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AMATEUR RADIO

BULLETIN

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

VOLUME 28 No. 6 PRICE 1/6

DECEMBER 1952

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R.S.G.B. BULLETIN

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Forthcoming Events

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Blackpool (B. & F.A.R.S.).—December 16, 7.30 p.m., 33 Clarence Avenue, Cleveleys.
Bury.—January 8, 7.30 p.m., Y.M.C.A., the Rock.
Chester (C. & D.A.R.S.).—Tuesdays, 7.30 p.m., Tarran Hut, Y.M.C.A.
Crosby.—Tuesdays, 8 p.m., over Gordon's Sweetshop, St. John's Road, Waterloo, Liverpool.
Darwen & Blackburn.—December 19, 7.30 p.m., Y.M.C.A., Limbrick, Blackburn.
Manchester (M. & D.R.S.).—January 5, 7.30 p.m., Brunswick Hotel, Piccadilly.
Preston.—December 19, 7.30 p.m., Three Tuns Hotel, North Road, Preston.
Rochdale (R.R.T.S.).—Fridays, 7.45 p.m., 1 Law Street, Sudden.
South Manchester (S.M.R.C.).—Alternate Fridays, 7.30 p.m., Ladybarn House, Mauldeth Road, Manchester 14.
Southport.—December 15, 29, 8 p.m., Y.M.C.A., off Eastbank Street, Southport.
Stockport (S.R.S.).—Alternate Tuesdays, 8 p.m., Blossoms Hotel, Buxton Road.
Warrington (W. & D.R.S.). — First and third Tuesdays 7.30 p.m, King's Head Hotel, Warrington.
Wirral (W.A.R.S.).—December 17, January 14, 7.45 p.m., Y.M.C.A., Whetstone Lane, Birkenhead.

REGION 2

Barnsley.—January 12, 7.30 p.m., King George Hotel, Peel Street.
Bradford.—December 23, January 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.—January 10, 7.30 p.m., Black Bull, Market Place.
Gateshead.—Mondays, 7.30 p.m., Mechanics Institute, 7 Whitehall Road.
Hull.—December 31, 7.30 p.m., R.E.M.E. Canteen, Walton Street.
Middlesbrough.—Thursdays, 7.30 p.m., Joe Walton's Boys' Club, Feversham Street.
Newcastle-upon-Tyne.—January 19, 7.30 p.m., British Legion Rooms, 1 Jesmond 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.—December 24, 8 p.m., Dog and Partridge, Trippet Lane; January 10, 8 p.m., Albreda Works, Lydgate Lane.
Slaithwaite.—Fridays, 7.30 p.m., 3 Dartmouth Street.
Spenborough.—December 17, 31, 7.30 p.m., Temperance Hall, Cleckheaton.
York.—Thursdays, 7.30 p.m., Club Rooms, Y.A.R.S., Fetter Lane.

REGION 3

Birmingham (South).—December 21, January 4, 10.30 a.m., Stirchley Institute.
Coventry.—January 2, 23, 7.30 p.m., Priory High School, Wheatley Street.
Kenilworth, Warwick & Leamington.—January 15, 7.30 p.m., Dalehouse Lane.
Malvern.—January 5, 8 p.m., Foley Arms.
Stourbridge (S. & D.R.S.). — January 6, 8 p.m., King Edward's School.
Worcester (W. & D.A.R.C.).—Thursdays, 7 p.m., City Library (basement), Foregate Street.
Wrekin (W.A.R.S.).—Mondays, 8 p.m., Wrekin Service Club, Roseway, Wellington.

REGION 4

Alvaston (D.S.W.E.S.).—Tuesdays and Thursdays, 7.30 p.m., Sundays, 10.30 a.m., Nunsfield House, Boulton Lane, Alvaston, Nr. Derby.
Chesterfield.—December 16, 30, January 13, 7.30 p.m., Bradbury Hall, Chatsworth Road.
Derby (D. & D.A.R.S.).—Wednesdays (except December 24), Derby College of Arts and Crafts (sub-basement), Green Lane.
Leicester (L.R.S.).—December 15, January 5, 7.30 p.m., Holly Bush Hotel, Belgrave Gate.
Loughborough.—December 17, 7.30 p.m., Great Central Hotel.
Mansfield (M. & D.A.R.S.).—January 4, 3 p.m., Swan Hotel.
Newark.—December 21, January 4, 7 p.m., Northgate House.
Northampton (N.S.W.C.).—Fridays, 6 p.m., January 2, 7 p.m., Club Room, 8 Duke Street.
Nottingham.—December 19, January 16, 7.30 p.m., Trent Bridge Hotel.
Worksop.—January 5, 7 p.m., King Edward Hotel.

REGION 5

Chelmsford.—January 6, 7.30 p.m., Marconi College, Arbour Lane.
Ipswich.—December 31, January 14, 7.30 p.m., T.A. Drill Hall, Woodbridge Road.
Lowestoft (L. & B.A.R.C.).—December 31, January 14, 7.30 p.m., Y.M.C.A.

REGION 6

Gloucester.—Alternate Thursdays, 7.30 p.m., Spreadeagle Hotel.
North West Wilts.—Fridays, 8 p.m., G3HXA, London Road Inn, Calne.
Petersfield & District.—January 2, 7.30 p.m., The Market Inn, The Square.
Portsmouth.—Tuesdays, 7.30 p.m., Signals Club Room, R.M. Barracks, Eastney.
Southampton.—January 3, 7.30 p.m., 22 Anglesey Road, Shirley.
Stroud.—Wednesdays, 7.30 p.m., Subscription Rooms.
Swindon.—January 17, 7.30 p.m., Connaught Rooms (off Regent Street).

REGION 7

Acton, Brentford, Chiswick.—Tuesdays, 7.30 p.m., A.E.U. Rooms, Chiswick High Road, W.4.
Balham.—December 17, 7.30 p.m., Alexandra Hotel, Clapham Common, South Side, S.W.4.
Barnes & Richmond.—January 13, 7.30 p.m., 308 Upper Richmond Road, East Sheen, S.W.14.
Bromley, Kent (N.W.K.A.R.S.).—January 2, 7.45 p.m., Shortlands Tavern, Station Road, Shortlands.
Chingford.—Apply T.R., 13 Mount Echo Drive, for details.
Croydon (S.R.C.C.).—January 16, 7.30 p.m., Annual Dinner, Cafe Royal, Croydon.
Ealing.—Sundays, 11 a.m., A.B.C. Restaurant, Ealing Broadway.
East Ham.—December 23, January 13, 8 p.m., 57 Leigh Road.
East London District.—December 21, 3 p.m., A.G.M., Town Hall, Ilford.
Eltham & Sidcup.—December 29, January 12, 7.30 p.m., Holy Trinity Church Hall, Hurst Road, Sidcup.
Enfield.—January 18, 3 p.m., George Spicer School, Southbury Road.
Finsbury Park.—December 23, 7.30 p.m., 164 Albion Road, Stoke Newington, N.16.
Grays.—Apply T.R., 68 Chestnut Avenue, for details.
Guildford & Woking.—December 28, 3 p.m., "Bring & Buy," Royal Arms Hotel, North Street, Guildford.
Harlow (H. & D.R.S.).—December 30, January 13, 8 p.m., 6 High Street; December 23, January 6, 8 p.m., War Memorial Institute.
Hendon & Edgware (E. & D.R.S.).—Wednesdays, 8 p.m., St. Martins School, 22 Goodwin Avenue.
Holloway (G.R.S.).—Mondays and Fridays, 7.30 p.m., Grafton School, Eburne Road, N.7.
Ilford.—December 18, A.G.M., and every Thursday, 8 p.m., G2BRH, 579 High Road.
Kensington & Shepherds Bush.—January 9, 8 p.m., Basement Flat, 38 Royal Crescent, W.11.
Kingston (K.D.A.R.S.). — December 17, "Thermion," 7.45 p.m., Penrhyn House, 5 Penrhyn Road.
Lewisham (R.A.R.C.).—Wednesdays, 8 p.m., Durham Hill School, Downham.
Norwood.—December 20, 7.30 p.m., "Windermere House," Westow Street, Crystal Palace.
Slough.—December 18, January 15, 7.45 p.m., Special Meeting, Labour Hall, Chados Street.
Sutton & Cheam.—December 16, 7.30 p.m., The Harrow, Cheam Village.
Uxbridge.—January 2, 7.30 p.m., Vine Hotel, Hillingdon.
Welwyn Garden City.—January 6, 8 p.m., Council Offices.

