

# **R·S·G·B** **BULLETIN**

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

**February 1946**

*The original front cover for this edition was not available.*

*The original front cover for this edition was not available.*

## AROUND



## THE DISTRICTS

### DISTRICT 1 (North Western)

**D.R.:** H. W. Stacey (G6CX), "Sandlens," Eddisbury Road, West Kirby, Cheshire. Hoyleke 337. **Scribe:** A. B. Wright (G6FW), 106 Knowsley Road, St. Helens.

**Ashton-under-Lyne and District.**—Activity amongst members is increasing with the issue of licences. G6TL and 3BY are active on 56 Mc/s. A good attendance was reported at the Annual General Meeting on January 13, when officials were elected for the year. Next meeting is on February 17 at A.C.S. Educational Rooms, Stamford Street at 2.30 p.m.

**Burnley.**—We welcome G6HP in his new business venture in the town; G3VO was the first to be relicensed. G2RB, 2XK, 3IY, 3WU, 5ZN, 6HP and STD are known to be active. A monthly meeting for the first Monday or Thursday of each month has been suggested, will members in favour please contact G5ZN at 35 Reedley Road, Burnley. G5ZN.

**Liverpool and District.**—At the meeting held on Saturday, January 26, there was an all time record attendance of 80 members, including several newcomers. Mr. J. Anthony (2FHB) now having left the district, Mr. R. Spears (G8AZ) was elected as T.R. for 1946. As a result of the recent Postal Ballot, future meetings will take place on Wednesdays in addition to Saturdays. For details see "Forthcoming Events." G8AZ.

**Oldham.**—VU2AN, G3PD, 2HCX, 2HDO, 7460 and 8616 were present at the last two meetings. We welcome back 2HDO after four and a half years in the Army. The next two meetings will be held as follows: February 15 at 2HDO, 5 Pennant Street, off Barry Street, Oldham; March 1 at 3PD, 26 Bargap Road, Oldham. Both meetings to commence at 7 p.m. G3PD.

**Rochdale.**—The third meeting of the Rochdale Section was held on January 20. Nine members were present, bad weather no doubt accounting for the small attendance. The next meeting will be held on February 16 at 3 p.m., at "Avonlea," 22 Castlaway, Castleton, Rochdale. 7083.

**West Cumberland.**—At an enjoyable meeting held at 2AUM on January 19, those present included G3BW, 3SY, 4NS, 6JZ, 6WR, 8DP, 2AUM and BR810,687, to whom we extend a hearty welcome especially as he came all the way from Keswick. Sincere thanks to all present were expressed to 2AUM for the use of his shop. Next meeting, the third Saturday in February, venue will come later. G3BW.

### DISTRICT 2 (North Eastern)

**D.R.:** C. A. Sharpe (G6KU), 56 Moore Avenue, Wibsey, Bradford. Bfd. 10772. **Scribe:** H. Beadle (G8UO), 13 Chandos Street, Keighley, Yorks.

**Barnsley.**—The recent meeting was not the success hoped for owing to a last minute change over of venue. Those present were 4JJ, 5IV, 5UA, 6LZ, 6XG, 8NM and 2AYX. Local members regret the passing of 8TZ. 8IJ who was recently demobbed from R.A.F. has re-joined.

**Bradford.**—Members interested in the re-starting of radio club activities in the city are asked to attend a meeting at 66 Horton Lane on February 18, at 7.45 p.m. 4GJ having received back his gear from the G.P.O. is busy rebuilding. 3HA is now stationed at Carnaby.

**Deursbury.**—2FQH, who was recently demobbed, would like to hear from local members and from those he met whilst in the R.A.F. His address is 29 Albion Street, Springfield. 6CB recently visited 5YV who demonstrated his 11 valve receiver.

**Halifax.**—G8SJ, who is now teaching radio at Pontefract, has applied for his licence and awaits the return of gear.

**Harrogate.**—2CDR, resident in town again, has built a three-valve battery short-wave receiver and signal generator. He would welcome Sunday morning visitors to his home at 27 Harlow Crescent and is willing to organise a Morse class.

**Keighley.**—G2VO, while on leave recently, visited 8UO. He had some interesting experiences to relate.

**Leeds.**—4349, who is in Bermuda, was pleased to see that G2LR had re-joined the Society.

**Linton-on-the-Ouse.**—A.C.I. Peter Matthews, BR87654, is now stationed at R.A.F. Station, Linton, and would like to meet other members.

**Sheffield.**—At the January meeting when Mr. E. Stubbs demonstrated some interesting Service gear, we were pleased to welcome 4JJ of Barnsley, 4OY of Doncaster and 2FNS, a newcomer to the city. G2LT, 3FN, 3TC and 5TO are active on 28 Mc/s.

**General.**—5834 awaits his bowler hat. 3VW anticipates early release from the R.A.F. and wishes to contact York members. His address is "Ingle Nook" Nether Poppleton, York. 8UO thanks the Leeds member with the queer sense of humour who returned to him, in an understamped envelope, the letter budgets dated July 1 and January 4, instead of forwarding them according to rota. G8UO.

### DISTRICT 3 (West Midlands)

**D.R.:** V. M. Desmond (G5VM), 90 Worcester St., Birmingham, 5. **Scribe:** E. J. Wilson (2FDR), 48 Westbourne Road, Olton, Birmingham.

**Birmingham.**—A meeting of M.A.R.S. was held at the Chamber of Commerce on Tuesday, January 15, when Mr. C. Naylor Strong gave a most interesting lecture entitled "The Analysis of the Human Speech." 36 members and visitors were present.

Up to January 29 only 5LJ and 8QY had been heard on 10, but it is known that a number of others have now been re-licensed and will be on the air by the time this is in print.

Members situated in the Market Drayton area who would like to meet together are asked to get in touch with Mr. W. L. Howat, 2CHG, at 29, Stafford Street, Market Drayton. 2FDR.

**Stoke and Newcastle-u-Lyme.**—Mr. P. A. Arnold, 2ARR, who has recently moved into the District from West London, has agreed to organise activity in the Stoke and Newcastle areas. Local members should contact Mr. Arnold, c/o Electrical Service Co., Bodley's Chambers, Market Place, Newcastle-under-Lyme, Staffs.

### DISTRICT 4 (East Midlands)

**D.R.:** L. Ridgeway, (G2RI) 90, Romway Road, Leicester.

It is five years since the writer compiled notes for THE BULLETIN, now having returned to civilian life at a time when our long lost "tickets" are being returned. It is a grand feeling to find enthusiasm running so high. Our District is full of life and not a little of this is due to the valiant efforts of the Deputy D.R. G8DZ, who did a splendid job during the difficult days of war. Many thanks Albert.

Membership has gone up to an astronomical figure and the list held by the D.R. is far from complete. Will all members in the counties of Leicester, Nottingham, Derby and Northants please send a postcard with name, address, call or BRS number to the D.R. at the earliest possible moment to permit a complete list to be prepared.

**Derby.**—Of 50 questionnaires sent out by the T.R. only about 10 have been returned. He will be glad to receive the others. The last meeting was well attended when U.H.F. receivers were discussed at length. Efforts are being made to get a room at Derby Tech. for future meetings. Visits have been made by P.O. Dallman (4751) and J. A. Barson (11,512).

**Leicester.**—The first meeting at new headquarters, 27 Belvoir Street, indicates that we shall soon require elastic walls fitted! New faces returned from the services were 5GN, 4BJ, 5MY and 2FUU. The D.R. outlined information received from Council and asked for the feelings of the meeting on suggestions for a P.D.M. and the forthcoming meeting in Birmingham. Several members are taking the plunge on 28 Mc/s. quite soon, and G6GO and G4FO have already been heard. Next meeting, February 17, 2.30 p.m., 27 Belvoir Street, Leicester.

**Nottingham.**—Meetings are going very well and topics under discussion are wide and varied. Those who are not taking advantage of the meetings would be well advised to do so. The T.R. would welcome offers from members who are willing to give short talks. Suitable permanent premises are still required to set up a workshop and meeting room. Can any member help? Building of gear is proceeding at increasing rate and two stations to look for are G8DD (28660) and G8QZ (28786 kc/s.). A signal survey group has been formed to report on conditions fortnightly.

Visits to the B.B.C., Daventry, and G.P.O., Rugby, are being arranged for May, June and July. Members wishing to attend should send their names to the T.R. The parties to the B.B.C. are limited to 15 and to the G.P.O. 20. There will be a visit on a Saturday and Sunday in each case.

The Social evening held at Hands Cafe, Beeston, on January 12, was a very enjoyable affair. The N.F.D. films caused quite a stir amongst the ladies, especially in the portion starring G2SD.

**Mansfield.**—A meeting is scheduled for the election of a T.R., and we are hoping this town will come back to its former brilliance. G2RI.

### DISTRICT 5 (Western)

**D.R.:** R. A. Bartlett (G6RB), 31 King's Drive, Bishopston, Bristol. Bristol 46960.

**Bristol.**—The first meeting of the New Year produced an attendance of 35, easily the best for many years. The T.R. welcomed back to civvy street many old members and also the new members attending their first meeting. The D.R. read a letter from 8DP requesting information of a missing key, the G.P.O. having returned the wrong one to him. Will all Bristol transmitting members please let the T.R. have their crystal frequencies as a register is being compiled.

Next meeting will be held on a Friday, February 22 at Keen's Cafe.

**Gloucester.**—7857 reports three further meetings, with some very interesting papers and discussions by members. The Acting T.R. would like to see a larger attendance at future meetings: these are being held fortnightly and will be announced in the local press. 5508, the Acting T.R. is at present away on a Post Office course: 6890 goes shortly.

**Swindon.**—A meeting has been arranged for 6 p.m. on Saturday, February 23, at "The Shack" rear of 7 Surrey Road, Swindon. JFO, Acting T.R., hopes to see a large attendance. Visits are reported from 5RP, 3HC, 8VP and 3HS. 2CGN is going into the radio business, 2BUJ will be demobbed shortly, 3NC is back in civvy street, 4AP is now residing in Swindon. G6RB.

### DISTRICT 6 (South Western)

**D.R.:** W. B. Sydenham, B.Sc. (G5SY), Sherrington, Cleveland Road, Torquay. Torquay 2097.

**Torquay.**—A successful meeting was held at G5SY on Sunday, January 13, when 10 members attended. Apologies were received from nine members who were prevented from attending. The T.R. dealt with the social arrangements for the ensuing period, and after discussion it was decided to hold monthly meetings on Saturdays at 6.30 p.m. at the Y.M.C.A., Castle Road, Torquay. The following dates have been booked: February 16, March 16, and April 13. The D.R. spoke of impending Society arrangements and of other official business.

Several members are ready to get "on the air" and contacts should shortly be effected on 60 Mc/s. It is hoped that the co-operation of other parts of the District can be made, with a view to running 60 Mc/s. field days during the summer.

A vote of thanks was passed to the D.R. and Mrs. Sydenham for their unending hospitality. Those present included G2GK, 3AW, 58Y, 2ARA, 2BMZ, 2CAA, BR83684, 5384, 9720 and a new member, Mr. Wale. G2GK.

**Penzance.**—The January meeting was attended by G3CC, 3IV, 3KO, 6TZ, 2BCL, BR88748, 10,083 and 10,448. During the rag-chew it was recalled that we have now had to say goodbye to quite a number of members now returned to their homes, including G2JS, 4CT, 6JF, SNA, 8VV, 2DOL, 2FZV, and 2FZZ, all of whom we hope to meet on the air in the very near future. G6ZT.

**Taunton.**—Five only met at the Y.M.C.A. on January 10. Needless to say the return of transmitters was mentioned. This led to a discussion on oscillators, with diagrams provided by 2DRW. Those present were: G2JM, 5AK, 6LY, 2DRW and Mr. Bass. G5AK.

**N. Devon.**—Members are well on the way to getting their gear in working order for the Great Start. The T.R. is hoping to arrange meetings very shortly.

The N. Devon Group join the T.R. in offering hearty congratulations to our old friend G6FO, on the honour conferred upon him as announced in the January issue of THE BULLETIN. (The D.R. adds his congrats.) G3BO.

**Plymouth.**—The T.R., whose address is 55 Greenbank Avenue, Lipson, Plymouth, reports that he hears that G6RF is well on the way to recovery, and is engaged in rebuilding. GSHF is home on leave after six years in VP4, and just as keen. No news has been received from 8PN, but 2FKO and 9728 are rebuilding. The T.R. has received visits from 2HLS, BR83464 and 3547. On one occasion he was visited by five lams at once, with the result that a rag chew lasted till the early hours of the morning! G3TX.

### DISTRICT 7 (Southern)

**D.R.:** W. E. Russell (G5WP), "Milestones," Mayford, Woking, Surrey. Woking 1589.

The competition originating at the meeting held at G2YL's QRA last summer was won by Ernie Dedman, G2NH.

**Croydon.**—The January meeting was the largest for some time with an attendance of 43. BR89514 continued his talk on Radar, which was well received.

The T.R. has received a letter from Mr. Hope, 6 Grange Road, Thornton Heath, offering help to members in his neighbourhood wishing to improve their knowledge of Maths. (Thanks for the kind offer O.M.) G2DP.

**Coulsdon.**—G2FI and 3IG have recently returned home after a spell overseas. 2DN looks forward to a quick demob. and returning to civvy life. 2CRD has returned after a few years in District 13. 4458 has joined the R.A.F. 3179 expects to be home for good soon. BR83003.

**Reading.**—The Reading Radio Club has been granted affiliation with the Society. Hearty congratulations to 2BHS on his award of the B.E.M. Excellent attendances have marked the meetings held in December and January. An interesting visit was paid to the B.B.C. Monitoring Station. The staff gave thorough explanations of the apparatus and of the service maintained. BR84573 received a card from the pre-war T.R., G5AO, conveying wishes to all the locals.

2DIO gave an excellent talk on aerials with illustrations on apparatus he prepared specially for the meeting. BR84573.

**Maidenhead.**—We are pleased to announce that, thanks to the pioneer work of 2DBF, regular meetings are being held on the second Tuesday of each month at the "Toc H" hut at 7.30 p.m. The "Toc H" hut is behind the Technical Institute, Marlrow Road. Congratulations to 2DBF are in order upon the award of the M.B.E. He will be glad to hear of members able to attend the local meetings. Please write him at "Crendon," Lock Lane, Cox Green, Maidenhead.

**Guildford and Weybridge.**—Twenty-four members attended the January meeting at Weybridge. An auction of apparatus belonging to the late GSIX was conducted.

"Forthcoming Events" contain details of the next meeting but please drop a card to G5RS, 20 Hedgeway, Guildford, if you propose attending.

**Portsmouth.**—South Hants R.T.S. enjoyed a most interesting lecture by G2XC on Pilotless Aircraft at the January meeting. With local members please note that meetings are held on the first Thursday in each month and advance notice is consequently not possible in THE BULL.

Thanks are due to 2AVV for arranging a visit to the Radar installation at a Naval establishment. G8WC.

**Bournemouth.**—Congrats to G8KX and his wife on the arrival of a junior op. G3BM complains that an overload of starlings on his 8JK spreaders over-balances the array and ties the feeders in knots!

Meetings are held on the last Thursday in each month at 7 p.m. at 45 Parkwood Road, Bournemouth. G2NS.

G5WP.

### DISTRICT 8 (Home Counties)

**D.R.:** S. J. Granfield (G5BQ), 47 Warren Road, Cambridge. Tel.: Cambridge 54644.

**Cambridge.**—A very successful meeting, attended by 23 members, was held at "The Jolly Waterman," Chesterton Road, Cambridge, on January 4. A feature of the meeting was a junk sale which realised nearly £11.

G2XV received his licence on January 17, and is believed to be the first in this district. 2DT, who has been seriously ill, is making good progress. 8LT, who was well-known in the town before the war is now a Major in Signals in India, and was recently married. 8LL, who was passing through Cambridge recently, sought information of 2FL, 2FU and 5DQ. He would like to hand over a supply of QSL cards to the new secretary of G6UW (University Wireless Society please note). Lt.-Col. T. Whimster, G8UJ, has been visiting the town, and hopes to take up residence if he can find suitable accommodation. A newcomer is Mr. T. A. Davies, 2ALL, formerly of Wakefield. The Pye Short Wave Society has recommenced its activities, and hopes to be re-affiliated to the R.S.G.B. soon.

**St. Ives.**—G5RL and 6WA have now been demobilised from the R.A.F. 6WA has just returned from India and is looking very fit. 4AZ, who has been unwell for many months, was able to attend the last meeting. XZ2DY, who is spending a well-deserved six months leave at Swavesey, is collecting gear to take back to Burma.

**Peterborough.**—G2NJ has applied to the Post Office for permission to operate both from his home address at Peterborough and also from London. He states that there is a real Ham atmosphere where he is stationed in London, his immediate workmates including 3JX, 3XG, 2FWA, and also a son of that well-known old-timer 5BA (of Berwick-on-Tweed). He adds that 5NP was on the sick-list at the time of writing. 3QS has been demobilised and is back in the town.

**Luton.**—G3KG has paid a visit to the D.R. to discuss local affairs, and 5BQ returned the compliment by going to Luton to see 3KG. There is not a great deal of activity here at present, but the T.R. is hopeful that things will improve as the members get back from the Services.

