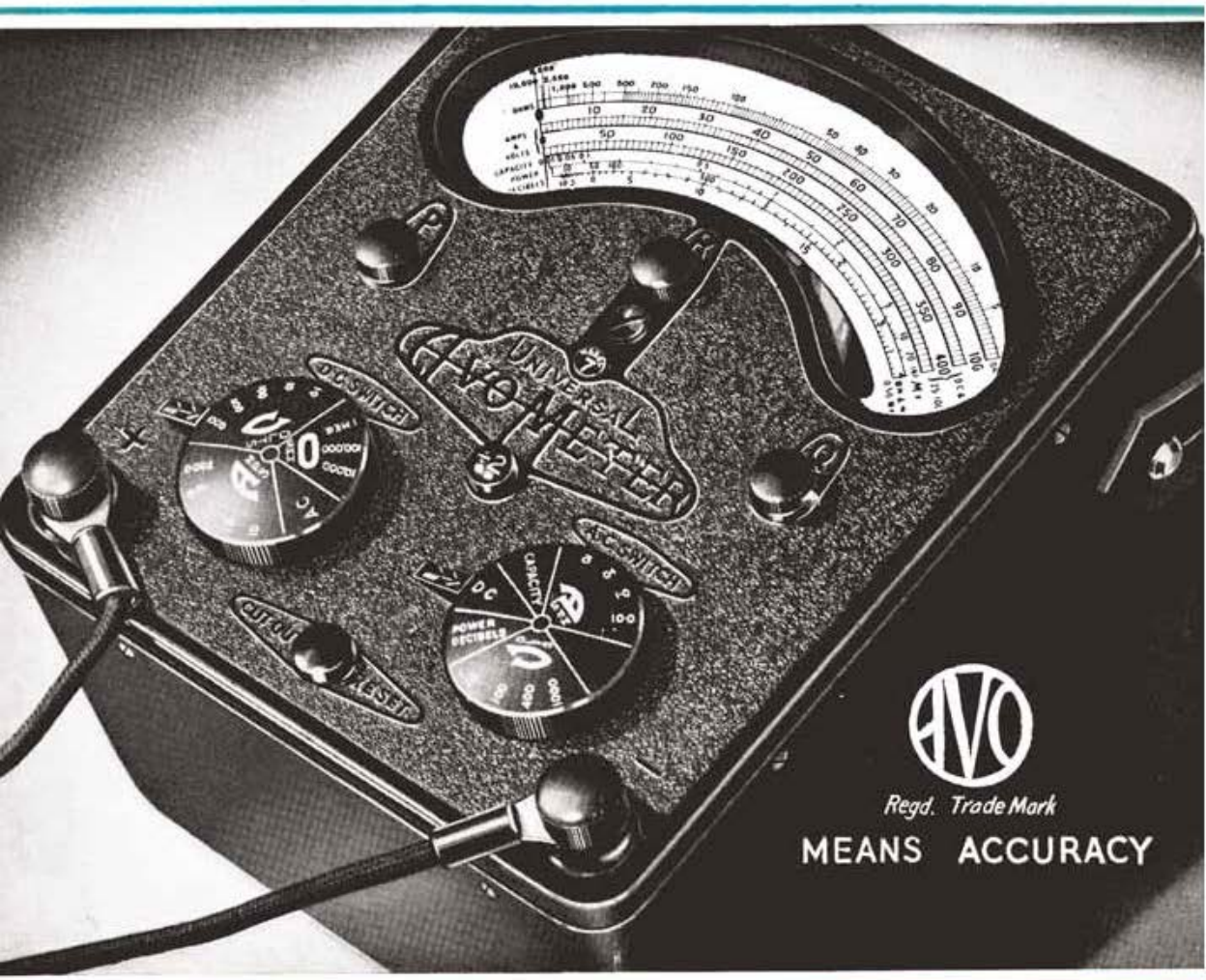
R·S·G·B VOLUME 22 · No. 10 · COPYRIGHT · PRICE 1/6 APRIL, 1947

BULLETIN

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN



- NOISE SIGNAL GENERATOR
- PORTABLE DIRECTION FINDING RECEIVER
- SPREADERS
- WORLD TELECOMMUNICATIONS CONFERENCE

NEW MEMBERS

THE COUNCIL HAS PLEASURE IN ANNOUNCING THAT THE FOLLOWING HAVE BEEN ELECTED TO CORPORATE OR ASSOCIATE MEMBERSHIP OF THE SOCIETY

SPECIAL NOTE

THIS SOCIETY IS NOT IN ANY WAY RESPONSIBLE FOR CIRCULARS FROM OUTSIDE SOURCES WHICH MEMBERS, AND PARTICULARLY NEW MEMBERS, MAY RECEIVE AS A RESULT OF THEIR NAMES APPEARING IN THIS JOURNAL.

British Isles (Licenced Amateurs)

G2GM F. D. CAWLEY, 6A Elm Grove, Taunton, Somerset.
G2MJ R. T. HUNT, 178 Bispham Road, Southport, Lancs.
G2ZB W. G. C. WYER, Ravine Road, Boscombe, Hants.
G3FC *K. H. R. MAYNARD, Largo, Camden Rd., Bexley, Kent.
G3LT *F. J. HARRIS, 89 Sandhurst Road, London, N.W.9.
GI3PF *M. V. RIDGEWAY, R.A.F., Aldergrove, N. Ireland.
G3XF *P. G. SAMUELS, 41 Houblon Rd., Richmond, Surrey.
G4AO E. G. KING, 125 Chestnut Grove, Mitcham, Surrey.
G4AY R. L. PLUCK, 9 Prospect Road, Southborough, Tunbridge Wells, Kent.
G4AZ *G. W. NEVILLE, Belmead, Hemingford Abbots, Huntingdon.
G4JK G. R. WHITESIDE, 88 Oxenholme Road, Kendal, Westmorland.
G4QW J. J. A. ALLNUTT, 38 Chatsworth Avenue, Merton Park, London, S.W.20.
G5AU *J. CUTHBERTSON, Sandy Lane, Longford, Warrington.
G5GI T. L. GILL, 48 Dykelands Rd., Seaburn, Sunderland.
G5KG *G. W. SLACK, 2 Brick Kiln Lane, off Sutton Road, Mansfield, Notts.
G5NL *N. G. NOLAN, 78A, Bedfont Lane, Feltham, Middx.
G5TL *S. A. TAYLOR, 61 Summerfield Crescent, Rotton Park, Birmingham, 16.
G5WB C. A. WEBB, Laurel Cottage, Ridgewell, Nr. Halstead, Essex.
G5WO *C. F. WOODWARD, 42 York Avenue, Wolverhampton.
G5YM H. J. EDWARD, P.O. Box 166, Dar-es-salaam, Tanganyika Territory, East Africa.
G6GS *W. B. GILHESPY, 96 Beverley Road, Ruislip Manor, Middlesex.
G6KB *W. O. S. GREENER, Stoke Row, Nr. Henley-on-Thames, Oxfordshire.
G6NN *C. V. WOOD, 48 Westfield Road, Barnehurst, Kent.
G6PH J. PARISH, 124 King's Hedges Road, Cambridge.
G6TN C. C. F. DUWE, 80 Burton Road, West Didsbury, Manchester.
G6UA G. W. BLOOMFIELD, 147 Cowgate, Norwich.
G8GC *K. E. ARIS, 9 Oak Avenue, Hornsey, London, N.8.
G8IR H. DALE, 11 Moor Drive, Pool Rd., Otley, Yorks.
G8LZ E. J. BONNER, 3 King's Drive, Gravesend, Kent.
G2AHU R. G. CRACKNELL, "Holmhurst," Post Street, Godmanchester, Hunts.
G2AFV P. CARBUTT, 79 Park Grove, Barnsley, Yorks.
G2AKT S. C. KEVILLE, By the Brook, 25 Walmington Fold, Woodside Park, London, N.12.
G2ASL *E. LINE, 68 Middle Pk. Rd., Selly Oak, Birmingham,
G2BBD G. SMITH, 46A Oxford Road, Birkdale, Southport, Lancs.
G2BJX *H. HARRISON, 1 Britannia Avenue, Luton, Beds.
G2BPF P. F. BALLARD, "Whitehaven," Manor Road, Farnborough, Hants.
G2CCD C. C. USHER, 24 Carlisle Road, Dartford, Kent.
G2CJL *J. R. LANE, Station Road, Cheddar, Somerset.
G2CKR G. S. GARFITT, 1 The Willows, Orchard Road, Great Malvern, Worcs.
G2CYN SURG.-LT. M. D. HERYLY, R.N.B., Plymouth.
G2DHR E. ROBINSON, 25 Manor Court, York Way, Whetstone, N.20.
G2DPZ J. ELLERY, Chapel Villas, Lostwithiel, Cornwall.
G2DQX R. J. WOODROFFE, 20 Carnarvon Rd., Southport, Lancs.
G2DZF J. ENGLISH, 112 Sea Place, Worthing, Sussex.
G2FNK J. H. ELLIS, 64 Ashley Road, Walton-on-Thames, Surrey.
G2FOS J. K. BIRCH, 19 Knowsley Road, Rainhill, Nr. Liverpool.
G2FUT S. GARSIDE, 47 Carr Lane, Slaithwaite, Nr. Huddersfield, Yorks.
G2FYY M. B. ROWLES, 90A Rockingham Road, Corby, Nr. Kettering, Northants.
G2HAJ P. C. H. TREZISE, 55 Church Road, Woolston, Southampton.
GW2HPG B. LEAR, Duke Radio, Morriston, Swansea, Glamorganshire, South Wales.
GI3ACV R. GABBEY, 24 Clandeboye Road, Bangor, Northern Ireland.
G3AET J. N. WATSON, 21 Trevethan Rise, Falmouth, Cornwall.
G3AGX L. D. COLLEY, "Conniston Bungalow," Hollym Road, Withernsea, Yorks.
G3AII H. W. BRUNTON, 26 East Parade, Whitley Bay, Northumberland.
G3AIU K. A. H. ROGERS, 161 Bramhall Lane South, Bramhall, Cheshire.
GM3AJY A. O. SUTTON, 32 Windsor Street, Glasgow, N.W.
G3AKY A. J. LLOYD, 425 Hatilar Road South, Richmond, Sheffield, 9.
G3AKZ R. T. GLYNN, "Oberon," Kayte Lane, Nr. Cheltenham, Gloucestershire.
G3ALN A. W. J. NEWBY, 40 Greywood Avenue, Fenham, Newcastle-on-Tyne, 4.
G3AND L. ATHERTON, 128 Roe Lane, Southport, Lancs.
G3AOU C. C. RUSSELL, 201 Washway Road, Sale, Nr. Manchester, Lancs.
G3APC K. G. M. REDMOND, 2A, Chalcot Gardens, Hampstead, London, N.W.3.
G3ARH L. C. DALBY, 16 Broadway, Kettering, Northants.
G3ARN F. W. PAGE, 1 Berkhamsted Parade, Wembley, Midx.
G3ASA J. C. YOUNG, 40 Dorothy Road, London, S.W.11.
G3ASL F. E. GODWARD, 40 Beufort Street, Southchurch, Southend-on-Sea, Essex.
GW3ASW C. R. MOUNTJOY, 15 Commercial Road, Resolven, Neath, Glamorganshire.

THE PUBLICATION OF NEW MEMBERS' LISTS IS TO BE SUSPENDED UNTIL FURTHER NOTICE.

GM3ASY J. H. COPELAND, 72 Main Street, Aberchirder, By Huntly, Aberdeenshire, Scotland.
G3ATP H. GREENWOOD, 45 St. Margaret's Road, Bradford, Yorkshire.
G3ATU S. A. HERBERT, Roker House, Roker, Sunderland.
G3AVD R. HARDEN, 358 Marsh Lane, Bootle, Liverpool, 20.
GM3AXX A. M. FRASER, 130 West Graham Street, Glasgow, C.4, Scotland.
G3AZA D. M. LEWIS, Sussex House, High Street, Portishead, Bristol.
G3AZL J. D. STROUD, 20 Green Court Avenue, Croydon, Surrey.
G3AZO C. J. VEALE, 56 Gifford Terrace Road, Mutley, Plymouth, Devon.
G3AZZ B. W. BLACKMORE, 17 Alexandra Road, Bridgwater, Somerset.
G3BAM R. G. BRUNSKILL, 110 Newtown Road, Malvern Link, Worcs.
G3BAQ T. R. COWLEY, 208 Baslow Road, Totley Rise, Sheffield.
G3BCR G. B. DONALD, Downgate House, Wadhurst, Sussex.
G3BDL G. F. KELLAWAY, Coker Hill, West Coker, Yeovil.
GM3BEB T. M. BOWDEN, 60 Crossgate, Cupar-Fife, Scotland.
G3BFC W. H. C. WHEELER, Moors Edge, Golf Link Road, Ferndown, Dorset.
GW3BFH R. H. JAMES, 63 Parkfields Road, Bridgend, Glamorganshire.
G3BFL H. V. W. SIEBERT, 125 Milborough Crescent, Lee, London, S.E.12.
G3BFM V. O. A. TUCKER, 54 Dowsett Road, Tottenham, London, N.17.
G3BFV A. J. MARSH, R.N. Signal School, Fort Southwick, Nr. Fareham, Hants.
GM3BGI H. T. WRIGHT, 16 Balaclava Rd., Fishponds, Bristol.

British Empire (Licenced Amateurs)

VE2BK–VE2NM C. C. DUMBRILLE, 4,106 Melrose Avenue, Montreal 28, Que, Canada.
VE3ABW G. S. LIGHT, at 28 Camden Avenue, Feltham, Middx.
VE3AUQ E. GULP, 67 Sherwood Avenue, St. Catherine, Ontario, Canada.
VP5CC *C. M. CORINALDI, P.O. Box 451, Kingston, Jamaica, B.W.I.

VP5RS R. S. SAMUELS, 100 King Street, Kingston, Jamaica, B.W.I.
VQ4REW R. WOOLFALL, P.O. Box 581, Nairobi, Kenya Colony, South Africa.
VS1BD A. H. DORMER, "Summerleigh," Beltinge Road, Herne Bay, Kent.
VS1AI A. MAXWELL, at Fordell Gardens, Hill End, Dumfermline, Scotland.
VS2BL T. LEA, at 3 Johnson's Yard, Market Place, Thirsk, Yorkshire.
ZB1L A. R. VELLA, 14 Depiro Street, Sliema, Malta.
ZS2BU R. A. DERSLEY, P. O. Box 82, East London, South London, South Africa.
ZS5DS W. S. REID, 1 Riverton Road, Pietermaritzburg, South Africa.
ZS6DO O. W. REID, 30 Selkirk Street, Germiston.
ZS6HS H. L. L. HOWES, c/o Director of Signals, G.H.Q., Pretoria, South Africa.

Foreign (Licenced Amateurs)

IL1R *DOTT I. R. OGNIBENE, Corso Magenta, 12, Milano, Italy.
K6CGK K. NOSE, Box 1242, Lihure, Kauai, Hawaii.
OZ5SN SVEND NIELSEN, JUNR., Oestrigsgade 12, Copenhagen S., Denmark.
W1AM E. B. REDINGTON, 16 Fremont Street, New London, Connecticut, U.S.A.
W8PTF H. E. RURLE, 3,011 Athens Avenue, Dayton, Ohio, U.S.A.
W8MWL E. R. RODERICK, 323 37th Street, N.W., Canton 7, Ohio, U.S.A.

British Receiving Stations (BRS)