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.
Hastings (B. & H.R.C.).—December 23, January 6, 7.30 p.m., Saxons Cafe, Sea Front.
Gillingham (G.T.S.).—Alternate Tuesdays, 7.30 p.m., Medway Technical Institute.
Isle of Thanet (I.O.T.R.S.).—Fridays, 7.30 p.m., George Hotel, Hawley Street, Margate.
Maidstone (M.K.A.R.S.).—Fridays, 8 p.m., Elms School, London Road.

REGION 9

Bath.—December 15, 7 p.m., Y.M.C.A., Broad Street.
Exeter.—January 2, 7.30 p.m., Y.M.C.A., 41 St. David's Hill.
North Devon.—January 1, 7.30 p.m., Rose of Torridge Cafe, The Quay, Bideford.
Penzance.—January 1, Railway Hotel.
Plymouth.—December 20, 7 p.m., Tothill Community Centre, Tothill Park, Knighton Road, St. Judes.
Torquay.—December 20, 7.30 p.m., Y.M.C.A., Castle Road.
West Cornwall.—December 18, January 2, Fifteen Balls, Penryn.
Weston-super-Mare.—January 6, 7.30 p.m., Y.M.C.A.
Yeovil.—Wednesdays, 7.30 p.m., Grove House, Preston Road.

(Continued on page 265.)

R·S·G·B·
BULLETIN
Volume 28 No. 6 December, 1952

Current Comment . . .

Goodwill

BARELY are the summer holidays over than we are told by some newspaper or other that "There are only another 93 shopping days to Christmas." And before we know where we are all the other organs of the Press have taken up the tale with such emphasis that ordinary folk, beset by the extra burden of doing two days' work in one that the pre-Christmas rush compels, may well ask for pause.

Yet when Christmas creeps inevitably upon us its sentiment melts even the would-be Scrooges among us. The word "Goodwill" succeeds in retaining its meaning in spite of all the strains placed upon it by its over-use around this time of year.

We radio amateurs, with ten days to go to Christmas after the appearance of this issue of the R.S.G.B. BULLETIN, think at this time of the very special interest in goodwill which we possess. We always *have* possessed it. And while many another hobby-organisation can claim much the same thing—for the simple reason that enthusiasts flock together, talk the same hobby-language and share similar mental processes—few surely have the very special facility that we in Amateur Radio enjoy of *being able to communicate*. For communication, in whatever shape or form, broadens outlooks and breeds tolerance. It is one of the tragedies of this Neo-Atomic Age that full communication between all the peoples of the world is barred at least for the time being, and in certain directions. Once it could be said that we radio amateurs were "all on the same side." That is not quite true now—and the community of nations suffers in consequence by the absence of that little bit of extra goodwill that international Amateur Radio can contribute towards it.

Within our own bounds, however, we can still preserve that goodwill among ourselves which is traditionally called "ham spirit," and which emphatically comes not from the synthetic *bonhomie* of Christian name calling but from something much deeper—that "something" which makes us all equal, the humblest welcome in the home of the mightiest (and *vice versa*), all of us "on the same side." To say we radiate goodwill is something that is almost literally true.

Strangely enough we might quite legitimately be regarded as a rather quarrelsome lot by any onlooker who appraised us from a detached point of view. That individual would get the impression that a deal of fuss and bother went on about things that seemed relatively unimportant —a rivalry for position in tables, ladders and contests, a hunger for coloured postcards with call signs on them. He would note, too, an immoderacy of opinion, expressed in both the spoken and the printed word, that matched ill those two "commandments" in The Amateur Code that "The amateur is balanced" and "The amateur is a gentleman."

Our outside appraiser's impression would be a false one. For if he stayed for an answer he would find that much of the apparent turmoil came from very few people—and perhaps gained an undeserved amount of publicity as a consequence. He would find, too, that the few hundred were not exactly typical of the many thousands who quietly went about their hobby undisturbed by the frenetic acquirers of stomach ulcers!

Christmas and New Year Greetings to Members Everywhere

It is these thousands who are the solid foundation of British Amateur Radio. And it is they who will derive most enjoyment in the season of extra goodwill that lies just ten days ahead.—J.H.

Royal patronage

THE President, on behalf of the Council, wishes to thank the many members and friends of the Society who, either verbally or by letter, have expressed their pleasure that His Royal Highness the Duke of Edinburgh, K.G., has extended his Patronage to the Society.

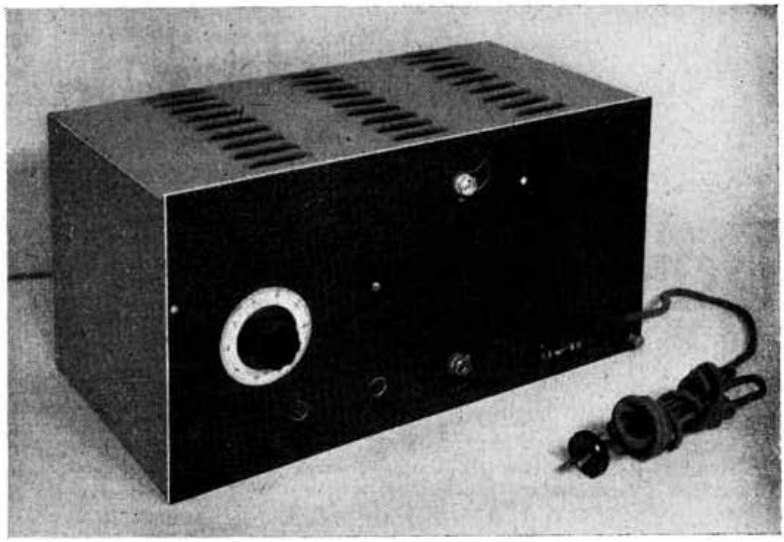
It was noted that during the course of his speech at the Radio Industry Council dinner held in London on November 25, His Royal Highness referred to the fact that he was now Patron of the Radio Society of Great Britain.

THE STORY OF THE "TT2"

Introducing the
"SURE FIRE"
145 Mc/s. converter

★

by
JACK HUM, G5UM
*(Hon. Editor)**



This article is a sequel to the one entitled "First Steps on Two" which appeared in the June issue. In carrying the steps a stage further along the road of 2-metre operation it suggests the design of a practical and simple converter for this band. This converter is incorporated in the "TT2" illustrated above.

FROM the mass of correspondence received as the result of the publication of "First Steps on Two" in the June, 1952, R.S.G.B. BULLETIN, one salient factor emerged. This was the need felt by a great many people for a really simple 2-metre converter that could be built and lined up under the conditions existing at the average amateur station. If, for instance, it were possible to get out a specification for such a converter then a long-felt want would undoubtedly have been filled. That this "long-felt want" was fairly urgent became very clear from the correspondence received about "First Steps on Two," for the number of readers who contemplated building the super-regenerative receiver described there was indeed alarming! And this in spite of the writer's advice to abjure this type of circuit for the main "station receiver."

Efforts were therefore bent to evolve a really simple 145 Mc/s converter design on the lines suggested above; the objective was something that would merit the title of "Sure Fire." How the objective was realised will be described in a moment, but first of all it is necessary to explain the so far mysterious reference to the "TT2" in the title of this article.

How The "TT2" Evolved

One of the primary purposes of designing a "Sure Fire" converter was to provide a prototype which could be copied by others who saw it. Further reasoning suggested that if the idea was to help people in their first steps on "Two," it would be a very good plan to offer a transmitter design as well.

In due course, then, a conventional 4-stage 2-metre transmitter was built on a single chassis 9 in. square and housed in a metal cabinet that happened to be available in the spares cupboard, a suitable power pack using a 5V4G rectifier being included as well. Then the "Sure Fire" converter was added, the result being a complete 2-metre send/receive unit entirely self-contained, presenting on its front panel nothing more than the following:

G.P.O. key switch to apply power supply either to transmitter or converter, operating a change-over aerial relay when pressed to "On";

A Pye plug to accept co-ax input from aerial;

Another Pye plug furnishing i.f. from the converter for feeding the adjacent receiver;

Igranic P40 socket for meter to measure p.a. current;

Igranic P40 socket breaking screen of V3 for keying purposes; and

P.A. tank capacitor control for "touching up" the final amplifier tuning should this be necessary if large hops in frequency were made on the 2-metre band. (When small changes of frequency are made a 2-metre p.a. normally does not need any re-tuning.)

