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*The*  
**SHORTWAVE**

*Magazine*



**EXCLUSIVELY FOR THE  
RADIO EXPERIMENTER &  
TRANSMITTING AMATEUR**

**VOL. IV No. 9 NOVEMBER 1946**

# WEBB'S RADIO

THE SHORT-WAVE SPECIALISTS

cater for the experimenter pursuing not only results—but the BEST POSSIBLE results

*Some of the Specialised Equipment now available:—*

## CERAMIC ROTARY SWITCHES

A long-felt want is met by the WEARITE ceramic rotary switches, supplied in individual wafers and components. You assemble any desired combination of contacts to make the finest low-loss switch yet devised. Ideal for the super-efficient receiver and high-grade instrument work. Ceramic switch wafers available in three standard contact arrangements:—

- 1-pole 12-way (use index type 12A)
- 2-pole 6-way (use index type 6A)
- 4-pole 3-way (use index type 3A)

Ceramic wafer .. .. .	7s. 0d.
6 in. spindle with Index .. .. .	4s. 0d.
Side Rod, 2½ in. long .. .. .	3d.
Side Rod, 3¾ in. long .. .. .	4d.
Side Rod, 6 in. long .. .. .	6d.
Spacers, ¾ in. long .. .. .	1½d.
Spacers, ¾ in. long .. .. .	1½d.
Spacers, 2 in. long .. .. .	4d.
Moulded Straps .. .. .	8d.
Nuts .. .. . per dozen	3d.

One moulded strap is required for each wafer used. The 6 in. spindle supplied with the three types of Index can be readily cut down to required length.

## EXAMPLE OF COSTING

Complete ceramic 2-wafer switch, each wafer 1-pole 12-way .. .. £1 1s. 10d.

## TEST INSTRUMENTS

In some directions these instruments are becoming a trifle easier in supply. Enquiries invited for such instruments as the AvoMeter Model 7 at £19 10s. 0d., AvoMeter Model 40 at £17 10s. 0d., and the new Pullin "Series 100" Multi Range

Meter, 10,000 ohms per volt, price £8 10s. 0d.

## RADIO FEEDERS

Webb's 600 ohms Feeder, something new. Ready built in lengths of 50 and 35 feet. Spacing 3½ in. with 18-gauge wire. Polythene spreaders securely moulded into wire every 20 ins., light and rigid construction. Supplied on drums ready for winding off, and immediate use.

- Per 50 ft. drum .. .. £1 17s. 6d.
- Per 35 ft. drum .. .. £1 6s. 3d.

*(Packing and despatch 2/6 extra)*

Co-axial Cable, impedance 80 ohms, outside diameter ⅞ in. Any length supplied. Polythene internal insulation, weather-proof rubber outer covering.

- Per yard .. .. . 1s. 6d.

Special.—Ten-yard lengths of ⅞ in. 80 ohms co-axial as above, fitted both ends with co-axial plugs and sockets. (Supplied only in 10-yard lengths).

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- No. 1034. 17¼ in. wide, 9¾ in. deep, 9¾ in. high .. .. £2 12s. 6d.
- No. 1061. 6½ in. wide, 6 in. deep, 7 in. high .. .. £1 10s. 0d.

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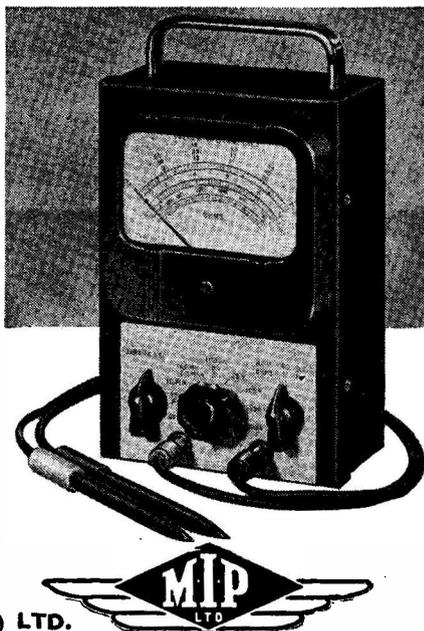
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Milliamps, D.C. only 2.5, 10, 25, 100 and 500.  
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Resistance from 100 Ohms to 1 Megohm with 13,500 Ohms at mid scale. Price **£8.10.0.**

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Transformer and Condenser for same ... ..	5/-
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**SWITCHES.** Dewar panel key Switches, 8-pole, C.O. flush fitting, 5/-; Yaxley 3-pole, 3-way, 3/6; 8-pole 1-way, 3/6. Lucas 8-way ex R.A.F. Switch Boxes, 3/6; 6-pole, 3/-; D.P., C.O. Toggle panel type, 4/3.

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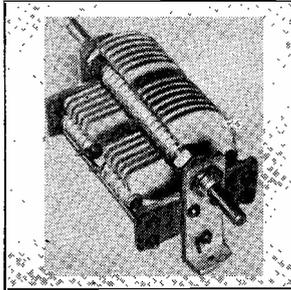
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These condensers are reasonably priced, soundly engineered components for the discriminating Amateur Transmitting Enthusiast. Materials and workmanship throughout are of the highest quality. End brackets are aluminium. The vanes are silver plated brass, accurately assembled for uniform airgap. The stator insulation employs rugged mycalex plates which are dimensioned for long leakage path. Rotor shafts of hard brass have conical bearing surfaces and the standard 1/2" dia. shafts extend for approximately 1" at each end. The range includes two series which are for either 1,500 v. or 4,000 v. peak working.



Type C75/75. Cat. No. E.5002C.  
A split stator 1,500 v. Peak Condenser. Cap. per section 75 pF. max. 10 pF. min. Price 24s. 6d.

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Cat. E.5002B. As above but 100 pF. max. 14 pF. min. Price 17s. 6d.  
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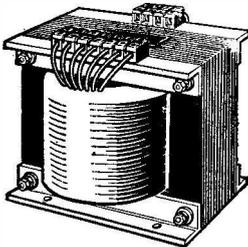
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Power transformers and audio units are available in twenty varied specifications.

Write for Leaflet "CT/7 SWM"

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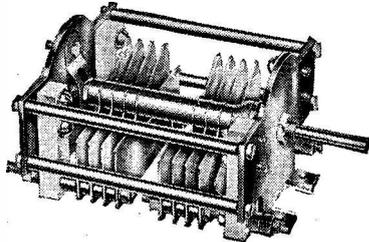
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All factory assembled and tested.  
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Max. Capacity	List Price
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60+60 ,, .....	£1 : 10 : 0 ,,
80+80 ,, .....	£1 : 12 : 0 ,,
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TYPE P5  
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CRYSTAL  
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**PRICES:** Ground to your specified frequency in the above bands ... **£1.17.6**  
Or ground to a frequency not specified by you but taken from our stock ... **£1.12.6**

Please note that all the leading dealers in amateur equipment now carry stocks of the P5 crystal unit. **THE QUARTZ CRYSTAL CO., LTD.** (Directors: E. A. Dedman, G2NH., N. H. R. Munday, G5MA., W. J. Thompson, G2MR.), 63/71 Kingston Road, **NEW MALDEN, SURREY.** Telephone: **MALden 0334**

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We can supply the following from stock, but suggest that you let us have your orders as soon as possible, as supplies are limited.

**METERS.** Moving Coil

First grade instruments at a very reasonable price. Pan-es. 0/500 micro-amps, 0/30 mA, 0/1 mA. Thermocouples. 0/5 Amps, 0/2.5 Amps.

**COILS**

Denco Maxi-Q coils. Chassis type. Ranges 3, 4, 5, 6. Plug-in type. Range 3, 5, 6. Raymart six- and four-pin plug-in coils. Complete ranges.

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Co-axial line, with low-loss insulation. Copper wire, and ceramic spreaders for 600 ohm line construction

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9001, 9002, 9003, 6AK5, EF50, EF39, ECH 3, SP4 1, 6L6, 6V6, KT66, KT61. PX25. 6A8, 6K8, 6J17, X63, X61M.

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**TRANSMITTING VALVES**

Full range of valves by S.T. & C. 807, PT15, DA41.

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### TRANSMITTING CONDENSERS

Recommended for low and medium power transmitters. Aluminium end plates and fixing brackets. Plates of brass, plated bright nickel and rounded edges accurately assembled for uniform air gap. Insulation in mycalex with long leakage path. Bearings of hard brass, phosphor bronze contacts. Single section and split stator types. Air gaps 0.10" for 4,000 v. Peak and 0.05" for 1,500 v. Peak working.

<b>4,000 v. Peak Working.</b>	
100 m.mfds. single section	£1 10s.
50 m.mfds. single section	£1 15s.
<b>1,500 v. Peak Working.</b>	
50 m.mfds. single section	14s. 6d.
50 plus 50 m.mfds. split stator	£1 2s. 6d.
100 m.mfds. single section	17s. 6d.
75 plus 75 m.mfds. split stator	£1 4s. 6d.

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For Plug in frequency changing, suitable for oscillators, frequency multipliers and power amplifier stages. Constructed of hard drawn copper wire, silver-plated and mycalex base. Spacers where necessary are of distrene. Types available are for single-ended or double-ended amplifiers either plain or with a fixed coupling link. Plugs and Sockets are of ample current rating. Base for above in mycalex.

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Double-ended type for split stator tuning with swinging coupling link in the centre for correct anode loading. Inductances of silver-plated hard drawn copper, spaced where necessary with distrene, all insulation in distrene, plugs and sockets of ample current rating.

Base for above range complete with swinging coupling arm made in distrene, complete with stand-off pillars for base mounting. The swinging link may be controlled from the front panel with a suitable expansion spindle.

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Crystal Calibrators, Cathode Ray Viewing Units, VFO Exciters, Stabilised and High Voltage Power Supply Units, Preselector Units, Rotabeam Directional Antenna Systems, Noise Silencer Units, Absorption Wavemeters, Racks and Panels, Transmitting Chokes, Neutralising Condensers, Aerial Feeder Spreaders, etc.

## VALLANCE'S

144 BRIGGATE, LEEDS, I.

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May we send you our 1946 price list? This details a comprehensive range of components that can now be despatched from stock.

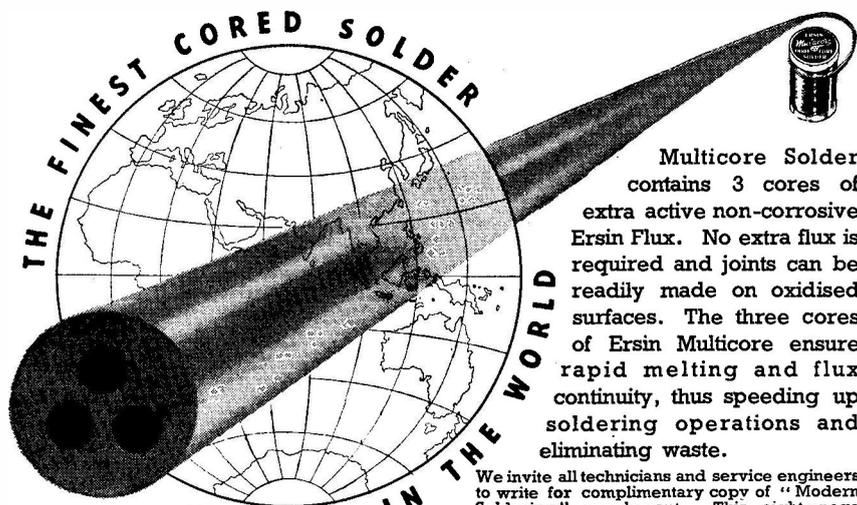
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Coaxial Feeder, type SCF—92, 77 ohm 1/2 yd.  
 Coaxial Feeder, heavy duty 2/6 yd.  
 Parallel Feeder, 80 ohm., low loss 7d. yd.  
 Hard-glass aerial insulators 1/- ea.

In addition to the above aerial equipment we have a large stock of components—details of which will be found in our free "S.W." lists, obtainable on request.

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**U.H.F. Receiving Valves**, 6AK5, 6I6, 9001 . . . . 15/- ea.

Ceramic bases for above . . . . 1/6 ea.

Please include sufficient to cover postage

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R.F. CHOKES—Ultra Short Wave 1/3, Short Wave 2/- All Wave—With wire ends 3/-. chassis fixing type 3/6

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 SHORT WAVE MANUAL NO. 5. Price 2/7 post free. SHORT WAVE COMPONENTS—Most types actually in stock. ALUMINIUM CHASSIS & PANELS—16 SWG. 8" x 7" x 2" 6/4, 15" x 9" x 2" 7/8, 16" x 7 1/2" x 3" 10/-, 17" x 10" x 2" 9/9. PANELS—8" x 8" 2/4, 16" x 8 1/2" 4/9, 19" x 7" 4/6, 19" x 3 1/2" 3/-, 19" x 10 1/2" 5/8.

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# CELESTION

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Chassis Diameter	MODEL	Speech Coil Impedance Ohms	Pole Diameter	Flux Density Gauss	Total Flux	Power Handling Capacity
2½"	P2V	3.0	⅞"	8,500	8,000	.25 W
3½"	P3C	3.0	¾"	7,700	24,000	1 W
5"	P5Q	3.0	¾"	8,500	26,000	3 W
5"	P5T	3.0	¾"	10,500	32,000	3 W
6½"	P6Q	3.0	¾"	8,500	26,000	4 W
6½"	P6T	3.0	¾"	10,500	32,000	4 W
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8"	P8M	2.3	1"	8,000	31,000	5 W
8"	P8G	2.3	1"	10,000	39,000	6 W
10"	P10M	2.3	1"	8,000	31,000	6 W
10"	P10G	2.3	1"	10,000	39,000	8 W
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# SHORT WAVE MAGAZINE

FOR THE RADIO AMATEUR AND AMATEUR RADIO

Vol. IV.

NOVEMBER 1946

No. 9

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## EDITORIAL

## Rationalisation

This is a word, beloved of planners, savouring of control and regimentation. In our world of Amateur Radio, one of the things we want to avoid is control for its own sake—of which there is already more than enough in our own daily lives.

Nevertheless, for the greatest good to the greatest number, there is need for a degree of self-imposed control in order that we may all enjoy our hobby to the utmost extent. Rational use of our frequency bands—on lines agreed and accepted by the majority—is a very different thing from control forced on us by an outside authority.

We of the *Magazine*, entirely independent as we are of the politics of Amateur Radio, consistently advocate and recommend certain divisions of the bands into 'Phone/CW areas, in what we conceive to be the interests of all concerned. The reason for making these recommendations is because we feel that without such rationalisation, interference will be far worse than it need be and the average amateur transmitter will not be able to get as much out of Amateur Radio as he should.

But this demands that he in turn must contribute something to it for the general good. If band-planning schemes are accepted by the majority, then all should conform. This is a very different thing from an imposed control giving the individual no freedom of choice in the matter.

Nobody is compelled to accept any measure of control not already laid down by the terms of the licence. But the progress and the individual enjoyment of Amateur Radio depends upon a large degree of mutual co-operation.

We therefore allow ourselves the hope that after proper discussion and consideration of the factors involved, there will be individual acceptance on the part of all concerned of the various band-planning schemes that are put forward from time to time.

*Austin Fordy G6FO.*

## Five Metres

*Error Corrected—The Contest Rules  
—Improved Conditions during October  
—New Activity—News from the North*

By A. J. DEVON

IT is said that he who never makes a mistake never makes anything. While not seeking shelter behind this heartening philosophy, we have to admit to a crass error perpetrated in this column in the August issue. It was stated there that the distance for the G5BY-G8UZ inter-G record was 256 miles. In fact, the distance is 233 miles. This immediately raises a query on the previous G5BY-G6CW distance, which is actually 224 miles and not as previously given.

Fortunately, these errors in no way affect the stations concerned in the sense of the retaining of the record, since the best distance of 233 miles G5BY-G8UZ has still to be exceeded for a new record to be made.

In giving these corrections the prominence accorded to the original mis-statements, we hope that honour is now satisfied and that those who follow this column so closely will duly amend the quotations they have been making from it. No harm has been done, except to your earnest conductor, who has had to put earth on his head and work out all the Editor's own 58 mc distances by great-circle calculation, as a penance.

### The 58 mc Contest

Let us quickly turn to happier matters. There is more support promised for the Contest than we had expected, and we are looking forward to a very interesting event which should stimulate and maintain activity on the band.

The Rules—to which much thought has been given—appear elsewhere in this article. We sincerely hope that those who propose taking part will

agree that they are as fair and as workable as such rules can be made for a band like five metres, where distance and geography are vital factors.

Naturally, a heavy premium has been placed upon outside-the-local-area contacts, the scoring value of which increases rapidly with distance and the number of times during the Contest a distant station can be worked.

In the interests of all concerned, we have made the closing hour 2300 nightly. Since there is no differentiation between 'phone and CW in the scoring—this is with the intention of improving DX and encouraging CW operators new to the band—it is hoped that all operators will use CW as much as possible.

While appreciating that the factor of location in relation to established centres of activity may appear to handicap some stations, a little calculation will show that this is not necessarily so. In any case, and apart altogether from who emerges as the national winner, the method of scoring invites competition between stations in the same areas of activity, who will thus be competing primarily against one another. In this sense, we anticipate some gruelling "local Derbys" in the South London, Birmingham, Portsmouth, Liverpool and Nottingham areas—to say nothing of the Mablethorpe Twins!

One final small point regarding the Contest—similar events in the past have been spoilt because somebody, hearing that old so-and-so has made a colossal score, feels "it's not worth sending my results in." Please send in

your results *whatever* your score, for the simple reason (look at the rules again) that the logs cross-check one another; hence, all operators who make a Contest QSO should send in a log, even if only to make sure the other man gets his points. Not that we expect that much actual checking is going to be necessary, but it is essential to be able to check if a query should arise. Apart from this aspect of the matter, the whole affair has a purely sporting angle.

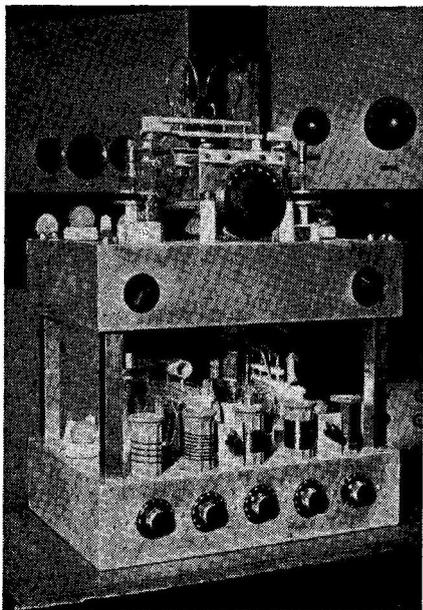
It would be no bad thing if all contestants kept their scores *sotto voce* until after the closing date, so as not to discourage the low scorers, like the Editor, who has undertaken to submit his log irrespective of the limited time he may have to go on the air himself.

### October Activity

A very fine batch of reports this month, mainly because of the sudden great improvement in conditions over the fortnight or so prior to October 11, when the band was really open for GD $X$  and gave many people interesting new contacts. During the Friday to Sunday evenings October 11-13 it is not exaggerating to say that five metres was more crowded than ever before, and some excellent GD $X$  QSO's were made. Everyone, in fact, was busy working new stations.

As to the reasons for this welcome change in conditions, G2 $XC$  and G6 $DH$  have been conducting a painstaking investigation into the mysteries of the upper air in relation to 58 mc propagation and have arrived at certain extremely interesting and convincing conclusions, which add much to our knowledge of the subject. At this stage, it would be unfair to them and discourteous to others concerned to discuss their researches further here.

In his report to us for October, G2 $XC$  mentions that the amazing conditions during the October period were probably due to a large and persistent inversion just above the cloud layer, accompanied by a remarkable humidity gradient. All this culminated in the evening of October



W1BB's transmitter for 50 mc. This feeds a vertical Johnson-Q aerial 60-ft. high. The Rx is a Hallcrafters "5-10."

11, when by midnight the temperature had risen 10° in 60 feet at an altitude of 2500 feet; at the same time, the humidity dropped from 95 per cent. to 10 per cent. over the same 60 feet!

G5BY remarks upon the fact that during this period conditions were not particularly good for him—in other words, the improvement seemed generally to be confined to the eastern side of the country.

### Some Individual Reports

G5MA (Ashted, Surrey) has now worked 108 different five-metre stations, and finds G6YU (Coventry) the outstanding signal from the Midlands; over the period August 8-October 19, G5MA and G2MR (Surbiton) worked G6YU on schedule every evening except once. G5MA has also heard G5TH (St. Anne's-on-Sea, Lancs) at RST439. G5TH has been worked by G6VX (Hayes) several times.

G5JU (Birmingham) had a good share of the DX during the October spell, and worked a number of stations

using simple gear—he has 25 watts into a Mullard QVO4-20 in the final, with a half-wave N/S dipole and a converter-superhet receiver. The dipole obeys theory exactly. G5JU mentions the peculiar conditions on the evening of October 15, when local stations were louder than usual and the DX, appearing suddenly at good strength, would fade out completely.

G8UZ (Sutton-in-Ashfield, Notts), whose only local supporter at the moment is G8JV (Nottingham), makes all his contacts at DX or semi-DX; his total of different stations worked is only 30 since June, but the fact that 28 of them are DX shows that he is doing well nevertheless. On October 13, new contacts were made with G2WS, G2YL, G3BY, G5LL, G6FO (worked in the middle of the afternoon), and G6LK. G8UZ has also been hearing G5BY again.

During the period September 15—October 14, G6YU knocked up a total of 92 contacts with 20 different stations, mainly DX and to the south-east, first contacts being made with G2MV, G2YL, G3OO, G4GB, G5IG, G5RD, G6FO, G6OH, and G8TV. G6YU remarks that during the good spell results were more like those usually obtained with local stations, with the DX coming in at S7-9 + on 'phone and CW—giving better QSO's than on any other band over the same distances. This is high tribute to "five," but is no exaggeration. Incidentally, in discussing G6YU's beam last month, the front-to-back ratio should have been stated as 25 dB, or approximately 200 : 1.