14,321 P. J. COOPER, Easton Grey, Malmesbury, Wiltshire.
14,322 S. J. EVANS, Inkerman Hill, Hazlemere, High Wycombe, Bucks.
14,323 W. F. CROOK, 34 Croft Road, Parkstone, Dorset.
14,324 E. A. HERRON, 9 Argyle Avenue, Victoria Park, Manchester, 14.
14,325 P. A. MIDDLETON, A.M.W.D. R.A.F. Station, Chilmarr, Nr. Salisbury, Wilts.
14,326 J. BROXUP, 13 Outwood Road, Burnley, Lancashire.
14,327 J. E. DAVIES, Bryn Awel, Bryncrug, Towyn, Merionethshire, N. Wales.
14,328 R. H. TURNPENNY, 51 Manor Court, York Way, Whetstone, London, N.20.
14,329 J. DALTON, 146 Plane Street, Hull, Yorks.
14,330 J. SHIELDS, 134 Kings Avenue, London, S.W.12.
14,331 L. OAKES, 31 Pitt Street, Macclesfield, Cheshire.
14,332 A. G. EMMERTON, White Hart Farm, Godstone Green, Godstone, Surrey.
14,333 L. C. GEORGE, 34 Broad Street, Coventry.
14,334 C. WATSON, 49 New Lowther Street, Whitehaven, Cumberland.
14,335 C. W. MACKENZIE, Hawthorn Bank, West Linton, Peeblesshire, Scotland.
14,336 C. K. CAMPBELL, 5 St. Gregory's, St. Andrews, Fife, Scotland.
14,337 J. B. INGRAM-COTTON, c/o Barnsley Technical College, Church Street, Barnsley, Yorks.
14,338 F. EWINS, Park Street, Stow-on-the-Wold, Nr. Cheltenham, Glos.
14,339 W. CAMPBELL, 85 Castlereagh Street, Belfast, Northern Ireland.
14,340 J. L. BAKER, "Berystede," St. Helens Rd., Leamington Spa, Warwick.
14,341 C. SIMPSON, "Aviemore," Coney Green, Stourbridge, Worc.
14,342 L. BERGNA, 121 Addycombe Terrace, Heaton, Newcastle-on-Tyne, 6.
14,343 D. C. RIMMER, 41 Keswick Road, Heaton Chapel, Stockport, Cheshire.
14,344 L. W. BURKITT, 21 Hewson Road, Lincoln.
14,345 R. H. HAYWARD, 21 Oaktree Avenue, Palmers Green, London, N.13.
14,346 V. J. WORTON, 12 Haden Hill, Wolverhampton, Staffs.
14,347 V. J. TOWNSEND, c/o 23 Mayesbrook Road, Dagenham, Essex.
14,348 D. J. WATTSON, 9 Mornington Ave,, Cheadle, Cheshire.
14,349 J. T. ARBER, 30 Cyril Ave,, Nuthall Rd., Nottingham.
14,350 T. J. POOL, 32 Portland Crescent, Greenford, Middlesex.
14,351 L. E. STAGG, 3 St. John's Buildings, Sutton Place, Devizes, Wilts.
14,352 A. R. PAINTER, 1A Perth Street, Weymouth, Dorset.
14,353 K. G. ASTON, "Exchange," Slade Rd., Portishead, Bristol.
14.354 A. M. PAYNE, "Hawksfield," 5 Bradmore Way, Brookmans Park, Herts.
14,355 D. A. BILLETT, 28 Rosewall Rd., Maybush, Southampton.
14,356 R. W. YATES, 1,356 Heather Rd., Small Heath, Birmingham, 10.
14,357 W. G. SCOULDING, 70 Heather Way, Romford, Essex.
14,358 R. G. STEPHENS, 1 Gatchell Cottages, Trull, Taunton, Somerset.
14,359 F. WHITTLE, 34 Whiteswallows Road, Barton Road, Swinton, Lancashire.
14,360 T. H. LAMBLE, "Little Dene," The Loop, Felpham, Sussex.
14,361 F. S. COATS, 107 Gatehouse Street, Glasgow, E.2.
14,362 R. C. WHITE, "The Shack," Rays Hill, Cholesbury, Nr. Chesham, Bucks.
14,363 A. W. IRWIN, "Belsize," Manor Road, Woking, Surrey.
14,364 S. H. MOCKRIDGE, 107 Lynford Square, Taunton, Somerset.
14,365 W. L. LUMSDEN, 28 Merkland Road East, Aberdeen.
14,366 A. D. COCKBURN, 53 Forest Road, Selkirk, Scotland.
14,367 J. E. HEARSE, Buckley Cottage, East Harptree, Nr. Bristol, Somerset.
14,368 E. H. MORTIMORE, 39 Bickham Road, Mt. Tamar, Higher St. Budeaux, Plymouth.
14,369 J. R. ORD-JOLLY, 12 Warminster Cres., Sheffield, 8.
14,370 E. J. HOUGHTON, "Upton Lovel," Hill Head, Fareham, Hants.
14,371 A. F. LANSLEY, Burnage, Manchester, 19, Lancs.
14,372 F. W. LITTLEJOHN, 86 Park Road, Didcot, Berks.
14,373 H. W. SNOW, 263 Mather Ave., Allerton, Liverpool, 18.
14,374 T. SEDDON, "Dysart," Castle Hills, Northallerton, Yorks.
14,375 D. C. DERHAM, "Romok," High Street, Freshwater, Isle of Wight.
14,376 E. P. HARRIS, "Kenmore," Eastcote View, Pinner, Middlesex.
14,377 A. L. RATNER, 13 Dagmar Avenue, Wembley, Middlesex.
14,378 R. M. BUTLER, 96 Castleview Gardens, Ilford, Essex.
14,379 K. G. PERKINS, 27 Woodville Road, Boston, Lincs.
14,380 R. J. HILLIER, 10 Cae-Wallis St., Bridgend, Glamorgan.
14,381 J. A. OATES, Briar Cottage, Parkgate, Neston, Wirral, Cheshire.
14,382 F. P. KAUERT, 75 Newington Butts, Elephant & Castle, London, S.E.1.
14,383 R. F. SMITH, 12 Penrhyn Avenue, Walthamstow, London, E.17.
14,384 F. E. SULLIVAN, 7 Leas Road, Warlingham, Surrey.
14,385 F. A. MILLS, 32 High Street, Gravenhurst, Bedford.
14,386 D. PARKER, 13 Huncoat Avenue, Heaton Chapel, Stockport, Cheshire.
14,387 L. THORN, 96 Harcourt Street, Luton, Bedfordshire.
14,388 P. J. MASTERSON, 13 Drumcliffe Drive, Cabra West, Dublin, Eire.
14,389 D. AITCHISON, 8 Coach Road, Astley, Manchester, Lancashire.
14,390 W. G. STORRIE, 294 Cemetery Road, Sheffield, 11.
14,391 H. WALTERS, 9 Leckhampton Road, Blackpool, Lancs.
14,392 D. G. KING, Stalham Hall, Stalham, Norfolk.
14,393 L. DAMON, 36 Teme Road, Tolladine, Worcester.
14,394 D. D. GAY, 2 St. Fagans Street, Caerphilly, Glamorganshire, S. Wales.
14,395 R. DAVIES, 26 Marlow Road, Brighton, 7, Sussex.
14,396 G. V. HUMPHREY, 61 Commonside, West Mitcham, Sy.
14,397 K. STOCKDALE, 43 Peter St., Workington, Cumberland.
14,398 P. K. THREADGOLD, 15 Westfield Park, Bath.
14,399 C. A. DUGDALE, 17 Low Rd., Lower Hellesdon, Norwich.
14,400 W. E. SAVAGE, "St. Mary's," Fencepiece Road, Chigwell, Essex.
14,401 G. J. WEBB, 134 Newbridge Road, Bath, Somerset.
14,402 R. R. REYNOLDS, 29 Park Road, Fenton, Stoke-on-Trent, Staffs.
14,403 J. T. FRANKLIN, Croft House, Longburgh, Nr. Carlisle, Cumberland.
14,404 E. ALLEN, 28 Malton St., Boothtown, Halifax, Yorks.
14,405 H. B. SHEWARD, 1 Rose Cotts, Whitchurch, Tavistock, Devon.
14,406 G. W. GILBERT, 56 Western Way, Barnet, Herts.
14,407 D. W. EASTERLING, 43 Lannoy Road, New Eltham, London, S.E.9.
14,408 L. A. BIRCH, 202 Chingford Mount Road, Chingford, London, E.4.
14,409 H. F. SKOYLES, "Aldine," Mount Drive, Wisbech, Cambs.
14,410 E. PESTELL, 115 Heathfield Road, Grantham, Lincs.
14,411 N. G. WILSON, Red Court, Chapeltown, Pudsey, Yorks.
14,412 J. W. HAMILTON, 32 Denny Road, Dennyloanhead, Stirlingshire.
14,413 M. FLETCHER, 3 Wilton St., C.-on-M. Manchester, 13.
14,414 DR. C. GORDON-WILSON, 77 Rydes Hill Road, Guildford, Surrey.
14,415 R. J. KNIGHT, "Belmore," Seagrave Road, Sileby, Leics.
14,416 T. H. ATTEWELL, Brightley Weir, Umberleigh, N. Devon.
14,417 E. P. MAPLESTON, 9A Emery Lane, Boston, Lincs.
14,418 E. H. COX, 81 Firth Park Crescent, Firth Park, Sheffield, 5, Yorkshire.
14,419 R. A. MORLEY, 318 Liverpool Road, Birkdale, Southport, Lancs.
14,420 W. D. MILLS, Tattenhoe Hostel, Bletchley, Bucks.
14,421 C. BATSTONE, 29 Conway Road, Cwmparc, Treorchy, South Wales.
14,422 P. W. SMITH, 15 High St., Portbury, Bristol.
14,423 E. R. WHITMORE, "Orpington," Geraldine Road, Great Malvern, Worcs.
14,424 F. B. JENKINS, 4 Brymyth Villas, Cannington, Nr. Bridgwater, Somerset.
14,425 E. V. TREVALLION, 14 Newport Street, Tiverton, Devon.
14,426 R. T. WARRENER, 19 Ingelow Av., Boston, Lincolnshire.
14,427 R. C. BARKER, 11 Park Grove, Portway, West Ham, London, E.15.
14,428 J. J. ROSE, 21 Swift Street, Barnsley, Yorkshire.
14,429 J. E. SUTTON, 14 Hill Street, Sheffield, 2, Yorkshire.

14,430 G. TOULALAN, 166 Kirkley Run, South Lowestoft, Suffolk.
14,431 R. E. SMITH, "Vega," Boundary Lane, St. Leonards, Nr. Ringwood.
14,432 K. G. CHETTLEBURGH, 44 Bardon Road, Coalville, Leicestershire.
14,433 MISS M. E. TURNER, 4 Nursery Road, Moordown, Bournemouth.
14,434 J. TOOTELL, 76 Hillfoot Road, Collier Row Lane, Romford, Essex.
14,435 J. M. SMITH, 25 Station Road, Histon, Cambs.
14,436 J. F. WOOD, 85 Chudleigh Road, Twickenham, Midx.
14,437 A. R. WATERMAN, 106 Laundry Road, Shirley Warren, Southampton, Hants.
14,438 L. BOEDO-YANEZ, Arundel, Knightcott, Banwell, Som.
14,439 D. C. MUNT, 74 Hoppers Road, Winchmore Hill, London, N.21.
14,440 T. M. BLACKSHAW, 145 Wanstead Park Road, Ilford, Essex.
14,441 V. E. HEARD, 48 Dickens Road, E. Ham, London, E.6.
14,442 A. B. WARD, 17 Rutland Road, Harrogate, Yorkshire.
14,443 P. STYLES, 47 Thornbury Rd., Clapham Pk., London, S.W.2.
14,444 A. W. COX, "Golden Fleece," Bell Green, Coventry.
14,445 T. J. STACEY, 24 Granville St., Swindon, Wilts.
14,446 D. CHALMERS, 15 Bruce Street, Lincluden, Dumfries, Scotland.
14,447 F. G. PACK, 40 Bonny Street, Blackpool, Lancs.
14,448 G. L. DAVIDGE, 67 Kenilworth Road, Monkseaton, Northumberland.
14,449 N. W. CLARKE, 179 Beccles Rd., Gorleston-on-Sea, Norfolk.
14,450 K. H. WIDDOWSON, 82 Lower Rd., Beeston, Nottingham.
14,451 J. S. CAIRNS, 9 Vogan Ave., Great Crosby, Liverpool, 23. (Transferred from Associate Grade.)
14,452 P. COX, 49 Hamilton Road, Southville, Bristol, 3.
14,453/XABO R. F. KILBY, 104 Norman Ave., Nuneaton, Warwicks.
14,454 D. PARKER, 5 Meech St., Openshaw, Manchester, 11.
14,455 DR. P. T. WALKER, M.B., Ch.B., The Guest Hospital, Dudley, Worcs.
14,456 R. W. HALLS, Barnsley Technical College, Church Street, Barnsley, Yorks.
14,457 J. E. PRICE, 12 Hutton Road, Cranswick, Nr. Driffield, E. Yorks.
14,458 K. COULTER, "Field Cottage," Marlborough Road, Romford, Essex.
14,459 L. F. HOBDEN, 17 Hartington Road, Brighton, 7, Sussex.
14,460 R. S. RANCE, 19 Lester Avenue, Gainsbord Road, West Ham, London, E.15.
14,461 D. E. WEBB, 19 Newcomen Road, Wellingborough, Northamptonshire.
14,462 D. I. REES, 25 Heathwood Road, Cabalfa, Cardiff.
14,463 D. A. PILLEY, "Manchester Cottage," Canberra Road, Christchurch, Hants.
14,464 H. F. HOWARD, 7 Berkeley Sq., Clifton, Bristol, 8.
14,465 K. R. FEAR, 11 Milton Park Road, Weston-super-Mare, Somerset.
14,466 E. ROSCOE, 3 Myerscroft Close, New Moston, Manchester, 10.
14,467 E. H. JONES, c/o Mrs. Wilkins, Calais Farm, Bampton, Oxon.
14,468 C. C. DOWLING, 4 Welbeck Walk, Carshalton, Surrey.
14,469 A. J. READ, Halfway House, Walton-on-Thames, Surrey.
14,470 P. A. TARRY, 25 Corfe Road, Woodsetton, Coseley, Staffs.
14,471 R. H. BLAND, 4 Brewster Terrace, Ripon, Yorkshire.
14,472 J. R. CLARKE, 88 Nunsfield Road, Buxton, Derbyshire.
14,473 F. TURNER, 30 Chedder Ave., S.S. Blackpool, Lancs.
14,474 E. W. CATTERMOLE, Thelveton, Diss, Norfolk.
14,475 L. B. AITKEN, 26 Leith Street, Glasgow, E.1.
14,476 W. GARDINER, 63 Sorbie Road, Ardrossan, Ayrshire, Scotland.
14,477 D. L. RUPP, 12 Kipling Avenue, Wellsway, Bath.
14,478 N. E. DEADMAN, 8 Athol Gardens, Pinner Hill, Midx.
14,479 B. LEE-GRAY, "The Setts," Coates, Cirencester, Glos.
14,480 PETER M. KIRK, 37 Annett Street, Deanston Doune, Perthshire.
14,481 G. V. ENTWISLE, 71 Tellson Crescent, Irlams on the Height, Salford, 6, Lancs.
14,482 H. R. MORRIS, 2 Council Houses, Vines Cross, Horam, East Sussex.
14,483 W. LOWE, 28, Allenby Road, Cadishead, Manchester.
14,484 J. H. KING, 84 Barclay Street, Bridgwater, Somerset.
14,485 C. PARKER, 69 Pulteney Street, Bath.
14,486 F. B. SINGLETON, 3 Ravenscroft Road, Beckenham, Kent.
14,487 I. A. MITCHELL, 135 Blenheim Road, Barnsley, Yorks.
14,488 D. H. STEERS, c/o R. Department, Lloyds Bank, Ltd., 6 Pall Mall, S.W.1.
14,489 JOHN SANDERSON, 2 Bath Street, Saltburn, Yorkshire.
14,490 A. S. GRIFFITHS, South Lea, Court Road, Banstead, Surrey.
14,491 C. H. LEES, "Rock Haven," Park Lane, Earls Colne, Colchester, Essex.
14,492 B. H. KYNASTON, 34 Shakespeare Street, Nottingham.
14,493 F. W. LUCAS, 32 Brougham Street, Darlington, Co. Durham.
14,494 E. R. HAYWARD, 48 Carisbrook Road, Nuneaton, Warwickshire.
14,495 L. HISCOX, 12 Oakhill Crescent, Acocks Green, Birmingham, 27.
14,496 R. D. WILLS, 81 Birchall Rd., Redland, Bristol, 6.
14,497 C. G. FORRESTER, 10 Beechey Road, Bournemouth, Hants.
14,498 E. G. DUNCAN, 10 Beechey Road, Bournemouth, Hants.
14,499 L. F. ROBINSON, 19 Oakfield Road, W. Croydon, Surrey.
14,500 VISCOUNT DANGAN, 9 Albert Hall Mansions, London, S.W.7.
14,501 H. B. LANCASHIRE, 58 Park Hill Road, Croydon, Surrey.
14,502 P. W. ADAMS, "Wilton." Dalgairns Road, St. Peter Port, Guernsey, Channel Islands.
14,503 H. H. HOWIE, Post Office House, Yarrow, Selkirk, Scotland.
14,504 R. A. WENGER, Viewfield, Lanark Road, Carluke, Lanarkshire, Scotland.
14,505 J. J. DENN, 32 Thorndale Rd., Waterloo, Liverpool, 22.
14,506 P. T. KNIGHT, 11 Manton Close, Manton, Marlborough, Wilts.
14,507 G. SMITH, 122 Marfield Street, Glasgow, E.2.
14,508 K. R. GILBERT, "Selworthy," Summerlands, Yeovil, Somerset.
14,509 L. A. JAMES, 41 Kennington Ave., Horfield, Bristol, 7.
14,510 A. J. FIELDING, 54 Balmoral Cres., W. Molesey, Surrey.
14,511 B. S. BOIVIN, 42 Pettits Lane, Romford, Essex.
14,512 N. B. TUCKER, 7 Royal York Cres., Clifton, Bristol.
14,513 L. R. THORNTON, 26 Dovedale Road, Beacon Park, Plymouth, Devon.
14,514 H. BOOTH, 308 Stockport Road, Denton, Nr. Manchester, Lancs.
14,515 L. TITE, 39 Pennericket Lane, Causeway Green, Langley, Nr. Birmingham.
14,516 G. R. DOWTHWAITE, 135 Dill Hall Lane, Church, Lancs.
14,517 C. R. WILLIAMS, 168 Gladstone Park Gardens, Dollishill, London, N.W.2.
14,518 J. DICKIE, 5 Dunedin Terrace, Clydebank, Scotland.
14,519 K. J. BREWER, 28 Cresthill Ave., Grays, Essex.
14,520 E. ROBERTS, 239 Wellington St., Long Eaton, Notts.
14,521 P. V. HAZELDENE, 32 Little London, Spalding, Lincs.
14,522 J. BRYANT, 15 Lansdowne Road, Chesham, Bucks.
14,523 J. T. SMITH, 36 Newhall Street, Cannock, Staffs.
14,524 R. NOLAN, 26 Norwood Rd., Tulse Hill, London, S.E.24.
14,525 R. NYE, 30 Gordon Ave., Highcliffe, Winchester, Hants.
14,526 G. C. SHEPHER, 9 Almer Terr., Bootham, York, Yorks.
14,527 C. W. JAMESON, 3 Vicars Hill, Armagh, Co. Armagh, Northern Ireland.
14,528 L. R. TURNBULL, c/o 69 Pretoria Road. Larbert, Stirlingshire, Scotland (Transferred from Associate Grade.)
14,529 K. G. JUDD, 24 Bathurst Rd., Folkestone, Kent. (Transferred from Associate Grade.)
14,530 W. G. CHAPMAN, 7 Wycliffe Road, Wimbledon, London, S.W.19.
14,531 F/Lt. W. G. WINTER, The Tryst, Birchwood Road, St. Annes Park, Bristol, 4.
14,532 C. BEARDOW, 146 Greenhill Ave., Sheffield.
14,533 G. E. SUGDEN, 69 Cobham Ave., Motspur Park, New Malden, Surrey.
14,534 G. F. HUGGINS, 70 Chinnor Cres., Greenford, Middlesex.
14,535 N. E. THORNTHWAITE, 39 Brunton Ave., Carlisle, Cumberland.
14,536 A. HALL, 146 Hinde House Lane, Sheffield, 9.
14,537 F. H. ALLEN, 65 Granville Ave., West Hartlepool, Co. Durham.
14,538 D. C. GOLD, 55 Southend Road, S. Woodford, London, E.18.
14,539 P. C. MEIKLEJOHN, 427 Rush Green Road, Romford, Essex.
14,540 D. J. EAGLES, 63 Matlock Rd., Tyseley, Birmingham, 11.
14,541 J. A. HEDGES, 54 Nelson Rd., Hillingdon Heath, Nr. Uxbridge, Middlesex.
14,542 A. C. THOMSON, 5 Ivy Terr., Edinburgh, 11, Scotland.
14,543 J. H. ONIONS, 121 Kenpas Highway, Coventry, Warwick.
14,544 P. MOUGHTON, 15 Hawthorn Ave., Thornton Heath, Surrey. (Transferred from Associate Grade.)
14,545 R. E. STAGG, 2 Northgate Street, Devizes, Wilts.
14,546 R. W. M. REES, 106 Bohemia Rd., St. Leonards-on-Sea, Sussex.
14,547 A. HALL, 31 Derbyshire Lane, Stretford, Manchester.
14,548 A. H. WILLIAMS, 5 Stone Terrace, Newtown, Montgomeryshire, Wales.
14,549 J. H. MAGEE, 246 High Road, Felixstowe, Suffolk.
14,550 T. R. STEVENS, West Walks House, Dorchester, Dorset.
14,551 A. CUMMING, "Dullan Brae," Dufftown, Banffshire, Scotland.
14,552 E. E. KENCH, 39 Kerrfield Estate, Duston, Northampton.
14,553 W. H. COLE, 65 Ashland Road, Nether Edge, Sheffield, 7.
14,554 R. T. STORTO, 151 North Circular Road, Palmers Green, London, N. 13.
14,555 J. H. AKHURST, 54 Victoria Road, New Barnet, Herts.
14,556 J. M. EALEY, 13 Gordon Gardens, Swindon, Wilts.
14,557 W. F. COPELAND, The Cottage, High Road, Chiswick, London, W.4.
14,558 D. CALODIKES, 4 Prae Street, London, W.2.
14,559 R. S. HEAD, 9 Tenniscourt Ave., Kingswood, Bristol,
14,560 J. HARRISON, 169 Main Road, Gidea Park, Romford. Essex.
14,561 H. FOSTER, 256 St. Helens Road, Bolton, Lancs.