**Bedford.**—The D.R. would be glad to hear from 5FO. Present QRA not known. G5BQ.

### DISTRICT 9 (East Anglia)

**D.R.:** H. W. Sadler (G2XS), The Warren Farm, South Wootton, King's Lynn, Norfolk. Castle Rising 233.

**Norwich.**—With sincere regret we have to record the retirement of Mr. Briggs the T.R. His wife having recently undergone a serious operation he feels that in the circumstances he would be unable to cope with the work entailed or to provide the hospitality he hoped to give. We wish Mrs. Briggs a speedy recovery.

Our old friend Mr. Nicholson, G2MN, of 78 Wroxham Road has kindly agreed to fill the breach, and members are asked to get in touch with him in order that meetings can be arranged. Phone 51254.

We hear that 5IX is out and about. Here's to an early contact.

**Yarmouth.**—As there are now sufficient members available for regular meetings the T.R., 2BXJ, would be glad if all interested would let him know which Sunday is most suitable. It is hoped that Lowestoft members will be able to attend too. Mr. Thompson thinks (and the D.R. supports him) that a vote of thanks should be accorded to Council for the alteration in the status of the Amateur and for the fine job of work done in respect of the new license. (On behalf of Council, thanks.—Ed.)

**King's Lynn.**—G2XS was pleased to receive a visit from 5QO for the first time in six years. QO is at present near Luton. 5UD, 4LM and 3IP are busy preparing to span the world on 28 Mc/s. G2NS.

### DISTRICT 10 (South Wales & Monmouthshire)

**Acting D.R.:** H. H. Phillips (GW4EQ), 80 Cottrell Road, Roath Park, Cardiff. (Cardiff 4512 during business hours.)

The return of licences in many instances, heralds a general resumption of activities in the district and many have again experienced the "thrill" which was an everyday occurrence in pre-war years.

**Cardiff.**—The programme for the ensuing year was tabled by the T.R., at the January meeting at which 20 members were present. Many old friends were to be seen amongst our new acquaintances and it is a pleasant duty to record the attendance of 11,419, our new lady member. Cordial invitations and a report

on this meeting have been sent to all local members and amongst those from whom replies have been received are 8096, 9551 (in M.N.), 9634, 9980, 10,185 (in Singapore), 10,390, 10,677, 10,818 (now in Germany), 10,847 (in Batavia), several reporting that they hope to be demobbed at an early date.

A talk on "The Experimental Section—Past, Present and Future" was given at the February meeting, full details of which are not to hand, and the next will take place on Monday, March 11, at the Park Hotel, Park Place, Cardiff, commencing at 7 p.m., at which Mr. J. C. Wilkie will deliver a talk entitled "Ship's Radio Installations." BRS10,374.

**Swansea.**—Future meetings will take place fortnightly at the Hotel Metropole, Wind Street, commencing at 7 p.m. The next two will take place on February 20 and March 6. Local members are requested to take due note of these dates and their support is strongly solicited in making a success of future meetings.

The January meetings were well attended and several new acquaintances were made. Re-building of gear is well under way and great activity is forthcoming on 28 Mc/s. upon the return of licences. GW4CC.

**Carmarthen.**—No news yet of proposed meetings, but Mr. J. Millie (GW8MQ) who has arrangements in hand, would be pleased to hear from those interested at 52 Little Water Street, Carmarthen.

**Newport.**—Is there a need for meetings? Please re-read last month's appeal.

**Neath/Port Talbot.**—A suggestion to commence local meetings covering these towns is favourably received and an offer from any member to co-ordinate activities would be welcomed. The D.R. has been pleased to receive a visit from 4467 now home on leave from Burma.

**General.**—It is proposed to hold a District meeting in Swansea in September/October next, further details of which will be given at an early date. Meantime, support has been evinced in several quarters for the Bristol P.D.M. in April and the writer would be pleased to hear from those who intend being present. GW4KQ.

## DISTRICT II (North Wales)

**Deputy D.R.:** C. Spillaine (BRS1060), 14 Queensway, Prestatyn, North Wales.

**Rhyl.**—GW5FU is preparing for the air again by rebuilding the rig to fit into a bureau. He has just acquired a national NC81X. At present 5FU's house is on D.C. mains, but he is hoping soon to be on A.C. 2DAH is back in "Civvy Street," and hopes soon to be active. BRS5520 has landed a shore job. GW2PH has left the Service and the District, and is now resident in the Birkenhead area. G2GZ now back at Kinnel Camp reports that his ex-associates 8152 and 8265 have been posted to Wakefield.

**Prestatyn.**—GW4CK and 2HIY have been busy rebuilding during leaves and at weekends. 4CK has been posted from District 17 and is now at Leighton Buzzard.

**Llandudno.**—2CRF, recently demobbed, reports possible activity as soon as he can settle down.

**General.**—It is hoped to arrange a P.D.M. during September, at Rhyl or Prestatyn. If you think one of the above venues is sound let us have your views in order to help make the meeting a success. BRS1060.

## DISTRICT 12 (London North and Herts)

**D.R.:** Seymour Buckingham (G5QF), 41 Brunswick Park Road, New Southgate, N.11. (Enterprise 3112). **Scribe:** C. R. Stevens (2DHF), 22 Bramford Court, Southgate, N.14. Palmers Green 0548.

**North London.**—At the meeting held at the home of Mr. E. H. Laister (BRS3386) on January 20 we were pleased to welcome some new members. Thanks to a sale of surplus gear one member who had not been able to attend a meeting for six years left with only his bus fare! Thanks are due to Mr. and Mrs. E. H. Laister for their hospitality and for the excellent tea provided.

The next meeting will be held at the home of Mr. C. R. Stevens (2DHF) on February 24 (see "Forthcoming Events") when it is hoped to be able to demonstrate a single valve time base which is now in the experimental stage.

Until a committee can be elected at the forthcoming P.D.M. (date not yet fixed) the D.R. has formed a "General Purposes Committee" to organise future District activities.

For the purposes of record G6QM and G6CL were re-licensed on January 18 and 19, 1946, respectively. Both have been active on 28 Mc/s. as have G2CV, 3GX, 3LO, 3FD, 6OT and 6WU.

**Enfield.**—Mr. T. Vickery (G5VY), 48 Willow Road, Enfield, acting T.R. for Enfield, has formed a group which held its first meeting on January 20 at his home, six members and two visitors being present. The main interest centred around V.H.F. equipment and aerial systems. Frequency stability and methods of checking same were also discussed after which it was agreed to arrange demonstrations of transmitters and receivers at the next meeting on February 17 with half the group at the above address and half at G8SK. It is hoped that licences will be issued by that time so that QSO's can be effected, thus enabling members to judge for themselves the merits and demerits of the various systems and methods of checking frequencies.

H. Stern (BRS11162) of 3 Bells Hill, Bishop's Stortford, and of 119 Gt. Edmunds Road, Edmonton, would like to contact members in both areas. 2DHF.

**St. Albans.**—G2CN, 2KQ, 2RD, 2MD, 3KG, 8TK, 2HAB, 2HDM, 3783, 4477, 5036, 5065, 7238 and 8824 enjoyed the very

generous hospitality of G5UM and his wife at the last meeting when general ragchewing was the order of the day. Support was forthcoming for the idea of a Mid-Herts. V.H.F. Network and to give the plan a start all the G's present agreed to get on to 5 metres as soon as maybe. It is hoped to announce regular transmission schedules in due course and the BRS members can go ahead with the construction of receivers knowing they have the co-operation of the full call members. It was suggested there should be an exchange or sale of surplus gear and the T.R. will be pleased to conduct an auction at a future meeting if members will first let him have a list of what they have for disposal. BRS3412

## DISTRICT 13 (London South)

**D.R.:** S. E. Langley (G3ST), 52 Dumbarton Road, S.W.2. **Scribe:** W. D. Gilmour (G2VB), 35 Grangecliffe Gardens, South Norwood, S.E.25.

The January meeting was very well attended, 43 members being present. G2BB addressed the company on R.S.G.B. matters and after tea Mr. Castle continued his talk on Radar. We congratulate Mr. Castle on the splendid manner in which he delivers his talks on this most interesting subject.

G2YB has arranged for the M.A.T.S. to give us a film display of Field Day activities in the near future. As another field day will be held at Warrington when the weather improves, members are invited to prepare portable gear for this event.

G3CI, who recently called on the D.R. sends 73 to all friends. G2JB and 2DJK have been demobbed. Many old timers are busy on the 10 metre band.

The monthly meeting held at the home of G4DC (63 Erlanger Road, New Cross) was attended by 14 members, in spite of adverse weather and the failure of 2VB's "Mighty Atom."

Several members, including 8GP, 2LXX, BRS5625 and BRS11,127, met for the first time since 1939. Others present were 2VB, 2FNW, BRS3003, 4584, 6878, 9287 and Mr. Rowntree (Assoc. Mem.). Many topics were discussed, including activity on "Ten" and the re-issue of licences.

G3OV reported "demobbed" hopes to be at the next meeting. G3ST.

## DISTRICT 14 (Eastern)

**Scribe:** L. J. Fuller (G6LB), "Meadow Brook," Vicarage Lane, Great Baddow, Chelmsford, Essex. Telephone: Gt. Baddow 224.

**Chelmsford.**—Attendance at the January meeting was small but enthusiastic, chief interest being in the one and only "ticket" so far issued. The lucky holder, G3WS of Romford, would not agree to the suggestion of G6LB that he ent the said "ticket" up into small bits and hand them round as souvenirs.

**Southend.**—The January meeting was well attended, and the 28 Mc/s. band was chief item of interest, and on which G5UK is already active. G6WQ writes from H.M.S. "Queen Elizabeth," where he is an "op," and says that he hopes to return shortly to Southend.

**Brentwood.**—The first post-war meeting was well attended, and out of the ten present, nine were holders of full call-signs. We were very pleased to see G4AK and G8RC back again, the former being already "demobbed."

**Chingford.**—The January meeting was badly upset by the weather, but a number of enthusiasts "made it" to hear G6FJ open a discussion on aerials. The ensuing arguments proved only too well the truth of the old adage "One man's meat, etc."

Owing to pressure of business G2HR has resigned as temporary T.R., the role now being held by G2XG. We are sorry to lose G2HR's services, but have no doubt that the District will rally to the support of his successor. G6LB.

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

**D.R.:** H. V. Wilkins (G6WN), 539 Oldfield Lane, Sudbury Hill, Greenford, Middlesex. **Byron** 3369. **Scribe:** E. Holt (2FZQ), 36 Bulstrode Road, Hounslow, Middlesex.

A District meeting, held at the Labour Hall, Southall, on January 26, was attended by about 40 members. Keen disappointment was felt that Mr. F. Charman, G6CJ, was unable, through illness, to give his lecture and demonstration on "Short Wave Aerials." Mr. S. Cutler (G2OL), however, kindly stepped into the breach and delivered the lecture and demonstration from Mr. Charman's notes. Whilst extending the District's congratulations to Mr. Charman on being awarded the B.E.M., we wish him a speedy recovery. A hearty vote of thanks was accorded to G2OL, and to Mrs. Bostock (wife of 5246) who supervised the refreshments and also to the Gramophone Co. for the loan of the demonstration instruments.

**West London.**—A successful meeting took place at the A.T.R.'s home on January 6 when the re-issue of licences was discussed. Later G8KZ supervised an interesting junk sale.

**Hounslow.**—A.T.R.: J. Clarke (BRS9621), 124 Springwell Road, Heston. In order to assist the A.T.R. to revise his QRA register, every member in the area unable to attend the next meeting, is requested to contact Mr. Clarke by post or 'phone. Feltham 2797.

**Ashford.**—A very successful meeting was held on January 12 when the November BULLETIN Editorial was discussed and a decision made to divide each meeting into two parts—technical and Morse instruction. It was further agreed to hold a 56 Mc/s. field day during the summer.



**Twickenham.**—A.T.R.: G. F. Barrett (G8IP), 23 Warfield Road, Hampton. Congrats to G8IP on his demob. and for volunteering to take over the A.T.R.'s duties. In order to assist him in compiling a QRA register every member in the area unable to attend the meeting on February 22 is requested to contact him by post.

**Harrow.**—At a meeting held on January 4, 6447 demonstrated a nidget mike.

**Edgware.**—At the A.G.M. of the Edgware and District Radio Society the old committee were re-elected and a decision taken to hold meetings every Thursday at 7.30 p.m. at the Constitutional Club, Edgware.

We apologise to 3811 whose BRS number and honours were incorrectly recorded last month. He was awarded the M.B.E. and American Bronze Star for his work with the R.A.F. 2F7Q.

### DISTRICT 16 (South Eastern)

**D.R.:** W. H. Allen, M.B.E., (G2UJ), 32 Earls Rd., Tunbridge Wells, Kent. Scribe: E. H. Trowell (2HKU), 27, Unity Street, Sheerness, Isle of Sheppey, Kent.

Mr. W. H. Allen, M.B.E., G2UJ, who has resumed his duties as D.R., upon his release from the R.A.F., wishes to offer his sincere thanks to Mr. W. A. Scarr, M.A., G2WS for having carried on as D.D.R., throughout the war and to Mr. E. H. Trowell, 2HKU, for his work as Scribe. As the latter has consented to continue in this role for the time being, all members are requested to send their reports to him.

**Tunbridge Wells.**—G50Q is ready for 28 Mc/s. and 60B is rebuilding. 2UJ is finishing off a 28/58 Mc/s. superhet and has built a field strength meter for both bands. SNO has taken up the post of Headmaster at Victoria College, Jersey, C.I.

**Bromley.**—At the meeting held at the home of the acting T.R., 2AVI on January 5, eleven members were present. The Decca Navigator was demonstrated by 2AVI and a junk sale followed. The next meeting is on March 9 and full details may be obtained from 2AVI at 18 Upper Park Road.

**Sidcup.**—2DHV sends a list of stations operating from Italy. **Gillingham.**—The M.A.T.S., held their A.G.M. on January 7 when the President 6NU, announced his resignation. The following were elected: President, 2HAU, vice President, 2CM, Treasurer, 2AFT, Secretary, Mr. Coombes, Assistant Secretary, 5FN, Committee Member, Mr. Burin.

**Maidstone.**—SUIDM expects to operate with a G call soon. 9445 is building an 18 valve V.H.F. double superhet and spectroscopy outfit. T. D. Eaves, 7387, has taken over as Hon. Secretary of the local club. 11315 has built a four-valve T.R.F. receiver which works well on 28 Mc/s.

**Sheppey.**—G2VA has left for Ceylon where he hopes to meet the locals. 3GW has completed an oscilloscope and would appreciate reports on his 28716 kc/s. and 58748 kc/s. signals. 4OU is also on the air and would like reports on his 58 Mc/s. signals.

**Doer.**—2DRP was married on December 29 and is stationed at Gillingham.

**Folkestone.**—J. Walton, 10,292, and 5QL would like to contact members at 16 Beachborough Villas (especially members of the old local society) in order to arrange a meeting. 5QL is now a civilian and building gear.

**Sussex.**—R. E. Lewis, 3PC, has been appointed Headmaster of Wisborough School and would like to contact local members. 3LK in a letter to 3YY asks to hear from members. His address is 905093, Flt/Sgt. Williams, H. Gp., A.P.O. S/10437 R.A.F., Singapore, S.E.A.A.F. 3YY extends his thanks to the District and the R.S.G.B., for letters and books received during his recent serious illness. He is much better now.

**Hove.**—10,187 has been building gear and hopes to meet local members.

**Hailsham.**—2FTS has built a T.R.F. receiver and is planning more gear. 8407 is experimenting with a radio-gram and expects to be "out" in March.

**Eastbourne.**—E. G. Cocks, D.S.M. and Bar, 7412, 3 Hyde Road, would like to contact local members. He is now a civilian.

**Special Note.**—Will members willing to support a District Meeting to be held in Gillingham during April or May please send a postcard to the Scribe, indicating suitable dates? This will be our first meeting since 1939 so please make an effort to attend and do not forget that postcard will you? 2HKU.

### DISTRICT 17 (Mid East)

**D.R.:** A. C. Simons (G5BD), "The Elms," Church Road, Mablethorpe. Phone 69.

Those present at the Gainsborough meeting spent six hours comparing notes and planning for the future. The log was signed by G3WB, 30S, 4GX, 40F, 2CFJ, 2VY, 8SH, 4315, 5LL, 2AAS, 2BLQ, 400, 5FP, 10,230, 10,245, 5BD and visitor. Several of the old hands are now on the air whilst two or three Service members hope to be active from their stations. G6TV is back in civilian life and expects to resume his old job, he is very interested in five metres and hopes to have a crack at centimetre waves. 4657 (R. Marines) has stepped up to Sergeant but still has two years to serve. 4GX has had visits from 4GZ and 3FP, the latter hopes to get his C.O.'s permission to put G3FP on the air. 2DRT sends regards to all.

At the time of writing most of our gear has been returned by the G.P.O. in very excellent condition and a few licences have been issued. It is hoped that all local members will make an attempt to get a five metre rig going before the DX bands claim all their interest. G5BD.

### DISTRICT 19 (Northern)

**D.R.:** R. J. Bradley (G2FO), 36 Raby Road, Stockton-on-Tees.

The re-issue of licences is no doubt responsible for the almost complete absence of news this month.

**South Shields.**—G5SB and 6PB are now active on 28 Mc/s. phone and C.W. The T.R. hopes to arrange regular meetings in the near future. G2FO.