A welcome letter from John Curnow, G6CW (Nottingham), who has been in a rebuild and, with G8JV, will be in on the Contest. While G6CW has been getting himself the new transmitter and aerial, G8JV used his receiver and did some tests with grounded-grid RF stages, obtaining marked improvement over the 956 or 6AG5 types. See the article on G.G. technique, which commences in this issue. We are expecting great things in the way of improved receiver

performance by the use of grounded-grid valves in RF stages.

G6LK (Cranleigh) has reopened the schedule with G5BY, and they are again in regular contact. G6LK's score of different stations worked is now 102. On October 5, he heard an MCW signal on 59.2 mc calling CQ and signing SM5WF; there is a little doubt about the call, but if confirmed it will be the first post-war reception of a Swede.

G8GX (Pinner, M'sex), reporting for the first time, says that though he occasionally "wastes a few hours" on ten metres, most of the time he has had to spare since May last has been devoted to five. Operating under cramped conditions with an indoor beam, he has worked a total of 50 different stations, and has now reached the stage where he can receive further than the transmitter will take him—G5BY and G6DH have been heard, but never worked. G8GX asks why so many stations crowd together within a few kc of 58.5 mc, blocking one another, when there is the whole 1500 kc in which to move. His comment on the "weak, unidentifiable 'phones" is that if they kept on the same frequency, they would be easier to identify when the beam is turned off.

G3IS (Rugby) another in for the first time, has a 6J5-SP41 converter into a Sky Challenger, the aerial a three-element close-spaced folded dipole, rotary in the roof-space, and the transmitter 89-89-89-807 on 59 mc.

G5BD (Mablethorpe) and his sparing partner G5LL keep steadily at it and are beginning to pile up a nice little total of new stations worked. Their achievements are all the more creditable when one remembers that for months they only heard one another, and even now the "local" is G8JV (Nottingham), 62 miles distant and worked nightly; during the month, G5BD has obtained eight contacts with G6YQ (136 miles) and on October 11, which was also his big night, no less than six different DX G's were heard in Mablethorpe.

G8VN (Rugby) suggests we list 58 mc stations by frequency; this has been

# THE SHORT WAVE MAGAZINE

## Five-Metre Contest

### RULES

- (1) The period of the Contest will be from 1800 hrs., Saturday, November 23, to 2300 hrs., Sunday, December 8, 1946, and from 0630 to 2300 hrs. daily.
- (2) Points will be claimed for inter-British Isles working only, from the home location.
- (3) Exchange of RST, reference number and QRA will constitute a contact. No contacts made between the hours of 2300 and 0630 the next morning will be counted into the Contest score.
- (4) Contacts may be made on either 'phone or CW, but no extra points will be allowed for 'phone QSO's as distinct from CW contacts. Under scoring rule 6(b) a contact counts as such irrespective of whether it is made on CW or 'phone.
- (5) Each contestant will allot himself or herself a 3-figure reference number which will remain unchanged during the whole period of the Contest. This will be sent before the RST or QS report, in the following manner : 342RST569, or 342Q5S7 in the case of a 'phone contact. The reference number *must* be given with the report outwards in every counting QSO.
- (6) Scoring will be on the following basis :
  - (a) For contacts with stations up to 50 miles distant (Zone A), one point,
    - Between 50-100 miles (Zone B), two points.
    - Between 100-150 miles (Zone C), four points.
    - Between 150-200 miles (Zone D), six points.
    - Between 200-250 miles (Zone E), ten points.
    - Between 250-300 miles (Zone F), twenty points.
    - Over 300 miles, thirty points *plus* five points for each additional 10 miles of distance.
  - (b) During the period of the Contest, Zone A stations may be worked twice to count ; Zone B stations, three times ; Zone C, five times ; Zone D, seven times ; Zone E, ten times. No limit is placed upon the number of times stations in Zone F, or at greater distances, may be worked.
  - (c) The additional score may only be claimed for such repeat contacts *provided* they do not take place within two hours of having already worked the same station.
- (7)
  - (a) Point-to-point distances may be taken off any map in the "Geographia" series (now obtainable at most stationers and booksellers), but the map should be scaled at not more than twelve miles to the inch. Zone areas can then be drawn in with the contestant's station as centre.
  - (b) The check map used will be Ordnance Survey sheets in the quarter-inch series for distances up to 250 miles. Distances over 250 miles will be checked by great-circle calculation.
- (8) Results should reach us, addressed A. J. Devon, c/o *The Short Wave Magazine*, 49 Victoria Street, London, S.W.1, by December 17 latest, set out as follows :
  - (a) A running log covering the period of the Contest, showing only contacts claimed to count, with time of working, reference number in, RST in, RST out, and QRA of station worked. The contestant's own reference number should be clearly marked at the top of each log sheet.
  - (b) A straight list (callsigns only) of stations worked in each Zone, with total points claimed for that Zone.
  - (c) The final total of points claimed.
  - (d) A short description of the equipment used, and notes on impressions and experiences of the Contest.
- (9) A preliminary survey of results will appear in our January issue. The decision as to whether Certificate of Merit awards are to be made for this Contest will rest with the Editor.

considered, but has not been pursued, for two reasons: Activity is now fairly well distributed over the band (though we agree that the majority are in the 58.5-59 mc area), and secondly, many stations have more than one crystal frequency. However, if people think it would be helpful, we shall be very glad to print an up-to-date activity list, complete with QRA's and frequencies. But this means a good deal of co-operation by all concerned.

G6FO (Penn, Bucks), the long-wire diehard, heard the band was open and came on over the period October 11-16, working a number of stations new to him with a 12  $\frac{1}{2}$ -wave N/S long-wire aerial and 25 watts to a KT8c. Contacts were made in all directions at surprising strengths, but the location—600-ft. up on the brow of the Chilterns and no screening in any direction—probably has a good deal to do with it. The aerial is a genuine long-wire (that is, it has no elbow, but runs practically level from the tuning unit to the top of a 35-ft. mast) and results show that under the conditions that prevailed radiation was virtually omnidirectional.

#### News from the North

G3BW (Whitehaven, Cumberland) has been heard by GM3OL (Dumfries), over 36 miles, for the first G/GM reception. G3BW is right out in the blue, and has not yet had a contact. He will be DX for practically anyone now on the band.

Another new centre of activity is in Hull, with G2AMJ, G2FZX, G3ACQ, G3IU, G3PL, G4LH, G5GX, and G6OS, together with many listeners, all busy working one another but not, apparently, getting out of the town yet. However, G5GX has heard the Mablethorpe Twins, and I's and F's have also been received by some of the others when the band has opened for Europe. At the moment, the group is still somewhat in the *ab initio* stage as regards equipment (though there is at least one 8-element rotary and several superhet receivers and CC transmitters), but as G3PL says, the urgent need is for better receivers. G5GX remarks

“One would expect a large and interesting log from such a collection of stations, but in actual fact we have worked precisely nothing outside this town and are almost sick of working each other”! Well, we can understand that, but remarks below about keeping at it apply!

From farther north still, GM2FZT says that GM2LQ (Glasgow) is on very regularly, with GM2DI (Wishaw, Lanarks), who has been worked from Glasgow. GM8MJ and GM3AKK are also active.

#### Ireland

We are very glad to hear from E12M that he and EI8G (both Dublin) are putting Eire on the map. E12M has an 1852/6J5 converter-superhet with IF on 12.2 mc.

Some short notes . . . . . G5AM says that OK2MV did *not* hear him on five, as he never touches the band. . . . New stations active are G2MB (Stourbridge), G2UJ (Tunbridge Wells), G2VH (Southsea), G3ABA (Rugby), G3APY (Sutton-in-Ashfield), G4AP (Swindon), G6HJ (Coventry), G6MN (Worksop) and G8TV (Romford) . . . . . G8TV has an indoor beam and only 5 watts input; yet he has worked G2XC and G6YU . . . . . Another fine contact is G2XC-G3BY . . . . . G3PD, who gives many southern stations a DX contact, has been working portable lately. . . . . The question of the first pre-war G/F QSO is still in doubt; G2QV has a card from F8NW, confirming contact on August 14, 1939, but we are also told that G2FA worked across the channel on some unspecified date in 1936; G2IC is kindly getting the facts for us on this.

#### Winter Activity

There is a belief in some quarters that now the winter is upon us, GDX on 58 mc will fade away till the spring. Previous experience suggests that this is not necessarily the case at all, but that we can expect steady working over established links, with flashes of good conditions such as have occurred during the last few weeks.

In other words, keep up the activity and let us see what the winter brings forth. The great demand that five metres makes on one is perseverance, and there is no doubt of its appeal and fascination once the ice has been broken and a few contacts outside local range have been made. The difficulty is always to get those first few contacts (in isolated areas in the 5-metre sense), but a little persistence never fails to produce results.

### Calls Heard

Lists are published this month, in the appropriate section, from G3IS, G5BD, G5JU, G5MA, G6FO, G6YU, G8GX and G8UZ. As we feel that

Calls Heard on this band are particularly useful and interesting, we should like to see more. May we ask that they be set out in the form in which they appear in print, and very tactfully, draw attention to G6FO's log, asking you to adopt that as the style best suited to the purpose, i.e., give distances, period of working, and gear.

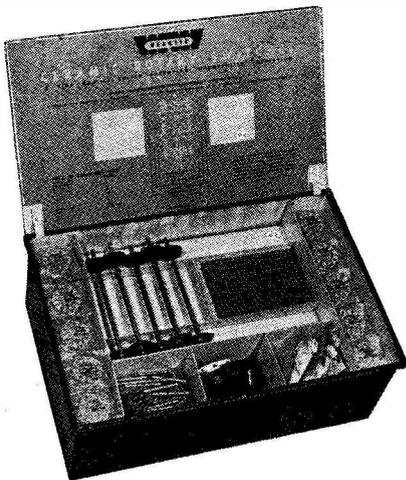
Reports for December issue by November 18, please, addressed A. J. Devon, c/o *The Short Wave Magazine*, 49 Victoria Street, London, S.W.1.

And now to get the outfit teed up for the Contest—November, 23 at 1800 hrs. Let us hope for a spell of "October Conditions."

### WEARITE CERAMIC SWITCHES

The neat and attractive kit of ceramic switch parts illustrated herewith is designed on the "make up your own" theme, to cover all possible switching requirements likely to be encountered by the amateur transmitter, in the receiver designer's laboratory and by the student of radio engineering.

To this end, the stocking of the chest was given much careful thought and the kit includes components for various switching problems calling for 1-pole 12-position, 2-pole 6-position and 4-pole 3-position combinations. It is complete with switch wafers, indicators with spindles, spacers, side rods, plastic bearing straps and the necessary nuts and washers. Assemblies are as rigid and as lasting as the fully manufactured product. Instructions and drawings, fixed to the inside of the lid, are included. Write Messrs. Wright & Weaire, Ltd., 740 High Road, Tottenham, London, N.17 (TOTtenham 3847). Their North Country factory and sales depot is Simonside Works, South Shields, Co. Durham (South Shields 2301).



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### CLIX PRICE CHANGES

Due to increased costs, the price of all "Clix" items has been advanced by 9 per cent. A complete schedule of revised list prices is obtainable from Messrs. British Mechanical Productions, Ltd., 21 Bruton Street, London, W.1. (MAYfair 5543).

### VK's ON 28 MC

Don Knock, VK2NO, informs us that the Australians now have the whole of the 28-30 mc band back. They are still cramped into 50 kc, 7150-7200 kc, on 40 metres, and as he remarks "you should hear the din that goes on in that sardine tin".

# Grounded-Grid Technique

## *Discussion and Practical Data on Design, Application and Circuitry of Common Grid Valves*

### PART I

By R. KNOWLES, B.A. (G3AAT), Instr. Lieut., R.N.

*(This article, to appear in two parts, will introduce a technique—largely developed during the war—which will not only be new to most readers, but also of great practical interest. In Amateur Radio, the immediate applications of the common grid or, as it is sometimes known, the grounded-grid circuit is for obtaining high RF amplification at VHF and large voltage gain in AF amplifiers. Suitable valves are readily obtainable.—Ed.)*

A STAGE of RF amplification has long been considered an advisable item in the construction of an HF superhet. It minimises second channel whistles, prevents radiation from the local oscillator and does in general give some measure of gain. It would have been quite possible to get all the necessary gain in the IF stages, but the frequency changer is the most potent source of noise and it is important that it is fed with a signal greater than its own self-generated noise.

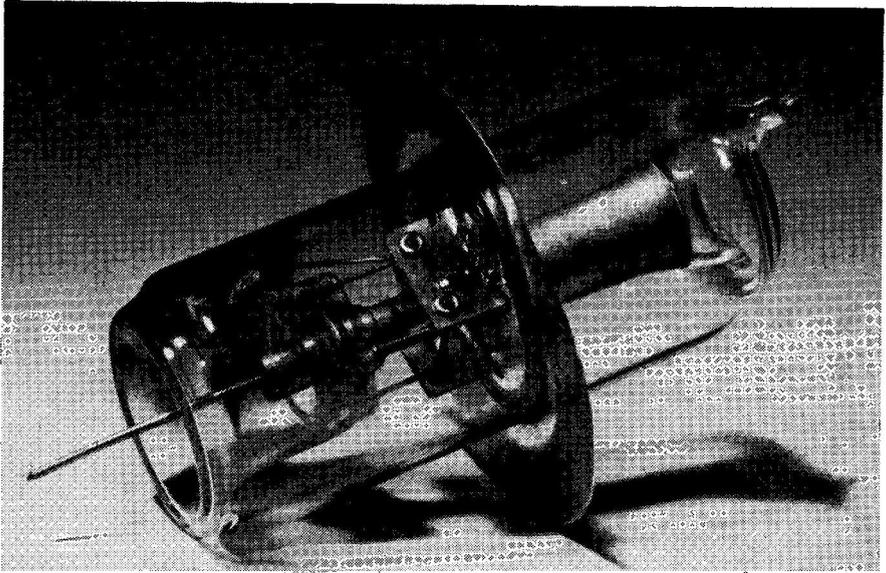
All the above is true at HF, but above 30 mc (referred to here as VHF) most normal valves put up a very poor performance as RF amplifiers. Many things happen; for example, the input resistance becomes very low and so the gain disappears or the noise-resistance of types which do give gain is unpleasantly large. An RF pentode such as SP41 or RL7 is a typical example of a valve suitable for VHF amplification. The input resistance at 45 mc is of the order of 3000 ohms and the mutual conductance of the order of 7 mA/V. The equivalent noise resistance is about 900 ohms and this sets a limit to the gain which can be usefully employed in later stages. This noise is made, broadly speaking, by irregularities in the emission from the cathode and by the division of the electron stream into

anode and screen currents. The space charge helps to reduce emission irregularity noise and a low screen current reduces the partition noise, so that if it were possible to make the screen current zero, one source of noise would be eliminated.

#### Triode as RF Amplifier

By using a triode as an RF amplifier, partition noise is of course absent, as there is no screen which draws current—but neither is there any electrostatic screen. Many readers will remember the older BC sets, using triode RF stages, and also having struggled with the neutralisation of a triode PA, can see some of the troubles which the use of a triode at VHF would cause.

The conventional triode amplifier using the cathode circuit common to input and output is quite satisfactory from the noise point of view, but it requires neutralisation of the grid-anode capacity, not an easy job over a wide band at VHF. Apart from convention, there is no reason why the grid or anode should not be the electrode common to input and output circuits. It is a little unusual, perhaps, and for our forefathers who had only batteries and directly-heated valves, the idea of batteries at RF potentials must have been too dreadful to contemplate.



A triode for 600 mc. *The Standard disc-seal 3B/148J.*

### The Grid as a Shield

Of the two remaining electrodes, the earthing of the grid has, in this case, the more interesting possibilities. The incoming voltage is to be applied to the cathode, the grid earthed directly and the output taken from a tuned circuit in the anode supply. The grid forms the earthed shield between the input (cathode) and output (anode) and it only remains for the maker of the valve to ensure that the cathode-anode capacity is small for the circuit to be stable without neutralising. If the input and output circuits are screened and the supplies decoupled, the cathode anode capacity forms the only possible coupling, and by artificially increasing it an oscillator can be constructed requiring two terminals on the tuned circuit.

Turning for a moment to Fig. 1, it can be seen that this circuit (A) and the cathode follower (B) have a similar appearance, but that the common grid circuit seems to be back to front. The cathode follower circuit is renowned for this low output impedance and as is to be expected, the common grid circuit

has a very low input impedance. So low is this impedance in practice that the valve can be connected to a low impedance concentric feeder with the most elementary matching or in some cases without any matching at all!

### Stage Gain

The anode-cathode phase splitter (C) is an even more exact parallel to the common grid circuit. It may be remembered that the effect of the un-bypassed cathode bias resistor is to increase the effective internal resistance of the valve. Exactly the same state of affairs exists in the common grid circuit. Two of the characteristics of the circuit are now known and it is only a matter of simple mathematics to find out what gain to expect. It is, however, not proposed to delve into any mathematical wangling, but for readers interested in the proof, it may be said that to put in typical valves for Ra, R2 and gm in Fig. 2 will produce: Input impedance, 300 ohms; Output impedance, 10,000 ohms; Voltage gain, 35. These figures apply to a Mullard RL37(CV66).

The figures in practice will be slightly different from these as no account has been taken of loss at VHF, or stray capacities. But they should not differ to any serious degree.

### Matching to Circuits

In a practical circuit to be described in the next part, a valve is used which has an input resistance of 150 ohms and an input capacity of  $10 \mu\mu\text{F}$ . This is somewhat different from the usual RF pentode and the very low ratio of resistance to reactance can be turned to great advantage. To match a concentric feeder to the grid of an RF pentode it is usual to employ a tuned circuit as a transformer, which includes the input capacity as part of the resonant circuit and provides the correct ratio. The tuning of the circuits is relatively sharp, an advantage at HF, but not necessarily so at VHF. A high value of IF is used to avoid second channel interference, and a highly selective RF stage is a nuisance inasmuch as it makes the already hard problem of tracking one degree harder. If a large band width could be achieved, then the input circuit would not need variable tuning, the anode circuit providing the necessary discrimination against signals outside the band.

If an 80-ohm cable is matched to the input resistance for optimum power transfer (not necessarily optimum

signal-noise condition) then the valve will "see" 150 ohms and it "looks" like 150 ohms itself so that there are effectively 75 ohms in parallel with the  $10 \mu\mu\text{F}$ . In a practical case, there is a further  $10 \mu\mu\text{F}$  in the matching device in parallel with  $10 \mu\mu\text{F}$  due to the valve, making  $20 \mu\mu\text{F}$  in all.

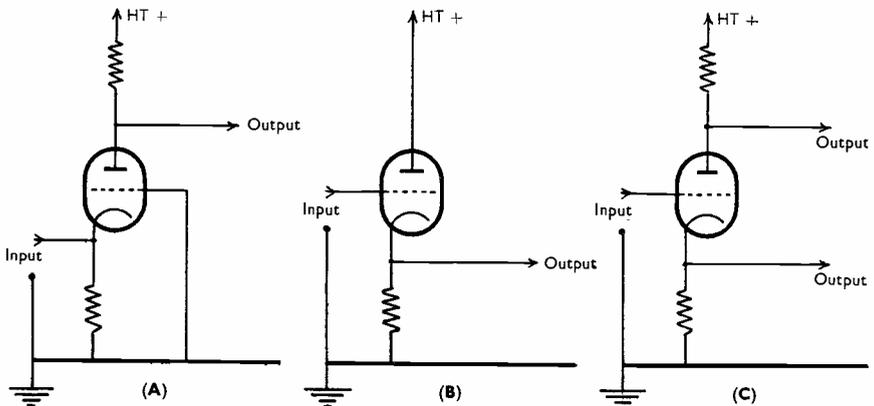
In the case under consideration the band-width is approximately 100 mc. This band-width is obviously quite large enough to do away with the need for tuning the input circuit. It must be noted that this value is the band-width and if the circuit is aligned for say 60 mc, then it will work from 10 to 110 mc without need for further tuning. If a 150-ohm cable were to be used, it could be connected straight to the valve without any matching and the  $10 \mu\mu\text{F}$  neglected for amateur bands.

### The Output Circuit

It has already been shown that the output impedance of the common grid triode was not much different from that of the more usual pentode. A normal type of resonant circuit with variable capacity tuning would be suitable, but not quite the best attainable because it involves placing additional capacity in parallel with the anode-grid capacity of the valve, causing reduced band-width.

There are two courses open to us. One is to use a normal output tuned circuit and to vary its tuning. The

Fig. 1. The common grid (A), the cathode follower (B), and anode-cathode phase-splitter (C) circuits.



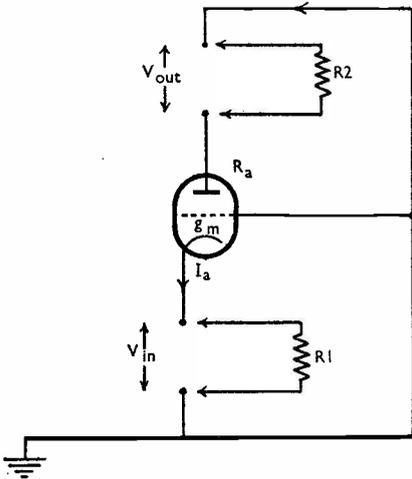


Fig. 2. Theoretical consideration of the common grid circuit in RF amplification.

selectivity of this arrangement will be poor, but not so poor that the anode will not need variable tuning. The other course is to aim at a band-width of about 3 mc, and have an aperiodic anode circuit. In order to do this, the tuning capacity must be as small as possible—and the smallest capacity possible is the anode-grid capacity *plus* the inevitable strays. Matching to the grid of the next stage is best done by tapping down the inductance, and the initial band-setting by varying the effective value of the inductance in series with the HT supply. Details of how all this is to be done will come in the next part.

