangement is quite satisfactory for single-band working since there is no other tuned circuit, apart from the crystal, with which the P.A. tank circuit can resonate; but most amateurs using crystal control require an output on more than one band. The use of an output stage as a frequency multiplier is inefficient besides tending to increase the emission of harmonics. Another point is that although crystal control is still used by many amateurs it is fast being replaced by the V.F.O. and this circuit does not lend itself to effective V.F.O. drive.

Use of a Cathode Follower

A simple, certain and cheap alternative method for low power transmitters is the use of a cathode follower. The components required (except the

* 16 The Parks, Minehead, Somerset.

valve) cost only a few pence and are usually to hand. The disadvantage of an additional valve is offset in two ways; first, it can be almost any type of small receiving valve (such as a 6J5) and need not match any other valve in the transmitter; second, such a stage need not occupy additional space as the use of a double triode (such as a 6SN7) in place of the usual oscillator will be satisfactory when space is limited.

Some time ago, a small transmitter, with an input of 8-10 watts, was built for use on the 1.8 and 3.5 Mc/s. bands. It was required for both C.W. and 'phone operation from the home station and also intended for portable use. A 6L6 was employed in the output stage and the oscillator was based on one described by W. Oliver (G3XT) in the May, 1949, issue of *Short Wave Magazine*. To eliminate instability, a cathode follower was inserted between the oscillator and power amplifier and this has proved most successful. The full circuit diagram is given in Fig. 3 together with the component values of the cathode follower stage.

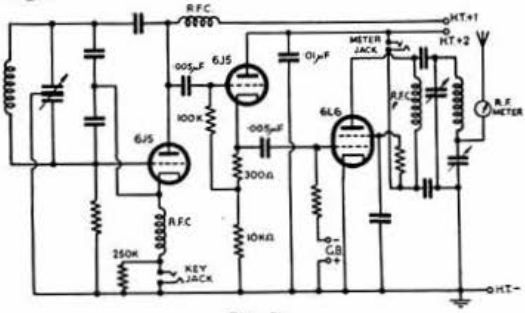


Fig. 3.
Low power 1.8/3.5 Mc/s. transmitter using a 6J5 as cathode follower. Circuit values for cathode follower stage shown, other values conventional.

One important point, which should not be overlooked, is the need for care in avoiding a breakdown from heater to cathode since the cathode is at a considerable potential above earth. This can be avoided either by feeding the heater from a separate winding connected by a 100,000-ohm resistor to the cathode so that there is no D.C. potential, or by limiting the H.T. applied to the cathode follower stage. At G3SB, the 6L6 is only required to operate with reduced anode voltage at low power (8-10 watts) but in the event of a similar transmitter being used at full power, the voltage applied to the cathode follower stage should be such that the heater-to-cathode potential does not exceed that specified by the manufacturers for the particular valve used. In a transmitter required for general use it would also be preferable to employ a separate aerial tuning unit, rather than the π-coupler shown: such an arrangement would tend to suppress harmonics and thus reduce T.V.I.

Local Ignition Suppression Campaigns

THE part that local societies and groups can play in the reduction of car ignition interference is emphasised by the announcement that the Southend and District Radio Society is to launch a local campaign for voluntary suppression. Leaflets will be distributed, garage proprietors circularised, letters sent to the local press, and demonstrations of the effect of car ignition systems will be given at local exhibitions. What action has *your* group or society taken to make the general public ignition-interference conscious?

"Airmet" Petition

THE Editors of *Weather*—a monthly magazine published by the authority of the Royal Meteorological Society—have sponsored a national petition for the restoration of the "Airmet" weather broadcasts which were discontinued in March, 1950, when the Copenhagen Plan came into force. Since 1932—with the exception of the war years—detailed weather broadcasts had been radiated during the hours of daylight on 145 kc/s. The value of this service, not only to airmen (for whom they were primarily intended) but also to farmers, teachers, yachting enthusiasts, housewives and radio enthusiasts was stressed at a press conference held in South Kensington on October 5 to inaugurate the campaign.

Mr. H. F. Smith, Editor of *Wireless World*, expressed the view that frequency space *could* be found for the service by some slight curtailment of the B.B.C. European Service. An R.S.G.B. representative confirmed that up-to-the-minute knowledge of weather conditions was of value to V.H.F. enthusiasts and suggested that, if the service were to be resumed, the possibility of providing radio propagation data and V.H.F. "alerts" should be considered.

Copies of the petition—each suitable for 20 signatures—are available from Headquarters. It is hoped that Local Groups and Clubs who regret the loss of the "Airmet" service will apply for copies *immediately*.

National Institute for the Blind

THE Society has been advised by the National Institute for the Blind that, because so many urgent requests for other books from students have to be met, it is not possible at the present time to undertake the preparation of further copies of the Braille Edition of *The Amateur Radio Handbook*.

The two copies now in existence were handwritten over a period of many months by highly skilled voluntary labour. Each copy occupies 12 large volumes.

The Institute point out that the preparation of technical books is very difficult particularly where circuit diagrams have to be included. The number of people who can undertake this work is very limited.

The Institute has looked into the question of producing a Talking Book version of *The Amateur Radio Handbook*, but here again production difficulties, particularly in regard to the preparation of circuit diagrams, are at present considerable.

The Council has expressed willingness to make a further financial contribution towards the cost of producing either a Braille or Talking Book version of the Handbook or similar publication and it is hoped that the Institute may eventually be able to accept the offer.

National Field Day, 1950

THE score of the Mansfield "B" Station was inadvertently omitted from the results published in the September issue of the BULLETIN.

Their station G3FR/P scored 158 points, entitling them to 120th place.

Congratulations

TO old-timer W. D. Kieller, G6HR of Edmonton, London, whose services to the R.N.V.(W.)R. have recently been recognised by the award to him of the Royal Naval Volunteer Reserve Decoration.

Mr. Kieller was an original member of the Reserve when it was formed nearly 20 years ago and, since 1937, has held commissioned rank.

I.A.R.U. CONGRESS, PARIS, 1950

A SPECIAL Meeting of the Council was held on September 12, 1950, to consider matters dealt with at the recent Paris I.A.R.U. Congress.

The Council had before them the account of the Congress published in the August, 1950, issue of the BULLETIN as well as a Report covering the business transacted at meetings of the Administrative and Technical Committees.

Band Planning

The Council noted that the Congress had agreed unanimously to support (a) the principle of Band Planning; (b) the principle of sharing between telegraphy and telephony stations in those sections of the various bands as indicated in the R.S.G.B. Band Plan; (c) the R.S.G.B. Band Plan with the exception of the recommendation concerning the 14 Mc/s. band.

In regard to the 14 Mc/s. band the Council resolved to accept the majority decision of the Congress, namely, that when the Atlantic City frequency allocation table becomes effective, the division between telegraphy and telegraphy-telephony shall occur at 14,125 kc/s. instead of at 14,100 kc/s.

In regard to the 21 Mc/s. band the Council resolved to submit the R.S.G.B. proposal (21,000-21,150 kc/s. Telegraphy only, 21,150-21,450 kc/s. Telegraphy and Telephony) to I.A.R.U. Headquarters for inclusion in the Calendar.

The Council noted that several delegates had expressed the view that the U.S. telephony bands should be restricted and that in future the A.R.R.L. should consult the other Member Societies of the I.A.R.U. before putting forward Band Planning proposals to the F.C.C.

Future International Telecommunication Conferences

After general discussion the Council resolved to submit the following motion to I.A.R.U. Headquarters for inclusion in the Calendar:

> The R.S.G.B. proposes on behalf of the Member Societies represented at the Paris I.A.R.U. Conference that at future International Telecommunications Union Conferences the I.A.R.U. shall be represented by at least one delegate from each of the three World Regions, and that insofar as Region I is concerned the cost of I.A.R.U. Representation at such Conferences shall be computed proportionally on the basis of the number of amateur transmitting licences in force at the beginning of each Conference year.

Administration of I.A.R.U.

The Council noted with pleasure that the Congress resolved to place on record the thanks of the Member Societies represented to the American Radio Relay League for the work it has done as Headquarters Society of the I.A.R.U. The Council also noted that a proposal to recommend to the Member Societies that the administration of the I.A.R.U. be transferred from A.R.R.L. to R.S.G.B. was lost by 13 votes to 1.

The Council then proceeded to give consideration to the resolutions adopted at the Congress relating to the setting-up in Region I of an organisation to represent the interests of the Member Societies in that Region.

After a lengthy discussion it was:

> Resolved (by 8 votes to 2) to notify I.A.R.U. Headquarters that the Council of the R.S.G.B. accepts in principle the invitation of the Congress to establish a Central Bureau in Region I to represent the interests of the Member Societies in that Region, and that the Council is prepared to accept financial liability, at a cost not exceeding £500, for operating the Bureau for a period of one year.

It was agreed to suggest to I.A.R.U. Headquarters that the proposal to set up a Region I Bureau should be made the subject of a special Calendar and that all Member Societies should be invited to submit their comments with the least possible delay.

A proposal by Mr. P. A. Thorogood that the Congress resolutions relating to the establishment of a Central Bureau in Region I should be referred to an Annual General Meeting was not seconded.

The Council decided to defer discussion of a suitable name or description for the Bureau until such time as the views of the Member Societies shall have been received and studied.

V.H.F. Operation

Mr. W. H. Allen was requested by the Council to bring to the notice of members the resolutions adopted at the Congress relating to the recognition of bands of frequency between 144 and 144.2 Mc/s. and between 432 and 433 Mc/s. for long distance communication purposes.