14,562 C. H. CHEATLE, 36 Esher Road, Birmingham, 22, C.
14,563 G. H. ASHTON, 26 Webster Ave., Liverpool, 20, Lancs.
14,564 L. C. MCLACHLAN, Morven Grove, Southport, Lancs.
14,565 R. MCKINNON, 40 Trevarthian Terrace, Milehouse, Plymouth, Devon.
14,566 E. HOWELL, 8 Regent Avenue, Harrogate, Yorkshire.
14,567 J. DOBSON, 556 Manchester Road, Bradford, Yorks.
14,568 S. MURPHY, 12 Commerce Street, Elgin, Morayshire, Scotland.
14,569 A. J. REYNOLDS, 135A, Green Wrythe Lane, Carshalton, Surrey.
14,570 T. W. SCOTT, 84 Park Road, Chesterfield, Derbyshire.
14,571 N. C. BURTON, 81 Harlington Road West, Feltham, Middlesex.
14,572 V. A. I. HOLMES, 243 Kent House Road, Beckenham, Kent.
14,573 J. W. FEW, 76 Pitcroft Road, North End, Portsmouth, Hants.
(Transferred from Associate Grade.)
14,574 C. HOOD, Greenlaw Road, Lauder, Berwickshire.
14,575 B. J. KILLICK, 75 Willoughby Road, Boston, Lincs.
916 *J. DEMPSEY, 34 Cross Lane, Lower Bebington, Wirral, Cheshire.
2278 *J. HADDON, 6 Rockmount Avenue, Thornliebank, Renfrewshire.
2488 *G. E. CASTELLAN, Burnside, Rolleston, Burton-on-Trent, Staffs.
4408 *J. MITCHELL-HENRY, 106 Station Rd., Hailsham, Sussex,
5661 *B. C. SEYS, 76 Ash Tree Road, Redditch, Worcs.
6892 *A. ELLIOTT, 2 Archdale Road, Arnold, Notts.
7171 *J. DEMPSEY, 34 Cross Lane, Lower Bebington, Wirral, Cheshire.
7284 *H. G. SMITH, 52 Joydon Drive, Chadwell Heath, Romford, Essex.

Associates

G. E. ALLEN, 42 Hands Road, Sheffield, 10, Yorks.
J. ANTHONY, 15 Albert Road, Chaddesden, Derby.
R. O. ATKINSON, 9 Keydell Close, Horndean, Hants.
E. B. BEST, 52 Ashley Road, Parkstone, Dorset.
J. BLACKBURN, 31 Flash Lane, Mirfield, Yorks.
F. J. BLAKE, 256 Victoria Road, Romford, Essex.
W. J. BOXALL, "Ty Galar," Bath Road, Emsworth, Hants.
G. BRIDGETT, 44 Main Road Grassmorr, Nr. Chesterfield, Derby.
R. BULL, 11 Albert Road, Chaddesden, Derbyshire.
D. C. BUNDLE, 48 Croyland Road, Edmonton, N.9.
A. T. BURDETT, Vividon, Bull Lane, Gerrard's Cross, Bucks.
D. H. BURRAGE, 15 Cumberland St., Westminster, London, S.W.1.
J. H. BUTT, 8 Endsleigh Grove, Hall Green, Birmingham, 28.
G. CARTER, 61 Castle Mona Avenue, Douglas, Isle of Man.
K. CALLOW, 40 Elkesley Road, Welbeck Colliery Village, Mansfield, Notts.
H. E. CHADWICK, 43 St. Philip's Avenue, Worcester Pk., Surrey.
D. H. COLLINS, 11 Sackville Road, Springwell Estate, Sunderland, Co. Durham.
L. F. A. COPLIN, 123A Kingston Road, New Malden, Surrey.
P. E. R. COURCOUX, 68 Edgeware Road, Milton, Southsea, Hants.
J. COUSER, 26 Rodside, Cumbernauld, Nr. Glasgow, Scotland.
A. W. CROSS, "Talbot Inn," Meadow Rd., Dettering, Northamptonshire.
D. CULLEN, 46 High Ridge Road, Apsley, Hemel Hempstead, Herts.
G. C. DRIVER, 117 Park Rd., Newcastle-on-Tyne, Co. Durham.
C. W. EASTER, 9 St. Paul's Road, London, N.1.
R. H. T. EDWARDS, "Green Roofs," Brown Loaf Farm, Race-Hill, Brighton, 7, Sussex.
A. G. EMBLETON, 14 Broadmoor Lane, Weston, Bath, Somerset.
J. L. EPSTEIN, c/o Department of Civil Aviation, Lydda Airport, Palestine.
C. F. FLETCHER, 64 Rothesay Terrace, Bedlington Station, Northumberland.
G. J. FOWLE, Magda House, 20 Magdalen Road, Exeter, Devon.
N. B. M. FRASER, 15 Dunnottar Ave., Stonehan, Kincardineshire.
F. S. FULLER, 15 Detling Road, Northfleet, Kent.
R. E. GARLAND, 182 Main St., Tweedmouth, Berwick-on-Tweed.
K. GATES, 20 Lancing Gdns., Lower Edmonton, London, N.9.
K. J. GATLEY, 19 Ashfield Road, Altrincham, Cheshire.
P. T. GEORGE, 42 Icknield Way, Tring, Herts.
A. R. GILES, Gateside, St. Katherine's, Aberdeenshire, Scotland.
A. D. GOLLOP, 9 Cook Rees Avenue, Neath, Glamorgan, S. Wales.
C. J. F. GORDON, 8 Castleton Avenue, Barnehurst, Kent.
S. H. GRAY, 1 Canesworde Road, Dunstable, Bedfordshire.
DR. J. GREEN, 12 Cambridge Gdns., Kilburn, London, N.W.6.
E. GREENWOOD, Brierley Road, Shafton, Nr. Barnsley, Yorks.
J. F. HALE, 74 Throne Rd., Whiteheath, Rowley Regis, Staffs.
D. W. HALL, 23 Abbotsford Road, Goodmayes, Essex.
F. S. HANCOCK, Sergeants' Mess, 7th Armd. Div. Signal Regt., B.A.O.R.
G. R. C. HANSTOCK, "Windyridge," Hulme Banks, Hulme, Nr. Longton, Stoke-on-Trent, Staffordshire.
J. H. HAWKINS, 15 South Street, Reading, Berks.
H. R. HODSON, 61 Molineaux Road, Sheffield, 5.
R. C. HOGG, 27 Shrubland Road, Dalston, London, E.8.
H. J. HOPKINS, 48 Westward Rise, Barry, Glamorganshire, South Wales.
B. M. HOPKINSON, 2 Swaledale Ave., Reedley, Burnley, Lancs.
J. H. HORNBLOW, 25 Shepherd's Hill, Stoughton, Guildford, Surrey.
F. B. HYBART, Liverton Vicarage, Loftus, Nr. Saltburn, Yorks.
T. J. JACKMAN, Stoneplace Cottage, Shorwell, Isle of Wight.
C. D. JONES, 38 Mason Street, Wolverhampton.
K. G. JUDD, 24 Bathurst Road, Folkestone, Kent.
W. KELLY, 100 Sherwood Street, Derby.
J. KERR, 42 Fisher Avenue, Hawick, Roxburghshire, Scotland.
J. KERR, Victoria Cottages, 96 Belville Street, Greenock, Scotland.
F. B. KING, 84 Court Rd., Grange, Cardiff, Glamorgan, Wales.
R. H. KITCHEN, 66 Bollo Bridge Road, Acton, London, W.3.
MRS. E. A. LIDSTONE, 71 Khama Road, Tooting, London, S.W.17.
E. S. LILLFORD, 43 Caldecote St., Newport Pagnell, Bucks.
G. A. LOCK, 41 Broomfield Rd., Gosforth, Newcastle-on-Tyne.
G. LYON, "Benchil," Broughty Ferry, Angus, Scotland.
R. MATTHEWSON, 88 Elford Rise, Windmill Lane, Nottingham.
W. L. MIDDLEMISS, 105 Manchester Rd., Knutsford, Cheshire.
J. W. B. MILLARD, 49 Oakhill Rd., Putney, London, S.W.15.
G. H. MITTON, 33 Greenfield Road, Colwyn Bay.
R. G. MOUNTAIN, 17 Druid's View, Crossflatts, Bingley, Yorks.
J. MULHOLLAND, 32 Erskine View, Old Kilpatrick, Nr. Glasgow, Scotland.
J. MCGRATH, Dromdiah, Killeagh, Co. Cork, Eire.
I. MACSPORRAN, 4 Killeonan, By Campbeltown, Argyll.
F. J. NICHOLLS, 225A Trysall Road, Merry Hill, Wolverhampton, Staffs.
W. C. NOYCE, 20 Queen Mary Road, Bemerton, Salisbury, Wilts,
F. R. ORMAN, High Street, Caring, Kent.
G. H. OXTOBY, 102 Bishopthorpe Road, York.
G. A. PALLISER, 45 Mayfield Grove, Dringhouses, York.
I. PENROSE, 27 Causewayhead, Penzance, Cornwall.
G. L. PHILLIPS, 3 Mill Street, Ballymena, Co. Antrim, N. Ireland.
R. PULLAN, 15 Intake Grove, Fagley, Bradford, Yorks.
S. W. REEVE, 101 Carlow Street, Middlesbrough, Yorkshire.
L. ROBERTS, 17 Parksway, Sedgley Park, Prestwick, Manchester.
G. ROGERS, 28 South Street, St. Austell, Cornwall.
I. M. ROLLO, 49 Arnold Street, Liverpool, 8.
F. C. RUSSELL, 25 Canonsleigh Road, Dagenham, Essex.
R. W. RUSSELL, 7 Nightingale Grove, Southampton, Hants.
D. G. SALT, 13 Albion Cottages, Albion Hill, Brighton.
T. SANDERS, 37 Park Road, Accrington, Lancashire.
E. SIDEBOTHAM, 8 Meldon Road, Manchester.
R. C. SMITH, 5 Grevill Avenue, Selsdon, South Croydon, Surrey.
S. B. SMYTHE, 16 Conville Boulevard, Bebington, Wirral, Cheshire.
T. S. SNEDDON, 1047 Dumbarton Road, Glasgow, W.4, Scotland.
R. T. SPOONER, 98 Shrewsbury Road, Carshalton, Surrey.
J. J. STEDMAN, 109 Watford Road, Sparkhill, Birmingham.
S. L. STEELE, 112 Mead's Lane, Seven Kings, Ilford, Essex.
J. R. STEVENS, 9 Browning St., Campsie, New S. Wales, Australia.
J. W. STRAFFORD, 32 Pontefract Rd., Ferrybridge, Knottingley, Yorkshire.
C. S. STYLER, 17 Alwyn Rd., Old Bilton, Rugby, Warwickshire.
A. SYKES, 7 Trinity Street, Huddersfield.
L. R. TURNBULL, 69 Pretoria Rd., Larbert, Stirlingshire, Scotland.
F. H. TURNER, Brightside, Brolighton, Hants.
W. J. UNDERWOOD, "Hillcrest," Fosse Road, Ratcliffe-on-Wreake, Leics.
C. WALKER, 96 Carlton Hill, Nottingham.
D. W. WALKER, 144 Folkestone Road, Dover, Kent.
K. R. WARNES, 64 Kingsway, Blyth, Northumberland.
I. D. WICKENDEN, 81 Benhurst Avenue, Elm Park, Romford, Essex.
L. S. WIDDICOMBE, "Ayrlea," Exeter Road, Exmouth, Devon.
J. H. WILKINSON, 523 Cowpen Rd., Cowpen, Blyth, Northumberland.
G. B. WOFFINDEN, 25 Chatham Street, Colne, Lancs.
J. K. WRIGHT, 22 Blyth Ave., Rawmarsh, Rotherham, Yorks.

Junior Associates

D. G. BENNETT, 933 Walmersley Road, Bury, Lancs.
T. F. BERNASCONE, 73 Osborne Road, Brighton, 6, Sussex.
J. A. BRISTER, 47 Leigh Hall Road, Leigh-on-Sea, Essex.
T. G. CULLIMOR, 1 Bowness Avenue, Headington, Oxford.
B. DAVY, 1 Glackwood Avenue, Balby, Doncaster, Yorks.
S. T. DEXTER, 44 Asplin Road, Leicester.
G. V. FARRANCE, 80 Ashleigh Avenue, Bridgwater, Somerset.
E. FAULKNER, 42 Dartington Street, Castleton, Rochdale.
B. GARCIA, Flat 1, No. 2–4 Dawson Place, Bayswater, London, W.2.
N. E. GAYLER, 32 Love Lane, Morden, Surrey.
J. R. GENTLE, "Silverdell," Bedmond Road, Abbots Langley, Nr. Watford, Herts.
S. HEATH, 41 Pentre Lane, Llanelly, Nr. Wrexham, North Wales.
D. L. MARTIN, 43 Sedgemere Avenue, Finchley, London, N.2.
B. PEARSON, 19 Hawthorn Grove, Rodley, Leeds, Yorks.
W. J. PITMAN, "Sunnyside," King George Avenue, Bridgwater, Somerset.
A. C. PRIOR, 224 Wellington Road, Enfield, Middlesex.
D. J. REDSHAW, 5 North Street, Driffield, East Yorks.
A. J. RUSSELL, 35 Parkland Grove, Ashford, Middlesex.
J. RUTHERFORD, 34 Holland Road, Ipswich, Suffolk.
D. E. SMITH, 13 Vale Road, Dartford, Kent.
E. SMITH, 36 Oxford Street, Barrow-in-Furness, Lancs.
G. L. SOUTWELL, 4 Leamington Terrace, Uppingham, Rutland.
P. WEYGANDT, 2,019 Giant Street, Toledo 6, Ohio, U.S.A.

* Denotes re-elected.

NEW MEMBERS ARE CORDIALLY INVITED TO ATTEND LOCAL MEETINGS.

R.S.G.B. BULLETIN

OFFICIAL JOURNAL OF THE INCORPORATED RADIO SOCIETY OF GREAT BRITAIN

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

Editor :
JOHN CLARRICOATS

Editorial office :
NEW RUSKIN HOUSE, LITTLE RUSSELL ST., 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.

CONTENTS for APRIL, 1947

VOL. XXII No. 10

THE BULLETIN

THE observant reader will have noticed that a new and, we hope, more acceptable layout has been adopted for recent issues. These changes are but a small indication of the way in which the present Council views the whole publications programme of the Society.

The BULLETIN, now approaching its 22nd birthday, has always been regarded as the chief privilege of membership and notwithstanding numerous difficulties it has continued publication without a break since Volume 1 Number 1 appeared in July, 1925.

The recent decision of the Council to pay for all published technical articles has been warmly welcomed throughout the country and although we do not anticipate spectacular results for some time to come the new arrangement will undoubtedly act as an incentive to many members who in the past have offered their contributions elsewhere.

Until the paper position improves materially it will not be easy to increase the number of pages set aside for technical articles for, unlike commercial publications, the R.S.G.B. BULLETIN is a Members' private journal and as such it must carry a good deal of general and non-technical material in each issue. However, a method has now been devised whereby members will be able to read more technical articles than is at present possible. By taking advantage of the Paper Control Order which covers the production of new periodicals, the Council will introduce to the membership next month the first issue of a publication entitled *The Proceedings of the R.S.G.B.* This new periodical will be published three times a year and each issue will contain at least two of the papers which have been read at meetings of the Society held at the Institution of Electrical Engineers in London. The amount of paper authorised for new publications will allow us to print 16 page issues. Admittedly this is not as much as we should like but we believe that the new venture will be warmly welcomed.

Reverting to the BULLETIN, in our last issue we appealed in general terms for technical articles. Here, we propose to be a little more precise by enumerating a few of the subjects which we should like to see dealt with in future issues :—

(*a*) Receiver Test Measurement—an article indicating ways and means for determining whether a receiver is functioning at peak efficiency.

(*b*) Measurement of Transmitter Output—a subject dealt with vaguely in most text books.

(*c*) Tendencies in the design of Communication Receivers with specific reference to new constructional and circuit features.

(*d*) Unorthodox aerial systems. Here is a chance for those who use odd bits of wire to tell us how they think they work !

(*e*) Practical information on Frequency Modulation.

(*f*) Equipment for use in the 2300 Mc/s. band.

(*g*) Methods and equipment used for the recording of amateur transmissions.

(*h*) Grounded grid amplifiers for amateur use.

These are a few suggestions for full length articles. In addition we invite short contributions on a variety of subjects, such as good earth connections, counterpoise designs, mercury vapour rectifiers and the danger of under-run heaters, *Perspex* windows for aerial lead-in arrangements and how to design a QSL card. Also how about a critical survey of operating habits for the guidance of new comers ?

We should also like to revive our pre-war " Bright-Ideas " feature by publishing useful hints and tips acquired by members in actual practice. There must be hundreds of members who have hit upon bright ideas which would prove invaluable to other readers. These like other technical contributions will be paid for.

The demand for more technical and constructional articles in THE BULLETIN has been growing ever since the war ended. We recognise that this is one of the primary services which our members need, and we are determined that their need shall be met. The Society's funds are therefore going to be used for securing the best articles for publication.

We must emphasise that it has never been our policy to publish a description of a piece of equipment until we have been assured that it *works*. In past years certain publications made a habit of describing, and even photographing, gear which had never been put into operation. We know of one case where a transmitter described in an article had not even been wired up !

While some constructional articles are written to illustrate the ingenuity of the authors in devising unorthodox ways of solving their problems, we are glad also to publish articles which are based on the conventional use of standard components. For some of these articles we shall be indebted to those manufacturers who have supplied the volunteer constructors with the necessary components and valves. The friendly relationship between the Society and the Radio Industry, especially that part which caters for the needs of the radio amateur, grows ever stronger, and as will be seen from the announcement on another page, the Society intends to strengthen that relationship by staging, in November next, the first Amateur Radio Exhibition ever to be held in Great Britain.