**Considerations of the Circuit**

We have seen some of the peculiarities of the common grid triode and its requirements and now we must investigate its advantages.

The equivalent noise-resistance of one commercial type of common grid valve is 400 ohms, almost half that of the lowest noise-level pentode available for VHF amplification. This is the property for which the grounded-grid principle is most valued. The ultimate limit of amplification is reached when the noise from the first valve drowns the signal, and so the use of the quiet

triode is obviously a step in the right direction.

This “noise-resistance” which we are now considering may seem to be a little mysterious ; it is a method of describing the goodness of a valve in this respect. Any resistance generates a noise voltage due to thermal agitation of the electrons in the material comprising it. The noise voltage is proportional to the square root of the product of the absolute temperature of the resistor, its resistance and the band-width under consideration. The equivalent noise-resistance of a valve is the value of resistance, which placed in the grid circuit, would produce an identical noise voltage across the anode circuit, assuming the valve to be perfectly noiseless. By using this value of resistance we can forget all about the noise generated within the valve and imagine that it is produced by this hypothetical resistance in the grid circuit. A valve with a low noise-resistance is obviously going to be less noisy than one with a high noise-resistance, as the noise voltage varies as the square root of the resistance, other things being equal.

**Construction of Suitable Valves**

It can be shown mathematically that for a valve to be good for this circuit, it should have a high value of mutual

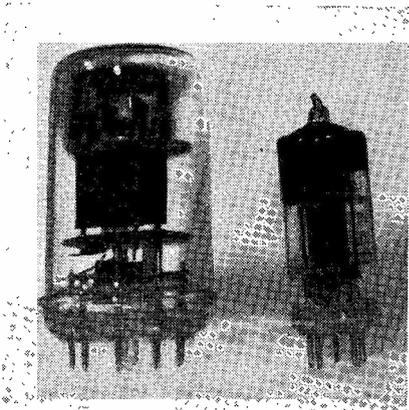


Fig. 3. The RL37 (CV66) on the left, and the miniature type common grid triode CV139.

conductance and low anode-grid and anode-cathode capacities. This means having a large cathode and close grid spacing, while the anode should be far removed from the cathode. For valves with bases some form of screen for the cathode or anode is desirable, so that the tendency to oscillation is small.

Small receiving valves are made in the conventional manner, for frequencies below 300 mc, with the grid extended to form a screen between the cathode and anode leads. Fig. 3 shows typical commercial types.

Another form of construction is that known as the planar triode. The cathode, grid and anode are all flat planes in this type, and the grid is often continued through the glass by a disc seal. If the valve is contained in a divided metal box, the anode circuit can be completely screened from the cathode circuit externally and the cathode-anode capacity reduced to a small fraction of a micro-microfarad. Stable operation up to 450 mc can be obtained with the type of valve shown in Fig. 4, and valves of this kind are available for frequencies as high as 600 mc.

The other valve shown on the right in Fig. 4 is suitable for transmitter

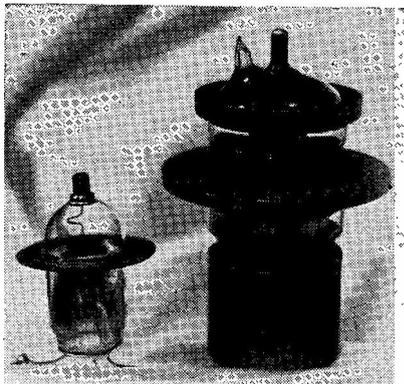


Fig. 4. The Standard 3A/146J (CV53) at left, with the large CV288 RF amplifier type of grounded grid oscillator, rated at 250 watts anode dissipation at 1,000 mc.

power amplification at VHF and is of cylindrical construction. The wide perforated ring forms an extension of the grid and the smaller perforated cylinder is the anode, which requires an air blast when in use. The cathode lead is at the top and is provided with a plug to take a concentric feeder.

(Continued next month)

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# First Steps On Five

## Getting Going with Simple Gear

By J. HUM (G5UM)

*(Himself new to 58 mc working, our contributor describes how he successfully put himself on the band by adapting existing equipment. This is a practical article which will be of great help to those who are thinking of making a start on five metres.—Ed.)*

OF the various frequencies open to British amateurs for normal communication purposes the 5-metre band probably demands more technical dexterity and "know how" on the part of its users than any of the others. In return, it gives the most unexpected results! But unfortunately 58 mc tends to frighten off those who feel they lack that necessary technical dexterity—or whose main objective in life is DX. The purpose of this article is to show that the process of getting going on "five" is by no means as difficult as many may think.

Readers who might imagine that the writer is an experienced 5-metre operator, who will inevitably make light of the problems involved, may be assured in advance that, until August of this year, he had never tried "five" before. All the practical problems were therefore as new to him as to any other beginner on the band. They seemed to be three in number—namely, receiver, aerial and transmitter, in that order. It is therefore proposed to analyse them and show how they were approached.

### The Receiver

Without reception facilities obviously no progress was possible. What should it be—a superhet, a superhet-converter or a TRF?

The superhet suggestion was dismissed straight away. Man-hours are at a premium at G5UM as much as they are with everybody else, and it was desired to get on to "five" this year, not next!

The idea of a superhet-converter that could "button on to the front end" of

the all-EF50 TRF receiver described in the August issue of the *Magazine* was more tempting. Its specification would require an RF amplifying stage; its IF would be around 3 mc. These two factors were intended to reduce the image trouble inevitable at VHF unless such precautions are taken. Another factor in the choice of this high IF was that the writer lives uncomfortably close to three BBC stations, which could make their presence felt on the more usual IF of 1,600 kc.

Accordingly, a circuit for such a converter—RF stage, mixer and oscillator—was roughed out and its values established. It is shown in Fig. 1 and the values are given in the table.

No excuse is made for recommending the EF50 once again, nor for advocating a 2-valve frequency changer. On the first point, the EF50 is becoming available from many sources now, and being perhaps one of the most versatile valves ever developed is well worth recommending in this service. As for the second point, it is common knowledge that a 2-valve frequency changer is generally superior to the multi-grid type when used at VHF. Neither type gives very much amplification there, but the former suffers far less than the latter from "pulling."

Now, by the time the preliminary investigations had been made into the superhet-converter proposition the writer was becoming rather impatient at the delay likely to occur in getting it going. He therefore speculatively decided to try the existing all-EF50 TRF receiver for VHF use in the hope

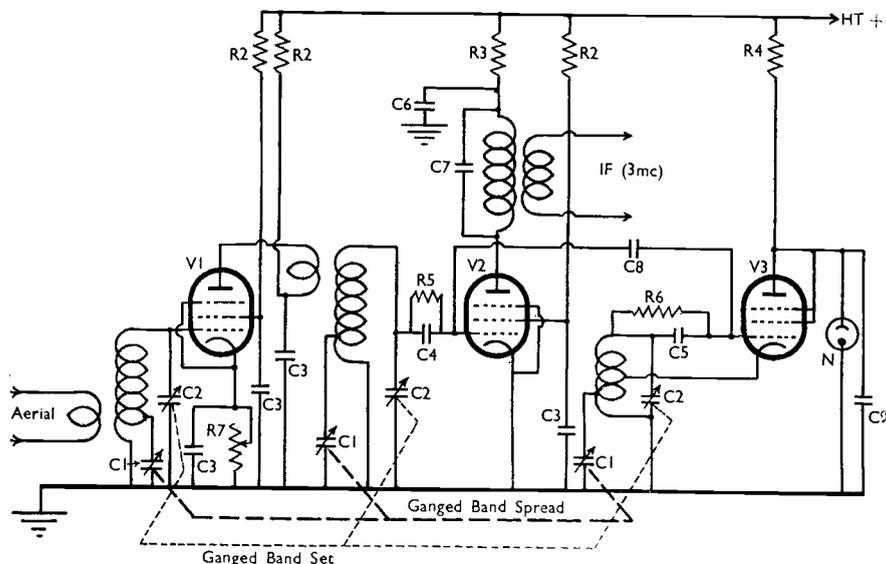


Fig. 1. A three-stage 58 mc converter using EF50's. V1 is the RF, V2 the mixer, and V3 the oscillator, with band-set and band-spread condensers ganged. All values are given in the table. Screen or suppressor-grid injection to V2 might be better, as grid-to-grid coupling can cause tracking difficulties at VHF.

that it would hasten his debut on 58 mc.

### Adapting the TRF

A pair of coils were wound of 16-gauge solid copper wire and plugged into the appropriate positions in the detector and RF stages. The BBC television transmissions around 7 metres were soon identified but were disconcertingly low down on the scale of the band-set ganged condenser.

Then followed the usual process of "cutting the coils to find the band"—a process that ended when the coils could be cut no more, consisting by then of a loop of wire from one socket to the other, and barely deserving the title of "a turn!"

Clearly, the stray capacities in the receiver were far too high and immediate steps were taken to reduce them—not an easy task when two canned coils, a gang condenser and a band-spread condenser had to be positioned in close relationship to one another and their two associated valves (RF and detector), at the same time retaining the neat and handy appearance of the controls on the front panel. However,

the job was completed and BBC television then came in at a much more encouraging position on the scale. The inductances by now consisted of three turns of 16-gauge copper on a half-inch former, with two turns for aerial coupling and for reaction.

Table of Values Fig. 1

C1	12 $\mu\text{F}$ variable ganged bandspread condensers.
C2	25 $\mu\text{F}$ variable ganged bandset condensers.
C3	.001 $\mu\text{F}$ fixed mica decoupling condensers.
C4	50 $\mu\text{F}$ mixer grid condenser.
C5	20 $\mu\text{F}$ oscillator grid condenser.
C6	.01 $\mu\text{F}$ anode decoupling condenser.
C7	4-12 $\mu\text{F}$ IF trimmer.
C8	local oscillator coupling condenser (very small; say, two leads side by side).
C9	.01 $\mu\text{F}$ mica.
R1	10,000 ohm. variable RF gain.
R2	20,000 ohm HT decoupling condensers.
R3	2,000 ohm mixer decoupling.
R4	10,000 ohm. oscillator decoupling.
R5	5 megohm mixer grid leak.
R6	20,000 ohm oscillator grid leak.
V1, V2, V3	EF-50.

Finding the 5-metre band was not a difficult process. The sixth harmonic of a 7.4 mc crystal fell right on the scale position where television was being received. The seventh harmonic was soon located, and then the eighth. For those beyond range of Alexandra Palace this would not be so simple!

Confirmation that the set would work well on "five" was soon forthcoming when stations were received up to 60 miles distance at about the same strength as one knew them on 160 metres! Indeed, G6VX and G5MA were louder than they could ever have been on 160 (even if they worked there), and their 'phone fully loaded the EF50 audio stage, permitting comfortable loud-speaker reception.

Reaction, contrary to expectations, was not fierce at all. But the capacity of the reaction condenser, 75  $\mu\mu\text{F}$ , while adequate for the lower frequency bands is a little high for 58 mc. It will shortly be replaced by a 4-12.5  $\mu\mu\text{F}$  midget condenser.

One snag encountered, however, was a high degree of modulation hum. The cure for this was to shunt the HT by-pass condenser (C11 in the diagram, on p. 343, August issue, and 2  $\mu\text{F}$  in value) with a mica condenser of .001  $\mu\text{F}$ . Spotty patches of modulation hum over the band can generally be attributed to an inefficient anode choke in the RF or detector feed leads. For 58 mc the anode choke should consist of 50 turns on a 1-megohm half-watt resistor or similar former. Two in series may prove better than one. Indeed, a certain amount of experiment there will pay high dividends.

By the time CW stations up to 100 miles distant had been received on the TRF receiver doubts were beginning to assail the writer as to whether or not there was any point in pressing on with the converter. Actually, of course, there is; in the nature of things the superhet on "five," if properly built, will score tremendously over the TRF in gain and ease of operation (a TRF is essentially a "two-handed" job) and in resolving and holding weak 'phone signals. So the converter is still a "must" at G5UM.

Having found the 5-metre band on the TRF receiver the next step was to build a simple absorption wavemeter (5 spaced turns on a one-inch former with 12  $\mu\mu\text{F}$  across it) so that when transmission was commenced on five metres there would be no doubt that it *was* in the band.

### The Aerial

Many of the initial experiments were done using the station 133-ft aerial. How would it work at VHF? The writer already had some information on this point. A television set had been successfully operated on the 133-footer, not from choice but due to the fact that a dipole was not available when the television set was acquired. Eventually, a dipole was erected, with such a magical improvement in the received picture, that the writer quickly concluded that similar results would follow if a resonant aerial, instead of the 133-footer, were used for the 5-metre amateur band.

The decision was therefore made to erect a three-element beam. Information about such aerials had appeared in the *Short Wave Magazine*, and as a supply of  $\frac{1}{8}$ -in. copper rod was available the job looked easy. Some 80-ohm twin feeder was also on hand. This could be fed straight into the centre of the radiator without the use of matching sections provided the radiator were doubled back on itself in the form of the now familiar "trombone." As close-spaced reflectors and directors are added to a dipole the matching impedance drops. If the dipole is folded back on itself trombone-fashion, this is brought up again to a value permitting the use, without very serious mismatching, of 80-ohm feeder connected into the centre in the usual way.

Here are the dimensions finally adopted:

*Radiator*: two 50-in. lengths fed in the centre, with a 100-in. length immediately in front of it, far ends soldered together.

*Reflector*: one 103-in. rod 30 in. behind radiator.

*Director*: one 93-in. rod 20 in. ahead of radiator.

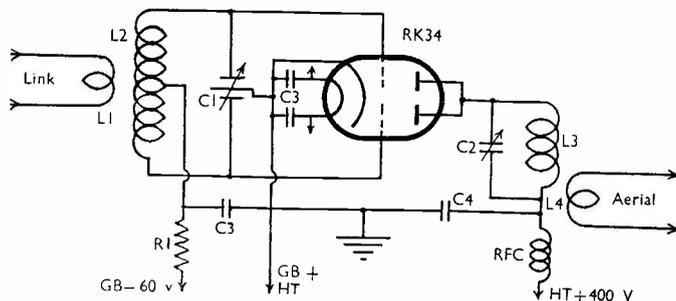


Fig. 2. Circuit of G5UM's push-push doubler for 58 mc, using an RK-34 twin-triode. This is a standard circuit, and with 400 volts on the plates, the RK-34 should put about 5 watts RF into the aerial. See text for discussion and table for values.

The distances between elements do not seem very critical.\* In many applications the director is further from the radiator than is the reflector. In others, it is nearer. In yet others, reflector and director are equi-distant from radiator. The really critical lengths, of course, are those of the elements themselves. The shortest element (the director) must always be on the side towards the desired direction of transmission.

Where to mount the beam? That was the next question. Ideally, it should have a pole of its own well in the clear—regrettably an impossible specification. Once again expediency came to the fore, suggesting that to get the aerial system going quickly it should be erected in the loft. It was. The ceiling was drilled and the twin feeder led down to the radio room on the first floor. Unfortunately, the beam could not be positioned immediately over the radio room, due to the presence of that mundane but very essential object, the cold-water tank. Consequently, the beam cannot be rotated at will from the radio room—yet. It is, therefore, lined up in the required direction and left there.

### The Transmitter

Two choices presented themselves when the design of a transmitter for 58 mc was considered. Either the 807 final amplifier in the 28 mc transmitter

could be persuaded to operate as a power doubler at 58 mc; or an entirely new rig could be evolved, using an RK34 twin-triode that was available.

The latter course was adopted. In a couple of evenings, a push-push doubler was built up on a metal chassis 9 by 4 inches, to the circuit given in Fig. 2. The RK34 was mounted horizontally, its grid tuning condenser close up to the two grid pins at one end of the chassis, and the two anode caps connected together and to the plate tuning condenser at the other end. Nothing could be simpler. No neutralising. Nothing to go wrong. All that was necessary was to ensure that

Table of Value Fig. 2

C1	100 $\mu$ F split stator grid tuning condenser.
C2	4-12.5 $\mu$ F anode tuning condenser.
C3	.001 $\mu$ F RF by-pass condensers.
C4	.0001 $\mu$ F HT by-pass condenser, or approximate value to give maximum dip when C2 tuned to resonance.
L1	2½-turn link.
L2	8-turns 14 SWG on 1-in. ribbed former spaced to occupy 1½ in.
L3	4 turns 14 SWG on 1-in. ribbed former spaced to occupy ½ in.
L4	3 turns 14 SWG on 1 in. ribbed former spaced to occupy ½ in.
R1	10,000 ohms, 1-watt resistor.
RFC	Good VHF choke (Eddystone, or 50 turns on ¼-in. former: two in series if better anode current dip thereby obtained).

\* (If field-strength checks are done, it will be found that considerable improvement in forward gain can be obtained by careful adjustment of element lengths and spacings.—Ed.)

the coils tuned correctly to the band.

### The Tx Coils

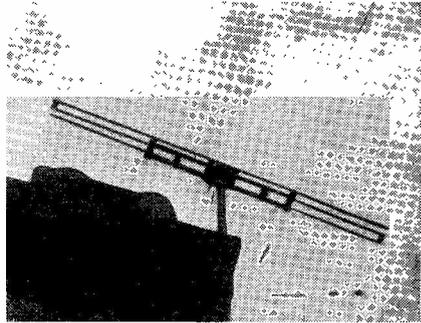
This was achieved as follows : Each coil was soldered to the appropriate condenser with exactly the same length of wire that would be used in the final layout. The coil-condenser combination was then tuned against the receiver detector on 58 mc until oscillation of the detector ceased, denoting that the coil/condenser assembly by itself tuned into the band.

When the anode tank coil L3 was finally positioned in the transmitter it was found to be slightly too large to resonate at 58 mc. One turn was removed. That enabled it to tune exactly ; which shows that even a small amount of internal capacity (such as that of an RK34) can have a considerable effect at these high frequencies.

At each end of the small chassis are twin plugs. The pair at the grid end of the RK34 are connected to the 2-turn link coil L1 that is wound round the centre of the grid coil L2. The pair at the anode end takes off the output from the tank coupling coil to the aerial. Into the grid end sockets an 80-ohm link line is connected. This link line takes drive off the main 28 mc transmitter by means of a one-turn coil at the "cold" end. It takes it, in fact, off the 14 to 28 mc doubler. The line-up is thus as follows :

- 6V6G crystal oscillator on 7.4 mc(x)  
(keyed)
- 6L6 doubler to 14.8 mc.
- 807 doubler to 29.6 mc.
- RK34 final on 59.2 mc.

When a 400-volt power supply was connected to the push-push doubler, with 60 volts negative grid bias, enough drive was obtained from the previous stage to push the plate current over the 100 mA mark. At resonance it dipped to 20 mA. On applying the aerial load it rose to 40 mA, or an



The folded rotary dipole at G2WS, Beckenham, Kent. This is fed by a 600-ohm line.

input of 16 watts. Feeder current was 0.2 amp.

### Results

With some trepidation a first "CQ Five" call was sent out. It immediately brought a reply from G5TX in the Isle of Wight, 90 miles distant. Half a dozen contacts at lesser ranges quickly followed—but none less than 30 miles. The combination of TRF receiver, small beam aerial and simple transmitter evidently works !

The writer hopes that this description of what can be done with extremely straightforward and inexpensive gear will encourage others to try five metres. But two concluding comments are necessary.

(1) Don't bother to go on "five" if the best you can do is to make up a self-excited oscillator. That system is not merely ten years out of date ; it is now illegal. Read the licence terms and see !

(2) Do not imagine that there is any future for super-regenerative receivers. There is none, so far as amateur working on 58 mc is concerned. VHF low-noise high-slope valves now available will leave the super-regen. standing.

In spite of these remarks, it costs little to be up to date and it is remarkably interesting !

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# Home-Constructed Communications Superhet

## *Wiring—Coil Construction—Lining Up —Calibration*

### PART II

By A. B. WRIGHT (G6FW)

*(The first part of this article appeared in the October issue.—Ed.)*

THE power supply section should be wired first, connections being brought out to the tag strip mounted on the metal screen. Filament and HT wiring, which may be cabled together for neatness, should next be undertaken, keeping these wires fairly close to the chassis. Then follow the various by-pass condensers, which should be wired as close to their respective valves, IF transformers, etc., as possible. Particular attention should be paid to the IF anode leads, which should be screened, and the screening earthed. Failure to provide adequate screening in the IF circuits will result in IF oscillation, the source of which may be difficult to trace.

It might be mentioned at this juncture that all valves, except the 6F6, are enclosed in screening cans to eliminate any possibility of stray feedback. It cannot be overstressed that great care must be taken with all screening in the set, as it has been found by experience that the majority of the instability troubles encountered in a home-built superhet arise from unscreened leads. In the original model an unscreened IF lead only 1½ in. length completely ruined the performance of the set until the trouble was located.

Further wires requiring screening are the lead from the grid of V5 to the LF volume control, and the leads from the ganged condensers to the top caps of V1 and V2. These latter leads should be made as short as possible, as the capacity between the wire and

the screening is in parallel with the tuning capacity.

Omission of the by-pass condenser C33 to the anode of V5 will also cause instability and close attention must be paid to all IF by-pass condensers.

The 2μF condenser C20 was added after trouble was experienced due to "motor-boating" when loud signals were tuned in. The addition of this condenser completely cured the trouble; it can be increased to 4μF, if the constructor runs up against a particularly persistent case of the same fault.

Care should, of course, be taken that all leads passing through holes in the metal chassis are adequately insulated by insulated sleeving or other means.

RF wiring should be carried out using a fairly heavy gauge of wire, and leads must be made as short, direct and rigid as possible.