A circuit diagram of this simple and conventional transmitter—the basic design of which was described in the R.S.G.B. BULLETIN many years ago—is shown here. There is no need to repeat the description given of it in the June issue, except to say that:

1. there is no objection to keying the screen of V3, even though the following valve is

* "Wyldes," Bulls Green, Knebworth, Herts.

operated without bias, provided the h.t. to V4 is kept to a reasonable value;

2. every effort should be made to secure equal drive on both halves of V4;
3. the actual amount of drive obtained in any of the grid input circuits will obviously depend on the value of h.t. employed. There is no need to be alarmed if the exact figures quoted on page 534 of the June issue are not achieved. After all, the ultimate criterion is how much r.f. appears in L4, and what it sounds like to the outside world.

So much for the transmitter side of this self-contained table top installation. We are now some way through the story of the "TT2," but we have still not disclosed the reason for its title!

The installation in question was made in table top form in its own self-contained cabinet so that it could be loaned to local amateurs who wished to make their first steps on "Two" with its aid. Before long the equipment acquired the title of "Table top for Two," and from that it soon became known as just "TT2."

It is now time to describe the "Sure Fire" converter portion of the "TT2," for this is the primary purpose of the present article.

The Crystal Controlled Converter

In the writer's opinion there is only one type of v.h.f. converter which deserves the title of "Sure Fire" and which can be guaranteed to get the newcomer to 2-metres on to the band with the least delay—and that is a crystal controlled one. Its great charm is that the local oscillator frequency is fixed, which means that the only adjustments necessary for setting the converter going are to peak the mixer grid circuit and anode circuit trimmers. Other advantages are:

(a) oscillator stability is guaranteed;

(b) incoming notes which are T9 *sound* T9;

(c) the necessary 2 Mc/s bandspread tuning is provided by the main receiver into which the converter is fed, and no complicated mechanical design work is needed;

(d) calibration "stays put."

This is not to say that self-excited local oscillator converters will not produce the same results. They will—but to the newcomer to v.h.f. they are much harder to put into operation. The extra expenditure on valves and power supplies entailed by the use of a c.c. converter is well worth while.

The crystal chain circuit can be constructed exactly as if it were intended for a transmitter, and may follow the diagram shown in Fig. 1 up to the V3 stage, except that the anode tuning circuit of V3 should be single ended. The line-up then is as follows:

With crystal at 7.4 Mc/s V1 produces third harmonic at 22.2 Mc/s and V2 produces third harmonic at 66.6 Mc/s; the final doubler produces a local oscillator signal at 133.2 Mc/s, which is used to drive the mixer valve V5 shown in Fig. 2.

The valves to use in the three stages of the exciter are not particularly critical, but it is a good plan to start off with something like an EL32 or an EL91 in order to produce plenty of drive into the following stages; after which V2 and V3 may be type EF50 or equivalent, either standard size or miniature.

The objective all the time should be to produce adequate drive to the mixer valve V5. This

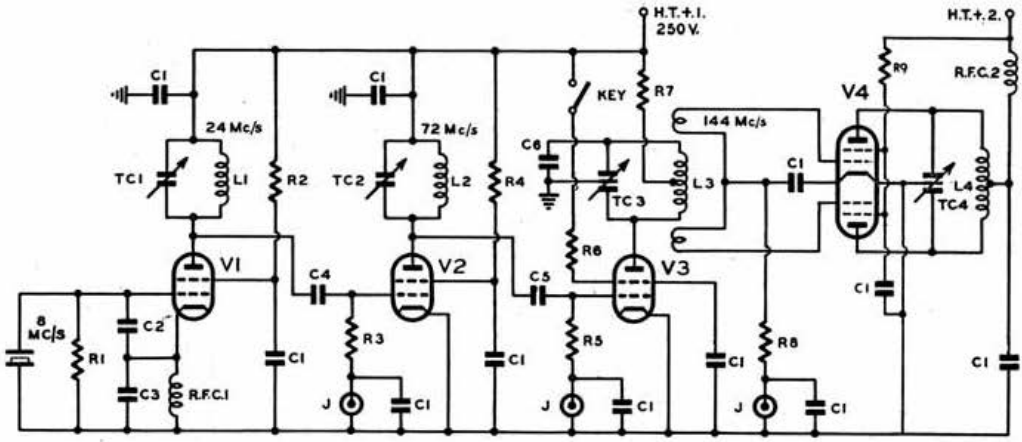


Fig. 1.—Circuit of a simple 4-stage transmitter for the 2-metre band.

C1	1000 $\mu\mu$F (by-pass).
C2	20 $\mu\mu$F.
C3	50 $\mu\mu$F.
C4	100 $\mu\mu$F (interstage coupling).
C5	32 $\mu\mu$F (interstage coupling).
C6	8 $\mu\mu$F balancing capacitor (or Philips trimmer).
TC1	50–75 $\mu\mu$F 1st multiplier tuning (surplus midget version had 6 moving and 6 fixed plates).
TC2	20–50 $\mu\mu$F 2nd multiplier tuning (surplus midget version had 4 fixed and 3 moving plates).
TC3	Butterfly trimmer 25 $\mu\mu$F max., 3rd multiplier tuning.
TC4	2-section midget capacitor (3 fixed and 3 moving plates per section) approx. 15+15 $\mu\mu$F; final amplifier tuning.
R1	100,000 ohms (1st multiplier grid return).
R2	10,000 ohms (1st multiplier screen dropper).
R3	100,000 ohms (2nd multiplier grid return).
R4	47,000 ohms (2nd multiplier screen dropper).
R5	100,000 ohms (3rd multiplier grid return).
R6	20,000 ohms (3rd multiplier screen dropper).
R7	50 ohms (or as RFC2–3rd multiplier anode stopper).
R8	20,000 ohms (final amplifier grid return).
R9	25,000 ohms (screen dropper).
RFC1	1st multiplier cathode choke, small 2-section "pi."
RFC2	Final amplifier anode choke, 24 turns on $\frac{1}{4}$in dowel.
L1	24 Mc/s for V1; 11 turns 24 s.w.g. on $\frac{1}{2}$in former.
L2	72 Mc/s for V2; 4 turns 14 s.w.g. $\frac{1}{2}$in diameter self-supporting.
L3	144 Mc/s for V3; 4 turns 14 s.w.g. centre-tapped, $\frac{1}{2}$in diameter self-supporting.
L4	Final amplifier; 2 turns 10–14 s.w.g. silver plated 1in diameter self-supporting. Coupling coil; single turn loop in centre of L4.
V1, 2	EF91, 6F12 or EL91.
V3	EL91 or QVO4/7.
V4	832 or TT15.

obviously will not occur until V3 furnishes it with some local oscillator voltage as a result of peaking-up the various stages on the above-mentioned frequencies. Each of the multiplier stages should produce an indication on a 0-1 milliammeter connected in the grid return lead of the following stage. Each output circuit should, of course, be checked for frequency with an absorption wave meter such as the one described in the earlier article.

As soon as this procedure has been completed, current should show in the grid return of V5 at point X, of a value between 50 and 150 micro-amperes. The next step is to adjust C106 mixer grid capacitor for maximum noise in the receiver fed by this converter; and also to peak up the iron dust core of L103 in like manner. These adjustments will not necessarily give best gain and at this point it is essential to line-up the converter finally on an external signal. In many districts there are airport or police frequencies in constant operation just outside the band, which will provide the necessary source for this purpose. Failing that—and we must remember that in most remote locations such signals may not be available—it will be necessary to line up the receiver on a local v.h.f. oscillator. When this is done the operator will probably discover that "maximum noise peak" does not necessarily represent maximum gain from the signal source.

No trimming of the r.f. valve V4 is provided. This stage tunes very flatly, but some slight increase in overall gain may be achieved by squeezing or spacing the turns of L101.

The coupling coil which carries off the i.f. from L103 is connected *via* a length of co-axial cable to a co-ax outlet. It is important that the i.f. output lead should be very effectively screened to minimise break-through on the i.f. band which is tuned on the main receiver. Indeed, it may be necessary to incorporate co-ax fittings both on the i.f. lead and on the receiver itself, making sure that the outer braiding is firmly bonded to earth.