In the meantime we shall prepare ourselves for a flood of contributions.

J. C.

NOISE SIGNAL GENERATOR

By W. P. DOLPHIN (G4DN)*

Receiver Sensitivity

IT will be very good news to most amateurs that the recent development of " noise source " methods of sensitivity measurement make it possible to measure receiver performance not only to a much higher degree of accuracy than was normally possible with older types of signal generator, but also with extreme simplicity and negligible outlay. Few amateurs have signal generators available to measure the " signal-to-noise " ratio of their receivers, and the device, about to be described, is of special interest to those working on the five metre band, and on Television Receivers, where it is so essential to achieve the best signal-to-noise ratio in the receiver. It provides a steady test signal in the same manner that a signal generator does, but has several advantages.

With a signal generator the method of measuring the signal-to-noise ratio is familiar to most experimenters. A signal is fed into the receiver at the correct impedance to match the input of the receiver, and the amplitude of this signal is varied by means of a calibrated attenuator so that the applied signal is made to appear at the output of the receiver just equal to the inherent noise level of the receiver. This condition is known as the lower-limit of detectability, and the signal-to-noise ratio is quoted as so many microvolts to double the receiver noise. The better the sensitivity of the receiver the lower will be the amplitude of applied signal to double the receiver noise, and this in turn is governed by the band-width of the receiver, for the following reason. Noise is generated over a very wide range of frequencies, and a receiver with a narrow band-width will therefore only select a small portion of noise frequencies, and conversely a receiver with a broad band will produce more noise because it will select a wider range of noise frequencies. A narrow band-width receiver will therefore require a smaller amplitude of signal to double noise and hence its sensitivity will be greater. It will be seen that receiver sensitivity figures should not be quoted without a reference to the band-width of the receiver and in most communications receivers the band-width is usually set for the correct amplifications of audio frequencies. This is a very narrow band and the amount of noise is small, but in the case of receivers working on higher frequencies, say 60 Mc/s, and on television receivers, band-widths are broader and it is more important to know this when making a signal-to-noise measurement. With the noise generator no consideration of band-width is necessary, for the noise signals have an infinite range of frequencies and if the band-width is narrowed, say in the I.F. channels, the reduction in noise signals getting through to the output will take place on both the applied noise signal and also on the inherent noise in the first circuit of the receiver.

The Noise Generator

The noise generator to be described provides experimenters with a simple and inexpensive device that will enable them to make sensitivity measurements on receivers with greater accuracy than that obtained with a signal generator. The valve referred to here is a G.E.C. E. 1468 (CV172), but similar results can be obtained by those wishing to use up an old bright emitter valve having a tungsten filament.‡ There are several applications of this noise diode the foremost among them being the measurement of receiver sensitivity.

The noise generator gives an absolute reading of the " noise factor " of any receiver or in other words an index of its sensitivity. This must not be confused with " gain," for an insensitive receiver can have a very high gain yet its ability to receive a weak signal may be less than a receiver with a lower gain but higher sensitivity. The definition of " noise factor " is given by the two ratios thus :

$$N.F. = \frac{\frac{Signal\ Power}{Noise\ Power}\ at\ input\ terminals\ of\ receiver}{\frac{Signal\ Power}{Noise\ Power}\ at\ output\ terminals\ of\ receiver}$$

The Character of Noise

The noise generator consists of a saturated diode as a source of noise signal and the anode current of this valve is directly proportional to the amount of noise power generated. Since no changes in anode voltage will produce any change in anode current (the diode being saturated) the anode current, and hence the noise power output, can only be varied by adjusting the filament temperature. The principle is as follows. In this or any valve, electrons arriving at the anode from the cathode do so at entirely a random rate, and this results in a very large number of minute current pulses or spikes which are spread over the entire frequency spectrum passed by the noise diode output circuit. The fluctuations are developed across a load resistance which is of such a value that it matches into the input impedance of the receiver. The noise fluctuations accepted by the band of frequencies to which the receiver is tuned are thus fed through the receiver as a test signal. The character of this test signal is similar to that of ordinary receiver noise so that its effect will be to give an increased level in the output of the receiver loud speaker or headphones, or on the carrier-level meter, in a similar way that a signal from a signal generator would do. The amount of noise signal required to be fed into the receiver to double the receiver noise will depend on the sensitivity of the receiver, and unlike the signal generator, as explained previously, will be independent of the overall band-width. The noise test signal is made to be equal to the amount of noise generated in the first circuit of the receiver, and it is only the first circuit that is important as regards sensitivity because it is this stage that has most amplification following it.

All valves subsequent to the first in a receiver generate their own noise signal but these noise powers are of no consequence if sufficient gain is obtained in the first stage. The ratio of applied noise to double the receiver (or first circuit) noise, is expressed as a logarithmic ratio with respect to the noise in a theoretically perfect receiver which would add no noise to that arising in the aerial. The theoretically perfect receiver can be taken as generating no noise of its own. The perfect receiver will therefore have an N.F. of 0 db. Fig. 1 shows the circuit of a noise diode which could be used by amateurs. The chokes CH1 and CH2 must be chosen to have a high reactance at the frequency to which the receiver is tuned and the condensers C1, 2, 3, must have a low reactance. For frequencies around 100 Mc/s. values of inductance can be 2–3 microhenries for CH1, a similar value for CH2, but this must have a substantial gauge of wire to carry the 1 ampere of filament current. An additional choke CH3 is a useful precaution to ensure that no external noise or interference is added to the noise signal. Condensers C1, C2 and C3 should be about ·001 μF. These values are not critical but it is

* 304, Battersea Park Road, London, S.W.11.

‡ Any R type triode with grid and anode strapped would probably function quite satisfactorily.—Ed.

essential to see that there are no long leads. For frequencies between, say, 28–50 Mc/s., it is sufficient merely to double the values of capacitance and inductance. R is chosen to match the input impedance of the receiver and in the case of receivers having balanced inputs an alternative circuit is given in Fig. 2. The added components C4 and CH4 may be made similar to C3 and CH2. The variable resistance RV should be 5 ohms and capable of carrying one ampere of current without overheating. It is useful to have a switch in the H.T. supply so that comparison can be made quickly and conveniently between the receiver noise and applied noise. If the receiver under test has a good noise-factor and therefore has good sensitivity, only a small amount of noise test signal will be required to double the existing noise of the receiver. On the other hand, if the receiver under test has a poor noise factor (*i.e.* is " noisy ") a larger amount of noise test signal will be required to double the existing noise in the receiver, and the anode current reading of the noise diode will be proportionally higher.

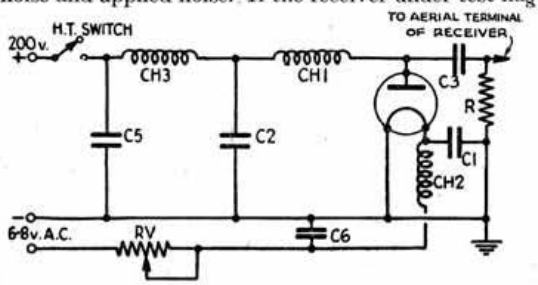


Fig. 1.

Noise Circuit suitable for concentric receiver output. For component values see text.

Measurement of Noise Factor

The procedure for finding the noise factor of a receiver with a saturated diode is as follows. Connect the noise diode with the correct matching resistance to the aerial terminals of the set, switch off its anode current and adjust the receiver gain so that the receiver noise is shown on the output of the receiver and observed either on carrier strength meter, second detector meter, or oscilloscope. Now switch on the noise generator and adjust its filament temperature (and hence its anode current) so that a 2 : 1 increase is observed on the receiver output. The noise factor of the receiver will be equal to

$$10\ log_{10}\ \frac{2IR}{300}\ decibels$$

where I is the anode current of the noise diode in milliamperes and R is the load resistance of the noise generator.

A typical case would be where the noise diode current required to cause the noise signal to double the receiver noise is 3 mA and the matching resistance is 80 ohms, which is the usual input impedance of, say, a communications receiver employing a dipole aerial. Now the noise factor would be

$$10\ log_{10}\frac{2 \times 3 \times 80}{300}\ decibels$$

which works out to

$$10\ log_{10}\ 1{\cdot}6\ = 2db.$$

Thus the noise factor of the receiver under test is 2 db. and as this expresses a ratio with the theoretically perfect receiver (whose noise factor would be 0 db.), it should be *minus* 2 db. The accuracy of this measurement will depend mainly on the ability of the operator to observe a 2 : 1 increase in the receiver output.

Checking the Law of Carrier Level Meter

Before making a noise factor measurement it is most essential to know what the output indicating device does when a signal on the input of the receiver is doubled. First, select a convenient range on the output meter—which may be a carrier strength meter, or a sensitive meter in series with the load resistance of the 2nd detector, say between the points 3 and 6 units on the scale of meter. If a meter calibrated in decibles is used, the points selected should have a difference of 6 db. Adjust the H.F. gain-control so that a very small amount of noise is indicated in the output. Now switch on the noise generator and set its anode current such that the noise signal from it causes the output indicator to read 3 units. Note the anode current of the noise diode and then increase its anode current so that it is 4 times the previous reading. The increased noise signal resulting from this higher anode current should cause the output indicating device to read 6 units if the receiver is linear. If it reads any other figure, say 5–6 units, it is non-linear, but this is now unimportant as it is now known that to double the receiver noise voltage the output indicating device should increase from 3 to 5–6 units. A noise factor measurement can then be undertaken. Switch off the noise diode and adjust the receiver H.F. gain-control so that the receiver noise causes the output indicator to read, say, 3 units, then switch on the noise diode and make a noise factor measurement as described previously.

Other Uses of Noise Generator

The noise generator can also be used to discover the optimum matching resistance of a receiver input circuit at any frequency. A number of noise factor measurements are made with a series of different load resistances and a curve can be drawn of the resultant noise factors. The best noise factor will be obtained with about optimum matching resistance and useful information can be extracted as to the characteristics of the aerial coupling circuit.

For convenience a chart is given (Fig. 3) showing the anode currents required for various resistances and equivalent noise factor.

Many amateurs will possibly find they will, with the noise generator, be able to improve the sensitivity of their receivers by perhaps as much as 3 db., and the importance of this will be readily realised as it is equivalent to doubling the power at the transmitter end.

The procedure would be as follows :

Select the value of R to be used, so that it matches into the receiver, in place of the aerial. If, for example, a half-wave dipole is used and the feeder cable is 72 ohms, then R must also be 72 ohms. Connect the noise generator to the receiver and carry out adjustments, say, to the input circuit, the coupling between input circuit and aerial coil or vary the amount of local

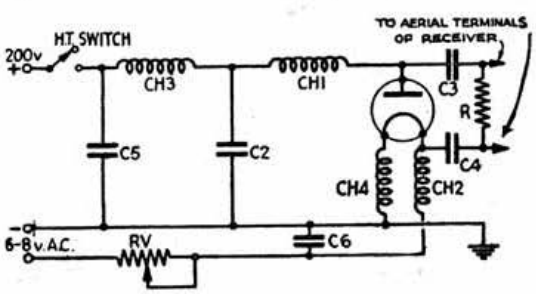


Fig. 2.

Noise Diode Circuit suitable for balanced receiver input. Suggested values for 28—100 Mc/s: CH 1 and 3, 10μH. CH2 and 4, 10μH but wound with suitable wire to carry 1 amp. C2—6 ·001μF. R chosen to match aerial input impedance of receiver under test. Short leads are essential where anode connects to C3, R, C4 and output.

oscillator injection, etc. The best condition will be that which results in the lowest value of noise diode current required, to double the receiver noise, *i.e.*, the lowest noise factor.

In checking the amount of extraneous noise picked up by the aerial, either from local sources or from outer space, it is not sufficient merely to remove the aerial. The comparison should be made with the receiver first connected to an artificial aerial. The noise generator can be used for this purpose with its H.T. supply switched off.

Another use of the noise generator is to calibrate the carrier-level meter. In many cases this is not linear and the amount of non-linearity can be determined by applying a noise signal and varying its anode current in steps. A curve can then be plotted of these readings against the readings obtained on the carrier level meter. The most linear carrier level indicating device, is a sensitive microammeter in series with the second detector cathode load resistance. For guidance, the noise-factor obtained on 60 Mc/s., using an EF50 or RL7, should be about 6–7 db. With a grounded-grid triode the noise-factor will be about 5–6 db.

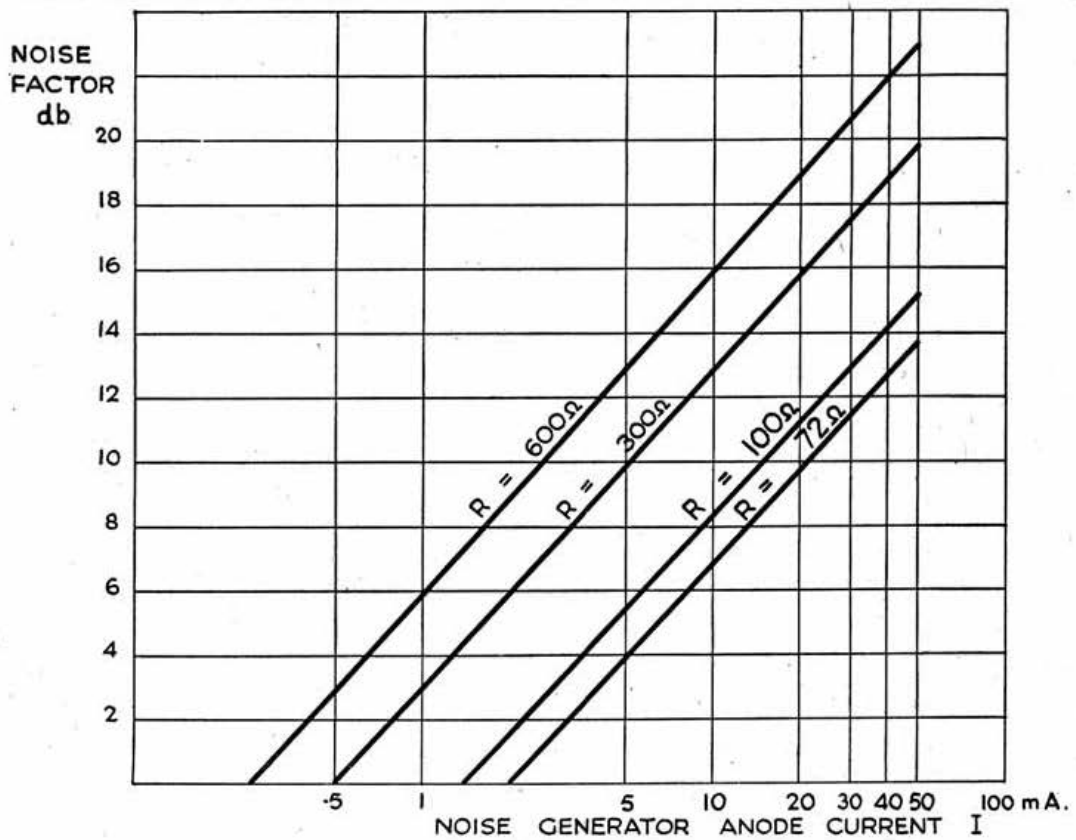


Fig. 3.
Graph relating anode currents required for various resistances and equivalent Noise Factor. The lines show the Noise Factor of a receiver measured with a Noise Generator when the load resistance R and the current I produce a 2 : 1 increase in the noise output of the receiver. Maximum current should not exceed 50 mA.

International Telecommunications Conferences

The United Kingdom Government has accepted an invitation from the United States Government to send delegations to attend the following International Conferences which are to be held at Atlantic City during the coming Summer.

(1) An International Radio - communication Conference, to open on May 15 next, for the purpose of revising the International Radio-communication Regulations, last revised in 1938, including the allocation of the radio frequency spectrum between the various types of wireless service.

(2) An International High-Frequency Broadcasting Conference, to be held immediately following the International Radio-communication Conference, for the purpose of securing a better regulation of long-distance broadcasting services.

(3) A Plenipotentiary Conference of the International Telecommunication Union, which will begin on July 1 next, for the purpose of drawing up a new International Telecommunication Convention to replace that signed at Madrid in 1932, and framing statutes under which the International Telecommunication Union will enter into relations with the United Nations Organisation.

New Honorary Member

The Council has been pleased to confer the dignity of Honorary Membership upon Mr. Ernest Lett Gardiner, B.Sc., G6GR, Immediate Past President.

Mr. Gardiner served as President from 1944 to 1946 during which time he visited many parts of the country as a representative of the Council.

We offer him warm congratulations on this latest recognition of his services to the Society.

A PORTABLE DIRECTION FINDING RECEIVER

By J. M. S. WATSON (G6CT)*

THE short article which appeared in the January issue of the BULLETIN described some of the results obtained during pre-war Direction Finding events. Rules for the forthcoming R.S.G.B. D/F contests appeared last month and those members interested in this aspect of radio will be thinking about building a suitable receiver; it is hoped that this article will be of help to such members.

Anyone who has been considering the construction of a "top-band" D/F receiver for the first time will probably have turned to some of the publications covering this field of work. If so they will have found that in the main they deal with highly complicated ground installations operating on low, medium or very high frequencies. Such installations are intended to give accurate bearings over comparatively long distances. Ship and airborne D/F systems are also discussed in most text books, but again the apparatus is complicated to say the least.

Before the war the writer used a small portable D/F receiver and, although it must be admitted that the range of operation never exceeded about 30 miles, he was surprised to find, during Service life, that the results he had been obtaining compared very favourably with certain well-known types of ground installations.

The Design of a 1·7 Mc/s. D/F Receiver

The essential design requirements are accuracy of bearings combined with rugged construction and complete portability. The receiver to be described was constructed after several alternative designs had been tried out by various interested amateurs. The circuit is conventional except for the addition of certain refinements that have proved their value in practice.

For operation in the 1·7 Mc/s band the only form of aerial with marked directional properties that can be usefully employed is the familiar loop or frame. Maximum signal pick-up is obtained when the plane of the loop points in the direction from which the signals are arriving. Conversely when rotated 90° so that the vertical plane of the loop is at right angles to the direction from which the signals are arriving, the pick-up will be at a minimum—in fact under theoretically perfect conditions it should be nil.

As it is much easier to detect slight changes in the strength of a weak signal than of a strong one, D/F bearings are always taken by swinging the loop across the position of *minimum* pick-up.