### Northern Ireland

**D.R.:** J. N. Smith (G15QX), 19 Hawthornden Drive, Belmont, Belfast, N.I. Phone 63323.

Mr. E. G. J. Tucker (G15DX) has been appointed to Rockport School, and not to Pretoria Royal, as previously stated. Mr. Eric Megaw's appointment by the Admiralty, to the post of O./C. Radar Research, will give much pleasure to his G1 friends. His call (G16MU) was one of the first to be issued in N.I.

A District meeting of R.S.G.B. members will be held at the Y.M.C.A. Club on March 2 at 7 p.m. when arrangements for the forthcoming Belfast P.D.M. will be discussed. It is hoped that members will support the meeting in strength. There is much local activity with many owners of stations impatiently awaiting the word "go." Impounded gear seems to have been well stored except for fixed condensers which tend to "short" easily.

G13ZX, who has been on leave, hopes to be demobbed soon. He is looking forward to a resumption of amateur activities. G15QX.

### Scotland

**Scottish Records Officer:** J. Hunter (GM6ZV), 51 Camphill Avenue, Langside, Glasgow, S.1. Langside 237.

"A" Area (Glasgow and surrounding counties).

**A.R.:** D. R. Macadie (GM6MD), 154 Kingscave Road, Glasgow, S.4. Scribe: J. D. Gillies (2FZT), 3 Berridale Avenue, Glasgow, S.4. Merrylee 4060.

At the December meeting of the Glasgow Amateur Radio Club those present were entertained by a lecture given by Alf Jones in the general series "What I'm doing now—any questions?" A short ragchew was followed by the main lecture on "Valve characteristics" given by Mr. Kennedy, BR88637, whose most illustrative diagrams were greatly appreciated by the members. Calls appearing on the air on 28.5 Mc/s. include GM3YS and GM4JL (?). The Scribe who is conducting Morse classes at his home on Tuesday evenings at 7.30 p.m. until further notice, would still like to hear from demobbed members and visitors to the area. A list of active amateurs is being compiled. To date nine members have reported that they are active on 28 Mc/s. and 58.5 Mc/s. Please inform the Scribe if you intend operation on these bands.

"B" Area (Aberdeen and the North).

**A.R.:** A. G. Anderson (BR55857), 87 Braemar Place, Aberdeen.

Mr. Anderson having returned to Aberdeen, Mr. Laing has relinquished his duties as acting A.R. Our sympathy is extended to him on the death of his mother.

"C" Area (Dundee, Forfar, Perthshire, etc.)

**A.R.:** Jas. Gough (GM3NH), 4 School Drive, Downfield Dundee.

The eleven members who attended the January meeting discussed the new licences but as only two of those present had been on the air in pre-war days it was difficult to work up an argument to anything approaching the 1939 pitch! It was agreed to approach the local authorities for permission to inspect the Police radio gear.

"D" Area (Edinburgh, Midlothian etc.)

At the January meeting which was well attended, 6FN and Mr. Tom Nisbet formed the backbone of a very enjoyable Brains Trust, the result of which has been a demand for more. A welcome return to the fold was staged by 6KZ. Geo. Millar, 3UM, expects to be demobbed soon and attended the last meeting. Members noted with interest that he wore three rows of ribbons including the D.S.C. and extended their congrats. Newer members are displaying a keen interest in local activities all of which augurs well. SMA is now stationed in "D" area and forms a welcome addition to the strength. Next meeting is scheduled for Thursday, February 21, Chamber of Commerce Rooms, 25 Charlotte Street, at 7.30 p.m., by that time it is hoped that T9X notes will once again be the order of the day. GM6XI.

"G" Area (Borders, namely Peebles-shire, Selkirkshire, Roxburgh-shire and Berwick).

GM8NW is back from the East and expects to be demobbed soon. "G" Area will now hold meetings at the King's Hotel, Galashiels at 2.30 p.m. on the 3rd Sunday of each month—next meeting will be February 17. GM5FT.

### Congrats

● To Major P. J. Best, G4QH, of Preston, Lancs., who has been made an Additional Member of the Military Division of the Order of the British Empire.

● To BR59063 on the arrival of a junior op., John Edward George, at Penzance.

### Apologies

to D.R.'s and Scribes whose notes have been cut. We cannot get a quart into a pint pot.

# R.S.G.B. BULLETIN

OFFICIAL JOURNAL OF THE INCORPORATED RADIO SOCIETY OF GREAT BRITAIN

Published on or about the 15th of each month. Issued free to members.

General Editor: JOHN CLARRICOATS.

Editorial Office:  
NEW RUSKIN HOUSE,  
LITTLE RUSSELL STREET, LONDON, W.C.1  
Telephone: Holborn 7373.



Advertisement Manager: HORACE FREEMAN

Advertising Office:  
PARRS ADVERTISING LTD.,  
121 KINGSWAY, LONDON, W.C.2  
Telephone: Holborn 2494

Honorary Editor: ARTHUR O. MILNE.

VOL. XXI

FEBRUARY, 1946

No. 8

## RADIO AMATEUR'S EXAMINATION

PRIOR to the war, when the only recognised justification for the issue of a licence was the carrying out of experiments, it was necessary for an applicant to furnish the G.P.O. with details of the experiments he proposed to conduct. This was by no means a simple matter, and we fear that in some cases an applicant felt it necessary to "invent" excuses whilst in others the services of a third party were solicited to invent them for him!

All that has been changed under the conditions of the new Amateur licence, for it is now fully realised that even without experimental activity, the amateur acquires skill and training of great value to the community. Therefore he is now only called upon to produce evidence of his ability to abide by the technical requirements of his licence, and thus to respect the rights of others.

This evidence may take the form of a radio Service trade qualification, a P.M.G. Certificate, or a pass standard in certain examinations, details of which will be published later. There will, however, be many who possess no recognised technical qualification, and it is for their benefit that special Radio Amateur's Examinations, conducted by the world-famous City and Guilds of London Institute, are being arranged.

The Society has been closely associated with the preparatory work necessary for the introduction of these new examinations into the extensive syllabus of the Institute and it has been represented on the Advisory Committee (appointed by the Institute) by Mr. W. A. Searr, M.A., G2WS (Director of Education, Beckenham Borough Council), and Mr. John Clarricoats, G6CL (General Secretary of the Society and a Member of the Southgate Borough Council Education Committee). They received invaluable assistance and advice from their deputies, Mr. Arthur Watts, G6UN (G.P.O. Liaison Officer) and Mr. H. A. M. Clark, B.Sc. (Eng.) G6OT (Hon. Secretary of the Society).

Appreciating that a very large number of members will wish to qualify for an amateur licence at an early date, arrangements have been made by the Institute for the first examination to take place on *Wednesday, May 8, 1946*, between the hours of *7 p.m. and 10 p.m.* This examination may be taken at a number of centres throughout the country, and intending candidates should apply to their nearest technical college for accommodation. The Institute's fee for the examination is 10s. and, in

addition, the examination centre may charge a small accommodation fee. Any intending candidates finding difficulty in contacting a suitable examination centre should communicate with the Superintendent of the City and Guilds Institute. The closing date for entries for the first examination is *Friday, March 8, 1946*.

### Syllabus

A comprehensive Syllabus has been prepared by the Advisory Committee as an indication of the ground to be covered by the examination paper. The full Syllabus is reproduced below.

#### 1. ELECTRICITY AND MAGNETISM.

The elementary theory of electricity; conductors and insulators; units including power; Ohm's law; resistances in series and parallel.

Permanent magnets and electro-magnets and their uses in radio.

Self and mutual inductance; types of inductances used in receiving and transmitting circuits. Capacitance. Condensers in series and parallel; construction of condensers; electrolytic condensers.

#### 2. RADIO PRINCIPLES (ELEMENTARY TREATMENT ONLY).

Alternating currents; series and parallel A.C. circuits incorporating inductance, capacitance and resistance; impedance; resonance; acceptor and rejector circuits; coupled circuits.

Radio waves; wavelength, frequency, velocity; nature and propagation of radio waves; fading and its connection with frequency, length of path.

#### 3. THERMIONIC VALVES AND CIRCUITS.

Construction of valves; thermionic emission; principles and characteristics of diode and triode valves. Multi-electrode valves.

Use of valves; amplification, oscillation, frequency-changing, signal detection; the power stage; power rectification. Power packs for H.T. supply; smoothing.

#### 4. RADIO RECEIVERS.

The essentials of a receiver. Typical receivers; principles and operation of T.R.F., superheterodyne and super-regenerative receivers. C.W. reception. Interference caused by receivers.

#### 5. LOW-POWER TRANSMITTERS.

Oscillator circuits; frequency stability; use of quartz crystal to control oscillators; frequency multipliers; power amplifiers. Methods of modulation and keying.

Avoidance of harmonic radiation and interference by shock excitation; use of key-click filters and other means of preventing spurious emissions. Dangers of overmodulation. Use of wave-traps and other devices for reducing interference with nearby broadcast receivers.

#### 6. AERIALS.

Simple types of receiving and transmitting aerials. Transmission lines. Simple directional aerials. Aerial couplings to lines and transmitters.

#### 7. MEASUREMENTS.

Measurements of frequency and simple frequency meters (including crystal type). Artificial aerials and their use for lining-up transmitters. Measurement of anode current and voltage. Power input to final stage.

## 8. LICENCE CONDITIONS.

Conditions laid down by H.M. Postmaster-General for amateur transmitting licences covering power and frequencies, frequency control and measurement, sending periods, avoidance of interference to other stations, log of sending periods, use of call-signs of calling and called stations, control in emergency, etc. (Particular importance is attached to this section of the syllabus.)

## Specimen Questions and Model Answers

Whilst it is not possible at the present juncture to publish a detailed specimen paper, it is hoped that the following questions and model answers which have been prepared by the Society's representatives, may serve as a guide to the standard likely to be required by the examiner.

## Question:

What are the peculiar advantages and disadvantages of an absorption wavemeter? Explain the method of using this instrument for checking the frequency of a transmitter.

## Answer:

Perhaps the greatest advantage of the absorption type of wavemeter is that it gives response only on the fundamental frequency of the circuit with which it is used. Once the instrument is correctly calibrated therefore, one may be certain that oscillating circuits which are affected by the meter are actually working at the frequencies indicated. Other types of wavemeter usually give response on harmonics and this, under some circumstances, may lead to confusion.

The absorption-type meter is very easy to construct and if made of good quality components and thick wire, will retain its accuracy indefinitely. The fact that it cannot be used harmonically is, of course, also a disadvantage as it necessitates coil changing if required for measurement on more than one band.

The chief disadvantage of the absorption wavemeter is its very limited accuracy. In this respect the heterodyne wavemeter is far superior and attempts should not be made to use the absorption meter where very exact readings are required. Capacity effects are produced as the instrument is brought within range of an oscillating circuit, which limit the degree of accuracy obtainable.

When the absorption meter is used to measure the frequency of a transmitter, it is usual to fix a small neon lamp in parallel with the coil or to couple a loop of wire and flash-lamp bulb loosely to the coil. When the meter coil is brought near to the tank coil of a transmitter in operation and tuned, the flash lamp or neon bulb will glow when the transmitter frequency is reached. The meter should then be removed slowly from the transmitter until only a faint glow is obtained at one point on the tuning dial. This reading gives the frequency of the transmitter when reference is made to the calibration chart. If the meter is not fitted with an indicating device, a loop and bulb may be set up near to the tank coil and a dimming of the bulb will then be noticed as the meter condenser is swung through resonance.

## Question:

Describe two different methods of keying a low-power transmitter operated from A.C. mains. What precautions would you take against interference with nearby broadcast receivers through mains induction.

## Answer:

METHOD 1. Low-power transmitters can conveniently be keyed in the cathode circuit of the power output stage or one of the preceding frequency doubler stages. This interrupts the anode current and reduces the output of this stage to zero. In the case of directly heated filament valves the key can be connected in the lead from the filament centre-tap to H.T. negative.

METHOD 2.—So-called "primary-keying" may be applied to any or all stages of the transmitter later than the master oscillator. In this case the key is connected in series with the mains winding of the transformer supplying H.T. to the stages in question. Separate filament transformers are necessary with this method.

"Mains induction" is understood to mean the passage of R.F. energy along the mains from the transmitter to a neighbouring receiver. To prevent this a filter should be inserted in the mains supply to the transmitter consisting of a R.F. choke in each lead and a condenser of about 0.1  $\mu$ F of suitable voltage rating connected from each side of the mains to earth. The earth is preferably the conduit in which the mains lead is brought to the transmitter.

## Question:

What is "break-in" operation? How would you design a station to enable "break-in" operation to be used?

## Answer:

The term "break-in" is understood to refer to a system of C.W. communication in which, when the transmitter key is raised, no radiation of any kind takes place from the transmitter, thus enabling the receiver to operate at full sensitivity even on the same frequency as that of the transmitter.

In this way either operator of a pair of communicating stations can attract the attention of the other when the latter is sending. Thus a calling station can continue to call, inserting the sign BK in his transmission from time to time until his colleague

replies. It is, of course, assumed that the frequencies have been pre-arranged. By this means time is not wasted by long calls during which the answering station must wait until he receives the "invitation to transmit" (K) at the end of the call.

Further, during the reception of traffic the receiving station can instantly interrupt the station sending the message to ask for repeats without waiting for the end of the transmission.

To prevent radiation during the spacer period the master oscillator of the transmitter is preferably designed to be stable enough to permit being keyed without frequency changes. An alternative plan is to screen completely the oscillator and a buffer amplifier, the key controlling the latter.

Separate transmitting and receiving aerials are commonly employed, but a single aerial can be used, switching it from receiver to transmitter by a relay, operated by the key.

It may be found that, even with the aerial removed, the receiver is over-loaded or paralysed by the transmitter every time the key is pressed. The time constants in the receiver coupling and de-coupling circuits will prevent it regaining its sensitivity quickly. To prevent this over-load a "muting" circuit may be necessary, which is relay-operated by the key and removes the H.T. from the early stages of the receiver or possibly applies sufficient negative bias to the R.F. stages to prevent any unduly strong signal from operating the receiver.

It is anticipated that the examination paper will consist of 8 to 10 questions, all of which should be attempted by the candidates.

## Duration of Examination

Although a period of three hours will be assigned for each examination it is expected that the majority of candidates will find no difficulty in completing their paper in about two hours.

## Licence Conditions

It will be seen from the syllabus that particular importance is attached to Section 8 (Licence Conditions). Members who propose entering for the examination are strongly recommended to study carefully the conditions of the new licence as published in the December, 1945 issue of the R.S.G.B. BULLETIN.

## Text Books

The text books listed below are recommended by the Advisory Committee, to the attention of candidates who will find therein all that is covered by the syllabus. It should, however, be appreciated that the scope of all these books is considerably wider than the standard needed by candidates to secure a pass.

<i>The Amateur Radio Handbook</i> (R.S.G.B.)	4s.	0d.
<i>The Radio Handbook Supplement</i> (R.S.G.B.)	2s.	9d.
<i>Notes for Wireless Operators</i> (H.M.S.O.)	3s.	6d.
<i>Admiralty Handbook of Wireless Telegraphy</i> (H.M.S.O.)		
Part I .. .. .	4s.	6d.
Part II .. .. .	6s.	0d.
<i>Modern Radio Communication</i> (Pitman)		
By Reyner		
Part I .. .. .	7s.	6d.
Part II .. .. .	7s.	6d.
<i>Foundations of Wireless</i> (Iliffe) By Sowerby	7s.	6d.

## Second Examination

It is anticipated that the second examination will be held during November, 1946.

## Correspondence

All communications relating to Radio Amateur's Examinations should be addressed to:—

The Superintendent:

City and Guilds of London Institute,  
Department of Technology,  
31 Brechin Place,  
South Kensington,  
London, S.W.7.

No correspondence should be addressed to the Society.



# RADIOLOCATION OR RADAR\*

By R. L. SMITH-ROSE, D.Sc., Ph.D., M.I.E.E., F.I.R.E.

## I. INTRODUCTORY

THE possibilities of devising some method of detecting and locating solid objects with the view of avoiding collisions at sea was probably in the minds of many people immediately after the tragic disaster to the s.s. "Titanic," which steamed at high speed into an iceberg while crossing the Atlantic on her maiden voyage in April, 1912. After this date, there were doubtless many inventions of so-called "iceberg detectors," some of which depended upon the aural detection of an echo resulting from sounds emitted from a horn, siren or other source on board the ship. Echo-sounding devices based on this principle have been described during the past 25 years or more, and have been developed to a high degree for depth sounding at sea and submarine detection purposes. It is now well known that radiolocation or radar is a somewhat analogous technique using radio or electric waves to enable us to extend our range of ordinary vision under conditions such as in darkness or in fog, when the human eye using visible light rays becomes ineffective or even useless. By means of

of the art and to describe the basic principles and quantities upon which the technique is founded. In so far as radio waves were being used for detecting and locating aircraft and ships, the technique was christened "radiolocation" in this country some years ago, but this term now tends to give way, under pressure of the influence of the Americans and their passion for short snappy titles, to the word, Radar, which, we are told, means Radio Detecting and Ranging. Radiolocation or Radar may be described as the art of using radio waves for the detection and location of an object, fixed or moving, by the aid of the difference of its electrical properties from those of the medium adjacent to or surrounding it.

