R·S·G·B AMATEUR RADIO

BULLETIN

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

VOLUME 27, No. 10 PRICE 1/6

APRIL 1952

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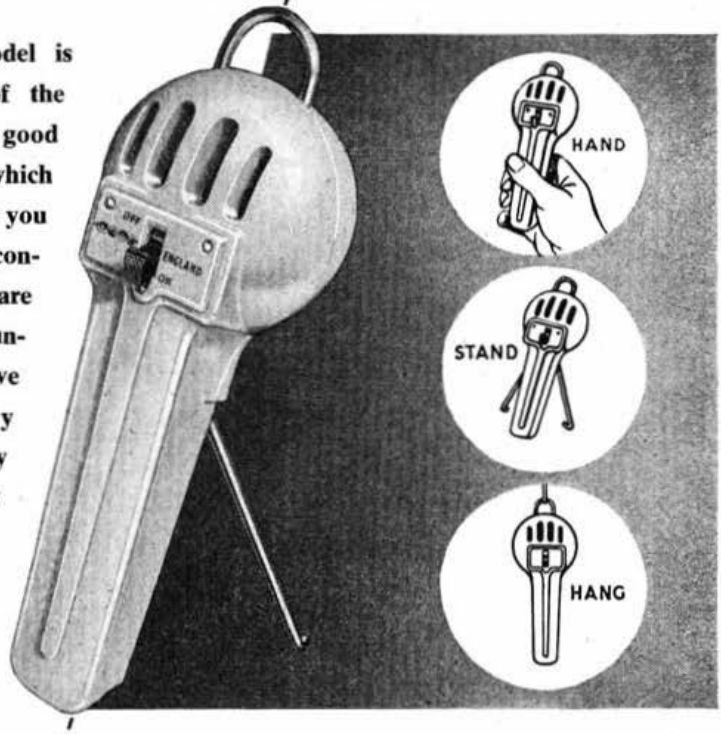

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Eversheds 500 Wee Megger, in leather case, as new..	£10	10	0	**General Electric (U.S.A.) Tube-Checker,** in portable case, 110 volts A.C., as new	£11	10	0	**R.C.A. AR88,** model D, first-class condition, complete with all valves	£50	0	0
Avo 1948 Signal Generator, as new	£12	10	0	**Avo Wide-Range Signal Generator,** as new	£23	10	0	**As above,** model LF	£40	0	0
Eddystone 640, as new....	£22	0	0	**Hunt's Resistance and Capacity Bridge,** model C.R.B., perfect, and as new....	£10	0	0	**Hallicrafters' Sky-Rider Receiver,** 5–10 meters, complete, and as new	£10	10	0
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R.S.G.B. Bulletin

Vol. xxvii No. 10 April, 1952

CONTENTS

Forthcoming Events

REGION 1

Blackpool (B. & F.A.R.S.).—May 20, 20 Fordway, off Newton Drive.
Bury.—April 19, Hamfest at Derby Hotel; May 8, 7.30 p.m., Y.M.C.A., The Rock.
Chester (C. & D.A.R.S.).—Tuesdays at 7.30 p.m., Tarran Hut, Y.M.C.A.
Darwen & Blackburn.—April 18, May 16, 7.30 p.m., Y.M.C.A., Limbrick.
Liverpool.—April 19, May 3, 2.45 p.m., Larkhill Mansion House, West Derby.
Manchester (M. & D.R.S.).—May 5, June 9, 7.30 p.m., College of Technology.
Preston.—April 25, May 9, 23, 7.30 p.m., Three Tuns Hotel, North Road
Southport.—April 21, May 5, 19, 8 p.m., Y.M.C.A., off Eastbank Street.
West Cumberland.—May 3, 7 p.m., Kells Community Centre, Whitehaven.
Wirral (W.A.R.S.).—April 23, May 7, 21, 7.45 p.m., Y.M.C.A., Whetstone Lane, Birkenhead.
Warrington (W. & D.A.R.S.).—First and third Tuesday each month, 7.30 p.m., King's Head Hotel.

REGION 2

Barnsley.—April 25, 7.30 p.m., King George Hotel, Peel St.
Bradford.—April 22, May 6, 7.30 p.m., Cambridge House, 66 Little Horton Lane.
Catterick & Richmond.—Wednesdays, 7 p.m., Loos Lines, Catterick Camp.
Darlington.—Thursdays, 7.30 p.m., 129 Woodlands Road.
Doncaster.—May 14, 7.30 p.m., Black Bull, Market Place.
Gateshead.—Thursdays, 7 p.m., Y.M.C.A., Sutherland Hall, Durham Road.
Leeds.—Wednesdays, 7.30 p.m., Swarthmore Educational Centre, Woodhouse Square.
Middlesbrough.—Thursdays, 7.30 p.m., Joe Walton's Boys' Club, Feversham Street.
Newcastle-upon-Tyne.—April 28, 8 p.m., British Legion Rooms, 1 Jesmond Road.
Pontefract.—April 17, May 1, 15, 8 p.m., Fox Inn, Knottingley Road.
Rotherham.—Wednesdays, 7 p.m., Cutlers Arms, Westgate.
Scarborough.—Thursdays, 7.30 p.m., L.N.E.R. Rifle Club, West Parade Road.
Sheffield.—April 23, 8 p.m., Dog and Partridge, Trippet Lane; May 14, 8 p.m., Albreda Works, Lydgate Lane.
Slaithwaite.—Fridays, 7.30 p.m., 3 Dartmouth Street.
Sunderland.—April 30, May 14, 7.30 p.m., 16 North Bridge Street.
York.—Wednesdays, 7.30 p.m., Club Rooms, Y.R.S., Fetter Lane.

REGION 3

Birmingham South.—April 20, May 4, 10.30 a.m., Stirchley Institute.
Coventry.—April 25, May 23, 7.30 p.m., Priory High School, Wheatley Street.
Hereford.—May 14 to May 17 inclusive, 2.30 to 9 p.m., Exhibition at Shire Hall.
Kenilworth (including Warwick & Leamington).—May 8, 7.30 p.m., Dalehouse Lane.
Rugby.—May 6, 7.30 p.m., Public Library, Mather Street.
Stourbridge (S. & D.R.S.).—May 6, 8 p.m., King Edward's School.
Worcester.—Thursdays, 7 p.m., City Library (Basement), Foregate Street.
Wrekin (W.A.R.S.).—Mondays, 8 p.m., Y.M.C.A., Canteen, Wellington.

REGION 4

Alvaston (D.S.W.E.S.).—Tuesdays and Thursdays, 7.30 p.m., Sundays, 10 a.m., Nunsfield House, Alvaston.
Chesterfield.—April 22, May 6, 7.30 p.m., Bradbury Hall, Chatsworth Road.
Derby (D. & D.A.R.S.).—April 30, May 7, 14, 7.30 p.m., Derby College of Arts and Crafts (Sub-basement), 119 Green Lane.
Leicester (L.R.S.).—April 21, May 5, 19, 7.30 p.m., Holly Bush Hotel, Belgrave Gate.
Loughborough.—April 16, May 21, 7.30 p.m., Great Central Hotel.
Mansfield (M. & D.A.R.S.).—May 4, 3 p.m., A.G.M., Swan Hotel.
Newark.—April 13, 27, May 11, 7 p.m., Northgate House, Northgate.
Northampton (N.S.W.C.).—Fridays, 6 p.m., May 2, 7 p.m., Club Room, 8 Duke Street.
Retford.—May 4, 3 p.m., Community Centre, Chapel Gate.
Worksop.—May 5, 7 p.m., King Edward Hotel.

REGION 5

Chelmsford.—May 6, 7.30 p.m., Marconi College, Arbor Lane.
Ipswich.—Second and last Wednesday each month, 7.30 p.m., T.A. Drill Hall, Woodbridge Road.
Norwich.—April 17, 8 p.m., The Duke's Palace, Duke Street.
Southend.—April 23, 7.45 p.m., G2BHA, 27 Park Road

REGION 6

Cheltenham (C.A.R.S.).—April 25, May 9, 7.45 p.m., St. Mark's Community Centre, Brooklyn Road.
High Wycombe.—April 22, 7.30 p.m., G3DQC, 6 Peterborough Avenue.
Petersfield.—May 1, 7.30 p.m., Market Inn, The Square.
Portsmouth (P.D.R.S.).—April 22, 7.30 p.m., Royal Marines' Signals Club, Eastney Barracks, Lecture on *The History and Development of Amateur Radio*, by G6CL.
Southampton.—May 3, 7.30 p.m., 22 Anglesey Road, Shirley.

REGION 7

Acton, Brentford, Chiswick.—Tuesdays, 7.30 p.m., A.E.U. Rooms, 66/68 High Road, W.4.
Barnes & Richmond.—May 13, 7.30 p.m., 308 Upper Richmond Road.
Barnet & Boreham Wood (B.A.R.S.).—May 10, 7.30 p.m., Bunny's Restaurant, New Barnet. **(B. & D.R.C.).**—April 23, 30, May 7, 14, 8 p.m., Hopedene, The Avenue, Barnet.
Bexley (N.K.R.S.).—April 28, May 12, 7.30 p.m., The Freemantle Hall.
Bromley, Kent (N.W.K.A.R.S.).—May 4, 7.45 p.m., *Plans for N.F.D.*, The Shortlands Tavern, Station Road, Shortlands.
Chingford.—April 17, May 1, 15, 8 p.m., A.T.C.H.Q., Pretoria Road, E.4.
Dulwich & New Cross.—May 5, 7.45 p.m., The Kentish Drovers, Rye Lane, Peckham.
East Ham.—April 22, May 6, 8 p.m., 57 Leigh Road.
East London District.—April 20, 3 p.m., *Tape Recording for the Amateur* (Mr. Lariviere). Ilford Town Hall.
East Molesey (T.V.A.R.T.S.).—May 7, Carnarvon Castle, Hampton Court.
Enfield.—April 20, May 18, 3 p.m., George Spicer School, Southbury Road.
Finsbury Park.—April 22, 7.30 p.m., 164 Albion Road, Stoke Newington, N.16.
Guildford & Woking.—April 27, 3 p.m., Royal Arms Hotel, North Street.
Hayes & Uxbridge.—May 2, 7.30 p.m., The Vine, Uxbridge Road.
Hendon & Edgware (E.D.R.S.).—April 16, 23, 30, May 7, 14, 8 p.m., St. Martin's School, 22 Goodwin Avenue, Mill Hill.
Hoddesdon.—May 1, 8 p.m., *Aerials*, Salisbury Arms.
Holloway.—Mondays, Wednesdays & Fridays, 7.30 p.m., Grafton School, Eburne Road, N.7.
Ilford.—Thursdays, 8 p.m., Junko, 579 High Road, Ilford.
Kensington & Shepherds Bush.—April 18, May 9, 8 p.m., 38 Royal Crescent.
Kingston (K. & D.A.R.S.).—April 18, 23, May 2, 7, 7.45 p.m., Penrhyn House, 5 Penrhyn Road.
Lewisham (R.A.R.C.).—Wednesdays, 8 p.m., Durham Hill School, Downham.
Norwood.—April 19, May 17, 7.30 p.m., 35 Grangecliffe Gardens, South Norwood.
Slough.—3rd Thursday each month, April 17, May 15, 7.45 p.m., The Golden Eagle, High Street.
Southgate.—May 8, 7.30 p.m., Arnos Secondary Modern School, Geography Room, Wilmer Way, New Southgate.
Sutton & Cheam.—May 20, 8 p.m., The Harrow, Cheam Village.
Watford (W.R.A.T.S.).—April 15, 7.45 p.m., *Mullard Film*, May 6, *Junk Sale*, Cookery Nook, The Parade, Watford.
Welwyn.—May 6, 8 p.m., *N.F.D.*, Council Offices, Welwyn Garden City.

REGION 8

Brighton (B.D.R.C.).—Tuesdays, 7.30 p.m., Eagle Inn, Gloucester Road. **(E.B.S.W.C.).**—Thursdays, 7.30 p.m., 27 Warren Avenue, Woodingdean.
Chatham (M.A.R.T.S.).—Mondays, 7.30 p.m., Co-operative Hall, Luton Road.
Eastbourne.—April 17, May 1, 15, 29, 7.30 p.m., Swallow Cafe, 333 Seaside.
Gillingham (G.T.S.).—Alternate Tuesdays, 7.30 p.m., Medway Technical Institute.
Hastings (B. & H.R.C.).—April 22, May 6, 20, 7.30 p.m., Saxons Cafe, Seafront, Hastings.
Isle of Thanet (I.O.T.R.S.).—Fridays, 7.30 p.m., George Hotel, Hawley Street, Margate.

REGION 9

Bath.—April 21, 7 p.m., Y.M.C.A., Broad Street.
Bristol.—April 18, 7 p.m., Carwardine's Restaurant, Baldwin Street.
Exeter.—May 2, 7.30 p.m., combined meeting with Torquay at Y.M.C.A., Torquay.
North Devon.—May 1, 7.30 p.m., Rose of Torridge Cafe, The Quay, Bideford.
Penzance.—May 1, Railway Hotel.
Plymouth.—April 19, 7 p.m., Tothill Community Centre, Tothill Park, Knighton Road, St. Jude's.
Torquay.—April 19, 7.30 p.m., May 2 combined meeting with Exeter, Y.M.C.A., Castle Road.
Yeovil.—Wednesdays, 7.30 p.m., Grove House, Preston Road.
West Cornwall (W.C.R.C.).—May 1, 15, Fifteen Balls, Penryn, near Falmouth.
Weston-super-Mare.—May 6, 7.30 p.m., Y.M.C.A.

(Continued on Page 460)

R·S·G·B· BULLETIN

Official Journal of the

Incorporated Radio Society of Great Britain

Editor:
JOHN CLARRICOATS

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

Telephone: Holborn 7373

Advertisement Manager:
HORACE FREEMAN

Advertising Office:
THE NATIONAL PUBLICITY CO., LTD.
358 STRAND, LONDON, W.C.2

Telephone: Temple Bar 0948-9

Issued free to members. *Hon. Editor:* JACK HUM **Published on or about the 15th of each month.**

VOLUME XXVII No. 10 APRIL 1952

CURRENT COMMENT

Problem of T.V.I.

COMMENT was made on this page a couple of months ago about the value of a constructive correspondence feature to a magazine such as the BULLETIN. In the correspondence page this month appears a letter of just the type we had in mind when we wrote. It is from John Petty, G4JW, of Sheffield, and it deals with "Television Interference." It is an important letter on an important subject—perhaps the supremely important subject of the present time where the Amateur Radio movement is concerned. If Mr. Petty's letter serves to provoke a more active interest in it, then the time he spent in writing it will not have been wasted.

A more "active interest" in T.V.I. is indeed required. For there seems to be a tendency on the part of many amateurs to view it passively to the extent of remaining off the air during television hours rather than risk trouble with neighbouring televiewers. This attitude could be called defeatist or lazy—or both!

It is not always so, of course; there are districts, especially in fringe areas, where the problem is almost incapable of solution, and where the wide-open "front end" of the average domestic television receiver will accept even the minutest emanation from a local transmitting set, however much the latter may conform to the "better-than-commercial" requirement for harmonic suppression. In such cases it will not be defeatist but only prudent if the amateur, knowing he causes interference, remains quiet during television hours.

In the majority of populous districts where a higher television field strength is available, it is very frequently the case that amateurs stay off the air when they need not do so. Of all the reported causes of interference to television, amateur transmitters rate a low figure. Since so many go into radio purdah during the television broadcasting hours this is not to be wondered at. It would be much more creditable if the amateurs lifted this self-imposed ban yet still did not cause those interference figures to rise. They *can* achieve this desirable end—but not by simply sitting down and hoping it will come to pass. It won't—unless the amateur is prepared to take some active steps himself to bring it about, by getting down to the construction of transmitters which are so T.V.I.-proofed that they can be reasonably exonerated from blame where interference is reported.

Perhaps the first thing that needs to be realised is that a great many of the conventional transmitter designs of the past are no longer applicable to an age in which television has arrived to stay. The time-honoured breadboard form of construction is regrettably out — and one says "regrettably" advisedly, for it had much to commend it as a means of helping the newcomer find his way around the transmitter circuits, to see "what made them tick" and to eradicate troubles when they arose. It has nothing to commend it today, except in communities where television does not exist!

If "breadboard" is out, so also are many metal chassis designs that expose points of high r.f. potential to the open air to put microvolts where they are not wanted. Indeed, the primary objective in any transmitter construction today should be to *radiate only the desired signal from the right place.*

The "right place" is, of course, the aerial. The "desired signal" is the one on the operating frequency chosen in any particular amateur band; when it and no other is fed to the aerial the operator can be said to have played his part in avoiding trouble at the source.

Clearly, this *desideratum* will be achieved only by a degree of screening of transmitting equipment which few have yet adopted—in spite of the need for it so clearly pointed in the various articles about T.V.I.-proof rigs that have appeared in these columns. Much greater care in mechanical design with this particular problem in mind is a *sine qua non.*

Electrical design, too, will demand the adoption of many of the special devices that have been recommended here from time to time in the interests of T.V.I.-proofing. One can, for instance, visualise a much greater acceptance of pi-coupling output networks once their efficacy in reducing T.V.I. has become appreciated.

But there is no need to dwell further on means of combatting the problem. Readers have available in the list that appeared in the February BULLETIN a bibliography of current material that has been written on the subject. They are recommended to thumb back to it and to examine the wealth of advice that is already at hand—advice which, put properly into practice, can do much to enable amateur transmission to enjoy a peaceful—and active—co-existence with television. J.H.

A 5-band 150-Watt T.V.I.-proof Power Amplifier

By LOUIS VARNEY, A.M.I.E.E. (G5RV)*

The power amplifier described in this article is intended for use with the 50 or 75 watt G5RV T.V.I.-proof exciter described in previous issues of the "Bulletin," and completes the equipment designed by the author—during several years of intensive investigation into the problems of television interference—to enable radio amateurs to operate on all h.f. bands without interference to television reception. Unique information is given on the proximity effect between a transmitting aerial and a television receiving aerial as it affects T.V.I.

THE power amplifier to be described has been thoroughly tested for T.V.I. at G5RV (Chelmsford, Essex) and at the station of Mr. W. J. Ridley, G2AJF (Springfield, near Chelmsford). At both locations, the amplifier was driven by the 50-watt transmitter-exciter unit previously described in the BULLETIN,[1] and tested for interference with a standard television receiver used *in the same room*. A Pye LV20 was employed at G5RV and an Invicta 105 at G2AJF. In neither case was it found necessary to use a high-pass filter in the television aerial feeder, nor was any adjustment or modification made to the receivers.† With the exception of an occasional flashing effect‡ visible on the picture during 14 Mc/s operation, no T.V.I. was produced during c.w. or 'phone operation at 150 watts input. On this band, however, it became necessary to limit the upper frequency used for telephony work to 14200 kc/s, as slight harmonic interference occurs at Chelmsford when operating on frequencies above that figure.** In areas where the field strength of the Alexandra Palace signal is some 6 db greater, and in the service areas of the remaining television stations, no difficulty should be experienced in obtaining full 14 Mc/s operation.

Since the 50[1] or 75[2] watt version of the T.V.I.-proof transmitter provides far more drive than is necessary for efficient operation of the 813—which is the valve used in this power amplifier—a useful degree of harmonic reduction may be achieved by setting the "Net-QRP-QRO" switch on the exciter unit to "QRP," and adjusting the "Excitation" control so as to obtain the required amount of grid drive. With an input of 150 watts, a drive current of 5 mA is ample for telegraphy operation, and from 6 to 8 mA for telephony.

In particularly difficult cases of T.V.I., reducing grid current to as low as 2 to 3 mA may provide a solution, while still permitting a useful signal to be radiated.

Circuit Features

From an examination of the circuit diagram (Fig. 1) it will be seen that complete band-switching is employed. A miniature coil-turret assembly is used in the grid circuit of the 813,

* *184 Galleywood Road, Chelmsford, Essex.*

† *This would not necessarily apply to superheterodyne television receivers having intermediate frequencies within the authorised amateur bands, or those which are prone to second-channel interference.*

‡ *See Appendix (p. 436).*

** *For full 150 watts input and transmitting aerial only 20 feet from T.V. aerial.*

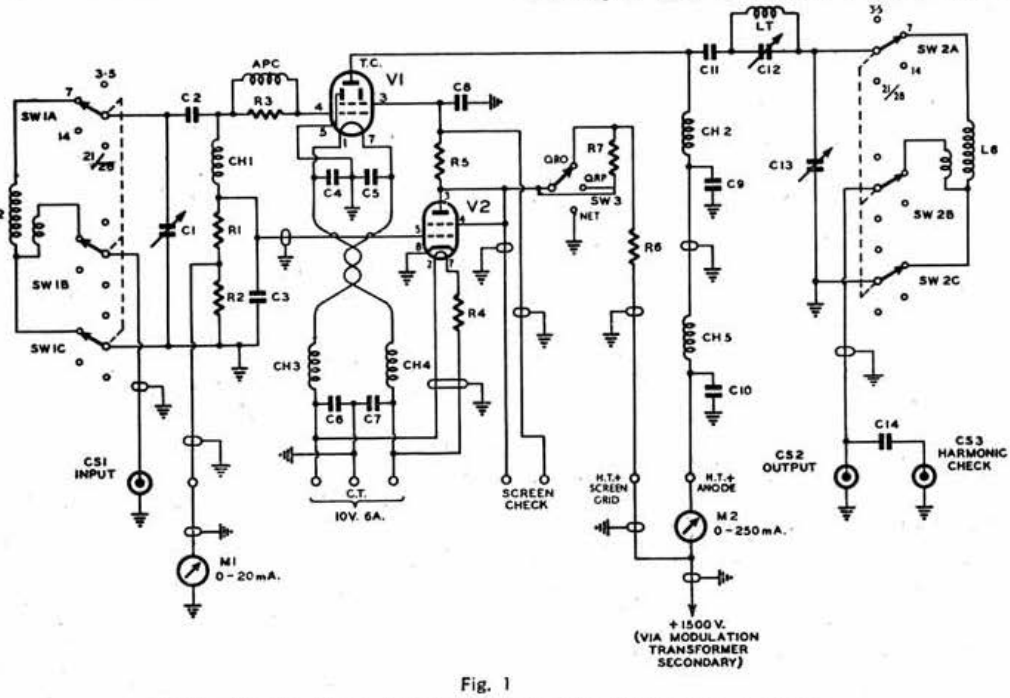


Fig. 1
Circuit diagram of the 5-band 150-watt T.V.I.-proof power amplifier.

while a heavy-duty ceramic switch and suitable coils are used in the anode circuit to handle an r.f. output of 100 watts or so with good efficiency.

For those who would normally prefer to use plug-in type coils in the anode circuit (in order to achieve *maximum* efficiency), it seems desirable to state that the loss occasioned by the use of a well-designed and carefully constructed coil turret is very slight, and is more than compensated for by the flexibility of operation afforded and the constructional convenience bestowed when a completely screened unit is required.

The clamper valve—a glass or metal 6L6 or KT66—obviates the necessity for providing a grid-bias unit and since, under the "key-up" condition, the 813 dissipates a safe but substantial power, the main h.t. supply is not subjected to a widely fluctuating load; thus its regulation is improved.

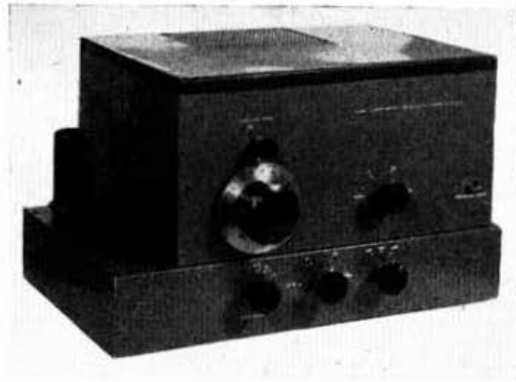
Clamper-valve modulation may, if desired, be used, with only minor alterations to the wiring of the clamper-valve grid circuit; but this system has not been tried at G5RV where high-level (p.a. anode and screen-grid) modulation is preferred.

Thorough screening between control-grid and anode circuits, together with effective electrode decoupling, and h.f. and v.h.f. by-passing ensures freedom from parasitic oscillation; no sign of any instability requiring neutralisation of the 813 has been observed at G5RV.