It will be seen from Fig. 1, which shows the pattern of a loop aerial, that the position of minimum pick-up

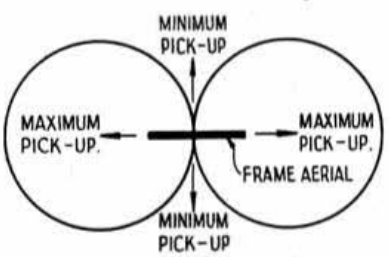


Fig. 1.
Loop Aerial showing positions of maximum and minimum pick-up.

* 23 Eastwood Boulevarde, Westcliff-on-Sea, Essex.

is much sharper than the area of maximum pick-up. It will also be seen that there are two minimum and maximum positions, each 180° opposed to each other. Fig. 2 shows the use of "sense," a feature which permits the operator to determine the true direction from which a signal is coming. This aerial pattern is called a "cardioid." As the single position of minimum pick-up is not so sharp as with the loop alone, it is common practice when taking a bearing on a signal

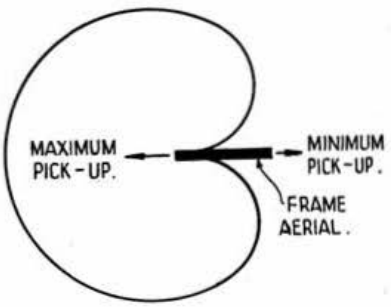


Fig. 2.
Illustrates the value of a Sense Indicator. The aerial pattern is called a "Cardioid."

to swing the loop across the signal and determine the two possible directions from which it is coming. "Sense" is then switched on and the true direction determined. It should be noted that the position of minimum pick-up when using the cardioid is 90° different to the two minimums of the loop.

A sharply defined and accurate minimum pick-up can only be achieved if the possibility of direct pick-up of the incoming signal in the receiver wiring is eliminated by complete screening. Leads from batteries which may be housed outside the screening should be decoupled to the screen at the point of entry. R.F. chokes may also be found necessary in the battery leads. At the same time coupling between the loop aerial and the first valve stage must be so arranged that only the electro-magnetic component of the incoming signal reaches the grid of the valve. This can be achieved by the employment of an electrostatic screen between a coil coupled to the loop and the grid coil of the valve. Such a coupling has to be fairly loose and even if the transformer is well designed there is only a small transfer of energy. An alternative method is to let the valve stage cancel out any electrostatic pick-up within itself. This method which is far more satisfactory is accomplished by employing a push-pull R.F. amplifier; the cancellation then takes place in the anode coil of the stage.

Before describing the receiver in detail it should be mentioned that a push-pull R.F. amplifier, using low consumption pentodes of the *Mazda* SP22 type followed by a conventional detector and pentode L.F amplifier, will give good headphone strength when listening to weak signals.

RECEIVER CONSTRUCTION

The description which follows should be read in conjunction with the circuit diagram (Fig. 3).

The Frame Aerial

Ten turns of 16 S.W.G. d.c.c. wire are close wound on a wooden frame 10" wide and 14" high. This aerial forms the grid coil of the push-pull R.F. amplifier, each end of the aerial being taken direct to the grids of V1 and V2. For maximum sensitivity the frame

is tuned by a ·0001 μF air-spaced trimmer (C1) mounted on the receiver panel, and thus can easily be adjustable at any time. The exact centre of the frame aerial is connected to the chassis.

Owing to the tight coupling employed throughout it will be found on approaching a transmitter that the receiver tends to be swamped. To prevent this happening, two resistances (R2 and R3) are shunted across the frame. These have values of 100 ohms and 50 ohms respectively. They are so arranged that either can be selected by the turn of a switch. The switch should have a third position so that for normal use there is no shunt in circuit.

In practice these shunts will be found very useful as a means of determining the range of the transmitter. With the 100 ohms shunt in use it should be just possible to hear the signal from a 10 watt transmitter at a distance of about one mile. With the 50 ohms shunt in circuit the range is reduced to about a quarter of a mile. In this position, it is possible to observe changes in signal strength over a distance of a few yards, assuming a suitable meter is employed.

The R.F. Amplifier

Two *Mazda* SP22 valves were used in the original set but similar valves would be satisfactory. The valves and their associated components must be well screened and the grids taken to the frame as previously mentioned. H.T. for the screens is obtained through a suitable resistance. A ·01 μF decoupling condenser (C5) is also required.

The anodes are connected to the two ends of an untuned coil which is tightly coupled to the detector grid coil.

The anode coil consists of 60 turns of 34 S.W.G. d.c.c. wire scramble-wound over about ½" of a paxolin former which is just large enough to slide over the grid coil. The centre of the anode coil is taken to H.T. through a 5,000 ohms resistance (R4) and is decoupled by a ·01 μF condenser (C6). The position of the anode coil should be adjusted to be as near to the grid end of the detector valve grid coil as will give maximum coupling, together with smooth reaction.

The Detector Stage

A *Mazda* HL23 triode (V3) is used in a conventional leaky grid circuit. The grid leak (R5) is taken to a potentiometer connected across the L.T. In its simplest form this need only consist to two fixed resistances (R6 and R7) of correct relative values. The values are unimportant provided the ratio gives the required voltage division. This will, of course, depend to some extent upon the constants of the circuit and upon the value of H.T. voltage used.

The grid coil consists of 80 turns 34 S.W.G. d.c.c. wire close wound on a 1" former. This coil is tuned by a ·0003 μF variable condenser (C4), but a useful refinement is to employ two ·0001 μF air-spaced trimmers (C2 and C3), one in series and the other in parallel with the main condenser. By suitable adjustment of these two trimmers the main condenser can be made to cover either the whole of the band, or a portion a few kilocycles wide. It will be found a great advantage when competing in a D/F contest, to adjust these trimmers so that the frequency of the hidden transmitter falls into the middle of a band about 10 kc/s. wide covered by the main tuning condenser. No time will then be lost in retuning and identifying the signal should the dial of the condenser be knocked or moved in any way.

The reaction winding consists of 12 turns 34 S.W.G. d.c.c. wound at the bottom of the grid coil.

The L.F. Amplifier

For some time the writer used transformer coupling between the detector valve and a *Mazda* PEN25

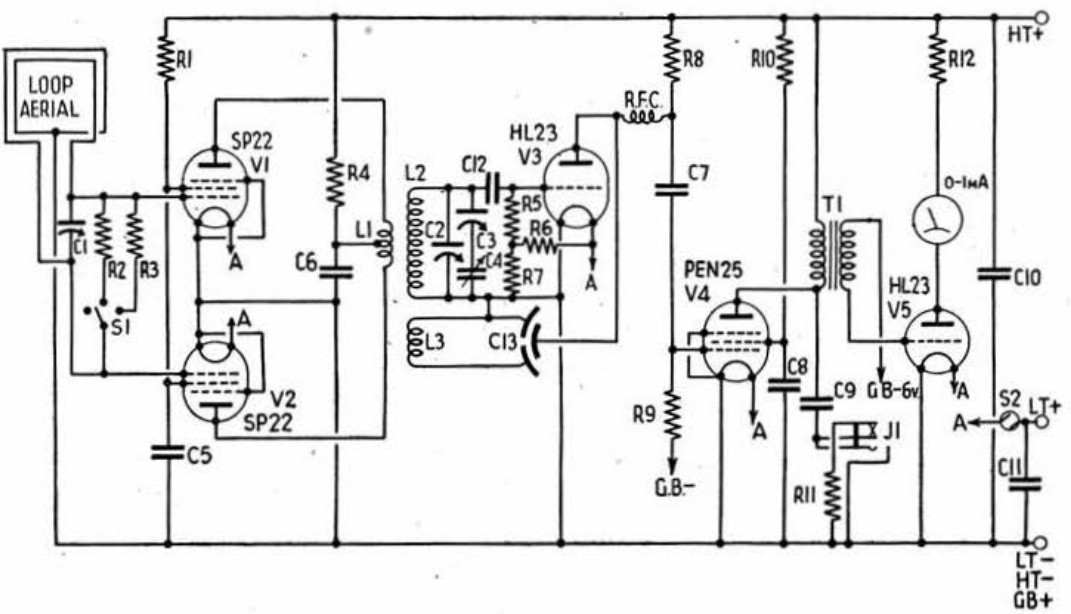


Fig. 3.
Circuit diagram of D/F receiver.

C1, 2, 3	.0001 μF air spaced trimmers.	R1, 8	250,000 ohms.	R12	100,000 ohms.
C4	·0003 μF variable.	R2	100 ohms.	All resistances ½ watt types.	
C5, 6, 7	·01 μF paper.	R3	50 ohms.	S1	Single-pole 3-way switch.
C8, 10, 11	·1 μF paper.	R4, 7	5,000 ohms.	S2	On-off switch.
C9	·5 μF paper.	R5	1 megohm.	T1	Midget 1–4 audio transformer.
C12	·0003 μF.	R6, 10	1,000 ohms.	L1–3	See text.
C13	·0003 μF differential reaction.	R9	500,000 ohms.		
		R11	2,000 ohms.		

output pentode (V4). It has been found, however, that weight is saved and satisfactory output obtained by using a normal resistance coupled circuit. H.T. for the anode can be supplied directly through the headphones but it is desirable to use a double contact jack so that when the 'phones are disconnected the set is switched off. When using an output meter, as shown in the circuit, the primary of the coupling transformer enables the 'phones to be decoupled through a ·5 μF condenser. (If quality is required this condenser should be larger.) To keep the loading constant so that the meter readings are unaffected when the 'phones are disconnected, the jack should be so wired that a resistance (R11) equal to that of the 'phones comes into circuit when the plug is removed.

The Output Meter

The *Mazda* HL23 triode (V5) is fed through a small high-ratio transformer from the pentode output valve (V4). The grid of the HL23 is supplied with 6 volts negative grid bias in series with the secondary of the transformer thus the valve operates as an anode bend detector or valve voltmeter, and indications are obtained in a 0–1 milliammeter placed in the anode circuit. A 100,000 ohms resistance (R12) is connected in series with the meter. Whilst this resistance will have no appreciable effect on low readings it will gradually limit the meter deflection as the current increases and it will, in fact, provide an approximate logarithmic indication of signal strength. It will also prevent overloading and damage to the meter.

When taking bearings it will often be found more accurate to watch the meter indications of minimum pick-up than to estimate them by ear. Furthermore, by using the shunt resistances previously mentioned to keep the meter reading at the bottom of its scale slight changes in signal strength can be detected when approaching the transmitter, or when the transmitter is over-shot.

"Sense"

To obtain "sense" indications and a cardioid aerial pattern as shown in Fig. 2, energy from a small vertical aerial (which should be equal to that picked up by each half of the frame aerial) is fed to the R.F. side of the receiver. This energy must be in-phase with one side of the loop winding and 180° out of phase with the other side. There are several ways of accomplishing this but perhaps the simplest is as shown in Fig. 4. This method does not give a true cardioid, but enables the vertical aerial to be kept down to about 2 ft. in length. The aerial can be mounted on the side of the receiver cabinet and the effective length to match its pick-up to the loop can either be obtained by varying the actual length of the aerial (an expanding steel rule is suitable), or by using an attenuator in the grid of the R.F. pentode. The easiest method of coupling this stage to the receiver is by means of two turns of 34 S.W.G. d.c.c. wire wound round the centre of the frame aerial winding. This arrangement will have some slight detrimental effect on the sharpness of the minimum pick-up position, but any inaccuracy in bearing should be very slight. The fact that the true direction of the transmitter can be determined outweighs any disadvantages.

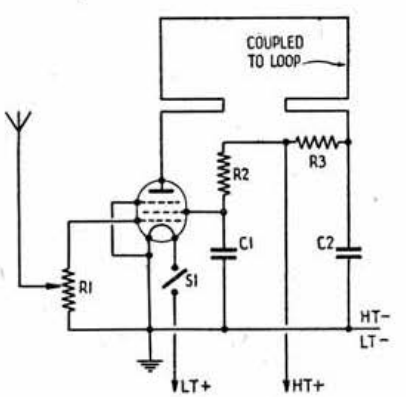


Fig. 4.
Circuit of Sense Indicator.

R1	1 meg. potentiometer.	R3	5,000 ohms.
R2	300,000 ohms.	C1, 2	·01 μF.
	S1 Sense on/off switch.		

The Cabinet

The original receiver was built on a small aluminium chassis and panel, which when completed was placed inside a screening box. A cabinet 7" deep and large enough to take the frame aerial was constructed from ¼" mahogany for the sides, top and bottom, and each corner strengthened by angle brass. The front and back of the cabinet can be of lightweight three-ply as all weight is taken by the mahogany sides. A small ball-bearing turntable should be screwed to the underside of the cabinet, and a leather carrying handle screwed to the top. These accessories can usually be obtained from an old portable B.C.L. receiver.

Valves and Batteries

Some difficulty may be experienced in obtaining equivalents of the valves used in this receiver. The range with 1·5 volt heaters will probably be found easier to procure.

To save weight midget-type batteries are very useful, but as their life is short they should only be used in the field. When testing, or using the receiver for other purposes, heavier standard types of batteries can be housed in a cabinet of the dimensions given above. The batteries should be held in position by means of rubber bands or by some other suitable method, and they should be so positioned that the weight in the cabinet is equally distributed. Attention to this point will assist carrying and permit easy operation of the set on the turntable.

Other Types of Receivers

During the past few months the writer has examined many different types of portable receiver ranging from converted walkie-talkie sets (with a frame aerial wound on an old tennis racket) to a truly midget effort in a 2 lb. toffee tin with a frame aerial about 4" square and forming the carrying handle. Some constructors mount the frame on top of the receiver cabinet, but after seeing these creditable efforts the writer still feels that a self-contained unit of rugged construction, reasonable weight and with a fairly big frame gives the best results under the considerably varying conditions in which it will be used.

Testing the Receiver and taking Bearings

The receiver should be fully tested on the bench and the constructor should be quite sure that the maximum gain possible is being obtained. The set should then be tapped quite heavily and any microphony, flutter of signal or similar defects cured before mounting in the cabinet. When the receiver has satisfactorily passed these tests and is a complete unit in the cabinet a compass of the "dead-beat" type should be mounted on the top of the cabinet. Great care must be taken to select a spot where its reading is not affected by the magnet in the output

meter or by any other magnetic field. Should such a spot not be found, an arm about 4" longer than the width of the cabinet should be hinged to the top of one side and the compass mounted at its end. When folded out it should be well away from any magnetic fields. When folded across the top of the cabinet the compass will protrude on the other side thus allowing the arm to fold down flush to the cabinet. Such a device will be found useful as a vernier control when rotating the set. When taking the compass readings always remove the headphones. If this is not done their magnets may affect the reading—especially if the operator is short-sighted !

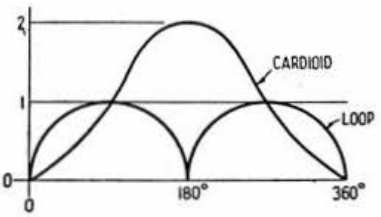


Fig. 5. Relative pick-up of a loop and Cardioid.

The next operation is to test the accuracy of the bearings, *i.e.* minimum pick-up position. To do this the set should be taken into a field, or to some position well away from wire fences, cables and aerials. After the set has been made to oscillate a medium strength signal from a known location should be tuned in. The cabinet should then be rotated until a position of minimum pick-up is heard, and the compass reading for this position noted. The set must then be rotated through 180° and a check made to ascertain that the frame is correctly balanced. The two bearings should be plotted on a large scale map and the accuracy of the bearing checked. Having repeated this procedure several times on signals of varying strengths the operator can turn his attention to obtaining " sense " indications. The direction in which the set always points for maximum and minimum pick-up in respect to the direction from which the signals are arriving should be noted. This direction will never change unless the coupling between the sense unit and the frame aerial is altered. The relative pick-up of a loop and cardioid is shown in Fig. 5.

It should be noted that this receiver is not designed to discriminate between ground and reflected waves. Should bearings be taken at night on distant signals, good, but inaccurate, bearings will often be obtained. In other cases the minimum pick-up position will not be sharp nor will the signal strength decrease very much.

The Art of D/F and Classification of Bearings

Anyone interested in the art of D/F would be well advised to visit a D/F station and watch an experienced operator at work. Bearings are not taken by slow ridged rotation of the loop or goneometer but by gently swinging across the minimum signal position. An experienced operator will produce an accurate bearing with a nil signal some 10° to 20° wide and under conditions of severe interference.

For reference purposes bearings are usually classified, *e.g.* a good bearing with a minimum not wider than 2° is called 1st class, 5° 2nd class, and 10° 3rd class. It will be found to be of great help in a D/F contest if a competitor always classifies his bearings. These classifications do not mean that a bearing is inaccurate but they do indicate the degree of reliability that should be placed on them.

The Map and Magnetic Variation

The largest scale map possible should always be used. For short distances the projection is not important, but for distances in excess of about 50 miles a projection of the great circle type should always be used. It will be found useful to mount the map on a board sufficiently large to accommodate the whole area of operation. If the map is to be used on more than one occasion it should be covered with thin *Perspex* or similar material. A wax pencil will " take " on these surfaces but if a lead pencil is to be used the outer surface should be slightly roughened with sand-paper or some other form of non-greasy abrasive.

To observers in this country the Magnetic North is some 10° west of true North. This is called the " magnetic variation " and is marked on most maps by a narrow red line showing the position of each degree of variation. Allowance for the variation must always be made and this can either be done whilst setting up the compass or in reading it. Perhaps the simplest way for our purpose is to so mount the map on the board that the sides of the board correspond with the Magnetic North; the base of a protractor can then always be set up parallel with the side of the board.

Conclusion

As many readers will appreciate, the subject of Direction Finding is a very extensive and interesting one. In an article of this type it has been necessary to ignore many aspects but it is hoped that the main considerations in respect to portable direction finding have been covered.

Amateur Radio Exhibition

A unique event is to be staged by the Society next November when the first *Amateur Radio Exhibition* will be held at the Royal Hotel, Woburn Place, London, W.C.1.

The primary purpose of the Exhibition will be to provide members with an opportunity of examining a wide range of short-wave equipment and components manufactured or retailed by concerns that normally do not show at Radiolympia. A number of the larger companies will also be represented.

Already several manufacturers and specialist retailers have reserved space. Others who are interested should communicate immediately with the Exhibition Manager, Mr. H. Freeman, Parrs Advertising Ltd., 121 Kingsway, London, W.C.2.

The Exhibition will be opened on Tuesday, November 18 and will run for not less than four days.

At the moment it is uncertain whether catering facilities will permit the holding of a Dinner on Saturday, November 22, but it is anticipated that even if this is not possible a number of smaller social events will be arranged during the week.

Further details of Exhibition plans will appear in later issues. In the meantime Provincial Members would be well advised to reserve their accommodation at the Royal. The Hotel is opposite Russell Square Tube Station (Piccadilly Line) and within a few minutes walk of Headquarters, King's Cross, Euston and Holborn stations.