## II. PRINCIPLES OF RADAR

### (a) Radio Waves and Light Waves

It is now over half a century ago since the theoretical work of Clerk Maxwell, an English scientist, showed that ordinary visible light as we know it, really consists of electric waves travelling at the very high speed of 186,000 miles a second, this speed being directly related to the ratio of the absolute electric and

TABLE I  
Wavelengths of different types of electric waves

Type of Waves	Wavelength in Centimetres	Frequency in Megacycles per second	Alternative Designation of radio waves
X-rays .. .. .	Less than $10^{-6}$	—	—
Ultra-violet light .. ..	$1 \cdot 10^{-6}$ to $40 \cdot 10^{-6}$	—	—
Visible Spectrum .. ..	40 to $80 \cdot 10^{-6}$	—	—
Infra-Red Spectrum .. ..	$80 \cdot 10^{-6}$ to $4 \cdot 10^{-2}$	—	—
Millimetre radio waves ..	0.1 to 1.0	30,000 to 300,000	—
Centimetre radio waves ..	1 to 10	3,000 to 30,000	Super high frequency
Decimetre radio waves ..	10 to 100	300 to 3,000	Ultra high frequency
Metre radio waves .. ..	$10^2$ to $10^3$	30 to 300	Very high frequency
Dekametre radio waves ..	$10^3$ to $10^4$	3 to 30	High frequency
Hectometre radio waves ..	$10^4$ to $10^5$	0.3 to 3	Medium frequency
Kilometre radio waves ..	$10^5$ to $10^6$	0.03 to 0.3	Low frequency

radiolocation technique, the approach of enemy aircraft can be detected in daylight or darkness, their position accurately determined and both searchlight and guns can be trained and the latter fired without the enemy becoming aware that he was even under observation. During the past war, enemy battleships have been sunk in total darkness, and with no indication whatsoever of their presence other than that provided by the radio instruments on the attacking ship. Submarines have been located and approached by patrolling aircraft, and caught on the surface in complete surprise at night when, at the last moment, the approaching aeroplane switched on its searchlight. Finally, the devastation of important target areas in enemy-occupied Europe was accomplished by the attacking bomber force first finding the operational rendezvous by a radio navigational aid, and then by the use of advanced radar technique picking out the critical points of the target area selected for destruction. The entire operation could be carried out in total darkness or from above the cloud level with the same accuracy as if the flying had been at a low level on a bright sunny day.

These are some of the achievements of radiolocation or radar during the past years of war, and in this lecture I propose to trace the historical development

magnetic units. Maxwell also predicted the existence of waves similar to those of light, but differing in a characteristic, termed wavelength, which renders them invisible to the human eye; and some years later Heinrich Hertz, a German scientist discovered the existence of such waves and showed how they may be produced and detected. The results of these and other investigations have demonstrated the existence of various types of electric waves which are similar in many of their general characteristics and differ only in their wavelength as indicated in Table I.

Among the shortest of these waves are those of X-rays and ultra-violet rays, both of which are invisible to the eye, but which have distinctive properties used in medical treatment. As the wavelength is increased, we get the waves commonly known as light rays, which vary in their colour effects from the blue or short waves to the red or long waves. By increasing the wavelength, the waves are no longer detectable by the human eye, but they are still detectable by the human body as heat or "dark heat" radiation. If now the wavelength is increased considerably—millions of times—the waves are no longer detectable by any of the human senses, and we can only verify their existence and receive them by using other devices, such as a crystal detector or a valve as commonly employed in broadcast receivers. These relatively long electric waves are those used in wireless

\* A paper delivered to the Society on December 29th, 1945.

communication for sending messages by telegraphy or telephony, or for the transmission of broadcasting programmes.

### (b) What can be seen by the eye, and by a searchlight

It will now be appreciated that when we say that we can see something, we mean that the eyes can detect the arrival of waves of the appropriate length called light. This light may emanate directly from a source like the sun or an electric lamp, or it may be light reflected from obstacles such as furniture or the walls of a room. In either case it is essential that the object which is seen is being illuminated by a suitable source of light. Our eyes are thus able to detect the existence of a scene, indoor or outdoor, by the aid of light waves reflected from the different parts of the scene, and we are able to detect the detail by either the colour or intensity of the light returned to us from the different

used for many years both on land and at sea, to detect enemy ships, aircraft, guns and men, but it will be appreciated that the effect of these is only satisfactory in clear weather, and their range is considerably reduced in foggy or cloudy conditions. In favourable circumstances, however, the searchlight is a powerful piece of equipment and as depicted in Fig. 1, the source of light *S* when suitably directed on to its target *T*, such as an aircraft, enables an observer situated at *R* to determine the actual direction of the target, and to specify both its bearing relative to true north and its elevation above the horizontal. But this art, which is well-known and has been practised for a long time, suffers from one serious drawback; this simple combination of a searchlight and an observer does not enable the distance of the target to be determined. In order to understand how this gap in our knowledge may be filled, we must divert a little to consider how the speed of travel of light and radio waves has been determined.

### (c) The velocity of light waves

Nearly 100 years ago scientists were experimenting with various methods of measuring the speed at which light waves travel. The failure of some of the earlier experiments indicated that this speed was very high, and among the earliest successful workers in this field was a French physicist named Fizeau who, in 1849, carried out some classical measurements of the velocity of light waves. To make these measurements, Fizeau interrupted a beam of light in such a way that the time of transit of the waves between the source and a reflector and then back to the detector could be determined. A mechanical method of measuring the time of travel of the waves over a path three or four miles long was devised and found to be successful. At that time the distance between the source and the reflector was accurately measured and so the velocity of the waves was determined; but if, as is the case nowadays, we know the speed of travel of the waves, then the length of an unknown path with a reflector at the end of it, can be determined.

In an adaptation of this method, depicted in Fig. 2, light from a source *S* is transmitted to a target at *T* whence some of it is reflected back to a receiver or detector at *R*. In front of both *S* and *R* rotates a disc or wheel *W*, with an even number of apertures in it, so that the beam is alternately interrupted and allowed to pass. With the disc stationary the outgoing and incoming beams pass through their corresponding slots at opposite ends of a diameter. As the disc is rotated and its speed increased gradually, some of the light which has passed through the slot *A*<sub>1</sub> in front of *S* will be cut off, because by the time the light has traversed the path *A*<sub>1</sub>*T**A*<sub>2</sub>, the corresponding slot will have moved round through a small angle. As the rate of rotation of the disc is increased, a speed will be reached at which the returning light will be cut off by the portion of the disc between the slots. As the speed of the disc is further raised the light will again be

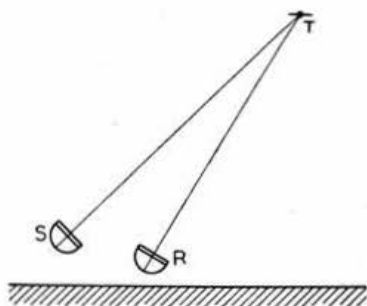


Fig. 1.

The searchlight *S* illuminates the target *T*, and some of the scattered light can be detected by the observer at *R*. The direction, both azimuth and elevation, of the target is thus determined, but not its distance or range.

parts of the field of view. We can determine the direction of the object looked at, since we can point in the direction in which we are looking and can relate this to the direction of the sun or to the magnetic north by reference to a compass. We can also make an estimate of the distance of the scene as a whole or of any particular object in it; but here individuals differ markedly in their skill at estimating the distance, and the human being has no means of measuring the distance of what he is looking at with any sort of accuracy or precision.

During the hours of darkness when there is no illumination from the sun to aid his vision, man has to employ artificial light in order to be able to see. This may be in the form of either general lighting as in a street or room, or he may employ a concentrated beam of light such as that given by a motor car headlamp to direct the illumination in a particular direction. In a similar way, searchlights have been

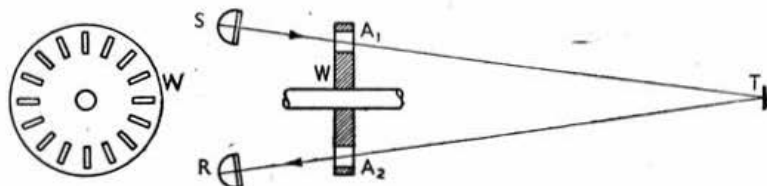


Fig. 2.

Adaptation of Fizeau's classical experiment to determine the speed of light. If the speed is known, the distance *A*<sub>1</sub>*T**A*<sub>2</sub> can be measured by the same technique.

perceived at R, since while the light is traversing the path  $A_1TA_2$ , the disc will have rotated through an angle equal to that separating the slots. Hence from an observation of the speed of the disc under these conditions, and assuming the velocity of the waves, the distance  $A_1T$  can be determined.

Measurements conducted in this way by Fizeau and Foucault nearly 100 years ago showed that the velocity of light in air was in the neighbourhood of 300,000 km./sec. (about 186,000 miles per second), and that the value was less in water than in air. When we come to a study of the precise value of the velocity of light, we can turn mainly to the work of Professor A. A. Michelson who, over a period of some 50 years conducted research in this subject in co-operation with various colleagues in the United States of America. Michelson used a rotating mirror to produce interrupted pulses of light waves which were caused to traverse a total path length of the order of 8-10 miles. Later measurements have been made by W. C. Anderson, R. A. Houston and others using a radio-frequency method of modulating the light waves, thereby enabling much shorter path lengths to be used. In all this work, the distance traversed by the light was obtained by reference to a carefully measured base line, and the time of transit was determined by reference to the frequency of a tuning fork or quartz crystal oscillator.

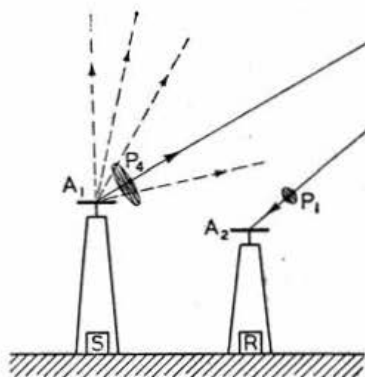


Fig. 3.

The use of pulses of radio waves  $P_1-P_4$  emitted at regular intervals to determine the distance of the target T from the sending and receiving aerials,  $A_1$ ,  $A_2$ , by measuring the time of travel of the pulses along the path  $A_1TA_2$ . In actual operation the pulse recurrence frequency is reduced so that only one pulse at a time is on the path  $A_1TA_2$ .

The best values of the velocity of light obtained from all these experiments give a mean figure of 299,775 km. sec. in vacuum; the modified value for light propagated through air under normal atmospheric conditions at sea level in this country is 299,670 km. sec. The uncertainty of these measurements is about  $\pm 15$  km./sec. or about 50 parts in a million.

When we come to the radio-frequency portion of the spectrum, the methods so far used for the direct determination of the velocity of the waves are much less accurate than this: and it may be stated that within the limits of the experimental accuracy so far attained, which is not better than one part in a thousand, the velocity of propagation of medium radio waves is about 299,000 km. sec. The experimental evidence so far available indicates that this value for the velocity is the same for all radio frequencies within the accuracy specified above. During the war, a good deal of indirect measurement

of the speed of radio waves through the lower atmosphere has been obtained, and we may look forward with interest to the results when these have been studied systematically and made available for publication.

#### (d) The measurement of distance and the principles of radiolocation

In the experimental investigations described above the two quantities actually measured were first, the distance from the source to the reflector and back to the observer, and second, the time of transit of the pulses of waves over this path. The ratio of these two quantities gives the speed with which the waves travel. It is clear, however, that once this speed is known for any particular condition, then a measurement of the time of travel of waves to a reflecting target and back will enable us to measure the distance of the target and

so to supply the value which was found to be missing in ordinary searchlight technique.

This in essence is the fundamental principle of radiolocation, which makes use of the longer electric waves in the radio frequency portion of the spectrum. A complete station consists of a combination of a sender and a receiver; and as depicted, in Fig. 3 the radiation from the sending aerial  $A_1$  is interrupted into short pulses of waves ( $P_1, P_2, P_3, P_4$ ) which travel outwards with the same velocity as light waves. After reflection from the target T, these pulses arrive at the receiving aerial  $A_2$ , where the time they have taken to make the round trip, sender-target-receiver, can be measured by electrical means using a cathode ray tube of the type used in television receivers. The simplest type of picture obtained on this tube is as shown in Fig. 4. When a pulse leaves the sender the spot of light leaves the point A and moves along the line OA tracing out a visible straight line. When the echo pulse returns from target T, the spot is deflected from this line, and so marks its time of arrival on the tube. A similar echo from another target T<sub>2</sub>, further away is also detected as shown. Since we know the velocity at which the pulse of waves travel, we can mark the base line OA in terms of the distance of the target from which the echo is received.

Modern radar technique uses beams of waves, which can be shone on to the target just like a searchlight beam; but the beam is invisible, and the only person who is aware of the beam being reflected from an aircraft, ship, or other target, is the one looking at the screen of the cathode ray tube at the end of the receiver. The vital point to understand is that not

only is the direction of the beam used to give the direction of the enemy target, but the distance of the target along the beam is also known, so that the range required for the training of a gun is determined. The manner in which this radio technique grew from an interesting scientific experiment into a practical military application is a fascinating story and is told in the next section.

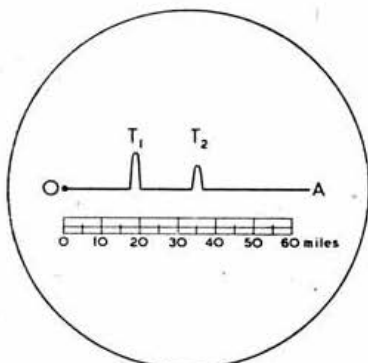


Fig. 4.

Type of echo display seen on screen of cathode-ray tube. The fluorescent spot sweeps along the time base OA in synchronism with the transmitted pulses. The received echoes from two targets are seen at a distance from O corresponding to the time taken for the pulses to travel to and from the targets  $T_1$  and  $T_2$ . The time-base can be provided with a range scale as shown.

### III. THE HISTORICAL DEVELOPMENT OF RADAR

#### (a) The use of radio waves for exploring the ionosphere

The first applications of radio waves for determining the distance of a reflecting surface, were devoted to demonstrating the existence of the Heaviside layer as a portion of the upper atmosphere, now known as the ionosphere, which is responsible for the transmission of waves around the earth. After many years of speculation with a variety of indirect experimental evidence, the first direct demonstration of the existence of the ionosphere as a reflecting region was provided by experiments made in this country by Dr. (now

Sir Edward) Appleton and Mr. M. A. F. Barnett during 1924 and 1925.

Shortly after the first of the above measurements were made, G. Breit and M. A. Tuve began some tests in the United States of America, using interrupted continuous waves or pulses of radio waves.

In the years following the dates mentioned above, a considerable amount of research work was devoted to the development and use of methods of determining the height of the reflecting layers of the ionosphere, using the pulse modulation and other methods. The principle of the method used in this technique is shown diagrammatically in Fig. 5.

The type of result obtained by the pulse method is shown in some records which are reproduced in Fig. 6 from a paper published in 1931, and are specimens of the actual records obtained by Appleton and Builder. The diagram shows first the ground wave pulses received without echoes, and then the presence of a single echo signal after reflection from the  $F_1$  layer. In this case the time interval can be measured in terms of the trace of an alternating current of frequency 1,110 cycles per second shown below the signal record. A very early photograph taken of the echo pattern on the cathode ray tube, shows the ground wave G and the F region echo delineated on a time base, which in this case corresponds to a period of about 12 milliseconds. This was probably the first published picture of what is seen on the screen of the cathode ray tube of a sending and receiving system used for determining range by measuring the time delay of the echo signal relative to that of the ground or direct path signal. The pulse-generating oscillator, and the cathode ray tube and time-base combination so described in 1931, formed the basis of the technique used some four years later in the first radiolocation experiments conducted in this country.

#### (b) Aeroplane altitude indicators

While scientific research on methods of exploring the ionosphere was being conducted on the lines described above, a corresponding technique was being developed concurrently and on very similar lines for the purpose of producing an instrument for indicating the height of an aircraft above the ground below it. For example, in 1928 a method was described in which waves are radiated towards the earth from a transmitter on the aircraft. A receiver also on the aircraft,

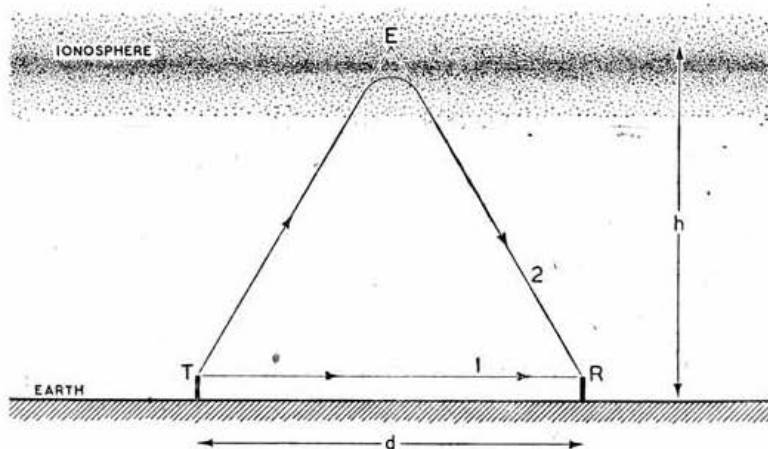


Fig. 5.