### Coils

All coils are wound on octal based formers, 1½ in. in diameter. Before the windings are commenced, provision must be made for mounting the coil trimmers on top of the former. The following method was found most convenient and allows the trimmer condenser to be easily removed when necessary for adjustment of coil turns: Two grooves are first filed, one on each side of the top rim of the former, and a small hole drilled ¼ in. below each groove. The reaction or aerial coupling coil is wound first, the ends of the

winding being brought out to the pins indicated in the diagram. The small postage stamp size fixed mica padder condenser is then fitted inside the former by soldering a 20 g. tinned copper wire to each tag of the condenser, and passing one wire through the appropriate coil pin. A similar wire insulated with sleeving is soldered to the same pin, brought up inside the former, passed through the nearest of the two holes already drilled, and  $\frac{1}{2}$  in. or so of wire left protruding from the former. A further wire is soldered to the grid pin, brought up inside the former and passed through the remaining hole.

The grid winding is then put on the former, the lower end being first soldered to the remaining terminal of the fixed padder and pulled tight, the top end going, of course, to the grid pin. The trimmer is placed on top of the former, its connecting tags over the grooves which have been filed. The two wires protruding from the top of the former are then passed along the grooves, through the condenser tags, pulled as tight as possible and soldered to the tags.

The trimmer will then be found to be firmly fixed to the top of the former and can easily be removed, if necessary, by unsoldering the two wires. Where an adjustable padder is required, as for the 1.7 mc coil, two trimmer condensers can be placed side by side.

The connections from all coils follow the same diagram (Fig. 2); aerial, RF coupling and reaction coils being connected to the same pins. Full details of coil windings, trimmer and padder condensers are given in the coil tables.

The position of the band-spread tap on the oscillator coils as shown in the table will give nearly full-dial band-spread on all bands. It will be found that the lower (uncalibrated band-spread) dial, which controls the RF and aerial band-spread condensers, keeps more or less in step with the oscillator band-spread tuning. All tuning should be done on the main band-spread dial, the lower band-spread

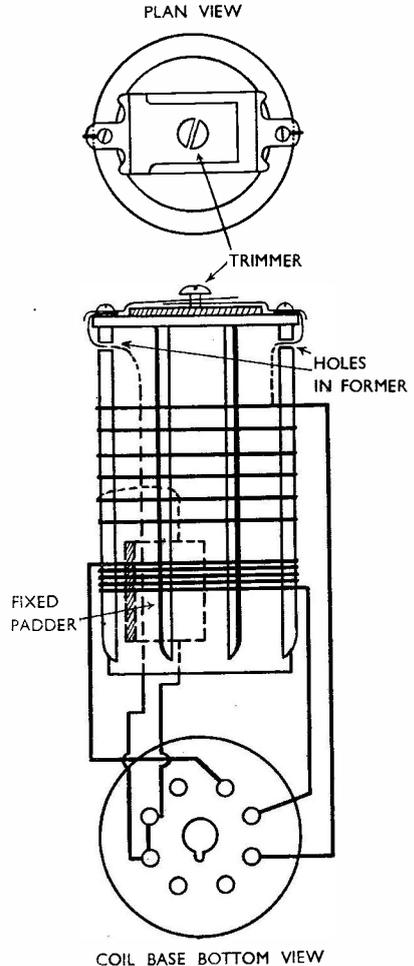


Fig. 2. Coil construction data. All sets of coils L1, L2—L3, L4—L5, L6 are wound in this way.

dial being used to peak up signals after they are tuned in.

### Lining-up Procedure

After completion, the wiring should be checked over carefully, coils and valves inserted and the set switched on, an earth and dipole aerial being connected.

With the bandspread condensers at minimum capacity, the main tuning condensers should be tuned over the

range. Most commercial IF transformers are usually tuned approximately to the IF frequency, in this case 465 kc, and tuning should result in the reception of some sort of signal. The receiver is now ready for lining up.

The IF circuits should first be dealt with. A commercial signal generator is the ideal instrument to use for alignment purposes, but the writer lined up the receiver quite satisfactorily by means of a small, well screened, self-modulated oscillator, the grid condenser and grid leak values of which were adjusted to give an audio modulated signal. This small oscillator was battery powered, and set by picking up the second harmonic on a calibrated BCL receiver, tuned to 930 kc or 322.5 metres.

Whatever the oscillator used, a screened output lead from it should be capacitively coupled to the anode of V4. Placing the end of the insulated lead near the top cap of the valve usually results in an adequate signal being injected.

The trimmers of IF transformer T3 should then be adjusted for maximum output, either in a pair of headphones or as indicated by an AC output meter. The output of the oscillator should then be reduced, the output lead coupled to the anode of V3, and the trimmers of T2 adjusted for maximum output. The same procedure is followed for T1. The whole process should then be repeated in the reverse direction, i.e., start at T2 and work back to T3, after which all IF circuits will be accurately tuned to 465 kc. The IF trimmers must on no account be touched after the trimming operation has been completed.

### RF Alignment

For the aligning of the "front end" of the receiver, either a commercial signal generator, a home-constructed modulated oscillator, or signals-and-background-noise may be utilised.

The adjustment of the receiver using the higher frequency coils will be first considered, as in these coils separate

### COIL DATA

Range	L1, L3	L2, L4	B/S tap L2, L4	L5	L6	B/S tap L6	Padder Condsr.	Trimmer Condsr.	Winding Details
.94 mc to 2 mc	8	65	36.4	15	56	33.5	.001 + 75 $\mu$ F trimmer	15/60 $\mu$ F	24g. enam. close-wound
2.3 mc to 5 mc	7	30	19.5	6	24.5	18.5	.002 $\mu$ F	15/60 $\mu$ F	24g. enam. spaced 1½ in.
4.7 mc to 10.2 mc	4	14.5	6	4	13	5.5	.002 $\mu$ F	3/30 $\mu$ F	20g. tinned cpr. spaced 1½ in.
9.8 mc to to 21 mc	3	6	2.1	2	5	2	.005 $\mu$ F	3/30 $\mu$ F	as above
20.0 mc to 43 mc	3	3	1.5	1.5	3	1.5	None	3/30 $\mu$ F	as above

All coils are wound on standard octal-based 1½ in. diameter formers. Reaction and aerial coils are close wound with 24g. enam. wire, the aerial coil spaced ¼ in. and the reaction coil ½ in. away from the respective grid coils.

variable padder condensers are not used.

Lining up the set using actual signals or noise can be a very tricky piece of work and it is recommended that an accurately calibrated commercial signal generator be employed if at all possible, and the alignment procedure will be described assuming the use of such an instrument.

Plug in the set of coils covering the 10 to 21 mc range, and adjust all the coil trimmers to approximately half capacity. Switch off the BFO and AVC, and turn up the RF and LF gain controls to maximum. An AC voltmeter or output meter is connected to the LS output jack. If such an instrument is not to hand, a loudspeaker or headphones may be used, although much greater accuracy is obtained by noting the peak points visually on the meter, rather than aurally in a pair of headphones.

Inject a modulated signal of 20 mc into the aerial and earth sockets and tune the signal in on the main dial, the bandspread condenser being left at minimum capacity during the whole alignment operation. The 21 mc signal should be found at a setting near the minimum of the dial scale; if not, the oscillator coil trimmer should be carefully adjusted until the signal is received at what is considered the correct spot on the dial. The oscillator trimmer should then be left severely alone.

Tune the mixer trimmer until a peak is noted on the output measuring device. If two peaks are obtained, tune to the one requiring most capacity. Repeat the procedure with the aerial trimmer. Next tune the signal generator to 9 mc and locate the signal on the main dial. Note the output meter reading, and by adjusting carefully the turn-spacing on the mixer and aerial coils, peak up the output to a definite maximum.

Return both signal generator and receiver to 20 mc, and adjust the mixer and aerial trimmers once more. It will probably be found that the trimmers require further adjustment to peak up the output. Note whether an increase

or decrease of capacity is required. If an increase, the generator and receiver should be returned to 9 mc and the turn-spacing of the aerial and mixer coils increased very slightly to peak up the LF end. Return once more to 20 mc and peak up again. The process of lining up the set at the HF and LF ends of the bands should be continued until the point is reached when no further trimming is required after adjusting the turn-spacing.

The whole alignment operation requires great care and a good deal of patience if the receiver is to give of its best.

When a particular set of coils has been satisfactorily adjusted, the coil turns should be cemented into position and a spot of sealing wax dropped on to each trimmer to ensure permanence of adjustment. Lining-up using the 1.7 and 3.5 mc coils is almost as described above, except that the variable padder, mounted alongside the trimmer on top of the coil is adjusted at the LF end of the band instead of adjusting the spacing of the coil turns.

If only the amateur band is required, the receiver could be somewhat simplified by dispensing with the .00016  $\mu\mu\text{F}$  main tuning condenser, and installing three ganged 50  $\mu\mu\text{F}$  condensers in its place. By this means the coil trimmers can be adjusted to the HF end of the amateur band, which will then be spaced over the main tuning dial. In this case, as only a comparatively narrow band of frequencies is to be covered, it will be found much easier to obtain accurate tracking over the whole dial, and if the coils are carefully designed the padder condensers may be dispensed with, all necessary inductance adjustments being made by slight alteration of the spacing of the coil turns.

### Calibration

If a 100 kc oscillator is used for calibration of the main tuning dial, it is simply a matter of noting the appropriate points lightly in pencil on the removable dial card. The card is then withdrawn and the necessary

divisions carefully ruled in, using Indian ink. Alternatively, 180 degrees can be marked around the inner circle of the dial card, and graphs drawn up for each band, by noting the positions of commercial stations of known frequency around the band. Each band may then be permanently calibrated in Indian ink with quite a high degree of accuracy. In this connection, the calibration points of station WWV on 15,000, 10,000 and 5,000 kc will afford an excellent check.

On the original model the band-spread dial was not calibrated, but there is no reason why, with a little re-arrangement of the panel controls, and perhaps a slightly longer panel, a dial similar to the main tuning dial should not be fitted, and calibration of all the amateur bands carried out.

One of the main advantages of the

home-constructed receiver is that any such refinements may be added at will.

**58 mc Band**

Whilst it is hardly practicable to tune down to the 58 mc band on the receiver as it stands, the addition of an adaptor in front of the set will convert it into an excellent 58 mc "double superhet." Such an adaptor need not be an elaborate affair, and can consist of an acorn valve, such as an 1852 or corresponding English type used as a mixer, its grid circuit tune to 58 mc, and a second acorn—or a valve which will oscillate readily in the VHF region, such as the 6J5 or 6C5—as oscillator.

An IF of 10 mc is quite acceptable at these frequencies, giving as it does fairly good image rejection; the oscillator should then be tuned to

**Table of Values**

(See Circuit page 473, October)

R1, 8, 11, 24,	100,000 ohms.	C24	Padder (see Coil Table).	
R2, 6, 10, 13,		C25, 30, 31,	} .0001 $\mu$ F.	
14, 23, 25,	50,000 ohms.	34		
R3, 9, 12,	300 ohms.	C33	.00025 $\mu$ F.	
R4	15,000 ohms wirewound variable.	C36	10 $\mu$ F, 50 volt.	
R5	500 ohms.	C38	BFO Coupling—see text.	
R7	15,000 ohms.	C40	.0002 $\mu$ F.	
R15, 20	250,000 ohms.	C41	3/30 $\mu$ F trimmer.	
R16	3,000 ohms.	C42	Two-plate variable.	
R17	2 megohms	C43	.0003 $\mu$ F.	
R18	1 megohm.	C44	25 $\mu$ F, 50 volt.	
R19	0.5 megohm	C45	.5 $\mu$ F.	
	potentiometer.	C46, 47, 48	8 $\mu$ F, 500 v. wkg.	
R21	0.5 megohm.	T1, T2, T3	465 kc IF transformers.	
R22	400 ohms, 2 watt.	T4	LS output transformer.	
R26	25,000 ohms.	T5	Power transformer, 350-0-350v. 100 mA, 6.3 v. 3a, 5v. 2a.	
C1, 4, 7	50 $\mu$ F variables.	RFC1, 2	2.5 mH. RF Chokes.	
C2, 5, 8	160 $\mu$ F variables, ganged.	LFCl, 2	15/30-H LF Chokes.	
C3, 6, 9	Ceramic trimmers (See Coil Table).	Sw.1	DPDT Toggle Swtch.	
		Sw. 2, 3, 4	SPST Toggle Swtch.	
C10, 18, 26,	} .01 $\mu$ F.	V1	6K7G.	
32, 35, 39			V2	6L7G.
C11, 12, 13,	} All 0.1 $\mu$ F.	V3	6K7G	
14, 16, 17,			V4	6K7G
19, 20, 21,			V5	6Q7G.
27, 28, 19,			V6	6F6G.
37			V7	6C5.
C15	50 $\mu$ F.	V8	6J5G.	
C22	.005 $\mu$ F.	V9	80	
C23	2 $\mu$ F.			

58 + 10 mc = 68 mc, or, alternatively, 58 - 10 mc = 48 mc. The local oscillation may be injected into the mixer grid either by capacity or link coupling.

The anode circuit of the mixer should consist of a circuit tuned to 10 mc, a low-impedance link being used to transfer its output to the dipole aerial sockets of the receiver. The anode coil and condenser should be enclosed in a screening can in the manner of the usual LF transformer, provision being made for tuning adjustments through a hole in the top of the can.

To use the adaptor, plug the low-impedance link into the receiver aerial sockets, insert the 9.8 to 21 mc coils in the main receiver, and tune it to 10 mc. Connect a suitable 5-metre aerial to the adaptor—which can be powered from the receiver if desired, as current consumption will be fairly low—turn up the RF gain on the normal set to maximum and tune the 10 mc circuit in the adaptor until a rushing noise in the 'phones indicate resonance. This setting of the IF will be permanent.

It then remains to calibrate the 58 mc stage and to adjust the coil inductances for correct tracking if a ganged condenser is used. If desired, the converter can also be used for 28 mc reception if suitable coils are wound, the advantages being improved image rejection and enhanced sensitivity.

### Final Adjustments

After the set has been correctly lined up, connect a dipole aerial and it can be given its first trial. To start with, however, the BFO will require initial adjustment. Set the BFO panel condenser to half-capacity, switch off the AVC and switch on the BFO. Unless you are lucky, no difference will be noted, and the trimmer on top of the BFO coil can should then be adjusted until a rushing noise is heard in the 'phones.

Tune in a steady 'phone signal, unmodulated if one can be found, and adjust the BFO coil trimmer until zero-beat is obtained with the incoming signal. It will now be found that by

varying the BFO panel condenser each side of centre the heterodyne note can be adjusted to any suitable pitch. If desired, the BFO coil can be adjusted to zero-beat with the panel condenser at minimum capacity, when it will be found that varying the latter control will raise the beat note from zero to its highest pitch.

When receiving CW the AVC switch should, of course, be off. Particularly loud signals may block the receiver and prevent a clear note being obtained. In this case, back off the RF volume control until the input is reduced and gives a suitable signal.

### Conclusion

The set as described has given every satisfaction in use, bearing in mind its necessary limitations. Whilst the receiver *will* work nicely on a short indoor aerial, it is recommended that an outside dipole, either 20 or 40-metre half-wave, be used, erected as high as possible to ensure the best signal-to-noise ratio.

At a later date, when the need for greater selectivity arises, and the necessary components are easily obtainable, there is no reason why a crystal filter should not be added to the receiver together with any other "communications receiver" refinements which may be desired.

The set compares very well with commercial receivers of a similar specification, and gives the satisfaction which can only be obtained from having constructed one's own receiver.

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### SURPLUS

It is said that in the States the value of the surplus radio and electronic equipment available for disposal is 75 million pounds. Sales so far are valued at about 4 million pounds only. The valve stocks alone are said to be worth 12 million pounds! These are War Assets Administration (WAA) figures, and are unchallengeable—and we *have* remembered to convert from dollars to pounds. It would be a reasonable estimate, on the basis of these figures, to assess the value of British surplus radio equipment at about 40 million pounds. No official British valuation has, however, yet been issued.

## End-Fed Single-Wire

### *Practical Notes on Installation and Coupling of the 68-Ft. Aerial*

By J. N. ROE (G2VV)

THERE is nothing new about the 68-ft. end-fed aerial which, in spite of its simplicity, is capable of giving good results on 7, 14 and 28 mc. It can also be used on the other bands, including 58 mc. To get maximum performance from the end-fed aerial some notes on general installation and method of coupling to the transmitter may be of assistance; the following details are based on 17 years' experience with this system.

Reference to the article entitled "Multi-Band Aerial System" (page 350, August *Short Wave Magazine*) will show that the principles of both aerials are identical. With the one here described there is only one aerial tuning condenser and the length of the radiator is 17 ft. shorter, thereby allowing installation in a more confined space.

When installing this aerial system remember that the 68-ft. length *includes* the portion of wire inside the radio room, right up to the aerial coupling unit. It is important that the length of wire out of doors be kept in one straight line having no odd angles or "downlead."

Where the radio room is situated on the opposite side of the house to the entry of the aerial, the coupler should be linked to the transmitter, using an ordinary low-impedance line. Do *not* try to bring the aerial through the house to the transmitter. Install the aerial coupling unit immediately where the aerial enters the window and use co-axial or twisted leads for the link back to the transmitter final tank circuit. Avoid running the radiating portion of the aerial about the radio room; always make any extensions necessary by means of link coupling.

In this way losses are kept to a minimum.

Get a good earth to the cold end of the coupling unit—it is not usually good enough to connect the earthy side back to the negative line in the transmitter.

Where the transmitter is installed upstairs it is, in most cases, possible to make a satisfactory earth to the main water supply in the roof.

#### Aerial Coupling Unit

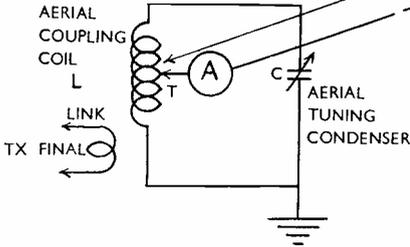
A suitable method of getting the complete coupling unit close to the entry of the aerial is to mount the condenser C, together with two stand-off insulators spaced to carry the coil L, on a small board or panel directly attached to the window frame, or wall. Individual requirements will differ and reference to Fig. 2 will give a general idea of the sort of layout suggested.

The capacity and spacing of the condenser C will depend upon the frequencies and power to be used. For 75 watts input, using CW on 7, 14 and 28 mc, a medium-spaced transmitting type variable condenser of about .0001  $\mu$ F is satisfactory.

Aerial coils are of  $\frac{3}{8}$  in. o.d. copper tubing and wound, air spaced, to an approximate diameter of  $2\frac{1}{4}$  in. For 7 mc use 12 turns, 14 mc 8 turns, and 28 mc 3 turns. The aerial should have a variable method of attachment to the aerial coil (in most cases it is a crocodile clip!) and an aerial ammeter may be used in series with the aerial lead.

For the three bands mentioned the link coil, at both coupling and transmitter tank ends, consists of two closely wound turns of 16 SWG

**Fig. 1.** The coupler for the 68-ft. end-fed aerial. This should be built as one unit and mounted at the termination of the aerial. If necessary, the Tx link can be taken to another room should it not be possible to bring the end of the aerial near the transmitter without going through the house. No part of the aerial itself should be run indoors, since the wire radiates off its whole length from the tapping point T. On 1.7 and 3.5 mc, the earth lead can be replaced by a counterpoise. Values of C and L for the different bands are given in the text.



tinned copper wire insulated with sleeving. These links are coupled to the cold end of the tank coil and the cold end of the aerial coil respectively. They can be wedged on to the copper tubing or arranged in any convenient manner.

**Tuning Operation**

Connect the aerial (tapping point T in Fig. 1) to approximately the centre of the coupling coil in use for the appropriate band and set the aerial tuning condenser to minimum. Tune up the transmitter in the normal manner, adjusting the final tank circuit for minimum plate current. Now tune the aerial condenser for maximum aerial current; if no aerial ammeter is available a 6-volt lamp may be used, or a neon indicator held against the aerial lead. To get the correct loading on the PA, adjust the aerial load on the coupling coil, say a turn either way for a start, and retune the aerial condenser. Each time the aerial tap T is moved on the coil it is best to reset the aerial condenser at minimum and tune again.

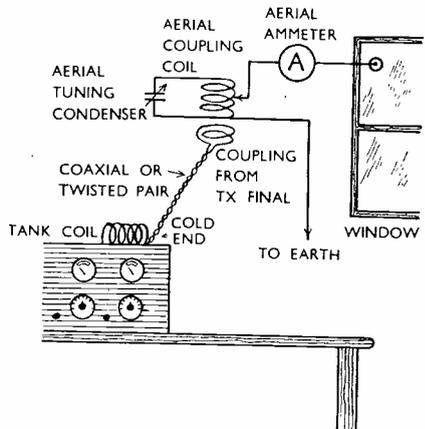
It will be found possible to increase the PA current by moving the aerial tap up to the hot end of the aerial coil, but if too far advanced this process will tend to reduce the indicated aerial current. A little experimenting for correct plate current, together

with maximum RF in the aerial, is worth while and will help the user to become familiar with the working of the system.

One point to remember — having, in the initial stages, set your final tank tuning for minimum plate current, do not retune this circuit. Make all adjustments for loading by means of the aerial coupling unit, as described. Reduction of loading where necessary can be effected by looser coupling of the links.

The system will work without an earth connection, but for correct operation, as already detailed, a good earth is recommended.

For the purposes of this article details are given for 7, 14 and 28 mc operation only. For 3.5 and 1.7 mc work, the earth is replaced by a counterpoise, which can be anything between 30 and 60 ft. in length; L should be increased to an appropriate size and C to about .0003 or .0005  $\mu$ F. The system is then tuned in the same manner as for the other bands. For 58 mc work, L and C must be considerably reduced in size and tuning becomes much more critical.



**Fig. 2.** Sketch showing the general arrangement of the coupler with respect to the transmitter. The link between coupler and Tx can be up to 50-60 feet in length.