This tunable intermediate frequency on the writer's BC 348 receiver, using the 7.4 Mc/s crystal specified above, is 10.8 Mc/s to 12.8 Mc/s.

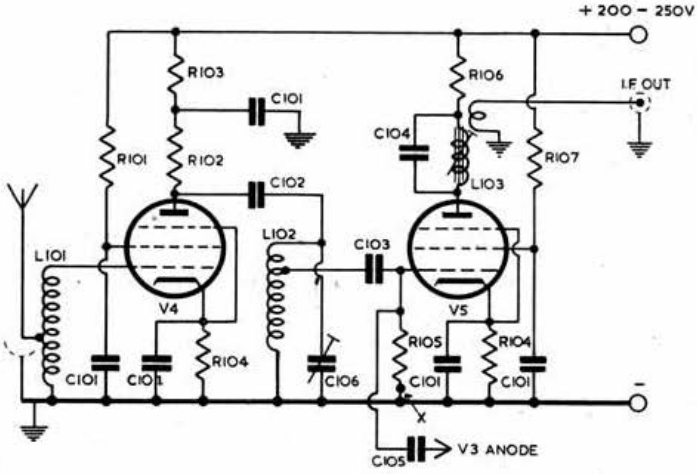


Fig. 2.

Circuit diagram of the r.f. stage and mixer of the 145 Mc/s crystal-controlled converter. This is used in conjunction with the 3-valve crystal multiplier shown in Fig. 1, and is connected to V3 anode *via* C105 as shown, V3 producing local oscillator volts at the i.f. away.

When V1, V2 and V3 are used as a crystal multiplier for a converter the three tank circuits will operate at slightly lower frequencies than those shown in Fig. 1, namely:

Crystal 7.4 Mc/s.
L.1 22.2 Mc/s.
L.2 66.6 Mc/s.
L.3 133.2 Mc/s (which is the fixed local oscillator frequency).

Notes (1).—In this service L3 should be "single ended," not balanced as in Fig. 1.

" *(2).*—The component values shown in Fig. 1 will normally apply for the lower frequencies tabulated above.

" *(3).*—Measure drive to mixer by inserting microammeter at point X.

TABLE OF VALUES: Fig. 2

C101	500 $\mu\mu$F by-pass
C102	47 $\mu\mu$F r.f. coupling
C103	15 $\mu\mu$F grid condenser
C104	30 $\mu\mu$F i.f.t. padder (if needed)
C105	3.3 $\mu\mu$F oscillator coupling
C106	3–30 $\mu\mu$F Philips Trimmer.
R101	10,000 ohms screen decoupling
R102	5,000 ohms anode load (or can be r.f. choke).
R103	10,000 ohms anode decoupling
R104	220 ohms cathode bias
R105	10,000 ohms grid-leak
R106	5,000 ohms anode decoupling (or can be r.f. choke)
R107	470,000 ohms screen decoupling
L101	3 turns 18 s.w.g. $\frac{1}{2}$in outside diameter tapped 1 turn up.
L102	3 turns 18 s.w.g. $\frac{1}{2}$in outside diameter tapped 1 turn down.
L103	15 turns 24 s.w.g. on $\frac{1}{2}$in former with iron-dust adjustable core.
Valves	Mazda 6F12

Note.—The above references are numbered 100 upwards to avoid confusion with the circuit references in Fig. 1.

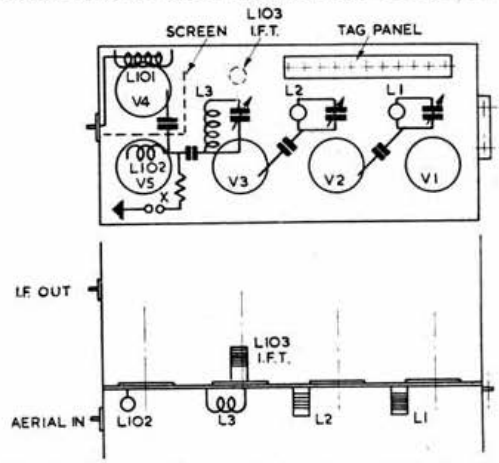


Fig. 3.—Suggested layout for the "Sure Fire" converter, showing under-chassis and side-chassis view. Point X can take the form of two tags to which a microammeter is connected when the mixer is being peaked. Afterwards they are soldered together. The aluminium screen between V4 and V5 assists towards stability. The crystal holder is at the right-hand end, and the Pye plugs for aerial and i.f. connections at the left.

It is, of course, possible to select an i.f. that tunes "4-5-6" to represent the 144-145-146 Mc/s points in the band. If, for instance, the receiver were tuned between 14 and 16 Mc/s then the fixed local oscillator frequency would have to be

(Continued on page 242.)

By G. C. BAGLEY (G3FHL)*

Reducing Heterodyne Interference

A survey of the problems of heterodyne interference, with particular reference to single-sideband operation.

IN order to demodulate an amplitude-modulated signal, whether it has one sideband or two, it is necessary that a certain proportion of the carrier should be present at the detector stage of the receiver. In the case of a conventional double-sideband amplitude modulated transmission, the carrier is supplied by the transmitter, being radiated along with the sidebands; but in the case of a single-sideband signal, one sideband and most of the carrier have been suppressed, so that it becomes necessary to replace the carrier before detection.

There are two ways in which this can be accomplished. One is to filter-out the residual carrier from the received signal, amplify it separately, then put it back "reconditioned" at the detector. This is, however, a rather complicated system, and for amateur requirements, the second method is much simpler—namely, to reinsert the carrier with the aid of a local oscillator (usually the b.f.o.).

The carrier is necessary for intelligible detection of a moduiated signal, because it is, in beating with the carrier, that the sidebands produce the equivalent audio-frequencies. It follows that if any other carrier or adjacent frequency is present at the detector, it will also beat with the carrier of the wanted signal (whether radiated or reinserted), and a heterodyne whistle will result.

Double-Sideband Signal

Having seen why heterodynes are audible, it is now necessary to consider ways in which this form of interference may be reduced on both normal double-sideband (d.s.b. or type A3) and single-sideband (s.s.b. or type A3a) transmissions, and how an ordinary receiver may be used to provide single-sideband reception. It is assumed that the receiver is of good design, with adequate selectivity, and has a variable b.f.o. "pitch" control.

A conventional A3 signal, having a carrier frequency of 3707 kc/s. with an upper sideband extending to 3710 kc/s. and a lower sideband to 3704 kc/c. is illustrated in Fig. 1a.[1] In order to receive this signal satisfactorily, a receiver with a response characteristic similar to that shown in Fig. 1b is desirable; such a curve would effectively reduce interference from any station radiation higher than 3710 kc/s., or lower than 3704 kc/s. The steeper the sides of the response curve, the better.

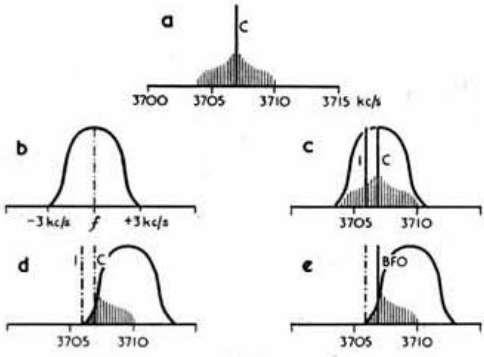


Fig. 1.

Reception of amplitude-modulated double-sideband signal. (a) The signal and sidebands; (b) response curve of receiver; (c) signal correctly tuned; (d) receiver detuned to attenuate interference; (e) single-sideband reception of A3 signal with re-inserted carrier.

In Fig. 1c, the station is shown correctly tuned-in, but a strong interfering carrier "I" has appeared on approximately 3706.2 kc/s., producing a loud 800 c/s. heterodyne whistle. In addition, some distortion of the wanted signal will now occur, because the sidebands will demodulate against the stronger of the two carriers, so that the modulation becomes "garbled."

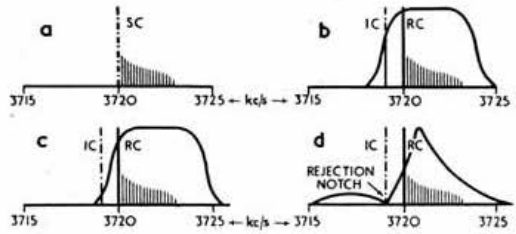


Fig. 2.