Principle of technique used in determining height of reflecting regions in the ionosphere. Two sets of waves, 1 and 2, reach the receiver R from the transmitter T, along TR and TER respectively. From the difference in time of arrival, the path difference of these sets of waves, and so the height of the region E, can be determined.



receives the waves after reflection from the ground and measures the time of travel of the waves to the ground and back again. This instrumental technique was later improved and culminated in a commercial pattern of terrain clearance indicator produced by the Bell Telephone Laboratories of America in 1938. The apparent delay in the successful production of this instrument was due to the fact that the heights in question are much smaller than those involved in ionospheric research, and that therefore the echo-time intervals to be measured are correspondingly less, e.g., 10 micro-seconds for about 5,000 ft.

### (c) Determination of distance by reflected waves

The above section described the use of methods of measuring the time delay in transit of reflected radio waves for determining the distance of large surfaces, such as the ground or ionosphere. In contemplating the possibilities of determining the distance of smaller objects such as ships or aircraft, consideration must be

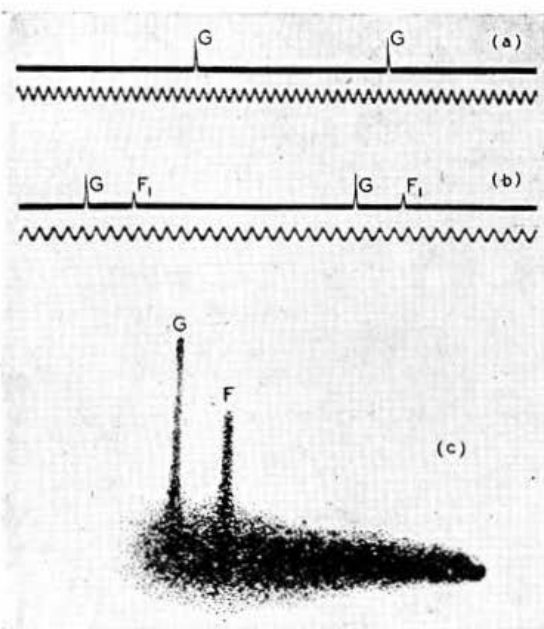


Fig. 6.

(a) Record showing ground pulses only, and timing oscillation of frequency 1,110 c/s. (b) Record showing ground pulses and echo received from F region about 3 milliseconds later. (c) Actual photograph of the ground wave and echo pattern as observed on the cathode-ray oscillograph screen. These records are reproduced from a paper by E. V. Appleton and G. Builder published in *Proc. Phys. Soc.*, 1932, Vol. 44, p. 82.

given to the reflecting properties of bodies which are not large and may even be smaller than the length of the waves used. With light waves, this question does not arise except in the case of detecting objects of microscopic dimensions, the length of the waves being of the order of a few hundred-thousandths of a centimetre: but, with radio waves the dimensions of the object from which reflection is desired may be comparable and even smaller than the wavelength used. Although the classical laws of reflection enunciated by Fresnel and verified experimentally in the case of optical phenomena, were equally applicable to the longer electric waves in the radio frequency portion of the spectrum, there was still lacking at the beginning of the 1930 decade, a satisfactory practical demonstration

that the reflection or scattering of radio waves from an object such as a ship or aircraft was of a sufficiently high order to be detectable.

For this reason, it is interesting and important to record that in December, 1931, the British Post Office observed the effects of reflection of waves from aeroplanes in the course of some radio communication tests being conducted on a wavelength of 5 metres over a path 12 miles long. Extracts from the station log show that on various occasions the received signal was subject to a variation and at all times when this occurred an aircraft was found to be flying in the neighbourhood at various distances up to  $2\frac{1}{2}$  miles and at heights up to 500 ft.

This experience was confirmed by further observations made in America in 1932 by engineers of the Bell Telephone Laboratories in the course of an investigation of the mode of propagation of radio waves of wavelengths about 5 metres. In 1933, it was found that when an aeroplane was flying overhead and approximately along the line joining transmitter and receiver, a noticeable flutter was produced in the signal from the receiver.

It was thus clearly established over 10 years ago, that radio waves reflected from aircraft in flight could be detected with suitable receiving equipment on the ground, and it now remained to be seen whether this principle could be applied to the development of a technique for the detection and location of aircraft at ranges and under conditions of practical utility as an aid to navigation in peace-time and as a defensive weapon in war. This important, and by no means easy, step was accomplished by Mr. (now Sir Robert) Watson Watt, who was at the time Superintendent of the Radio Department of the National Physical Laboratory, incorporating the Radio Research Station at Slough where the initial experiments in radio location in this country were conducted. Under the auspices of the Radio Research Board, the above Research Station had been responsible for a wide variety of investigation work on the propagation of waves, the study of atmospherics and of direction finding; and in the course of this work had developed those techniques which were required as a foundation upon which to develop radiolocation into a practical and worthwhile proposition. The first experiments carried out with high power pulse transmitters built at Slough together with suitable receivers and appropriate aerial systems, were designed to demonstrate the possibilities of range-finding by wave reflection from aircraft.

In the technique used for ionospheric measurements, where the height of the lower main reflecting region is about 100 km., the time of travel of a pulse of waves up and down again is about two-thirds of a millisecond, so that with a pulse length of the order of 100 micro-seconds, it is easy to distinguish between the ground or direct wave and that reflected from the ionosphere. For the detection of aircraft at appreciably smaller ranges, and also for the discrimination between aircraft at a reasonable distance apart, however, it was necessary to shorten the pulse to a few micro-seconds. This shortening, accompanied as it was by a large increase in power and the need for keeping the pulse of reasonably square shape, gave rise to many technical problems affecting to a major extent the design and layout of transmitters, and the development of special receivers of appropriately large band-width. In the present state of the art, pulse lengths of less than 1 micro-second have been attained; a time interval of 1  $\mu$ s. between an echo pulse and its originating direct pulse, or between two echoes, indicates a distance discrimination of 150 metres (about 165 yards).

#### (d) Direction finding (azimuth and elevation)

The earliest applications of radiolocation operated in the high frequency band between 6 and 30 Mc/s. (wavelengths 10 to 50 m.) with horizontally polarised transmissions, and the dimensions of the aerial system used, were such that these were necessarily of the fixed type. For the determination of the bearing or azimuth of the target, normal radio direction finding technique was applied, using a pair of crossed horizontal dipole aeriels connected through a radio-goniometer in the usual manner. This is in effect equivalent to a single rotating horizontal dipole which receives a minimum of signal when the dipole is in the direction of reception of horizontally polarised waves. Thus, by turning the search coil of the goniometer until the required echo signal as seen on the cathode ray tube decreases to a minimum or zero amplitude, the horizontal direction of arrival of the incoming signals can be determined. This system of direction finding is subject to what is termed polarisation error, in so far as it is liable to give false readings if the arriving waves contain some vertically polarised component, i.e., a portion of the electric field of the waves is in the vertical plane of incidence. Except in the case of high-flying aircraft at very short ranges, however, this polarisation error is likely to be small, since the angle which the arriving waves make with the horizontal plane is small.

It is necessary, however, to be able to measure this angle of elevation in order to be able to fix the position of the target. This operation of determining the angle of elevation of the arriving echo signals, or height finding as it is termed, was carried out on the frequencies referred to above by comparing the amplitude of the signals received on two horizontal aeriels at different heights above the ground. This technique had been developed long before the war and was used for studying the angle of arrival of radio waves transmitted through the ionosphere. The method involves a knowledge of the reflecting properties of the ground, which has to be reasonably level and horizontal in the neighbourhood of the receiving aerial system. In the case of mobile equipments operating on frequencies in the region of 60 Mc/s. (wavelength 5 m.), the site of the station was sometimes levelled by excavation, while in other cases, a wire netting screen, having dimensions of several times the wavelength, was erected to serve the dual purpose of a good conducting sheet and a horizontal reflecting surface.

In the case of the equipments using these higher frequencies the aerial system is sufficiently compact for it to be rotated with the van containing all the transmitting and receiving apparatus together with the operators. This facility made possible the use of a spaced horizontal aerial system for direction finding in the horizontal plane. Two horizontal dipoles spaced a wavelength or so apart are rotated about a symmetrical vertical axis. The aeriels are connected in opposition so that when the signal voltages induced in the two aeriels are exactly equal and cancel one another, the line containing the two aeriels is perpendicular to the direction of arrival of the incoming waves. A considerable improvement in the accuracy of indication of the bearing position is obtained by the use of this technique.

#### (e) Improvements due to the adoption of centimetre waves

Among the technical developments which revolutionised the whole art of radiolocation was that of centimetre-wave technique, in which valves, transmitters and receivers were all developed to a high state of operational efficiency on frequencies of 3,000 Mc/s. and above. At the corresponding wave-

lengths of 10 centimetres or less, a half-wave dipole aerial could be fitted at the focal point of a parabolic mirror of dimensions of one metre upwards, so that the resulting radiation is concentrated into a fairly narrow beam of a few degrees overall width. Such an aerial system could be turned at will in both azimuth and elevation, and when trained on the target by the aid of the echo pattern displayed on the oscillograph screen, the direction of the target was indicated directly on the scale settings of the mirrors containing the sending and receiving aeriels respectively. With the highly intensive research and development applied to this centimetre-wave technique during the war years, the art has progressed far beyond this simple conception of a radio wave searchlight. Equipment for producing a very narrow beam of radiation with means for scanning over a wide angle of view and for direction determination to a high degree of precision has become available for use on land, in ships and in aircraft; the story of this technical revolution in radio engineering science, and of its achievements during the war will be unfolded in time by all those in the research establishments, in industry and in the fighting services, who have been responsible for the outstanding successes achieved.

#### IV. CONCLUSION—AUDIOLOCATION

Brief reference was made in the introductory section to the use of sound waves for the location of objects, and it will perhaps be fitting to end this lecture by drawing attention to recent publications\* by Professor H. Hartridge and others of the results of some investigations into the manner whereby the bat finds its way about during flight. After much speculation in the past, it has now been established by direct experimental measurement that bats produce two different kinds of sound, one for locating and avoiding obstacles and the other for communication with other bats. For signalling purposes, a tone of frequency about 7,000 c.p.s. is used; while for audiolocation, as we may term it, a supersonic frequency in the range 30 to 70 kc/s. is used. This supersonic tone, which corresponds to a wavelength of sound in air of 1 cm. or less, is emitted in the form of pulses of duration about one-hundredth of a second, with a recurrence frequency which varies from 5 or 10 per second, while the bat is at rest, to 20, 30 and even 60 per second during flight. There is evidence that bats can detect obstacles at a distance of several metres, as well as quite close to them; and the pulse repetition rate increases as an obstacle is approached, and decreases again after this has been passed.

Both ears of the bat are used to give stereophonic reception, and the ears are provided with flaps to give directional gain in the forward direction. There are also grounds for suspecting that the ears are made insensitive during the radiation of the supersonic pulse.

Experiments conducted in a darkened room, showed that bats in normal flight could detect and avoid with complete success a thin wire or carpet thread stretched across the room; they could also find their way through a partially closed doorway even when the aperture was reduced to about 4 in. Further interesting observations were made from within a well-lighted room provided with a large plate-glass window, which was invisible to the bats outside. It was found that these creatures would fly directly towards the lighted window, the presence of which was detected at a distance of about 2 ft.; by folding up one wing, the bat would carry out a roll and turn manoeuvre, and so reverse its motion when within a few inches of the glass and after dropping a few feet fly away in safety. In the course of many observations of

\* *Nature*, 1945. Vol. 156 pp. 490 and 692.

this direct approach flight, there was never a collision with the glass window. Apart from using this application as an aid to flight and the avoidance of obstacles, the bat has adapted this sound location technique to feed itself; for it seems to be the practice for a bat to fly with its mouth wide open, so that by locating and homing on to flies and insects, these are easily caught and absorbed. This is a good example of the truth of the saying that "necessity is the mother of invention." It thus appears that what man has accomplished after many years of patient and intensive research into the possibilities of radiolocation, the bat has been practising for generations.

## SOLILOQUIES FROM THE SHACK

By UNCLE TOM

WE have gone back to the old familiar title, after a lapse of more than six years, because we have a shack again! And in our shack there are some watts, and when the licence arrives they will—we hope—start going out from it. So, the paper situation and the Editor permitting, you may count on some monthly rudery from your Uncle once again.

Before the war (this is for the young 'uns) your Uncle delivered monthly tirades against all and sundry who did silly things in the amateur bands. This will continue, as relentlessly as the Nuremberg Trials, as long as silly things continue.

Fortunately, our present bands are not so easy to snoop in; but wait till Forty comes back! Last month I gave a few Foundations of Good Operating. Now, before all the fone-hounds get busy again, let's say something on the subject of Fone Futility. If you aspire to belong to the Forty Fone Brigade when the band is opened, take note.

Fone Futility, as attacked in the past, comprises things like this:

(i) The use of synthetic American accents, and QSO's packed with "Wheel it away, bo," "Take it, pal," "How say, Doc," and the like. Most of these cretinous phrases have a good old English equivalent—for the love of Pete, use it!

(ii) Interspersing contacts with "Hi, hi!" "Dah-de-dah," and other strange noises which make the BCL's think we are a lot of excited children.

(iii) Pointless natter about abstruse technical matters which make it obvious that the talker hasn't a clue on the subject.

(iv) Use of horrific phrases like "Q R Morocco," "Q Esses Baltimore," and so on, when the words "Interference" and "Fading" would be easier to say and easier for the other man to hear.

(v) All sorts of brag about wonderful results when the quality of the transmission is obviously such that there's nothing to be proud of.

That's only a small guide to Fone Futility, but I promise you that there will be other kinds, which will be duly noted. I will award the Diploma of the Fraternity of Forty-Fone Futility to any deserving cases that I hear in the phuture.

Maybe you'll think it's a bit hard to have to read a ticking-off like this when you haven't done anything wrong, yet. But for the sake of the Spirit of Ham Radio—and for the comfort of all of us—let's start off right. If you're a CW enthusiast, or if you're a Fone-merchant, for Heaven's sake start your new Ham Life by being a good operator and then you won't have any harsh words from me or anyone else.

Once upon a time there was a First-Class Operator's Club, but it only boasted about 70 members and it was not officially sponsored by RSGB. This time I

### BIBLIOGRAPHY

1. *The Scientific Principles of Radiolocation*. Sir Edward Appleton, *Journal of the Institution of Electrical Engineers*, 1945, Vol. 92, Pt. I, pp. 340-353.
2. *Radar in War and in Peace*. Sir Robert Watson Watt, *Nature*, 1945, Vol. 156, pp. 319-324.
3. *Radiolocation*. R. L. Smith-Rose, *Wireless World*, 1945, Vol. 51, pp. 34-37 and 66-70.
4. *Radar Techniques*. Clinton B. Desoto, *QST*, 1945 April, May, June.
5. *The Radar Equation*. D. G. F., *Electronics*, 1945, April, pp. 92-94.

am hoping that we can arrive at some official status and grant some form of recognition to good operators—something that can be taken away from them if they transgress.

If we're all on the air by the time you read this, Be Warned. Your malevolent Uncle has quite a good receiver and lots of time!

### Television Comes to Life.

The transmission of a still pattern from the London Television Station at Alexandra Palace started on February 1. Transmissions are being made on weekdays from 11 a.m. to noon and from 4 p.m. to 5.30 p.m., and will consist of a tuning note and interval signal on the sound channel of 41.5 Mc/s. (7.23 metres) and a still pattern of a black cross on a white background on the vision channel of 45 Mc/s. (6.67 metres).

The choice of the still pattern which can be produced without the use of studio cameras and apparatus will allow the B.B.C. to continue the work of overhauling the studio vision apparatus at Alexandra Palace without interruption from the tests, and will at the same time provide a test signal which is most suitable for the use of the radio trade.

While these transmissions will be of no immediate interest to the general public, the B.B.C. is undertaking them in order to assist the radio trade in the production, testing and servicing of television receivers. The date of the opening of the public television service from Alexandra Palace will be announced later.

### Prisoners of War

With reference to the paragraph published in our last issue we are glad to announce that the following members have reported their safe arrival in Great Britain after being held captive by the Japanese:

- Mr. T. A. Dineen, VS2AK, now of West Lodge, Reigate Road, Epsom Downs, Surrey.  
Pte. A. Wales, BRS3644, of 36 Wright Place, Pathhead, Kirkcaldy, Fife, Scotland.  
Mr. R. P. Whyte, VS2AC, now of 1 Lansdowne Crescent Edinburgh, 12.

### G6ZY

Capt. Stanley C. Isaacs, G6ZY, who is now serving with Cyrenaica Area Signals at Benghazi, sends greetings to all old friends and in particular to ex-Station 53B personnel. He recently changed his name to Ingram.

## LONDON MEETING

A Meeting of the Society will be held  
on FRIDAY, MARCH 15th, 1946

at

The Institution of Electrical Engineers  
Savoy Place, Victoria Embankment, W.C.2

LECTURE

"Recent Advances in Frequency  
Measurement"

By Dr. L. Essen, B.Sc., A.M.I.E.E.  
(National Physical Laboratory)

Tea 5.30 p.m.

Commence 6.30 p.m.



# STATION DESIGN AND PLANNING

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

## PART III.—FREQUENCY MULTIPLICATION AND KEYING

**Q**UARTZ crystals can be manufactured with resonant frequencies up to about 30 Mc/s., but as the natural frequency of a crystal is a function of its thickness, such high frequency plates are very thin and fragile, both mechanically and electrically, and generally speaking it is not wise to use crystals having fundamental frequencies above about 7 Mc/s.