# Crystal-VFO Mixing

A Stable Oscillator, Easily Calibrated

By W. A. SPARKS

*(This is another approach to the problem of producing a stable, variable drive source. The principle employed is not widely known in Amateur Radio practice, but is capable of giving excellent results. Several commercial VHF transmitter designs incorporate this system of control.—Ed.)*

Many amateurs have in their possession crystals which are outside the new band limits, mainly 7 mc type, that are at present being used for doubling to 28 mc. In view of the QRM on 7 and 14 mc, it is almost essential that the transmitting amateur should be able to change his frequency in order to ensure contacts free of interference.

The purpose of these notes is to describe a method whereby a stable drive frequency may be generated, still making use of crystals outside the band, and also gaining the advantage of the use of a low radio frequency oscillator with the qualities usually associated with this class of equipment, viz., frequency stability, ease of calibration and simplicity of construction.

## The Mixing Circuit

The principle adopted is that of beating the crystal frequency with a low frequency oscillator over a range of 100 kc to 400 kc and filtering out the required beat frequency in the anode circuit of the mixer valve. This beat frequency is then amplified in the normal way and radiated.

The construction of a variable frequency oscillator inevitably demands more than a little care and attention to detail. The difficulties of construction increase as the frequency of operation required increases; therefore, if a low radio frequency unit is constructed the stability should be greatly improved over the normal type. Oscillator drift is also proportional to frequency for any given set of operating conditions and therefore a low radio frequency is desirable for maximum stability.

By using a VFO which operates in the *broadcasting* bands, the ease of calibration is emphasised—this without the aid of expensive gear.

## Practical Points

The system to be described was tested out using a crystal working on 6040 kc and an oscillator section with a range of 1000 kc to 1500 kc. By this combination a

frequency range of 7040 to 7540 kc was established, covering the 7 mc band very satisfactorily.

The crystal section of the unit was mounted together with the valve (6K8) on the top of the chassis. The output coil and its condenser were also mounted above the chassis. The oscillator coil and setting condenser were placed beneath the valve-holder and controlled from the front panel by means of an extension spindle.

The circuit diagram, Fig. 1, shows that the crystal input was led to the tuning grid of the 6K8 and the oscillator input fed to the oscillator grid. The feedback necessary in the case of the VFO was obtained by coupling the anode coil of the oscillator section to the grid coil, in the normal fashion. The values of grid leak and condenser in the oscillator are not given since various values of condenser from 250  $\mu\mu\text{F}$  to 0.01  $\mu\text{F}$  may be used. The leak could be any value between 20,000 ohms and 100,000 ohms.

The low effective anode/grid capacity in the crystal section enables the valve to be run with a fairly high screen voltage, thus improving the power output from the stage.

## Operation

The system of operating the unit is as follows: Switch off the oscillator section and tune the crystal stage in the normal way. When the crystal stage is oscillating properly, switch in the variable frequency oscillator and slightly detune the anode coil. Tune the variable frequency oscillator to give dip in the anode current at the new setting. Note the setting of both VFO and anode condenser dials. Repeat for various settings of the anode condenser and then calibrate the VFO by beating with broadcast signals.

When the VFO has been calibrated the anode condenser can then be set at any required frequency by drawing a graph of anode condenser and oscillator condenser settings for desired frequencies. In order to QSY, all that is necessary is to move the

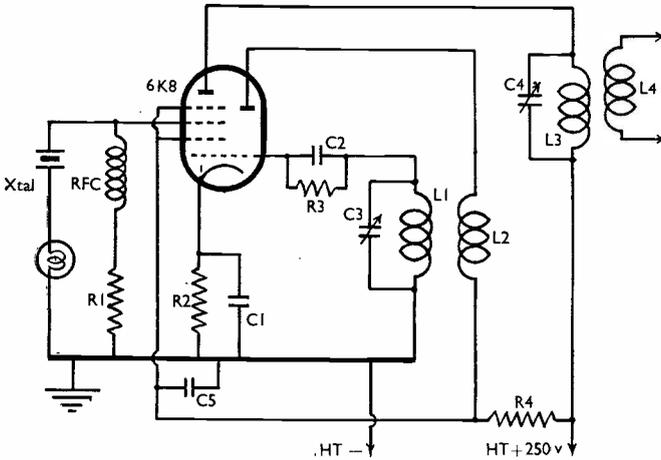


Fig. 1. Circuit for obtaining a variable and controllable beat frequency from a single crystal oscillator. The beat frequency taken off this oscillator can be amplified in the usual way for drive purposes. With a 6040 kc crystal, and a VFO covering 1000-1500 kc, a variable output frequency in the range 7040-7540 kc can be obtained, with a high degree of stability.

anode condenser to the required setting to put the VFO upon the wanted frequency—radiating frequency required minus crystal frequency—and line up the transmitter in the usual way.

It is advisable to check the beat-frequency, since if only a small variation between crystal and radiating frequency is required, the lower frequency beat may break through. It is therefore essential that the anode coil and its tuning condenser be of the highest quality, and also that coupling between the oscillator and buffer should not be too tight in order to avoid drawing both frequencies. The output may be checked quite simply by tuning the short wave receiver over the required band and noting whether a second beat is being radiated.

**Output Obtainable**

The principle is illustrated in block diagram (Fig. 2) but the finally constructed circuit is no more complicated than the normal VFO, the only additions being the crystal, RF choke, and grid leak. The output from the unit is sufficient to drive a 6V6, 6L6, or 807 and a high degree of stability is achieved. By checking the frequency drift against the BBC in the 7 mc band over a period of four hours, a very slight change in tone was noted, this probably being due to initial warm up of the oscillator valve itself.

Experimental work on the above has

so far been confined to the 6040 kc crystal, but these notes are presented as a possible means of escape from the present bad QRM on 20- and 40-metre bands.

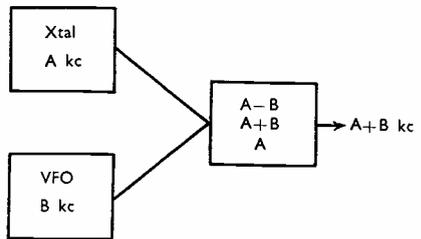


Fig. 2. Block diagram illustrating the principle of operation.

**Table of Values**

C1	0.1 μF.
C2	See text.
C3	.00025 μF.
C4	.0001 μF.
C5	.01 μF.
R1	20,000 ohms, 1 watt.
R2	300 ohms, 1 watt.
R3	See text.
R4	20,000 ohms, 10 watts.
L1/L2	To tune L/W BC band.
L3	To tune 7 mc.
L4	Output coupling coil.

# DX COMMENTARY

## ON CALLS HEARD, WORKED & QSL'd

Interest in DX work certainly does not decrease, and it is becoming clear that there are many "modest violets" who are doing great things all over the world and saying very little about them. Anyone who listens a lot can find that out for himself.

The chief event of the month, of course, is the simply astounding behaviour of the 28 mc band. The sunspot fade-out mentioned in these pages last month pursued its normal course, and then the bands came back to life, 28 mc being the last to clear up. But when it did . . . However, details of this come under another heading.

In the whole of our rather bulky post-bag this month there are only three letters referring to 7 mc. We are therefore deciding, for the present, that 7 mc cannot be dignified by the title of a "DX band," and we have omitted it from the DX Forecast. After all, we know our own opinion of the band to-day, and we imagine that yours is the same. Perhaps some time in the future, when the whole band is available, it will again be possible to find some DX underneath that scum on the surface, but for the time being the band is, in our opinion, no longer worth anyone's serious attention except for a few hours very early in the morning.\* Perhaps the faithful three will keep watch and report any improvement. No one mentions 3-5 mc at all!

### Grouse-and-Grievance Dept.

This section looks like becoming a flourishing concern. We can, however, open it with one pleasant thought—that the high-powered 'phone menace has not been quite so much in evidence. People continue to abuse the unwritten laws concerning the divisions of the bands into 'phone and CW areas, but not in quite such large numbers.

Commercials remain about where they were. True, DHTA/2 has removed from his pitch on 14 mc, but the Russian at the low end of 28 mc seem to have multiplied, and at times there are four commercials between 28000 and 28100.

S/L Pain, late of ZB2A, remarks that

\* There are other opinions on this point! See GC3GS's letter in this issue.—Ed.

By L. H. THOMAS, M.B.E. (G6QB)

some operators seem to do nothing but clutter up the bands to no purpose. "Three times three" becomes "twenty times twenty."

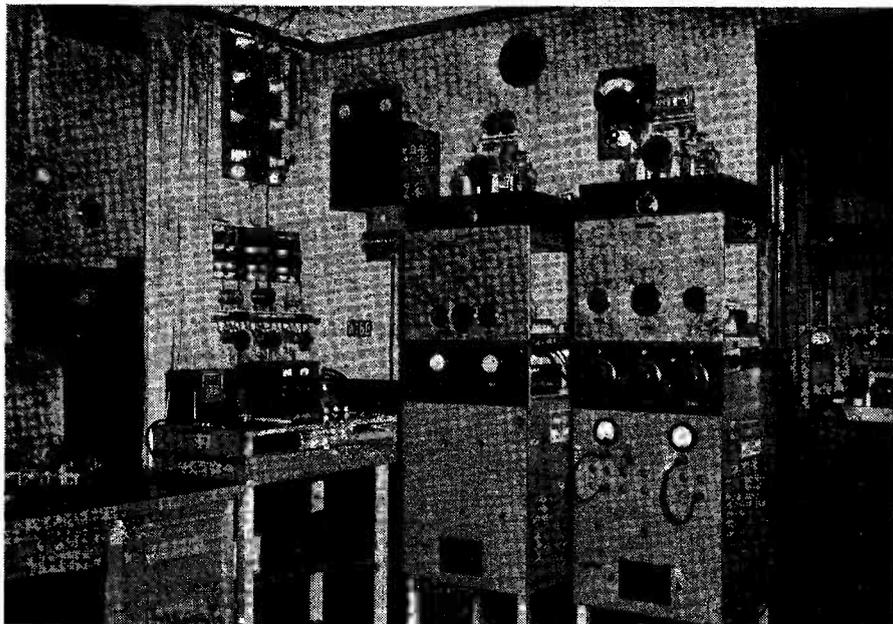
G2PL (Wallington) voices a sentiment when he says "I strongly deprecate this use of  $\frac{1}{2}$ - and 1-kW by some of the DX lads. It is not necessary to use more than 150 watts."

G5LC (Molesley) has a few unkind words to say about would-be QSO-stealers. He heard a VQ2 finishing a QSO with a G station, and sat on his frequency waiting. While the VQ2 was listening to the other station's "final," up came W1, 3 and 9 all calling him. G5LC waited for a genuine "SK" and then called the VQ2 and worked him; but in the middle of the QSO the VQ2 reported several G's calling him on or very near G5LC's frequency, with the W's still hard at it—actually during a QSO! So G5LC decided that these gentry needed a lesson, and kept the VQ2 talking, with W's and G's all jumping like cats on hot bricks from one frequency to the other.

At the end of the QSO the VQ2 said he was going out, but the would-be thieves apparently couldn't read text—only call-signs—so after the final QRT there was another orgy of calls. No comment necessary, I think. At the same time we would like to remark that far too many stations send "SK" when they don't mean it. "SK" should only be sent *once* during a QSO, and then it should mean "I have finished."

On the same subject, the great "Overoffnclear" mystery continues to deepen. What *does* it mean! Three times in one day I heard W's say "Overoffnclear and listening for your final." This strange word is surely the equivalent of "SK"—or is it? What does the "off" part mean? "Over to you" is unmistakable; "over and off," we imagine, would mean "listening to your final and then QRT"; "over and clear" might mean "listening for your final and then tuning the band," or even just "tuning the band." But this "overoffnclear"—Oh dear, oh dear!

G6PJ (Sheffield) delivers a boiling tirade on "station visits and crosstown QSO's"



General view of WIBB, Winthrop, Mass. Separate Tx units are used for each band and all bands from 3.5 to 150 mc are covered. He can change channels in less than a minute. A photograph of the operating position appeared in the November "Short Wave Listener."

on 14 mc. When, as he says, the offenders use over-modulated 'phone and clutter up the whole CW end of the band by bleating that they haven't been getting any DX, thoughts become murderous. He suggests that an annual Morse test would be a very good thing, judging by the rare but painful appearances on the key of some of the chief offenders.

G5LH (Horbury, Yorks), who was G5KZ some 20 years ago, comes up with similar remarks. High-power 'phone, 'phone in the wrong part of the band, and futile conversations are his main points. He also does a little propaganda for the DX men of the North, which appears under the appropriate heading. G6FU (Surbiton) also slates the high-powered XA's who use commercial transmitters and manage to occupy some 70 kc. He suggests that some of them have so much wire strung up over occupied Europe that it would be simpler and more pleasant to instal a direct cable to the States.

#### 28 mc DX

But enough of this grouching—we have more pleasant topics to deal with. The Aurora or sunspot fade-out from Sept-

ember 16 to 20 ran its normal course, and from September 21 the bands were open again. It was a severe one, as fade-outs go, but did not last very long. 28 mc was wide awake by September 25, and from that time never looked back. By the beginning of October the W6's were putting in strong signals at about 1900; seven days later they were in full cry by 1600; by the 16th they were frequently S9 at 1500; and then the skip changed slightly and there was a most spectacular spate of W7's and VE7's. From October 17 to 21 practically every W7 and VE7 heard was peaking at 20 to 40 db above S9. G6QB (Bexhill) worked eight W7's in a row one afternoon, all on 'phone, and in every case was "first G QSO"—and all at S9 plus. This, of course, proves

#### CALLS HEARD

The Calls Heard page is now of particular interest to transmitters, in that it lists mainly G's heard overseas on the DX bands, as well as on 1.7 and 58 mc at shorter ranges. Overseas readers are invited to send in such lists, covering reception of G's on all amateur bands.

that conditions were completely freakish, otherwise these chaps would have got into G long before.

Curious that the W6's and W7's should peak on different days, but there is no doubt that the two sets of conditions are somewhat different. Incidentally, we can tell a 6 from a 7 by looking at the "S" meter! The 7's have a deeper and more rapid fade—their peaks are higher and their troughs lower. Another interesting find at G6QB was VR2AB (Suva, Fiji) putting in S7 'phone on about 28200 at 0900 hrs. on a Sunday morning. VK and ZL 'phone, at the time of writing, is good from 0830 until 1100.

G5CP (Manchester) certainly holds one record on 28 mc. He has worked ZS1T 81 times and ZS1AX 62 times. Similar credit, incidentally, to the South Africans for holding the other end of the record.

G6WY (Beckenham) has worked VP8LK (Falklands), PK1AM (Java), XZ2AB and VS9AP, together with many W's and VE's on 'phone on 28 mc. He has also collected FM8AC (Martinique) both on 28 and 14.

G3VR (Bradford) worked all W dis-

found by G6QB with only 30 per cent. of calls answered on a Sunday, with 100 per cent. for the four previous days. Week-ends on 28 are now decidedly hectic.

#### 14 mc DX

We rather doubt whether 14 mc can any longer claim to be the main DX band. The curious thing is that all the activity on 28 does not seem to have diminished the activity on 14 at all. (The explanation can probably be found in the swelling lists of New QTH's each month.)

G2VV (Hampton-on-Thames) reports some nice contacts with KH6CT, CX1DZ and ZS6DO operating from an aircraft. He reminds us, by the way, that the VK DX Contest takes place during the first two week-ends in November, 1700 GMT Saturday, until same time Sunday.

G6BB (Streatham) considers that 'phone troubles have decreased. He mentions several freak QSO's in which signals have dropped quickly from QSA 5 to QSA zero. He has been working VE6, VE8, KL7 and many VK's and ZL's.

G2PL (Wallington) is, as usual, a mine of information on 14 mc doings. He now

## ON THE AMATEUR BANDS

tracts in three hours on 28 mc. Actually he says "WAS"—but you can't Work All States in ten QSO's. Incidentally, can anyone claim a "WAS" on 28 mc only? It should be easily possible by now—and on 'phone at that. G3VR also comments on excellent contacts with VU2AQ (Santa Cruz, Bombay), daily at 1330. And he worked W2LQ who uses 1 kW of FM! Transmitter is said to be in a box 12-in. by 8-in. by 6-in. and costs \$39.50 retail. Saints preserve us!

Several W's were recently heard on 28 calling HE1CE. This turns out to be HB9CE's portable in Liechtenstein. Many other strange calls heard on the band are best disregarded; ET4BM sounded mighty like a "G," and fairly close at that. AU3KBC (Moscow), however, is genuine, although he tends at times to sound like the next-door neighbour, complete with hum and key-clicks far over the band.

Other 'phone stations in the S9 plus category have been VP6YB (Barbados), XZ2AB (Burma), and several VE7's in Vancouver or thereabouts. VK's come through well—both 'phone and CW—from 1000 until 1230, when the W's usually drown them.

A measure of the week-end QRM was

totals 110 countries (post-war) in spite of deleting some from his previous list who are now considered "phoney." Here are a few of his best: UA6LC (Rostov-on-Don), EL5B, VE8AY, ZA2D (Albania), XE1KR, UD6AB (Baku, Azerbaijan), OX1A, PK1RI, UI8AA (Tashkent), VQ8AB (Mauritius), VP4TB (Trinidad) and HI8X. We presume that 'PL sleeps sometimes, but when?

G6WY (see also 28 mc news) has worked W7ELJ/KL7 in the Aleutian Islands, on 'phone at 1900 hrs. Most unusual DX, especially at that time.

Harold Owen, that stalwart on the Gold Coast (see Calls Heard), also sends a general 14 mc log which shows that he misses very little. He has heard K6HOT/KC6 (Canton Island), a real rarity, and ZK1AB (Cook Islands). He has just opened up on 28 mc, so we expect great things from him next month.

Lt. Craig in the Punjab (also see Calls Heard) likewise sends in some most interesting notes. He says W5IFM operates a fixed portable on Bahrein Island, using 6 watts on 14 mc and 7 watts on 7. Reception of G's has been consistent, but he has found the D4's continue to be a menace.

Lest the Londoners and Southerners become too complacent, I had better quote from a letter from G8KP (Wakefield), who has put Yorkshire on the map in no ordinary way with 94 countries on 14 mc. His grand total, including pre-war, is 137. Recent trophies include ZD8A, HH5PA, HK3CX, W4IEN/NY4, EQ4DC, YV5AP, OA2XE, ZP6AB, AC3SS, LZ1XX, LX1AI, and scores of slightly less rare ones.

He also had an unexpected 17-minute QSO with W3QR, operator of the Super-Fortress "Dreamboat" (over Iceland at the time). W3QR reported G8KP as "blowing him out of his chair." Just for the record, this was on October 5 at 1840 on 14 mc.

Another little statistic concerning 'KP is 800 QSO's on 14 since July 1; 640 of them outside Europe! Any contestants for the marathon? Incidentally, G8KP's shack has been dignified by the local paper with the brand-new name "bedroom wireless cabin"! We like that one.

7 mc

On the whole, there is very little to say about 7 mc except what we all know! But G8NI (Kenilworth) reports hearing VK5NR there at RST 429, and also mentions the "group effect" with several UA3's on the band. G2HKU (Sheerness)

has worked UA3KAE (Moscow) and OE4LA (Innsbruck) on the band, and has also had several contacts with OK1XU, who uses a CO only, with 3 watts. Harold Owen (Gold Coast) has heard W (all districts), CM and TI. Broadcast QRM does not worry him much out there, but QRN does!

*Transmitting readers are invited to send items for DX Commentary to L. H. Thomas, G6QB, "The Short Wave Magazine," 49 Victoria Street, London, S.W.1., to reach him as early as possible in the month. SWL reports are only included in DX Commentary if they are of direct interest to transmitters.*

Miscellany

VU2AD, 2AJ and 2JD, all at Mhow (QTH's in box) send newsy letters. There is now a Mhow Amateur Radio Society with 15 to 20 members. New VU stations active include VU2AA, 2AC, 2AY, 2EG, 2FY, 2HI, 2JP, 2LS and 2XB. The "VU5AG" recently mentioned was genuine, but now has a licensed call! VS7EP and 7GR are active in Ceylon, and AC3SS (Sikkim) is on the air again. VU2AB has departed for the Middle East and hopes to have an exotic call-sign of some sort

**DX FORECAST FOR NOVEMBER 1946 (All times GMT)**

	14 mc	28 mc
<b>NORTH AMERICA :</b>		
East and Central USA, Canada, Newfoundland, etc. . . . .	1300-0600	1200-1700
West Coast . . . . .	1600-1900	1500-1800
<b>CENTRAL AND SOUTH AMERICA :</b>	2300-0800	1200-2200
<b>AFRICA :</b>		
North of Cancer . . . . .	All day	1000-1600
South of Cancer . . . . .	1600-2300	0900-2000
<b>ASIA :</b>		
West of 75° E. . . . .	All day	0800-2000
East of 75° E. . . . .	1200-1900	1000-1600
<b>OCEANIA :</b>		
Australia and New Zealand . . . . .	0900-1200	0830-1030
Dutch East Indies, Malaya, Philippines, etc. . . . .	1400-2000	0830-1400

NOTE.—The times given above are the most likely periods during which signals may be expected from the parts of the world indicated. Under unusual conditions, signals may be heard outside these times.