Reception of amplitude-modulated single-sideband suppressed-carrier signal. (a) The signal, consisting of upper sideband only; (b) signal correctly tuned-in, with carrier re-inserted; (c) receiver detuned to attenuate interfering carrier; (d) attenuation of interfering carrier by rejection-notch of a crystal gate filter.

In Fig. 1d, the receiver has been retuned to a frequency of 3710 kc/s., thus using the edge of the pass-band (or response curve) to attenuate the interfering carrier. Unfortunately, the wanted carrier is also attenuated, and this will impair detection of the incoming signal. The solution is simple: with the a.v.c. switched off, r.f. gain low, and a.f. gain at maximum, the b.f.o. should be switched on, and the pitch adjusted to and fro until a zero beat is obtained with the carrier of the wanted signal—the latter then being fully readable, as indicated in Fig 1e. In this way, the r.f. output of the b.f.o. is being used to augment the weakened carrier, and restore reception to normal, at the same time enabling a great reduction in the heterodyne interference to be effected.

Single-Sideband Reception

A single-sideband suppressed-carrier (s.s.s.c.) signal, with its (suppressed) carrier on a frequency of 3720 kc/s. and using the upper sideband, is shown in Fig. 2a. The dotted line "S.C." indicates the suppressed carrier.[2] Fig. 2b shows the signal correctly tuned-in, with the b.f.o. reinserting the carrier as previously described (the reinserted carrier being labelled "R.C."). Again an interfering carrier "I.C." is received at a frequency some 800 c/s. lower than that of the wanted signal. By retuning the receiver (Fig. 2c), the interfering carrier can be greatly attenuated, but

* *34 Wharfage, Ironbridge, Shropshire.*

in this case the setting of the b.f.o. will need to be readjusted in order to preserve intelligibility, since the alteration of the receiver tuning changed the modulation beat frequencies with the reinserted carrier from the b.f.o., causing the incoming speech to sound deep and guttural.(3)

If a BC.221 frequency meter or similar instrument is available, the carrier may be reinserted at the aerial of the receiver, thus rendering the use of the b.f.o. unnecessary, and enabling the operator to adjust the main tuning without also having to change the frequency of the reinserted carrier. Fig. 2d shows how the rejection notch of the crystal-gate filter (if fitted) may be used to reduce an interfering carrier under these conditions.

The above procedure only covers the case of an interfering carrier falling in the lower (unwanted) sideband; but what if it should fall in the upper sideband? The A3 enthusiast will undoubtedly point out that he has a choice of sidebands, whereas the A3a operator has not. The answer is that if the transmitter is of the phase-shift type, or of the filter type (having a filter for each sideband), then the operator might be asked to switch over to lower-sideband, assuming this contains less interference. If this is not possible, then the transmitting operator might do well to zero his (suppressed) carrier on the interfering one, so that a zero beat is obtained with the reinserted carrier in the receiver. An alternative, for stations suitably equipped, is the "Selectoject,"(4) which will reject one audio note in the a.f. stages of the receiver.

Conclusion

Until the operator has mastered the above technique, he will probably not be getting the best out of his receiver on our crowded bands. When several strong carriers arrive together at the detector, additive mixing occurs,(5) the signals being demodulated against the strongest carrier present. A reinserted carrier of the correct frequency will make the desired signal stand out clearly and intelligibly.

Finally, it is worth remembering that a heterodyne heard when receiving s.s.s.c. would be 9 db. worse on normal A3!

References

(1) How to visualise a 'Phone Signal, *QST*, July, 1950.

(2) Tuning and Checking S.S.B. Signals, *QST*, October, 1950.

(3) Reception of Amateur S.S.B. Telephony, *Short-Wave Magazine*, August, 1951.

(4) The "Selectoject," *QST*, November, 1949, May, 1951.

(5) The Synchrodyne, *Wireless World*, August, 1948.

Acknowledgment

The author wishes to thank Mr. H. F. Knott, G3CU, for his assistance in the preparation of this article.

Television Society

THE Annual Exhibition of the Television Society will be held on January 23 and 24, 1953, on the premises of The Edison Swan Electric Company, Ltd., 155 Charing Cross Road, W.C.2. The Exhibition will be open at the following times: January 23, 6 p.m.-9.30 p.m., members and friends; January 24, 10.30 a.m.-6 p.m., members. Public admission will be by invitation card.

All exhibits will be closely related to Television engineering or production or to the production of Television programmes. Tickets of admission may be had from Society members and Patron members or from G. T. Clack, 43 Mandeville House, Worsopp Drive, London, S.W.4.

CQ Single Sideband

By H. F. Knott (G3CU)*

THOSE who were fortunate enough to attend the recent R.S.G.B. Amateur Radio Exhibition, and who viewed the equipment shown on the s.s.b. stand, will have realised the great advances made recently in this field of Amateur Radio communication and in particular the research that has gone into simplifying the construction of equipment.

Amongst the exhibits, and the one which attracted most attention, was the "S.S.B. Jr." This transmitter (designed by D. Norgaard, W2KUJ, of G.E.) contains only three valves and four crystal diodes and is capable of 5 watts peak power output with an unwanted sideband attenuation of 39 db. As with all phase-shift exciters, the "heart" of the circuit is the 90° audio network. The arrangement comprises four close-tolerance (1%) resistors and four (1%) capacitors. It is hoped that these components will shortly become available in the U.K. at reasonable prices. The complete transmitter, built on a chassis measuring 9 in. x 9 in. x 2½ in., compares favourably with the writer's original exciter (also exhibited) built about four years ago, which contains 13 valves.

Activity

Since the last report appeared, seven new s.s.b. stations have come on the air in Europe, including HB9HF and G3GKA (Letchworth), who is using a crystal filter. His transmitter includes speech clipping before the balanced modulator, but there is some doubt whether or not this is really necessary for s.s.b. operation. The filter is followed by a balanced mixer and a 6AG7 Class A buffer. Recently a pair of 807s in Class AB2 were added to increase the power. Another newcomer, G3FPL, is using a W1JEO crystal filter in his transmitter. Being a regular 'phone man, we hope he will encourage some of his friends to give s.s.b. a trial. G3IMW (Harrow) is using a phase-shift rig which includes the same network as the "S.S.B. Jr." This obviates the use of complicated test gear, as the final alignment may be carried out by the use of a simple oscilloscope or a selective receiver. He uses p.p. LS50s at 50 watts in his p.a. GM3BEA is the second Scottish amateur to become active on s.s.b. and has worked most of the 80-metre enthusiasts. G3ESV (Wigan) is using a Weaver-Brown lattice filter in the region of 450 kc/s. G3AYT (Birmingham), brother of G3FDG, has completed his W2UNJ exciter and is finishing his amplifiers. G3IFT (Donnington), using the "S.S.B. Jr.," crystal controlled on 3798 kc/s, with a peak input of about 1 watt, has had local contacts with good reports, and has worked G3BQQ. G2IG (Orpington) has had two-way contacts with more than 24 different U.S.A. s.s.b. stations, apart from the DX previously reported. W2ALJ worked G2IG and G2ALN recently for the first three-way trans-Atlantic s.s.b. QSO involving two G stations in the one contact.

Tit-bits

G3FDG suggests that by using a 6SA7 in place of the EF50 in the mixer circuit of the G2NX type exciter, a substantial increase in drive for the following stages becomes available.

G2IG recommends the use of a long persistence c.r.t. for monitoring short duration peaks of modulation.

G3FHL finds that when using a 6SN7 in place of the 12AT7 in the "S.S.B. Jr." greater gain ahead of the phase-shift network is needed. He suggests a 6SJ7-6V6 combination.

* *31 Batchwood Green, St. Paul's Cray, Orpington, Kent.*

Simple Two Metre Power Amplifier

By J. HUNTER (GM6ZV)*

This power amplifier—designed to operate with the 144 Mc/s exciter described in the October, 1951, issue of the Bulletin—should appeal to members who desire to get going on that band with simple equipment.

THE amplifier is capable of handling input powers up to 30 watts, or, with a small adjustment to the mounting of the anode tuning assembly, up to 100 watts. The choice of suitable valves is limited, the most popular available types being the 832 for the lower input, and the 829B for the higher. The circuit is straightforward, using tuned grid and tuned anode, with neutralisation as a precaution against instability.