International Contests

It was reported to the Council that pursuant to the agreement reached at the Congress three Societies in Region I had forwarded to R.S.G.B. their views on International Contests. These were being studied by the Contests Committee.

The Council noted that as the Emergency Radio Conference had been postponed the projected meeting at The Hague with the Secretary of the I.A.R.U. to discuss Contests had also been postponed.

Regulations

The Council noted that the Congress had given consideration to the operation of commercial stations in the exclusive amateur bands but had taken no positive action because of the difficulty of enforcing control on the basis of the Cairo Conference frequency allocation table.

The Council noted that the Congress had agreed that within Region I all variations of internationally-agreed amateur frequency allocations should be referred to the Central Bureau.

Technical Matters

The Council agreed that matters dealt with by the Technical Committee of the Congress should, in the first place, be considered by the R.S.G.B. Technical Committee.

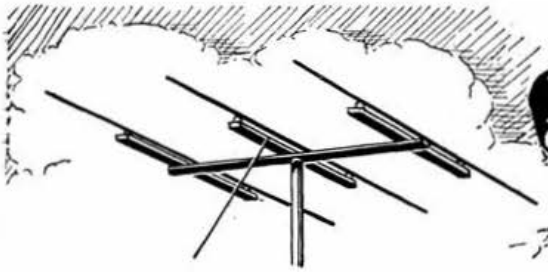
Next Congress

The Council noted that the delegates of Region I had resolved to hold a further Congress during 1953.

It was reported that it had been the wish of the 1950 Congress that the arrangements for convening the next Congress should be left in the hands of the Central Bureau.

DELAY IN PUBLICATION

We again apologise to readers for the delay, caused by the recent dispute in the printing industry, in the publication of this issue. The next issue will appear towards the end of November or the beginning of December.



AROUND THE V.H.F.'s

British Amateurs Gain Two World Records

*By W. H. ALLEN, M.B.E. (G2UJ)**

FOR the first time, two amateur V.H.F. world records are held in this country: 3 cm. (10,000-10,500 Mc/s.) by G3APY/P and G8UZ, who worked over a distance of 12 miles on September 23; and by the magnificent efforts of G8DD and G3QC who covered no less than 75 miles on 23 cm. (1,215-1,300 Mc/s.) exactly a week later. These two world records follow closely upon the raising (as reported last month) of the European 2-metre record—this time to 520 miles—by a QSO on 'phone between G2BMZ (Torquay) and DL4XS/3KE (Wiesbaden) on September 13. Warmest congratulations to all concerned!

G3APY (Kirby-in-Ashfield), operating portable from Ambergate Height, 3 miles west of Ambergate, Derbyshire, succeeded—on September 23—in contacting G8UZ (Sutton-in-Ashfield) at 12 miles, signals being S9 'phone in each direction on both 3 and 23 cm.

On the 3 cm. band, the world record of 7.65 miles had been held since 1947 by W4HPJ and W6IFE—both operating portable in the United States Third District—while the longest distance in this country was the 1¾ miles covered by G3BAK and G3LZ/P in January last. For a week 3APY and 8UZ also held the British record for 23 cm.; but, on October 1, in extremely uninviting weather conditions for portable operation, G8DD worked G3QC/P, situated at Merrton Low, 4½ miles N.E. of Leek, Staffs., first from Titterstone Clee Hill, 5 miles E. of Ludlow, 60 miles away, and then, a few hours later, over the 75-mile path from Worcester Beacon, near Great Malvern.

A "line-of-sight" path existed between Titterstone Clee Hill and Merrton Low but this must have been more theoretical than practical under the conditions prevailing at 1,700 ft. a.s.l. with 10/10th cloud, rain and hail to harry the operators. Signals were, however, S9 plus both ways. From Worcester Beacon there was no question of line-of-sight working, but nevertheless, in cold, cloudy weather with a high wind, reports were S8/9.

During this contact best results were obtained when the transmitting and receiving parabolic reflector was tilted upwards some 15 or 20 degs. from the horizontal, but signals could still be exchanged when the aerial was aimed at a nearby hillside or even when pointed vertically upwards.

The gear was designed with portability well in mind, and consisted of CV90 cavity oscillators and super-regen. receivers. 18-in. parabolic reflectors were employed with dipoles at each station. The operators wish to record their thanks for the invaluable assistance they received from G3CZV, 6CW and 8QZ.

For the combined 3 and 23 cm. tests G3APY and G8UZ had rather more elaborate equipment consisting again of CV90 cavity oscillators, frequency modulated, on each band, with separate 5-element Yagis for receiver and transmitter on 23 cm. and a wave-guide fed dipole and reflector mounted in an 18 in. parabola for 3 cm. A common I.F. — discriminator — A.F. unit was employed with either of the crystal mixers and their associated first stage I.F.'s. The apparatus at both stations was identical.

The I.A.R.U. Conference and the V.H.F.'s

Readers' comments are invited upon the proposals adopted at the recent I.A.R.U. Conference in Paris in regard to the assignment of bands 200 kc/s. wide between 144.0 and 144.2 Mc/s. and 1 Mc/s. between 432 and 433 Mc/s. for international DX working.

Two Metre Band

G6WU (Southgate, London) has been testing a 6J6 p.p. neutralised triode pre-amplifier ahead of his all-6J6 c.c. converter. The additional unit employs "figure 8" coils, following a recent design by *R.C.A.*, and incorporates a Faraday screen between the aerial and grid coils. The combination of good balance to earth and removal of capacity transfer of lower frequency signals from the aerial has resulted in the *complete* disappearance of all "birdies" due to signals at I.F. or those beating with harmonics of the oscillator crystal although tuning is carried out on the 30 Mc/s. range of the main receiver. Recent results have included several 'phone contacts with F8XM (nr. Dieppe) and with F3JR (nr. Paris) and DL4XS/3KE (Wiesbaden). DL4XS/3KE told 6WU that other DL stations were active at the time—2330 B.S.T. on September 12—but although DL4CK and DL4OD were heard at the extreme low frequency end of the band, no further DL contacts were made. Remarking upon the fact that several stations were hearing the DL's well while others in the same area heard nothing, 'WU would be interested to know whether the use of the two basic types of aerial, simple Yagis or stacked arrays, with their differing polar diagrams, could account for this difference—quite apart, that is, from the question of good and bad receivers. G6WU is at present using a Yagi, but is constructing a multi-element stack.

G2APW (Pant, nr. Oswestry) is now active on approximately 145.4 Mc/s. and would welcome contacts.

70 Centimetre Band

To judge from several reports of lack of signals from those stations taking part in the recent *R.S.G.B. Tests*, GW2ADZ (Llanmynech) was lucky to hear two—G4LU, only a few miles away in Oswestry, and G3BUR/P at Walton Hill at a distance of 50 miles. Through drenching rain G3BUR's signals were S8/9 despite the fact that the R.F. output of his transmitter did not exceed 1 watt. The following 70 cm. skeds. are now being operated by GW2ADZ, G4LU and G8JI and other stations in the Birmingham area, every Monday evening:

2000—2010 G.M.T. GW2ADZ 432.84 Mc/s.
2020—2030 G.M.T. G4LU 431.55 Mc/s.
2030—2040 G.M.T. G8JI and other Birmingham stations.

(Continued on Page 140)

* *32 Earls Road, Tunbridge Wells, Kent*

THE MONTH ON THE AIR

*By A. O. MILNE (G2MI)**

Round Tables and Nets

IF only some of those who talk such drivel over the air could hear their performances played back to them at a public meeting! Other people, besides transmitting amateurs and recognised short-wave enthusiasts, listen on the short-waves. The impression given to many of these must sometimes be rather unfortunate. This is no place for individual criticisms but nevertheless some of those who contribute their own personal inanities to various "clubs" or "organisations," might feel rather foolish if they could only hear themselves as others hear them.

Thought for the Month

Our Happy Lid is testing 'phone,
With not *exactly* "broadcast tone";
A carbon mike, and grid mod. which
Is worse than any trawler spitch!

* * *

"Hullo CQ" he will mutter,
Smiling as his meters flutter;
Then turning up the A.F. gain,
Bellow his call as though in pain.

* * *

Our Happy Lid is happy still,
No qualms his empty head yet fill:
Eight stations out of every nine,
Simply report "Your speech is fine."

G3VA

T.V.I.

In one South Coast town there is a "flying squad" of members of the local viewers' association who specialise in tracking down all types of interference to television reception. What an excellent thing if local amateurs could be persuaded to combine for similar purposes. To stay off the air during T.V. programme-hours is just not good enough. How much simpler the problem would be if local amateurs pooled ideas on T.V.I. amongst themselves and assisted one another when trouble arose. Then, where viewers' associations exist, the local amateurs should offer wholehearted co-operation: it would make for friendly relations all round; better liaison with the local traders, who might even be deterred from installing interference-prone makes of T.V. sets near amateur stations; and it would surely be welcomed by the long-suffering engineers of the G.P.O., who have quite enough interference work on their books already.

Notes and News

W6AY tells us that G5WI, now enjoying life in San Carlos, California, is busy learning to drive on the "wrong" side of the road! BRS16304 reports that amateur stations in Sicily use the prefix IT1; he has heard two in Palermo and one in Messina using the new letters. FD3RG and CR7IV have been heard on 28 Mc/s. VP4LL asks GD6IA, VS1CW, VS1DC, VS2AR, ZD1FB, ZD1PW and VS7SV to QSL. Yes, O.M. FY7YB is genuine and QSL's. G2FAY wants the QTH of VS1DF. GW3DOF has worked FY7YB, FM7WF and VP3FJ for three choice ones on 14 Mc/s. and says it is when the band appears to be dead that some of the best DX can be raised.