Proposed Worcester Society

Mr. J. Morris Casey, G8JC, c/o Brookhill Farm, Ladywood, Droitwich, Worcestershire, contemplates forming a Radio Club in Worcester, and invites interested local members to attend a meeting in the Rest Room, Y.M.C.A., High Street, on 24th April, at 7 p.m.

SPREADERS

By C. R. GREEN (G5LN)*

IN the design and erection of an aerial system, where spreaders become necessary, there is always the difficulty of constructing the spreaders sufficiently strong, yet light enough to span a distance of about 12 ft., without developing a precarious sag, which may lead to eventual collapse. The construction to be described will stand up to the strain of rough weather and is capable of being hoisted to within a few inches of the mast head. Furthermore the appearance is neat.

Materials Required

The following materials are required :—

(*a*) A number of 1 in. × 1½ in. lengths of wood (according to the number of spreaders required) about 12 ft. long. When planed (which feature is desirable) they will measure about ⅞ in. × ⅜ in.

(*b*) A few wooden wheels as used in the construction of children's toys, in two sizes ; 6 in. and 3 in. and 1 in. thick.

(*c*) A supply of 1 in. countersunk headed screws.

(*d*) A few feet of wooden rod, 1 in. in diameter (broomstick size).

(*e*) Some paint.

The construction is simple as can be seen from an examination of the sketches and photograph.

Centre Spreader

To construct a centre spreader, set aside four lengths of wood, two 6 in. wheels and two 3 in. wheels. Saw off two 3 ft. lengths of the 1 in. dia. wooden rod. Make four slots in the wheels around the periphery (Fig. 1). Remember that the position of the slots will be determined by the diameter of the mast at its base or at a convenient position up from the mast base where the spreader will be re-assembled. In the centre of the 3 in. wheels countersink a 1 in. dia. hole to take the end of the 1 in. rod. Hold one of the 6 in. wheels upright in a vice with one of the slots

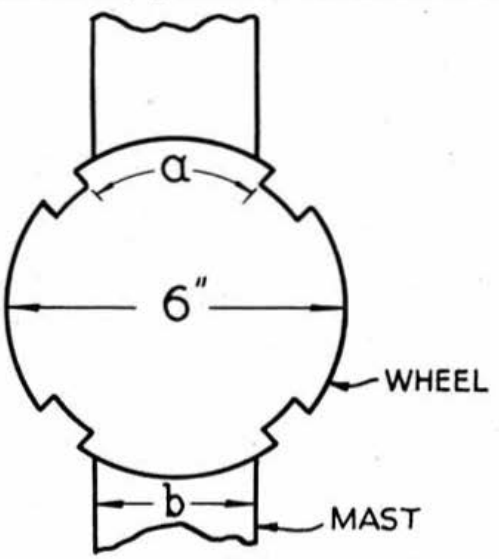


Fig. 1.
Method of mounting wheels to the mast. The distance "a" will be determined by the diameter of the mast "b" near its base where the centre spreader will be re-assembled. A wheel is mounted on either side of the mast.

* 15 Clanricarde Gardens, London, W.2.

uppermost, and screw down the first 12 ft. length into the slot on the wheel. Again consider the diameter of the mast. If, for example, it is 4 in., then the 12 ft. length should be screwed down 2 in. off-centre of the length. Follow by screwing the other three lengths into the remaining slots. For ease in handling tie the ends of the lengths together temporarily with string. Next screw down the other 6 in. wheel in the same way, but 2 in. off-centre in the opposite direction. Insert a 3 ft. length of 1 in. rod into the countersunk hole in the 3 in. wheel and screw down from the other side of the wheel. The rod and wheel can then be slid along in-between the four lengths until the right position is found. The whole construction will be found to taper towards the ends. It only remains now to screw down the lengths on to the 3 in. wheels and the 1 in. rods.

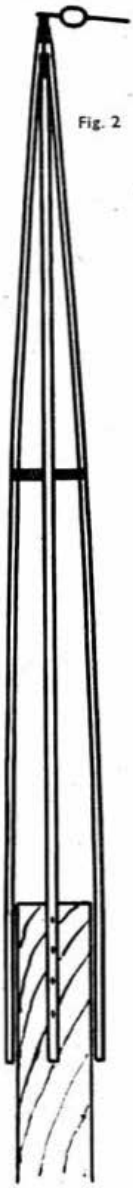


Fig. 2

Fig. 3

End Spreaders

The construction of end spreaders is similar, although it has been found that only three 12 ft. lengths of wood are necessary and, of course, only three equidistant slots are required in the wheels. One 6 in. wheel is placed in the centre of the spreader. The two 3 in. wheels are placed each one quarter of the way up from either end of the spreader and about 4 in. of 1 in. rod at either extremity. The 1 in. rod can project out a short distance to take the insulators. At least three coats of paint should be given to the spreaders. It is also desirable to apply a dab of paint to the thread of each screw before it is screwed home.

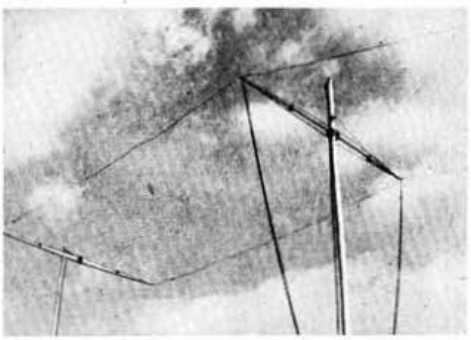
Where a centre mast is already *in situ*, it is an easy matter to dissemble the centre spreader and re-assemble it around the mast before connecting up the aerial wire and feeders.

Fig. 2.—Shows how the principles of spreader construction described in the text can be applied to increasing the height of an existing mast. The construction will be strong enough to take a single-wire aerial.

Fig. 3.—Shows how the same principles can be applied to the fabrication of a 10 metre half-wave dipole—fixed or rotary.

Because the centre spreader is a little more elaborate than the end spreader, its construction has been described first, but readers would be well advised to start with the construction of the end spreaders as they are simpler.

It will no doubt have occurred to readers that the methods of construction described herein lend themselves to other uses. For example the height of an aerial mast can be increased as shown in Fig. 2 or a strong support constructed for the elements of a fixed or rotary beam (see Fig. 3). In the later case the centre element could be secured directly to the ends of the wooden lengths where they meet by means of 4 B.A. bolts. The insulation at this point is not important. The whole structure should, however, be insulated from its suspension or support as the case may be.



Photograph of "Q" Beam at G5LN showing centre and end spreaders. The centre spreader supports "Q" bars which are two $\frac{3}{4}$ in. copper tubing, spaced $\frac{3}{4}$ in. apart.

'Ware—High Voltage

Mr. W. Graham, G15GV, points out that the chassis and the key operating the Midget Utility Transmitter described in the March issue, can be at mains voltage above earth and thus constitute a danger to the operator.

This is the usual "snag" of course with A.C./D.C. apparatus.

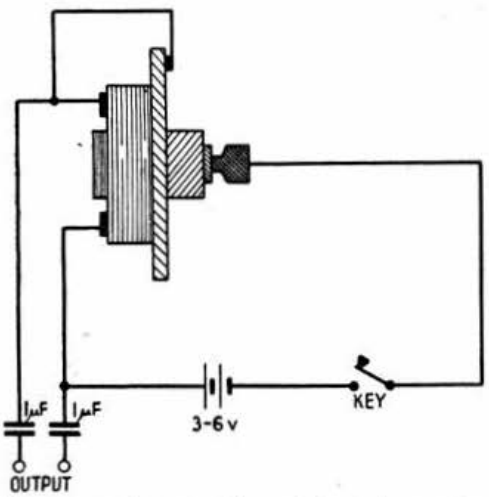
An Easily Constructed Audio Oscillator

By G. OPENSHAW (G2BTO)

THE following is a description of an easily constructed, reliable and compact audio oscillator, giving a pleasing note, which has been used by the author for local Morse practice sessions with great success. Although no new principle is involved, it may not be so well known among those newcomers to Amateur Radio who are looking for something with which to practise code.

The only components necessary are an old earpiece from a pair of headphones (preferably low resistance) and a telephone type carbon inset microphone.

These two are assembled face to face by means of a suitable mounting bracket. Alternatively they may be bound together by insulating tape. By connecting them in series with a 3-volt battery, the circuit can be made to oscillate at audio frequency, utilising the action of audio feedback which is often experienced between the microphone and loudspeaker of an A.F. amplifier.



The output is normally sufficient for ordinary purposes, and by connecting the speech coil of a moving coil speaker (with a series condenser of say 1μF.) across the headphone earpiece terminals, a reasonable output can be obtained for working Morse practices at local meetings. Low resistance 'phones can also be used as a similar output.

The writer has been operating an oscillator of this type using an earpiece from Brown's "A" type 120 ohms. resistance headphones, and a G.P.O. type microphone inset No. 10.

London (I.E.E.) Meeting

There was an attendance of about 100 members at the meeting on March 14 when Capt. A. A. Jones, G6RF, read his paper entitled "Ex-Enemy Radio Equipment." Thanks to the co-operation of E.M.I. and of individual members the lecturer was able to display a wide range of German equipment much of which was captured during the war.

The Chair was taken by the President (Mr. S. K. Lewer, G6LJ) and a cordial vote of thanks to the lecturer was moved by Major K. Ellis, G5KW (SU1KE).

Capt. Jones' paper will appear in a forthcoming issue of the *Proceedings of the R.S.G.B.*

World Telecommunications Conference

THE full provisions which the G.P.O. are proposing for Amateurs at the World Conference are now known and are as follows :—

1,715– 2,000	kc/s.	shared (as now)
3,500– 3,600	,,	exclusive
7,000– 7,200	,,	,,
14,000–14,400	,,	,, (as now)
21,250–21,450	,,	,,
28,000–29,700	,,	,,
168– 170	Mc/s.	exclusive
400– 415	,,	shared
1,215– 1295	,,	exclusive
2,300– 2,450	,,	,,
5,650– 5,850	,,	,,
10,000–10,500	,,	,,
20,500–22,000	,,	,,

These proposals were formulated as the result of Governmental Conferences held in Moscow and Paris.* It is understood that, substantially, agreement was reached regarding all frequencies (including the amateur bands) with France and U.S.S.R. at the latter Conference.

The Society has registered the strongest possible protests against the proposals for the 3.5 and 7 Mc/s. bands and against the omission of a band around 60 Mc/s. and will make every endeavour to get these changed. It seems clear that the chief dangers are with these bands.

In the case of 3·5 Mc/s. it would appear that the G.P.O. had to compromise with France and the U.S.S.R. in order to obtain for British Isles amateurs an allocation however small. In the case of 7·2–7·3 Mc/s. it would seem that the G.P.O. has been given instructions by the politicians. The 60 Mc/s. "impasse" appears to be due to the encroachment of television.

As an illustration of how frequency agreements are reached members should appreciate that if the British representatives find at a Conference that the U.S.A., France and U.S.S.R. agree that the 28–30 Mc/s. band (proposed by the British) should be reduced to 28–29·7 Mc/s. we stand to lose the 29·7–30 Mc/s. portion unless a substantial number of other countries agree that the whole band should be retained. On the other hand by falling into line with the other countries British representatives may be able to secure agreement to an allocation elsewhere. The whole position is one of great complexity.

In placing the above facts frankly before the membership the Council wishes to make it clear that the G.P.O. proposals are still only proposals—no doubt they will be severely mauled at the Conference. To watch our interests the Council is sending the President and General Secretary to Atlantic City. Their chief task will be to secure for amateurs the best arrangement possible, by enlisting the sympathetic support of the representatives of the European Countries as well as those of the Dominions. Without doubt the European problem will present many difficulties, particularly in view of the involved political situation. Much may depend on the support given by the smaller European Countries to their amateurs.

We wish our delegates to the Conference every success in their difficult task and assure them that they will have the full support of every British Isles amateur worth his salt in whatever actions they may take to ensure fair play for amateurs.

A. E. W.

* A Conference, attended by representatives of the U.K., France and Russia, was held in Paris a few weeks ago when frequency allocations were further discussed.

M.o.S. Surplus Transmitters Scheme

In view of the fact that many members have been unable to participate in the above disposal scheme, owing to the great demand having exhausted the available supply, Messrs. Edwards, G8TL and Bloomfield, G2NR, are negotiating with the Ministry for a further selection in the future. If successful, these will not be advertised until all contracts connected with the first issue are completed. Furthermore, these details will not be made known until publication in the appropriate BULLETIN, so as to give everyone a fair opportunity to make application. Preference will be given in the first instance to those who were not successful in obtaining items from the first issue, and only one transmitter per person will be allowed. Each town should then make application through the T.R. who will in turn place his order together with cheque in the hands of the C.R. The Society is not in any way connected with the issuing of contracts, neither is it responsible for any inconvenience or delay in obtaining the equipment. It is solely the business of the Ministry.

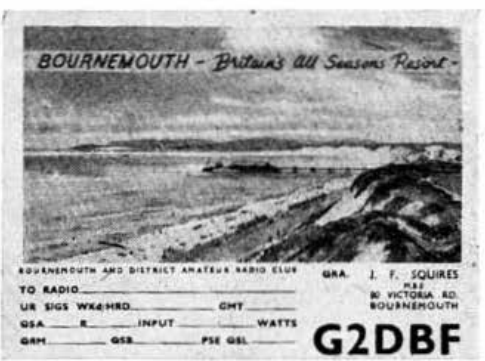
C. H. L. E.

Experimenters' Contact Bureau

Further to the list published in our last issue we are pleased to announce that Mr. D. G. Alexander, BRS4292, 6 Dighton Road, Wandsworth, London, S.W.18, and Mr. E. C. Halliday, B.Sc. (Eng.), BRS6398, 89 Grange Road, Hayes, Middlesex, have agreed to act as Leaders of the Receiver and Portable-Mobile Equipment Groups respectively.

Enterprise

We illustrate one of the very attractive QSL cards which have been donated to members of the Bournemouth and District Amateur Radio Club by the Bournemouth Borough Council. No less than 40,000



of these cards have been printed in colours for the use of the 20 licensed members of the Club.

Credit is due to Mr. F. C. White, G3XP, for having brought this enterprising venture to fruition.

LETTERS TO THE EDITOR

DEAR SIR,—I was very interested in the article by Mr. J. W. Mathews (G6LL) on "A Compact Four Band Frequency Doubling Unit," because I have recently built a very similar piece of equipment. The switching arrangement in my case has certain advantages and may be of interest to readers who do not mind a slight increase in complication.

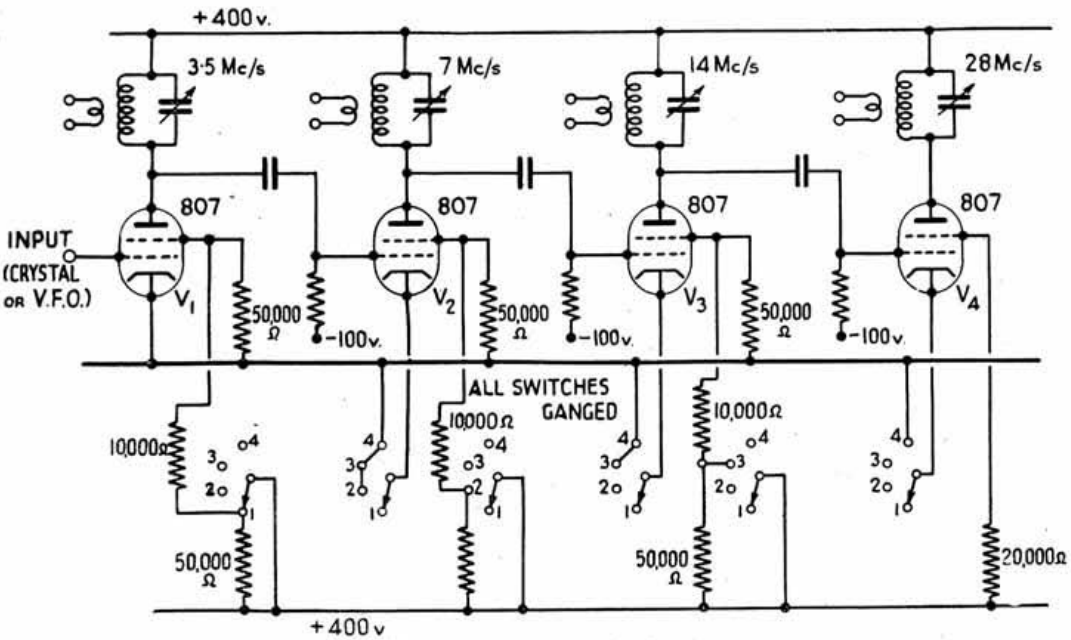
The general idea was that only the particular doubler which is supplying output at any time need be running at full power. All the preceding doublers can run at very low input, just sufficient to drive the following one. At the same time all the doublers *after* the one in use must be switched off. The accompanying diagram (simplified by the omission of decoupling, etc.) shows how this switching can all be carried out with a single knob control, a six-pole four-way Yaxley switch being required. The reduction of power is achieved by inserting an additional screen dropping resistance, while the cathodes of the stages not in use are open-circuited. Capacity coupling is used throughout, with consequent reduction of the number of tuned circuits. The unit will deliver about 20 watts output on any band from 3·5 Mc/s. to 28 Mc/s. at the turn of a switch and has proved quite satisfactory as a low power transmitter as it stands. It is desirable that an earthed link is used to couple the output to the aerial tank circuit (or a Faraday Screen) as the output stage is always being used as a power doubler, and it is very easy to get undesired radiation on the fundamental. The final plan is to build a separate P.A. stage for each band, as suggested by G6LL.

An interesting point was encountered in connection with the biasing system. Originally the same view as G6LL was held, that it was a good thing to use cathode bias, and to allow the valves to draw a steady current from the H.T. supply with the key up, thus minimising voltage changes. It was found, however, that the transmitter was radiating "noise" around the frequency in use, making it difficult to work break-in with weak stations. (Separate aerials were in use permanently connected to both transmitter and receiver.) A careful investigation failed to reveal the presence of any parasites, and it was concluded that the effect must be genuine "noise" radiation, due to the high gain in the various transmitter stages. The trouble disappeared when fixed bias was used, as shown in the diagram. As this does not seem to have been mentioned as one of the difficulties likely to occur with break-in working, it would be interesting to know whether anyone else has encountered the effect.

Yours faithfully,

B. H. BRIGGS, B.A. (G2FJD).

20 Lindley Drive, Gt. Horton, Bradford.



Position 1. 3·5 Mc/s. V1 Full Power; V2, V3, V4 Off.
Position 2. 7 Mc/s. V2 Full Power; V1 Low Power; V3, V4 Off.
Position 3. 14 Mc/s. V3 Full Power; V1, V2 Low Power; V4 Off.
Position 4. 28 Mc/s. V4 Full Power; V1, V2, V3 Low Power.