Construction

The chassis is made of sheet aluminium and measures 10 in. by 8 in. by 2½ in. The layout of the circuit (Fig. 1) is largely determined by the anode tuning assembly (*Eddystone* type 709) due to the space required to accommodate the hairpin inductance. It was decided to mount the p.a.

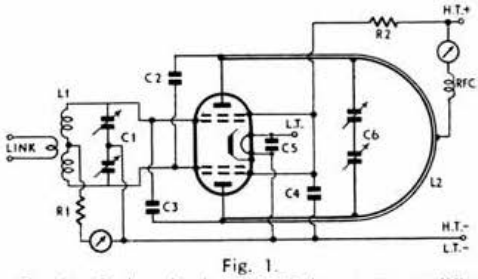


Fig. 1.
Circuit of the simple 144 Mc/s power amplifier.

C1 15+15$\mu\mu$F split stator (Eddystone).
C2, 3 Neutralising condensers (see text).
C4 500$\mu\mu$F ceramic.
C5 500$\mu\mu$F small mica.
C6 Split stator (Eddystone Cat. No. 709).
R1 22,000 ohms, 1 W.
R2 22,000 ohms, 10 W.
RFC R.F. choke (Ohmite Z-0).
L1 2+2 turns of 14 s.w.g. wire, diam. ½", spaced ½" between sections.
L2 Anode tuning assembly (Eddystone Cat. No. 709).

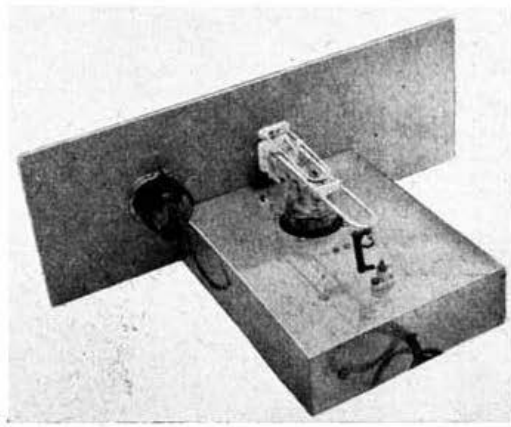
valve vertically through the chassis in order to obtain short leads and maximum isolation of the grid and anode circuits. The valveholder and mounting were obtained from an SCR522 transmitter. Other components which require mounting are the two tuning condensers, the neutralising condensers, a tag strip, and two insulated pillars to hold the coupling link. Drilling centres are shown in the layout diagram (Fig. 2).

The anode tuning assembly bracket is insulated from the chassis by means of small pieces of polystyrene, the rotor of the condenser being left floating (*i.e.* not earthed) as this was found to give the best results. The grid condenser is mounted on the side of the chassis, the rotor being thus earthed.

The neutralising arrangements comprise two lengths of No. 14 s.w.g. connected direct to the grid tags on the valve-holder, crossed over, and taken through the chassis *via* small *Eddystone* stand-off insulators from which the terminals have been removed. Short lengths of sleeving are slipped over the wire to prevent vibration where it passes through the insulators.

Two insulated pillars are used to act as

* *20 Mansefield Crescent, Clarkston, Renfrew.*



Top view of chassis from rear, showing top of 832 valve, anode lines anode tuning condenser, and grid-current milliammeter.

terminals for the link coupling loop and link line, while a small stand-off insulator on top of the chassis acts as a feed-through connector for the h.t. positive lead and as a mounting for the r.f. choke. The grid coil is soldered direct to the grid tags on the valve-holder. The general appearance of the completed unit is shown in the accompanying photographs.

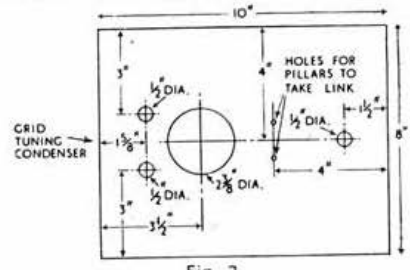


Fig. 2.
Mechanical layout drawing of p.a. chassis.

Operation

With a 6.3V supply connected to the heater leads, the link should be coupled to the exciter. The coupling link coil can consist of two turns of No. 18 or 20 s.w.g. having the same diameter as the grid coil, and enclosed in sleeving to prevent the possibility of a short-circuit. For the link itself, any available 75 or 300-ohm line or coaxial cable† may be used—though the writer prefers 75-ohm twin feeder.

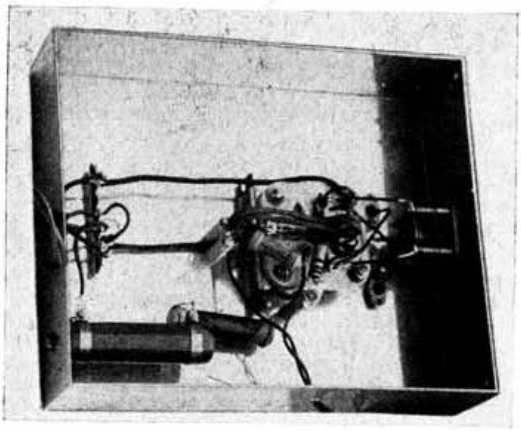
To provide an indication of grid current, a low-range milliammeter (0-5 mA or 0-10 mA) should be connected in the grid return lead. The exciter can now be switched on. If all is in order, the grid condenser of the p.a. should be rotated until grid current appears. The anode circuit of the

† *If 300-ohm line is used, the size of the link coupling loops may need to be altered to match the feeder impedance, though the author did not find this was necessary.*

144 Mc/s stage of the exciter may require some adjustment in order to obtain maximum drive.

If, when the anode tuning condenser of the p.a. is rotated, a dip appears in the grid current meter, adjustment of the neutralising condensers is necessary. The two wires protruding through the chassis should be bent away from the valve by an equal amount. The anode tuning condenser is rotated again, and the dip should now be less; it can be reduced still further by shortening the neutralising wires until tuning the anode circuit produces no change—or at the most a mere flicker—in the grid current. The p.a. is now adequately neutralised, and h.t. can be applied. A practical point of tuning is that with an 832 valve the anode lines are normally used at full length, but a valve having a greater output capacitance may require a shorter length.

Initially, h.t. should only be switched-on for as long as is necessary to tune the anode circuit to resonance, since the valve may be damaged if operated without a suitable load. Grid current should be restricted to about 3 mA; if it exceeds



The underside of the chassis, showing the grid circuit wiring and components.

this value, then the drive should be reduced. The transmitter is best keyed in the screen circuit, for —as no fixed bias is used—other methods may damage the valve (though, if desired, fixed bias may easily be derived from a battery or power pack).

The form of aerial coupling employed will depend on the type of feeder in use, and on whether it is intended to use the original aerial coupling loop mounted as supplied, or mounted separately. At GM6ZV it was found impossible to obtain sufficient coupling with 75-ohm twin lead and the original coupling loop. A short length (about 15 in.) of 300-ohm ribbon feeder in series, however, provided the necessary match. Under certain conditions it may be necessary to mount the loop separately in order to obtain sufficient coupling.

If an 829B valve is used in the p.a., the anode condenser mounting bracket should be raised on small pillars to increase the height of the anode condenser and anode lines above the chassis in order to allow enough clearance for the valve.

The Rig at GM6ZV

A few notes on the equipment in use at GM6ZV may prove of interest. On a small rack are mounted the exciter and p.a. for 144 Mc/s operation, and a unit to provide output on 430 Mc/s, the latter being a modification of the tripler described in the December, 1951, issue of the BULLETIN. As it was desired to use only a single 200V power pack for the exciter (which provided ample drive to the 144 Mc/s 832 p.a. but insufficient for the 832 430 Mc/s tripler), it was decided to modify the 430 Mc/s unit by adding a separate 144 Mc/s p.a. (with standard coil and condenser tuning) as a driver. While this may be considered an unnecessary luxury, the improved convenience in operating makes it worth while. A ceramic switch included in the 75-ohm twin feeder enables the drive to be applied to either the 144 Mc/s p.a. or the 144 Mc/s driver for 430 Mc/s, so that both channels are available at a moment's notice. The 144 Mc/s and 430 Mc/s aerials are permanently connected. Modulation can be quickly changed over by means of a system of plugs and sockets.