From GM3AVA, who has worked VP8AP on 7 Mc/s., comes the following "gen" on Antarctica: VP8AP is on South Orkney with G3DDV as operator (try 7020 kc/s. around midnight); VP8AO is on Admiralty Islands; VP8AJ is at Port Stanley, Falkland Islands; VP8AK is on Deception Islands, and VP8AQ on the main Falklands. The QTH of VP8AL is unknown.

G2YS says W4RBQ no longer handles QSL cards for FM8AD. This is now done by W4AZK who requires an international reply coupon for each card. G2DHV has just received confirmations from PK3JF, HH3DL and FF8FP—enough to keep most people happy for a week or two! G3BGP of Canterbury reports that YI6BD is G6BD, whose home address is 12 Carisbrooke Road, Hastings.

ZD6EF is now very active in Zomba, Nyasaland, and his cards have come to hand at the Bureau (Q.S.L. *via* R.S.G.B. only). G8JJ, now ZE3JP at Borrowdale, Southern Rhodesia, hopes soon to have some rhombics in operation. Present frequencies are 14050 and 14106 kc/s.

In answer to last month's appeal, G3AJP suggests that VS7NX should try for XE1VA around 0020 G.M.T. on 14115 kc/s. C.W.; QTH is Box 1138, Mexico City. Incidentally, 'AJP has heard LP2J in Jan Mayen Islands.

G2YS says the following are licensed stations in Poland: SP1CM, KM, JF, SE, SJ, 5AB, AC, SG, PZK and ZPZ. Two or three more will be active soon.

G4CP, of Dudley, considers that August was an outstanding month for 14 Mc/s. Pacific DX. He had several good contacts with ZK1BC and others with KP6AA/KH6, VR2BO and VR2BW. His best in Asia was PK5AA, 14007 kc/s., QTH L. Devos, c/o Radio Station, Balik Papan. This station QSL's. YA2B on 14022 kc/s. says QSL *via* W2SN and appears to be genuine. VP3FJ is at Atkinson Field, British Guiana, and is on 14006 kc/s. G4CP adds that he has worked four XE's on C.W. and has had cards from all of them.

G6RH has received advice that his A.A.A. claim has been accepted by S.A.R.L. His best for the month are ZM6AA, 14340 kc/s., phone, VK1YN, 14160 kc/s., 'phone, and ZA2AA, 14200 kc/s., phone.

MS4FM is back home in the U.K. and has QSL'd all his contacts. (QTH pse O.M.) G3DYY is ex-VS9ET and is now in Ismalia hoping that the ban on amateur stations in Egypt will be lifted soon.

Activity in Greece

The amateurs now active in Greece are all American except two: SV0AM who is British; and SV1SP who is Greek. The American calls are SV0WB, H, J, L, M, N, O, U, V, W and X. SV0UN is operated by United Nations personnel in Salonika.

Parting Thought

If we want to be regarded with respect we have to be careful what we say in public.

* *29 Kechill Gardens, Hayes, Bromley, Kent.*

QUA

TALK of **amateur television** has reminded old-timer **Harold Bailey, G2UF** of Manchester, of the licence which he was granted in 1934 for experimental television transmissions. The band of 30000 to 31950 kc/s. was allotted for vision signals while sound was radiated in the normal 28 Mc/s. band. The permit stipulated that no objects of entertainment value were to be televised; although geometrical designs and diagrams, or three dimensional objects, and not more than two minutes of film were allowed. Demonstrations were limited to other experimenters. G2UF, who was one of a number of amateur experimenters with low-definition mirror drum systems, also wrote a booklet on the subject.

The *Réseau des Emetteurs Français* (R.E.F.) has been authorised to broadcast, from 3.5, 7 and 14 Mc/s. amateur stations in French territory and the French Zone of Germany, short **technical lectures** in foreign languages. Altogether 13 lectures will be broadcast at fortnightly intervals, starting November 1 and continuing until the end of April, covering operating procedure and the general principles of short-wave reception and transmission. Each lecture will last from eight to ten minutes and will be transmitted from selected stations several times during the fortnight. Lectures are being planned in English, French, German and Spanish. It is hoped to publish further details later.

There are a number of joint husband-wife stations these days, but the **"Morley Pair"** of Manitoba, Canada, are probably unique in that both partners' names are reflected in their call-signs: VE4JM (Jean Morley) and VE4AM (Art Morley).

A pertinent warning on the dangers of allowing **international politics** to creep into amateur transmissions is contained in an editorial in *Amateur Wireless*, journal of the *Wireless Institute of Australia*. "The careless comment; the burning personal opinion on international affairs; or the profound political conviction, find no place within the permissible limits of our experimental licence, and rightly so. Any such phrases eminating from Amateur Stations, and so quickly caught up, may easily and promptly echo to our disadvantage. . . ."

Television has brought in its wake its full quota of strange and **unusual faults.** The American magazine *Radio Electronics* quotes the following queer cases: a receiver where one channel vanished whenever a neighbour raised his venetian blind (made of aluminium strips); variable reception which was traced to the rise and fall of a local gasometer; the berthing of a ship upsetting reception of an entire district; while one televiewer reported that he could only receive a certain station if he stood a heavy vase on top of his receiver (a lead ring in the vase was probably acting as a resonant reflector). Can you cap these cases from your Amateur Radio experiences? But please, no stories of mice in the transmitter—they lost their novelty long ago!

The *F.C.C.* proposes to establish a new **Disaster Communications Service** in the United States on frequencies between 1750 and 1800 kc/s. Organisation will be left to local groups: heavy reliance—*QST* states—is to be placed on amateurs.

Thirty years ago, in October, 1920, *Wireless World* published its first short list of post-war amateur callsigns: only 12 calls were given (mainly Club stations) but they included at least two which are still held by the original licensees. These are **2HA—A. L. Megson,** and **2FG—Leslie McMichael,** then Hon. Secretary of the *Wireless Society of London.* Wavelengths granted at that period were 1000 and 180 metres. No amateur station was supposed to work more than five other stations!

Not a few members have, from time to time, devised new or improved apparatus with commercial possibilities; but they have usually been discouraged from taking out a **patent** by the legal complexities which surround the subject. Few of the standard handbooks contain details of the new Patents Act which came into force at the beginning of this year, but fortunately a new and lucidly-written 16 pp. guide "Notes on Patents" is now available, on request, from **Kings Patent Agency Ltd.,** 146a Queen Victoria Street, London, E.C.4.

The *G.E.C.* are rightly proud of their claim that the **BRT400** communications receiver has been chosen by the B.B.C., the Norwegian broadcasting service and the Swedish Forces after extensive trials against the best alternative apparatus available in Europe and America.

The grapevine whispers that the R.S.G.B. technical handbooks pop up in the most unexpected places. Recently at one of the major radio design centres in the United Kingdom, the backroom boys were getting a little hot under the collar over a fundamental problem concerning a new transmitter for the B.B.C. Peace was restored, according to our informant, when a copy of **Valve Technique** was produced and its *dicta* quoted.

An illustrated programme schedule is available on request from the Swiss Shortwave Service, 23 Neuengasse, Berne, Switzerland. U.K. channels include: HEU3 9.665 Mc/s. and HER5 11.865 Mc/s. (1845—2030 G.M.T.). . . . The engineering division of the B.B.C. has a staff of 3,700. B.B.C. transmitters include 1 long-wave station, 14 high-power medium-wave stations, 8 medium-power medium-wave stations, 26 low-power medium-wave stations, 31 high-power short-wave stations and an experimental 25kW. V.H.F. station. . . . In the U.S. there are some 2,200 amplitude modulated broadcasting stations, 820 frequency modulated stations and 110 television stations. . . . In polar regions an atmospheric condition can limit the range of U.H.F. communication to less than "line of sight." . . . U.H.F. and V.H.F. receiver oscillator radiation is becoming a problem of increasing importance in the U.S. . . . Early British experiments with wave-guides were carried out with a piece of boiler tube salvaged from one of the German battleships scuttled after the Great War.

AROUND THE V.H.F.'s *(Continued from Page 138)*

On Thursdays, G4LU and G8SB (Horwich, nr. Bolton) attempt contact between 2100 and 2120 B.S.T. Reports on any of these skeds. would be very welcome.

G2QY (Pinner, Middlesex) is now active on this band, and since August 20 has worked G2DD, FKZ, 3FP, FZL/A, 4CG, 5PY, 6LK, 8GX and 8QY/P. G8QY/P was operating at Princes Risborough, 61 miles away, and the reports were S6/7 on 'phone. G2QY's apparatus consists of an SCR 522 driving an 832A tripler, CV102/6J6 converter into a BC 348 receiver, and a 10-element beam with wire netting reflector erected in the roof space. The frequency is 435.1 Mc/s. and an almost nightly sked. is kept with G2DD at 1930, followed by a CQ call at 2215 G.M.T.

I.A.R.U. News

MAIN feature of the summer issue of the half-yearly *Calendar* of the International Amateur Radio Union is information on the plans which had been made for the Extraordinary Administrative Radio Conference at The Hague, now postponed. It was intended that the I.A.R.U. should be represented in an observer capacity by V.E.R.O.N., the A.R.R.L. representatives being attached to the United States delegation.