THE MONTH ON THE AIR

By A. O. MILNE (G2MI)*

WE regret that the information published two months ago, regarding a station signing ZC1AN was incorrect. We and others have, in fact, been the victims of a silly hoax perpetrated by a misguided British amateur who has been using this call from his own station in the Home Counties. The discovery was made by a vigilant G.P.O. Inspector—himself the owner of a short wave receiver—in the culprit's home town, and the amateur concerned has had his licence cancelled. May this isolated piece of folly find no imitators.

News from the Four Corners

During and just before Easter the London DX gang were working VK, ZL and West Coast W's up to as late as 01.00 G.M.T. on 28 Mc/s.

HB9CE will again be operating from Liechtenstein this summer, so keep a look out for HB1CE. Incidentally he complains of the poor response to his QSL's. He supplies the following addresses : HH2BL, c/o Pan-American Airways, Port-au-Prince, Haiti. KA6FA, Ismail Vito Ilo Ilo Panay Is. He is ex-KA7FV. W0MCF/C1, Box 2497, Shanghai. CT2XA, c/o A.P.O.406, c/o Postmaster, New York. UA0KTU is in Irkutsk. VP2PA and HE2UD are pirates.

VS1BJ is trying to contact G's on 28 Mc/s., says it is very difficult. G5CI gives ZA1AB on 14060 as being in Zejer Albania. Both this station and ZA1RF say await QRA on cards which will come *via* R.S.G.B. —so far nothing has arrived. LI2CL is O.K. and he QSL's. QTH is near Tobruk. Address is R.A.F. Signals, El. Adem, M.E.F.7.

G5RQ has worked a station signing PH0DA on 3·5 Mc/s. The operator stated that he was working from a plane. 'RQ has a son who is G3ALJ and they have maintained a regular daily sked since the latter was licenced. He wonders if there are any other father and son skeds running.

G2FKO says QSL to PK1AW *via* V.E.R.O.N. and R.S.G.B. YI2AT is O.K. at Habbaniya. SU1WP says QSL to Post Office, Rochford, Essex. VQ4MNS/G2CKM is now on his way to Southern Rhodesia and hopes soon to be on with a ZE call. VE8MJ has some of his new gear working and hopes to have 45/50 watts on the air before long. HZ1AB has come through with a nice fat wad of QSL's. He is using two 813's in parallel with 300 watts input to a vertical cage aerial. The receiver is a super Pro.

G8ON has produced the usual crop of rarities. CP1AP, 14010, Box 346, La Paz, Bolivia. W3EKK/J2 near Tokio and W8URU/C7, Lt. Badovinic Signal Section, A.P.O. 912, c/o Postmaster, San Francisco.

G3BEV has worked HZ4EA, who gave his address as Box 812 Mecca, not Ineka. Frequency is approx. 14200 kc/s. A letter has been received from OY3IGO together with a batch of cards. His address is Ingv, Olsen, Tungugota, Thorshavn, Faroes. He informs us that OY3G is a pirate.

Apologies to an unknown contributor who sent us a long list of addresses, mostly Indian. Unfortunately his letter has been mislaid. The list has been forwarded to the Call Book Co.

G8VR gives us the following : TR1P, A.P.O. 498, U.S. Army, Tripoli, Libya. CZ7O, Adrinople, Turkey. QSL *via* I1PQ. I6USA, A.P.O. 843, c/o Postmaster, New York. Station at Asmara, Eritrea. He draws attention to XAFG on 'phone, who is in Trieste. A new country and 100 per cent. QSL. Who is Kufra ? Worked by G6CL.

* 29 Kechill Gardens, Bromley, Kent.

Take a look for VS9GT. Cpl. Tompkins stationed at Sharjah, Trucial Oman, Arabia. He has heard a number of G's on 14 Mc/s. but can't seem to raise them.

ZP8AC is Casilla de Correo, 404 Asuncion, Paraguay. ZD2K, Box 570, Lagos. ET3Y, Box 1191, Addis Ababa. VU7JU is G3JU on Bahrein. QSL *via* R.S.G.B.

G6RH offers the following : FK8VB, 28080, W6ONP/KW6 28550, TG9BA 28410, HC1FG 28350, all on phone. In addition there are ZD1KR 14210, ME5AC 14050, VQ8AD 14090, VQ8AK 14090.

G8CD is using narrow-band FM and has been doing very well with it. Contacts include J9AAI, J9AJA, ZL3LB and VK5CA, who incidentally is at R.A.F. Station, Port Darwin, Northern Australia. The 8CD rig uses 120 watts to a 3 element beam. F.M. unit consists of a 6SN7 2 stage speech amplifier and a 6SJ7 reactance tube modulator to a 6F6 V.F.O. to receive this on an ordinary set, switch off the A.V.C. and tune to one side band. VS6AA, AC and AZ are all genuine. QSL *via* R.S.G.B.

OE9AA on 14100, gives his address as Reg Richards, A.P.O. 545, Klagenfurt, Austria. This comes from G3SS. Cards are in.

Warning

G6MN tells us that a surprising number of amateur calls have appeared between 5·25 and 5·5 Mc/s. These must be 3rd harmonics from 1·7 Mc/s. Better look into it chaps.

Further complaints have been received—this time from the Ministry of Civil Aviation—that Amateurs using telephony are endangering the R.A.F. distress frequency of 3805 kc/s. Chaps, you have already been warned so watch your step.

LETTERS TO THE EDITOR

List of Countries

DEAR SIR,—I am very interested indeed to note that a new revised list of countries has been issued by the A.R.R.L. and R.S.G.B. Whilst I appreciate the amount of work involved in such a revision, I feel that some of the well-known British amateurs who specialise in DX might have been consulted prior to its publication. An enquiry has elucidated that few in England were aware of the proposed " standardisation " of the list.

It would be interesting to know the reason for not counting the Aleutian Islands as a separate country from Alaska, and similarly for not counting Tasmania as a separate country from Australia. Against this decision, is the inclusion of Guanatama Bay, which is clearly part of Cuba.

Yours faithfully.
P. PENNELL (G2PL)

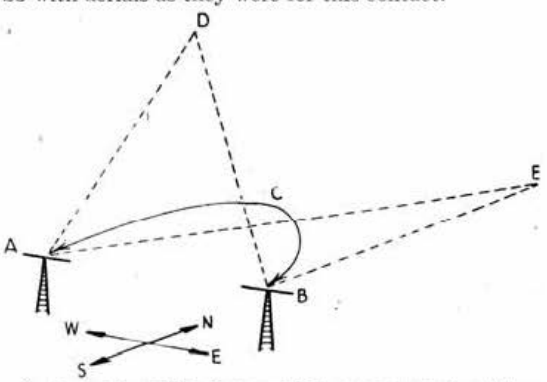
[*Editorial Note.—The list is not absolutely final and unalterable. It has met with widespread acceptance and only one point of importance has been raised—the status of the Isle of Man. 'What is a Country ? The " yardstick " has been that a " country " has its own prefix or is self governing and uses its own stamps or is so remote from its parent territory as to be geographically separate. Tasmania is in exactly the same political position as New South Wales or Victoria and uses Australian stamps. It is no more independent than any other VK zone. The amateurs in the Isle of Man have been advised to ask for a separate prefix as the best solution. They will then automatically become a separate country for DX CC purposes.*]

THE MONTH ON FIVE

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

CONDITIONS for the second half of the contest were in welcome contrast to the first week-end and were so interesting on the first day, March 8th, that these notes will be devoted to a consideration of the effects noticed during that period.

Firstly, to summarise reports received. 5MA (Ashstead, Surrey) found that 5BD (Mablethorpe) came in best when he beamed N.W. and 6OH (Ascot) turned his beam North to receive 5BY (Devon). To work 2MV (Coulsdon, Surrey), 5BD turned his beam N.W. and 8JV (Nottingham) turned his N.E. In Liverpool, 5MQ was able to receive 5MA when he turned his beam to the North but could not hear him when he turned it South. BRS3003 (Croydon) heard 6DH (Clacton) with his beam due North. 2WS (Beckenham) and 2UJ (Tunbridge Wells) had an S7 (both ways) contact with both aerials pointing North. Normally these stations are S6 with aerials facing each other and only S3 with aerials as they were for this contact.



An attempt to explain diagrammatically recent unusual conditions on 60Mc/s when stations were received from abnormal directions.

Many will be inclined to dismiss these effects by a rather glib reference to auroral reflection and undoubtedly there was a magnetic storm during that week-end. Let us examine the effect in a little more detail, however, and compare the 28 Mc/s. short-skip effects usually attributed to the same cause. The writer gave some account of these 10-metre reflections in the April and May, 1946, issues of the BULLETIN. The characteristics of the 10-metre reflections are briefly :

(*a*) Pronounced flutter—giving T6 notes.
(*b*) Absence of directional effects—owing to high-angle reflection.
(*c*) Uniformity of signal strength over wide areas irrespective of distance between receiver and transmitter—*e.g.* on one occasion signals from all parts of U.K. came in at about S7.

How does this compare with the 5-metre effects of March 8th? Very badly it seems. Signals remained T9 in quality and were still very directional (though from *wrong* directions) and for the most part they were received at the strengths we should expect from the distances covered in a direct line.

Now auroral reflections are assumed to take place several hundred miles above the earth's surface. Such reflections must therefore, unless the signal is to travel an enormous distance, be " high angle." This is suggested in the diagram by the path ADB. For low angle effects, the point of reflection may be at some point E, giving a path, AEB, several times as long. Thus to obtain marked directional effects such as were observed on March 8th a very long path would be needed. But if 5-metre signals followed such a path it may surely be assumed that after reflection they would be received with equal ease over very large areas, as they are in fact on 10-metres. This, as stated above, was not the case on " five." Stations which were not getting DX results obtained best contacts when their aerials were North and not " face to face." Summing up then, it would seem impossible to account in the same way for the effects noticed on " five " on this occasion and on " ten " during short-skip conditions.

Can any other explanation be offered ? In the writer's view, the only other way of explaining the observed effects on " five " is by supposing that U.H.F. signals can be continuously refracted in a horizontal plane. Suppose, for example, that during a magnetic storm, U.H.F. waves were repelled from the North magnetic polar region. Referring again to the diagram, waves from A, starting North might be gradually turned away from their Northerly path until they actually travelled South. A wave following the path ACB would then arrive at B from a North or N.W. direction, giving what might be termed a " Boomerang Effect."

FIVE METRE FIELD DAYS
JULY 20 & SEPTEMBER 7.

Now suppose A and B to turn their aerials E. and W. or face to face. Signals leaving either aerial would, as it were, " drift " South and so be received weakly or not at all.

All this is mere theory of course, but it does fit the observed effects, whereas the auroral reflection theory apparently does not. There is no space for further comment in this month's notes but U.H.F. enthusiasts may care to discuss the problem and offer other explanations. What do you think, chums ?

Holland to South Africa on 50 Mc/s.

Signals from PA0UN were heard by ZS1P, ZS1T, ZS1AX and ZS1DJ (all of Capetown) between 12.40 G.M.T. and 15.25 G.M.T. on March 26. The Dutch station was S9 throughout the period but unfortunately two way communication could not be established.

G6DH and other British stations were co-operating in the tests.

Jamaica Amateur Radio Club.

We understand from Mr. T. Myers, Honorary Secretary of the above Club that the Radio Association of Jamaica (listed in the B.E.R.U. Contest Rules) ceased to function in 1933.

The J.A.R.C. is regarded as the National Society for Jamaica and members of that Club will be eligible to compete in the forthcoming Contests.

The J.A.R.C. has been in affiliation with the R.S.G.B. for many years.

Gloucester County Representation

Mr. F. N. Bedwell, G8DT, Redcroft, Eldon Avenue, Cheltenham and Mr. A. A. Uppington, G2BAR, 6 Stapleton Road, Bristol 2, having both been nominated for the office of Gloucestershire C.R., an election becomes necessary.

Votes should be recorded in the form set out in the July 1946 issue of the BULLETIN and should be sent to reach Headquarters by not later than April 30, next.

The new Catalogue for HAMS

IN presenting this catalogue we have for the first time aimed a section of our products straight at your dens. The components illustrated are, we know, used a great deal in Amateur Radio circles. They should be, because, having undergone stiff electrical and mechanical tests in Service gear, they have proved to be reliable even under the most arduous conditions of Modern Warfare, and may, therefore, be used with complete confidence by the most discriminating Ham.

Send for this Free Booklet now!

Ask for Publication No. P339/R. (*Enclosing 2½d. stamp for Postage.*)

BELLING & LEE LTD
CAMBRIDGE ARTERIAL ROAD. ENFIELD. MIDDX

RADIOVISION

EXPANDER

Extends the range of any receiver to cover:—

Model A 27–30 and 56–60 Mcs.

Model B 14–14.5 and 27–30 Mcs.

Both models are complete with built-in power pack.

THE V55R

Communications Receiver cover the 14, 7 and 3.5 Mcs. amateur bands. Short, Medium and Long-wave broadcast.

Illustrated Brochure "R" from

RADIOVISION (LEICESTER) LTD.

58-60 RUTLAND STREET, LEICESTER.

Phone: Leicester 20167.

RAM Variable Frequency Oscillator

This equipment provides a stable method of frequency control, with the added advantage that frequency changes can be rapidly and accurately made. The circuit consists of a "Franklin" Oscillator, using two triode valves, with a tetrode valve as buffer stage. An iron-cored tuning unit is used, and is fitted in a cast aluminium screening box. The fundamental frequency coverage is from 3·5 to 4·0 Mc/s. A 4 in. Muirhead Precision S/M dial, with vernier reading to 1/10 of a degree is fitted. The output from the Buffer stage is supplied with a co-axial cable with plug for connection to crystal holder in transmitter. A "stand-by" switch is incorporated. An external power supply is required, and should provide 6·3 volts at 1·5 amps, and 200 to 300 volts D.C. at 18 MA. A separate power pack can be supplied upon request.

Write for details of R.A.M. Equipment to Department B.

EQUIPMENT AVAILABLE SHORTLY. Power Pack providing 500 volts at 200 MA, with 6·3 volt heater output. Switched coil assembly for use in Transmitter P.A. circuits. 25 Watt Transmitter, for three bands. Complete with coils, crystal and power supply.

AGENCIES. We are prepared to consider applications for Agencies in our Radio Products, and invite Traders specialising in Amateur Radio Equipment to communicate with us.

(G3PS, G4OO, G8ID, G2FPP)

Radiocraft Ltd

11 CHURCH ROAD · UPPER NORWOOD
LONDON, S.E.19 'Phone: LIVingstone 4787

NOTE—We have absolutely no connection with any other firm trading under the same or similar name as ourselves.

TAYLOR 1412

Correspondence to H.Q's

During Secretary's Visit to U.S.A.

During the General Secretary's absence from this country on Society business, the Council appeals to all members to ease the burden at Headquarters by reducing, to an absolute minimum, all but routine correspondence.

Mr. Clarricoats and the President expect to leave for America early in May, and although the date of their return is uncertain it will not be earlier than the middle of July.

During the Secretary's absence Miss Gadsden will be in charge at Headquarters.

Correspondence relating to Contests (including N.F.D.) should be sent direct to Mr. C. J. Greenaway, G2LC, 56 Jubilee Drive, South Ruislip, Middlesex, who is Hon. Secretary of the Contests Committee. Licence matters should be referred either to the G.P.O. or to a member's Town or County Representative. Correspondence relating to THE BULLETIN should be addressed to H.Q's. for the attention of Mr. A. O. Milne, who will also deal with as much general correspondence as his other duties permit.

Mr. Watts (who represented the Society at Madrid and Cairo) is unable to attend the forthcoming Conference due to pressure of private business. He will, however, maintain the closest possible contact with Mr. Lewer and Mr. Clarricoats.

It is anticipated that arrangements will be made for the Society's representatives in Atlantic City to communicate *via* Amateur Radio with stations in this country.

News items concerning the Conference which may be intercepted from W1AW or any other U.S. amateur station should be passed on promptly to Headquarters, or if received during weekends telephoned to Mr. Watts (Tudor 3970) if considered to be urgent.

The President and Secretary expect to leave England early in May.

New Vice Presidents

The Council has been pleased to confer a Vice Presidency upon Messrs. H. W. Sadler, G2XS, of King's Lynn, Norfolk; W. B. Sydenham, B.Sc., G5SY, of Torquay, Devon; and H. V. Wilkins, G6WN, of Greenford, Middlesex, in recognition of their long and loyal service to the Society as District Representatives.

Mr. Sadler was East Anglia D.R. from 1934 until 1946, Mr. Sydenham was South Western D.R. from 1934 until 1946, and Mr. Wilkins was D.R. for West London from 1929 until 1946.

Under their leadership the membership in their respective Districts increased considerably during the war years thereby laying a firm foundation for post-war activity.

We offer warm congratulations to our new Vice Presidents and trust that they will long be spared to take an active interest in Society affairs.

Northern Ireland Regional Representation

The Council has unanimously resolved to appoint Mr. Frank A. Robb, GI6TK, 60 Victoria Avenue, Sydenham, Belfast, to the office of Acting Representative for Region 15. In making its decision the Council paid due regard to the fact that at the time of his appointment Mr. Robb was the only elected County Representative in Northern Ireland. Furthermore as President of the Belfast Y.M.C.A. Radio Society he is well known to a very large number of Region 15 members. He has been a member of the Society since 1931.

The name of Capt. Downing, GI3ZY, was also considered by the Council but it was felt that Mr. Robb had prior claims.

It is hoped that Region 15 will continue to make good progress under Mr. Robb's guidance.

Third Party Messages

The Postmaster General has asked the Society to draw the attention of those members who hold transmitting licences to Condition 8 of their licences whereby they are permitted to send or receive only messages relating to their own or their correspondent's private affairs and prohibited from sending or receiving other messages.

The sending or receiving of messages originated by or about the affairs of third parties whether for payment or not is therefore a breach of the conditions attaching to the licence and renders it liable to cancellation.

Top-Band Contest, 1947
Ist Section.

The leading stations in the Ist Section of the 1947 Top-Band Contest were:—

Ist:	Mr. D. Mitchell, GW6AA	...	98 points
2nd:	Mr. P. G. Tandy, G2DU	...	86 ,,
2nd:	Mr. J. A. Hunt, G2FSR ...	...	86 ,,
4th:	Mr. H. Mee, G5MY ...	...	85 ,,
4th:	Mr. F. T. V. Ritson, G5RI	...	85 ,,

A detailed report will appear in the May BULLETIN.