Metering of the 813 control-grid and anode circuits is provided, but the meters, following modern transmitter design practice, are mounted on a separate panel in the enclosed-type rack. This is desirable both aesthetically and from a practical viewpoint, since it is essential to avoid cutting meter holes in the p.a. screening-box. If, however, the meters have to be mounted on the amplifier panel itself, the chassis should be made 2 in. wider (*i.e.* the 10 in. dimension should be increased to 12in). The meter cases can then be accommodated between the rear of the front panel and the front of the screening box. Extension shafts would, of course, be required for the anode-tuning condenser, the harmonic-trap condenser, and the anode band-switch.

Screened wire is recommended for all supply and non-r.f. leads, and receiver-type coaxial cable (diameter $\frac{1}{4}$-in) for the 1500 V h.t. supply.

During initial tests, some trouble was experienced with the conventional pie-wound r.f. choke, used for CH2, burning-out due to unwanted resonances occurring in one or more of the bands used. A more suitable choke was therefore wound on a 1 in. diameter paxolin former $6\frac{1}{2}$ in. long, consisting of a close winding of No. 22 s.w.g. enamelled copper wire commencing $\frac{5}{8}$ in. from the bottom and continuing for about 4 in., then a space of $\frac{1}{4}$ in., then 10 turns followed by a further space of $\frac{1}{4}$ in., then 6 turns, another $\frac{1}{4}$ in. space, and a final 5 turns. The wire gauge is not very critical; No. 20, 22 or 24 s.w.g. may



Front view of the T.V.I.-proof p.a., showing panel controls: Left to right (top) p.a. tank tuning and, immediately above, harmonic trap; tank-coil-turret band switch; (bottom) p.a. grid tuning; grid-coil band switch; and "Net-QRP-QRO" switch. The clamper valve can be seen on the left of the chassis.

COMPONENT LIST

CONDENSERS

C1. 100 $\mu\mu$F. variable.
C2. 100 $\mu\mu$F. ceramicon.
C3. 0.002 μF. mica.
C4, 5. 0.01 μF. mica.
C6, 7. 0.001 μF. mica.
C8. 0.001 μF. mica, 500 V wkg.
C9, 10. 0.001 μF mica, 3000 V wkg.
C11. 0.002 μF. mica, 3,000 V wkg.
C12. 100 $\mu\mu$F midget air trimmer
C13. 200 $\mu\mu$F. p.a. tank condenser (preferred capacity).
C14. 5 $\mu\mu$F. ceramicon.

RESISTORS

R1. 22,000 ohms, 2-W.
R2. 100 ohms, $\frac{1}{2}$-W.
R3. 220 ohms, $\frac{1}{2}$-W.
R4. 4 ohms, 10-W (wire-wound)
R5. 47 ohms, $\frac{1}{2}$-W.
R6. 60,000 ohms, 30-W (wire-wound)—to stand 1,500-V drop under no drive conditions.
R7. 75,000 ohms, 30-W (wire-wound)—to stand 750-V drop under no drive conditions.

R6 and R7 may consist of any convenient number of resistors connected in series to make up the required total value.

VALVES

V1. 813.
V2. 6L6, 6L6G or KT66.

INDUCTANCES

Grid Coil Turret

L1. 3.5 Mc/s—60 turns of No. 24 s.w.g.; winding length $1\frac{3}{8}$in, with 5-turn link coil.
L2. 7 Mc/s—30 turns of No. 24 s.w.g.; winding length $\frac{3}{4}$in, with 3-turn link coil.
L3. 14 Mc/s—16 turns of No. 18 s.w.g.; winding length $\frac{7}{8}$in, with 2-turn link coil.
L4. 21–28 Mc/s—6 turns of No. 16 s.w.g.; winding length 1in, with 2-turn link coil.

All coils wound on $\frac{1}{2}$in diam. bakelised linen formers, except L4, which is self-supporting and spaced to occupy required winding length.

Anode Coil Turret

L5. 3.5 Mc/s—24 turns of No. 16 s.w.g.; winding length 2in, with 3-turn link coil.
L6. 7 Mc/s—12 turns of No. 14 s.w.g.; winding length $1\frac{1}{2}$in, with 2-turn link coil.
L7. 14 Mc/s—8 turns of No. 14 s.w.g.; winding length $1\frac{1}{2}$in, with 2-turn link coil.
L8. 21–28 Mc/s—4 turns of $\frac{1}{2}$in-diam. copper tube; winding length 2in, with 1-turn link coil.

L5 is wound on $1\frac{1}{2}$in diam. ceramic former; all others are self-supporting (doped) with internal diam. $1\frac{1}{2}$in. L7 and L8 have turns spaced to required winding length. Coaxial-type link coils may be used if desired.

Miscellaneous

Ch1. H.F. choke (*Eddystone Cat. No. 1010*).
Ch2. (See text).
Ch3, 4. V.H.F. filter choke—No. 16 s.w.g. wire of 2in winding length on $\frac{3}{8}$in diam. Tufnol rod.
Ch5. V.H.F. filter choke (*Eddystone Cat. No. 1011*).
LT. Harmonic trap coil—6 turns of No. 16 s.w.g. wire; internal diam. $\frac{1}{2}$in; winding length $\frac{3}{4}$in.
APC. 6 turns of No. 22 s.w.g. enamelled wire wound on R3.

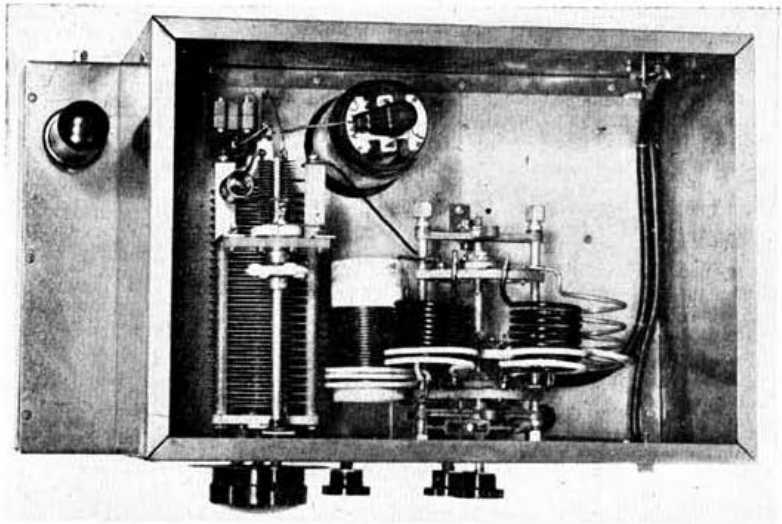
SWITCHES

SW1A–C. 3-wafer "Oak" type. Each wafer 4-position single-pole. (*British N.S.F. Co.*)
SW2A–C. 3-wafer ceramic heavy-duty type. Each wafer 4-position single-pole. (*Films & Equipment Ltd., London.*)
SW3. 1-wafer 3-position single-pole "Oak" type.

MISCELLANEOUS

CS1, 2, 3. Coaxial sockets (*Belling-Lee*).
M1. 0–20 mA d.c. m.c. meter (mounted externally).
M2. 0–250 mA d.c. m.c. meter (mounted externally).

be used. The choke should be mounted vertically, about 2 in. to the side of the 813, above the chassis, and supported by two small " L " brackets, in the form of " feet," screwed to the bottom of the paxolin tube. Care should be taken to ensure adequate insulation between these feet and the choke winding since there will be nearly 3,000 V between choke and chassis on positive modulation peaks. This choke has proved completely effective.



View of top of chassis, with cover of screening box removed, showing layout of tank-circuit components (coil turret and anode-tuning condenser).

Construction

The amplifier is built on a standard chassis 17 in. by 10 in. by 3 in. deep, of No. 16 or 18 s.w.g. aluminium, with No. 20 s.w.g. base-plate. The screening-box is also made from No. 20 s.w.g. aluminium, and measures 14 in. by 10 in. by 7 in. high, and is fitted with a flanged lid having a suitable ventilating window above the 813. A standard 19 in. by 10½ in. front panel of No. 14 s.w.g. dural, or No. 16 s.w.g. mild steel may be used.

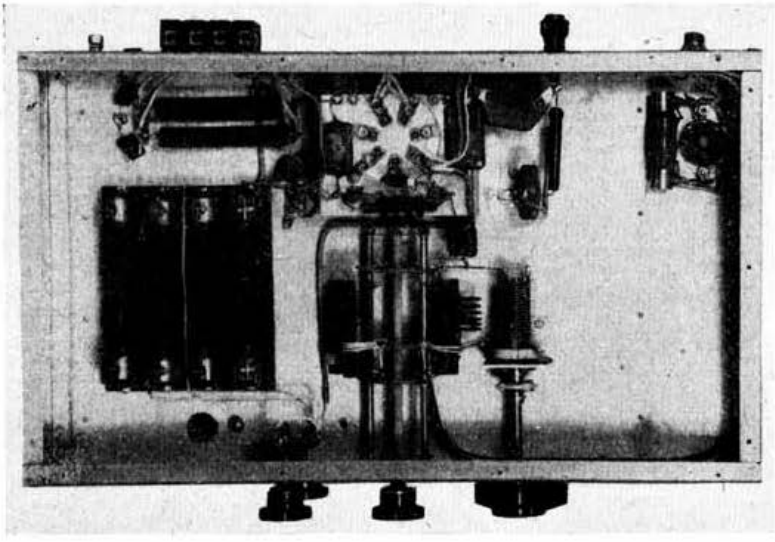
General constructional features, as well as some idea of component layout, can be obtained from an examination of the photographs. In the prototype, a rather large anode tank condenser with a capacity of 300 $\mu\mu$F was used because it happened to be available and was of convenient size and shape. Any similar condenser of requisite voltage rating would, however, be suitable.

The harmonic trap circuit (made up as a small sub-assembly) is bolted on to the tank condenser, thus providing extremely short leads between the anode blocking condenser C11 and the tank condenser. Adequate ventilation—which is essential—may be achieved by making the hole in the chassis, through which the 813 valve sits, about ¼-in. greater than the bulb diameter, and by drilling suitable holes in the chassis base - plate immediately below the 813 mounting bracket. A piece of perforated metal (drilled out with ⅛-in diameter holes) is fitted on the screening-box lid above the 813. The cut-out for this ventilating window measures 5 in by 3¼ in. The 813 socket is mounted on a suitable aluminium bracket 2 in below the top of the chassis.

Provided that care is taken to adhere to the essential screening features of the design, the layout may be rearranged to accommodate components which are readily available.

Operation

After a careful check of wiring, the amplifier should be tested for stability and presence of parasitics by the normal procedure already outlined for the 807 amplifier in the exciter unit.[1] [2]



Under-chassis view, showing layout of grid-circuit components, including coils and band-selector switch.

With 1500 V applied to the anode of the 813, but with no r.f. drive, the standing anode current should be about 40 mA, and should not change or flicker when either grid or anode tuning condensers are rotated completely from minimum to maximum capacity on each range. After this check has been made, r.f. drive may be applied, and the power amplifier adjusted for correct working conditions on each band. With 6 mA of grid current, 300 V on the screen, and 1500 V h.t.* the p.a. should be loaded until the anode current reaches a value of 100 mA. The screen current will be about

**As used at G5RV.*

15 mA. Overdriving will result in less output, as illustrated in the graph, Fig. 2.

Provision for an occasional check of both screen-grid voltage and current is made by bringing out connections from the screen-grid metering resistance, R5, to a pair of insulated sockets on the rear apron of the chassis. It is

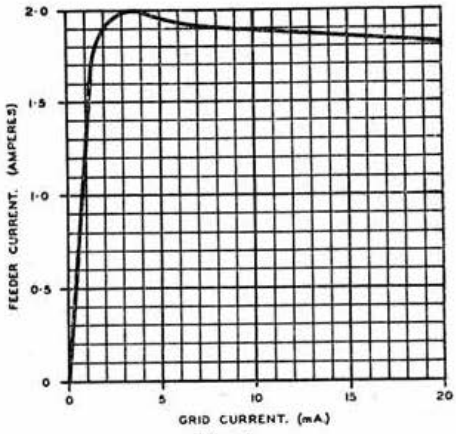


Fig. 2.

Graph showing relationship between p.a. grid current and feeder current. For optimum working, drive should be adjusted until a grid current of about 6 mA is obtained.

important to ensure that the actual voltage *measured at the heater socket connections* is 10 V for the 813, and 6.3 V (*via* the 4-ohm heater voltage dropping resistor R4) for the 6L6.

Results

Complete T.V.I. suppression on all bands may be expected in many locations. Reference to Table 1, which is based upon independent observations made by G2AJF, will indicate the efficacy of the p.a. in a rather poor television location, since Mr. Ridley's television aerial is only 25 ft high and is screened by rising ground and trees in the direction of Alexandra Palace.

While a multi-band amplifier of this type must obviously be somewhat less efficient on the higher frequency bands (21 and 28 Mc/s) than one designed expressly for those bands, nevertheless, a very useful performance is obtained, even at 28 Mc/s.

At 14 Mc/s and lower frequencies, the p.a. leaves nothing to be desired. The amplifier could, if preferred, be made to cover only the 3.5, 7 and 14 Mc/s bands, a separate fixed-coil p.a. being used on 21 and 28 Mc/s, thus achieving maximum efficiency on those bands. This is, in fact, the arrangement used at G5RV—a push-pull pair of Eimac 35TG valves in a 21-28 Mc/s amplifier fed with modulated h.t. *via* the common modulator transformer secondary, it being only necessary to switch-on the heaters to whichever p.a. is required, and to plug the coaxial cable from the exciter into the appropriate amplifier.

Modulation may be applied by any of the usual methods described in current Amateur Radio textbooks. A pair of TZ40s in class "B," driven by class "A" triode-connected push-pull 6F6s, are used at G5RV. This unit, which is housed in the main (screened) transmitter rack, is associated with a remotely-located high-gain microphone amplifier.

When used in conjunction with the 50 or 75 watt T.V.I.-proof exciter unit, the power amplifier herein described provides a 150-watt T.V.I.-proof transmitter embodying all the essential features of modern design for low harmonic content and complete stability, together with maximum ease and flexibility of operation.

It may be assumed from a study of Table 1 that no T.V.I. will be caused when operating with an input of 150 watts on 'phone or c.w. in the 3.5 and 7 Mc/s bands, even at locations where the television field strength is considerably below that obtainable at G2AJF in Springfield. The reason for this is the considerable amount of reserve suppression available in the harmonic trap, low-pass filter and aerial tuning unit.

On the 14 Mc/s band, with an equivalent television field strength, full-power operation should be possible on frequencies between 14,000 and 14,200 kc/s on 'phone and c.w., provided that the television aerial is at least 40 ft away. Telephony transmission is possible over the whole band, even when the television aerial is as close as 20 ft, if excitation is reduced in order to provide an input of 80-90 watts. On the 28 Mc/s band, no T.V.I. occurred at G5RV using full power for 'phone and c.w.

The author expresses his thanks to Mr. W. J. Ridley, G2AJF, for his help in carrying out the tests, the results of which are shown in the table, and for his constant interest and assistance in

Table 1
T.V.I. Test Results
at G2AJF

Conditions. — 50-watt T.V.I.-proof exciter and 150-watt T.V.I.-proof p.a. with 4-section low-pass filter and aerial tuning unit, speech amplifier, modulator, and all power supplies contained in a standard 4 ft high metal rack cabinet. External screened v.f.o. Transmitting aerials—dipoles for each band, fed *via* 80-ohm flat twin feeder hung behind television aerial. "D" is the spacing, in feet, of the nearest end of the transmitting aerial from the centre of the television aerial. Location of site—37 miles from Alexandra Palace, about 200 ft. a.s.l. Television aerial in line with transmitting aerials. 28 Mc/s band not tested.

Freq. Mc/s	Ig mA	Ia mA	Ea V	Filter pos'n.	A.T.U.	Trap	D	Interference	Remarks
3.5	10	150	1000	cut	cut	s/c	10′	nil	c.w.
3.7	10	150	1000	cut	cut	s/c	10′	nil	phone
7.0	10	150	1000	cut	cut	in	10′	nil	c.w.
7.2	10	150	1000	cut	cut	in	10′	nil	phone
14.0	8	130	1050	cut	cut	in	130′	nil	c.w.
14.0	8	130	1050	cut	cut	in	60′	nil	c.w.
14.0	8	130	1050	cut	in	in	30′	nil	c.w.
14.0	8	130	1050	in	in	in	10′	slight	c.w. (increase in picture brilliance with key down)
14.0	5	100	1075	in	in	in	10′	nil	c.w.
14.2	8	130	1050	cut	cut	in	130′	nil	phone
14.2	8	130	1050	cut	in	in	60′	nil	phone
14.2	8	130	1050	in	in	in	20′	nil	phone (setting of trap and l.p. filter critical)
14.4	8	130	1050	in	in	in	60′	nil	phone
14.2	4	90	1080	in	in	in	20′	nil	phone
14.2	4	90	1080	in	in	in	10′	slight	phone (modulation bars)

numerous T.V.I. experiments conducted during the past four years at his station and at G5RV.

Appendix

Since writing this article, the writer has removed the anode-coil turret assembly and rebuilt the tank circuit in the form of a pi-filter network in order to compare the T.V.I.-suppression properties of such a circuit with those of the more orthodox

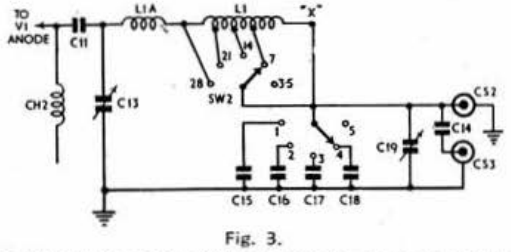


Fig. 3.

Pi-filter tank circuit suitable for use in place of original anode coil turret. Component values: CH2, C11, C13 and C14 as in Fig. 1; L1–20 turns 14 or 16 s.w.g. enam. copper wire wound 8 t.p.i. on 2½in. diam. ceramic former, with taps (counting from end marked "X") at 10t. (7 Mc/s), 16t. (14 Mc/s), 19t. (21 Mc/s), all plus L1a; L1a–28 Mc/s, 4 turns of 14 or 16 s.w.g. enam. copper wire wound 1in. diam. self-supporting and mounted with axis at right-angles to L1; C15–0.0008 μF; C16–0.0005 μF; C17–0.0003 μF; C18–0.0001 μF (all mica 500V working); C19–fine loading control, 0.0003 μF variable air dielectric (receiver type) capacity *decreasing* with clockwise rotation as for SW4; SW4–coarse loading control, single-pole 5-way "Oak" wafer switch (ceramic if possible).

tank circuit. The results have been satisfactory in every way. The harmonic trap has been eliminated—thus dispensing with a control—with no detectable ill effect. A very significant fact has emerged since making this change, namely, the "flashing" effect on 14 Mc/s, mentioned earlier in this article, has not been observed during two weeks of testing. This suggests that perhaps the trouble may be due to harmonic voltages building up across the trap and producing transitory breakdown of the trap condenser, with consequent arcing or brushing.

This theory has yet to be proved, however, but is mentioned now because the writer believes it to be, if true, a possibility of great importance. The low-pass filter and aerial tuning unit were both retained.

The pi-filter tank circuit is shown in Fig. 3. The component values quoted are chosen to suit the 813 operating conditions described, and to work into an 80-ohm coaxial cable correctly terminated, *via* the low-pass filter, into the aerial tuning unit. A separate coil is used for the 28 Mc/s band, mounted with its axis at right-angles to the main coil, so that any shorted-turn effect (which has been proved experimentally to have negligible influence on the lower-frequency bands) cannot affect the 28 Mc/s range, due to the simple and convenient method of band-switching employed. The 28 Mc/s coil will, if desired, also tune 21 Mc/s very effectively, thus permitting a single-pole switch with four contacts only to be used.

The ceramic heavy-duty switch found in the TU5B and similar surplus units may be used in place of the more expensive 3-wafer ceramic switch which is required if the coil turret system is used. The correct adjustment of the pi-filter circuit has been described by several writers[3] and need not be repeated here. Having once used a correctly-designed pi-filter tank circuit, the writer feels that he is not likely to revert to using the less convenient and more expensive coil turret system, unless it is desired to use a balanced push-pull amplifier.

(1) VARNEY, "*T.V.I.-proof 50-watt Transmitter*," R.S.G.B. BULLETIN, *July, 1950.*
(2) VARNEY, "*Improved 75-watt T.V.I.-proof Transmitter*," *Pts. I and II*, R.S.G.B. BULLETIN, *December, 1951, and January, 1952*
(3) CRAGG, "*The Use of Pi-coupling Networks*," R.S.G.B. BULLETIN, *June, 1951.*
WOODS, "*The Collins' Coupler*," R.S.G.B. BULLETIN, February, 1952.

Official Meetings, 1952

THE Council has approved the following programme of Official Meetings for 1952.

Date	Venue	Council Representation
May 4	Falmouth (C)	Messrs. Charman, Edwards and Milne
.. 11	Llandudno (C)	Messrs. Cooper and Scarr
.. 18	Lincoln (C)	Messrs. Cooper and Milne
.. 24	Birmingham (R)	Messrs. Charman, Herdman, Lambeth and McConnell
June 15	York (C)	Messrs. Hum and Winsford
.. 29	Leicester (C)	Messrs. Findlay and Scarr
Sept. 14	Reading (C)	Messrs. Cooper and Hum
.. 21	Liverpool (R)	Messrs. Charman, Bartlett, Edwards and Findlay
Oct. 5	Bristol (C)	Messrs. Charman, Cooper, Lambeth and Walker
.. 12	Southampton (C)	Messrs. Findlay and Walker
.. 18 or 19	Falkirk (R)	Messrs. Charman, Bartlett, Edwards and McConnell

(R) Regional Meeting (C) County Meeting.

In addition to the Council Members listed the General Secretary expects to be present at most of the meetings.

Are You a Veteran?

IN other words, were you licensed before the 1914-18 war? If so, please let Headquarters have a note of the call sign you then held. If you have forgotten it they may be able to trace it through the medium of the first list of members of the Wireless Society of London or the directory published by Messrs. A. W. Gamage, both of which appeared in 1913.

"Yagi Made Easy"

ANY reader who felt momentary surprise at seeing in the March issue of the *Short Wave Magazine* an article by the Hon. Editor of the R.S.G.B. BULLETIN, no doubt came quickly to the correct conclusion. Yes, the article was written long before the Hon. Editor was ever Hon. Editor—a year before, in fact.

National Field Day, 1953

After careful consideration of the factors involved, the Contests Committee has recommended, and the Council has accepted in principle, that an improvement in National Field Day will result from changing the present grouping of stations ("A" station on 1.7 and 3.5 Mc/s; "B" station on 7 and 14 Mc/s) to an alternative grouping, as follows:

"A" station on 1.7 and 7 Mc/s.

"B" station on 3.5 and 14 Mc/s.

In recommending this change, the Committee is aware that it may involve modification to existing N.F.D. equipment but is of the opinion that the advantage of ensuring a more constant level of activity at each station, throughout the day and night of the Contest, will in practice more than compensate for any re-building or redistribution of equipment that may be necessary.

SKIP DISTANCE PREDICTIONS for the Amateur Bands

By P. H. SOLLOM, B.Sc., A.C.G.I. (G3BGL)*

The value of m.u.f. predictions to the average amateur is very small, yet a tremendous quantity of potentially useful data is made available regularly by the professional organisations which study ionospheric conditions. The author has developed a new method of presenting this data in a form which will allow members to make an immediate interpretation of the conditions predicted professionally for the amateur bands. The Skip Distance Map is designed to enable users to differentiate readily between normal and abnormal band conditions, and to appreciate the mode of behaviour of the length of the skip.

THE prediction of ionospheric conditions is far from being an exact science, and is based largely on experience and experimental observations. Measuring stations are scattered all over the world, and from their observations, which are brought together and correlated, the trend in conditions can be followed, previous predictions checked, and new forecasts made. Records of sunspot activity and predictions of "sunspot number," made by astronomical observatories, are used in conjunction with the critical frequency measurements of the ionosphere layers to obtain the complex pattern of scientific data necessary for the prediction of maximum usable frequencies. In spite of this scientific approach to the problem, it is still impossible to predict conditions with certainty, even for only a short time ahead.

The accuracy of predictions can be improved and maintained by checking them against the actual conditions which occur, and noting the extent of any errors. By doing this on an organised basis it might be possible for members of the R.S.G.B. to contribute to the work of the department responsible for making the predictions in this country—the Department of Scientific and Industrial Research. It is, however, first necessary to present these predictions to Society members in a useful form. This is the object of the present article.