## DX QTH's

CR4HT	Henrique Torres, Praia, Cape Verde Islands.
CX2CO	P.O. Box 37, Montevideo, Uruguay.
FG3GP	c/o Pan American Airways, Dakar, F.W.A.
HE1CE	Portable in Liechtenstein (QSL via HB9CE).
KA1CB	c/o Philippine Amateur Radio Association, Manila, P.I.
OX1AS	136 A.C.S. Sqdn., APO 858, Postmaster, N.Y.C.
OX1Z	136 A.C.S. Sqdn., APO 858, Postmaster, N.Y.C.
PK1AM	No. 2 Coy., HQ AFNEI Sigs., Batavia, Java, N.E.I.
PK3RS	Sgt. Dullemond, Royal Netherland Marine Corps, Marine P.O., Batavia, N.E.I.
PK5AR/PK6	Cpl. Vandonjen, Coenenlaan, Macassar, N.E.I.
PZ1A	Box 679, Paramaribo, Dutch Guiana.
TG9RC	Pan-American Airways, Guatemala City.
TI2EV	Ernest Venegas, Electric Co., San Jose, Costa Rica.
TI2OA	Otto Andre, San Jose, Costa Rica.
VE8MF	c/o East Arctic Patrol, Ontario (Sin. at Clyde River, Baffin).
VP4TB	Bob Wilson, Pan-American Airways, Trinidad, B.W.I.
VQ2FR	P. O. Box 111, Mfulira, N. Rhodesia.
VS1BU	Korean Camp, ALFSEA Sigs., Singapore.
VS9AR	Aden Command Sigs., Aden.
VU2AD	Sgt. J. A. Rouse, G2AHL, Sigs. Training Centre (British), Mhow, India.
VU2AJ	L/Cpl. A. Hudson, Indian Signal Corps School, Mhow.
VU2JD	Lt. J. M. B. Draper, R. Sigs., No. 3 S.T.Bn., (British), Mhow.
W5KGI/C7	Lt. Glen Simpson, APO 912, U.S. Army, China.
W6OCA/J3	B. Coy., 58 Sig. Bn., APO 713, c/o Postmaster, San Francisco
W7ELJ/KL7	Aleutian Islands—full QTH wanted.
W9CAC/TF	136 Sqdn., APO 610, c/o Postmaster, N.Y.C.
XE1KR	P.O. Box 544, Mexico City.
XZ2AB XZ2AF	AHQ, R.A.F., Burma, SEAAF.
XZ2DA	R.A.F. Signals Section, Rangoon, SEAAF.
XZ2DN	R.A.F. Signals Section, Mingaladon, nr. Rangoon, SEAAF.
ZA2D	Durazzo, Albania—QSL via A.R.R.L.
ZB1A	Port Radar Centre, H.M. Dockyard, Malta.

soon. VS1BG and 1BJ (Singapore) are both active on 28 mc now. AC4YN is also on 28, but with low power. The three musketeers of Mhow (Three Blind Mhice?) will all be glad of reports on their signals, and have offered to do anything for readers who want information or any assistance regarding the Far East.

John Hunt, famous as VS4JH (Labuan), has now returned to U.K., and is G2FSR—"just another G" as he says. After picking and choosing in his DX paradise, he has to get in the queue with the others. VS4JH closed on August 15, after having worked 84 countries. All the cards and SWL reports are being answered as time permits. Latterly, the famous rig used 100 watts on CW and 50-60 on 'phone, the PA being an 813; the nice rack-and-panel job in last month's photograph was made of old boxes, with nails and screws dug out of anything handy. The whole thing was built of salvaged components, including Jap gear.

GC2CNC (Jersey) says that the Channel Islands Field Day corresponded with the night of the Aurora. The transmitting stations kept their word and were on the air, but the receiving stations were not so enthusiastic!

The 1.7 mc band is flourishing. Sussex and Kent amateurs are using it for its proper purpose—semi-local phone QSO's; quite a crowd join in thrice-weekly "QSO parties." . . . G2CUR (Leicester) wants reports from anyone hearing his 1909 kc transmissions. . . . G5IH (Tunbridge Wells) reports that in the Midlands they are using "101" and "102" at the beginning and end of a QSO to mean "all the alphabet and numerals of polite CW"—CUL, 73, tks QSO and all that. . . . G8PL would like to know some more about XUAIR, worked on October 20; QRA given as Yakutsk, Siberia, but there appears to be some doubt regarding his authenticity.

Reports for next month by November 15 latest, please. 102!

Acknowledgments to all those mentioned in this article, and also to G6FG (Bristol), G4AR (Kensington) and G3ADW (H.M.S. *Diadem*).

## 'PHONE/CW AREAS

Help rationalise the use of the 3.5, 7, 14 and 28 mc bands by keeping 'phone in the 3685-3800, 7200-7300, 14200-14300, and 28500-29500 kc areas. New 3-letter G's and CW operators, please choose your crystals to give working points in the 3500-3635, 7150-7200, 14100-14200 and 28000-28500 kc areas.

# CALLS HEARD

Please arrange all logs strictly in the form given here, in numerical and alphabetical order and on separate sheets under appropriate headings, with call sign and address on each sheet.

## OVERSEAS

Harold Owen, B.Sc., West African Cacao Research Institute, Tafo, Gold Coast Colony.

14 mc CW and 'Phone; EI9J (55), G2AJ (55), 2BJY (44), 2BQ (55), 2BQC (448), 2CBA (44), 2CCD (548), 2CLL (54), 2CNW (43), 2DZ (33), 2FDF (54), 2FGX (57), 2FMU (43), 2FMY (448), 2FXQ (54), 2HD (55), 2HFO (54), 2HNO (33), 2HOJ (558), 2IM (558), 2IO (33), 2IQ (588), 2LC (446), 2MD (44), 2MF (45), 2NA (54), 2OS (45), 2PL (44), 2QO (54), 2SA (44), 2SG (44), 2SY (55), 2WW (32), 2XD (44), 2XV (44), 2XY (54), 2ZA (558), 3ADP (43), 3BQ (55), 3BU (558), 3BW (43), 3CO (54), 3DO (56), 3FA (57), 3FC (54), 3GA (44), 3IY (44), 3LB (558), 3LP (34), 3LR (448), 3MI (35), 3OF (43), 3QD (55), 3XD (44), 4FM (44), 4HG (54), 4JZ (43), 5AD (44), 5BJ (45), 5DQ (557), 5DZ (44), 5FF (43), 5HH (43), 5LH (558), 5LI (55), 5LP (558), 5MY (43), 5QA (558), 5RP (43), 5RV (567), 5TH (43), 5UI (43), 5UQ (44), 5VB (557), 5VH (44), 5VM (44), 5VT (44), 5WI (54), 5YV (547), 6AG (45), 6BB (558), 6BK (348), 6BQ (578), 6CL (558), 6CW (558), 6FG (558), 6HC (33), 6JF (55), 6LV (45), 6LX (43), 6NN (54), 6PJ (54), 6PR (55), 6RC (458), 6RH (55), 6SQ (44), 6VQ (448), 6VX (56), 8AC (54), 8AL (55), 8DY (33), 8II (45), 8IW (43), 8JJ (44), 8JM (55), 8OH (43), 8PB (54), 8PO (568), 8QY (55), 8QZ (548), 8RL (568), 8TP (568), 8TT (54), 8UA (55), 8UD (44), 8UT (567), 8VB/ON4 (55), 8VI (55), 8W3AX (44), 8CX (43), 8MQ (44). Receiver O-v-1, Sept. 1-Sept. 30 (RS values in brackets, T9 unless otherwise stated).

OKIAW, A. Weirauch, Mestec Kralove, 9, Czecho-Slovakia.

1.7 mc CW: G2CPT, 2DP, 2FPU, 3MD, 3NT, 4GA, 6KU, 6ZQ.

3.5 mc CW: G2BCX, 2NM, 3ACC, 4AK, 5CI, 5DU, 6HB, 6HC, 8DY, 8QZ, 8RQ, GC8NO, GISUR.

Roger C. Legge, 20 Beethoven Street, Binghamton, New York U.S.A.

14 mc 'Phone: G2AAN, 2CDI, 2CIN, 2SY, 2ZB, 3XC, 3XP, 4GF, 4KC, 4KY, 4PS, 5RL, 6LY, 8AC, 8AN, 8KP, 8OV, 8PO, GW3KY, 3UO, 6JW, 8SO.

Lt. R. S. Craig, 10th Gurkha Rifles, Alhial Camp, Kangra Valley, Punjab, India.

14 mc 'Phone: G2AJ, 2DRR, 2GL, 2JZ, 2OZ, 2PU, 3BK, 3BM, 3DO, 3FA, 3HZ, 3IQ, 3LP, 3MI, 3MK, 3TT, 3WW, 3YM, 4FM, 4MC, 5GN, 5LG, 5OV, 5PW, 5XA, 5XI, 5XK, 5YV, 6FI, 6WX, 6XP, 6XR, 8AW, 8CD, 8CL, 8IG, 8KL, 8KP, 8LP, 8QW, 8QX, GM2MG (Army welfare receiver, battery-operated, no band spread).

## GENERAL

G2DHV, 28 Longlands Road, Sidcup, Kent.

1.8 mc CW: G2HW, GM3UM 6TH, GW8WJ.

## FIVE METRES

GSJU, 333 Rednal Road, Birmingham, 31.

Worked: G2MR, 3IS, 4OS, 5BD, 5LJ, 5MA, 6FO, 6LK, 6VX, 6YU, 8JV, 8UZ.

GSBD, The Elms, Church Lane, Mablethorpe, Lincs.

G2AK, 2MR, 5JU, 5MA, 5TX, 6LK, 6VX, 6YQ, 8JV, 8UZ.

G5MA, 21 Broadhurst, Ashted, Surrey.

Worked: G2AK (112), 3BY (170), 3IS (85), 3PD (173), 4AP (67), 4OS (172), 5BD (145), 5BY (176), 5JU (109), 5LJ (112), 5LL (145), 6DH (73), 6YU (93), 8JV (120), 8UZ (135).

(Distances in brackets.)

G8GX, 40 Tolcarne Drive, Northwood Hills, Pinner, M'sex.

Worked: G2XC, 3CQ, 3GM, 3OO, 4CI, 5AS, 5IG, 5MA, 5TX, 6LK, 6UH, 6VX, 6YU. Heard: G2AK, 2MR, 2WS, 2YL, 3IS, 5BY, 5LJ, 5UM, 6DH, 6OH, 6OT, 6RA, 8SK. September 10—October 11.

G3IS, 59 Eastlands Road, Rugby.

Worked: G2AK, 2AIH, 2ZV, 3ABA, 3DI, 3PD, 5JU, 5LJ, 5MA, 5TX, 6CW, 6HI, 6VX, 6YU, 8UZ, 8WN. Heard: G2MR, 2MV, 5BR, 5MQ, 5RD, 6LK, 8GX, 8JV, 8QY, F3JB.

G6YU, 14 Bourne Road, Copsewood, Coventry, Warks.

Worked: G2MR, 2MV, 2XC, 2YL, 3ABA, 3IS, 3OO, 4GB, 5IG, 5LJ, 5MA, 5RD, 5TX, 6FO, 6LK, 6OH, 6VX, 8GX, 8TV, 8UZ. Heard: G2WS, 4OS, 5JU. September 15—October 14.

G8UZ, 29 Columbia Avenue, Sutton-in-Ashfield, Notts.

Worked: G2MR, 2MV, 2WS, 2XC, 2YL, 3BY, 3IS, 4OS, 5BD, 5JU, 5LJ, 5MA, 5TX, 6CW, 6FO, 6LK, 6VX, 6YU, 6YQ, 8JV. Heard: G2AK, 3PD, 5BY, 5TH, 6DH.

G6FO, Elm Cottage, Beacon Hill, Penn, Bucks.

Worked: G2MR (27), 2UJ (52), 2WS (31), 2XC (62), 2YL (19), 4OS (146), 5JU (80), 6DH (81), 6LK (36), 6NA (27), 6OH (15), 6UH (13), 6YU (66), 8JV (95), 8TV (36), 8UZ (108). Heard: G2AK (85), 3OO (22), 4AP (49), 4DN (25), 5LJ (83), 6KB (12), 6OT (22), 6VX (34), 8KZ (22). All during October 11-22. Tx KT8c-DET19-KT8c; Rx S27; Aerial 12  $\frac{1}{2}$ -wave N/S. All contacts on CW.

# First Class Operators' Club

## Revival—Function and Membership—Explanatory Notes

Further to the announcement which appeared on p. 296 of the July issue of the *Magazine*, it is now possible to put forward full proposals for the revival of the well-known First Class Operators' Club, always referred to before the war as the F.O.C.

The first point to make clear is that the F.O.C. is not a "snob society." Its only objects are to encourage, stimulate and preserve a high standard of operating ability and operating behaviour on all amateur bands. To this end, membership of the F.O.C. is open to any operators who—in the opinion of a jury of three members—measure up to certain reasonable standards, as laid down in the rules given here.

The F.O.C. is sponsored by the *Short Wave Magazine* only to the extent that the Editor has undertaken to reserve space, up to a  $\frac{1}{2}$ -page each month, for F.O.C. publicity and announcements as prepared by the honorary secretary, and has also agreed to provide, free of charge to the Club, what may be required in the way of printing, stationery and membership certificates. The reason for this is that in the interests of Amateur Radio generally, the *Magazine* fully supports the aims and ideals of the F.O.C. and is, therefore,

anxious to give the Club all possible backing to ensure its success.

In all other respects, the F.O.C. will be an independent organisation managed by its own committee, elected by the membership, with its funds in the charge of a secretary-treasurer.

Capt. A. M. H. Fergus, G2ZC, who has for many years been a well-known operator on the amateur bands, has agreed to become secretary-treasurer of the F.O.C. He will undertake the launching and preliminary general management of the Club. A small nominal subscription of 3s. yearly, payable immediately upon election, is being levied to meet postages and other small incidental charges that may not be covered by *Magazine* services.

Readers interested in the F.O.C. and its ideals and standards are invited to introduce themselves to the Club, in accordance with the rules and conditions of membership.

All communications regarding the F.O.C. should be addressed to the honorary secretary-treasurer, Capt. A. M. H. Fergus, G2ZC, 89 West Street, Farnham, Surrey. Readers who have already written to the *Magazine* with regard to F.O.C. membership will in due course be notified further by G2ZC.

### THE FIRST CLASS OPERATORS' CLUB

#### Rules

- (1) The Club will be known as the First Class Operators' Club (F.O.C.). Its aims will be to foster and encourage a high standard of operating ability and behaviour on all amateur bands.
- (2) The F.O.C. will be managed by a small committee elected by the membership. The Editor of the *Short Wave Magazine* (or his representative) will be an ex-officio member of this committee.
- (3) Membership of the F.O.C. will be limited to those who
  - (a) Can send and receive Morse at not less than 18 w.p.m.
  - (b) Can work break-in on at least three amateur bands, with ability to QSY as necessary. Break-in single-channel working with VFO is desirable but not obligatory.
  - (c) Are prepared over the air to assist and advise newcomers to Amateur Radio.
  - (d) Agree strictly to observe all conditions of the licence.
- (4) Operators will be elected to membership on the recommendations of at least three sponsors, who are themselves already F.O.C. members and have been in contact with the applicant over the air.
- (5) The F.O.C. "club wave" will be the 3500-3635 kc section of the 3.5 mc amateur band.
- (6) Club periods each week will be as under :
  - (a) Tuesdays and Fridays, 1800-2000 hrs.
  - (b) Sundays, 1100-1300 and 1500-1700 hrs.
- (7) F.O.C. members operating on this band during these periods should always sign "FOC" after the call. This will identify them and enable prospective members to QSO with a view to obtaining a recommendation for election. In the general interests of the Club, the use of "FOC" after the call is always desirable on any band.
- (8) Upon election, a subscription of 3s. will be payable. Elections to membership will be notified periodically in the *Short Wave Magazine*, and no claim to membership will be valid unless so notified.

## NEW QTH's

Only those which have changed since the appearance of the September, 1939, issue of the Call Book or were not included in it for fully licensed operation, or are now licensed for the first time, can be published here. All that do appear in this column will automatically be included in the next Call Book, now in preparation. The number of QTH's we can print each month depends upon space available. QTH's are inserted as they are received, up to the limit of the space allowance. Please write clearly and address to QTH Section.

- |         |   |        |  |
|---------|---|--------|--|
| E18P    | J. E. Mills, Millfield, Wilmont Avenue, Sandycove, Co. Dublin, Eire.                      | G3AFD  | L. M. Worboys, Meldreth, Portsmouth Road, Sholing, Southampton, Hants.                   |
| G2ABB   | H. F. Nell, Littlemoor Cottage, Pattingham, Staffs.                                       | GM3AFG | J. M. Thomson, 37 Landale Road, Peterhead, Scotland.                                     |
| G2ABW   | A. B. Fieldham, Bromley, Brierley Hill, Staffs.   | G3AFT  | Grafton Radio Society, Grafton L.C.C. School, Eburne Road, Holloway, London, N.7.        |
| G2ACZ   | G. Whitehead, Pumping Station Cottages, Goole, Yorks.                                     | G3AGI  | T. F. Austin, 6 Florence Road, Kings Heath, Birmingham, 14.                              |
| G12BGM  | W. J. McClune, Model School House, Londonderry, N. Ireland.                               | G3AGJ  | D. A. H. Ellis, Five Gables, Lt. Eversden, Cambridge.                                    |
| G2BQR   | E. B. Powell, 43 Lansdowne Court, Brighton Road, Purley, Surrey.                          | G3AGN  | S/Ldr. C. J. Curtis, 115a St Andrews Road, Felixstowe, Suffolk. (Tel.: Felixstowe 1005.) |
| G2CWL   | C. K. Haswell, 2 Laurel Cottages, Chiddingfold, Surrey.                                   | G3AHE  | C. James, 52 Priory Avenue, Southend-on-Sea, Essex.                                      |
| G2CZH   | F. R. Scott, 140 Seymour Avenue, Morden Park, Morden, Surrey.                             | G3AII  | H. W. Brunton, 26 East Parade, Whitley Bay, Northumberland.                              |
| G2DRB   | G. H. Heppel, 3 Coastguard Cottages, Newhaven, Sussex.                                    | G3AIR  | J. F. Wort, Radio Servicing, R.A.F. Upwood, Nr. Ramsey, Hunts.                           |
| G2DZF   | J. H. English, 112 Sea Place, Worthing, Sussex.   | G3AIU  | K. A. H. Rogers, 161 Bramhall Lane South, Bramhall, Cheshire.                            |
| G2FNX/A | F/O D. N. J. Cudlip, Empire Radio School, R.A.F., Debden, Essex.                          | G3AJC  | D. G. Maygothling, 35 Briar Road, Kenton, Harrow, Middx.                                 |
| G2FRZ   | W. N. Handley, 52 Bannerman Avenue, Prestwich, Manchester, Lancs.                         | G3AJE  | D. H. Dawson, BM/YNGB, London, W.C.1. (Station at Kenton, Middx.)                        |
| G2FSA   | R. L. Harvey, Hynton, Fulford Road, West Ewell, Surrey.                                   | G3AKQ  | M. F. Owen, 101 Shaftesbury Road, Reading, Berks.  |
| G2FUM   | H. Hunt, 59 Saxby Road, Melton Mowbray, Leics.  | G3AJS  | J. Binning, 15 Clova Road, Forest Gate, London, E.7.                                     |
| G2HCZ   | E. S. G. Fish, 203 Parkway, Gidea Park, Romford, Essex.                                   | G3AJV  | A. S. Eastaugh, 21 Polin Avenue, Bradford Moor, Bradford, Yorks.                         |
| G2HHH   | T. H. Bayliss, 43 Batchley Road, Redditch, Worcs.   | G3AKH  | D. G. Lucas, 9 Dewhurst Terrace, Sunnyside, Newcastle-on-Tyne.                           |
| GM2HIK  | J. A. Clark, 30 North Street, Forfar, Angus, Scotland.                                    | GM3AKS | J. F. McLean, 72 Highcroft Avenue, Croftfoot, Glasgow, S.4.                              |
| G2NJ/A  | W. Carter, 34 West Parade, Peterborough, Northants.                                       | G3AKX  | R. G. Lascelles, 3 Church Avenue, Liverpool, 9.  |
| G3AAI   | N. Connell, 81 Burgh Road, Gorleston-on-Sea, Norfolk.                                     | GW3ALE | F/L B. Randell, Holmestower, Wellwood Drive, Dinas Powis, Glamorgan.                     |
| G3ABW   | D. H. Seymour, 28 Cherry Tree Walk, West Wickham, Kent.                                   | G3ALH  | J. Turney, 54 Wyncliffe Gardens, Leeds, 7.   |
| G3ACN   | A. D. Odell, 31 Edison Road, Welling, Kent.   | G3ALI  | D. R. Small, 24 The Paddocks, Wembley Park, Middx.                                       |
| G3ACQ   | H. Harmsworth, 209 Beverly Road, Hull, Yorks.   | G3ALM  | D. J. R. Martin, 88 Mysore Road, London, S.W.11. (Tel.: BATTERSEA 6382.)                 |
| G3ADF   | N. Wears, 2 George Street, Chester-le-Street, Co. Durham. (Tel.: Chester-le-Street 2233.) | G3ALO  | W. A. Norris, 65 Polefield Road, Prestwich, Manchester.                                  |
| G3ADH   | Liverpool and District Short Wave Club, St. Barnabas Hall, Penny Lane, Liverpool 15.      | G3ALU  | D. J. Bailey, 16 Cobham Mansions, Station Road, Westcliff-on-Sea, Essex.                 |
| G3AED   | W. N. L. Seward, 33 Beech Lane, Earley, Reading, Berks.                                   |        |  |

<b>G3AME</b>	P. Landauer, The Red House, Capel, Nr. Dorking, Surrey.	<b>G3AVO</b>	F/L W. H. A. Jones, Benhale, Green Lane, Stanmore, Middx.
<b>G3AMF</b>	K. G. Thompson, 672 Old Ford Road, Bow, London, E.3. (Tel. : <i>ADVance</i> 1305.)	<b>G3NN</b>	Bradford Short Wave Club, 1374a Lees Road, Bradford, Yorks.
<b>G3ANG</b>	J. W. Emmott, 5 Balderstone Road, Preston, Lancs.	<b>G3OP</b>	D. T. Bennett, 1 Manor Drive, Southgate, London, N.14. ( <i>Mobile.</i> )
<b>GM3ANO</b>	I. O. Shaw, c/o 167 Perth Road, Cowdenbeath, Fife, Scotland.	<b>G3OV</b>	A. H. Parker, 32 Dilston Grove, Rotherhithe, London, S.E.16.
<b>GM3ANV</b>	I. D. McDermid, 23 Otterburn Drive Giffnock, Renfrewshire, Scotland'	<b>G5GK</b>	G. E. Webster, Schoolhouse, Simonstone, Nr. Burnley, Lancs.
<b>G3ANW</b>	C. Paxton, 3 Elm Gardens, Mitcham, Surrey.	<b>G6FU</b>	J. H. Cant, 51 Victoria Road, Surbiton, Surrey.
<b>G3ANY</b>	R. F. Russell, 24 Rosslyn Avenue, North Chingford, London, E.4.	<b>G6YU</b>	J. Hanson, 14 Bourne Road Cosewood, Coventry.
<b>G3AOC</b>	R. E. Newitt, 10 Tunley Road, Balham, London, S.W.12.	<b>G8CA</b>	A. J. Frisby, 26 Springcroft Avenue, Fortis Green, East Finchley, London, N.2.
<b>G3AOG</b>	J. H. Boorman, 1 Pound Avenue, Stevenage, Herts.	<b>G8HA</b>	C. E. Baker, Church Lane, Rearsby, Leics.
<b>G3AOS</b>	J. G. Barnes, 4 Victoria Road, Hale, Cheshire.	<b>G8IX</b>	G. H. Tagg, 17 Nelson Road, Hanley, Stoke-on-Trent, Staffs.
<b>G3APC</b>	K. G. Redmond, 2a Chalet Gardens, Hampstead, London, N.W.3. (Tel. : <i>PRImrose</i> 5039.)	<b>G8KG</b>	F. M. Smith, The Limes, High Street, Bletchingley, Surrey.
<b>G3AQX</b>	S. Roberts, 22 Park Street, Alfreton, Derbyshire.	<b>G8PP</b>	L. Parnell, 36 Darenth Road, Stamford Hill, London, N.16.
<b>GW3ARB</b>	W. J. Parry, 6 Craig Pandy, Tregarth, Bangor, N. Wales.		