Three new applications for membership are now being voted upon by all Member Societies: *Israel Amateur Radio Club* (membership 201, licensed amateurs 96); *Amateur Radio Club of India* (membership 400, licensed amateurs 83); and the *Syrian Technical Institute of Radio* (membership 50, licensed amateurs 8). The T.I.R., incidentally, has an annual subscription of more than £8! The election to membership in the Union of the *Union Congolaise des Amateurs de Radio* has been confirmed.

Recent A.R.R.L. elections have affected I.A.R.U.; new Vice-President of the Union is Wayland M. Groves, W5NW. Not only is W5NW an active amateur himself, but his wife and two sons are also licensed.

Political disturbances in Peru last year led to the denial of amateur licences to new applicants. South American amateurs are suggesting that the band 14,160-14,180 kc/s. should be used for emergency communication when necessary. N.Z.A.R.T. reports growing public appreciation of Amateur Radio. This year has been an eventful one for A.R.R.L. with many F.C.C. licence revisions and conferences. The premises at 38 La Salle Road, West Hartford, previously leased by the League, have now been purchased as a permanent headquarters. W.I.A. suggests that Amateur Radio is now undergoing a "settling down" period after the post-war rush brought about by the availability of Government surplus material. The Institute is disappointed at the results of its efforts to eliminate commercial stations from the amateur bands: Russian and Russo-Chinese stations have caused endless trouble to VK amateurs.

Festival of Britain

SEVERAL R.S.G.B. Groups and Clubs—including Bristol and Malvern—have been asked by their local authorities to arrange special activities concurrently with the 1951 Festival of Britain. To facilitate an exchange of ideas and to promote mutual co-operation, all groups which have received such requests are invited to notify Headquarters. Mr. F. Wingfield, G2AO, 1 St. Margarets, Imperial Road, Malvern, Worcs., would also appreciate hearing of any plans which are being made elsewhere.

The Wyllie Cup

AT a recent meeting of the Ayrshire R.S.G.B. Group, Mr. Douglas Lamb, GM2UU, became the fourth holder of the Wyllie Cup. This much-prized silver cup was presented in the 1930s by the late Mr. John Wyllie, GM5YG, to be awarded for outstanding amateur achievements by Scottish members. In presenting the cup, the Regional Representative, Mr. David Macadie, GM6MD, referred to GM2UU's remarkable DX achievements—he holds the first Empire DX telephony certificate ever issued and the first telephony DX.C.C., W.A.S. and W.A.V.E. certificates to be issued to a Scottish amateur.

LONDON MEETINGS, 1950/51

All meetings are held at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2.

Friday, Nov. 17, 1950. **F. Aughtie, D.Sc., M.Sc., A.M.I.E.E., A.M.I.Mech.E. (G6AT)**
"ELECTRONIC COMPUTING."

Friday, Dec. 29, 1950. ANNUAL GENERAL MEETING.

Friday, Jan. 26, 1951. **D. N. Corfield, D.L.C. (Hons.), A.M.I.E.E. (G5CD).**
"EQUIPMENT FOR THE 420 Mc/s. BAND."

Friday, Feb. 23, 1951. **H. A. M. Clark, B.Sc. (Eng.), A.M.I.E.E. (G6OT).**
"POST-WAR DEVELOPMENTS IN TELEVISION."

Friday, March 30, 1951. **R. H. Hammans (G2IG).**
"HIGH SELECTIVITY 'PHONE RECEPTION."

Friday, April 27, 1951. **A. O. Milne (G2MI).**
"LOW POWER PORTABLE EQUIPMENT."

All Meetings commence at 6.30 p.m. Tea will be served from 5.30 p.m.

Readers are reminded that the meetings listed are open to all members of the Society.

Radio Society of Ceylon

UNDER the Patronage of the Minister of Posts and Telecommunications, the Radio Society of Ceylon was formally inaugurated on July 9, 1950, with the objects of assisting all who are interested in Amateur Radio to derive the maximum amount of enjoyment from their hobby, to advance and safeguard the interests of radio amateurs, and to provide them with opportunities for personal contact. A VS7 Newsletter has been started with VS7JA as Editor. A cup, presented by VS7KR, will be awarded to the winner of a 7 Mc/s. Hidden Transmitter Hunt. Secretary is Mr. J. E. Amaratunga; the address for all correspondence is P.O. Box 907, Colombo, Ceylon. R.S.G.B. members everywhere will welcome the formation of this new Commonwealth Society.

HELP US . . .

- *When writing to Headquarters do not include* BULLETIN *items, queries, changes of address and publication orders, etc., on the same sheet of paper. Only one envelope is necessary, but a separate sheet for each subject please.*
- *Always print, or write clearly, your full name and address. Christian names, call-signs and illegible signatures cause much unnecessary checking.*
- *Notify Headquarters of impending changes of address several weeks before you move. Alterations to subscription reminders, etc., are not sufficient unless definite instructions are given. Include your B.R.S. number and/or call-sign, your present address and, if possible, the date your subscription falls due. Remember that* BULLETIN *wrappers are prepared up to a fortnight before the publication date.*
- *When forwarding your subscription renewal always return the reminder card sent to you from Headquarters, or, if this has been lost, indicate the date your subscription fell due.*
- *Please send all QSL cards to Mr. A. O. Milne, G2MI, 29 Kechill Gardens, Hayes, Bromley, Kent, and not to Headquarters.*
- *The Society is seldom able to supply information on ex-Government equipment except in the form of* BULLETIN *articles.*

. . . TO HELP YOU!

A Devon Occasion

FOR the first time in the history of the Society an Official Regional Meeting has been held in Plymouth. The date—Sunday, September 24, 1950—the venue, the Continental Hotel. Wisely, the hour before lunch had been set aside for the gentle art of ragchewing—and how it was used! A miniature Tower of Babel seemed to have been created. Coach and car parties from Exeter, Weston-super-Mare, Bristol, Falmouth, Penzance and other remote parts of the widely-flung Region added their quota to a sizeable gathering of locals and near-locals until an attendance only just short of 100 was finally recorded.

The Headquarters party, in the persons of the President (Mr. W. A. Scarr, M.A., G2WS), the Executive Vice-President (Mr. F. Charman, B.E.M., G6CJ), the General Secretary (Mr. John Clarricoats, G6CL) and the Assistant Secretary (Miss May Gadsden) had the support of the Regional Representative (Mr. H. A. Bartlett, G5QA of Exeter) and a goodly number of County and Town Representatives.

A comprehensive display of radio equipment, arranged by Mr. H. Jones, G5ZT, attracted great interest during the pre-lunch period and again later in the day.

During lunch—an excellent meal served in the spacious and well-appointed ballroom — the General Secretary initiated a number of informal toasts which were taken up by either the President or Regional Representative with the particular group concerned.

A toast to the Society was offered by Mr. Bartlett and replied to by the President, after which Mr. Harold Jones proposed the health of the ladies, and Miss Anne Walford, G3GOX—the only licensed lady member present—responded.

Business Meeting

The business meeting was opened by Mr. Bartlett, who extended a warm welcome to the official party from London and to all others who had made long journeys. He then invited the President to preside.

Mr. Scarr spoke of his pleasure at being present in such congenial surroundings and in the company of such an enthusiastic group of members. He commented upon the excellent organisation which had contributed to the success of the meeting and congratulated all concerned.

The meeting was then addressed by the General Secretary, who gave much useful advice and information on topics of domestic, national and international interest. He urged full support for local Festival of Britain activities and recommended T.R.s to offer the services of group members to their Local Authority.

Mr. Charman spoke on the subject of Contests and Miss Gadsden on matters concerning the routine side of Headquarters.

A number of questions, all of topical interest, were answered by the President or General Secretary.

Following tea, when tongues were again let loose, a draw for prizes took place. Mr. Charman then cast his spell over the audience by demonstrating his miniature aerials. The majority of those present had not previously witnessed this demonstration and loud were the praises when at last the "Aerial Wizard of Stoke Poges" sat down. The general opinion was that Mr. Charman's lecture alone was worth a day's travel to hear.

The writer of this brief account wishes to record his personal thanks to all who contributed in any way to the success of the event. Special thanks are due to Mr. Bartlett and Mr. Gordon Wheatcroft, BRS.13,968, for donating prizes, to Mr. H. Jones for arranging the display, to overseas visitors VS6BK and VS7QD, and to those stalwarts—such as G2JL, 2TZ, 5DV, 5UF and 6LV—who travelled from distant parts to be present.—J.E.

South-Western Official Regional Meeting, Plymouth, September 24, 1950.
Front Row: G3TX, Miss Gadsden, G5UF, G6CL, G2WS, G5QA, G6CJ, BRS13968, G2BDO, G3EFY.

The eleven competitors in the eliminating round of the R.S.G.B. D/F Contest which was held at Romford on August 13. G3BSI, of Southend, was the first to locate the transmitter, followed by G3FHH, also of Scuthend. The event was organised by G3FNL and members of the Romford Radio Society.

"Hej and Farvel"

FOR several years, parties of British amateurs, organised by Harold Andrews, G5DV, have, each summer, crossed the waters to meet in person fellow enthusiasts in European countries. This year was the turn of Denmark and Sweden: a choice which few of the 26 members of the party had cause to regret.

So it was that one evening in August the citizens of Copenhagen must have pondered over the meaning of the large banner "Welcome to the G Hams" which suddenly appeared at the railway station; perhaps, they thought, the mad English are now *exporting* bacon! No less mysterious

At Copenhagen. This group includes: G2DP, 3RQ, 3BAP, GM3CSM, G2MR, G3FMY (G XYL), G6DH (GXYL) and PA0JG.

was the strange language which echoed along the platform as OZ greeted G, GM and GW! But not for long—soon the combined party were wisked away to a roadhouse where refreshments were waiting.