* "The Rowans," Green Street Green, Farnborough, Kent.

M.U.F. Predictions

The Society regularly receives a copy of the D.S.I.R. booklet—"Predictions of Radio Wave Propagation Conditions"—containing world contour charts, compiled several months in advance, of maximum usable frequencies for 0 km. and 4000 km. distance (*i.e.* for transmissions at 90° and 0° wave-angle by the F_2-layer) from which the values for other distances can be obtained. Predictions for the E and F_1-layers are also given, but these will not be discussed here, as conditions on the high-frequency amateur bands are generally governed by the F_2-layer.

Normally, the user-organisations (B.B.C., Cable and Wireless, the Services, etc.) are only interested in transmissions over particular circuits, and they need to know which frequency bands should be used to maintain efficient communication. The m.u.f. for any given path is determined by the ionisation density at the points of reflection. Each direction and distance will have its own

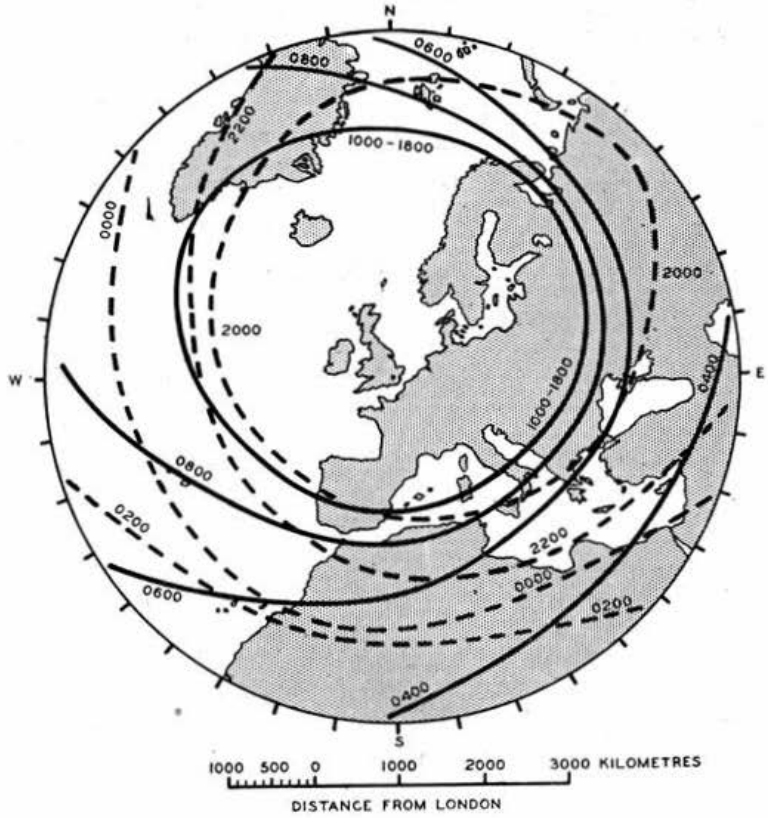


Fig. 1.

Great circle map centred on London, with curves showing predictions, for May, 1952, of the fringe of the skip zone for the 14 Mc/s band for transmissions by the F_2-layer from S.E. England, at various times throughout the day (expressed in G.M.T.). At any given time, signals can be received from points between the appropriate curve and the edge of the map. An average curve is drawn for 1000–1800 G.M.T. to avoid confusion of the diagram; the actual predictions for this period lie within ±250 km. from the distance given by the curve. Skip distances from Ireland will be similar, but will occur about 45 minutes later; from Scotland skip distances will be 200–500 km. longer.

particular value of m.u.f. at any one time. The amateur, however, is interested in the performance of one particular frequency band in all directions at the same time; consequently, the m.u.f. curves published for particular circuits are of little use to him.

Maximum Skip Distance

The m.u.f. is defined as the highest frequency that can be used for transmission over a particular distance by means of a particular layer. The same frequency will be reflected to greater distances if a lower wave-angle is used for the transmission, but at higher wave-angles the wave will penetrate the layer and skip will occur. The converse of this definition is of interest to amateurs confined to one frequency band: the skip distance of a particular frequency is the distance for which that frequency is the maximum usable frequency. Skip distance defined in this way implies that reflected signals can just be received at this distance, but not at points nearer the transmitter; it is known, therefore, as the *maximum skip distance*—the actual skip or region of zero signal being always slightly less. (Ground wave signals are, of course, audible up to a few miles from the transmitter. —Ed.)

The maximum skip distance in a given direction can be found for any band by interpolation of a series of m.u.f. curves drawn for various distances in that direction, or by inverted operation of a nomogram.

To present the whole pattern of conditions around a transmitting station it is necessary to display the conditions obtaining in all directions at the same time. This can be done most conveniently on a great circle map (Fig. 1). At various times throughout the day the maximum skip distance is computed for several directions, points plotted for the same time being joined together by a curve which shows the fringe of the skip zone at that time. On the map fringe curves are drawn for the 14 Mc/s band for May, 1952. This method of presenting predicted conditions should help towards an understanding of the normal behaviour of the band. In practice, abnormal conditions arising from Sporadic-E, ducting, scattering, or disturbances will be found at certain times, but the extent of the departure of the actual conditions from the predicted ones can be readily gauged from the observed skip length.

Least absorption occurs when the frequency used is very near the m.u.f., so that the strongest signals will be received from points close to the fringe curves. Signals from distances of 3500-4000 km. will usually be weak if received by single-hop transmission, due to the inferior performance of amateur aerials at the very low wave-angles required for such distances, but good two-hop signals may be received when the skip distance is 1500-2000 km. As the skip distance increases, a strong two-hop signal from about 3000 km. distance will usually drop in strength as it changes to an attenuated one-hop signal. A two-hop signal from just beyond 4000 km. distance will fade out completely as the skip lengthens past 2000 km. and a second skip zone will appear. Long-distance communication is most likely when the skip distance is about 3000 km., but multi-hop propagation requires co-operation from the ionosphere at the successive reflection points.

Table 1.

Predicted max. skip distance....	1500	2000	2500	3000	3500	4000 km.
Actual skip: Predictions 10% high	1650	2400	2900	4000	(band closed)	km.
Actual skip: Predictions 10% low	1400	1800	2150	2600	2800	3000 km.

Accuracy of the Predictions

The maximum skip distance at any given time can be checked by tuning a receiver and identifying the nearest stations heard from any direction. Table 1 shows the corresponding figures of maximum skip distance for departures of plus and minus ten per cent. from the predicted maximum usable frequencies. Inaccuracies in the predictions will be observed most readily in terms of the time at which the band opens or closes for a particular distance. The hours of sunrise and sunset are continually changing, and as the predictions are for an average day, it is to be expected that the predicted m.u.f.'s will be too high at the beginning of the month, and too low at the end, or *vice versa*, depending upon the trend in conditions.

Noisy Tuning in the BC.453

INVESTIGATING the cause of noisy tuning around mid-scale in a two-year-old BC.453 receiver, Mr. C. R. Street, B.R.S. 12366, found that the crackling originated in a bad contact between a copper-alloy fork (mounted on the outer plate of the condenser drive mechanism) and the rotating condenser spindle. Oxidisation and inadequate tension in the fork was producing intermittent noise as the condenser was rotated.

The trouble was cleared by removing the fork, cleaning it, then bending it slightly with the aid of a pair of pliers, in order to increase its pressure upon the spindle. Care is required when carrying out this operation, as the fork is liable to snap if bent excessively.

The drive mechanism of the tuning condenser is not accessible unless the valves and i.f. transformers are first removed from the chassis. The inner cover protecting the condenser may then be taken off. It is important that the i.f. transformers should be replaced in their correct order, and not be interchanged, as some of them have centre-taps.

Modifying R.S.G.B. Badges

A SIMPLE method of modifying R.S.G.B. membership badges for newly licensed B.R.S. members is described by Mr. F. A. Herridge, G3IDG. The B.R.S. number should be carefully removed by the judicious use of a file, finishing off with a very fine emery cloth to leave a smooth finish. The call sign is then inserted in this space, using letters (and figures) cut from a sheet of ¼-inch model aircraft transfers, which are available in several colours and are inexpensive. A final coating of transparent varnish will render the modified badge weatherproof.

Plessey Television Receivers

THE British Radio Equipment Manufacturers' Association have been advised by Plessey Co., Ltd., that a decision has been made to incorporate a permanent i.f. wave trap in their new television receiver.

This news will be warmly welcomed by all amateurs living within B.B.C. Television Service areas.

THE DESIGN OF PI-NETWORK TANK CIRCUITS

By H. WHALLEY, M.Sc., A.M.Brit.I.R.E. (G2HW)*

The problem of T.V.I. has caused radio amateurs to give considerable thought to ways and means of reducing harmonic radiation from their transmitters. During recent years the value of the pi-coupling network as a low-pass filter for T.V.I. has been widely recognised. In this article G2HW high ights the factors which must be considered when using such networks as tank circuits.

A PI-NETWORK suitable for harmonic suppression is illustrated in Fig. 1. R1 and R2 are the resistances to be matched, while X_{C_1}, X_L and X_{C_2} are the reactances of the network components. Over a wide range X_L can be chosen quite arbitrarily, and providing suitable values for X_{C_1} and X_{C_2} are used, R1 can be matched to R2. A special case is the so-called *quarter-wave network* [1] where

$$X_{C_1} = X_{C_2} = X_L = \sqrt{R1.R2}$$

This network is satisfactory for impedance matching, but, since the sum of the capacitive reactance is not equal to the inductive reactance, it is obviously not a resonant network, and would therefore be unsuitable for use as a tank circuit (because there would be no "flywheel effect" so essential to the operation of class "C" r.f. amplifiers [2]). Thus, the constants of the network must be chosen not only to match impedance, but also to ensure that the circuit is resonant and has a reasonable "Q" value.

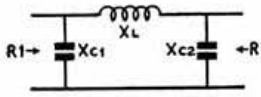


Fig. 1. Pi-network suitable for harmonic suppression.

Once it is stipulated that the network is resonant, and has a "Q" of not less than 10, the problem can be attacked from the point of view of the impedance-matching properties of a tapped resonant circuit, and the following equations result:

$$X_{C1} = \frac{R1}{Q}\left(1+\sqrt{\frac{R2}{R1}}\right) \quad (1)$$

$$X_L = \frac{R1}{Q}\left(1+\sqrt{\frac{R2}{R1}}\right)^2 \quad (2)$$

$$X_{C2} = X_{C1}\sqrt{\frac{R2}{R1}} \quad (3)$$

There is a proviso that an impedance match will be impossible if "Q" is less than

$$\sqrt{\frac{R1}{R2}\left(1+\sqrt{\frac{R2}{R1}}\right)^4}$$

This means that the maximum impedance ratio which can be matched when "Q" is 12 is 100:1, but it is desirable that the ratio should be appreciably less than this. If matching cannot be achieved, then the value of "Q" must be increased.

Application of Formulæ

In applying the above formulæ, it is necessary to know the values of R1 and R2. R1 is the resistive impedance that the p.a. must "see" in order to deliver its rated power output. In normal class "C" telegraphy operation and the steady carrier condition with anode modulation, the peak r.f. voltage at the anode of the valve will be about 80 per cent. of the d.c. supply voltage. If the h.t. voltage is called Eb, then the peak r.f. voltage will be 0.8Eb, and the r.m.s. value of this voltage (E) will be $0.707 \times 0.8 \times Eb = 0.57$ Eb.

The valve power output (P) may be obtained from the manufacturer's data, or alternatively, may be taken as 65 to 75 per cent. of the d.c. power input. This power is delivered into the effective anode load of the valve, which is, of course, R1.

thus $E^2/R1 = P$

and $R1 = (0.57Eb)^2/P$

R2 is normally equal to the surge impedance of the coaxial feeder to the aerial system. The feeder is assumed to be matched either because it is correctly terminated at the aerial, or because it feeds a correctly adjusted aerial tuning unit. The value of R2 will not be affected by the inclusion of a low-pass filter for further harmonic suppression designed for insertion into the feeder. If the network is being used as a driver tank circuit, R2 will be the grid input impedance of the following stage[3]. If I is the d.c. grid current (mA) and Pd the driving power (watts) required by the driven stage, then

$$R2 = (Pd \times 622)/I^2$$

The formulæ are easily applied, and should be used where greatest accuracy is required, but for convenience the charts in Fig. 2 and Fig. 3 have been prepared, using equations (1) and (2). They show X_{C_1} and X_L plotted against the ratio R1/R2 for different values of R1. The values of X_{C_1} and X_L which may be derived from the charts are the correct reactances to use for a tank circuit "Q" of 12.

The network is reversible, so that if R2 happens to be greater than R1, the charts may still be used. The ratio is always the higher resistance divided by the lower, and C1 is always associated with the higher resistance (which is denoted by R1 in the charts).

The most convenient method of determining X_{C_2} is to re-arrange equation (3) which now becomes

$$X_{C_2} = X_{C_1}/\sqrt{R1/R2} \quad (4)$$

Example

A single-ended p.a. (Fig. 4) is to be used under class "C" telegraphy and anode-modulated conditions, running at 1,000 V h.t. and 150 mA d.c. feed current (*i.e.*, 150 watts input). If it is assumed that the efficiency is 66 per cent. (a typical value for tetrodes of the 813 class), the power output will be 100 watts.

Now $R1 = (0.57Eb)^2/P = (0.57 \times 1000)^2/100$

$= 570^2/100 = 3250$ *ohms.*

If the transmitter is to feed a correctly matched

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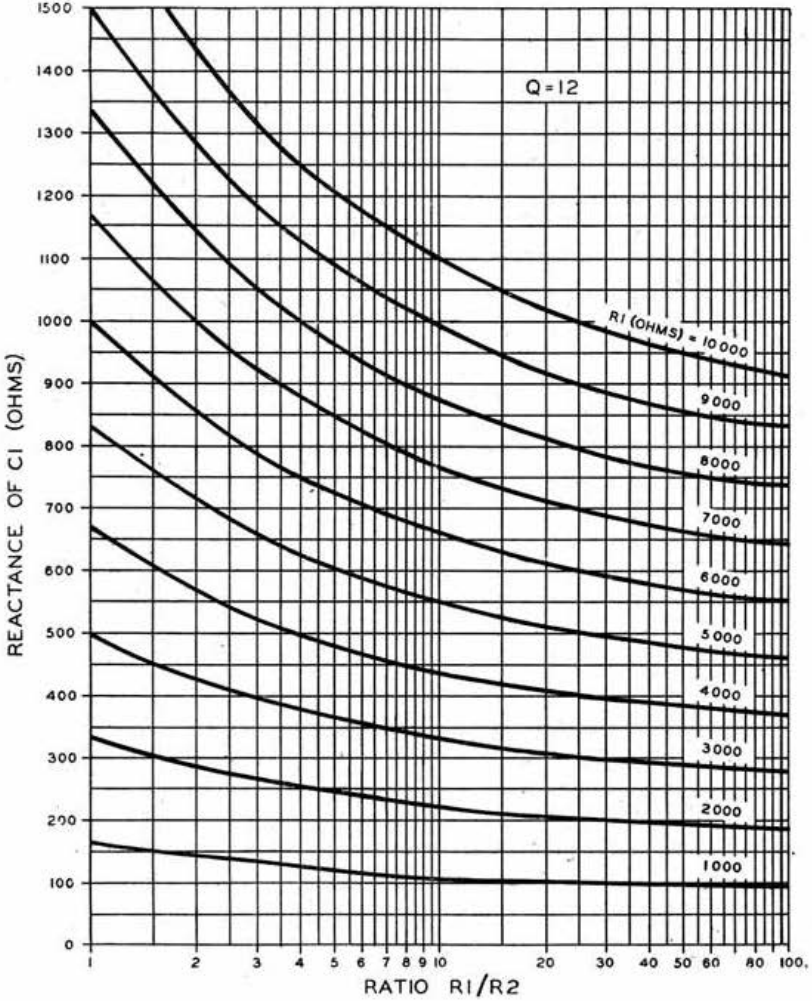


Fig. 2.
Graph of Xc plotted against the ratio R1/R2 for different values of R1.

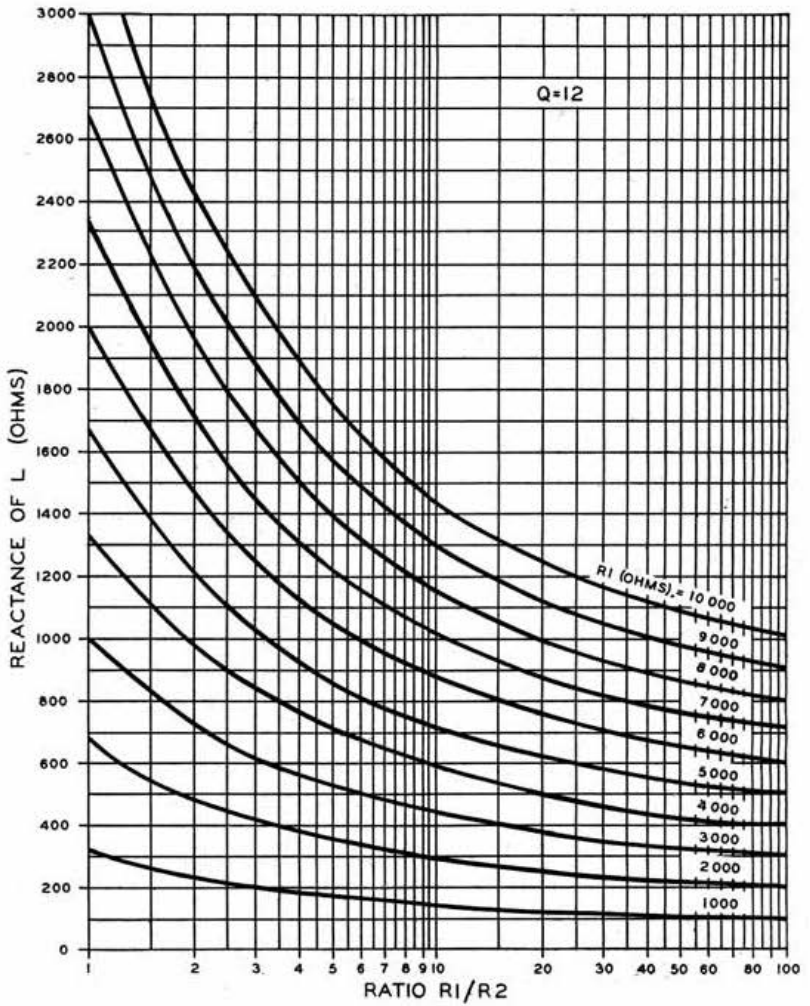


Fig. 3.
Graph of Xl plotted against the ratio R1/R2 for different values of R1.

72-ohm feeder, then

$$R2 = 72 \text{ ohms},$$

$$\text{therefore } R1/R2 = 3250/72 = 45$$

This is much less than the critical ratio of 100:1, and a match will be obtained using a "Q" value of 12.

From Fig. 2 — $X_{C_1} = 311$ ohms.

From Fig. 3 — $X_L = 357$ ohms.

From equation (4) — $X_{C_2} = 311/\sqrt{45} = 311/6.7 = 46$ ohms.

These values can be checked since, for resonance to occur —

$$X_L = X_{C_1} + X_{C_2}$$

$$i.e.\ 357 = 311 + 46$$

These reactances are, of course, independent of the transmitter frequency, and once determined will apply to any amateur band. The actual values of inductance and capacity to be used on a specific frequency must be found from reactance-frequency charts [4], or worked out in the usual manner from:

$$C = 10^{12}/\omega X_C, \text{ where } C \text{ is in } \mu\mu F.$$

$$\text{and } L = 10^6 . X_L/\omega, \text{ where } L \text{ is in } \mu H.$$

If the transmitter is to be used on the 3.5-3.8 Mc/s band, it will suffice to base the tank circuit values on the mid-band frequency of 3.65 Mc/s.

Thus $\omega = 2\pi f = 6.28 \times 3.65 \times 10^6 = 22.9 \times 10^6$

Hence $C1 = 10^{12}/22.9 \times 10^6 \times 311 = 10^6/7150 = 140\ \mu\mu F.$

$$L = 10^6 \times 357/22.9 \times 10^6 = 15.6\ \mu H.$$

$$C2 = 10^{12}/22.9 \times 10^6 \times 46 = 10^6/1050 = 955\ \mu\mu F.$$

It will be noticed that the value of C1 obtained is very close to the value of capacity which would be used in a conventional tank circuit [5]. This is reasonable, as the ratio of impedances is quite high. When the impedance ratio is low, as would be the case if the network were coupled directly to the end of a half-wave aerial (giving R2 approximately equal to 2500 ohms), or, alternatively, inserted between the driver anode and p.a. grid, then the value of C1 will differ considerably from conventional values.

Components to be Used

The component values calculated are the actual capacities and inductances required, but, to allow a little "leeway," the condensers should have higher maximum values than those derived from the formulæ. It is often advantageous to use condensers with semi-circular vanes; capacity, being proportional to rotation, can then be estimated with reasonable accuracy.

A suitable maximum capacity for C1 would be 200 $\mu\mu$F. Spacing between vanes should be adequate to withstand the peak r.f. voltage, bearing in mind that with anode-modulated telephony the r.f. peak voltage is twice that for class "C" telegraphy. It is possible that the value calculated for C1 in the 28 Mc/s band is less than the output capacity of the p.a. valve, in which case, the minimum possible value for C1 should be employed, provided the band can be covered. It is of interest to note that when the portion of C1 external to the valve becomes zero, the tank circuit becomes the so-called "series tuning" arrangement.

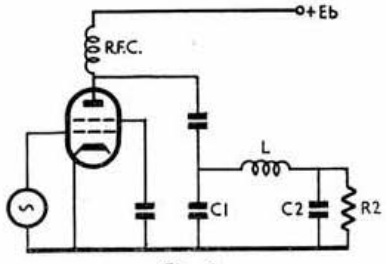


Fig. 4.

Circuit of a single-ended p.a. incorporating a pi-network tank circuit.

The maximum capacity for C2 should be about 1500 $\mu\mu$F.—a value readily obtained by using a 3-gang 500 $\mu\mu$F. receiving condenser with the sections joined in parallel. Assuming the feeder is matched, the r.m.s. voltage E may be found from the relation:—

$$E^2/R2 = P$$

from which $E = \sqrt{P.R2} = \sqrt{100 \times 72} = 10 \times 8.5 = 85\ V.$

Hence the peak voltage across the condenser will be:—

$$\sqrt{2} \times 85 = 119\ V.$$

This can easily be handled by a receiving type condenser. Arcing at C2 will denote a serious standing wave on the coaxial feeder.

The design of the inductance can be determined from any of the usual coil design charts or tables. If desired, the following formula [6] may be used, which gives the number of turns required for an inductance if the turns-per-inch and the coil diameter are known.

$$N = Lx[1 + \sqrt{1 + (9/aLx^2)}]$$

where N is the required number of turns, n is the number of turns per inch, d is the diameter of the former in inches, a is the radius of the former in inches, L is the inductance in microhenries (μH.), and $x = 20/nd^2$.

If the 15.6 μH. inductance is to be wound on a 2.5 inch former with 8 turns-per-inch, then:—

$$x = 20/8 \times 2.5^2 = 20/8 \times 6.25 = 0.4$$

$$x^2 = 0.16$$

$$9/aLx^2 = 9/1.25 \times 15.6 \times 0.16 = 2.89$$

$$N = 15.6 \times 0.4(1 + \sqrt{1 + 2.89})$$

$$= 6.24(1 + \sqrt{3.89}) = 6.24(1 + 1.96)$$

$$= 6.24 \times 2.96 = 18.5 \text{ turns.}$$

Thus, the coil would have 18.5 turns wound 8 turns-per-inch on a 2½-inch diameter former. Suitable wire would be No. 16 s.w.g. bare copper. If the inductance is wound to formula, then the condenser values will automatically be correct when the transmitter is properly adjusted (provided R2 is actually 72 ohms).

Circuit Arrangement

If the theoretical harmonic reduction is to be realised in practice, some thought must be given to the layout of components. It is important that the stators of C1 and C2 be earthed by as short a lead as possible, preferably by bolting the condensers direct to the chassis. The coaxial feeder should be brought into the p.a. shielding compartment *via* a coaxial feed-through connector, and should then be continued right up to the terminals of C2 where the outer conductor is earthed at the same point as the stator. This avoids an unshielded loop which might allow harmonic power to be coupled into the feeder.