SOME

# Letters

TO THE EDITOR

## COMMENT

I would be glad if you would convey to G4HM my thanks for his most helpful article in the July issue of the *Short Wave Magazine*. I think that modulating on the auxiliary grid had probably occurred to many of us, but not as a worth-while proposition. However, I have gone one further.

On getting T9 reports with an ECO using an 807 and running at 50 watts input, I tried modulating it on the auxiliary grid. The modulator was a carbon microphone and single KT61, using an old 3:1 transformer. The first contact on 3.5 mc, over 150 miles, produced an S7-8 report, with good quality and stability. I have hitherto regarded modulated oscillators with suspicion, but if they will stand this unorthodox

method of control at 3.5 mc, they might be persuaded to do as well at higher frequencies. —*J. B. Roscoe, G4QK, Springdale, Woburn Sands, Bletchley, Bucks.*

(As a general rule, it is most unwise to modulate an oscillator. With any depth of control, frequency modulation is almost impossible to avoid on the HF bands. The degree of FM produced might not be noticeable on 1.7, and with careful adjustment, just tolerable on 3.5 mc.—*Ed.*)

## SERVICE

At 1100 on Monday, September 16, I posted one of my crystals to Messrs. Quartz Crystal Co., Ltd., with a request that this should be re-ground to a new frequency in the 3.5 mc band, and be fitted with one of their Type U holders.

At 0800 on Wednesday,

September 18, this crystal arrived back with the work duly completed. This is quite the best example of service I have ever met with in all my dealings with the radio trade. —*A. J. Hunt, G5HH, 29 Newcastle Road, Reading, Berks.*

(We are glad to print this tribute to the efficiency of a well-known firm.—*Ed.*)

## SUGGESTION

I have consulted several of the fellows regarding the possibility of a cross-band (1.7/3.5 mc) Test, along the lines already discussed, and they seem to think it might be feasible.

However, I personally have checked up on the Loran interference along the coast here, and it comes in more or less over the whole of the 1.7 mc band. I am afraid it is bad enough to discourage all but the keenest operator. Nevertheless, I think your idea is worth a try and might turn out to be quite successful. I would recommend only two week-end tests each month

for January and February, so that our fellows will not lose too much sleep if conditions are bad. Based on our past experience, I think the best time would be 0600-0900 GMT.—*Stewart S. Perry, W1BB, 36 Pleasant Street, Winthrop, Mass., U.S.A.*

(We are making plans along these lines, and in the meantime would like to hear from those who would be interested in such a test—G's on 1.7 mc, and W's on 3.5 mc. The Loran interference over there is quite likely to make the Test unworkable from the American point of view. See the article "Top Band Again" on p. 91 of the April issue for the results and experiences of pre-war Trans-Atlantic tests on 1.7 mc.—*Ed.*)

### CRITICISM

I must take strong exception to your recommendation that 7 mc 'phone should be confined to 7200-7300 kc. Why should the best and, in fact, the only workable part of the 7 mc band, 7150-7200 kc, be reserved solely for CW operation?

I also note that the much despised 7 mc band, of which there is never any mention in the *Magazine*, is usually full of QRM when 80 metres and the other bands are unworkable. This is caused mainly by those DX operators whose call signs frequently appear in the pages of the *Magazine*. As a test, I would be willing to stand by at any time and see how many of these stations can work 'phone to me here on 7200-7300 kc—I would be CC on 7238 kc. I might mention that I have had daily contact on 7 mc 'phone with PAØMM since July 27; I am not ECO and use less than 50 watts.—*A. G. Cole, GC3GS, 6 Greve d'Azette Gardens, St. Clements, Jersey, Channel Islands.*

(We are glad to have this forthright expression of opinion, and to know that GC3GS is able to make good use of 7 mc. The reason we advocate 'phone in the 7200-7300 kc area is because the Americans, when they get the whole band back, will be using 7200-7300 kc for telephony exclusively. Since 7 mc is a DX band, and as the W's outnumber us by approximately 20-to-1 on any band, it is clear that whether we like it or not, we must accept American planning on the 7, 14 and 28 mc bands. The present condition of 7200-7300 kc is,

relatively speaking, a temporary one, and it may be cleared for us before the W's have it fully reopened to them. In order to save confusion later, it is surely wiser to start as we shall have to go on. In regard to GC3GS's challenge, perhaps one of the operators to whom he refers would like to take him up on it.—*Ed.*)

### ADVICE

I wonder if you could find space to print a reminder about postal rates to the Continent. According to PAØMM, quite 60 per cent. of the cards he receives are under-stamped. Although he wishes me to stress the fact that he is not complaining about the extra charges on him, it seems the Dutch postal officials are making comment at the additional work involved, and suggest that PAØMM might pass the word along.

The correct rate is 3d. for a sealed letter of one ounce and 2d. for an open card.—*J. A. Whiteley, G6QA, 82 Molyneux Street, Rochdale, Lancs.*

(Thank you, G6QA. In their own interests, readers should check on the overseas postage rates, which are subject to remarkable variations. Any main Post Office can give the information.—*Ed.*)

### SUPPORT

As a Class-A licence holder who has had considerable experience on the 80-metre band both pre-war (R.N.V.(W) (R., PR8) and during the last month, I am fully in agreement with your article "Discussing Eighty Metres" (pp. 488-490, October issue), except for the following points:

(1) I consider that the maximum power should only be used after midnight for the purpose of hunting real DX.

(2) I think you should have mentioned the disgraceful QRM caused by non-amateur CW stations, especially in the early morning, just when one hopes to work a W or a VE. What operating—what notes! —*C. P. Cowell, G5AM, Tud-denham, Nr. Ipswich, Suffolk.*

Your article "Discussing Eighty Metres" coincides so exactly with my own views as to make me applaud it wholeheartedly and without reservation. It is fairly obvious that unless all amateurs will

submit to a little band-planning, Amateur Radio may be choked out of existence in a few years. The present overall rate of increase in the granting of licences is about 120 a month. Can there be better proof of the urgent need for better operating habits among British amateurs?

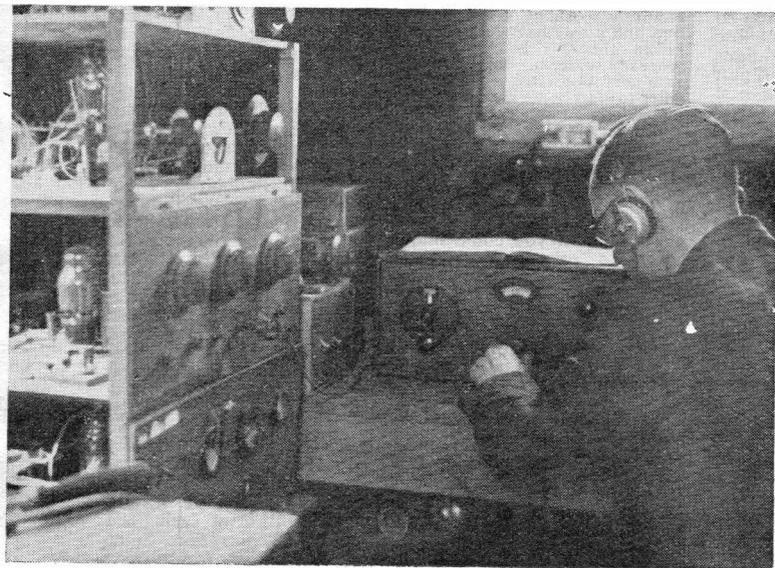
Since our regulating authority, the GPO, cannot do more than lay down very broad lines of behaviour for us, it is our own funeral if our bands become untenable. Any discipline in British Amateur Radio must be voluntary, and come from within the movement. In this connection, you may be interested to know that the St. Albans and Welwyn Garden City groups have passed resolutions that they will confine telephony operation to the channels 1850-2000 kc and 3685-3800 kc, leaving the LF section of each band free for CW operation. Some forty to fifty transmitting amateurs in this district have accepted this decision.—*J. Hum, G5UM, 9 Windermere Avenue, St. Albans, Herts.*

I am glad to see your proposals for 80 metres and I think that most amateurs will support them.—*A. G. Dunn, G3PL, 79 Hayton Grove, Hull, Yorks.*

Regarding "Discussing Eighty Metres," I entirely agree with your article in the October issue. The local amateurs will support you 100 per cent., and suggest that the GPO be asked to divide the band for 'phone and CW as a condition of the licence. It is no use expecting voluntary observance of the division, as witness the number of G 'phones now operating in the CW portion. There must be a GPO regulation about it.—*T. H. Streeter, G5CM, Cottesmore, Gordon Avenue, Bognor Regis, Sussex.*

(It is perhaps significant that no dissenting voice has yet been raised against the proposals made in our article. The letters printed above are but a selection from all those received in support. We feel that G5UM's comments take a realistic view of the situation in that he advocates voluntary acceptance of band-planning on these lines. Regulation by an outside authority is in our opinion neither desirable nor practicable.—*Ed.*)

# The other man's station G5LP



Above is a view of the station of Lionel F. Parker, G5LP, 22 Second Avenue, Wellingborough, Northants, whose main interest in Amateur Radio is experimental work with aerials.

First licensed in 1935, at a location without mains supply, he tersely remarks that QRP working from batteries was not so attractive when it was compulsory! In 1938, he selected a new QRA, carefully chosen for its suitability for radio and with mains power. Two 40 ft. masts carry the various aerial systems under test from time to time. By 1939 he had worked 96 countries on 7 and 14 mc, averaging well over a thousand CW contacts a year.

The present equipment, home-constructed and all British with the exception of one valve, is built into a wooden rack and consists of a KT66-KT66-801 exciter unit giving output on 7 and 14 mc without coil changing. This exciter is link-coupled to a PT15 as buffer-doubler on 14 or 28 mc and in turn drives a pair of Tungram OQ55/1500's in push-pull in the final PA, with the CO on 3.5 mc. Link coupling is used to an aerial tuning unit for the various aerials on test. There are three power packs—350, 750 and 1,000 volts—using Mullard RG3/250 mercury vapour rectifiers. The 1.7 mc Tx is APP4C-PT15, suppressor-grid modulated with a

3-stage RC-coupled amplifier using a DO24 as modulator.

The receiver is a three-stage battery-operated straight, built in 1933, and comprising an untuned RF buffer, triode detector and RC-coupled tetrode output stage. It covers all bands from 1.7 to 28 mc and, as G5LP puts it, is still going strong.

Since the restoration of his licence, he has worked 36 countries on 28 mc CW. Not so many when compared with the well-known DX stations, but still very creditable in view of the fact that most of G5LP's time is spent on experimental work with aerials.

#### DIRECT SUBSCRIPTION LISTS

*These are still open, for subscriptions to commence with the December issues of the "Short Wave Magazine" and/or the "Short Wave Listener." It is the only way we can guarantee you a regular copy.*

*Direct subscribers' copies are posted to them on the first Wednesday ("Short Wave Magazine") and the third Thursday ("Short Wave Listener") of each month.*

*Twelve issues of either publication cost 20s. ("Short Wave Magazine") or 16s. ("Short Wave Listener"), post free. Write the Circulation Manager, the Short Wave Magazine, Ltd., 49 Victoria Street, London, S.W.1.*

# Here and There

## QSL Bureau

As announced in the first issue of our companion *Short Wave Listener*, we have now established a QSL Bureau—the use of which is free to those readers who are obtaining either the *Short Wave Magazine* or the *Short Wave Listener* by subscription direct from us—and we are ready to accept cards for amateur stations throughout the world. But before sending in yours, please read very carefully the rules on page 540 in this issue.

## Corrigenda

Polite Latin word for “Errors Crep’ In.” Circuit p. 473, October: Delete connection between top (grid) end of T2 and plate of V4, as the receiver will probably work better without full HT on the grid of the second IF stage! On p. 498, under heading “Developing the Design,” the depth of the chassis should be 2 in., and not as stated.

Further to the article on the R.A.F. T.1154 on pp. 499-501 of the October issue, G3APA (Coventry) rightly draws attention to the fact that the T.1154M (a sub-type of the T.1154) covers 16·7-8·7, 8·7-4·5 and 4·5-2·5 mc, and could thus be operated in our 14, 7 and 3·5 mc bands. With the T.1154A, another variant on the original design, ‘phone working is *not* possible. For telephony with all other types, either a carbon microphone can be used direct, or an electro-magnetic microphone with a speech amplifier. In the Service, amplifier type A.1134 is provided for this purpose.

## “Pse QSL”

Transmitters who would like reports from SWL’s are invited to send us details covering the band(s) and type of transmission on which they are wanted, the distance from which they are required, the QTH for QSL’s and, if possible, operating periods.

This information will be published in a new *Short Wave Listener* feature under the heading “Pse QSL,” on the understanding that SWL reports so received will be acknowledged by card by the transmitter concerned.

## Do You Know That

In self-biased transmitters (cathode resistor *plus* grid leak), grid-block keying can easily be applied to all stages by returning all grid resistors to the bias line? A blocking bias voltage of -120 is enough for most types of valve operated with up to 600 volts on the plate, and standing currents will be reduced to zero. When using grid-block keying, be careful to check for squiggers and thumps, as in some oscillators, readjustment of loading and, in the tritet, resetting of the cathode tuning condenser is necessary to produce a clean sharp note. It is also worth trying a fixed condenser of .01  $\mu$ F across the key, though theoretically it should not be necessary with this system.

## UHF Allocation

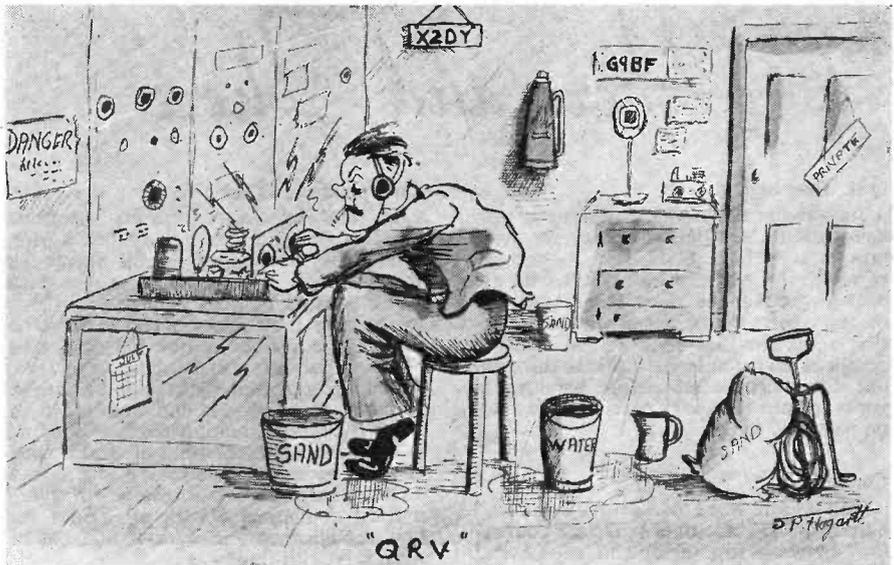
The first band in the ultra-highs has recently been opened to us; 2300-2450 mc, 25 watts (A) and (B), and FM—but not pulse—working is allowed. Though it is most welcome as an experimental band, 2400 mc will have little value as a communication channel except for purely local working. Valve technique is not very easy at these frequencies.

## Club Transmitting Contest

This is to take place over the period November 16-24, on 1·7 mc, and we hope that readers who operate on this band will give many contacts to the twenty or more Club stations entered—they will be identified by the call “CQ MCC” (Magazine Club Contest). Some further notes regarding the event appear in “Month with the Clubs” in this issue.

## Old Timer Note

G5NF, who was well known on 58 mc in pre-war days, has been on his back for the last two years, but is now operating again with a few watts on 14 and 28 mc “from that angle”, as G5FF puts it. G5NF will be glad of contacts with anyone. Good luck to you, OM—keep the flag flying.



## G9BF Calling

(Does anyone really want to read this stuff?—Ed.)

Continuing my special series real technical articles, have no hesitation describing new auto-key now in use KZ7LX. This of course is me G9BF.

Well known that no DX operator able resist lure rare call signs, so have designed my auto-key to send "CQ DX Special" 25 times followed by call sign once. So far, quite straightforward and no unusual ability required to produce auto-key on these lines.

But to increase lure and hence chances QSO have arranged keying strip to send *different* rare call sign after each rotation. This illustrates exceptional cleverness operator famous station KZ7LX (this of course is me G9BF) and proves contention station KZ7LX in forefront technical progress Amateur Radio.

First time out with new auto-key quite successful. Used calls KZ7LX, PQ4E, LP7ZZ, GK1GKE and ZY5UU. Well-known G came back with long careful call ZY5UU but as he always boasting his super DX, gave him QLF and QRT. After next call concentrated on good T3 sig at HF end 14440 kc, none other than old pal MOIFFI using call PX9YL and answering

"PQ4E-hi-G9BF." Bit annoyed at this and told him QRU and QRL. He came back "Ur note too FB to miss OM are u using raw AC on plate?"

As am well known quality my signals resented implication and told MOIFFI his note like rusty nails falling on corrugated iron. No reply from him.

Next call raised very FB signal from station signing W22J/OE, S8-9 at LF end 14 mc. Bit doubtful about the call, but he said carrying out special test and sure QSL. Gave QRA as near Austria, so station obviously genuine.

Then CQ again brought back another G answering GK1GKE and signing new 3-letter call. Gave him "RST-589 hr QRA Orkneys." He replied "Vyvy FB FB OM u sure putting in gud sig RST-583 chirpy hr in London is GK new prefix for Orkneys?" Replied "No, OM, special call hr sure QSL nw QRU es QRT so tnx FB QSO cuagn no chirp hr." Knew his report unreliable, as though my note slightly modulated (intentional for DX), note is usual good char-chip-char-chip char-char-chip-char. So ignored report.

("Char-chip-char-chip" indeed.—Ed.)

# THE MONTH WITH THE CLUBS

## FROM REPORTS

We are glad to be able to say that considerable interest is being taken in the forthcoming 1.7 mc Club Transmitting Contest; following is the list of entries at the time of writing:

Beaumanor (G6AK), Belfast (GI6YM), Bolton (G2BTO), Bradford (G3NN), Cheltenham (G3LP), Coventry (G2YS), Edgware (G3ASR/A), Grafton (G3AFT), Grays (G2YH), Hi-Q (GM2FZT), Hull (G3AMW), Liverpool (G3ADH), Medway (G5FN) Salisbury (G5DZ), Stroud (G5WA/P), Surrey (G2FWA), Swindon (G2BUJ), Wanstead (G2BCX), West Cornwall (G2JL).

The Contest takes place over the eight days 1800 hrs. Saturday, November 16, to 2359 hrs. Sunday, November 24, entrants being limited to a maximum of 20 hours' working during this period. Scoring is on a zone system, with each zone worked counting as an additional multiplier, and operation will be on CW only in the 1715-2000 kc band.

All Club stations participating will call "CQ MCC" (Magazine Club Contest), to identify themselves as stations entered in the Contest, since there are extra points for inter-Club contacts.

While it is not possible completely to overcome the unalterable factor of geography, we have been at great pains to try to devise a scoring system which as far as possible will give level chances to stations in all parts of the country. Every Amateur Radio contest, national or international, presents this same problem to those who have to frame the rules.

Anyway, it should be an interesting week, and we ourselves hope to have the opportunity of working many of the stations in the Contest. And Club Secretaries, please do not overlook Rule 10, and the fact that results should be in our hands by December 2.