The rig has been in use for several months, and has given satisfactory results with a high degree of operating convenience.

THE STORY OF THE TT2 (Continued from page 238.)

130 Mc/s, produced by a crystal on 7.222 Mc/s. This sounds all very nice and fine—until the perceptive reader observes that this crystal produces a very nasty second harmonic on 14.444 Mc/s, right in the middle of the 14-16 Mc/s band it was desired to tune!

Moral: Select converter crystals with great care to avoid "birdies."

Mechanical Layout

Deliberately, no precise constructional data have been given for the "Sure Fire" converter. It is felt that the great majority of newcomers to "Two" will prefer to use what materials they have to hand when building it. However, the skeleton of a layout which places components in logical circuit diagram order is shown in Fig. 3.

Sometimes an existing chassis with Octal or B9G socket holes in it will be adapted for the converter, and if in such case it is desired to use B7G miniature valves the oversize holes can be blanked out with a circular aluminium disc which is then cut to accommodate the smaller size of socket.

What To Expect

It is quite impossible to predict the results the constructor may expect to get from a modest converter such as this. Much depends on location, local screening, type of aerial, and of course external noise level. In general, the user will find that the quasi-optical range characteristic of v.h.f. will prevail, where simple equipment and aerial are used. The exceptional results achieved by our leading v.h.f. stations in regularly covering hundreds of miles under average conditions will hardly be repeated by the newcomer to "Two" until a great deal of experience has been obtained with better equipment than that described herein. After all, given the necessary increase in aerial and receiver gain the Atlantic itself might be spanned one of these days. . . .

But that is many steps ahead. For the present it is "First Steps on Two"—and may many readers of this article be successful in making them!

LONDON MEMBERS' LUNCHEON CLUB

will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road.

At 12.30 p.m. on December 19, 1952.

Visiting amateurs especially welcome.
Telephone table reservations to HOL 7373 prior to day of luncheon.

Bandspread on the R107

By O. C. WELLS, (G3FXE).*

THE R.107[1], although quite useful as a general purpose receiver for amateur use, has several serious disadvantages, the most obvious being lack of bandspread. Probably the simplest solution (short of actually replacing the slow-motion drive) is to fit an extra scale to the slow-motion tuning knob; this provides adequate bandspread without altering the receiver calibration, and is equally useful on all bands.

The additional scale cannot be calibrated directly in frequency, since the amount of spread differs on each band. It should be marked off at 5-degree intervals (or even degree intervals if desired, though this is unnecessarily fine). Scale reading should increase in a clockwise direction. A vernier scale is unnecessary.

Modification

After removing the slow-motion tuning knob, the bandspread scale (which should be about 2½-in. in diameter) may be fitted in the manner of a skirt, using the three 6 B.A. tapped holes already present. It will be found that the knob cannot be replaced, since, due to the fact that the centre knob was originally recessed into the outer (annular) tuning control and is now displaced by the bandspread scale, the driving shaft is too short to be engaged by the grub screw.

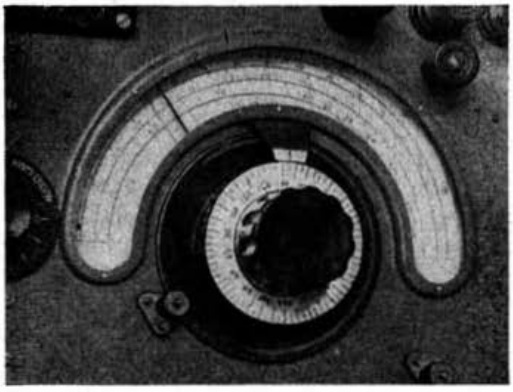


Fig. 1.
Photograph of the modified receiver, showing the bandspread scale in position.

This difficulty may be overcome either by removing about ¼-in. from the back of the knob on a lathe, or by soldering a brass collar to the back of the scale so that the original fixing screws are no longer required. To ensure that the collar is accurately centred, a length of ¼-in. diameter rod should be inserted in the collar and knob during soldering. A slot must be cut in the outer knob so that a screwdriver can be inserted to tighten the fixing screw in the collar which, being mounted behind the scale, is otherwise inaccessible.

The cursor

The cursor, made from sheet brass, is bolted to the front panel at a point behind the skirt of the outer knob, which is thus left free to rotate. The hair-line should coincide with the highest point (or "top dead centre") of the scale (Fig. 1). The shape and measurements are given in Fig. 2. Two fixing holes are drilled to clear 6 B.A., the hairline AB is scored and stained, and the edge is carefully filed to fit the rim of the scale. After cutting out, the plate is bent as indicated, and is then ready for fitting to the receiver.

Before drilling the fixing holes in the front panel of the receiver, the r.f. unit must first be removed by disconnecting the wires from the three aerial terminals, removing the dial lights and knobs, disconnecting the wires at the back (including the r.f. lead); and finally removing the four fixing screws. After drilling, the cursor can be bolted in position, and the receiver reassembled.

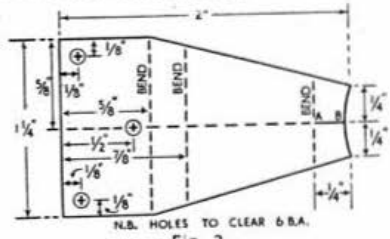


Fig. 2.
Diagram of cursor, showing dimensions and method of construction.

Although there is slight backlash in the tuning drive, the modification greatly facilitates the location of weak stations. As an indication of the degree of bandspread obtained, the c.w. part of the 20-metre band now occupies about three-quarters of a revolution—a scale length of almost 6 inches—enabling a single figure to be used for reference with no possible ambiguity. Other bands are, however, too wide, and two figures must be recorded (*viz.* the scale reading and the reading on the main tuning dial).

Stabilising the 807

WHEN the usual resistor of about 50 ohms is placed between the screen and the screen dropping resistance and by-pass condenser, there is a serious effect on the anode/control grid isolation which may result in the valve oscillating at the operating frequency. Experiments have shown, however, that for maximum efficiency the anti-parasitic suppressor should be not more than 10 ohms, and, provided the usual anode and control grid stoppers are used in conjunction with complete screening of the input and output circuits, this value will permit the construction of a perfectly stable p.a. G3GPL.

Bright Idea

OLD discarded valve-holders may be used for anchor positions and terminal connecting points, provided they are raised from the chassis by pillars or washers. The tops of disused 90V-1½V combined h.t.-l.t. batteries can similarly be employed. B.R.S. 12480.

A reminder of summer. The Brighton "A" Station being erected during N.F.D.

* 7 Buckland Crescent, London, N.W.3.
(1) *Described in "Wireless World," August, 1945.*

Wrinkle Finishes for Radio Components*

BY far the most popular finish for radio chassis, panels and components, is what is properly termed "wrinkle enamel." One of the biggest advantages resulting from the use of textured finishes is that they cut down machining, since blemishes in the surface to which they are applied are masked by the nature of the dried enamel film. In addition, the inevitable dust in the atmosphere of an ordinary workshop, which would make itself all too apparent when an orthodox coating is applied, is of no consequence with a wrinkle finish which hides all but the very large specks.

Wrinkle enamels may be successfully applied to any material which will stand baking at a temperature of 220 degrees F. for 30-40 minutes, and so can be used on all metals and paper, hardboard and certain plastics such as bakelite, etc. Though a temperature of about 220 degrees F. is required, there is no necessity to work at such a low heat, and metal articles may be stoved at anything up to 300 degrees F. with correspondingly shortened time schedules.

By "Chemist"

The nature of the special synthetic resins used imparts excellent adhesion properties to the finish, and the minimum of pretreatment is required. On brass, copper or steel it is only necessary to remove grease and corrosion, but light alloy die castings (of Mazak or similar metals) must be thoroughly roughened with emery cloth, and should preferably be given a phosphate treatment such as boiling one per cent. Bonderite for 10-15 minutes. The best treatment for aluminium is anodising, but satisfactory results can be obtained by etching with warm five per cent. caustic soda solution for five minutes or even by roughening with emery cloth. Well-sized paper may be painted as bought, and so can tempered hardboard, but the softer untempered grades must be given a coat of sealer first.