The use of a feeder voltmeter is a little unusual in amateur transmitters, but in this case it has the following advantages:—

(i) Unshielded loops formed by *ammeter* connecting-leads are avoided.

(ii) The voltmeter has leads which are "cold" to r.f., and thus can be remote from the p.a.

(iii) The difficulty of connecting a large instrument in series with the inner conductor of a coaxial feeder is avoided.

A suitable voltmeter arrangement is shown in Fig. 5. Any meter having a full-scale deflection of not more than 5 mA. may be used. The diode should be of the EA50 class, while C3 and C4 can be 0.01 μF. mica condensers. For a 150-watt transmitter R should be adjusted so that full-scale deflection is obtained for 200 V. peak applied between the diode anode and earth. With a large paper condenser (8 μF.) temporarily connected across C3, the voltmeter may be calibrated by applying known 50-c/s. voltages between the diode anode and earth. The diode heater may be run from an "earthy" 6.3 V. supply. All the voltmeter wiring, with the exception of the diode anode lead, is preferably carried out in shielded cable. If the feeder has no low resistance d.c. path between inner and outer conductors, a r.f. choke must be connected across C2.

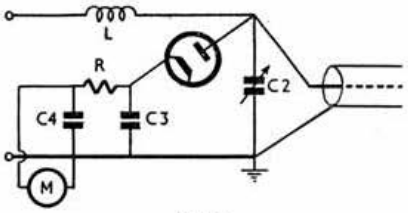


Fig. 5.
Circuit of feeder voltmeter described in text.

As C1 and C2 are directly earthed to the chassis, the tank circulating current will flow in the chassis. At higher frequencies, where the valve output capacity forms an appreciable fraction of the effective tank circuit capacity, an increased chassis current will flow between C1 and the screen-grid and cathode connections of the valve. To minimise coupling between anode and grid circuits due to r.f. chassis currents, the grid circuit should be earthed at one point only, this taking the form of a low impedance connection to the cathode pin (in the case of an indirectly heated valve) or the centre point of the two-filament by-pass condensers. All by-pass condensers should have a low impedance in the 40-70 Mc/s. range as well as at the transmitter working frequency; the mica disc type should be satisfactory.

Harmonic traps in the anode lead should be avoided, if possible, as they tend to encourage parasitic oscillations. It is desirable that C1 should have a very low residual inductance and be mounted close to the valve. All leads in the loop from the valve anode, through the blocking condenser, C1, the chassis, and back to the screen-grid, should be of metal strip—copper 1 in. wide by 0.005 in. thick being suitable. The low inductance leads and the small enclosed area of the loop will raise the frequency of this parasitic circuit thus providing a low impedance path for harmonics and reducing the tendency for parasitic oscillations to occur.

Circuit Adjustment

The normal tuning method is well known,[1] and will not be described here. If, however, the network is required to feed a coaxial cable having a high standing-wave ratio, or an aerial of random length, then the load presented to the transmitter will be unknown. A "cut and try" method will have to be used, in which case it is desirable for L to be adjustable.

When working into an unknown load, adjust C1 and C2 in the usual manner until the p.a. valve is loaded to the required input. Check that the minimum d.c. anode current to the p.a. coincides with maximum output as indicated by the aerial or feeder ammeter. If this coincidence does not occur (assuming there is no regeneration taking place), then the tank circuit "Q" is too low. The value of L should be reduced, and the tuning process repeated. Use the maximum value of L consistent with maximum output occurring at minimum d.c. feed current as C1 is adjusted.

Should it be found that the system "works backwards" (*i.e.*, the p.a. loading increases as C2 is *increased* in value), then the impedance ratio is too great. Tuning may be restored to normal if the circuit "Q" is increased by reducing L, but this may cause overheating of the coil due to excessive circulating current in the tank circuit. A preferred method is to modify the load impedance by connecting a suitable reactance (usually a fixed condenser) in series between the load and C2—the value being determined experimentally. The condenser, if used, should be of a good quality mica dielectric type rated to carry the load current as measured by the output r.f. ammeter.

References

(1) CRAGG, "The Use of Pi-Coupling Networks," R.S.G.B. BULLETIN, *June, 1951.*
(2) *The Radio Amateurs' Handbook (A.R.R.L.), 1951, p. 154.*
(3) *The Radio Amateurs' Handbook (A.R.R.L.), 1951, p. 160.*
(4) LANGFORD SMITH, *Radio Designer's Handbook, p. 313.*
(5) *The Radio Amateurs' Handbook (A.R.R.L.), 1951, p. 155.*
(6) LANGFORD SMITH, *Radio Designer's Handbook, p. 145.*

See also: TERMAN, *Radio Engineer's Handbook, p. 632, p. 208,* and EVERITT, *Proc.I.R.E., May, 1931.*

Tuning Unit Capacitors

FOR the benefit of the many members using war-surplus units of the "TU" series, Mr. F. G. Southworth, GW2CCU (R.R. Region 11), has compiled the following table of values relating to capacitors found in these units. All values are in $\mu\mu$F. Neutralising condensers in all units: maximum 26 $\mu\mu$F, minimum 8 $\mu\mu$F.

Unit Type No.	M.O. Tuning Condenser		P.A. Tuning Condenser	
	Max.	Min.	Max.	Min.
TU5	135	20	156	20
TU6	77	15	116	19
TU7	111	23	116	19
TU8	66	14	81	15
TU9	77	15	116	19
TU10	62	14	116	19

Affiliated Societies

THE following are additions to the list published in the March issue:—

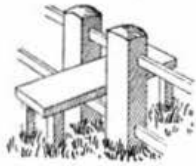
ABERDEEN AMATEUR RADIO SOCIETY, c/o G. M. Jamieson, 66 Elmfield Avenue, Aberdeen.
FORFAR & DISTRICT AMATEUR RADIO CLUB, c/o J. Patterson, 19 Taranty Road, Forfar, Angus.
GREAT PORTLAND RADIO CLUB, c/o V. F. Turner, 18 Henley Road, Edmonton, London, N.18.
WARRINGTON & DISTRICT RADIO SOCIETY, c/o S. Wood, 12 Thelwall Lane, Latchford, Warrington, Lancs.
WEST KENT RADIO SOCIETY, c/o L. S. King, Glenisla, Maidstone Road, Pembury, Kent.
WOLVERHAMPTON AMATEUR RADIO SOCIETY, c/o H. Porter, 221 Park Lane, Wolverhampton, Staffs.

Silent Key

Members resident in the neighbourhood of the Thames Estuary and in particular members of the Medway Amateur Radio Transmitters' Society deeply regret the passing of Harry Harding, G6RQ, of Tunstall, near Sittingbourne, Kent. Harry was a staunch supporter of the old-time spirit of Amateur Radio and, although his voice will no longer be heard, he will be remembered with affection by all who cherished his friendship.

To his wife and relatives we offer our sincere sympathy. G6NU.

THE HELPING HAND TO AMATEUR RADIO



Part X.—Drift and Chirp—Keying Systems

AN oscillator stage may exhibit slow changes in frequency (known as *drift*), arising from temperature variations, and rapid changes in frequency (known as *chirp*), brought about by keying fluctuations in voltage or loading.

Drift

Drift may be minimised by using materials having low temperature co-efficients of expansion; by keeping as low as possible the heat developed by the valve and individual components; by judicious placing of these components on the chassis, and by allowing free circulation of air. It is rare, in amateur equipment, for the oscillator stage to be enclosed in a thermo-statically controlled cabinet.

By

B. W. F. MAINPRISE

B.Sc. (Eng.), A.M.I.E.E. (G5MP)

Chirp and its Causes

Chirp is more serious, since, in addition to being unpleasant to listen to, it makes a signal harder to copy on a selective receiver. Additionally it causes quite unnecessary interference with transmissions on adjoining frequencies. Fortunately, any steps taken to improve the general stability of an oscillator will often simultaneously minimise both drift and chirp.

The causes of chirp fall roughly into six categories:

(i) *Insufficient reserve of valve emission.*—This may occur through a defective valve, or because voltage on the heater is too low due to drop in the resistance of the leads. As very little variation from the makers' figures is permissible, a voltmeter reading should be taken at the actual valve-holder while all stages are in operation.

(ii) *Incorrect feed-back.*—In the e.c.o. circuit, feed-back is determined by the position of the cathode-tap on the grid coil. The setting of this tap which will combine a steady note with good output may be determined as follows: a resistor of a few thousand ohms is wired in series with the anode h.t. supply and temporarily short-circuited by means of a switch. The oscillator frequency is then tuned in on a receiver. When the switch is opened, the anode voltage is reduced, and the oscillator frequency will either rise or fall. A rough rule is that: *If the frequency falls when the voltage falls, then the tap must be moved towards the low potential end of the grid coil.* The rule is not absolute, however, for other effects may swamp the change in frequency, arising from incorrect positioning of the cathode-tap.

In oscillator circuits where feed-back is obtained by means of two series-connected condensers, alteration of their ratio should be tried. The relative values of the two condensers should, if possible, be chosen to maintain a constant total capacity. The grid leak also plays an important part in feed-back, and alternative values should be tried in order to obtain a chirp-free note.

(iii) *Insufficient capacitance across the oscillator coil.*—The inter-electrode capacitances of a valve change slowly as the electrodes expand with heat, but they also vary in sympathy with rapid voltage fluctuations, such as are present during keying. It is, therefore, desirable to swamp these relatively small changes by connecting a large capacitance across the grid coil. A high-grade silver mica condenser, having a value around 0.00025 μF, would be suitable for a coil tuned to 14 Mc/s (or 0.0005 μF on lower frequencies), the resulting gain in stability being more valuable than the consequent reduction in output.

The valve should work into a fairly low impedance, necessitating the use of a tank condenser of 0.0001 μF or more. As the capacitance of this condenser is increased, the harmonic output decreases—a useful point to remember when designing a p.a. stage in localities where T.V.I. must be considered—but the output on the fundamental frequency is not greatly affected. Stability is therefore assisted by permitting some reduction in harmonic output from the oscillator, the loss being restored by increasing the gain of the subsequent frequency-multiplying stages.

(iv) *Time lag in condenser charging and discharging.*—This often gives rise to chirp when condenser values are larger than necessary. Consider, for instance, an oscillator keyed in the screen-grid circuit. When the key is closed, voltage is applied to this electrode, but the associated r.f. by-pass condenser is in a discharged state, maintaining the electrode at a near zero d.c. potential. The voltage across this condenser will increase as charging current flows, but this rise will be retarded by the screen-grid voltage-dropping resistor, producing a chirp. Conversely, when the key is "up," the charge on the by-pass condenser will take a little time to leak away and will prevent the potential of the screen-grid from dropping immediately to zero, again resulting in a chirp.

By-pass condensers should, accordingly, be as small as possible, consistent with efficient by-passing on the lowest frequency band employed. Values of around 0.001 μF will generally suffice. An additional advantage is that, if the stage is modulated for telephony, attenuation of the higher speech frequencies will be reduced.

The combination of capacitance and high resistance formed by the grid condenser and its

associated resistor will again have a time constant producing a charging lag, and the condenser value may, with advantage, be reduced below the value of 0.0002 μF in common use.

In a keyed oscillator stage the r.f. by-pass condenser at the lower end of the tank coil may give rise to chirp, due to time lag in charging and discharging, but the effect will be less pronounced, because of the absence of any high series resistance.

(v) *Unsuitable ratio of anode to screen voltages.*—Modern oscillator circuits favour tetrodes or pentodes. The ratio of anode to screen voltage often has an appreciable effect on drift and chirp. The optimum ratio should be found by experiment and be maintained, if possible, by the use of two series-connected voltage-stabilising valves of the gas-filled type (see Part VIII—February issue). Stabilisers should be added only after the circuit constants have been adjusted for minimum sensitivity to voltage change, and should be regarded as a refinement, lending a finishing touch to the constancy of the oscillator note.

(vi) *Fluctuations of the oscillator load.*—If the stage following the oscillator is keyed, it will constitute a varying load, as demonstrated by the difference in grid current readings when the key is in the "up" and "down" positions. Chirp arising from this cause is difficult to eliminate. The procedure already outlined to ensure maximum oscillator stability should be followed, after which the coupling between the two stages should be reduced by using the smallest value of coupling condenser commensurate with reasonable power transfer. A value well below 50 $\mu\mu$F may be possible.

In some cases it may be found necessary to key the oscillator simultaneously, but it is better practice to leave these two stages in steady operation and key the third stage (provided that this is not the output stage running at fairly high power).

* * *

H.T. Positive Keying

In this system, keying is effected by means of a relay in the h.t. positive lead. If the valve is a tetrode, the screen-grid circuit must be broken simultaneously in order to prevent that electrode from drawing excessive current and overheating. A relay is essential for anode voltages above 150 V to avoid the serious risk of shock. Since the current in the circuit may amount to as much as 100 mA at a potential of several hundred volts, sparking will almost certainly occur at the keying contacts, causing pitting of the contact alloy, and radiating key-clicks which may interfere with nearby receivers and with transmissions on adjoining frequencies. A key-click filter should therefore be used. This may consist of a resistance condenser combination across the keying-relay contacts to absorb the spark at "break," and a low-frequency choke in series with the contacts for smoothing the abrupt surge at "make." A typical key-click filter is shown in Fig. 1.

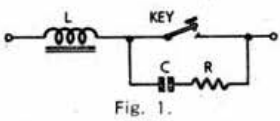


Fig. 1.

Key-click filter. Optimum values should be found by experiment, typical figures being: L 5H; C 0.005–0.5 μF; R 100 ohms.

Cathode or "Centre-Tap" Keying

This system of keying takes place in the cathode lead of the valve, or—if a directly-heated type is used—at the junction between the centre-tap of the filament transformer winding and h.t. negative. This system breaks the anode, screen and grid current, and is generally more popular than h.t.+keying as it is considered less prone to produce key-clicks. Breaking the grid current, however, causes greater fluctuation of the load into which the previous stage is working—an undesirable feature where the previous stage is the oscillator.

The same precautions must be taken as in h.t.+keying, for although one side of the key may be earthed, the full h.t. voltage exists across the contacts when the key is in the "up" position.

Transformer Primary Keying

Provided the filaments or heaters of the valves are fed from an independent transformer, the primary of the h.t. transformer may be keyed. Due to the inductance of the transformer winding, current will rise slowly, while the charge held by the filter condensers will produce a slow fall of current, tending to add "tails" to the signal. Care is therefore necessary in the choice of component values. Because of this gradual rise and fall, the keyed signal may possess a "soft" note; this can be attractive, but it may make the signal harder to read than when a clear-cut keying system is used. Primary keying sets up considerable surges in the mains, with corresponding stresses in the transformer; for this reason it has largely fallen from the popularity it formerly enjoyed.

The above methods directly break fairly large powers, and it is usually considered better practice to key in relatively low-powered circuits, such as the screen or control-grid of a valve. In this way, the wear on the keying contacts and the formation of key clicks are greatly reduced. Two typical methods are described below.

Screen-Grid Keying

This system is undeservedly regarded with suspicion by many operators in the belief that considerable output may still be present in the anode circuit when the key is "up." While this may be true if the screen-grid lead is merely broken, leaving the electrode to take up some indeterminate potential, the system is entirely satisfactory provided that a slight negative bias is applied to the screen-grid (and to the suppressor-grid if the valve is a pentode) when the key is in the "up" position.

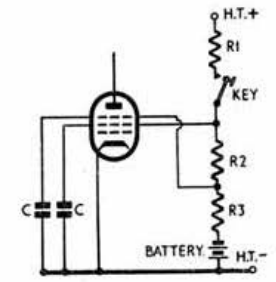


Fig. 2.

Screen-grid keying, with provision for slight negative bias when the key is "up." For values see text.

The arrangement is illustrated in Fig. 2. R1 is the normal voltage-dropping resistor. The dry battery supplies about 6 volts of negative bias to the screen and suppressor grids *via* the resistors R2 and R3 respectively. C, C are the usual r.f. by-pass condensers. The resistor values may readily be calculated. For example, consider the case of a valve with a screen-grid rating of 200 volts at 10 mA, and a suppressor-grid rating of 45 V at negligible current. The h.t. supply voltage is, say, 480 V. R2 and R3 are chosen to

pass about 4 mA at 200 V; thus, by Ohms Law, their combined value must be 50,000 ohms. Since the suppressor-grid requires roughly one-quarter of the screen voltage, R3 will be 12,000 ohms, leaving 40,000 ohms for R2. R1 has to drop 280 volts at (10+4) mA, necessitating a value of 20,000 ohms.

When the key is "up," both the screen and suppressor grids are biased 6 volts negative. With the key "down" they receive approximately (200−6) volts and (50−6) volts respectively, so the effect of the bias is then negligible.

The writer uses the values calculated above when keying a 2E22 valve (a pentode of rather lower rating than the familiar 807 tetrode) which is loosely coupled by a link to push-pull PT.15s. With the key "down," this output stage is driven to 120 mA at 1,200 volts, at the rated grid current of 15 mA. With the key "up" the grid current is zero, while the anode current meter shows a barely perceptible deflection from zero—indicating that adequate cut-off is provided by screen-grid keying in the preceding stage.

Where the anode voltage is not more than 300 V it may be found that the bias battery can be dispensed with, R3 being joined directly to the chassis. The screen by-pass condenser should be as small as possible (*e.g.*, 0.001 μF). A key-click filter is usually unnecessary. In mobile equipment the filament battery will provide the necessary bias.

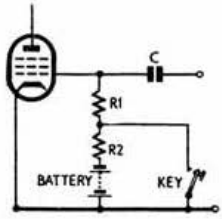


Fig. 3.

Blocked-grid keying. A safe and almost click-free circuit, specially suitable for oscillator stages.

Blocked-grid Keying

This keying system, shown in Fig. 3, unfortunately requires a 90 or 120 V h.t. battery. When the key is "up," the valve receives a high bias from the battery, and the output is cut-off; but when the key is "down," the lower end of the grid leak is connected to chassis, and the valve then derives a working bias from the grid current flowing through R1, and gives normal output. R2 (about 20,000 ohms) prevents a short-circuit on the battery when the key is "down." The values of R1 and C (the grid resistor and condenser) may be adjusted by experiment to eliminate any slight chirp that is present, but provided that the stage constants have been chosen for really stable operation this system of keying is excellent.

Keying Relays

In circuits operating with voltages up to 300 V, the standard G.P.O. relays (Types 3000 and 600) are quite satisfactory, provided that a higher voltage than the rated value is applied to the coil in order to ensure rapid action, and that the assembly comprises only one set—or at the most two sets—of contacts. For keying higher powers, vacuum-enclosed contacts are desirable (the relay resembling a vibrator in outward appearance), such contacts being light enough to permit the necessary rapid action without undue wear or noise.

CQ Single Sideband

By H. F. KNOTT (G3CU)*

ONE of the problems confronting the newcomer to s.s.b. is to decide which system is the easier to get going. Unfortunately, space does not permit a full discussion, but the following few pointers may act as a guide to those who are trying, or are about to try, s.s.b. for the first time.

Basically, single-sideband technique may be conveniently divided under two headings, namely, the *filter* method and the *phasing* method. The former method employs either an LC filter (inductance and capacitance) designed in the region of 10 kc/s (with an upper limit of 20 kc/s where toroidal-wound coils are used), or a crystal filter which can consist of either a lattice-network or crystal-gate arrangement, designed for any frequency from 100 kc/s upwards. The surplus "channel" crystals (FT241) have made possible some extremely good filters in the frequency range 450-950 kc/s, while crystal filters operating at 5.6 and 8 Mc/s have been constructed.

The filter system requires a number of heterodyne steps to reach the desired band, but this can be accomplished with receiving valves and components. It is not so easy to change sidebands, but provision for reinserting the carrier is comparatively simple.

With the phasing method, it is possible to commence with the frequency on which it is intended to operate, either sideband being easily obtained, and both amplitude and phase modulation being available by simply switching-off one of the balanced modulators. Carrier insertion is just as easy as with the filter rig. The audio phase-shift networks are, however, rather more difficult to align, and require the use of a simple oscilloscope. Information is becoming available on networks incorporating fixed-value close-tolerance resistors and capacitors, which will simplify the process of setting-up. Either system, given accurate construction and adjustment, can provide a 30db attenuation (or more) of the unwanted sideband.

A final word of advice to anyone who wishes to experiment with single-sideband working and has not yet made up his mind how to go about it: read as many articles as possible on the subject, and choose the method best understood, or the one which appears the simplest from the point of view of construction and alignment. Build the s.s.b. drive equipment with receiving-type valves (low-level generation), after which only linear r.f. amplifiers are required to reach the desired power level.

S.S.B. Activity

A number of interesting facts came to light recently as the result of tests conducted by G3BVA and the writer with the co-operation of G3AEX. During a regular Sunday afternoon sked, G3BVA, who is crystal-controlled, was operating on 1975.9 kc/s using the lower sideband. G3CU, who at the time was using the upper sideband, adjusted his "reference" carrier to coincide with that of G3BVA, resulting in what appeared to be a double-sideband suppressed-carrier transmission. G3AEX, who was receiving both transmissions, opened the bandwidth of his receiver to 6 kc/s, centred the b.f.o. in the middle of the pass-band, and obtained two perfectly intelligible signals, capable of being read simultaneously, both using the same carrier frequency, and without the unpleasant noises that

(Continued on Page 450)

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THE CLERICAL SIDE OF SHORT-WAVE LISTENING

By D. W. E. POWELL (B.R.S.17241)*

Any short wave listener who takes his hobby at all seriously finds himself with some clerical work to do, not the least of which is the keeping of log books and the compilation of reports. It is true to say that the correct maintenance of the former is essential to the full compilation of the latter. After much experience, the author of this article has devised a form of log which he feels may be of use to others who, like himself, find that many of the printed books do not meet the full requirements of the individual.

THE average short wave listener will have only a restricted space in which to rest his log book while he is listening, and for this reason the book chosen should be of just sufficient size to allow an adequate record to be maintained. A ruled exercise book 6¾in. x 8¼in. has been found suitable at the writer's station. The S.W.L. is more fortunate than his transmitting colleague in that he may use a loose-leaf book if he so desires, which is an advantage if space is so restricted that the log has to be folded over whilst in use. If a loose-leaf book is selected, it should be of a type from which sheets cannot easily be torn.

The pages should be vertically ruled in order to achieve a layout suited to individual requirements, allowing just sufficient room in each column to insert the requisite details. Suggested column headings are as follows: *Date; G.M.T.; Station heard; Station being called or worked; RST (for C.W.) or RSF (for 'phone); QSB and QRN; Modulation; Remarks and QRM;* and a final column in which, by the use of suitably devised codes, the *dial reading* may be recorded, together with an indication of whether (in the case of superhets) the *a.v.c. noise-limiter, or crystal filter* was in circuit at the time of reception.

Codes

Most of the codes used for logging are well known, such as, for example, the RST code. The F-code, for recording quality is, however, not so often used although it is quite useful.

F1.	Speech distorted—completely unintelligible.
F2.	Distorted, but 10 to 15 per cent intelligible.
F3.	General sense followed, but intelligibility low.
F4.	Pronounced distortion — 30 per cent. intelligible.
F5.	Speech breaking—poor quality—60 per cent. intelligible.
F6.	Unnatural speech, but readable.
F7.	Slightly distorted, but 100 per cent. intelligible.
F8.	Good clean speech.
F9.	Perfect, well modulated telephony.

The F-Code for recording quality of telephony transmissions.

In addition to the recognised codes, the writer has devised others to facilitate concise recording in the log book of additional data mentioned, *e.g.*—modulation. Without the use of a meter, modulation depth cannot be accurately estimated, but it is usually possible to approximate. For instance, a strong carrier bearing relatively quiet speech indicates under-modulation; whereas if the speech is distorted and the sidebands can be heard over a wide portion of the band, then the transmission is probably being seriously over-modulated. Between these extremes are stations which modulate about 100 per cent. For the purpose of concisely recording this in the log, a five-point code has been devised (shown in the following table).

U	Serious undermodulation.
F—	Slight undermodulation.
F	Full or 100 per cent. modulation.
F+	Slight overmodulation.
O	Serious overmodulation.

A suggested code for recording depth of modulation.

Six degrees of QRM are recorded, indicating the extent to which reception of the desired signal is impaired by interference. The method of abbreviation used by the writer is as follows: *Nil;* Very slight QRM *(Vy sl);* Slight *(Sl);* Fairly bad *(F bad);* *Bad*; Very bad *(Vy bad).* This can be amplified, if necessary, by adding the call sign of the offending station, or by noting a special type of QRM (*e.g.*—when listening on 160 m., the writer inserts *T* if the interference is from a trawler: similarly *BC* is used for broadcast, *C* for commercial, *L* for Loran, and so on).