### Frequency Multiplication

In order, therefore, to enjoy crystal control on higher frequencies frequency multiplication must be resorted to.

Fortunately the pre-war amateur bands were allotted in harmonic sequence, *viz.* 1.7, 3.5, 7, 14, 28 and 56 Mc/s., and it is to be hoped that similar arrangements will ultimately be made in the new allocations.

Common practice was to employ one crystal working in the 1.7 Mc/s. band for fundamental operation, with a frequency-doubler (F.D.) to provide drive for a 3.5 Mc/s. P.A., and a further 7 Mc/s. crystal to control the transmitter on 7 Mc/s., and by using successive doubler stages, on 14, 28 and even 56 Mc/s.

On paper, a frequency multiplier circuit resembles a P.A., and the difference between the two is mainly confined to the different conditions under which the valve is operated.

It will be remembered that the Class C P.A. is operated with a high value of grid-bias so that anode current only flows when a positive R.F. voltage is applied to the grid.

In the F.D. the bias is increased still further, together with the R.F. drive, and the anode circuit tuned to a multiple of the drive frequency.

The resulting sharp pulses of anode current will excite the anode tank circuit into oscillation, but as the pulses will now occur every other cycle (in the case of an F.D.) the output will be lower than would be the case with a P.A. It will also be appreciated that the "flywheel" effect of the circuit will have to be adequate.

A frequency multiplication of three or four times is quite possible in one stage, but the power output is apt to be somewhat disappointing, and for "quadrupling," two doublers in cascade are usually employed.

The negative grid-bias for an F.D. is four or five times that required for the same valve used as a P.A., and the R.F. drive required is twice as great. Under optimum conditions the second harmonic output will then be about 50 per cent. of that to be expected from a P.A.

Any of the three types of valves may be used as frequency multipliers, but it should be noted that triodes do not require neutralising as their grid and anode circuits are tuned to different frequencies.

### Keying the Transmitter

Keying may be carried out in any stage by breaking the H.T. supply to the anode or to the cathode of the valve, and leaving H.T. applied to the other stages, but matters are best arranged so that when the key is up, no R.F. energy is generated anywhere in the transmitter. This is desirable as it is then possible to use "break-in" working (or "listening-through" as it is known in the Services).

By this is meant the ability to receive signals from the distant station as soon as the transmitting key is raised, a practice which is highly to be recommended as communication is far more speedy, the distant

operator being able to ask for repetition of words at the time they are missed, and not to have to wait until the end of the message. Should another station commence transmitting on the frequency in use, the operator who is using break-in will immediately be aware of the fact, and can stop transmitting and resume when the interference has ceased.

It will be appreciated that in order to fulfil these requirements, the oscillator must be keyed, and this brings in its train certain difficulties, all of which can, however, be overcome by care in design.

It is somewhat outside the scope of this article to go into all the possible methods of keying, but the following points arise:—

(1) Making and breaking the H.T. supply to the oscillator is apt to produce a chirpy note unless the H.T. voltage is well regulated and the oscillator itself is properly adjusted.

(2) The grid-bias for subsequent stages of the transmitter must be so arranged that it does not depend entirely upon R.F. excitation.

(3) The regulation of the power supply for the stages following the oscillator must be such that an excessive voltage rise does not take place under "no-load" conditions.

Provided that points 2 and 3 are taken care of, it has been the writer's experience that what is known as "grid-blocking" keying of the oscillator gives results superior to breaking the anode or screen supplies. This involves the application of sufficient negative voltage to the control grid of the oscillator, when the key is up, to prevent oscillation, the excess bias being removed when the key is pressed. Such a circuit is given in Fig. 7.

"B.B." is the blocking battery, and its voltage, depending on the valve being used, will be between 50 and 100 volts. Various values should be tried, the minimum which gives clean keying being chosen.  $R_1$  is the normal grid-leak, while  $R_2$  is present to prevent the battery being shorted when the key is depressed. It should be high enough to limit the current taken from B.B. to a few milliamps, and a value of 100,000 ohms will be found satisfactory.

It may be added that the author has employed this form of keying for controlling a variable frequency

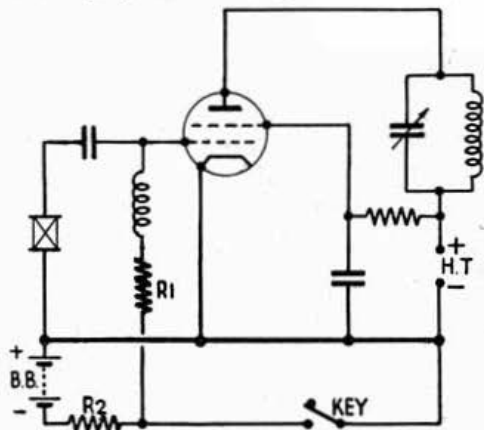


Fig. 7.  
The method of keying an oscillator by grid-blocking. For values of components see text.



oscillator on the 1.7 and 3.5 Mc/s. bands with complete satisfaction.

The sudden starting and stopping of a transmitter, as takes place during keying, tends to produce clicks in neighbouring receivers, even when these are tuned to frequencies well removed from that of the transmitter. Naturally, this is not calculated to enrage the average broadcast listener with the cause of Amateur Radio, and it is essential for the continued peace of mind of the amateur operator to make quite sure that he does not offend in this respect.

Full details of key-filters and their uses will be found in a section of the *Amateur Radio Handbook*.

### Summary

The newcomer is advised to start with a transmitter consisting of a crystal oscillator and a power amplifier (known among amateurs as a COPA) employing a tetrode or pentode as a C.O. and a neutralised triode as a P.A.

When experience has been gained with this arrangement, an attempt should be made to operate on the next higher frequency band (provided this is permitted by the terms of the licence), and for this purpose a further triode could be used as an F.D. Much experience will be gained in transmitter adjustment, coupling arrangements, grid-bias supply and keying with this layout, and incidentally many good "QSO's" (contacts) should be enjoyed.

At this stage, there is no object, from the experimental standpoint, in using more than a few watts to the P.A., although enthusiasm may dictate otherwise. Adjustments on a low power transmitter are similar to those on larger apparatus, and the cost of valves certainly goes up in proportion to their anode dissipation.

### New Year Honours List

The Sixth Supplement to the *London Gazette* of December 28, 1945, and dated January 9, 1946, announced that:

The King had been graciously pleased to approve the award of the British Empire Medal to:

Mr. Frederick John Henry Charman (G6CJ), Observer, Royal Observer Corps.  
Mr. Francis Woodhead Garnett (G6XL), Observer, Royal Observer Corps.  
Mr. William Jones (G6WOK), Observer, Royal Observer Corps.  
Mr. Howard John Long (G5LO), Observer, Royal Observer Corps.

Mrs. Olive Milne Katherine Henry Myler (G3GH), Observer, Royal Observer Corps.

Mr. Sydney Lloyd Robinson (BRS4951), Engineer, Masteradio Ltd.

Mr. John Nelson Smith (G15QX), Observer, Royal Observer Corps.

Mr. Herbert Wilson Stacey (G6CX), Observer, Royal Observer Corps.

Sgt. D. P. M. Urquhart (G4DR), Royal Signals.  
We offer our warm congratulations to them all. Their honour has been well deserved.

### Edgware Society

The name of the above Society has been changed from Edgware Short Wave Society to Edgware and District Radio Society, and meetings are in future to be held every Thursday at 7.30 p.m. at the Constitutional Club, Edgware.

At the Ninth Annual General Meeting the following were elected to office for the current year:

President, Mr. L. Gregory, G2AI; Vice-President, Mr. E. R. Radford, G2IM; Chairman, Mr. F. A. Thorogood, G4KD; Hon. Treasurer, Mr. W. Pope, G3HT; Hon. Secretary, Mr. P. Modridge, G6PM; Experimental Section Manager, Mr. F. Anderson, G2QY; Journal Editor, Mr. R. Filkin.

A Victory Dance will be held at the Constitutional Club on Saturday, March 2, when Ft./Lt. Ted Fowler, VE5VO (now D2VO), will be the guest of the evening. Tickets 2s. 6d. each.

### Stockport Amateur Short-Wave Radio Society

A cordial invitation is extended to local R.S.G.B. members to join the above Society which was formed on December 14 last. Meetings are held on Monday evenings at the Textile Hall, Chestergate, Stockport, from 7.45 p.m. onwards. General discussions take place on the 1st and 3rd Mondays and lectures on the 2nd and 4th Mondays of each month.

Further details can be obtained from the Acting Chairman, Mr. G. Wood, BRS11,306, 121 Garners Lane, Stockport.

When it is felt that a firm grasp has been gained on the essentials of tuning and operating the transmitter, a more permanent and ambitious design will doubtless be attempted, and purely as a suggestion, the following layout is put forward.

**1st Stage.** Tetrode or pentode C.O. capable of being used as C.O./F.D.

**2nd Stage.** Tetrode or pentode working as either an amplifier or as a doubler.

**3rd Stage.** Neutralised triode P.A.

It will be seen that three frequencies are available from any one crystal, while, using suitable valves, ample drive should be available for any triode taking an input of 25 watts.

Different aerial coupling arrangements will almost certainly form part of future experiments, but discussion of these circuits will not be undertaken here as they can more easily be dealt with under the subject of aerials.

No one realises better than the writer that much has been left unsaid on the subject of transmitters in these three brief articles. Modulation has not been dealt with at all because the beginner should first make quite sure that he can put out a satisfactory C.W. signal before attempting the more difficult feat of transmitting telephony. Modulation is a big subject, and it is hoped to devote an article to it at a later date.

The last remark applies equally well to specialised H.T. and grid-bias supplies, but for the low powered transmitter, dry H.T. batteries will be found satisfactory for grid-bias, and receiver practice may be followed for the supply of H.T. from the mains.

(To be continued)

### Stourbridge and Dudley Radio Society

Mr. D. Rock, G8PR, "Sandhurst," Vicarage Road, Ambleside, Stourbridge, Wores., proposes to reform the above Society, and invites all members living in or around Stourbridge and Dudley to communicate with him. He hopes to convene a meeting at an early date.

### Romford Radio Society

Appropos the notice published in our last issue, Mr. R. Beardow, G3FT, informs us that meetings of the above Society are held at 8 p.m. on Tuesday evenings (not Thursdays) at the Y.M.C.A. Red Triangle Club, Western Road, Romford.

### Radio Club in Dum Dum

A.C. Owen, W.R.1877976, Radar Section, 52 Squadron, R.A.F. S.E.A.A.F. has recently formed a Radio Club in Dum Dum, near Calcutta. Members serving in that area are cordially invited to contact Mr. Owen.

### Reseau Belge

The first post-war General Meeting of Reseau Belge will be held at the Café de L'Horloge, Porte de Namur, Brussels, on Sunday, March 3, 1946, at 2 p.m.

R.S.G.B. members located in Belgium are cordially invited to attend the meeting.

### Can you Help?

Mr. F. H. Watts, G5BM, Berrivale, Arle Drive, Cheltenham, asks whether any member can inform him of the correct type of paste to use for cementing a loose valve anode cap. None of the cements so far tried will stand the heat developed by the valve.

### OUR FRONT COVER

NOTHING much of real experimental worth in radio can be accomplished without accurate measurement. The Model 7 Universal AvoMeter is a 50-range B.S. first-grade combination measuring instrument giving direct readings of A.C. and D.C. Voltage, A.C. and D.C. current, Resistance and Capacity. Audio-frequency power output and Power Level readings are also provided for. It is but one of the comprehensive range of "AVO" high-grade electrical measuring instruments—a range which includes something to meet the needs of every amateur, service engineer and serious experimenter. Fuller particulars obtainable from The Automatic Coil Winder & Electrical Equipment Co., Ltd., Winder House, Douglas Street, S.W.1.

# A RADIO AMATEUR VISITS THE PHYSICAL SOCIETY EXHIBITION

By JOHN R. FENNESSY (G5ZI).

THE 30th Annual Exhibition of the Physical Society held at the Imperial College, South Kensington, London, was opened on January 1 by Sir Stafford Cripps (President of the Board of Trade).

Although the war has been over for only a comparatively short time and many war-time difficulties and restrictions remain, manufacturers have applied themselves diligently to the task of producing electronic equipment for peace-time use. The enormous strides made in the design and application of equipment, particularly for Radar and V.H.F. telecommunication during the war, and contributed to not a little by the radio amateur himself, is seen in these products. Clearly the general trend is one of using even higher frequencies and in turn making everything "lower loss." Exhibits of equipment working on centimetric wave lengths were outstanding.

Enormous progress has been made in the development of thermionic and wave guide equipment.

The *National Physical Laboratory* demonstrated an ingenious analogy of Radiolocation employing an amplifier and loud speaker as a transmitter. This arrangement produced  $12\frac{1}{2}$  pulses per second and echoes were displayed on a cathode ray tube representing reflective features of the room.

Equipment for measuring impedance at frequencies of between 200 and 600 Mc/s., a precision cavity resonator wave-meter covering 500 to 10,000 Mc/s., and a wide range heterodyne frequency meter covering 100 to 10,000 Mc/s. were also shown.

The *General Electric Co. Ltd.*, were showing a pulse-width modulation telephony system using ultra-high signal frequencies and capable of multi-channel operation over long visual distances and with comparatively low input powers.

Of particular interest to the amateur was the *Salford Instrument Company's* "Miniscope," a really miniature cathode-ray oscilloscope. This firm also showed quartz crystals of various cuts in improved plastic mountings.

*B.T.H. Research Laboratories* displayed a most interesting range of Klystrons and Magnetrons. Also on show were oscillators and wave meters using the "Butterfly" circuit for centimetre wave-lengths, a feature being that the equipment used a standard split-stator type of condenser.

*British Insulated Cables Ltd.*, displayed a wide variety of high frequency cables, moulded high frequency connectors and wave guides including a new 3 centimetre flexible wave guide of ingenious design. In collaboration with *Nash & Thompson, Ltd.*, they were showing an equipment for the measurement of 3 centimetre wave-guide characteristics. Losses due to absorption, and reflection in wave guides under test could be clearly demonstrated.

A range of the famous "Telcon" H.F. cables were shown by the *Telegraph Construction & Manufacturing Co. Ltd.* (all of them employing "Telcothene" as the dielectric) together with excellent "Telcothene" mouldings for a variety of radio purposes where good mechanical and water resistant characteristics are called for.

In addition to the familiar "Avo" there were newcomers to the range, a multi-range electronic test meter having 47 ranges and encompassing such diverse measurements as voltage at 200 Mc/s., capacity up to 50 $\mu$ F. and D.C. volts to 10,000.

*British Physical Laboratories* were exhibiting a

range of test equipment and "Quadrant" Meters, one of which had a 25 micro-ampere movement with a resistance of 1,200 ohms. A popular scale, reading 0-1 milli-amp. is supplied in a  $3\frac{1}{2}$  in. rectangular case with illuminated scale. An ideal "foundation" unit for those building measuring equipment.

For those who prefer to acquire a test set complete *Ernest Turner Electrical Instruments* have produced their model 458 with ranges up to 1,000 volts A.C. and D.C. and ohms scale, a feature being the employment of wire-wound resistors throughout.

An excellent range of test equipment was also shown by *Lealand Instruments*, including a "Ferris" V.H.F. Signal Generator covering 20 to 250 Mc/s. and a "Boonton" frequency modulated Signal Generator covering 41 to 150 megacycles with a maximum F.M. deviation of 125 kc/s.

*Standard Telephones & Cables Ltd.* had among their smaller-size exhibits many items of absorbing interest to the visitor. A range of miniature Selenium Rectifiers (in appearance somewhat resembling small mica condensers) have been produced for general circuit use and for incorporation in Meter Rectifiers. A range of high-voltage low-current tubular capacitors, which would make an ideal trouble-free source of H.T. positive for the post war oscilloscope, were also on view. These rectifiers, similar to a lead pencil in size and shape will fill a long felt need in this field.

The S.T.C. "Thermistor" is a resistance with a negative temperature coefficient. This characteristic can be made use of in a wide variety of ways, and immediate uses will occur to almost every radio engineer and amateur. An interesting feature of this component is that under certain circumstances the "Thermistor" can be made to display negative resistance characteristics. A variety of types were shown.

The "Grounded Grid" Triode designed for use at 600 megacycles employing a fairly simple tuning arrangement was shown for the first time.

*Labgear* of Cambridge were showing a range of racks for equipment. These are made from channel iron material and are provided with suitable brackets for holding units. The racks which are ingeniously footed to prevent overbalance are made to take a 19 in. standard panel and are obtainable in heights varying from 47 in. to 83 in.

## WEST MIDLANDS PROVINCIAL DISTRICT MEETING

to be held at

THE IMPERIAL HOTEL, BIRMINGHAM

on

SUNDAY, 24th MARCH, 1946

### PROGRAMME:

11 a.m. Lecture: "Aerial Systems for the Radio Amateur" and Demonstration with Scale Models, arranged by Mr. F. Charman, B.E.M. (G6CJ).

1 p.m. Lunch.

2.30 p.m. Business Meeting. (The President, Council, District Representatives and Headquarters Staff will be in attendance.)

4.15 p.m. Tea.

5.30 p.m. Station Visits.

Inclusive charge: 8s. 6d.

Reservations to Mr. V. M. Desmond, G5VM, 90 Worcester Street, Birmingham 5, by not later than March 17, 1946.