### December Closing Date

Copy date for Club reports for December issue is November 14. Address "Club Secretary," *The Short Wave Magazine*, 49 Victoria Street, London, S.W.1. And now, here are those for this month, the secretaries' addresses being given separately in a panel for ease of reference. The monthly record has been broken again, 36 Clubs having reported, with two more projected.

**Hull.**—The Hull Group now has a licence (call-sign G3AMW) and the transmitter operates from the club-room at 30 Princes Avenue. There are more than 25 licensed amateurs in Hull, and a good deal of activity on 58 mc, although no one has yet worked outside the immediate neighbourhood of the city.

**Stourbridge and District Radio Society.**—At the October meeting a talk on aerial design was given by G5JY. Future meetings will include talks on power distribution, discussions on oscillators, transmitters, and so on. Meetings are held on the first Tuesday of each month, and the attendance is growing rapidly.

**Gloucester & District Amateur Radio Club.**—Another newcomer. Fortnightly meetings are held at the Spread Eagle Hotel, but it is hoped that a room will be made available at Gloucester Technical College. All meetings begin with half an hour's slow Morse practice under G3MA—an excellent scheme which is being adopted by many other clubs. Some "D/F Field Days" are also in the offing.

**Reading & District Amateur Radio Society.**—Several changes of officers took place at the annual election during the September meeting, and the new Secretary is G2BHS. Two cups were awarded to members, the Lewis Cup going to G6KB—a well-known 58 mc operator—and the Nash Cup to G5XB. Judges were G4NT, G6JK and G2BB, who had the hard task of selecting the winners from a display of excellent home-built gear. It is hoped to run a Society station in the near future. Meetings are held at Palmer Hall, West Street, at 6.30 p.m. on the second Wednesday and last Saturday of each month.

**Coventry Amateur Radio Society.**—A "Quiz Night" was held recently on an inter-team basis, with questions on all aspects of Amateur Radio, and the society has heard a lecture by G5JU on the Eddystone 504 receiver. A topic for future debate is "That telephony on amateur bands be abolished"! The secretary, G2YS, is representing the society in the Contest.

**Swindon & District Short Wave Society.**—The third of a series of talks on the Cathode Ray Tube was given at the last meeting. There are two new call signs in the town, and a hearty invitation is extended to Service personnel in the district to attend meetings.

**Grimsby Amateur Radio Society.**—This society has resumed its activities under a new title. Meetings are held every Thursday at 7.30 at the Oddfellows Hall, Victoria Street, pending the acquisition of a permanent club room. There are 17 members, mostly licensed, and newcomers will be cordially welcomed.

**Bournemouth & District Amateur Radio Club.**—A local 1.7 mc contest has been organised, but the club itself has not yet received its licence. A hut has been bought for headquarters, and the land on which to put it up is available—on the highest spot in Bournemouth. Two 100-ft. lattice towers are being erected!

**Wirral Amateur Transmitting & Short Wave Club.**—The inaugural meeting was held in September, and 33 members heard G3CK give an account of the club's pre-war work, and G8OC a talk on "Receivers." At the October meeting an "auction of members' surplus apparatus" (junk sale?) took place.

**Slade Radio.**—D/F Tests are being held in conjunction with G2AK/Portable, but in view of petrol rationing, the first is taking place on foot and will cover only a small area. At the September meeting a discussion on D/F circuits was held, and hints on the plotting and transferring of bearings were given. The October meeting branched off into the subject of Telearchics and was a combined effort with the Model Aero Club.

**Watford & District Radio & Television Society.**—The monthly meeting on October 1 attracted 26 members and another junk sale was held. It was decided to draw up a quarterly programme to be circulated to all members and friends, and also to hold meetings in future on the first and third Tuesdays of each month. The first will be a junk sale, the third a talk or technical lecture. The October talk was by G5KU on "Noise."

**Radio Society of Harrow.**—The first meeting of this new Society was attended by 33 members. Meetings will be held fortnightly and the Secretary, G2KA, invites applications from any would-be members in the district.

**Beaumanor Amateur Radio Society.**—This club, another newcomer to these pages, is awaiting its call-sign and hopes to be participating in the Contest. The Secretary is E. Pethers (ex-G6QC).

**Oswestry & District Radio Society.**—The last two meetings have included a Film Show and a talk by Gerald Marcuse, G2NM, on "Amateur Radio since 1912." At the latter meeting G2NM presented one of the earliest transmitting valves to the youngest licensed member, G3ASC.

**Grafton Radio Society.**—The Society is now licensed as G3AFT. Its new committee has been elected as follows: President, C. T. Bird, A.M.I.Mech.E.; Chairman, A. W. H. Wennell; Vice-Chairman, A. E. Mitchell, G8DF; Secretary, W. H. C. Jennings, G2AHB; Treasurer C. V. M. Ramsey; Minute Secretary, F/L. B. Randell, GW3ALE. A recent junk sale provided many bargains and enriched the funds by £8 5s. Two additional groups in the practical section have started work on transmitters—both *Short Wave Magazine* designs. Grafton make a speciality of training the youngsters; two 15-year-olds have just completed the 1.7 mc transmitter. A club library has also been started, and the club's own monthly magazine, called "QTH Grafton" is edited by GW3ALE. We have seen a copy of this excellent production, and commend it to other clubs. Meetings continue on Monday, Wednesday and Friday evenings. QTH: Grafton, L.C.C. School, Eburne Road, Holloway, N.7.

**Edgware & District Radio Society.**—Recent events included a junk sale, a talk on cinema amplifiers, and a description of an amplifier with switched selection of local stations, television sound and the output from a communications receiver. A research and experimental sub-committee has been formed, and test equipment will be built for the use of members. The club now has its own call, G3ASR.

**North-West Ireland Amateur Radio Society.**—The new secretary is D. R. J. Adair—full address in panel of secretaries—to whom all communications should now be addressed. He would be very glad to hear from prospective members.

**Thames Valley Amateur Radio Transmitters' Society.**—"TVARTS," a newcomer to these pages, is an old-timer in clubs, having been founded in 1933. First post-war meeting was held in September and several pre-war members returned to the fold. Old friends and new members holding transmitting licences will be welcomed, and full details of forthcoming programmes are to be published. The President is G5LC and the Secretary G3JG.

**Medway Amateur Transmitters' Society.**—About 40 members heard all about condenser manufacture at the September meeting, when Mr. Bentley of TCC gave a very interesting lecture. Membership now exceeds 50, and the society had a stand at the local Model Engineering Society's exhibition. The gear constructed by members attracted a good deal of attention. Meetings are held at 207 Luton Road, Chatham, on Monday evenings at 7.30. Visitors are welcomed.

**Midland Amateur Radio Society.**—The first annual dinner was held in September, 54 members and visitors being present. Officers for the ensuing year were elected, and the new President is G2FDR. G4OI is Secretary and G3AU Treasurer. The next meetings are on November 19 and December 17, both at 6.30 p.m. at the Imperial Hotel, Birmingham.

**East Grinstead Radio & Television Society.**—The first meeting was held in August, and weekly meetings are now taking place on Tuesdays with a small but keen membership. More members are required, and it is hoped to arrange a permanent meeting room and workshop.

**Grays & District Amateur Radio Club.**—At the last two meetings, lectures were given on Frequency Meters and on Standing Waves. Morse lessons are being started, and the next meeting after publication will be Friday, November 8, at Baird's Café. New members and visitors will be welcomed.

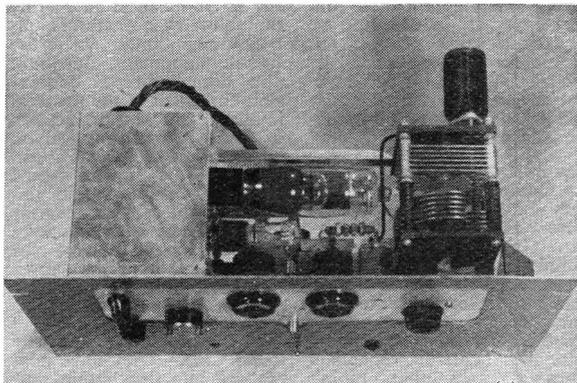
**Kingston & District Amateur Radio Society.**—Thirty members attended the first post-war meeting. G8IP presided, and tribute was paid to G6BI, now a "Silent Key." The new committee was formed, future policy discussed, and it is hoped that the society is placed on a firm footing for the coming season. Meetings are held on the second and fourth Thursdays of the month, at the Three Fishes Hotel, Kingston, at 8 p.m.

**Bradford Short Wave Club.**—This club recently had several visitors from the Leeds Radio Club. They are arranging with the local textile industry for QSL's advertising the city. A weekly Club News Sheet is produced, and meetings are well attended.

**Halifax Experimental Radio Society.**—This society has just been formed. Its aims are the advancement of Amateur Radio in the district, encouragement of newcomers, and furthering of knowledge of the principles and practice of radio. Three worthy aims! Morse classes have been arranged, and many lectures and discussions scheduled for the future. Meetings are held at Toc H, Clare Road.

**Doncaster & District Amateur Radio Society.**—Good progress is being made with the club room. On a recent visit to Finningley RAF station, the head of the signals section was roped in for membership. Some interesting lectures are hoped for! Morse classes are under way. G8BA would like to meet the pirate using his call, so that he can give him a crystal that is in the band instead of outside!

**Birmingham & District Short Wave Society.**—This club runs an excellent regular feature called "The Month's Log"—a talk given by a member covering conditions on the amateur bands. A talk was also given at the last meeting on the recent Radio Amateur Examination Paper. The next meeting is on November 4 at 7.45 p.m. The club's chairman, awaiting his call-sign, hopes to be the first member to go on the air.



This fine transmitter by G5XB won the Reading Society's Nash Cup for the best piece of apparatus built from bought parts.

**Cheltenham & District Amateur Radio Society.**—Their field day on September 29 was another great success. The hidden Tx. was found by a party from Gloucester, with which were G3MA and G6ZQ, in 35 minutes. The only other party successfully to D/F G3LP/P came from Cheltenham, and included G5BM and G5BK. The increased power (10 watts) used by G3LP/P made it not so easy to get good minima on the loops. Subjects at recent meetings have included BCL interference, by Mr. Bray of the GPO engineering section, and the operation of the CO, by G3LP. Regular lectures have been arranged for each meeting during the coming season.

**Hi-Q Club, Giffnock.**—Since the last report, there have been three good talks by members: "Dellinger, Sporadic-E and other Ionospheric Disturbances," by GM3ANV; "Aerials and Feeders," by GM3AR; and "A Frequency Meter with Interpolation Oscillator," by GM3AEC. GM3AR would welcome reports from Western India on his Sunday p.m. transmissions, as his junior operator is in the R.A.F. at Karachi, and they are trying to establish contact. The book circulation scheme is going well, and members now have access to anything in the way of current radio literature. Hi-Q welcomes the appearance of another Scottish Club, Aberdeen, and

hopes to get into touch. They would also like to work a few more G's on 1.7 mc.

**Liverpool & District Short Wave Club.**—Another "Radio Quiz" has been held—the visiting team won! This is another good scheme worth adopting by other clubs. Talks have also been given, and the present committee is now resigning and looking forward to a rest. At a recent discussion it was decided that YL's in the district will be welcomed for membership—provided they are interested in Amateur Radio!

**Wanstead & Woodford Radio Society.**—At the last meeting, G3CQ gave an interesting talk on "Starting Five Metres." New members and visitors are welcomed to the meetings—every Tuesday at "Wanstead House," 8 p.m.

**South Shields Amateur Radio Club.**—New officials were elected at a recent general meeting, and an interesting series of lectures and demonstrations has been arranged. They take place at 8 p.m. every Friday evening at St. Paul's School Room, Westoe, and newcomers will be cordially welcomed.

**Bolton & District Radio Society.**—This club now has its own rooms in Corporation Chambers, and they are open every evening for private or constructional work by mem-

bers. Meetings are held on Mondays at 7.30, and at present a series of talks on "Fundamentals of Radio" is running. Morse classes have started and a transmitter is being built. Inter-club visits are also planned.

**Surrey Radio Contact Club.**—On October 8, over 50 members visited the Mullard valve factory at Mitcham. After tea Mr. Greaves, head of the technical department, in a short speech of welcome said that the visitors were to see some of the most modern processes in valve manufacture. Mr. Fichter, commercial manager, said that radio amateurs fulfil a function of far greater importance than

the active business they bring to valve manufacturers, as they not only advertise British equipment, but have also been indirectly responsible for much of the progress in the design and production of small transmitting valves. He remarked that it was hoped the supply position in regard to British valves would improve considerably in the near future. These addresses were followed by a tour of the works, members being shown the manufacture of many types of valves and CR tubes.

**West Middlesex Amateur Radio Club.**—They have now got well into their stride, and the membership continues to increase steadily. At the last

meeting, over 40 members heard a useful and interesting talk on "High Quality Reproduction," given by Mr. A. C. Gott. Meetings are held on the second and fourth Wednesdays of each month—prospective are invited to get in touch with the secretary.

**Romford & District Amateur Radio Society.**—Six competitors entered the recent D/F contest, including some entries from the Southend Club. Romford members (aided by local knowledge of geography?) gained first and second places. Thirty-three members sat down to tea afterwards, and the society is thriving.

*Those interested in the formation of a Club in the Hampstead/Swiss Cottage/Chalk Farm district are invited to get in touch with K. G. Redmond, G3APC, 2a Chalcat Gardens, Hampstead, N.W.3.*

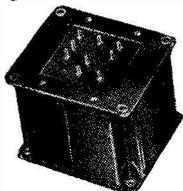
*W. Bartlett, who founded the Weymouth Club in 1937, would like to hear from anyone in that district who is interested in re-forming the Club. His present QTH is Midland Bank House, Whitland, Carmarthen, South Wales.*

Following are the names and addresses of the secretaries of the clubs mentioned this month. They will be pleased to give every assistance to prospective members.

**BEAUMANOR.** E. Pethers, Beaumanor Park, Loughborough, Leics.  
**BIRMINGHAM.** C. W. Thompson, 6 Caldwell Road, Birmingham 9.  
**BOLTON.** N. Moorcraft, 3 Beaconsfield Street, Deane Road, Bolton.  
**BOURNEMOUTH.** J. F. Squires, M.B.E., G2DBF, 80 Victoria Road, Bournemouth.  
**BRADFORD.** V. W. Soven, G2BYC, Rushwood, Grange Park Drive, Cottingley, Bingley, Yorks.  
**CHELTENHAM.** H. Brislin, 52 Cleevemont Road, Cheltenham.  
**COVENTRY.** J. W. Swinnerton, G2YS, 118 Moor Street, Coventry.  
**DONCASTER.** H. Flintham, 50 Burton Avenue, Balby, Doncas. er.  
**EAST GRINSTEAD.** E. C. Cooper, Heatherlea, Cranston Road, East Grinstead, Sussex.  
**EDGWARE.** R. H. Newland, G3VW, 42 Bacon Lane, Kingsbury, N.W.9.  
**GLOUCESTER.** J. W. Dean, G2AZT, 100 Stanley Road, Gloucester.  
**GRAPTON.** W. H. C. Jennings, G2AHB, 82 Craven Park Road, London, N.15.  
**GRAYS.** R. F. Read, 26 Hillside, Little Thurrock, Grays, Essex.  
**GRIMSBY.** S. Stocks, G8KH, 60 Tunnard Street, Grimsby.  
**HALIFAX.** L. Blagbrough, 39 Fountain Street, Sowerby Bridge, Yorks.  
**HARROW.** J. F. A. Lavender, G2KA, 29 Crofts Road, Harrow, Middx.  
**HI-Q.** J. D. Gillies, GM2FZT, 3 Berridale Avenue, Glasgow, S.4.  
**HULL.** A. Bell, G2XA, 22 Orchard Road, Anlaby Park, Hull.  
**KINGSTON.** J. Hughes, 12 Hillingdon Avenue, Ashford, Middx.  
**LIVERPOOL.** T. W. Carney, G4QC, 9 Gladeville Road, Aigburth, Liverpool 17.  
**MEDWAY.** S. J. Coombe, Stanvic, Longhill Road, Chatham, Kent.  
**MIDLAND.** W. J. Vincent, G4OL, 342 Warwick Road, Solihull, Birmingham.  
**N.W. IRELAND.** D. R. J. Adair, Cosy Lodge, Culmore Road, Londonderry, N. Ireland.  
**OSWESTRY.** G. H. Banner, 6 Coppice Drive, Oswestry, Salop.  
**READING.** L. A. Hensford, B.E.M., G2BHS, 30 Boston Avenue, Reading.  
**ROMFORD.** R. C. E. Beardow, G3FT, 3 Geneva Gardens, Whalebone Lane North, Chadwell Slade, L. A. Griffiths, 47 Welwyndale Road, Sutton Coldfield, Birmingham. [Heath, Essex.  
**SOUTH SHIELDS.** W. Dennell, 12 South Frederick Street, South Shields.  
**STOURBRIDGE.** D. Rock, G.P.R. Flat 1, Block 1, Worcester Road, Summerfield, near SURREY. L. Blanchard, 122 St. Andrews Road, Coulsdon, Surrey. [Kidderminster.  
**SWINDON.** P. Greenwood, G2BUJ, 49 Western Street, Swindon.  
**THAMES VALLEY.** D. R. Srearing, G3JG, Thurston, Orchard Way, Esher, Surrey.  
**WANSTEAD.** M. M. D'Arcy, G3AGL, 27 Theydon Grove, Woodford Green, Essex.  
**WATFORD.** J. C. Warren, 29 Market Street, Watford.  
**WEST MIDDLESEX.** N. Priest, 7 Grange Road, Hayes, Middlesex.  
**WIRRAL.** B. O'Brien, G2AMV, 26 Coombe Road, Irby, Heswall, Cheshire.

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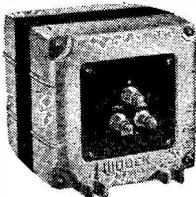
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D.T.F.14. 5 v. 4 amp. C.T.	24/9	D.T.F.19. 4 v. 2.5 amp. C.T. }	29/2
D.T.F.15. 6.3 v. 4 amp. C.T.	24/9	4 v. 6 amp. C.T. }	
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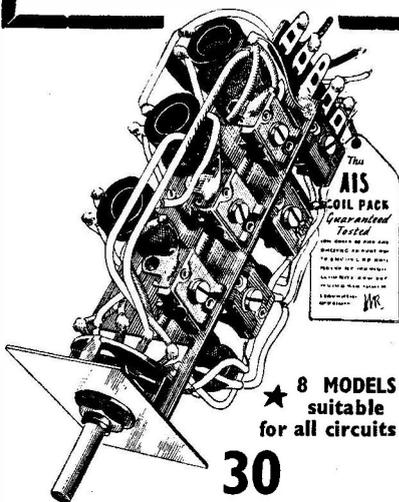
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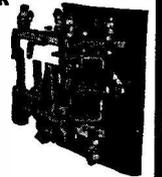
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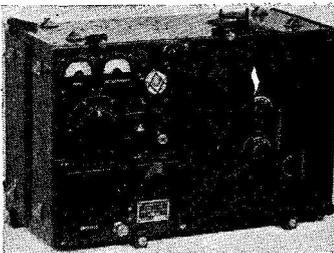
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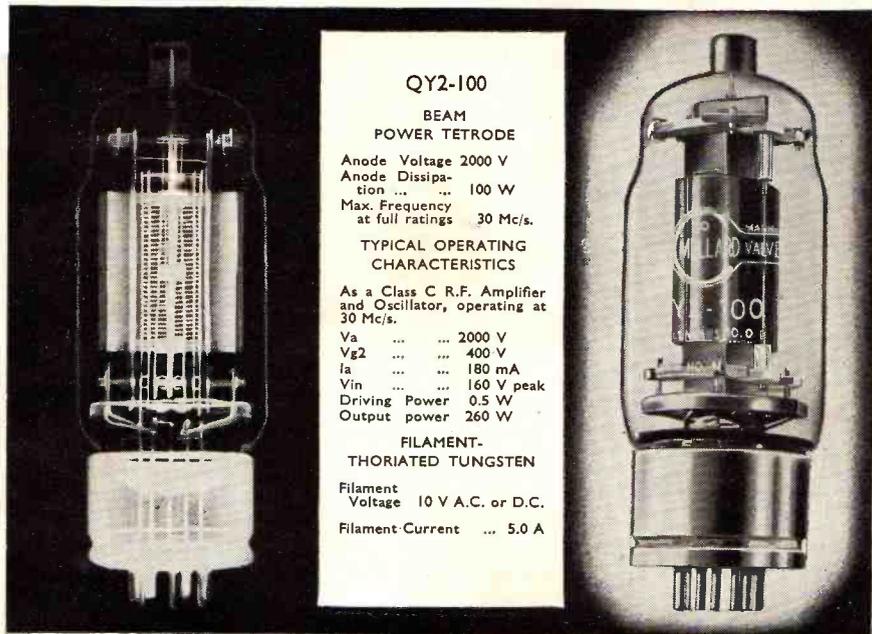
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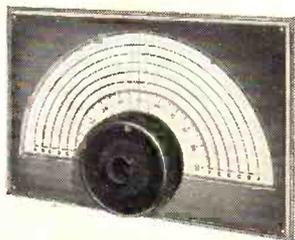
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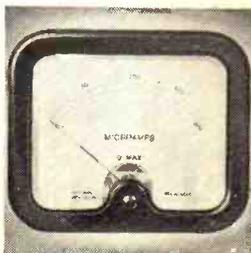
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$12'' \times 7'' \times 7''$   
(Chassis  $11'' \times 6\frac{1}{2}'' \times 2\frac{1}{2}''$ ) 45/-

$13\frac{1}{2}'' \times 8\frac{1}{2}'' \times 9''$   
(Chassis  $12\frac{1}{2}'' \times 8'' \times 2\frac{1}{2}''$ ) 63/-  
(Carriage extra)



# BERRY'S

(SHORT WAVE) LTD.

25 HIGH HOLBORN, LONDON, W.C.1

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