Telephony signals are shown thus: *KV4AA, VK9RM,* and c.w. thus: *KV4aa, VK9rm;* avoiding the use of an extra column, and enabling more data to be recorded quickly.

Final Entry

The last column in the log book is used to indicate, in not more than eight characters, whether the noise-limiter, a.v.c., or crystal filter were in circuit, whether speaker or 'phones were used, and the dial reading at which the station was received (this requires not more than four figures since, in practice, the setting 100 is not normally used on either dial). *N* is inserted to show that the noise-limiter was in circuit; *A* for a.v.c.; *X* for crystal filter; while *S* or *P* indicates either loudspeaker or 'phones. If 'phones or speaker are permanently in use, then the last symbol is unnecessary.

Dial reading is recorded in four figures: the first two show the band in use (or the setting of the band-set dial, according to the type of calibration available), and the last two indicate the setting of the band-spread dial. The band-set reading should be accurate, since the smallest error will make a considerable difference on the band-spread dial. If a frequency meter, or 100 kc/s. sub-standard is available, the h.f. end of the band in use should be located on the band-set condenser to coincide with a zero setting of the band-spread dial (assuming that the reading increases as frequency decreases). This ensures that a rough frequency check is available merely by noting the dial read-

* *206 Holly Road, Aldershot.*

ings, translation into kc/s. being carried out later, if required.

A typical entry in the final column might be *NAX 2845 P*, meaning that the noise-limiter, a.v.c., and crystal filter were all in circuit, the band-set dial reading was 28 (or alternatively that the 28 Mc/s. band was in use), 45 was the band-spread dial setting, and listening was on 'phones.

Judicious Logging

An important point is the question of which stations to log. Most S.W.L.'s probably find that DX is the goal, and there is obviously little point in filling up the log with S9 DL4 signals on 14 Mc/s! In tuning around, however, it is desirable to get the feel of the band, so that some idea of the prevailing conditions may be obtained. If there are several VK2's and 3's coming in at S5-7, or if the PY's are there, they should be noted, and one or two logged for reference. They will serve as a standard against which to measure DX. After the session is over, a brief review of conditions should be made, either in another part of the log book or in a separate book such as a table diary. Where short skip conditions prevail, an entry such as *Short skip—DL4, F, HB, etc.* would be sufficient to indicate this fact The book may also be used to record weather, sunspots, types of aerial and receiver in use, and any experiments that may be tried. At the back of the writer's log book, two other items are shown. One is a list of stations for which period reports are to be compiled, and includes a schedule of dates and times. The other is a list of stations to which reports have been sent, showing date and channel of despatch, and the date the QSL card is received.

One final tip: make full use of the Q-code when logging stations. It will often save much writing, and enable a quick accurate note to be recorded.

Readability

R1. Unreadable.
R2. Barely readable, occasional words distinguishable.
R3. Readable with considerable difficulty.
R4. Readable with practically no difficulty.
R5. Perfectly readable.

Signal Strength

S1. Faint, signals barely perceptible.
S2. Very weak signals.
S3. Weak signals.
S4. Fair signals.
S5. Fairly good signals.
S6. Good signals.
S7. Moderately strong signals.
S8. Strong signals.
S9. Extremely strong signals.

Tone

T1. Extremely rough hissing note.
T2. Very rough a.c. note, no trace of musicality.
T3. Rough, low-pitched a.c. note, slightly musical.
T4. Rather rough a.c. note, moderately musical.
T5. Musically modulated note.
T6. Modulated note, slight trace of whistle.
T7. Near d.c. note, smooth ripple.
T8. Good d.c. note, just a trace of ripple.
T9. Purest d.c. note.

(If the note appears to be crystal-controlled add a x after the appropriate number. Where note is "chirpy" add c).

The RST-Code for recording readability, signal strength and tone.

"GEORGE"

The True Story of a Personal QSO

IT was a glorious day, and I was on holiday, so the obvious thing to do was go down to the beach and enjoy a quiet spot of sunbathing. As an afterthought, I decided to deliver one or two QSL cards on the way. But I hadn't reckoned with George. He is my nearest neighbour, and although we have had several QSO's in recent weeks, we had not met personally.

George's QTH was my first call, and it wasn't long before I found myself knocking on the door, wondering vaguely what he would be like. He was at home, and as I went in I found him relaxing in an easy-chair. He didn't recognise me at first, so I said, in my best 'phone manner: "Hello George—do you know the voice?" Even then he was uncertain about me, until I told him my call sign. From that moment we became firm friends.

It wasn't long before I was following George upstairs in the direction of his bedroom. I think it always gives me great pleasure to walk into a shack for the first time, and this visit was no exception. The shack-cum-bedroom was neatly laid out with an imposing black, crackle-finished, QRO rig installed in a small alcove. Numerous items of equipment were standing on the table and on the floor. There seemed to be an amazing amount of gear, including a 640 receiver and the remote control panel for the transmitter.

But let George tell the story. "This," he said, picking up a B2 transmitter, "is a marvellous job. I worked thirty countries on it." He replaced the B2 on a shelf. I asked him whether he had modified it for "Top Band" working. "Yes," he replied. "The coil is in here." He brought the coil from a cupboard to show me.

Then more coils, followed by crystals, wavemeters and modulators, came out for my inspection, while George briefly related the history of each item, indicating how it had played its part in the operation of the station. He switched on the receiver and deftly tuned round the bands. "I get a lot of industrial static," he explained, and sure enough, he did.

"Take a look out of the window," he invited. I did so, following his arm as he pointed out the various landmarks. "There's the gasworks and the power station, and just over there, to the left, the rope works." We returned to the receiver. "Twenty's dead," he remarked, switching over to 40 metres. Here he managed to tune in two stations engaged in a QSO, and was able to demonstrate the effectiveness of the noise limiter against the industrial interference.

Finally, George demonstrated the QRO rig for me, and I was greatly impressed by the remote control facilities. And then it was time to leave, so I gave him my QSL card, but he didn't look at it, simply placing it very carefully with his other cards.

It is surprising how time flies when visiting other people's shacks and chewing the rag about this and that. The afternoon was nearly over, and my sunbathing session a mere might-have-been, but I enjoyed every moment I spent with George because I knew that I had met a *real* ham.

You see—George is blind.

NORTH-WESTERNER.

DX TOPICS
THE MONTH ON THE AIR

by A. O. Milne* G2MI

Conditions

DURING March, conditions on 14 Mc/s were generally poor except for one or two short spells when they improved for long distance contacts. Even short distance contacts were usually made against a background of high noise level and it appeared that, in general, signals were arriving at relatively high angles or were subjected to considerable scatter. It was often almost impossible to determine the direction from which a signal was arriving and some of us began to wonder if rotary beams were worth it after all. Fortunately the directivity could still be checked on local signals, but the extra gain of a beam array, due to its low-angle characteristic was more often than not absent.

Notes and News

One welcome rarity was the appearance of YA3UU with a nice strong signal on 14 Mc/s c.w. This station was quite genuine and cards have been received from him at the Bureau. He hopes to be in Afghanistan again during this month.

B.R.S. 10663 of Yeovil says XZ2SY is a good signal on 14 Mc/s 'phone at 1640 G.M.T. Both he and GM8MN have informed us that cards for VP5BP can be obtained either from VE3QB or from VE3CJ.

TI2CHV, fixed portable 3, gives his QTH as P.O. Box 584, San José, Costa Rica, VE8RO is at Carl Harbour, Southampton Island, N.W.T.

G3BID's list for February contains some useful frequencies: OQ5AV, 14220 at 1830; 5A2CC, 14225 at 1550; SP2KGA, 14285 at 1535; CE2CC, 28300 at 1535; W2MAK/MM, 28580 at 1315, and ZS7C, 28200 at 1245. During March, his best were HH2X, 14310 at 2200; ZD4BF, 14140 at 1800; YI3BZL, 14245 at 1700, and CR6AT, 28480 at 1830.

It is understood from B.R.S. 7594 that ZS1VRF, active between March 15th and April 5th, was at the Van Riebeck Festival Exhibition in Capetown. Transmissions were made on 7, 14 and 28 Mc/s. Special cards will be used for QSL's. In his report of the month 7594 says there were one or two LU, PY and ZS signals on 28 Mc/s, but ZP4BB was the only really good one. On 14 Mc/s he heard EL9A, EL9M, CR6AN, FF3CN, HH2X, HI6EC, HZ1TA, I5US (14125), OA6C, VP3AG, VP7NT, VP7NU, VS7RSC, XZ2DN, 14208 at 1620, ZP4AF, 14185 at 2320, P.O. Box 512 Asuncion, ZP7AW, 14250 at 2040 and ZS3E, 14395 at 1730. Did we say conditions were poor? B.E.R.S. 195 has had his card from FB8ZZ *via* F8BS.

B.R.S. 250 comments that even if conditions were bad on 14 Mc/s, during the second week-end of the A.R.R.L. DX Contest, they were excellent—on 3.5 Mc/s. Around 0300 (do these chaps ever sleep?) he heard W4OSU/KP4, PY7WS, TI2PZ, KZ5CW, ZS2HI, CN8EX, EA9AP and any number of W's including the 5th and 9th districts. The best ones on 7 Mc/s were AP2N, DU1GO, EL2A and VP5BH.

G5JL agrees that conditions have been pretty poor, but curiously enough, on 7 Mc/s he had a bumper month. This was because several of the rarer Europeans obliged and he was able to add GD, HE, LZ, SP, SV, OY and ZB1 to his list. Countries outside Europe which were contacted included EA9, FA, CN8, ZC4, SU, W, ZS, PY, VE and 4X4. In all, 39 countries in the month.

G5JL has given some useful frequencies to watch on 7 Mc/s. Here they are: 5A2TV, 7007; VQ4HJP, 7007; LZ1KAB, 7010; HE9LAA, 7028; TA1CR, 7010; SU1DV, FD, GY, GO all around 7010 and all between 1800 and 1930 G.M.T. In the early mornings, VP8AP, 7027; ZC4CC and ZC4XP and on 3.5 Mc/s ZC4XP, 4X4BX and OY2Z all on 3510 kc/s. G2AHP on the other hand forsook 144 Mc/s and had a crack at "Top-Band," celebrating the occasion by working OK1AEH who uses an O-V-1 receiver.

We are glad to learn that G2VV has made a spectacular recovery from serious illness and is back on the air once more. With 30 watts he has worked CT2, VE1 and ZB2 on 3.5 Mc/s, with OX, VQ3, VK3 and ZE on 14 Mc/s for good measure. He wishes we could publish a blacklist of the really bad cases of "behaviour" on the air—so do we O.M.!

G3ETQ using a B2 with 15 watts input has contacted OX3MF in position 77° N, 18° W whose next outgoing mail will be in August.

G2YY gives details of his "Top Band" contacts with Finland. In each case he was the Finnish

The operating position at VS7RSC, the Amateur Radio station at the Colombo Exhibition with VS7DB at the controls.

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

operators' first "Top Band" contact with Britain. OH3NY, November 17, 1951, OH3PK, December 17, and OH7OH, December 26. All contacts have been confirmed by card.

G2HOF, of Wallasey, after echoing the general complaint about conditions, then proceeds to tell us about his contacts! VK9XK at 1020; KZ5GF, 1700; LZ1KWS, 1745; FB8BB at 1820 and OQ5VN at 1925. Not too bad for a "dead" band.

From W5KUC's DX C.C. Bulletin, we glean the following: FR7ZA, 14315, FB8BC a new one in Madagascar on 14340; FB8XX, 14040; ZD1SD on 14100 and 14150. This station is Steve Donohue, Royal Signals, Tower Hill, Freetown, who says ZD1AN is a phoney. ZD1BD, SS and SW are all genuine. KM6AX on 28710 is a new one as is KS6AA on 14052. KH6PA/KJ6 on 3840 is a rather forlorn hope for G. Others are F9QV/FC on 14052, IS1CNQ on 14051 and FD8AA on 14048.

Major K. E. S. Ellis, Royal Signals, ex-HZ1KE, and now DL2KE, wearing the gold-jewelled Arab dagger and ceremonial robes presented to him recently by H.M. King Ibn Saud of Saudi Arabia.

New Country

An announcement will appear in *QST* for May listing Singapore Island, VS1, and the Malayan Federation, VS2, as two separate countries. All contacts made since the statute was announced in 1946 making Singapore a crown colony will count for DX C.C.

New Prefix

Amateur stations in Germany will soon be using the prefix DJ in addition to DL as the latter series is practically exhausted. We are glad to see that this course is being followed rather than the creation of a series of three-letter DL calls.

Who's Who

YI3DYN has QSL'd all his contacts and is back in this country operating as G3DYN. He has his YI logs and will re-QSL anyone who has not had his card. Austin Sterling, KZ5ES, is now active on Swan Island with the call sign KS4AQ. He QSL's strictly card for card. AC4YN is now definitely QRT. His last transmission was made on September 6, 1949. Des. Alimundo VQ4HK will be on as ST2HK for the next two years. His address is Box 48, Khartoum. He will be working 14 Mc/s c.w. and later 28 Mc/s 'phone. He tells us that ST2KR, ST2AM and ST2RL are no longer active. From G6GN we learn that Ken Ellis is now DL2KE. VQ4AJ/G3GAJ is ZD2GAJ and will be active for some considerable time. Norman Webber, ex-MP4BAB, will shortly be operating as ST2NW c/o International Aeradio 200 Juba, Sudan.

John Brown, VP8AP, is in Port Stanley, Falkland Islands. His own home transmitter is being sent out to him. He is the operator of the "Met" station ZHF88. Harry Heal, ZD2HAH, is crystal controlled on 14072 kc/s and looks for G's between 1600 and 1830 G.M.T. He sends 73 to G3CKL.

G2BPJ has it from VQ3PBD that he hopes to work portable on 28 Mc/s and 7 Mc/s 'phone only from Zanzibar sometime fairly soon. Frank of VQ4RF will be in England about mid-July. QTH c/o Lloyds Bank, Newquay, Cornwall.

Stan Crow, VQ4SGC, has been posted to the Cable and Wireless station in Jamaica. He sails on April 24. Margaret Carmody, wife of ZE3JE, has been on holiday in Britain and has sailed for home with a big bag of bits and pieces of radio gear for Bob. B.E.R.S. 195 says VK1RF should be active soon on Heard Island.

MD2DW/5A2TL is returning home soon. He has QSL'd all contacts. In six months he worked 83 countries, using a B2 transmitter and an AR77 receiver.

VS7RSC

This station was set up at the Colombo Plan Exhibition which opened on February 23 and was manned by members of the Radio Society of Ceylon. A photograph of the operating position appears on page 448. The station was licensed to use 250 watts and all contacts will be confirmed by special card. The aerial was a close-spaced rotary beam. Due to the high noise level at the Exhibition, the receivers were a mile from the site and were connected by a 144 Mc/s link installed by VS7JB. For this information we are indebted to VS7DB.

* * *

The closing date for reports for the May issue will be Saturday, April 26.

Po Valley Floods

REFERENCE was made in a recent editorial to the emergency communications service organised by Italian amateurs during the disastrous floods in the valley of the River Po. We have now received more detailed information from the Associazion Radiotechnica Italiana and have pleasure in recording a very notable achievement.

The emergency service, which began spontaneously at Padua on November 15, received Government sanction on November 20, and lasted until December 16. The official frequencies were 7080 and 7110 kc/s but due to the vagaries of this band, much of the traffic was handled over hastily assembled 145 Mc/s circuits both fixed and mobile.

One of the main handicaps was that Italian amateurs are neither permitted to use the 3.5 Mc/s band nor to operate portable so that the unsuitable 7 Mc/s band was the only one readily available. Two different nets were organised, one working with the Fire Service directly concerned with rescue work, and the other handling traffic to the Red Cross and local authority officials.

Italian amateurs gave generously of their time, equipment and money and many loaned their cars, some of which were damaged.

Amateurs in all walks of life took part and "Radio Review," the journal of A.R.I. carries photographs of a doctor and a priest operating their stations during the emergency. Many lives were saved as a result of the use of portable radio and special mention is made of I1DBE who, although suffering from fever, stayed for many days at the top of a church belfry maintaining a vital link in the v.h.f. chain.

The Italian amateurs have received the official commendation of the Ministers of Interior Affairs and Communications, the Pontifical Committee, the Italian Red Cross, the Italian Broadcasting system and many local authorities.

It is earnestly hoped that as a result of this demonstration of their value to the community, Italian amateurs will have more generous facilities made available to them, in particular the use of the 3.5 Mc/s band, and an opportunity to develop portable equipment which could be used if ever the need should arise again. Well done, O.M.'s.

W.F.S.R.A. Contest

W.F.S.R.A. announce a contest for junior members of that organisation which will require competitors to log transmissions radiated by R.S.G.B. Slow Morse Practice stations during May.

Further details may be obtained from the originator of the contest—P. Walsh, c/o Post Office Farm, Stutton, Ipswich, Suffolk.

CQ SINGLE SIDEBAND *(Continued from Page 445)*

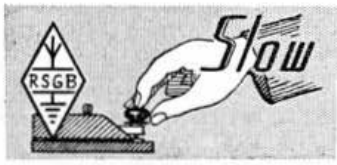
would have occurred had two a.m. transmitters been similarly received. This could have been called "independent sideband reception," though it did not conform to commercial practice.

G3FQQ (Billericay) can now be heard regularly putting out a good signal most evenings on "Top Band," whilst G8RC (Brentwood), running a filter rig, recently worked W2ZZ/MM, located somewhere off the coast of Norway.

G2IG (Petts Wood), who is doing well on 14 Mc/s with his phase-shift rig, says he "wants company," and reports that he is well on the way to an s.s.b.-W.A.C., having worked two continents already, and been heard by a third. It's a pity those PY's didn't know how to receive s.s.b!

Contests Diary

May 11	144 Mc/s Field Day (No. 1)
June 7-8	National Field Day
June 22	420 Mc/s Tests
July 6	European V.H.F.
July 26-27	144 Mc/s Open Event
September 7	Lower Power Field Day
September 21	144 Mc/s Field Day (No. 2)
October 4-5	Low Power
November 8-9	"Top Band" (No. 2)



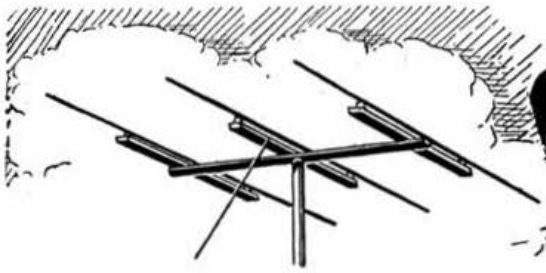
Slow Morse Practice Transmissions

The following slow Morse transmissions, sponsored by the Society, are intended to assist those who aspire to obtain an amateur transmitting licence. More volunteers are still required for parts of the British Isles not already covered, particularly in the London Area. Stations listed who find themselves unable to continue transmissions should immediately notify the organiser, Mr. C. H. L. Edwards, A.M.I.E.E. (G8TL), 10 Chepstow Crescent, Newbury Park, Ilford, Essex.

* *Each station will operate in turn.*

B.S.T.	*Call*	*kc/s*	*Town*
Sundays			
10.00	G6MH	1990	Southend-on-Sea
10.30 *	G3AAZ, G3EPK, G5UM	1780	Welwyn
10.30	G3GIO	1915	Guildford
11.00	G2FXA	1900	Stockton-on-Tees
21.00	G2FIX	1812	Nr. Salisbury
22.15	G3AEZ	1847	Dorking
Mondays			
19.00	G3NC	1825	Swindon
20.30 *	G6LX, G3BLP	1875	Croydon
21.00	G3BHS	1720	Eastleigh, Hants
21.00	G3BLN	1900	Bournemouth
22.00 *	G3EJF, G3DZU, G2AYG	1810	Bury, Lancs
22.00	G3AEZ	1847	Dorking
22.00	G3GIO	1915	Guildford
22.15	G2BRH	1900	Ilford
22.30	G8TL	1896	Ilford
Tuesdays			
19.00	G3IBL	1883	Derby
19.30 *	G3HGY, G5PP, G5SK	1830	Coventry
21.00	G3EFA	1855	Southport
22.00	G3ELG	1772	Rotherham
22.00	G2BND	1890	Dalston, E.
22.00	G2FXA	1900	Stockton-on-Tees
22.00	G3GIO	1915	Guildford
23.00	G2XG	1735	Chingford
Wednesdays			
14.00	G3ADZ	1910	Southsea
19.00	G3ADZ	1900	Southsea
Wednesdays *(continued)*			
19.30 *	G3HBX, G6XA	1870	Warwick
21.30	G3HKC	1770	Birmingham
22.00	G3DLC	1800	Grays, Essex
22.00	G3GIO	1915	Guildford
Thursdays			
19.00	G3NC	1825	Swindon
19.30	G3GRM	1815	Derby
19.30 *	G2DOF, G3DTG, G3ENH, G6KI, G8JI	1830	S. Birmingham
20.00	G3FVH	1920	Hull, Yorks
21.30	G6DL	1760	Birmingham
22.00	G2NK	1730	St. Mary Cray
22.00	G3AEZ	1847	Dorking
22.00	G2FXA	1900	Stockton-on-Tees
22.00	G3GIO	1915	Guildford
22.30	G3OB	1803	Manchester
Fridays			
19.00	G3BLN	1900	Bournemouth
20.00	G3CSG	1870	Wirral
20.00	G5AM	1900	Witnesham, Ipswich
21.00	G3BHS	1720	Eastleigh, Hants
22.00 *	G3AUT, G3AUF, G3CBV, G3GTX	1785	Rugby
22.00	G3GIO	1915	Guildford
Saturdays			
14.00	G3ADZ	1910	Southsea
22.00	G3GIO	1915	Guildford
23.00	G2FXA	1900	Stockton-on-Tees

MEMBERS USING THIS SERVICE ARE REQUESTED TO SEND LISTENER REPORTS TO THE STATIONS CONCERNED



AROUND THE V.H.F.'s

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

The 70-cm. Activity Plan

AT the time of writing, 29 stations in this country and two on the Continent have signified their interest in a plan to co-ordinate 70-cm activity. A list of these stations, together with their frequencies and situations, appears in Table 1. For convenience stations are grouped on a geographical basis, and additions will be made as interest grows. A tentative suggestion for the frequency band to be employed by each group, based on frequencies already in use, is given in Table 2. Since nearly everyone expressed a desire to take part in a Monday evening activity period, it is suggested that from 1900 to 2100 B.S.T. should be adopted for group activity and inter-group skeds.

It is hoped that operators who are doubtful of the efficiency of their apparatus will find group activity useful in improving the operation of their transmitters, receivers and aerial systems before embarking, perhaps fruitlessly, on longer distance skeds. Several London stations have been able to improve their gear considerably in this way.

It is not possible at present to organise many skeds., and these are left for individuals to arrange between themselves. A suggested procedure for the Monday evening periods is that stations in Group 1 should call CQ towards Group 3 at 1900 B.S.T., stations in Group 3 replying from 1910. At 2000, Group 1 should call CQ towards Groups 4 and 5, the latter replying 10 minutes later. At 2100 Group 2 should call CQ towards Group 5, which would reply at 2110. A further suggestion to increase the possibilities of contacts at other times would be for stations in Groups 1 and 2, when radiating CQ calls, to do so at the hour or half-hour, and for those in Groups 4 and 5 to transmit at 10 minutes past the hour or half-hour.

The Two-Metre Band

ZL3JX reports that ZL3AR recently worked VK2AH on two metres. Further details regarding this contact would be much appreciated.

G3WW (Wimblington, Cambs), taking advantage of the good conditions during the second week of February, heard G3BW (Whitehaven, Cumb.) at RST 559 on the 12th and worked G3AGS (Manchester). Two days later G5YV (Leeds) was putting in the best signal so far heard from him. Some aerial tests have been carried out by 3WW recently to compare signal strengths received on an 8-element stack (the top element being 50 feet above ground) with the normal 5 over 5 Yagi array (63 ft. high). The stack exhibited a much broader polar diagram than the double Yagi, but produced slightly greater signal strength from G3EHY. A third beam which is available—a form of "lazy H" with reflectors in which both the element and element-reflector spacings are quarter wave—has so far only been operated 10 feet above the ground, but further tests will be carried out at a greater height.