# THE MONTH ON THE AIR

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

**W**ELL, chaps, here it is! Each day that dawns is the great day for someone, as licences slowly trickle back. The methods by which they are being returned are certainly rather different from those by which they were withdrawn! Still it is something to be able to work a few locals on ten and five. There is always the chance that you may work a bit of DX like all the pirates on twenty and forty do. Talking of DX, the honour of working the first overseas contact goes, we believe, to Bert Allen, G8IG, of Bromley, Kent, for his QSO with LA8C. Jim Kirk, G6ZO/I has also made several G contacts on 28 Mc/s. including one with a fellow North Londoner, Bill Bridgen, G6WU. Several W contacts have been made but the band is, to all intents and purposes, dead, except for inter-G QSO's up to about 25 miles. (See Stop Press.—We spoke too soon.—A.O.M.)

This year 28 Mc/s. is behaving very much as it did in 1936 and if all goes well, it should open up with a flourish next summer for a period of exceptional conditions over the next few years.

G6ZO/I, ex-XAZO, who is in Caserta, Italy, says the South Africans are roaring in there. He is on the band each day from 1200–1300 and 1530–1700 G.M.T. The C.M.F. boys are now licenced for the same frequencies as ourselves. Power is nominal 25 watts to the aerial and there are no restrictions on operating time or contacts. XA calls continue but those who wish may use their G calls/I.

Ken Ellis, ex-SU5KW, and now SUIKE, says Egyptian amateurs are shortly being licenced for ten and five. He also says he is trying to get JCKW moved to the 49 metre band! (More power to your elbow, Ken.—Ed.)

An interesting story comes from ZD4AC, ex-G2QL, at present on leave in this country.

On September 1, 1945, the Gold Coast P.M.G. issued licences to five amateurs ZD4AA–4AF/AG and several of them duly appeared on the amateur bands; ZD4AG operating from the U.S. airport. On November 20 official action from London caused these licences to be withdrawn and in future ZD4 licences will follow the policy adopted in Great Britain. ZD4AC's address is H. J. Clements, P.O. Box 555, Accra, Gold Coast. He will be pleased to handle cards for the area.

PA0UB tells us that the PA's hope soon to be on 28 and 58.5 Mc/s. with 100 watts.

Apropos the Newfoundland position, VO1G was heard recently on 14 Mc/s. telling G7AA that "as for official status hi! hi! Just got the urge to work hams." So VO's are not licenced for 14 Mc/s.!

## Notes and News

Some interesting DX notes come from G5BM, viz. on January 15 C07AQ, 7060; XE3WT, 7118; LU1AB, 7095; 18th OQ5BL, 14105; 22nd XE1AA, 14090; and W8BGV/4, W5IRO and VO1H all on 28 Mc/s. between 1450 and 1615 G.M.T.

2FWA reports some queer ones on 7 Mc/s.—G9AAK in Yorkshire and Z1BIBL.

BRS11,160 has heard OY3L, who gives his QRA as Faroes.

BRS7594 heard X2OT on 7 Mc/s. say he is G3US, but we do not know if this is true or where he is located. W9SHG is U.S. Navy in Tasmania, heard on 14 Mc/s. working W2LOP in Okinawa.

BRS10,772 on "H.M.S. Loch Achray" says O4AP gave his QRA as Calcutta. Someone else gives it as Suez.

BRS9209, on Cape Verde, says the possibility of

being licenced is very remote, apart from the prohibitive price of gear. Have a try O.M., we would be pleased to hear a CR4 again!

BRS2317 records excellent reception of medium wave American broadcast stations during December. His list includes WKBW Buffalo, WTAW Texas, and WTTIC Hartford.

2AAN of Harrogate has heard G1AB on 7 Mc/s., G7BA on 3.5 Mc/s., G7OM, G5XX, G7XX and G5GL on 14 Mc/s. We think this last one must be a pirate!

BRS10609 gives us a queer one, DAAF on 12 Mc/s. working HB9DB, and 2FJM has a few more on 7 Mc/s., viz. G8BB, G2DF, 2ACG, GX5IT, PC3VS, WX1F and KIAA.

Even our worthy Secretary is not immune. He was recently informed by the War Office that his call sign was being pirated on 7 Mc/s. . . . and they sent him a QSL to celebrate the event!

LI6ZY, better known as G6ZY, is active in Benghazi on 14 Mc/s. G4RX, just back from M.E.F. was working as SA, ST and SU4RX and confirms that EP5SO is operated by G5UG. He tells us that YI6JS is operated by BRS8391 and is near Basra. VS7QB is 2HKK, VS7PS is G8NV, LI3JU is G3JU near Tripoli, and SV1FS was operated jointly by G6SX and 2BFA. All the above information was volunteered over the air says G4RX.

ZB1VN, who it will be remembered promised to be active (see last month's notes) duly appeared. He is W9VND on board "S.S. Walter L. Fleming"; has been on also as FA8VN and will, by now be on his way home operating either under his own call or CT2VN.

PA0UB, mentioned earlier, hopes soon to be active on 28 Mc/s. with 100 watts. He sends 73 to all old friends. His home and business were extensively damaged by both German and Allied bombing but he is getting over his troubles now.

2CNN sends us another list of 14 Mc/s. DX but really it does not seem fair to publish it! Suffice to say that the "Military traffic" must have good receivers! 'CNN comments on the predominance of Italian spitch on the bands. We wonder who would be pinched by the Authorities first if as many G's were active on this, as yet unlicensed, band?

On January 13 G4MR heard F8JW on 28 Mc/s., on January 19 both G6ZO/I and G3YM/I and on the 20th W4BZA/4.

In answer to our 28 Mc/s. question last month, BRS1151 heard W3—G at 82 on December 23, BRS3003 logged W3NA and W3JLV on December 17, W8UUG on December 18 and W8NU on the 24th, all around 1530 G.M.T.

## Claims

G6QB claims to have made the first post-war transatlantic contact on January 26 at 1420 G.M.T.

G6CL claims first with Newfoundland (VO2KJ, R.C.A.F. Gander) on February 1 at 1445 G.M.T.

G8IG claims first with Cocos Island (G6CU/ZC2) on January 26, frequency about 28550. Full QRA, Ft./Sgt. R. M. Evans, 1154640, 366 A.M.E.S., R.A.F., Cocos Island, Ceylon Air Forces, G8IG, heard him again at 1320 G.M.T. on January 27. Nice work! (Since then he has been worked by G2MI, 6CL and others.)

## A Warning

And now a warning! Mr. Nicol of Elgin, who does not quote his BRS number, has logged VE3AYE calling VE3AZC at 1609 G.M.T. CQ de W2ODS at 1618 G.M.T., CQ de W2HYF at 1640 and W2KPV de W2HYF at 1646, all on January 13.

\* 29 Keehill Gardens, Hayes, Bromley, Kent.



Nothing very remarkable in that you say? Ah! but there was! They were on the 21 Mc/s. band! Let us take heed and not despise the humble absorption wavemeter before we land in trouble.—Wise words which we heartily endorse.

#### He's lost his QRA—Poor Fellow!

Talking of being in places where we are not wanted, could not someone pirate the call sign QRA, work MCE who has been calling him on 14120 kc/s. for the past few weeks and put the poor chap's mind at rest? Better still, could not someone in authority move said interloper as a start to clearing the band? We cannot see that idling on QRA de MCE hour after hour can be classed as "overriding military necessity." It looks more like an attempt to stake a claim to that frequency.

#### Books Wanted

A letter comes from YL2KX who, it will be remembered was the Latvian QSL Manager before the war. He is at present a "displaced person" in the British area of Germany and asks for Radio books and periodicals. Perhaps some of you would like to help a ham who has had a very tough time. He has lost everything he ever possessed. His address is Alfred J. Karklin, 1225/A Camp, 1225 D.P. Assembly Centre, 800 Control Unit, B.A.O.R.

#### News from Austria

Word comes from OE1ER that the Austrian Society O.V.S.V. is again active.

#### In a Lighter Vein

This is from VU7BR in Bahrain. He says: "I have read THE BULLETIN articles for the beginner with interest. Yesterday I got some mail from England and one letter was from an AA man with a QSL card, mentioning a contact I had made with someone on August 26, 1939. I was quite flattered until I opened the October BULLETIN which came by the same mail with a picture of one of my cards confirming a contact on August 26, 1939. Our enterprising friend had obviously not taken to heart the remarks about useless listener reports, but had gone a step further and sent me a card on the strength of the photo in THE BULL!" Talk about casting one's bread on the waters!

#### Tail-piece

The writer of these notes would like to take this opportunity of thanking his many ham friends who made kind inquiries during his recent illness, especially those who came to see him in hospital. I am glad to say that the now famous thumb is doing well, thanks to the expert care and attention given to it in the Bromley and District Hospital.

Incidentally, I never realised what a boon the B.B.C. programmes can be to those who have to spend long weary hours in a hospital bed, nor how woefully short the hospitals are of headphones in these days of double the number of beds to the ward. If I had not taken my own pair along, I should not have been able to listen. Now, fellows in District 16 can you help? If these monthly notes please you how would you like to show that you are glad your old Uncle still has a right hand with which to pen them? Perhaps a few of you outside the District might like to join in. After all, Bromley Hospital is very conveniently situated on one of the main motor roads out of London and... well you never know do you?

In short, there must be hundreds of pairs of seldom if ever used headphones around the shacks of Britain. How about sending them along to me. I will see that they are duly presented as a gift from members of the Society. If Bromley's needs are exceeded, steps will be taken to see that other hospitals get the surplus. 4000 ohms and in usable condition please. How about it? I thank you.

#### Stop Press

Our dreams have come true and 28 Mc/s. has opened with a vengeance. The biggest sun spot ever certainly did its stuff during the afternoon of February 3, when hundreds of G-W and a few G-VE, contacts were established. An intimation of good things to come was given in the morning when KAIRO was heard at S6 with some QSB. At about 1400 G.M.T. the band burst wide open for North America and remained usable until 1800 G.M.T. The G 'phones appeared to be breaking through what must have been colossal QRM. Truly the biggest day since our licences came back. May the spot stay put!

#### FORTHCOMING EVENTS

- |         |  |         |  |
|---------|--|---------|--|
| Feb. 15 | London Meeting, 6.30 p.m. at the Institution of Electrical Engineers.  | Feb. 24 | District 12 (North London), 3 p.m. at 2DHF, 22 Bramford Court, Southgate, 500 yards south of Southgate Tube Station on the 29 bus route. |
| Feb. 15 | District 2, 7 p.m. at 22 Market Street, Barneley.  | Feb. 26 | District 14 (Chelmsford), 7 p.m. at 184 Moulsham Street.   |
| Feb. 15 | District 14 (Chelmsford), 7 p.m. at 184 Moulsham Street.   | Feb. 27 | District 2 (Torquay), 6.30 p.m. at Y.M.C.A., Castle Road.  |
| Feb. 16 | District 6 (Torquay), 6.30 p.m. at Y.M.C.A., Castle Road.  | Feb. 27 | District 2 (Sheffield), 8 p.m. at the "Dog and Partridge," Trippett Lane.  |
| Feb. 17 | District 12 (Enfield), 3 p.m. at G5VY, 48 Willow Road, and at G8SK, 15 Rotherfield Road, Enfield Wash (turning out of Ordnance Road.)        | Feb. 27 | Scotland "A" Area, 7 p.m. in the Institute of Engineers and Shipbuilders, 39 Elmbank Crescent, Glasgow.                                  |
| Feb. 17 | District 14 (Chingford), 4 p.m. at A.T.C. H.Q., Pretoria Road, E.4.  | Mar. 1  | District 2 (Barnsley), 7 p.m. at 22 Market Street.   |
| Feb. 17 | Scotland "G" Area, 2.30 p.m. in King's Hotel, Galashiels.  | Mar. 1  | District 15 (Hounslow), 7 p.m. at The Scouts Hall, Sutton Estate, Great West Road, (30 yards east of Vicarage Farm Road.)                |
| Feb. 21 | District 15 (West London), 7 p.m. at A.E.U. Room, 66 High Road, Chiswick, W.4. Lecture by Mr. Maenamaro on "Radar."                          | Mar. 3  | Districts 7 and 13. Combined meeting, 3 p.m. at the Y.M.C.A., North End, West Croydon.   |
| Feb. 21 | Scotland "D" Area, 7.30 p.m. in Chamber of Commerce Rooms, 25 Charlotte Street, Edinburgh.   | Mar. 9  | District 7 (Reading), 6.30 p.m. at Palmer Hall, West Street.   |
| Feb. 22 | District 15 (Twickenham), 7 p.m. at 23 Warfield Road, Hampton, Middlesex.  | Mar. 9  | District 15 (Ashford), 6.30 p.m. at "Digswell," The Avenue, Sunbury-on-Thames, Middlesex.  |
| Feb. 22 | District 8 (Cambridge), 7 p.m. at "The Jolly Waterman," Chesterton Road.   | Mar. 10 | District 15 (West London), 5.30 p.m. at 51 Rushall Avenue, Chiswick, W.4.  |
| Feb. 23 | District 1 (Liverpool), 2.30 p.m. at Stork Hotel, Lecture on "Condenser and Dielectrics" by Mr. C. Rhodes. Elementary talks and discussions. | Mar. 13 | District 1 (Liverpool), 6.30 p.m. at Stork Hotel, Discussion Group, "Month on the Air," etc.   |
| Feb. 23 | District 7 (Reading), 6.30 p.m. at Palmer Hall, West Street.   | Mar. 15 | London Meeting, 6.30 p.m. at the Institution of Electrical Engineers.  |
| Feb. 24 | District 4 (Derby), 2.30 p.m. at G2OU, 43 Kenilworth Avenue.   | Mar. 15 | District 2 (Barnsley), 7 p.m. at 22 Market Street.   |
| Feb. 24 | District 7 (Guildford), 3 p.m. at The Cafe, The Cinema, Woodbridge Road.   | Mar. 16 | District 6 (Torquay), 6.30 p.m. at Y.M.C.A., Castle Road.  |
|         |  | Mar. 17 | District 13 (S. Eastern Area) 3 p.m. at 63 Erlanger Road, New Cross Gate.  |

*A cordial invitation is extended to Society members to attend any of the above meetings.*



## HEADQUARTERS CALLING

## COUNCIL 1946

## President:

ERNEST LETT GARDINER, B.Sc., G6GR.

Executive Vice-President: S. K. Lewer, B.Sc., G6LJ.

Honorary Secretary: H. A. M. Clark, B.Sc. (Eng.), G6OT.

Honorary Treasurer: A. J. H. Watson, F.S.A.A., G2YD.

Honorary Editor: Arthur O. Milne, G2MI.

Immediate Past President: A. D. Gay, G6NF.

Members: P. C. G. Bradley, G8KZ, C. H. L. Edwards, G8TL, R. H. Hammons, G2IG, F. G. Hoare, G2DP,

S. E. Langley, G3ST, Capt. J. W. Mathews, G6LL,

K. Morton Evans, O.B.E., GW5KJ.

G.P.O. Liaison Officer: Arthur E. Watts, G6UN.

General Secretary: John Clarricoats, G6CL.

## December Council Meeting

*Resume of the Minutes of a Meeting of the Council of the Inc. Radio Society of Great Britain, held at New Ruskin House, Little Russell Street, London, W.C.1, on Monday, December 17, 1945, at 5.30 p.m.*

*Present.*—The President (Mr. E. L. Gardiner in the Chair), Messrs. S. K. Lewer, A. D. Gay, H. A. M. Clark, A. J. H. Watson, A. E. Watts, F. Charman, D. N. Corfield, K. Morton Evans, F. G. Hoare, S. E. Langley, E. H. Laister, W. E. Russell and John Clarricoats (General Secretary).

*Apology.*—The General Secretary presented an apology for the absence, due to indisposition, of Mr. A. O. Milne.

1. It was resolved to elect 307 Corporate Members, 21 Associates, 12 Junior Associates and 1 Junior Associate to Corporate Membership. Total elected 341.

2. It was resolved to grant affiliation to the Reading and District Radio Amateurs' Club, the T.R.E. Amateur Radio Society, the R.A.F. Cottesmore Amateur Radio Society, and the Admiralty (Bath) Electronics Society.

3. It was resolved to accept and adopt the monthly Receipts and Payments Account.

4. It was agreed to renew the lease of Headquarters for a further period of four years as from June, 1946.

5. It was reported that Ft./Lt. J. Oswald Dykes, 2AIJ, had agreed to act as organiser of the Radio Remote Control of Models Group. His appointment was confirmed.

6. Reference was made to the prolonged and difficult negotiations which had taken place recently in connection with the reissue of licences. Council expressed its warm appreciations to Mr. Arthur Watts for his invaluable assistance to the Society in this connection.

It was reported that the Society's representatives had suggested to the G.P.O. that the receipt for a licence fee should have the effect of a temporary licence, but the G.P.O. could not agree. A further suggestion that the P.M.G. should be asked to make a broadcast announcement regarding the reissue of amateur licences was also rejected by the G.P.O.

7. Mr. Watts read the draft of a letter which he proposed to send to Col. Sir Stanley Angwin regarding a proposal made by the Telecommunications Branch that 10-watt licences should continue to be issued. Mr. Watts contended, and Council agreed, that the 10-watt licence had been superseded by the Class A (25-watt licence).