After four hectic days in Copenhagen, including the traditional Dinner Party—more than 40 were present—it was time to depart for Stockholm. Here the arrival was no less impressive, SM5WL, Editor of *QTC*, having "laid-on" a reception party complete with press photographers. The following evening the visitors were privileged to attend an S.S.A. tea-party, supported by more than 100 enthusiasts. The international flavour of the trip was strengthened by the presence of PA0JG and W1RSY, and two well-known YL operators, OZ4YL (formerly OZ7EH) and I1AOY. Visits were paid to many places of interest,

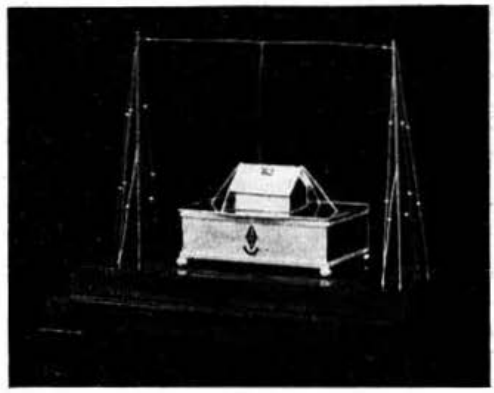
Another Copenhagen Group which includes: G5DV, OZ5KM, G3BJU (G XYL), OZ3EA, OZ3BC, G3FOO and G2AUP.

On the return journey, a further two days spent at Copenhagen, provided an opportunity to visit the Danish Radio Exhibition. Now, safely home, the thanks of the entire party, which included G2AUP, DP, MR, UK, 3BJU, CTE, EYO, FMY, FOO, RQ, 5DV, 6DH, MN, GM3CSM and GW5TJ, are extended to their many OZ and SM friends, both new and old; and also to the kind Fates who provided brilliant sunshine throughout the trip. To SM—"*Adjö och tack sa mycket.*" To OZ—"*Farvel og mange tak.*"

Region 1 Field Day Results

TEN towns were represented in the first Region 1 Field Day held on August 27, 1950. Despite keen competition—only twenty points separated the leading five stations—Bolton, operating under the call G2BTO/P, finished at the top of the table with 94 points.

Place	Town	Call	Points
1	Bolton	G2BTO/P	94
2	Burnley	G8TD/P	85
3	Manchester (N.W.)	G2ATU/P	80
4	Southport	G2ART/P	78
5	Bury	G3BRS/P	75
6	Wirral	G3BOC/P	72
7	Warrington	G3CKR/P	67
9	Preston	G3FBH/P	58
8	Liverpool	G2AXH/P	46
10	Ashton-u-Lyne	G3BY/P	28



Region 1 Field Day Trophy

Here is a picture of the handsome and distinctive trophy which has been donated by a local member and his family for annual competition among the R.S.G.B. Town Groups and Affiliated Societies in Region 1. It comprises a silver casket, bearing the R.S.G.B. emblem, surmounted by a miniature silver tent, and mounted on a polished mahogany stand between two aerial masts: a wooden case should enable the trophy to travel around Region 1 in safety. This year's contest was won by the Bolton Group, and the trophy was presented to the T.R. for that town at the Preston O.R.M. on October 29.

Silent Keys

It is with deep regret that we record the passing of Mr. W. E. ("Bill") Firth (GM8RU) of Glasgow on September 17. Mr. Firth, who operated mostly on 7 and 14 Mc/s., will be sadly missed by his many friends and colleagues. To his wife and daughter we extend our heartfelt sympathy. GM6MD.

* * *

Members will learn with deep sorrow of the death of Lieut. (E.) Derek Aldwell, R.N. (GI3EDN-G3EDN/A), as the result of a flying accident at St. Merryn, Cornwall, on September 13. Although only recently licensed, he was widely known and respected for his great and infectious enthusiasm. When on leave Lt. Aldwell frequently operated from GI2HML, his brother's station in Belfast. His death will leave a gap in the ranks of the younger generation of amateurs which will be hard to fill. We offer our profound sympathy to his family.

G6CW—GI2HLT.

* * *

It is our sad duty to record the death, also on September 13, of Mr. A. T. King-Moir (G5WN), of Bromley, Kent. Although a keen amateur for many years his recent radio activities had been limited by failing health, and the work entailed in his Harley Street practice as a radiologist of considerable eminence. His charm and wise counsel will be much missed by those who were privileged to know him.

H. B.

HEADQUARTERS CALLING

July Council Meeting

Résumé of the Minutes of a Meeting of the Council held at Headquarters on July 18, 1950, at 6 p.m.

Present.—The President (Mr. W. A. Scarr), in the Chair, Messrs. W. H. Allen, A. P. G. Amos, F. Charman, D. N. Corfield, W. N. Craig, C. H. L. Edwards, J. W. Mathews, A. O. Milne, P. A. Thorogood and John Clarricoats (General Secretary).

Apology.—Apologies for absence were submitted on behalf of Messrs. V. M. Desmond and A. J. H. Watson.

Finance.

The Cash Accounts for May and June, 1950, as prepared by the Hon. Treasurer were accepted and adopted.

Membership.

Resolved—

(*a*) To elect 66 Corporate Members, 17 Associates and 4 Junior Associates (total elected 87).

(*b*) To grant Corporate Membership to 13 Associates who had applied for transfer.

" Milford Viscount."

Correspondence was submitted from the Ministry of Transport regarding a suggestion put forward by the Society that a meeting should take place to discuss the procedure to be adopted if radio amateurs are again called upon to co-operate with the authorities in maritime distress work.

(The correspondence was referred to in the September issue of the BULLETIN.)

Mr. D. L. Davies.

It was reported that the Minister of Town and Country Planning had dismissed the appeal of Mr. D. L. Davies, G8QW, to be allowed to retain in position his 58 ft. tower.

Violation of Licence Regulations.

It was agreed to draw the attention of the A.R.R.L. to the activities of a U.S. amateur station which had been heard transmitting news bulletins to amateurs in the U.S. Zone of Germany.

I.A.R.U. Congress, Paris.

It was reported that the Society had issued an account of the Congress to all I.A.R.U. Societies.

Festival of Britain.

After studying reports from Messrs. Sharp (Region 2) and Vance (Region 4), it was resolved to inform the Festival authorities that the Council has decided, with regret, to abandon the idea of manning an Amateur Radio station at the Land Travelling Exhibition.

[A new proposal from the Festival Authorities is now being examined, further details of which will be published shortly.—ED.]

St. Albans.

It was reported that difficulties had arisen in St. Albans due to the reluctance of the T.R. to take an active interest in Society affairs. The Membership and Representation Committee had considered correspondence from the North London D.R. and had proposed that the Secretary should write to the T.R. in question, pointing out that unless a satisfactory reply is received within 7 days he will be deemed to have resigned.

Resolved to approve the proposals of the Committee for dealing with the question of representation in St. Albans.

Guildford-Woking Area.

It was reported that certain members resident in that part of Surrey which is in Region 8 had expressed a desire to be more closely allied with members living in certain parts of Surrey which are in Region 7. Correspondence had taken place between the Region 8 Representative and Headquarters from which it had been made clear that Surrey members in Region 8 would feel satisfied if they could be transferred to Region 7 (London).

The Membership and Representation Committee were of the opinion that the wishes of the members concerned should be met.

Resolved to agree to the recommendations of the Committee and to transfer that part of Surrey in Region 8 to Region 7.

O.R.M.s.

It was reported that the Membership and Representation Committee had given consideration to a suggestion that a circular should be issued setting out the precise duties of a Regional Representative appertaining to O.R.M.s.

The Committee recommended the Council to define the duties as under:

(*a*) To organise all Official Regional Meetings held in his Region.

(*b*) To submit to the Council such resolutions, recommendations and suggestions as may be put forward by his County Representatives or other members, irrespective of who is in the Chair.

(*c*) In the event of financial loss being incurred in running the meeting and if a claim is to be made against the Society, to submit to the Council a Profit and Loss Account.

Resolved to issue a circular to the Regional Representatives outlining their duties, as put forward by the Committee, appertaining to Official Regional Meetings.

General Purposes or Organisation Committee.

The Council gave consideration to the constitution of the Committee and

Resolved—

(*a*) That the Committee shall consist of four Members of the Council and the General Secretary.

(*b*) That the General Secretary shall have full voting powers.

(*c*) That the Council Members of the Committee shall be Messrs. F. Charman, C. H. L. Edwards, P. A. Thorogood and A. J. H. Watson.

(*d*) That the Committee shall have power to co-opt up to four non-Council members.

(*e*) That the President shall be an ex-officio member of the Committee.

Recess.

Resolved—

(*a*) That the Council shall not meet during the month of August, 1950, unless some matter of extreme urgency shall have arisen.

(*b*) That the President be authorised to instruct the Secretary to convene a meeting of the Council during August if, in his view, such a meeting appears desirable.

(*c*) That the President and Acting Vice-President (Mr. F. Charman) be authorised to deal with any normal matter calling for an early decision.

(*d*) That the President be authorised to deal with all applications for membership received up to Tuesday, August 15, 1950, and that the Secretary be instructed to advise the Council at its next meeting of the President's decision.

Mr. Mathews voted against the resolution.

The meeting terminated at 10.20 p.m.