* 32 Earls Road, Tunbridge Wells, Kent.

Table 1.—70-cm. Activity Plan

Group	Stations	Freq. Mc/s	QTH.
1	GW2ADZ*†	432.85	Llanymynech, Mont.
	GW5MQ	432.6	near Mold, Flint.
	G4LU*	431.75	Pant, Nr. Oswestry, Salop.
2	G3APY*†	433.296	Kirkby-in-Ashfield, Notts.
	G3ENS	433.35	Loughborough, Leics.
	G3IS	432.0	Rugby, Northants.
	G5RW*†	433.0	Ilkeston, Derby.
	G8QY†	433.3	Birmingham.
3	G3EHY	435.75	Banwell, Somerset.
	G4AP	435.6	Swindon, Wilts.
4	G2WJ†	436.0	Nr. Dunmow, Essex.
	G2XV†	432.78	Cambridge.
	G3FUL	434.55	Luton, Beds.
	G5VY	v.f.o.	Enfield, Middlesex.
5 (London N. of Thames)	G2QY†	435.16	Pinner, Middlesex.
	G3HBW†	434.6	Wembley, Middlesex.
	G5CD*	435.6	Hendon, N.W.11.
5 (London S. of Thames)	G2MV†	435.21	Kenley, Surrey.
	G2RD	435.53	Wallington, Surrey.
	G2WS	—	Beckenham, Kent.
	G2FKZ*†	435.95	Dulwich, S.E.22.
	G3FP	436.0	Thornton Hth., Surrey
	G3FZL*†	435.3	Dulwich, S.E.22
	G3IEE	—	Kingston, Surrey.
	G5DT	434.88	Wallington, Surrey.
	G5PY	435.4	Clapham Pk., S.W.12
	G6HD	435.12	Beckenham, Kent.
	G6PG†	435.3	Dartford, Kent.
	G6YP	435.77	Camberwell, S.E.5.
5 (Continental)	ON4UV*	434.75	25 miles S. of Brussels.
	PA0PN*†	434.82	Island of Walcheren

** Over 5 watts r.f. output. † Interested in early morning operation during summer weekends only.*

G3EHY (Banwell, Som.) reports that his results during the past month were equal to and in some cases surpassed those generally obtained in the best periods of the summer. Starting in the middle of February and continuing until March 3, a long steady period of good conditions was experienced, the Meteorological Office upper-air graphs showing that there was a large temperature inversion present during that time, which seemed to affect the whole country. G3BW, at 232 miles, was worked on c.w. on February 27, and on 'phone two weeks later. Consistent evening and Sunday-

Table 2.—Suggested Frequency Bands

Group	Frequency Mc/s	Group	Frequency Mc/s
1	432–433	4	Not yet decided
2	433–434	5 (N. & S.)	435–436
3	435.5–436.5	5 (C.)	435–435

morning contacts have been possible with G5YV, despite the distance of 184 miles. Unfortunately, a number of northern stations who are well received in the summer have apparently missed these openings, but several new calls continue to appear on the band, including G2COP (Litchfield), G2HOP (Stamford), GW3FYR (Cardigan) and G3HII (Liverpool), all of which have been putting excellent signals into Banwell.

GW8UH (Cardiff) is still active on 145.44 Mc/s as mentioned in February, but has not found conditions very good at week-ends. He has, however, contacted G3MA (Gloucester) and heard G2XC (Portsmouth).

G3DLU (Weston-super-Mare) should be putting out a signal on 145.36 Mc/s by the time these notes appear. He uses a G.E.C. Type 7B transmitter with 20 watts input on 'phone or c.w., a 5-element Yagi aerial, and a double-superhet. receiver with a neutralised 6J6 r.f. stage. G5BM (Cheltenham) intends to take part in the R.S.G.B. Two-Metre Field Day on May 10-11, operating from Clyro Hill (1240 ft) in Radnorshire, Wales, the site used for portable work three years ago. The frequency will be 145.35 Mc/s.

G6UH (Hayes, Middlesex) has just completed a 6-element Yagi array on which much care has been lavished in matching the feeder to the beam. The results seem to be extremely good, but from a recent test with G2UJ it would appear that a compass would be a necessity in setting it up, as signals fell from S9 to S4 at 15 degrees either side of the correct bearing!

Another new call to be heard on the band is that of G3HWJ (Surbiton, Surrey) on 145.1 Mc/s who would appreciate contacts and reports. G6LL (Cuffley, Herts.) heard F8NW on March 5.

At a recent 144 Mc/s meeting in Norfolk a suggestion was made by the members present that stations in the greater London area should sign their calls on c.w. as well as on 'phone as many unidentifiable transmissions are heard coming from that direction.

The 70-cm. Band

GW2ADZ (Llanymynech, Mont.) was worked by G3EHY on nine consecutive evenings at strengths varying between S7 and S9, and almost as good a result was obtained during a test at midday on February 26. Both ends of this 105-mile contact are equipped with 32-element beams, but, even so, it says much for their matching and general efficiency, bearing in mind that 'EHY's transmitter employs an 832 tripler in the final, that on one occasion GW2ADZ found the Banwell signal blocking his receiver!

The absence of news from GW2ADZ in these pages recently has been due to a spell in hospital, and we feel sure that his many friends will wish him a speedy and complete return to health. Apart from the sked. mentioned above he has been obtaining very consistent results with G2FKZ (London, S.E.22), having worked him on every evening from February 18 to 28. Although occasionally both the 70 cm and 2 m bands are open together, this is by no means general and, in fact, exactly opposite conditions on the two frequencies are often experienced.

Commenting upon the American tests on 412 Mc/s (see this feature in February last) GW2ADZ believes that the results described would not necessarily be applicable to another part of the world, since the nature of the air mass, which determines the propagation of such frequencies over long distances, would be so different. He remarks on the unreliability of barometric pressure in estimating conditions, and suggests that the dew point, together with the colour of the sky, wind, cloud formation and dispersal, and visibility, is a far better indication. We feel that in a few months' time, when more data has been collected from long distance 70-cm operation, a very interesting article could be written on this subject. How about it 'ADZ ?

G3HHY (Solihull, near Birmingham) will be radiating test transmissions from April 6 to 27 on approximately 440 Mc/s. These will take the form of three-minute calls for 15 minutes from 1230 B.S.T., and again from 2300 B.S.T. daily. After each call the *two-metre* band will be searched for replies. The transmitter, comprising a linear oscillator on 220 Mc/s feeding an 832 p.a., is used with a corner-reflector rotatable beam, and a 70 cm receiver is available. Skeds. would be welcomed.

G3GOP is looking forward to some contacts as a result of the Activity Plan; soon after commencing operations on the band more than a year ago he worked G5BY and other less distant stations, but so far as he knows there is, at present, no 70-cm activity within 50 miles of him. Two frequencies are available, 435.78 and 436.2 Mc/s, and a change can be made from 2 m—where he is active most evenings from 8 p.m. onwards—at a few minutes notice. Using an 11-element Yagi 35 feet high (the station being at sea level) most directions are satisfactory except to the north-east, where rising ground interferes with radiation towards the London area. Skeds. would be welcomed. G3GOP's address is 7 Creighton Road, Millbrook, Southampton.

"The Radio Amateur" V.H.F. Contest

Our contemporary, *The Radio Amateur*, known until recently as *Short Wave News*, is holding its third annual v.h.f. contest from 1800 B.S.T. on Saturday, May 24, until 2000 B.S.T. on Sunday, May 25. This year both the 145 and 420 Mc/s bands may be used for contacts on either 'phone or c.w. Only one contact per station per band will count for points; cross-band working is not eligible for scoring.

Serial numbers starting from 001 and followed by the RST (or RS) report will be passed, and entries from listeners will be welcomed. Full details regarding scoring and the data to be included with entries will be found in the May issue of *The Radio Amateur*, or may be obtained from Amalgamated Short Wave Press, 57 Maida Vale, London, W.9.

The 3-cm. Band

G3BAK and G3LZ are continuing their work on this band but found, after their first successes in 1950 when they made contact over a distance of 4½ miles, that a lower frequency link and adequate test gear would be essential before greater ranges could be tackled with certainty. These points have now been attended to and, in conjunction with G3FDU (Alderley Edge) and Mr. Hickman, who have been assisting with development of the gear, they intend to carry out further field trials during the summer, employing a 70 cm link. G3BAK, using a CV129 klystron in the transmitter and a 723 A/B in the receiver, intends setting up a permanent link as soon as possible with G3FDU who has similar apparatus, and would be pleased to hear from anyone who is interested in 3 cm. His address is 6 Isis, Damhead Hall, Glazebrook, near Manchester.

TWO-METRE FIELD EVENT—MAY 11

SOCIETY NEWS

The 21 Mc/s Band

FOLLOWING the signing of the Extraordinary Administrative Radio Conference Agreement, the Society inquired from the G.P.O. whether the 21 Mc/s band could now be released to United Kingdom amateurs. It was pointed out that frequencies around 21 Mc/s appear to be in little use by commercial services and that the release of this band would greatly ease the problems of congestion in the 7 and 14 Mc/s amateur bands.

In reply the G.P.O. stated that no decision had yet been taken regarding the date when the band will become available to U.K. amateurs.

Broadcasting and Commercial Stations Operating in the 7 Mc/s Amateur Band

THE Society recently wrote to inquire whether the G.P.O. is prepared to draw the attention of the Pakistan Government to the presence of a Pakistan broadcasting station within that portion of the 7 Mc/s band which is assigned internationally to amateurs on an *exclusive basis*. The Society pointed out that this station, which operates on 7010 kc/s, transmits test programmes to the United Kingdom from 1930 G.M.T. onwards.

The Society also drew attention to the presence in the 7 Mc/s band of a number of Spanish broadcasting stations and to the nuisance caused by key clicks from an Italian commercial station (IRE 20) operating on 7000 kc/s.

In their reply the G.P.O. express regret that no action can at present be taken because no definite date has yet been fixed for the implementation of the Atlantic City plan for the part of the spectrum in question.

The G.P.O. explain that they themselves are most anxious to see services diverted to their proper bands and they continue to hope that the international position will soon make this practicable.

London Lecture Meeting

AT the last London Lecture Meeting of the 1951-52 session held at the Institution of Electrical Engineers on Friday, March 28, 1952. Mr. H. A. M. Clark, B.Sc. (Eng.), M.I.E.E., G6OT (Chairman of the R.S.G.B. Technical Committee), lectured on "Microphone Acoustics for the Radio Amateur." A number of novel experiments and a series of instructive lantern slides combined to make the lecture one of the most interesting ever delivered to a meeting of the Society.

After briefly referring to the history of acoustics from the days of Pythagoras to Galileo, the lecturer dealt exhaustively with basic acoustic principles, including a detailed description of the construction of the human ear. Electro-acoustics were then considered as a preliminary to a discussion of the basic principles of microphones. The lecturer then displayed and explained the outstanding characteristics of microphones in use. Of special interest was the original transverse-current carbon microphone used by Mr. Gerald Marcuse during the late '20's for his historic Empire Broadcasts.

The lecture ended with advice on the selection of microphones for high-fidelity uses and high-intelligibility services.

The Chair was taken by the President (Mr. F. Charman, B.E.M., G6CJ), who had the support of Mr. W. A. Scarr, M.A., G2WS (Immediate Past-President) and Mr. Gerald Marcuse, G2NM (Past President). The latter voiced the thanks of the meeting to the lecturer.

Frequency Measuring Test

TWO amateurs measuring a frequency of 3545.684 kc/s may obtain values of 3546.4 kc/s and 3545.63 kc/s. In both cases the determinations are in error by less than the 0.1 per cent. specified in the amateur transmitting licence, and may therefore be regarded as satisfactory. Nevertheless, many amateurs strive for something better, but do not always find it easy to assess the progress they are making.

There will be an opportunity of finding this out on Saturday, May 24, between 2230 and 2300 B.S.T., when the Society is holding its first Frequency Measuring Test. Members will be invited to submit their measurements of the frequencies of two transmissions in the 3.5 Mc/s band. The Council has agreed that certificates will be awarded to those whose measurements are of a high order of accuracy.

The test will provide a rare opportunity for B.R.S. members to compete on equal terms with their transmitting colleagues, and it is hoped that there will be a large entry. Full details will be published in the May BULLETIN; meanwhile, make a note of the date—May 24.

Historic Equipment

THE General Secretary would be glad to hear from any member living within easy reach of Central London who is in a position to offer accommodation to the Society for the establishment of a museum of historic Amateur Radio equipment and photographs.

The accommodation should be accessible by public transport and available for occasional visitors.

Offers should be made in writing and should indicate the terms under which the accommodation is offered.

The 14 and 21 Mc/s Bands

JUST before this issue closed for press it became known that both the United States and Canada had decided to withdraw from amateur use, as from April 1, the frequencies 14350-14400 kc/s and to make available to amateurs in both countries, as from May 1, the entire new band 21000-21450 kc/s.

In order not to delay the May 1 opening date with discussions of sub-allocation proposals, the 21 Mc/s band will be available in the U.S. and Canada only to c.w. emission. Subsequent discussions will commence concerning its sub-division to other modes of emission.

As soon as the above news came to hand the Society again wrote—for the third time in a few weeks—to the G.P.O. to enquire when the 21 Mc/s band will be released to U.K. amateurs. Up to April 8 no decision had been reached. Members will, however, realise that the problems which affect countries in Region I (Europe and Africa) are different from those which concern countries in Region II (the Americas).

A letter has also been sent to I.A.R.U. Headquarters as from Region I Bureau requesting that the A.R.R.L. should bear in mind the decisions of the Paris I.A.R.U. Congress, 1950, in regard to the planning of the 21 Mc/s band. At that Congress it was unanimously agreed that the following plan should be adopted on a world-wide basis:

21000-21150 kc/s (Telegraphy).
21150-21450 kc/s (Telephony and Telegraphy).

I.A.R.U. NEWS

THE latest issue of the Calendar of the International Amateur Radio Union (dated December, 1951) reports that membership in the Union now totals 42. During the year it became necessary to drop the Chinese Society from membership because of its inactivity, whilst the resignation of the Czechoslovakian Society became operative in March, 1951. These deletions were balanced by the admission of new members in the Dominican Republic and French Morocco.

I.A.R.U. Headquarters reports that although amateurs in Netherlands Antilles (Dutch Guiana) have made substantial progress in their struggle for official Government recognition, there are still a number of countries where Amateur Radio is not officially sanctioned.

During the year 1951, I.A.R.U. Headquarters issued 681 WAC certificates, 239 of which were for work on radio telephony.

There have been many indications of a decrease in Amateur Radio activities. In addition to a falling-off in the number of WAC certificates issuances, there has been a marked reduction in the number of QSL cards being handled through the QSL Bureaux of the world. There has been a 50% decline since 1949. I.A.R.U. Headquarters explain that this may, to a certain extent, be due to changing radio conditions, but it also appears that many of those who got back on the air following the enforced inactivity during the war years had lost a part of their enthusiasm and were putting Amateur Radio aside for other interests. In the U S. the low point in amateur activity appears to have been passed.

Extraordinary Administrative Radio Conference

The E.A.R.C. (Geneva, 1951) was held for the purpose of agreeing on complete new station assignment lists for the fixed, coastal, aeronautical and broadcast services (a matter in which amateurs have no interest) and, thereafter, formulation of a plan for the implementation of the Atlantic City I.T.U. Conference frequency spectrum table below 27.5 Mc/s. Although station lists were not completed, an implementation plan was worked out which takes into account the current situation with respect to such matters, and is now of interest to us in view of the 21 Mc/s band which amateurs will obtain under Atlantic City, and the loss of 50 kc/s from the high-frequency end of 14 Mc/s. I.A.R.U. Headquarters now conveys to Member-societies the essential features of this implementation plan, for their information and guidance.

Generally speaking, the process of implementation between 4 and 27.5 Mc/s will be a step-by-step process extending over a period of years. In broad terms, the procedure contemplates that the job will be accomplished to a sufficient extent by 1955 that the Administrative Council of the International Telecommunications Union (I.T.U.) can announce a date for the inauguration of a "final adjustment" procedure which, by blocks of frequencies starting at 27.5 Mc/s and moving downward, will result in completion of the change-over to the Atlantic City plan seven months later. (If things have not advanced far enough by 1955, the Council of the I.T.U. can postpone start of the final stages.)

Despite the dates indicated above, it should not be assumed that it will be a matter of years before anything occurs in connection with our 21 Mc/s and 14 Mc/s bands. Conceivably, the changes could be made by individual administrations in a very short time indeed. It should be emphasised, for the information of Member-societies, that *action will be by individual administrations* as they can see their way to clear our 21 Mc/s band or find it necessary to make fixed assignments in 14350-14400 kc/s. The way is open, therefore, for Member-societies to promote these changes individually within their own countries. [The R.S.G.B. has already taken action along the lines indicated by I.A.R.U. Headquarters. See statement on page 453.—ED.]

Buenos Aires Conference

Present indications are that no *administrative* radio conference will be held in Buenos Aires this year. There will, however, be a plenipotentiary conference, but this will probably have on its agenda only I.T.U. organisational matters and will contain nothing of direct interest to amateurs.

Voting on Previous Proposals

Proposal No. 74 in Calendar No. 40 on the question of representation at International Telecommunications Conferences, was carried by 19 aye votes to 3 opposed, with one abstention. Aye votes were received from the following Societies: A.R.C.I., A.R.I., B.A.R.S., C.R.A.G., E.D.R., H.K.A.R.T.S., I.R.T.S., N.R.R.L., R.C. Chile, R.C.U., R.C. Peru, R.E.F., R.L., R.S.G.B., S.R.A.L., S.S.A., T.I.R., U.R.E., V.E.R.O.N. Nay votes were received from A.R.R.L., R.C.A. and W.I.A. O.V.S.V. abstained.

As a result:

At future International Telecommunications Conferences the I.A.R.U. shall be represented by at least one delegate from each of the three world regions; that insofar as Region I is concerned the cost of I.A.R.U. representation at such Conferences shall be computed proportionally on the basis of the number of amateur transmitting licences in force at the beginning of each Conference year.

The A.R.R.L. voted against this proposal for the following reasons:—

(1) Every region is obligated by the proposal* to send a delegate to a conference even though no matters concerning Amateur Radio may be on the conference agenda: (2) The financial responsibilities in Regions II and III are not defined, and particular hardships would fall on societies in Region III: (3) The administrative organisation of present-day conferences provides for effective representation only by delegates from individual governments and offers little hope for effective representation by the delegate of an international group: and (4) *Since at any conference where amateur matters are on the agenda, A.R.R.L. will have its own representative present as a member of the United States delegation, A.R.R.L. does not feel it should share in the expenses of additional delegates.* By the terms of Art. IV, Par. 3, of the Constitution, A.R.R.L. gives notice that it cannot be bound by the provisions of Proposal No. 74 if adopted.

The significance of the fourth reason put forward by A.R.R.L. will not be lost sight of by the European I.A.R.U. Societies.

Proposal No. 77

Proposal No. 77 in Calendar No. 42, on the question of adopting some standard numbering system for international contests, was carried by 19 aye votes to 2 opposed. Aye votes were received

[* *It should, we suggest, have been apparent to all Member-societies that the proposal referred only to I.T.U. Administrative Conferences where Amateur Radio matters are to be discussed.*—ED.]

from the following societies: A.R.R.L., C.R.A.G., H.K.A.R.T.S., I.A.R.C., I.R.T.S., L.A.B.R.E., N.R.R.L., N.Z.A.R.T., R.C. Chile, R.C.D., R.C.U., R.E.F., R.L., R.S.G.B., S.A.R.L., S.S.A., U.R.E., V.E.R.O.N., W.I.A. Nay votes were received from O.V.S.V. and R.C.A.

As a result:

I.A.R.U. agrees that a standard numbering system for world-wide contest use be adopted by Member-societies.

Proposal No. 78

Proposal No. 78 in Calendar No. 42, on the question of adopting the standard numbering system used by the Wireless Institute of Australia for international contests, was carried by 20 aye votes to 1 opposed. Aye votes were received from the following societies: A.R.R.L., C.R.A.G., H.K.A.R.T.S., I.R.T.S., L.A.B.R.E., N.R.R.L., N.Z.A.R.T., O.V.S.V., R.C. Chile, R.C.A., R.C.D., R.C.U., R.E.F., R.L., R.S.G.B., S.A.R.L., S.S.A., U.R.E., V.E.R.O.N., W.I.A. A nay vote was received from I.A.R.C.

As a result:

I.A.R.U. agrees that the standard numbering system used by the Wireless Institute of Australia for world-wide contest use be adopted by all Member-societies. (In the VK-ZL International DX Contest, the serial number of five or six figures is made up of the RS or RST report plus three figures which may begin with any number between 001 and 100 for the first contact and which will increase in value by one for each succeeding contact.)

New Members Proposed

The Radio Society of Bermuda, the Guayaquil Radio Club (Ecuador), the Deutscher Amateur Radio Club (Germany) and the Netherlands Antilles Radio Society are proposed for membership. [R.S.G.B. has cast an "aye" vote in favour of the election of each of these Societies.—ED.]

I.E.E. Radio Section Debate

"THE lone worker can no longer make a major contribution to radio development" was the subject for debate at a recent informal meeting of the Radio Section of the Institution of Electrical Engineers. The motion was proposed by Geoffrey Parr, and seconded by A. J. Biggs. M. G. Scroggie and W. A. Scarr (Past-President, R.S.G.B.) opposed the motion. Dr. Eric Megaw (ex-GI6MU) was in the Chair.

Mr. Parr, after paying a fulsome tribute to the work of radio amateurs in the past, expressed the view that modern developments were such that team work was essential, and that equipment to conduct modern investigation was too costly and elaborate for a lone worker to afford or build. Mr. Scroggie, opposing the motion, considered that fundamental knowledge rather than detailed development was the important factor. The germ of an idea originated from one man, although it might be perfected in detail by a team, such as occurred in the case of Sir Robert Watson Watt with radar. The opposers did not believe that the world had changed since the days of Kelvin and Faraday, both of whom had great difficulties with apparatus and finance. Furthermore, the team system often stifled ideas because they were not thought to be valuable or lucrative.

The debate was opened from the floor by Capt. P. P. Eckersley, who opposed the motion, as did a large number of speakers in succession, after which supporters of the motion rallied in response to a speech made by Dr. R. L. Smith Rose. On a vote by show of hands, the motion was defeated by a fair majority.

OZ Cross-Country Award and E.D.R. Jubilee Contest

A NEW award, known as the OZ Cross-Country Award (OZ-CCA), is announced by the Danish National Society E.D.R., which this year celebrates its 25-year Jubilee. The award is based on a points system for telegraphy or telephony contacts since August 1, 1947, with most or all of the 25 districts of Denmark. There are three grades: OZ-CCA Class III for contacts with 15 districts and a score of 50 points; Class II, 20 districts and 60 points; and Class I, 25 districts and 70 points.

Also, as part of its 25th anniversary celebrations, E.D.R. is organising a world-wide Amateur Radio Contest, which will commence at 2100 G.M.T. on Saturday, May 3, 1952, and finish at 2100 G.M.T. on Sunday, May 4, 1952. Telegraphy and telephony will be permitted on the 3.5, 7, 14, 28 and 144 Mc/s bands. Contestants will call "*CQ OZ-CCA DE . . .*" and exchange a code-group consisting of an RST or RS report followed by a three-figure serial number, starting at 001 for the first QSO, and increasing by one for each successive contact. An award will be made to the leading c.w. and 'phone stations in each participating country. Contacts obtained in this contest will also count for the OZ Cross-Country Award.

Further details may be obtained from E.D.R., c/o Borge Petersen, OZ2NU, Himmerlandsgade 1,3, Aalborg, Denmark.

The Granfield Trophy

THIS trophy is to be competed for in Region 5 on the v.h.f.'s this year, and will be awarded to the Society member ordinarily resident in the Region who, as sole operator, obtains the highest aggregate published score in any three of the five 1952 two-metre contests, one of which must be worked from the home station. The contests are the two R.S.G.B. Field Days on May 11 and September 21, the Open Event on July 26-7, the European V.H.F. Contest on July 6 and the *Short Wave Magazine* Annual Contest in November or earlier. Claims should be sent to the Regional Representative, Mr. R. F. G. Thurlow, G3WW, North House, Wimblington, near March, Cambs., not later than one month after the result of the latest of the above contests is published.