8. Attention was drawn to the fact that radio-controlled meteorological balloons had been heard working in the 28-29Mc/s. band. It was agreed to institute inquiries.

9. Mr. Hoare asked for an assurance that the band 58.5-60 Mc/s. would continue to remain an amateur allocation for some time to come. He pointed out that amateurs could not be expected to purchase special crystals for use in this band, unless they are assured that it will remain open to them for a reasonably long period. It was agreed to solicit information on this point from the G.P.O.

10. It was reported that it had originally been the view of the Wireless Telegraphy Board that amateur licences should be reissued on the basis of 5 watts input only. As a result of a meeting with the W.T. Board the decisions recorded in the December BULLETIN were reached.

11. The Secretary reported that Mr. Watson and himself had recently had an opportunity of meeting Mr. James Hunter GM6ZY (Hon. Scottish Records Officer) and had discussed with him matters relating to Scottish Representation. As a result of the discussion Mr. Hunter had agreed that in future Scottish District Officers (who are elected by local members) shall be known as Area Representatives. Council approved this proposal and agreed to confirm the appointment of Mr. Hunter as Honorary Scottish Records Officer with the status of District Representative. Council also agreed that Mr. Hunter should be asked to invite two

of the Area Representatives to accompany him to the forthcoming D.R.'s Conference.

12. It was reported that arrangements had been made for a meeting to be held on January 19, 1946, to discuss the future of the Experimental Section. Invitations had been extended to the Experimental Section Manager and other prominent members of the Section.

13. It was reported that arrangements had been made for the D.R.'s Conference to take place at the Imperial Hotel, Birmingham, on Saturday, March 23, 1946. A draft letter and Agenda were approved.

14. It was reported that as the result of discussions which had taken place between the Secretary and the Director of Signals, Air Ministry, approval had been received for parties of members to visit R.A.F. schools and stations. The draft of a notice outlining the conditions governing such visits was read and approved for publication.

15. The Secretary reported upon recent discussions which he had had with the M.A.P. Contracts Branch and Mr. Brown of the Radio Industry Council. The M.A.P. had expressed their willingness to operate a scheme whereby accredited Society Representatives (e.g. D.R.'s) would purchase bulk quantities of specialised surplus radio equipment for sale direct to local members. The M.A.P. had, however, suggested that the Society should obtain support for the scheme from the R.I.C. The Secretary stated that he had discussed the matter fully with the Secretary of the R.I.C. and had subsequently sent him a list of equipment which he considered would find a ready sale among members. Maximum selling prices, and estimated quantities likely to be purchased by members, had also been suggested.

## STAFF VACANCIES

at

## R.S.G.B. HEADQUARTERS

Vacancies exist at Headquarters for an experienced SHORTHAND TYPIST and a GIRL CLERK. Applicants should communicate with the General Secretary in writing stating age, salary required and qualifications.

The Secretary expressed the opinion that the scheme outlined would come to fruition provided the R.I.C. were willing to give it their support. The Secretary emphasised that he had discussed the disposal of equipment only, as he had been informed that strong objections would be raised by the radio industry if the Society attempted to obtain components and valves at preferential terms for its members. The equipments which he had listed were, in his opinion, unlikely to find a sale in the normal civilian market.

16. The Secretary submitted a draft circular to D.R.'s dealing with District meetings. He recommended that since the catering and accommodation difficulties precluded the organisation of a London Convention during 1946, every D.R. should be invited to arrange a meeting in his own District, and that Headquarters' representation at such meetings should be divided between the Officers of the Society and other Council members. On a basis of 25 meetings the cost of the project was estimated at £500. After discussion it was resolved to adopt the scheme and to approve the draft circular as submitted.

17. Letters were read from the Radio Board and the Air Ministry regarding suggestions made previously by the Society, that steps should be taken to revive Wireless Reserves of radio amateurs. The letters indicated that whilst the Services are desirous of encouraging the formation of Reserves, no decision can be made at present as the Government's future policy in regard to conscription has yet to be announced.

The meeting closed at 9.30 p.m.

## London Meeting

Nearly 200 members were present at the meeting of the Society held on Friday, January 18, 1946, at the Institution of Electrical Engineers, London, when Chief Inspector George Brown, G5BJ, lectured on the Birmingham City Police Radio System. The lecture was illustrated by numerous slides.

Messrs. Milne, Scarr, Buckle, Phillips and others contributed to the discussion, after which Sq./Ldr. J. N. Walker, G5JU, proposed a vote of thanks to the lecturer.

In the unavoidable absence of the President the Chair was taken by Mr. S. K. Lewer, G6LJ (Executive Vice-President).

It is hoped to publish a précis of Mr. Brown's lecture in a future issue of THE BULLETIN.

## German and Italian Valves

Capt. A. A. Jones, R.E.M.E., G3RU, Lyndhurst, Warren Lane, Chapeltown, Nr. Sheffield, offers to supply information on any specified type of German or Italian valve.

Members who wish to avail themselves of this offer are requested to enclose a stamped and addressed envelope for a reply.

## EXCHANGE AND MART SECTION

**MEMBERS' private advertisements 2d. per word, minimum charge 3s. Maximum words accepted, 100. TRADE advertisements 6d. per word, minimum charge 9s. Maximum words accepted, 50. An additional charge of 1s. 6d. is made for use of Box Numbers. TERMS: Cash with order. All copy and payments to be sent direct to Advertisement Managers, PARRS Advertising Ltd., 121 Kingsway, London, W.C.2, by the 25th of the month for following month's issue.**

**ALL KINDS OF PRINT, especially QSL Cards.**—Send your inquiries to G6MN, Castlepoint, Workop.

**A.C. Gram** wanted with or without pick-up. State condition, price, etc.—Box D/93, PARRS, 121 Kingsway, London, W.C.2.

**AMATEUR supplies.** Quality components at keenest prices. Eddystone Raymart, Hamrad components. S.A.E. for lists.

**AMATEUR RADIO SERVICE, G6HP, 27-29 Canning Street, Burnley.**

**"AVOMINOR"** Universal AC/DC model, new, unused, first cash 28 secures.—G2XV, 89 Perne Road, Cambridge.

**A.W.S. 16 Crystal Palace, Parade, London, S.E.19,** can supply excellent transformers built to your specification. Examples: 750v 250ma, 67s. 6d.; 1000v 250ma, 81s.; 1500v 250ma, 95s.; 2000v 300ma, 167s. 6d. Intermediate or special taps if desired. Filament transformers. Smoothing and swinging chokes. Condensers (2000v wk/g) etc. Quotations forwarded upon receipt of details.

**CRYSTALS.**—Your specific needs can be supplied by Quartz Crystal Co., Ltd.—Send stamp for List, 63 Kingston Road, New Malden, Surrey.

**DISPOSING** of Ham Stn. Q.R.O. gear. Valves: RK48, 807, 813, 866, RK20, PT15, 6L6, 100 metal octals and glass receiving valves. Meters: M/A 3 1/2 in. 0-25, 50, 100, 150, 200, 300, 500. Voltmeters A.C. 0-15, 0-7.5, D.C. 0-350, 0-750, 0-1000, 0-2000. Electrostatic 0-3000v, 3 1/2 in. 0.1M/A 2 1/2 in. Transformers: 500v, 1000v, 2000v C.T. 250M/A. P.P. mod. transformers 60 watt audio. Split-stator 5000v condensers, single 5,000 condensers. 5000v H.T. condensers fixed, articles too numerous to list, and below pre-war prices. Let me know your wants. Send stamped envelope for reply.—Box D/82, PARRS, 121 Kingsway, London, W.C.2.

**DO you run a regular Radio Repair Business?** If so, you should become a member of V.E.S. Advantages include:—(a) You can buy most spares at trade prices. (b) You receive an interesting magazine fortnightly. (c) You can borrow service sheets, etc. Enrol to-day, send 15s.—V.E.S. (B) Radio House, Kuislip.

**EVERYTHING for the Amateur!**—If you are building a transmitter, communications receiver, high fidelity audio equipment or test apparatus, come along and see us. We can help you. Send 2jd. stamp for List "R."—TELE-RADIO (1943) Ltd., 177 Edgware Road, London, W.2.

**FOR Sale.**—Millers Falls Electric Drill, 1 1/2 in. 203/250v. AC/DC. Perfect condition; £9 10s.—VS2AK, West Lodge, Reigate Road, Epsom Downs.

**GRWL offers:**—Hammarlund Super-Pro, 540Kcs/20Mes. with pack and speaker; offers. Driver and modulation transformers for class AB 6L6s; £4 5s. 2000-0-2000v. 150ma. transformer, new; £3. Wooden rack 4 ft. 6 in. x 15 ft. x 15 ft., £1. Wanted: Meters, tank condensers, gear of all kinds.—26 Waverley Road, Kenilworth.

**G2EJF** has for disposal j.k.w. rotary converter by Marconi Wireless Telegraph Co., input 100 volts D.C.—J. FOSTER, Burn Cottage, Main Street, Gospipe, Sutherland.

**G5OI** has for disposal rotary converter 230 volts D.C. to 230 volts A.C. 40 watts (conservative rating). 50s. Valves: RFP15, ditto 60, 20s.; 6A6, 53, 25L6GT, 25Z6G, 8s. 6d. each. EFS, 210, 4d, 45, 56, 59, 6C6, 5s. 6d. each. 7 pairs headphones, 7s. 6d. pair. Ekco D.C. eliminator 12s. 6d.—135 Lichfield Road, Four Oaks, Warwickshire.

**HRO Coils.**—5 to 1 or 9 to 2 required. Bulletins and QST for disposal: from 1937 to 1944, complete and in good condition. Offers please.—2WQ, 7 Stanley Road, Broughton, Manchester, 7.

**HARMONY HOUSE** (Proprietor, G2IN) offers you a first class service in supplying your radio equipment needs. Raymart agent and stockist. No order too small.—116 Cambridge Road, Southport, Lancs.

**MONOMARK service.**—Permanent London address. Letters redirected. Confidential. 5s. p.a. Royal patronage. Key tag. 9d.—Write BMM/ON07A, W.C.1.

**MURPHY** Type B47 battery receiver (4-v), condition perfect, excellent tone. New H.T., 45a-h. accumulator. Will exchange for equivalent A.C. mains receiver.—Box D/97, PARRS, 121 Kingsway, London, W.C.2.

**NATIONAL HRO** senior table model, complete 9 coils, power supply, speaker, phones, excellent condition, £55. West London.—Box D/76, PARRS, 121 Kingsway, London, W.C.2.

**OBTAIN** frequency stability on the amateur bands by using Hamrad Type MC crystal control units. New design, high quality plastic dustproof holder, calibration accuracy within .02% at 25° cent. Available in 7 M/cs range: from stock, 30s.; to your specification 35s.—HAMRAD WHOLESALE LTD., 348 Portobello Road, London, W.10.

**POSITION** in Radio required by ex-Marine radio operator. 7 years experience, age 25. Qualification C.G.L.I., grade 1 and F.M.G. 2nd class. Willing to study at technical college if required. South England preferred.—BR5520, "Lyndfield," Medrose, Cornwall.

**QST's** wanted. State price; write 2BGZ.—J. BATEY, 74 Dunloe Avenue, London, N.17.

**RAYMART R9** Preselector. Tobe communication receiver covering 20, 40, 80, 160. Amateur bands, also separate interchangeable tuner 11-550 metres without gaps. Blue Spot speaker, phones; the lot, £30. Universal Avomitor, £8.—2 Priory Crescent, Cottenham, East Yorks.

**SALE.**—Unused Valves. AT4, 33s. 6d. each (3), AP4 40s. each (2); RL18, 20s.; D1, 7s.; 6L6, 10s. each (2); 6J5, 6s.; DET19, 13s.; two 705A rectifiers 3000v peak, with one ceramic holder, 50s. each. Following slightly soiled: 1N5G, EF50, MS4B, AC/Pen, 5s. each, £9 the lot, or offers. Also Mullard RC Bridge, £10, good condition.—Box D/61, PARRS, 121 Kingsway, London, W.C.2.

**SALE.**—Two National velvet vernier type X dials, scaled 0-100. Offers!—BRYANT, 47 Belmont Hill, Lewisham, London, S.E.13.

**SALE.**—1939 Hallicraft Sky Champion and spare valves. Performance perfect on all bands, and cabinet as new. What offers? Also quantity radio gear.—G3SN, 7 Sidwell Terrace, Exeter.

**SALE.**—Oscilloscope 3in. tube "gas" time-base, horizontal and vertical amplifiers, in steel cabinet, £20 or offer.—I. K. CHRISTMAS, Marionfield, Kington, Sussex.

**SALE.**—Avometer Universal type 40. Also 68J7, 68G7, 6J5G, 68Q7, 6V6G, 6V6GT/6, 68A7, 6K6GT/6, 6J5, 6H6GT/6 807, valves unused.—Offers the whole or part, to Box D/89, PARRS, 121 Kingsway, London, W.C.2.

**SALE or Exchange.**—BR5 4042 surplus pre-war equipment, all excellent condition. Gytman diversity coupler, £4. 3 sets four-pin plug-in coils 9-200 metres, 25s. Dynamike velocity microphone, superb job, £6. 2 sets Eddystone U.S.W. plug-in silver-plated coils, with bases for six, 15s. Steinitz marble transverse current mike, £4. Epoch cinema speaker, £2. Selection 10 new 2v battery valves, Osram and Mazda H/F Pens, output Pens, etc., £2. Preference given to anyone able to exchange any or all of above for H.M.V. Hypersensitive pick-up or high quality speakers.—Write or phone, A. E. CAWKELL, Burton Bower, Stansted, Essex. Tel. Stansted 2346.

**SALE.**—24A (2), 35 (2), 45, 56, £2 5s. Offers invited; Mullard DO 60, and M205-60 (new).—BR54770, 3 Chestnut Walk, Salford, Bristol.

**STUDENT B.I.R.E.** ex R.A.F. W/O.P. seeks part time work, Radio or Electronics. London area. Diligent student, immediately available.—Box D/67, PARRS, 121 Kingsway, London, W.C.2.

**UNUSED** popular and rare valves, list price or less, components. S.A.E. for list.—BR511065, 28 Ramsgill Drive, Ilford, Essex.

**WANTED.**—Eimac 100TH tube, must be first class. Also good signal shifter.—ANDERSON, 114 South Street, St. Andrews, Fife.

**WANTED.**—Good communication receiver in first class order, Hallicrafters preferred.—State model and price to G6MV, 125 Balmoral Road, Morecambe. (Tel. 637, M/cbe).

**WANTED.**—An American valve 12A7.—D'ARCY, 27 Theydon Grove, Woodford Green, Essex.

**WANTED.**—HK54, 35TG, TZ40, 866 or similar type bottles. Also Meissner signal shifter model 9-1058. Minis or other rotary beam parts. High class frequency meter. First class material only, please.—Box D/64, PARRS, 121 Kingsway, London, W.C.2.

**WANTED.**—6AC5G; also model number of 6 valve "Push Button" Travler Car Radio.—TANNER, 744 London Road, High Wycombe, Bucks.

**WANTED.**—Simpson Turntable.—2COT, 17 Sylvan Avenue, London, N.W.7.

**WANTED.**—"Bug" key, 3A5 and 6X5 tube. 1938 or 1939 Call Book; old radio mags., QST, "Bulls"; buy or exchange for 68SG, 68SG, 6J7G, VP58, 1642. Odd German gear free anyone interested. BRS 11,119.—C.P.O., P. J. LAMONT, R253721, 32 Netherton Grange, Netherton, Liverpool, 10.

**I 946 Amplifiers.** De Witt 20 watt high fidelity model, complete with all valves, ready for use, £7 19s. 6d. Comprises High-mu input stage, twin 6L6 output tubes, heavy duty speaker transformer for 2 5 and 15 ohms, and massive A.C. power pack. Carriage extra.—Sole Distributors: KOSSTUTH RADIO CO., 410 Dudley Road, Edgbaston, Birmingham.

**W.W.**—U.S.W. superhet with power pack and co-ax feeder £15. Field type portable receiver 5-200m, bargain £4.—S.A.E. HOOPER, 306 Station Road, King's Heath, Birmingham.

**WIRELESS** World, Jan. 1944 to Dec. 1945, inclusive, for sale, complete. Offers?—FARMER, 67 Broadmead Road, Woodford Green, Essex.

**I 5,000** Radio Amateurs all over the world take advantage of the real service offered by Coughline Radio! Do You? If not, write for most comprehensive list of new goods at really competitive prices. Please enclose S.A.E.—COULPHONE RADIO, Station Road, New Longton, Nr. Preston.

**8+8pf** 500v 4s. 11d.; 16pf 320v (cans) 6s. 9d. Trimmers 30pf, 150pf, 1s. 6d. each. Loudspeakers 8 in., 28s. 6d.; 5 in. 21s.; 5 in. with transformer 29s. Output transformers 6s. 6d. Chokes 10H 60mA 10s. All valve types including 6L6s. 1 watt resistors 6d. or 60 for 27s. 6d. Orders over £2 post free.—VU2EU, Carlton Music Salon, Tudor Cinema Buildings, West Kirby, Cheshire.

## PATENTS AND TRADE MARKS

**KING'S Patent Agency Ltd.** (B.T. King, G5TA, Mem. R.S.G.B. Reg. Pat. Agent), 146a Queen Victoria Street, London, E.C.4. Handbook and Advice on Patents and Trade Marks free. Phone: City 6161. 50 years' refs.