London Lecture Meetings

An attendance of about 100 was recorded at the opening meeting of the 1950-1 season held on Friday, September 29, at the Institution of Electrical Engineers, London, when Mr. F. Charman, B.E.M., G6CJ, demonstrated his miniature aerials including a number of new designs.

Messrs. Newton, G2FKZ, Heathcote, G3JR, Dodd, G8GX, and Royle, G2WJ, were among those who contributed to the discussion.

Mr. A. O. Milne, G2MI, was in the Chair.

* * *

Mr. J. W. Mathews, G6LL (Hon. Secretary), was in the Chair at the meeting held on Friday, October 27, when Mr. H. J. Leak, M.Brit.I.R.E., lectured to more than 100 members on " High Quality Reproduction." A convincing demonstration of the capabilities of modern amplifier and loudspeaker equipment took the form of a direct comparison between musical instruments played in the lecture theatre and in an adjoining " studio." After the conclusion of his paper the lecturer dealt ably with a barrage of questions on many aspects of high-fidelity technique. Mr. W. H. Allen, M.B.E., G2UJ, voiced the thanks of the meeting to Mr. Leak.

Slow Morse Transmissions

Regular slow Morse transmissions have proved of considerable benefit to many aspiring amateurs, but more volunteers are still required for districts not already covered and to allow a temporary respite to stations who have given their services for several years.

Stations listed who find themselves unable to continue transmissions should immediately notify the organiser, Mr. C. H. Lamborn Edwards, A.M.I.E.E. (G8TL), 10 Chepstow Crescent, Newbury Park, Ilford, Essex.

G.M.T.	*Call*	*kc/s.*	*Town*
Sundays			
09.30	G6NA	1750	Guildford
10.00	G6MH	1990	Southend-on-Sea
10.00	G5XB	1950	Reading
11.00	GM3AVA	1860	Falkirk
22.00	G2FXA	1900	Stockton-on-Tees
Mondays			
13.00	G3AXN	1870	Southend-on-Sea
19.00	G3NC	1825	Swindon
19.30	G3AIX	1760	Birmingham
19.30	G3ESP	1850	Wakefield, Yorks
19.30	G3GYW	1922	Westcliff-on-Sea
20.00	G2AJU	1900	Stutton, Ipswich
20.00	G3DSR	1750	Derby
20.00	G2CLD	1775	Tunbridge Wells
21.00	G2BLN	1900	Bournemouth
21.00	G3BHS	1820	Eastleigh, Hants
22.00	G8TL	1896	Ilford
22.00	GM4MF	1860	Falkirk
Tuesdays			
13.00	G3AXN	1870	Southend-on-Sea
19.00	G5XB	1905	Reading
19.30	G2AVK	1850	Ossett, Yorks
20.00	GI2HLT	1900	Belfast
21.00	G3EFA	1855	Southport
22.00	G3ELG	1772	Rotherham
22.00	G2FXA	1900	Stockton-on-Tees
22.30	G6JB	1820	Salcombe, Devon
Wednesdays			
18.45	G3CQL	1990	Leigh-on-Sea
20.00	G2NY	1850	Preston
20.00	G3AFD	1783	Southampton
22.00	G6NA	1840	Guildford
22.00	G3DLC	1800	Grays, Essex
22.00	GM4JQ	1860	Falkirk
Thursdays			
18.00	G3AXN	1870	Southend-on-Sea
19.00	G3NC	1825	Swindon
19.30	G2AQN	1850	Ossett, Yorks
19.30	G3BUJ	1990	Southend-on-Sea
20.00	G3NT	1805	Northallerton
21.30	G6DL	1760	Birmingham
22.00	G2FXA	1900	Stockton-on-Tees
22.00	G3ARU	1990	Wanstead, E.12
22.30	G3OB	1803	Manchester
Fridays			
13.00	G3AXN	1870	Southend-on-Sea
19.00	G3BLN	1900	Bournemouth
19.30	G3DMP	1850	Wakefield, Yorks
20.00	G2AJU	1900	Stutton, Ipswich
20.00	G2AMV	1870	Wirral
21.00	G3BHS	1820	Eastleigh, Hants
22.30	G6JB	1820	Salcombe, Devon
Saturdays			
10.00	G3FPS	1800	East Molesey
22.00	GM3OM	1860	Falkirk
23.00	G2FXA	1900	Stockton-on-Tees

OTHER AMATEURS ARE ASKED TO AVOID CAUSING INTERFERENCE TO THESE TRANSMISSIONS

Representation

The following are additions to the list published last month:—

Town or Area Representatives.

Region	Town	Name, call sign & Address
7	Ilford	A. F. Dennis, G3CNV, 19 Havering Gardens, Chadwell Heath.
	Harlow	B. E. Rogers, G8LC, 20 Priory Avenue.

Vacancies.

Messrs. K. D. Jackson, G3KJ, and A. S. McNicol, GM3UU, have resigned as Representatives for the Counties of Hampshire (Region 8) and Northern Counties (Region 12) respectively.

Messrs. G. L. Fish, G3ADJ, P. A. Mainwaring, G3BSM, H. M. Synge, G3BOC, E. J. Williams, G2AKY, and F. Hill, G2FZI, have resigned as Representatives for the towns of Hull, Southampton, Wirral, Dagenham and Reading, respectively.

As no replies have been received from recent correspondence addressed to Mr. J. F. Squires, G2DBF, he is deemed to have resigned from the office of Bournemouth Town Representative.

Nominations for their successors should be made in the manner prescribed in the September, 1949, issue of the BULLETIN and sent to reach the General Secretary by November 30, 1950.

Region 10 Representation

Messrs. A. J. Crookes, GW3ALV, and F. Hamer, GW8BW, having been duly nominated for the vacant office of Region 10 Representative, it will be necessary to conduct a Ballot.

Corporate Members resident in Region 10 are invited to record their vote in favour of one of the above candidates, and to forward same on a *postcard* addressed to the General Secretary, Incorporated Radio Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1, by not later than November 30, 1950.

Prescribed Form of Voting Card.

I, ... being a fully paid-up Corporate Member of the Society and resident in Region 10, wish to record my vote in favour of Mr. ..... as Regional Representative for Region 10.

Signed .....

Call-sign or B.R.S. .....

Address .....

.....

Around the Trade

The new *Eddystone* " 740 " communications receiver has now gone into production. Eight miniature B8A-based valves are used ; the line-up including an R.F. stage and a 450 kc/s. I.F. amplifier. Particularly attractive is the wide continuous frequency coverage, 484 kc/s. to 30.6 Mc/s., thus covering the 500 kc/s. shipping and the medium-wave broadcast bands, as well as all amateur and short-wave broadcast bands up to 30 Mc/s. The price will be £29 10s. (exempt from Purchase Tax).

FORTHCOMING EVENTS—(*Continued from page* 123)

Lewisham (R.A.R.C.).—7 p.m., Wednesdays and Thursdays, Childeric Road School, New Cross.
New Barnet.—December 16, 7.30 p.m., Bunny's Restaurant, Station Road.
St. Albans.—December 13, 8 p.m., " The Beehive," London Road.
Slough.—December 21, 7.45 p.m., The Golden Eagle Hotel, High Street.
Sutton & Cheam.—December 5, 19, Sutton Adult School, Benhill Avenue.
Welwyn.—December 5, 8 p.m., Council Chambers.
Woolwich & Plumstead.—December 6, 20, 8 p.m., Bull Tavern, Vincent Road, S.E.18.

REGION 8

Brighton.—Tuesdays, 7.30 p.m., Eagle Inn, Gloucester Road.
Chatham (M.A.T.R.S.).—Mondays, 7.30 p.m., Co-operative Hall, Luton Road.
Eastbourne.—December 1, 7.30 p.m., Friends Meeting House, Wish Road.
Gillingham (G.T.S.).—Alternate Tuesdays (November 21, etc.), 7.30 p.m., Medway Technical College.
Petersfield.—November 23, 7.30 p.m., Y.W.C.A. Hostel, High Street.
Portsmouth.—Tuesdays, 7.30 p.m., Royal Marines' Signal Club, Eastney Barracks.
Reading (R.R.S.).—Main Society, November 25, December 14; Instr. Section, December 9, 7 p.m., Abbey Gateway; November 26, Annual Hamfest, People's Pantry, Cross Street.

REGION 9

Bristol.—November 17, December 15, 7 p.m., Keens Cafe, Park Row.
Exeter.—December 1, 7 p.m., Y.M.C.A., 41 St. David's Hill.
Gloucester.—Alternate Thursdays (November 16, etc), 7.30 p.m., Spread Eagle Hotel, Market Parade.
North Devon.—December 1, 7.30 p.m., Rose of Torridge Cafe, The Quay, Bideford.
Plymouth.—November 17, 7 p.m., Tothill Community Centre, Tothill Park, Knighton Road, St. Jude's.
Stroud.—Wednesdays, 7.30 p.m., Subscription Rooms.
Torquay.—November 18, 7.30 p.m., Y.M.C.A., Castle Road.
Weston-super-Mare.—December 12, 7.30 p.m., Y.M.C.A.
West Cornwall (W.C.R.C.).—November 16, December 7, " Fifteen Balls," Penryn.
Yeovil.—Wednesdays, 7.30 p.m., Grove House, Preston Road.

REGION 14

Falkirk.—November 24, December 8, 7.30 p.m. Temperance Cafe, High Street.
Glasgow.—November 29, 7.30 p.m., 39 Elmbank Crescent.