R.S.G.B. D/F Field Days

MEMBERS interested in R.S.G.B. D/F Field Days are asked to note that the first qualifying event will take place on Sunday, May 25, 1952. Full details of this event, which will be organised by the Romford and Southend Groups, will appear next month.

Society Films

IN order to safeguard the Society's Films, members borrowing them for projection purposes are asked to give details concerning the type of projector (with date of manufacture and serial number), wattage of the projection lamp, and the experience of the operator responsible for projecting the film.

The Editor would be pleased to consider for publication photographs of v.h.f. stations and equipment, accompanied by brief descriptive details. To reproduce well, pictures should be of good contrast with a gloss finish.

First "Top Band" Contest, 1952

ONE hundred and one competitors braved the very cold weather during the January "Top Band" Contest, and were sufficiently thawed out to send in their entries by the closing date. The winner was D. Davies, GW3FSP, with 184 points, followed by J. Foster, G2JF, with 174 points, both stations repeating their leading positions in the November, 1951, contest. P. R. Golledge, G3EDW, was third, with 169 points, while J. N. Walker, G5JU, who was third last time, came fourth.

Posn.	Callsign	Reg.	Pts.	Posn.	Callsign	Reg.	Pts.
1	GW3FSP	10	184	51	G8MD	01	93
2	G2JF	08	174	52	G3HCX	02	92
3	G3EDW	05	169		G2AFV	02	92
4	G5JU	03	166		G3GDW	09	91
5	G6HD	07	160	54	G3HYG	08	91
6	G4AU	07	158		G4CM	07	91
	G6BQ	07	158	57	G3GWT	02	90
8	G3EBH	04	152	58	G6UT	05	88
9	G6VC	07	151		G3HQQ	08	87
10	G3YF	07	146	59	G2HCZ	07	87
	G3BMY	03	146		G8DL	08	87
12	G8IP	07	141	62	G3GGN	08	86
13	G3ERN	07	140		G3CWL	07	86
14	G5JL	07	138	64	G3HIW	07	84
	G3CHW	09	138		GM3OM	14	75
16	G2MJ	01	135	65	G2BOU	07	75
17	G5MP	08	130		G2XW	08	75
*	G6ZN	02	129	68	G3CDZ	05	74
18	G3AGQ	06	128		G3GZJ	07	74
	G3IAS	07	128	70	G2AYG	01	70
20	G3AUT	03	126		GW3GXL	10	70
21	G3FUR	04	125	72	G2HOX	07	65
22	G3CWW	07	122	73	G2CMK	05	62
	G3BGP	08	122		G2FT	04	59
24	G5PR	08	121	74	G3CNO	06	59
25	G5MR	08	120		GC2CNC	GC	59
26	G2FGD	06	118	77	G3AKY	02	57
	G3FXA	08	118		G2HBG	04	57
	G3AFZ	04	117	80	G3ELZ	04	56
28	G2NJ	04	117		G3HTC	07	56
	G2CVV	04	117	82	G3GFD	02	55
31	G3FST	07	113	83	G2AXQ	05	54
32	G3HBU	06	110	84	GD3UB	01	53
	GM8MJ	14	110		GM3GIJ	14	53
34	G3FOP	03	108	86	G5AO	08	52
	G3CPA	07	108	87	G3NT	02	51
36	GM6RI	12	106		GM6IZ	12	51
	G3US	02	106	89	G3FPV	08	50
38	G3DDM	06	104		G3GZB	07	50
	G3HKX	07	103	91	G3HXI	03	48
39	G6UR	09	103	92	G2CUR	04	47
	G2CV	07	103	93	G3HTI	04	45
42	G3BJU	05	102	94	G6NK	07	44
43	G3HKC	03	100	95	G3GLV	01	43
	G2VX	05	100	96	G2ZR	09	42
45	G3FZC	07	99	97	G3IDM	07	40
46	G3ISA	07	98	98	G3HTP	07	39
47	G3VM	05	97	99	G2AYM	07	35
48	G2RD	07	96	100	G3HZM	01	8
49	G3IIR	07	95	101	G3IDG	07	6
50	GI3HFT	15	94				

Check logs: G2JB, 2LC, 2MI, 2ZZ, 2HBA, 3ATU, 3CKX, 3EPV, 5RZ, 6OM, 6QX, 6ZT, GM3GUS.

* *Disqualified under Rule 4 (no declaration).*

The revised scoring system did not materially alter the result, despite the frequent charge that it helps competitors in Region 7. In general, there were as many stations preferring the new as favouring the old. Several suggestions for alternative systems were made, including county, region and country multipliers, certificates for the leading competitors in the various regions and in GI, GM, GW, etc. Those who made suggestions are thanked for their interest; their comments will be analysed by the Contests Committee to assist in the formulation of rules for the next "Top Band" Contest.

Conditions generally appeared to be good, but there were conflicting reports on the noise level, which varied from "very quiet" to "very noisy." Activity was spread over more of the band as compared with last time, particularly above 1900 kc/s; below 1800 kc/s some competitors had trouble with DAC and DAN.

First Two Metre Field Day, 1952

NO major changes have been made to the rules for the Two Metre Field Day to be held on Sunday, May 11. The scoring system has been slightly modified to allow for contacts at greater distances, and Rule 2 now permits transmission on telephony, c.w. or m.c.w.

Rules

1. The event is open to fully paid-up members of the R.S.G.B. resident in the British Isles (G, GC, GD, GI, GM and GW).

2. Contacts may be made on telephony, c.w., or m.c.w.

3. Entrants must operate according to the terms of their licences; the input to any stage of the transmitter must not exceed 25 watts.

4. The station must be operated from the same site for the duration of the event. Except for N. Ireland and Channel Islands entries, the National Grid Full Six Figure Reference must be given.

5. Only one contact with a specific station will count for points.

6. Contacts with unlicensed stations will not be permitted to count for points. Proof of contact may be required.

7. Entries should be written on lined foolscap or quarto paper, or typed on plain paper, and must be set out in the form shown below:

Two Metre Field Day, May 11, 1952.

Name..... Call Sign.....

Home Address..... Claimed Score.....

Site of Station.....

National Grid Full Six Figure Reference.....

Transmitter..... Receiver.....

Aerial System(s).....

B.S.T.	Call sign of station worked	My report on his sigs.	His report on my sigs.	Location.	Estimated distance	Points claimed
					TOTAL	

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

Signed.....

8. The event will start at 1100 B.S.T. and finish at 2000 B.S.T. on Sunday, May 11, 1952.

9. Power supply must not be derived from public or private supply mains.

10. No part of the station may be situated in any building existent on the site prior to the date of the event.

11. No apparatus may be erected on the site prior to the day of the event.

12. An exchange of reports (RS or RST) as well as location will be required before points for contact may be claimed. The location given must consist of distance and direction from the nearest town or village, e.g. "RST 569 6SE Caterham" (i.e. 6 miles south-east of Caterham).

13. Points will be scored on the following basis:

Distance	With Portable Stations	With Fixed Stations
Up to 50 miles	2	1
50 ,, 75 ,,	4	2
75 ,, 100 ,,	6	3
100 ,, 150 ,,	8	4
150 ,, 200 ,,	10	5
200 ,, 250 ,,	12	6
Over 250 ,,	16	8

14. Entries, postmarked not later than May 19, 1952, must be addressed to the Hon. Secretary, R.S.G.B. Contests Committee, New Ruskin House, Little Russell Street, London, W.C.1.

15. A miniature cup will be awarded to the winning station, at the discretion of Council, and the runner-up will receive a Certificate of Merit.

COUNCIL PROCEEDINGS

Résumé of the Minutes of the Proceedings at the Meeting of the Council of the Incorporated Radio Society of Great Britain held at New Ruskin House, Little Russell Street, London, W.C.1, on Tuesday, February 12, 1952, at 6 p.m.

Present.—The President (Mr. F. Charman) in the Chair, Messrs. H. A. Bartlett, L. Cooper, C. H. L. Edwards, D. A. Findlay, T. L. Herdman, J. H. Hum, F. G. Lambeth, H. McConnell, A. O. Milne, W. A. Scarr, R. Walker, P. W. Winsford and John Clarricoats (General Secretary).

* * *

Death of His Majesty King George VI.

The President, after referring to the death of His Majesty King George VI, reported that a number of messages of sympathy had been received from overseas Amateur Radio organisations and individual amateurs. Suitable letters of thanks had been sent to the organisations and amateurs concerned.

Membership.

It was agreed

(a) to elect 57 Corporate Members and 14 Associates ;
(b) to grant Corporate Membership to 4 Associates who had applied for transfer ;
(c) to grant Life Membership to Messrs. A. R. Brown, B.R.S. 7410, and H. C. Spencer, G6NA.

Application for Affiliation.

It was agreed to grant affiliation to the Great Portland Radio Club.

R.S.G.B. Amateur Radio Call Book.

The Secretary reported upon the progress made to date in connection with the publication of the 2nd Edition of the Call Book. He also reported that complimentary copies of the 1st Edition had been sent to Commonwealth Radio Societies with an invitation to place orders.

R.S.G.B. Amateur Radio Exhibition, 1952

It was reported that accommodation had been reserved at the Royal Hotel, London, W.C.1, for the week ending November 29, 1952.

Honorary Member and Vice-President.

Ballots were conducted for the election of Messrs. V. M. Desmond and A. J. H. Watson as Honorary Member and Vice-President respectively. The Ballots proved unanimous in favour of the candidates.

"The Short Wave Magazine."

The Secretary submitted copies of an article entitled "The Structure of a National Society," published in the February, 1952, issue of "The Short Wave Magazine."

After discussion it was agreed to publish a brief statement in the March issue of the BULLETIN.

Staff Matters.

After receiving a report from the Finance and Staff Committee, it was agreed to offer the position of Senior Male Assistant to Mr. G. F. Barrett, G8IP, of Hampton, Middlesex. [Mr. Barrett has since declined the offer.—ED.]

Official Meetings, 1952.

After receiving a report from the Membership and Representation Committee it was agreed to issue a tentative programme of official Society Meetings to the Regional Representatives for their comments. It was also agreed that, in future, such Meetings, according to their status, would be described as Regional or County Meetings and that in general the Council representation at such Meetings would be on the basis of one for every 25 members expected to be present, with a nominal maximum of four, plus Headquarters Staff.

The Meeting terminated at 9.25 p.m.

Résumé of the Minutes of the Proceedings at a Special Meeting of the Council held at New Ruskin House, Little Russell Street, London, W.C.1, on Tuesday, February 19, 1952, at 6 p.m.

Present.—The President (Mr. F. Charman) in the Chair, Messrs. H. A. Bartlett, L. Cooper, C. H. L. Edwards, D. A. Findlay, T. L. Herdman, A. O. Milne, H. McConnell, R. Walker, P. W. Winsford and John Clarricoats (General Secretary).

Apologies for absence were submitted on behalf of Messrs. J. Hum, F. G. Lambeth and W. A. Scarr.

* * *

Purpose of Meeting.

The President explained that the purpose of the Meeting was to give further consideration to the revision of the Articles of Association.

The Council then proceeded to examine a draft revision of the Articles. Articles 46-75 were considered for the first time and certain Articles which had previously been examined were re-considered.

The Meeting terminated at 9.15 p.m.

REGIONAL AND CLUB NEWS

Bradford

On April 22 C. A. Sharp, G6KU, R.R. for Region 2, will lecture on "Home Workshop Practice." Arrangements for N.F.D. are in hand; rosters are being prepared and operators who are interested should attend the next few meetings, when final details will be settled. B.R.S. members are welcome in this event; in previous years they have rendered useful assistance by logging, checking lists of stations worked, etc.

Brighton & District Radio Club

"Metal Detectors" (Cinema Television Ltd.) and "Lecher Wires" (R. J. Canning) were subjects for recent lectures and demonstrations. On April 22 W. Pitfield will talk on "The Class D Wavemeter." Hon. Secretary: R. T. Parsons, 14 Carlyle Avenue, Brighton 7.

Bristol

At the March meeting, J. F. Salisbury, G8GB, described his T.V.I.-proof transmitter, the exciter and p.a. units of which were demonstrated, together with his electronic keying unit. A resolution was carried unanimously at this meeting endorsing Council's reply to a recent article published in a commercial magazine. Technical films, loaned by the C.O.I., will be shown on April 18. The T.R. (R. T. Poeton, G3CTN) will be pleased to hear from any member willing to lecture at one of the forthcoming local meetings.

Coventry

At the February meeting John Williams, G3DXF, delivered a lecture entitled "After Radar—What Then?" giving the members a remarkable demonstration of the use of electronics to solve mathematical problems.

Coventry Amateur Radio Society

At the recent Annual Dinner Mrs. Theakston presented prizes and trophies to the following contest winners: H. J. Chater, G2LU (Transmitting Trophy), H. Montgomery (Listener's Trophy), R. Bastin (best lecturette), and A. Clements (constructional). "Communication Receivers" is the title of a lecture to be given on April 28 at the Y.M.C.A., Queen's Road, Coventry.

East Surrey Radio Club

A lecture by Mr. Betts on the Telekinema and the use of stereoscopic projection apparatus was the highlight of a recent meeting. On April 17 Mr. Betts will lecture on "Tape Recorders." Meetings are held monthly at the Old County Police Station, 19 London Road, Reigate, commencing 7.45 p.m. Hon. Secretary: L. G. Knight, Radiohme, 6 Madeira Walk, Reigate.

Kenilworth Radio & Television Society

The Society now meets on Thursday evenings. Hon. Secretary: S. Smith, 40 Stoneleigh Road, Kenilworth.

Kingston & District Amateur Radio Society

Future programme includes talks on power supplies, the ionosphere, and transformers. Radio theory classes are held fortnightly on Fridays. Hon. Secretary: R. S. Babbs, 28 Grove Lane, Kingston.

Leicester Radio Society

On May 5, C. L. Wright, B.Sc.(Eng.), will lecture on "Frequency Modulation." Meetings are held at the Club Room, Holly Bush Hotel, Belgrave Gate. Hon. Secretary: A. L. Milnthorpe (G2FMO), 3 Winster Drive, Thurmaston, Leicester.

At the recent Annual Dinner of the Derby and District Amateur Radio Society, W. A. Mead (G5YY), was the recipient of an electric clock subscribed for by members in appreciation of his services to the Society as Chairman since its formation in 1947. C. M. Swift, the new Chairman (right) is seen making the presentation.

Manchester & District Radio Society

Meetings are held on the first Monday of the month at the Manchester College of Technology, commencing 7.30 p.m. New members and visitors, who are always welcome, should communicate with the Hon. Secretary: P. Dean, Fairfield, Park Lane, Whitefield.

Newark & District Amateur Radio Society

The Society has been presented with a DST 100 receiver and would welcome technical data (including alignment procedure) for this particular set, which is in need of a complete overhaul. Communications and offers to the Hon. Secretary: J. R. Clayton, 160 Wolsey Road, Newark, Notts.

Newbury & District Amateur Radio Society

The Society held its first Hamfest on March 9, 1952, at the Tudor Cafe, Newbury. A full and varied programme included "stunts" with a tape recorder built by a member of the Society and a display of films. Councillor Jack Hole, Deputy Mayor of Newbury, welcomed the visitors and gave a short talk on Newbury—past and present.

Tommy Price, World Speedway Champion 1949-50, a guest of honour, spoke of his recent visit to Australia and the U.S.A., and of his meetings with amateurs in those countries, his talk being illustrated by 35 mm. transparencies, black and white and coloured. Visitors were welcomed from Swindon, Oxford, Andover, Salisbury and Reading. All present enjoyed a first-class high-tea, and to round off the evening two sets of miniature 1.4 V valves presented by the Chairman, J. Olive, were put up for auction.

Norwich & District Radio Club

The inaugural meeting of the above Club (formed from the local R.S.G.B. Group) was held on March 27. Future policy was considered and a Committee elected. Members of the Swanton Morley Amateur Radio Club were warmly welcomed. Further details from the Norwich T.R., F. W. Fisher (G3VM), 156 Dereham Road, New Costessy, Norfolk.

The Fourth Annual Dinner and Ladies' Festival of the Sutton and Cheam Radio Society, presided over by Stanley Vanstone (G2AYC) (third from left top table) attracted an attendance of 100 members and ladies.

Pontefract Area Transmitting Group

The Group's first dinner and social was held recently. Among the 51 present were 25 licensed amateurs from Pontefract and neighbouring towns. Everyone received at least one prize during the raffle. Slow Morse transmissions are ceasing at Easter, but will probably be resumed in September. Preparations for N.F.D. are in hand.

Portsmouth & District Radio Society

The Society mourns the loss of Mr. L. A. Vaughan (G2VH), whose interest in Amateur Radio dated back to 1913.

"Aerials and Earths" was the subject of a recent lecture by J. A. Jacobs. Meetings are held at 7.30 p.m. each Tuesday at the R.M. Barracks, Eastney.

[Photo by F. C. Strutt, Newbury

Official reception of the guests of honour at the Newbury and District Radio Society's Hamfest. Left to right: A. W. Grimsdale (G3CJU) (A.R. Newbury and Hon. Secretary); Mrs. Price; Mr. Tommy Price; Councillor J. Hole (Deputy Mayor of Newbury), and J. Olive (G3HQO) (Chairman).

Slade Radio Society

"Nuclear Physics" and "Home-Built Tape Recorders" were discussed at recent meetings. "Electric Traction" (April 25), and "The Use of V.H.F. in Mobile Radio Schemes" (May 9) are the subjects of future lectures. The date of the first D/F contest has been provisionally fixed for May 11. Meetings are held on alternate Fridays at the Parochial Hall, Broomfield Road, Erdington, Birmingham.

Southport Radio Society

The Society has recently been reorganised and now forms part of the Southport Y.M.C.A. It is expected that a workshop will shortly be available. Meetings are held on alternate Mondays. Hon. Secretary: F. H. P. Cawson, 113 Waterloo Road, Southport.

Spen Valley

Local members of the R.S.G.B. are invited to attend a meeting on April 23 at the Cleckheaton Temperance Rooms, commencing 7.30 p.m., when N.F.D. matters will be discussed. A talk on "Frequency Modulation" is planned for May 7.

Sutton & Cheam Radio Society Ladies' Festival

An attendance of 100 was recorded at the Fourth Annual Ladies' Festival of the Sutton & Cheam Radio Society held at Wilson's, Grove Road, Sutton, on March 8, 1952.

The President of the Society (Mr. Stanley Vanstone, G2AYC) and Mrs. Vanstone, had the support of three Members of the R.S.G.B. Council (Messrs. Leslie Cooper, G5LC, F. G. Lambeth, G2AIW, and P. W. Winsford, G4DC) and their ladies, together with the General Secretary and Mrs. Clarricoats, and the Assistant Secretary (Miss May Gadsden). Excellent support was given by the Thames Valley Amateur Radio Transmitters' Society, of which Society Mr. Cooper is President.

Numerous informal toasts were offered during dinner, after which formal toasts were proposed by the President (who welcomed the visitors), Mr. Clarricoats (who offered congratulations to the Society on its progress and successes in many fields) and Mr. M. Mitchell (who welcomed the Ladies). Responses were given by Mr. Cooper, Mr. Leslie Seaton (on behalf of the Committee), and Mrs. Webb.

Presentations were made to the winners of the Home Constructors' Competition, after which floral bouquets were presented to several of the ladies present.

A spell of dancing, followed by a musical interlude arranged by Mr. Reg Pearson, G4DH, were "curtain raisers" for the distribution of gifts to the ladies and items of radio equipment to the men.

"Auld Lang Syne" at midnight marked the end of yet another successful Sutton & Cheam Radio Society function.

Council Members, P. W. Winsford (G4DC), L. Cooper (G5LC), and F. G. Lambeth (G2AIW), probe the mysteries of a piece of surplus radio equipment at the Sutton and Cheam Radio Society Dinner. Also in the picture, R.S.G.B. Vice-President, H. V. Wilkins (G6WN), Sutton and Cheam Radio Society President, S. E. Vanstone (G2AYC), and R.S.G.B. General Secretary, John Clarricoats (G6CL).

Taunton & West Somerset Radio Society

A lecture on "Television" by G. Fidler, A.M.Brit.I.R.E., was the main feature of the March meeting. Prospective members are invited to contact the Chairman: J. T. Bass, 2a Hammet Street, Taunton, Somerset.

Torbay Amateur Radio Society

Welcome visitors at the March meeting were members of the Exeter Radio Society, including H. A. Bartlett, G5QA (Council Member and R.R.), G. Wheatcroft, G3HMY (C.R. for Devon), and T. Smith, G3EFY (T.R. for Exeter). Highlight of the meeting was a talk on "Propagation" by R. Hope, G3AUS, followed by a discussion. Hon. Secretary: W. A. Launder, 15 Cambridge Road, St. Marychurch, Torquay.

An example of the special QSL card (designed by Eric Martin, G6MN), used to confirm contacts with G3BTU/A, the Rotary Club Hobbies' Exhibition station which operated from East Retford Town Hall last month.

Warrington & District Radio Society

Recent activities have included a lecture on "Speech Clipping" by H. Whalley, M.Sc., A.M.Brit.I.R.E., G2HW, and a film strip, "Valve Construction," presented by N. D. Atkins, G3EXG. The future programme includes talks on "Radar Principles," "Two-Metre Operation," and "Single Sideband Transmission and Reception." Meetings are held on the third Tuesday of each month at the King's Head Hotel, Warrington.

Wirral Amateur Radio Society

A recent constructional contest was won by H. J. Hurst, G3AKW, with an ingenious piece of compact equipment combining grid-dip oscillator, audio oscillator, signal generator (range 200 kc/s to 30 Mc/s), field-strength meter, and c.w. and phone monitors, with built-in power supply. Second and third prizes went to J. Hopkins, G2FXT, for a clamp modulator, and J. Wess, G3EQE, for a valve voltmeter.

Stray

G3DJD, 2 Canfield Road, Brighton, who is working on an exciter designed to produce harmonic-free r.f. at 14 Mc/s, by mixing the outputs of a 6 Mc/s v.f.o. and an 8 Mc/s c.o., would be glad to exchange notes with any member who has knowledge of the system.

Can You Help?

● G3WR, 6 Green Ridge, Brighton, needs the circuit diagram of Wavemeter type W.1310.

LETTERS TO THE EDITOR

The Society assumes no responsibility for the views expressed herein by correspondents.

T.V.I.—An Active Viewpoint

DEAR SIR,—Much instructive material has appeared in recent issues of the BULLETIN on television interference—a subject on which I should like to make a few comments.

The T.V.I. position in this part of the country seems to be particularly bad. In spite of the proximity of Holme Moss (only 18 miles away), many viewers, due to the hilly terrain, are getting better results from Sutton Coldfield, although Sheffield is outside the official fringe area of that transmitter. In certain districts, dealers are still having to install receivers for Sutton Coldfield because reception is better than from the local transmitter. We have, therefore, two frequencies to guard against.

Of the 90 or so local transmitting amateurs, nearly all are obliged to keep off the air during television hours, in spite of attempts at harmonic suppression by a few of them. This seems to correspond with the recently reported case from Dallas, Texas, and shows that harmonic suppression is not a complete cure for T.V.I. Many local television receivers seem to be swamped by the 14 or 28 Mc/s fundamental. Conversation with viewers does not promise much co-operation; their attitude is that as they are in such a vast majority, amateurs should bow to this and keep off the air during television hours.

We may expect television broadcasting in this country to increase, and eventually reach as much as 15 hours per day. The only time available for amateur operation would then be during the night, if the present position were allowed to continue. I know that the Council realises this and that remarks on these lines have occasionally appeared in the BULLETIN, but I am certain that the average member does not fully appreciate the dangers ahead. Several amateurs have already resigned themselves to their fate and gone off the air indefinitely because of T.V.I. The position will become much worse as the eleven-year cycle moves around so that the DX bands are again open for longer periods.

May I in all diffidence make one or two suggestions for consideration?

(i) That the Society should at once form a T.V.I. Committee, comprising our best technical members, to collect information on all aspects of the subject. A member finding a new cure or useful suggestion should be invited to write to this Committee, giving all details. In fact, the Committee, which would operate similarly to that in Dallas, could put our case before television manufacturers and the G.P.O. [Note.—The Technical Committee of the Council already performs this function.—ED.] It might be helpful if groups of provincial members got together to pool their knowledge and experience and equipment, thus mutually assisting one another, and then submit a report to the main Committee.

(ii) Considerably more of the valuable space of the BULLETIN should be given over to T.V.I. matters, even at the expense of other items.