Renewal of Licences

Members who have held a transmitting licence for one year and wish to use telephony and/or higher power are advised to write to the Engineer in Chief, Radio Branch W5/5, London, E.C.1, one month before their licence falls due for renewal. This will avoid delay, as the renewal notice for the licence fee is sent out by the Accounts Branch, whereas alterations to licences are dealt with by the Radio Branch

Alternate Portable Calls

The G.P.O. have recently granted permission to Mr. W. Carter, G2NJ, of Peterborough, to use the call G2NJ/P as well as G2NJ/A/P. The latter call is used when G2NJ is operating portable from his alternate address at Harrow on the Hill.

GBIRS Pirated

Information has been received that the Headquarters station call-sign GB1RS has been "pirated" on 28 Mc/s. The station is not yet in operation.

Any information which will lead to the apprehension of the person responsible for the unauthorised use of GB1RS will be appreciated by the Council.

Hutt Valley Gift

The first 10 tins of fat donated by the Hutt Valley Branch of the N.Z.A.R.T. have now been distributed to ex-P.O.W. members who were interned in Japanese camps.

Can you help —

● Mr. E. R. Westlake, G6KR, "Ardlui," Wenlock Road, Shrewsbury, who requires details of the Naval P38 receiver ?

● Mr. D. W. Goldsmith, BRS7972, 1 East Dulwich Road, London, S.E.22, who asks, "Has any member actually fitted an efficient noise limiter stage to an R1155 ?"

Amateur Radio Calls for Flood Rescue

By G. F. Wakefield (G5WG)*

BEFORE going into details it should be explained where we live, and a brief description given of the surrounding land. The location is low-lying, half-way between Staines and Datchet. If you know the district, and have noticed the rows of bungalows there, that is Wraysbury. Being in the fashion, we live in one of these single-storey buildings, and at times this fact had us a trifle worried, because at the height of the flooding, some of the dwellers in the few-and-far-between two-storey houses had to move upstairs.

It all started on Sunday morning, March 16th, water came pouring into the garden, and my first thought was to get the aerial off the ground. During the recent bad weather one of the lanyards had broken, the result was that one end was down. This was secured to the branch of a tree six feet off the ground. The next job was to rescue the poultry at the bottom of the garden. When these jobs were completed the water was about six inches deep, and continued to rise slowly throughout the day. At mid-day an effort was made to contact a local station, as we had been told that the telephone line to Staines had broken down. G8WS, at Sanderstead, was raised and the situation explained.

Little was done on the air during the afternoon, but planks of wood were laid down in order to make it possible to walk from the front door to the road without wading through water.

By the evening the situation in the Wraysbury area was very serious, and many people were being evacuated into Slough. At 8 p.m. two policemen arrived, and asked if someone with a transmitter lived there. When told this was so, they explained that all telephone communications out of Wraysbury had failed and they wanted a message got through to Slough asking for an amphibious tank to be sent immediately, as a lorry evacuating women and children into Slough had broken down in five feet of rising flood water.

Three emergency CQ calls were sent out. Finally G4KG in Hounslow was contacted and the message transmitted to him. It was not long after that the breathless voice of 4KG came back saying that as he could not find the Slough number quickly enough, he had dialled 999 and passed the message to Scotland Yard, who then informed Slough. It has since been learned that help was on its way within 15 minutes from the message being sent.

G4KG was worked at pre-arranged times for the next twenty-four hours. As can be imagined, close watch was kept on the rise of the water, because once it did get above the floor boards it would only have a few inches to go before reaching the fuse boxes and meters, and this would certainly have put the station off the air. A detailed report was therefore given to him each time he was contacted. A number of urgent messages were passed for the people marooned and the Wraysbury people got a very good opinion of Ham Radio !

When G4KG had to leave for work, G4BH of Surbiton took over during the day, and at night G2LP and his son G3BNZ of Tolworth, stood by.

The writer's warm thanks are extended to the above-mentioned amateurs for their patience when standing by, and for their efforts to get messages through.

Friends of Mrs. Dorothy Hall, W2IXY, will be grieved to hear that her husband, Capt. Hall, died suddenly on March 10 last. W2IXY expects to visit England during the coming summer.

Rhyl Shows its Paces

MR. E. G. FOULKES, GW5FU, recently appointed Representative for certain of the North Wales counties, was chiefly responsible for staging last month an exhibition of amateur radio gear in the Lounge of the Pavilion Theatre, Rhyl. The exhibition —opened by the Chairman of the Rhyl U.D.C.— carried the support of the Director of Education for Rhyl and ran for a period of three days during which time a large number of visitors was entertained.

Application was made to the G.P.O. for GW3CF, 4CX and 5FU to operate from the Exhibition and the authority was granted within 10 days, an indication of the close co-operation which can be expected from the G.P.O. when events of this character are organised.

The flat roof and domes of the Pavilion Theatre are admirably suited for the erection of aerials and as proved to be the case no difficulties were encountered in establishing numerous contacts.

The Chairman of the Rhyl U.D.C. at the opening of the Exhibition supported by, from left to right, GW5FU (C.R.), 4CK, 4CX, BRS11062, 3245, 1060 and GW2CCU (T.R.).

In order to defray expenses and to avoid the entry of any undesirable element, a charge of 1s. (children 6d.) was made for admission.

Application was made to the Customs and Excise authorities for exemption from Entertainment Tax on the grounds that the exhibition was designed to acquaint the public with a scientific hobby. The application was granted and the small profit was subsequently handed to a local charity.

The education authorities were invited to arrange for parties of scholars to visit the exhibition. No charge was made and the gesture was warmly appreciated by the young people as well as by the teaching staffs.

Advertisements were inserted in local papers and large bills were posted on Pavilion Theatre boards around the town and in shop windows. A gramophone record advertising the exhibition was played at the local Odeon Cinema. For the information of others who may contemplate organising a similar exhibition the following items should not be forgotten : Tickets, R.S.G.B. literature, a cash float and door attendants. A P.A. equipment is also necessary for conducted tours. Don't let the public hear too much noise without explanation !

The hire charges for the hall were £3 3s. 0d. and the address of the Customs and Excise Entertainments Duty Dept. is City Gate House, Finsbury Square, London, E.C.1.

God Speed

The best wishes of their many amateur friends in Great Britain go to the Rev. H. A. M. Whyte, G6WY, and his wife who sailed for Canada on Good Friday last. " Ham " Whyte, one of the best-known DX men of all time, has been appointed Pastor of the Apostolic Faith Church, Toronto. His address will be 214 Delaware Avenue, Toronto. He hopes to be operating under a VE3 call before the year is out.

NEWS FROM HEADQUARTERS

COUNCIL, 1947

President :
STANLEY K. LEWER, B.Sc., G6LJ.

Executive Vice-President : V. M. Desmond, G5VM.
Hon. Secretary : H. A. M. Clark, B.Sc.(*Eng.*), G6OT.
Hon. Treasurer : A. J. H. Watson, F.S.A.A., G2YD.
Hon. Editor : Arthur O. Milne, G2MI.
Immediate Past President : E. L. Gardiner, B.Sc., G6GR.

Members : I. D. Auchterlonie, G6OM, G. F. Bloomfield, Ph.D., A.R.I.C., G2NR, C. H. L. Edwards, A.M.I.E.E., G8TL, K. Morton Evans, O.B.E., G5KJ, R. H. Hammans, G2IG, J. W. Mathews, G6LL, W. A. Scarr, M.A., G2WS.

G.P.O. Liaison Officer: Arthur E. Watts, G6UN.
General Secretary : John Clarricoats, G6CL.

February 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, 10th February, 1947, *at* 5.30 *p.m.*

Present.—The President (Mr. S. K. Lewer, in the Chair), Messrs. Bloomfield, Clark, Edwards, Evans, Hammans, Mathews, Milne, Scarr, Watson, Watts and John Clarricoats (General Secretary).

Apologies.—Apologies were submitted for the absence of Messrs. Auchterlonie, Desmond and Gardiner.

Contests

Resolved to authorise the Contests Committee to organise 5-Metre field days during July and September, 1947, and a listeners' contest during October, 1947.

World Telecommunications Conference

Resolved to record an " aye " vote in favour of the I.A.R.U. Calendar Proposal 52, that " the delegation of the Union to the 1947 World Telecommunications Conference be composed of all representatives named and sent by individual Member-Societies." Mr. George Bailey (President of the Union) and Mr. K. B. Warner (Secretary of the Union) are proposed as Chairman and alternate respectively. It is further proposed " that these representatives be instructed to endeavour to secure additional frequencies and other privileges to as great an extent as circumstances will permit, without endangering present frequencies and regulations."

Resolved to name Messrs. Lewer, Watts and Clarricoats as the Society's Delegates to the 1947 World Telecommunications Conference.

Resolved further that not more than two of the three delegates named in the previous resolution shall simultaneously attend the Conference, one of whom shall be the General Secretary.

A letter was read from the A.R.R.L. in which details were given of the U.K. frequency proposals, insofar as they apply to amateurs. The Council expressed surprise and disappointment that these proposals had not been communicated direct to the Society by the G.P.O.

Resolved to request the G.P.O. to authorise amateur operation in the diathermy bands.

It was reported that interference had been caused by amateur stations with the R.A.F. distress service on 3805 kc/s. and that as a matter of urgency a message had been sent out warning members that they should operate at least 20 kc/s. from the distress frequency.

Membership

Resolved to elect 169 Corporate Members, 36 Associates and 11 Junior Associates. Messrs. A. J. Hallett (G3CQ) and K. J. Cawse (BRS7123) applied for and were granted Life Membership. Three Associates applied for and were granted Corporate Membership.

Resolved to grant affiliation to the R.A.E. and Farnborough District Radio Society, and the South Shields Amateur Radio Club.

Finance

Mr. Watson explained the purpose of the budget and warned against dissipating Reserves. The provision of services not already covered by the current budget may result in a reduction of surplus assets.

Mr. Milne expressed the view that the Council, whilst exercising caution, should take such steps as may seem desirable to provide the maximum service to members even if, for the current year, expenditure exceeds income.

Resolved to accept and adopt the Cash Account for the month ended 31st January, 1947.

Resolved to obtain a legal ruling regarding the raising of subscription rates.

Official Regional Meetings

Resolved to invite each Regional Representative to arrange an O.R.M. in his Region during the current year.

Resolved further to restrict Headquarters representation at O.R.M.s to not more than three persons including members of the H.Q. staff.

Region 4

A letter was submitted signed by about 30 members resident in and around Leicester protesting against the action of the Council in ignoring the claims of Mr. L. Ridgway, G2RI, to the office of Regional Representative.

Resolved to advise the signatories that Mr. Ridgway's name was carefully considered by the Council, and to point out that if the Regional scheme proves satisfactory the membership as a whole will eventually be required to elect the Regional Representatives.

I.A.R.U. Calendar

Resolved to record a vote in favour of the election to membership in the I.A.R.U. of " Union Belge des Amateurs-Emitteurs."

Radio Amateurs' Examinations

Resolved to inform the City and Guilds of London Institute that the Society is of the opinion that examinations should be held twice each year.

The meeting terminated at 9.45 p.m.

Modern Radio Technique

The Cambridge University Press announces a new series of monographs, edited by J. A. Ratcliffe, on Modern Radio Technique. This series will give an authoritative account of the advances in technique in radio and radar which did so much to bring the Allied victory in the war. All the authors contributing to the series worked during the war either in Government Establishments or in industry on the subjects of which they write and were personally responsible for important advances in techniques.

Final arrangements were made some time ago for the following twelve books and work has been begun on all of them. In the present difficulties of printing it is not possible to say in what order they will be published though the first four on the list are already in the proof stage :

Radio Aids to Navigation by Dr. R. A. Smith.
A Survey of Principles and Practice of Wave Guides by Dr. L. G. H. Huxley.
Velocity Modulated Thermionic Tubes by A. H. Beck.
Principles of Radar by Dr. D. Taylor and Dr. C. H. Westcott.
The Design of Radar Equipments by Dr. D. Taylor.
Radio Frequency Measurements by C. W. Oatley.
Radio Receivers for High and Ultra-high Frequencies by L. A. Moxon.
Triode Valves for Ultra-high Frequencies by G. W. Warren.
Modern Aerials for Metre Waves by Dr. R. A. Smith.
Superregenerative Receivers by J. R. Whitehead.
Aerials in the Region of Centimetre Wavelengths by D. W. Fry.
Radio Pulse Techniques by Professor F. C. Williams and N. F. Moody.

County, Town & Area Representatives

Further to recent lists the following members have been appointed County, Town or Area Representatives.

C.R.s

Region	Name, Address and Call Sign
REGION 2 Yorkshire (North Riding)	G. A. KENYON, G3YK, 32 Emerson Avenue, Middlesbrough.
REGION 5 Huntingdonshire ..	C. D. WHALEY, G6WA, 2 Parkside, St. Ives.

T.Rs. or A.Rs.

Town	Name, Address and Call Sign.
REGION 1 Darwen, Blackburn Area Rochdale	H. HARGREAVES, G8FI, 15 Earnsdale Road, Darwen, Lancs. A. E. SUTTON, G3BN, 29 Rossall Road.
REGION 2 Middlesbrough ..	H. WALKER, BRS6824, 9 Chester Street
REGION 3 Burton on Trent Malvern .. .. Wellington Area ..	R. C. HARRISON, G2RH, 1 Springfield Villas, Woods Lane. L. O. ROGERS, G2HX, Top Flat, Bradford House, Barnards Green. T. L. STEVENS, G3XV, Sunny Cottage, Donnington Wood, Wellington, Shropshire.
REGION 4 Nottingham ..	B. H. SINGLETON, BRS7362, 13 Tithby Drive, Sherwood.
REGION 7 Reigate and Redhill Area Walthamstow ..	L. G. KNIGHT, G5LK, 6 Madeira Walk, Reigate. R. L. DRIES, BRS8137, 70 Diana Road, E.17.
REGION 8 Farnham Area .. Maidstone	J. ST. C. RUDDOCK, G8TS, Stoneyford, Tor Road, Crondall Lane. T. D. EAVES, G3AGV, Ashmore, Ashford Road.
REGION 12 Aberdeen	L. HARDIE, GM2FHH, 530 Holburn Street.
REGION 13 Dunfermline .. Kirkcaldy	C. A. M. CLACKSON, GM8KR, 24 Blake Street, Brucefield W. G. HOPCROFT, GM4AN, 3 McKenzie Street.

Trade Publications

Labgear, Willow Place, Cambridge—prominent at the R.C.M.F. Exhibition—have just published an illustrated and descriptive catalogue of their short-wave apparatus and components. A pre-selector-convertor is due for early release.

Telegraph Construction and Maintenance Co. Ltd., Telcon Works, Greenwich, London, S.E.10, have recently issued a new Telcon R.F. Cable Publication (No. 10—1947) which gives details of R.F. cables developed during and since the war. The chapter dealing with the fundamentals of R.F. cables will be of special interest to transmitting amateurs.

Aerialite Ltd., Castle Works, Stalybridge, Cheshire, offer a temporary price list of television and radio aerial products. Seven-strand aerial is offered at 5s. 3d. per 100 ft. run and an all-wave dipole aerial at £1 19s. 6d. R.F. cables are also available. Prices on application.

Advance Components Ltd., Back Road, Shernhall Street, Walthamstow, London, E.17, send details of their Type E Signal Generator. Frequency range 100 kc/s.–60 Mc/s. in 6 ranges. Calibration accuracy ± 1 per cent. Output voltage is obtained from the end of a 75 ohm matched transmission line and is made variable from 1μV to 100 mV by means of a 5-step decade multiplier and attenuator. Internal modulation—35 per cent at 400 c/s. Weight 15 lbs. Price 19 guineas.

Wimbledon Engineering Co. Ltd., Garth Road, Lower Morden, Surrey. Vibrators scientifically constructed for efficiency and durability under all conditions of service are described in a new W.E.C. leaflet which also contains a series of typical diagrams of connections. Non-synchronous and synchronous types are available. D.C. inputs 6, 12 and 24 volts. Nominal rating 30, 60 and 120 watts.

New Components

Belling & Lee Ltd., Enfield, have released two new co-axial plugs, L614 (Right-Angle) L615 (Twin Right-Angle) and socket L.604. These take cables up to ¼ in. diameter and the screen is held without soldering. They can be easily loaded without special tools and they have a "Snap" action.

Trade Notices

M.O.S., 24 New Road, London, E.1, have been appointed sole distributors in the U.K. for the Burgoyne co-axial connector. This new product provides commercial and amateur users with a means of making watertight co-axial cable connections for aerials. It also serves as a centre insulator for a half-wave doublet. Total weight 12 ozs. Price on application.

British I.R.E.

A discussion on Single Side-Band Communication Channels will be opened by Mr. E. C. Cherry, M.Sc., at a meeting of the, British I.R.E. to be held at the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, London, W.C.1, on Thursday, April 17, at 6 p.m.

Book Review

TELEVISION RECEIVING EQUIPMENT. By W. T. Cocking, M.I.E.E. Second edition. Published by Iliffe & Sons, Ltd. Price 12s. 6d.

This is the second edition of what was before the war a very popular book. Although covering the subject very completely the presentation is largely non-mathematical. The whole field of television reception is dealt with in such a way as to be invaluable to home constructors and designers of receivers. In this edition 48 additional pages are included, chiefly in the sections dealing with electromagnetic deflection, sawtooth oscillators and V.F. and I.F. amplification. H.A.M.C.

Thames Valley Amateur Radio Transmitting Society

In spite of the appalling weather, several "hardy annuals" attended the March meeting to hear an excellent lecture by Ron Newham, G3SU, on "Modern Transmitter Design." Thanks are due to G8SM who drove the lecturer 15 miles home in the worst possible conditions.

The President welcomed the Chairman of the K. & D.A.R.S., Mr. R. Sheargold, G6RS.

Public School Exploring Society

For the first time since 1939 a party of 74 Public School boys under Surgeon Commander Murray Levick, R.N., will participate in a summer expedition to uninhabited parts of Newfoundland.

The expedition will survey the land, set up, work and operate short wave radio stations, look for specimens for the British Museum and take photographs and films of the country.

No details are yet available of the call signs to be used by the expedition but it is anticipated that they will be in the normal VO series.

We shall be glad to learn of any contacts between the U.K. and members of the expedition.

Stray

W1PEG (ex W9TXG) now active on 14 and 28 Mc/s. is looking for old friends and in particular G2YK. Information via G2YY

VQ 4JBC

VQ4JBC (P.O. Box 4013, Killarney, Nairobi) wishes to contact stations in the Oswestry, Shrewsbury area. Frequency 14,260 kc/s., operating hours 17.30–20.30 G.M.T.

Congrats

● To Mr. Jack Lees, G2IO, and his wife, of Nottingham, on the safe arrival of a daughter, Jean Margaret.

Printed in Great Britain for the Inc. Radio Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1, by Sir Joseph Causton & Sons, Ltd., 72 Fleet Street, London, E.C.4.