TOP BAND CONTEST

THE second " Top Band " (1.8 Mc/s.) Contest of the 1950 programme will be held during the weekend of November 18-19.

The contest is open to all members who are licensed to operate on the band, wherever situated. The leading station in the British Isles (prefix zones: G, GC, GD, GI, GM, GW) will be recommended to Council for the award of the *Victor Desmond* trophy. The leading overseas entrant will receive a certificate of merit. There are few changes in the rules—as they relate to British stations—since the February event.

Fullest use should be made of the entire band (1715-2000 kc/s.) to avoid undue congestion. Competitors are also reminded that the tone report T9 should only be given to stations whose notes are " Purest D.C."

A list of the counties which form the R.S.G.B. regions will be found on page 83 of the September, 1949, issue of the BULLETIN.

Rules

1. The contest is open to all fully paid-up members of the Society.
2. The contest will run from 2100 G.M.T. on Saturday, November 18, to 0800 on Sunday, November 19.
3. Entries will only be accepted if submitted on foolscap or quarto paper and set out in the form below:—

Top Band Contest
November 18-19, 1950

Name ..... Call S'gn .....

Address ..... Region .....

Transmitter .....

Aerial System .....

Receiver .....

Contact No.	Time	Call Sign of station worked	REPORT			POINTS Claimed		
			Sent	Recd.	Reg.	3	4	5
1		G2——	599	599	06		4	
2		G3——	599	599	07	3		
				Sub-Totals				
				Total				

Declaration: I declare that my station was operated strictly in accordance with the rules and spirit of the Contest and I agree that the ruling of the Council of the R.S.G.B. shall be final in all cases of dispute.

Signed .....

4. Details at the top of the entry form must be completely filled in and the declaration signed, otherwise the entry will be disqualified.
5. Entries must be addressed to the Hon. Secretary, R.S.G.B. Contests Committee, New Ruskin House, Little Russell Street, London, W.C.1. No entry will be accepted bearing a postmark later than Monday, November 27, 1950.
6. Contest operation during local hours of restriction in the use of electricity for wireless which have been publicly announced is prohibited.
7. Proof of contact may be required.
8. Contacts with ships or unlicensed stations will not be permitted to count for points.
9. The contest is confined to two-way telegraphy contacts only.
10. Only the entrant will be permitted to operate his apparatus during the contest.
11. An exchange of RST report and Region number will be required before points for a contact can be claimed. The report and region number must be sent as a six character group, e.g. 579R07 or 579R11 for Regions 7 and 11 respectively. All reports must be acknowledged with " R."
12. Only one contact with a specific station during the contest will be permitted to count for points.
13. The system of point scoring will be as follows:—
   (*a*) For entrants in the British Isles (G, GC, GD, GI, GM, GW)—
      Three points will be scored for contact with a station in the entrant's own R.S.G.B. Region.
      Four points will be scored for contact with a station in any other R.S.G.B. Region.
      Five points will be scored for contact with a station outside the British Isles (*e.g.* DL2).
   (*b*) For entrants elsewhere—
      Three points will be scored for contact with a station in the entrant's own country.
      Four points will be scored for contact with a station outside the entrant's own country.
14. The power input to the final stage of the transmitter or to any preceding stage must not exceed 10 watts.
15. Any competitor frequently receiving tone reports lower than T9 may be disqualified.
16. Stations can also be disqualified for unethical operating procedure reported by the monitoring stations.
17. An award will be made to the station in the British Isles with the highest total score. Certificates of merit will be awarded to the stations placed second and third, and to the leading station outside the British Isles.
18. The Contests Committee reserves the right to alter or amend these Rules at any time prior to the commencement of the contest.

AROUND THE REGIONS

Dumfermline Radio Society

New members and R.S.G.B. visitors to the district are invited to the monthly meetings of the Dunfermline Radio Society, held on the last Thursday of each month. On November 30, at the Public Baths, Pilmur Street, Mr. C. N. R. Ross, GM3ACD, will open a discussion on operating procedure. President is Mr. J. F. Shepherd, GM3EGW. Full information can be obtained from the Hon. Secretary, D. Lean, GM3GFH, 14 Hillwood Terrace, Rosyth.

Edgware 2-Metre D.F. Field Day

On Sunday, October 15, the second annual 2-metre direction finding contest of the Edgware and District Radio Society took place. The hidden portable transmitter, G3HT/P, was located amongst trees and bushes on Stanmore Common. Transmissions were made at intervals of 20 minutes between 1400 and 1645 BST, and the station was first discovered by Messrs. S. Fryer, G3ERO, and R. Filkin, G3BJT, accompanied by their car driver, Mr. W. Holl, G2DSV, who arrived at 1630 BST. Runners-up were Messrs. K. Smith (1633 BST) and R. Haygreen (1638 BST). No other competitor located the transmitter.

The equipment used by all entrants comprised some form of squegging oscillator receiver, whilst the transmitter employed a pipe oscillator constructed by G3HT using a DET 20, plate-modulated for speech and M.C.W.

Fine weather added considerably to the enjoyment experienced by all who took part, and a cine-camera record of the event was taken by Mr. Leslie Gregory, G2AI, President of the Society. Tea was enjoyed at Heath Cafe, Bushey Heath, during which the competitors compared notes with each other and with the operator of G3HT/P.

The success of this event has been such that the organiser is to be asked to repeat the effort at an early date. Incidentally the Edgware and District Radio Society was probably the first club to run a 2-metre D.F. contest.

Luton Amateur Radio Exhibition

Amateur television equipment, a typical 1.8 Mc/s. amateur station, and a representative selection of home constructed equipment were features of an Amateur Radio exhibition held at St. Mary's Hall, Luton, on October 21. The closed-circuit television demonstrations, arranged by Mr. Ivan Howard, G2DUS, were interspersed with short technical descriptions of the 300-line equipment.

Contacts with a number of amateur stations were made with an eight-watt " top-band " transmitter and an AR88 receiver. The constructional section was also supported by exhibits of the work of the Sheffold club. Attendance by the general public—about 500—was less than had been anticipated, but those who came were given an outstanding impression of Amateur Radio. The Luton Society hope that the exhibition may become an annual event. The R.S.G.B. was represented by Council Member A. P. G. Amos, G3AGM.

Midland Amateur Radio Society

At the well-supported A.G.M. held in September, the retiring President, Mr. Garnett G. Lapworth, G6DL, reviewed the accomplishments of a most successful year. Mr. Arnold Rhodes, who has held the office of Hon. Secretary for several years, has been elected to succeed Mr. Lapworth, while Mr. B. Bligh takes over the secretarial duties.

Local interest in the radio control of models has risen appreciably as a result of a recent lecture by Messrs. Such and Verity, in the course of which several working models were demonstrated. Members of M.A.R.S. would appreciate information on the results achieved by other groups in this absorbing hobby. Meetings are held on the third Tuesday of each month at the Imperial Hotel, Birmingham.

Stourbridge & District Amateur Radio Society

A display of six films on elementary electronics, shown by courtesy of the Midland Electricity Board, proved very popular, and further film programmes have been arranged.

Worthing & District Amateur Radio Club

Outstanding event of the month was the participation in a local exhibition, at which an attendance of over 5,000 was recorded. Exhibits on the Club stand included a display, compiled by Mr. Upperton, of museum pieces of early receivers, gramophones, loudspeakers and valves. Some interesting interference suppression equipment, including a visual display of the effects of car ignition systems, was provided by the G.P.O. Radio Interference Branch. Members' home-constructed apparatus was shown and attracted much favourable comment.

This Month's
AMAZING OFFER!

Despite substantial price increases throughout the country, we are still able to offer you at very low prices a complete station consisting of two items: a first-rate Communication Receiver and a QRO Transmitter.

ADMIRALTY RECEIVER
Type B36 (Made by Marconi)

Covers 1-20 Mc/s. in 4 Bands. Line up: 2 RFs-KTW62s, Frequency Changer X65, 3 IFs (2 KTW63s, 1 X65) Det. and First Audio DH63, Output KT63, BFO, KTW63. Well designed Coil Turret gives this set a sensitivity of less than 1 μV, with a 10 dB sig./noise ratio on all bands. **A final offer of these very F.B. Receivers**

LESS VALVES **£9–10–0** EACH

AMERICAN TRANSMITTERS
Type 4336

A Phone/C.W. Transmitter covering 2-20 Mc/s. Tuning Controls, Operating Switches, Meters and Modulation/Keying Indicator of Vacuum Column Type, mounted on the front panel. Size approx. 5' high x 17" x 24".
Line Up 807 C.O. into pair of 813s in parallel. Carrier output 350 Watts C.W. 250 Watts phone. Input 230 V. 50 c/s.
High Speed Keying Relay up to 100 words per minute.
The Modulator consists of a pair of 805s (an external speech amplifier being used).
Rectifiers are 4 866s.
These Transmitters are in good condition and complete except for some vitreous clip in resistors. Owing to the size of these items we are offering them as stated and less Valves at

£12–10–0 Each, **EX NEWPORT**

DON'T MISS THIS OFFER.

AMPLIFIER UNIT Type A3562A

Contains 2-807s, 1-EF50, 1-5U4G, 1-EA50, Block Condensers, Metal Rectifier, Potentiometer, etc. Also 2-500 c/s. Transformers, one of which gives 22 V. at 1 A. with a 230 V. 50 c/s. input.

Brand New in Sealed Cartons.

19/6 Each, Plus 2/6 Carriage.