(iii) That more emphasis should be laid on the importance of the matter in editorials. Too many amateurs are taking the position lying down; if this attitude persists and no one makes them see the danger ahead, the time may come when Amateur Radio as we know it today will be only a memory, with 144 Mc/s as our low frequency band.

Yours faithfully,
JOHN R. PETTY (G4JW).

Sheffield.

T.V.I. of Another Type

DEAR SIR,—I have read with interest the various articles on the suppression of television interference in the BULLETIN and other technical journals. Whilst agreeing with the necessity for carrying out suppression of interference generally, are we not going round in circles when we consider that television sets themselves radiate considerable signals? The interference from the line-scan field usually affects the Light Programme, Droitwich, and also the amateur bands, especially 14 Mc/s. and 28 Mc/s.

Could not the manufacturers be requested to carry out more efficient screening of television receiver circuits, and could not some publicity be given to the fact that T.V. sets *do* generate interference to non-viewing listeners?

Yours faithfully,
E. LEWIS (Associate).

Chorley, Lancs.

N.F.D.—Quo Vadis?

DEAR SIR,—It seems to me about time that we considered just where we are going with respect to National Field Day. Surely, as originally conceived, the primary object of the event was to encourage the development of mobile equipment that would provide *reliable* communication under emergency conditions.

To meet this requirement I submit that a communications receiver is essential. This will require some 60-100 watts which is easily obtained from batteries. Our self-imposed power restrictions since the war have already brought us to the slightly ridiculous state of having our genemotors screaming away, lightly loaded, when sending, in spite of the fact that ample power is available. In view of the receiver problem, reducing the transmitter power has little or no effect on battery requirements as the sending-to-receiving time ratio is small. Such a restriction does, however, tend to discourage those groups who wish to design balanced permanent equipment. A large number of groups have invested in petrol-electric sets to reduce the dead weight of accumulators used before the war, and there would appear to be no reason why we should not revert to 25 watts input on all bands except 1.7 Mc/s.

There is already a low-power field day for those members who are interested, but this has little bearing on the aims of N.F.D. To quote an example: G2MI's QRP equipment, which has an imposing list of contacts to its credit, had the utmost difficulty in working ¼ mile across Manchester to GB3RS/A during the Manchester Convention. This is *not* reliable communication. Low power is a relative term and I would not call 1 watt low power compared with 5 watts!

Now there appears to be a proposal to make A stations operate on 1.7 Mc/s. and 7 Mc/s., while B stations use 3.5 Mc/s. and 14 Mc/s. This will render a number of perfectly good transmitters obsolete to no purpose and unnecessarily complicate the design of replacement equipment. It is indeed difficult to see any sense at all in such a proposal unless it has some bearing on relative point scoring, in which case N.F.D. merely degenerates into just another contest. If that is what the membership wants, so be it, but let us at least be honest with ourselves (and with the Press) when stating the aims of N.F.D.

Yours faithfully,
HY. WHALLEY (G2HW).

Darwen, Lancs.

Contest Operation

DEAR SIR,—It becomes increasingly evident that successful contest operating, particularly in international events, is a privilege reserved for those who (a) choose to exceed their licensed input power; (b) are able to erect aerial systems beyond the scope of the average city dweller; and (c) due to their location, are still able to operate during T.V. hours.

Admittedly we do not all enter expecting to win, but there must be many operators who hesitate to compete in any contest after considering any or all of the above-mentioned facts. No matter how good an operator one might be, it is hopeless trying to compete with high-power and aerial farmers.

What do other amateurs think of this, I wonder?

Yours faithfully,
JOHN A. HUNT (G2FSR).

Chingford, London, E.4.

Retford Rotary Club Hobbies' Exhibition

Special QSL cards bearing the coat of arms of Retford and signed by the Mayor and the President of the Rotary Club of that town, were sent to those who worked the Amateur Radio station (G3BTU/A) operated from Retford Town Hall last month on the occasion of a Hobbies Exhibition organised by the local Rotary Club. The station employed a 150-watt transmitter loaned by G3BTU and a Top Band telephony transmitter loaned by G8ON, the whole project being undertaken by Retford and Worksop members of the R.S.G.B.

Contacts were established with KG6, VK9, VS6, VE1 and ZB2 on telegraphy and with W1 on telephony. Television and broadcast receivers located almost directly below the transmitters were entirely unaffected. Numerous sideshows, including demonstrations of a v.h.f. beam array and a c.r. tube, attracted considerable attention.

The station was operated throughout the period of the Exhibition by G3BTU and 8ON, ably assisted by G3AUZ, 3HKQ, 6MN and a number of B.R.S. members.

Around the Trade

A comprehensive 52-page catalogue of radio and television equipment, components and publications is now available from *Southern Radio and Electrical Supplies*, 85 Fisherton Street, Salisbury, Wilts. The catalogue is alphabetically arranged, fully illustrated and priced at 9d. post free.

FORTHCOMING EVENTS.

(Continued from Page 430)

REGION 10

Cardiff.—May 12, 7.30 p.m., The British Volunteer, The Hayes.

REGION 11

Llandudno.—April 30, May 7, 7.30 p.m., Station Restaurant.

REGION 13

Edinburgh (L.R.S.).—April 17, 7.30 p.m., thence fortnightly, Edinburgh Chamber of Commerce, 25 Charlotte Square.

REGION 14

Falkirk.—April 25, May 9, 7.30 p.m., The Temperance Cafe.

CORNWALL COUNTY MEETING
SUNDAY, MAY 4, 1952
MADEIRA HOTEL, SEAFRONT, FALMOUTH

Programme:

Assemble	11.30 a.m.
Luncheon	12.30 p.m.
Business Meeting	2.00 p.m.
Group Photograph	3.15 p.m.
Car Trip	3.30 p.m.
Tea	4.30 p.m.
Model Aerials Demonstration by the President (Mr. F. Charman, B.E.M., G6CJ)	5.15 p.m.

Tickets (10/- each) from Mr. J. N. Watson (G3AET), 21 Trevetham Rise, Falmouth, not later than May 1, or from local representatives.

CAERNARVONSHIRE COUNTY MEETING
SUNDAY, MAY 11, 1952
EMPIRE HOTEL, MOSTYN STREET, LLANDUDNO

Programme:

Assemble	12 noon
Lunch	1.00 p.m.
Group Photograph	2.15 p.m.
Business Meeting	2.30 p.m.
Tea, followed by Film Show	5.00 p.m.

(A coach trip, price 4/-, will be arranged for the Ladies)

Tickets (11/- each) from the C.R., Mr. G. Roberts (GW3ENY), Montclare Hotel, Llandudno, not later than May 7.

LINCOLNSHIRE COUNTY MEETING
SUNDAY, MAY 18, 1952
GREAT NORTHERN HOTEL, LINCOLN

Programme:

Assemble	1.15 p.m.
Business Meeting	2.15 p.m.
High Tea	4.30 p.m.
Raffle and Sale	5.30 p.m.

Tickets (5/6 each) from the Lincoln T.R. Mr. L. Gostelow (G2FOW), 21 Cannon Street, Lincoln, not later than May 9, Early application is advised. The Acting Vice-President, Hon. Secretary and General Secretary expect to be in attendance.

West Midlands Regional Meeting

Members resident in the West Midlands (Region 3) are asked to make every effort to attend a Regional Meeting in Birmingham on Saturday, May 24 1952. Full details will be announced next month.

Representation

THE following are additions or amendments to the list published in the February, 1952, issue.

Region 1

CHESHIRE
Town Representative :
Stockport.—R. A. Stringer (B.R.S. 19553), 1 Hillington Road, Edgeley.

Region 2

DURHAM
Town Representative :
South Shields.—T. L. Peterson (G6VG), 3 Bellevue Crescent, Tyne Dock.

YORKSHIRE WEST
Town Representative :
Keighley.—J. J. Platt (G2VO), Underhill, High Spring Gardens.

Region 4

LINCOLNSHIRE
Town Representative :
Lincoln.—L. Gostelow (G2FOW), 21 Cannon Street.

NORTHAMPTONSHIRE
Area Representative :
Wellingborough.—C. F. Robinson (G3HZF), Bona Vista, Wharf Road, Higham Ferrers.

ESSEX
County Representative : W. J. Ridley (G2AJF), Gablehays Lodge, Springfield, Chelmsford.

BEDFORDSHIRE
Area Representatives :
Bedford.—R. M. Baerlein (G3EII), Rostherne, Wood Lane, Aspley Guise.
Luton.—J. A. Plowman (B.R.S. 4760), 119 Farley Hill.

CAMBRIDGESHIRE
Town Representative :
Cambridge.—T. A. T. Davies (G2ALL), Meadow Side, Comberton.

SUFFOLK
Area Representative :
Lowestoft & Beccles.—A. Barber (B.R.S. 18397), 98 Fair Close, Beccles.

Region 7

LONDON, EAST
Town Representatives :
Brentwood.—G. L. Turner (G3LA), 59 Crow Green Road, Pilgrims Hatch.
Woodford.—R. S. James (G3GZD), 4 Grove Hill, E.18.

LONDON, WEST
District Representative : A. W. Timme (G3CWW), 11 Cheyne Walk, Hendon Central, N.W.4.

BUCKINGHAMSHIRE
Area Representative :
Amersham, Beaconsfield & Chalfonts.—P. L. Spencer (G3FIY), Little Croft, Green Lane, Chesham Bois.

HERTFORDSHIRE
Town Representative :
Watford.—R. T. Youens (G2HAR), 104 Baldwins Lane, Croxley Green, Rickmansworth.

Region 8

KENT
Town Representatives :
Canterbury & Ashford.—J. P. Wilson (G3BGP), 7 Cunningham Avenue, Canterbury.
Isle of Thanet.—E. R. Dolman (G2DCG), 20 Canterbury Road, Westbrook, Margate.
Maidstone.—C. S. Bradley (G5BS), Half Yoke, East Farleigh.
Medway Towns.—W. B. N. Althorpe (G2CBA), 85 Copperfield Road, Rochester.

SUSSEX
Town Representative :
Worthing.—F. L. Robins (G3GVM), 104 Congreve Road.

Region 9

DEVON
Town Representative :
Torquay.—F. J. Wadman (G2GK), 106 Warbro Road.

SOMERSET
Town Representative :
Weston-super-Mare.—A. J. E. Williams (B.R.S. 19172), Bradley, The Ridge, Yatton.

Region 10

GLAMORGANSHIRE
Town Representative :
Cardiff.—S. Howell (GW5FN), 7 Homelands Road, Whitchurch.

Corrections
Region 7—London South-East—Woolwich area. Address of K. W. Ireland (G3IKW) should read: 82 Grangehill Road, Eltham, S.E.9.
Region 8—Sussex C.R. The call sign of G. W. Morton should read G3DRC and not B.R.S. 10769.

Vacancy
Mr. R. Bowers (G3CXD) has resigned as Representative for the county of Staffordshire.
Nominations for his successor should be made in the prescribed form and sent to reach the General Secretary by May 15, 1952.

NEW MEMBERS

The following have been elected to membership:—

Corporate Members (Licensed)

G2BWR †S. G. THORPE, 28 Wheatsheaf Close, Woking, Surrey.
G2DAZ †S. JACKSON, 2 Peterhill Commonside, Batley, Yorks.
G2HCV R. N. HEDGES, 90 Bentworth Road, London, W.12.
G2SG †F. A. ROBINSON, 100 Jockey Road, Sutton Coldfield, Warwickshire.
G3AUU †A. J. HILL, 19 Grimsdyke Crescent, Barnet, Herts.
G3GCO S. A. BOWEN, 43 Tureff Avenue, Donnington, Shropshire.
G3GTJ †J. P. TEAGUE, 23 Park Lane, Hayes, Middlesex.
G3HFQ R. F. JANAWAY, 7 East Wyld Road, Westham, Weymouth, Dorset.
G3HNU J. L. MANGNALL, 77 Tanfield Road, Birkby, Huddersfield.
G3HPG P. D. ROBINSON, 3 Cliff Lane, Mappleton, Nr. Hornsea, E. Yorks.
G3HQP *L. S. D. CHRISTIAN, 20 Kingsway, Coney Hall, West Wickham, Kent.
G3HQV E. MITCHELL, 138 Baddow Hall Crescent, Great Baddow, Chelmsford, Essex.
G3HSZ H. FERGUSON, 29 Victor Street, Bishophill, York.
G3HTJ *W. N. WALKER, Geraldine Staff Club, Geraldine Road, Great Malvern, Worcs.
G3HTK *A. G. GASSON, 24 Tower Hill Works, Witney, Oxon.
G3HTX *W. F. HIPWELL, 138 St. Albans Road, Seven Kings, Ilford, Essex.
G3HUA R. E. HOLLOWAY, 73 Gainsford Road, Bitterne, Southampton.
GM3HUZ D. C. MILLAR, 55 Marywood Square, Strathbungo, Glasgow S.1.
G3HVE A. E. BROADBENT, 78 Malthouse Meadows, Liphook, Hants.
G3HVO J. D. LOADER, 5 Highwood Road, Parkstone, Dorset.
G3HWE R. F. PERRETT, 9 Peverel's Way, St. James, Northampton.
G3HWT *MAJOR M. W. HEWETT, Chaceley, Kingswood Road, Shortlands, Bromley, Kent.
G3IAS *A. M. SMITH, 21 Hamsey Green Gardens, Warlingham, Surrey.
G3IIL †J. P. GIBSON, Ravenscourt House, 3 Paddenswick Road, Hammersmith, London, W.6.
G3INT F. P. WHARTON, Vimmy Cote, Milespit Hill, Mill Hill, London, N.W.7.
G5AX †H. B. SUMNER, 35 Moss Lane, Leyland, Lancs.

* * *

GW2BMN †H. MILLINGTON, 24 Mount Pleasant, Menai Bridge, Anglesey.
G2BZA E. L. HUNTER, 111 Church Road, Hayes, Middx.
G2CZS R. B. SACHS, 104 Centre Drive, Newmarket, Suffolk.
G2FHK D. A. SMITH, 18 Lucas Avenue, Harrow, Middx.
G2FTL R POTTER, 191 Nottingham Road, Spondon, Nr. Derby.
G3BTI P. V. HAZELDENE, The Cottage, Broadgate, Weston, Spalding, Lincs.
G3CMN J. C. SARGENT, 232 Elphinstone Road, Hastings, Sussex.
G3EAU †V. C. CUNDALL, 93 Chandos Road, Stratford, London, E.15.
G3FHH J. H. PARK, 111 Burnside Avenue, Skipton, Yorks.
G3FZS J. H. BRENT, 26 Redhill Drive, Fishponds, Bristol, Glos.
G3GAF *C. T. DOLLERY, White House, Burton Road, Lincoln.
GW3GVB B. H. PHILLIPS, 25 Pentyla Road, Sketty, Swansea, Wales.
G3GVF J. A. LOWE, Hillside, Hartley Wintney, Nr. Basingstoke, Hants.
G3HCX J. ARUNDEL, Drapery Stores, The Square, Airedale, Castleford.
G3HGG *L. SARJEANT, 86 Western Road, Crookes, Sheffield 10.
G3HID F. W. FOX, Armadale, Manor Road, Burnham on Sea, Somerset.
G3HQF H. EVANS, 23 Westcroft, Chippenham, Wilts.
G3HSS H. J. SMITH, St. Martin's, Locksheath Park Road, Locksheath, Southampton.
G3HSV D. E. ALESBURY, Myrtle Cottage, The Green, Rowlands Castle, Hants.
G3HSX 1921013 L.A.C. STAFFORD, L. H., Signals Section, K.Q.(U.), 2nd Tactical Air Force, Bad Eilsen, B.A.O.R. 29.
GM3HUT †M. DOUBLEDAY, 42 St. Baldreds Road, North Berwick, Scotland.
G3HVV *R. J. NEWMAN, 136 Norwood Road, London, S.E.24.
G3HVX W. H. WELLS, 5 Bonham Grove, Blakesley Road, Yardley, Birmingham.
G3HWC W. PILKINGTON, 36 Malt Street, Preston, Lancs.
G3HWG N. C. TA'BOIS, 33 High Road, Woodford Green, Essex.
G3HWH W. E. WILKINSON, 11 Albemarle Street, Clitheroe, Lancs.
G3IAI C. C. ROBINSON, 58 Derby Road, Northampton.
G3IFT F. H. TOBIN, 81 Wrekin Drive, New Donnington, Wellington, Shropshire.
G3ILS L. SMITH, 73 Ellesmere Road, Alum Rock, Birmingham 8.
G3IRP R. W. PLUMB, 25 Love Lane, Morden, Surrey.
G3RX J. A. READING, 29 Herrick Road, Highbury, London, N.5.
GM3YS †G. TROY, 8 Elizabeth Street, Ibrox, Glasgow S.W.1.
GW4GL †A. R. JONES, Beverley, Tonna Road, Neath, Glam, Wales.
G8LZ E. J. BONNER, 3 King's Drive, Gravesend, Kent.
G8OU J. A. VAREY, 3 Barnett Wood Lane, Ashtead, Surrey.
GW8SU E. C. BATH, Hill View, Newton-Nottage Road, Porthcawl, Glam.

* * *

GI2ARS D. RUTHERFORD, 5 Kilhorn Green, Annalong, Co. Down, N. Ireland.
G2BBH S. PARK, 11 Church Lane, Clayton le Moors, Nr. Accrington, Lancs.
G2BVM K. H PEARCE, High Street, Ixworth, Nr. Bury St. Edmunds, Suffolk.
G2CDF †J. WALKER, 40 Devon Street, Beswick, Manchester 12, Lancs.
G3CCM W. R. HARRIS, 39 Rayleigh Road, Wimbledon, London, S.W.19.
G3DSH D. J. CARTMELL, 31 Thornton Road, Carlisle, Cumberland.
GM3FDP A. F. CAMPBELL, Woodbine, Fort Augustus, Inverness-shire, Scotland.
G3FHL *G. C. BAGLEY, 34 Wharfage, Ironbridge, Salop.
GW3GQN W. T. WALTERS, Hillside, Ynystawe, Swansea, Wales.
G3GTM P. MOREY, Star Hotel, Helston, Cornwall.
G3HIG F. STACEY, 11 Fairspear Road, Leafield, Oxon.
G3HJF L. J. SMITH, 120 Crest Drive, Enfield, Middx.
G3HLO C. PARKIN, 254 Warminster Road, Sheffield 8, Yorks.
GW3HMQ J. A. ROBSON, Melrose, Park Drive, Swansea, Wales.
G3HPK G. HAMBER, Venta, Osborne Road, New Milton, Hants.
G3HQG G. ATKINS, 36 Fire Station, Division Street, Sheffield 1, Yorks.
G3HQZ G. CROYSDALE, Dunboyne, Frimley Green Road, Frimley, Aldershot, Hants.
G3HRQ S. A. J. SCOTT, 40 Overcliffe, Gravesend, Kent.
G3HTM W. ELLIS, 5 Kingwell Crescent, Ward Green, Worsbro Bridge, Nr. Barnsley, Yorks.
G3HTR H. BOLTON, 691 Hagley Road West, Quinton, Birmingham 32.
G3HTV E. B. W. WOLLEN, 15 Woodside Road, Richmond Road, Kingston upon Thames, Surrey.
G3HVJ *A. E. CHAPPELL, Myrtle House, Vespan Road, London, W.12.
GW3HWR H. W. REES, Room C3, "A" Coy., 3 Trg. Bn., R.E.M.E., Bailleul Camp, Arborfield, Berks.
G3HWS G. R. MARSHALL, 39 Kew Road, Birkdale, Southport, Lancs.
G3HWY W. R. THOMAS, "G" Flt., "B" Sqdn., Apprentice Wing, 6 Radio School, R.A.F. Cranwell, Sleaford, Lincs.
G3HXG F. DAVIES, 1 New Street, St. George's, Oakengates, Shropshire.
G3HYC H. MAXWELL, 95 High Street North, Dunstable, Beds.
GM3HYD K. M. ROSS, 547 Holburn Street, Aberdeen, Scotland.
G3HYG *D. R. TOPPING, 57 South Farm Road, Worthing, Sussex.
G3HYQ A. A. UPCHURCH, 27 New Street, Blaby, Leicester.
G3HZF C. F. ROBINSON, 100 Wharf Road, Highams Ferrers, Northants.
G3HZH T. B. GOOD, 10 Woodlane Terrace, Falmouth, Cornwall.
G3HZU *M. O. FAROOQ, 63 Sherwood Street, Wolverhampton, Staffs.
G3IAF M. J. MARLOW, Lynkhurst, 158 Epsom Road, Merrow, Guildford, Surrey.
G3IGW M. G. WHITAKER, Stile House, Bridle-Stile, Shelf, Halifax, Yorks.
G3IIW M. SANDS, Alonne, Fermor Road, Crowborough, Sussex.
G3ISA *A. R. SMITH, 10 Brabourne Rise, Beckenham, Kent.
G3IYL MRS. S. W. FISH, 107 Eton Road, Ilford, Essex.
G4TM †T. A. MAGUIRE, 51 Whitchurch Gardens, Edgware, Middx.
G6SY †J. F. STANLEY, The Frith, Mersham, Ashford, Kent.

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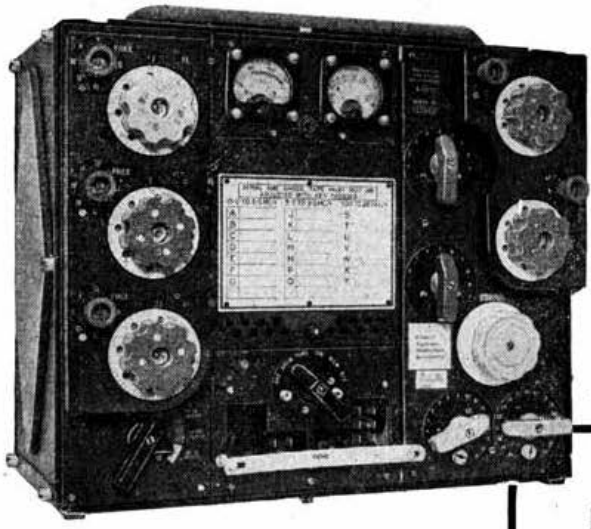

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(Continued on Page 472)

EXCHANGE and MART SECTION

(Continued from Page 471)

VALVES. — 1s. 6d. each: SP210—4, FC2A—5, CV265—6, VR100—2, P61, VP23, VR53—4, VR66—3, VR65A—2, CV63—3, 7193—4, 6C6, 77—4, 12J5GT, 12SA7GT, 12A7, 12SR7, 12SH7—4. 89, 78—3. 2s. each: VR136—4, 72—5, 956—7, 955, 954, 12SG7—2, 6J5G—8, 3Q5GT, 6D6. 2s. 6d. each: VR91—2, KTZ41—4, KTZ63, VT501—4, 6F5G, 2C21, 2C26. 3s. each: X65—3, X61M, MKT4—3, UU6, VT52—4, 7C5, 6AC7. 4s. each: VU72—5 (used slightly), VU39—7, 10—2, 6SS7—2. VT62—2. 5s. each: VS68, 5U4G—6, IN5G—8, 6L7G, 6K6G—2, VC139A—4 (loose bases), VR150/30—6. 6s. each: PT15—4 (Osram), AZ1, 5V4G, 524—4, 5Z4G, 5Z3, 6SC7, 6Y7G—9, 6F7. 7s. each: KT31, 43—2, 6V6G, VU72—2, 6SN7GT—10. 8s. each: PT15—4 (Hytron, superior job), 6B4G—5. 16s. each: 803—5 (holder 2s. 6d.). 17s. 6d. each: TZ40—5. 21s. each: 832A—3. 25s.: 815. 30s.: 829B. Transformer, 1100-0-1100 500 mA, with C.T. rectifier transformer for GU50s. Never used pair 63s. Complete set I.F.s, coil pack condenser and almost every part for BC.348L with handbook, 63s. R.1132 without front panel 10s. BC.624 R.F. section removed, 11s. 6d.; carriage extra. Going QRP abroad.—Box 325, NATIONAL PUBLICITY CO., LTD., 358 Strand, London, W.C.2. (323

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WANTED. — H.R.O. coils, receivers, power packs, AR88Ds, AR88LFs, SX28s, BC348s, AR77s, etc.—Details please to R.T. & I. SERVICE, 254 Grove Green Road, Leytonstone, E.11. (LEY 4986.) (101

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WANTED.—Type 12 transmitter, unmodified.—Details to G3GJC, 55 Huntingfield Road, Roehampton, London, S.W.15. (304

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