500Volt 'RECORD' MEGGERS

A few only available

At **£5** Each

VALVES

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1625s at 6 for **£1** or **3/9** Each
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AERIAL MASTS

Sectional Type. 2¼" dia., approx. 6½' long, 6 lengths make 40' mast in tubular lightweight steel.

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PRE-SET TRIMMER CONDENSERS.—Air-spaced: 10pF., **2/-**; 20 pF., **2/3**; 30 pF., **2/6.** Compression: 30 and 50 pF., **1/-**; 100 pF., **1/3**; 250 pF., **1/9**; 500 pF., **2/2**; 750 pF., **2/3.**

VARIABLE TUNING CONDENSERS.—Eddystone Ceramic Microdensers: 580, 12.5 pF., **5/-**; 588, 27.5 pF., **7/3**; 589, 54 pF., **7/3**; 582, 60 pF., **6/-**; 585, 100 pF., **7/6**; 586, 140 pF., **7/9**; 476, 15+15 pF., **7/3**; 583, 25+25 pF., **7/6**; 739, 8+8 pF., **8/-**; 584, 34+34 pF., **7/9**; 719, 25+25 pF. Differential, **7/6**; 738 100 pF. with double end plates and bearings, high stability type for V.F.O.s, etc., .03" A.G. **15/-.** Transmitting types: Eddystone: 137, 60+60 pF., .068" A.G., **32/-**; 611, 25+25 pF., .08" A.G., **27/6**; 612, 50+50 pF., .08" A.G., **25/-**; 614, 100+100 pF., .08" A.G., **29/-** Labgear: 0.05" A.G.:– 50 pF., **14/-**; 50+50 pF., **21/-**; 75+75 pF., **23/-.** Labgear: 0.1" A.G.:– 100 pF., **35/-**; 50+50 pF., **37/6**; 50 pF., **30/-.** Raymart: 0.09" A.G. 15 pF., **4/6**; 40 pF., **5/3**; 0.058" A.G. 20 pF., **4/3**; 0.07" A.G. 80+80 pF., **25/-**; 0.08" A.G. 100 pF., **45/-**; 0.15" A.G. 50 pF., **45/-**; 100 pF., **55/-**; 100+100 pF., **65/-.**

AERIAL WIRE & FEEDER CABLE.—14 S.W.G. hard-drawn enamelled copper aerial wire, 70', **5/6**; 100', **7/6**; 140', **10/6.** Telcon Cable: K25, flat, 300 ohm, **9d.** yd.; K35, tubular, 300 ohm., **1/3** yd. Belling Lee: L600, 80 ohm., ½" diam., co-axial, **1/3** yd.; heavy duty, 80 ohm., .45" diam., co-axial, **10d.** yd.; lightweight, 52 ohm., co-axial **1/-** yd.; L1221, 80 ohm., twin screened, **1/9** yd.; L336, twin flat, 80 ohm., **7½d.** yd.

COMMUNICATIONS RECEIVERS.—Eddystone: "740," **£29/10/0**; "750," **£49/10/0**; "680," **£89/5/0.** Radiovision: "Hambander," **£25/10/0**; "Commander," **£52.** Further details on request.

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The following are new, but in plain cartons or unboxed: 12SH7, **4/-**; 2C26, 6SK7, **4/9**; 6B8, 12SK7, EC53, 76, **5/-**; 5R4GY, 5Z4, 5U4G, VR105, **5/9**; 6F6G, 6J7, 6V6, 6Y6G, **6/-**; 6B4G, **6/3**; 80, **7/-**; 6L6G, 6J6, **7/9.**

THERMAL DELAY SWITCHES, 6NO75, **8/6.**

ADMIRALTY WAVEMETER G82A. This unit contains one EC53, one EA50, one Y63 Magic Eye and three EF50, also 200: 1 slow-motion dial and numerous components in sturdy grey case. Weight 23 lb. Price **31/-** plus 4/6 carriage

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Large assortment of ex-Govt. valves at lowest prices. Metal Rectifiers 350 V. 60 mA., **3/6**; assorted Eyelets, **1/-** gross; Sleeving, **6d.** doz. yards; 465 kc. IFT's, **6/-** pair; 6½" Speakers, **10/-**; ½-meg. Pot with switch, long spindle, **3/3**; Knobs, **2½d.**; Microphone Transformer, **6d.** All items plus post and packing.

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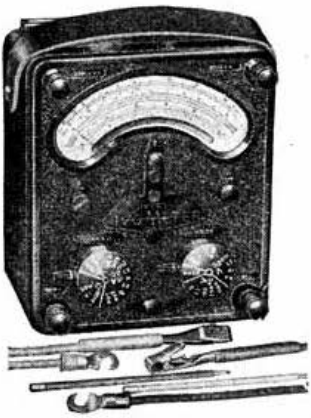

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It is a compact and portable multi-range instrument, having many advantages which will commend it for use in laboratory or workshop. **A 5-inch clearly marked scale** with an anti-parallax mirror is used for the following ranges of readings:

D.C. CURRENT: 50μA to 1,000 mA.
D.C. VOLTAGE: 2.5 V. to 2,500 V.
A.C. VOLTAGE: 10 V. to 2,500 V.
RESISTANCE:
Model 1: 0.1 ohm to 5 megohms.
Model 2: 0.1 ohm to 20 megohms.

The instrument can be supplied, if required, fitted with magnetic screening for protection against stray magnetic fields. It will stand up to heavy overload and is **protected by an automatic cut-out.**

In addition to its multi-range facilities it can be used as a Galvanometer, for which purpose the zero can be offset to the extent of 30 per cent. of full-scale deflection by a simple knob adjustment.

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MAGNETS.—Swift Levick S.L.S. 36 circular horseshoe 1¾" dia. ⅜" thick, ½" Polar gap, drilled poles, weight 2oz., lift 3lb., **2/6** each. Alni disc Magnets ⅝" dia. ⅛" thick, 3/16" centre hole, **3/6. D.C. Electro Magnets,** twin coil, weight 10oz., lift 4lb. on 6 V., 3lb. on 4V. & 1½lb. on 2V., new surplus, **5/-,** post 6d.

MERCURY SOLENOID SWITCHES.—New and boxed 15 A., size **5/-,** post 1/-. Dewar Key Switches, 7-pole C.O., **3/6.** Yaxley 3-pole 3-way or 1-pole 8-way, **2/-** each, post 6d.

METERS.—Thermal A.C./D.C. 2½" flush panel meter, 0-6 A., **10/-.** 2" M.C. Ammeter 50-0-50 A., **5/-;** 0-20 A., **5/-,** post 6d. D.C. M.C. Ironclad Voltmeters, G.E.C., 4" Switch Bd., 0-40 A. and 0-50 V. **35/-** each, post 2/-; 5" Switch Bd. meters, A.C., 0-300 V. and 0-50 A., **35/-** each, post 2/-.

FREQUENCY METERS.—5" Flush Switch bd. type, Crompton make, 40-60 c/s., **£5 10s.**

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TRANSFORMERS.—Foster Double wound 230 V. 50 c/s. input 50 V. 2 A. output, **15/-,** post 2/-.

RELAYS.—G.P.O. bank of 20 100-ohm. relays, enclosed in metal case, **10/-;** post 2/-. G.P.O. relays in circular metal cases, as new, operate on 6-12 V. 30 ohms. 2 S.P.C.O. contacts 165 ohms. D.P.C.O. contacts 1,000 ohms., 2,000 ohms., both 2-S.P.C.O. contacts, **2/6** each, or **25/-** doz., post 6d. each relay.

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R28/ARC5 100-156 Mc/s. Radio receivers complete with 10 valves. Price **37/6**, plus 1/6 post.

NS1/STV280/80. Voltage stabilising valve, regulating simultaneously at the following four voltages: 73 V., 143 V., 205 V. and 283 V. Maximum cathode current 80 mA. **Bargain Price 12/9**, plus 11d. post.

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ROCK RADIO (G3LN)

VALVES.—832, **13/6**; 2A3, **7/6**; 6L6M, **8/6**; 807, **6/–**; 803, 805, **11/9**; 5U4, **6/9**; EF50, EF54, **4/6**; EL32, EF36, **3/9**; 5Z4, **5/9**; 6X5, **5/3**; 6J5, **3/3**; EA50, **2/9**. **DURAL TUBE.**—1" x 16 S.W.G., **8d.** ft.; ⅞" x 16, **7d.**; ⅜" x 20, **4d.**; ⅜" x 20 alum, **3d.**; ¼" x 18, **3d.**; small stocks, please quote alternatives, crg. extra. **FEEDER.**—300 ohm. H.D., 70 ohm., **5d.** yd.; 70 ohm., coax. ⅜" dia., best quality **7d.** yd.; all crg. extra. **3" MAGS. IPS** 50/100 V. A.C., **17/6** pr.; **METERS**, 350 mA., T.C., **3/3**; 40 V. M.C., **3/6**; **TX CONDENSERS**, 146 pf, 4kV., **3/3**. **CHOKES**, midget, 5H., **2/–**; swinging 3.6/4.2 H, 150 mA, **5/-**. **P.O.** standard jack plugs, **4d.**; large type 4-way plugs and sockets, **6d.** pr. **CERAMIC SWITCHES** for 150 watts, 3-bank, 2-way, **5/-**, or 3 for **12/6**; 2-bank **3/6**, or 3 for **9/-**. **COPPER WIRE**, 12 to 44 S.W.G., enam., D.S.C., Lewmex and Litz, see previous advts. **1154 TX**, 3-band, new in crate, **£5/10/-**. We stock Eddystone, Denco components.

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