Method of Application

The original wrinkle enamels were slow-curing materials which required excessively thick coats, with consequent difficulties of application and of "runs" during stoving, but of late years improvements in synthetic resin technique have produced foolproof finishes which wrinkle satisfactorily with normal coats. Since the size and pattern of the wrinkle produced are, however, largely a function of film thickness, it is apparent that special care is necessary so as to ensure an even coating.

Though brush application will give reasonably good results on small flat panels and similar surfaces, there is no doubt that spraying produces much more even patterns and, in addition, more easily reproducible ones. When a number of items in an assembly are being treated, reproducibility is obviously of very considerable importance from the point of view of final appearance. When spraying wrinkle enamels they should be used at as high a viscosity as possible with the equipment available, since this allows a full even coat to be applied with the minimum of passes. Slight "orange peel" effects in the freshly sprayed film are of no consequence, since they will flow out during stoving. The best results will be obtained with air pressure of not less than 50 lb. per square inch and a consistency which would normally be regarded as "brushing," but low-pressure spray equipment is satisfactory providing two or more coats are applied "wet on wet," allowing 5-10 minutes between coats for preliminary setting to take place. The viscosity will obviously have to be very much lower than at the higher air pressure. Any good synthetic enamel thinner or duco thinners should prove a satisfactory dilutant.

Stoving and Baking

It is advisable to allow the articles to air dry for at least 10 minutes before entering the oven, but this waiting period should not be extended much beyond 45 minutes. Stoving may be carried out in any form of oven provided there is a reasonable amount of ventilation. Certain types of domestic ovens, however, do not have ventilators, and when using these the door should be left ajar or alternatively, the number of articles to be stoved at one time should be limited so as to ensure that there is sufficient oxygen present to allow rapid skin drying to take place before the rest of the film has hardened. It is this surface setting within a few minutes of entering the oven which gives a satisfactory wrinkled appearance to the stove film.

Infra-red baking gives excellent results with wrinkle enamel, but care should be taken not to increase the rate of heat input to such a point that complete curing of the film takes place before there has been time for the development of the pattern. As with all applications of infra-red radiation, the fact that the radiant heat waves travel in straight lines like light must be borne in mind when deciding on the contour of the heating bank. Intricate shapes, parts of which tend to cast shadows upon other parts, call for very careful placing of the lamps.

The terms "crackle lacquer" or "crackle enamel" are often incorrectly applied to wrinkle finishes. They should properly be used to describe that type of finish which resembles Morocco leather, i.e., relatively large smooth areas separated by narrow indented veins which may or may not be of a different colour. Such finishes are produced by spraying a quick-drying and somewhat brittle paint over a relatively soft undercoat which has not had time to do more than become surface dry. During the subsequent hardening the top coat "pulls" the under-coat and cracks irregularly in the process. When the system is thoroughly dry it is best to overspray with a coat of clear protective varnish. Such finishes can be produced in nitrocellulose lacquers or stoving enamels, but they are, unlike wrinkle enamels, necessarily two- or three-coat systems.

** (Reprinted from the December, 1951, issue of Radio ZS, official organ of the South African Radio League.)*

R.S.G.B. Sixth Annual

AMATEUR RADIO EXHIBITION, 1952

In this article a provincial member describes the scene on the opening day of the Sixth Annual R.S.G.B. Amateur Radio Exhibition. With the passing of the years this event has now assumed the role filled in pre-war years by Convention. The same happy spirit that prevailed at Pinoli's and the Florence from 1926 to 1938 is now in evidence at the Royal.

AMID the gloom and chill winds of Wednesday, November 26, 1952, the Royal Hotel, Woburn Place, London, W.C.1—focal point of the thoughts of many old timers and newcomers to Amateur Radio alike—was again a shining light in the annals of the R.S.G.B. For four days, until Saturday, November 29, the Sixth Annual Amateur Radio Exhibition, organised by the Society, displayed the scientific skill and achievements, both of its own members and of sections of the British radio industry and Government departments who recognise and support its objects. There was again emphasis on amateur-constructed equipment, the highlights this year being a fully equipped Amateur Radio station—operating under the special call sign allocated to the Society, GB3RS—and a television studio with associated equipment, relaying pictures over a 70 cm radio link, arranged by the British Amateur Television Club.

Col. Sir Ian Fraser, C.B.E., M.P., speaking at the opening of the Exhibition. Also in the picture, from left to right, Horace Freeman (Exhibition Manager), Leslie Cooper, G5LC (President-Elect), Arthur Milne, G2MI (Hon. Secretary), Frederick Charman, G6CJ (President) and John Clarricoats, G6CL (General Secretary).

The value of the exhibition as a venue for personal contact, with enthusiasts skilled in the requisite knowledge, is now recognised by the signals and radio branches of the three Services. This year, in addition to the elaborate setting of the many types of Royal Air Force equipment, a comprehensive display was exhibited by the Army, who were making their first appearance at the Exhibition.

Opening Ceremony

The Exhibition was officially opened by Col. Sir Ian Fraser, C.B.E., M.P., who was welcomed on behalf of the Society, and before a large gathering of distinguished guests, by the President, Mr. F. Charman, B.E.M. (G6CJ).

Himself formerly an active amateur (G5SU) and President of the Society in 1928, Sir Ian displayed the typical propensity of the keen "ham" to criticise the equipment of another's shack when he good-humouredly complained of "lack of top" in the microphone before him. "I am not sure that I am going to use it," he said—and promptly didn't! He referred to the honour conferred upon the Society by the acceptance, by his Royal Highness, the Duke of Edinburgh, K.G., of the office of Patron. Sir Ian spoke of the valuable work done by the Society since it was founded in 1913 and to the fact that the present membership now exceeds 11,000. "That figure," said Sir Ian, "represents a strong and vigorous amateur movement which, properly guided and given proper facilities, can do a great deal towards helping forward the art and science of radio."

He was particularly glad that there were a considerable number of young people among the membership and he urged the Council to give them full encouragement. He well remembered that many who were only schoolboys in the early days of radio later led the way to great developments and had taken up important posts in the industry throughout the world.

It is possible that Sir Ian—who lost his sight during the First World War—did not know that the stand occupied by the Radio Branch of the G.P.O. was close by, but there was the suspicion of a smile when he commented: "I remember how, in those early days, we used to quarrel with the Post Office, which was as old-fashioned as Post Offices generally are, about allowing us to experiment." Executive members of the Engineering Branch listening to his words joined in the laughter that followed his "dig," especially when he added: "They did not believe that when we said '73, Old Man,' it really meant something!"

Referring to the recent approval in principle by the Government of the development of "free" television, he said he thought they ought to be told why this development was not making further progress. He recalled the beginnings of the British—especially the Empire—broadcasting services and the efforts waged in the House of Commons to obtain them; his reference to the activities in those days of Gerald Marcuse "with his 10-watt station" brought further laughter. In conclusion, Sir Ian commended the work of the Amateur Radio movement to all who came as visitors and hoped that it would flourish and go on from strength to strength.

The Honorary Secretary, Mr. A. O. Milne (G2MI), on behalf of the Council, thanked Sir Ian for opening the Exhibition. "I think it is very true—and it has been shown to us here this morning," he said, "that once a ham, always a ham. Sir Ian referred to '*our* Exhibition'—not to

'*this* Exhibition.'" He added that they were especially honoured to have Sir Ian with them, for he was a very busy man with interests far and wide.

The Luncheon

Following the opening ceremony, the President and Council entertained a number of distinguished guests and representatives of the radio industry at luncheon. Among those present were:

At the AVO stand Sir Ian Fraser was shown an example of a special test meter designed for sightless amateurs.

Sir Noel Ashbridge (former Director General of Engineering, B.B.C.), Brigadier Eric Cole (C.S.O., Southern Command), Air Vice-Marshal R. G. Hart (Director General of Engineering, Air Ministry), Charles Ian Orr-Ewing, M.P. (Parliamentary Private Secretary to the Minister of Labour and National Service), H. Faulkner (Deputy Engineer - in - Chief, G.P.O.), A. H. Mumford and J. Reading (Assistant Engineers in Chief, G.P.O.), Dr. R. L. Smith-Rose (Director of Radio Research, D.S.I.R.), Hugh Pocock, Dr. Eric Megaw (Chairman, Radio Section, I.E.E.), John Hytch and Philip Slessor (B.B.C.), Gerald Marcuse, A. D. Gay, E. L. Gardiner, S. K. Lewer, V. M. Desmond (Past Presidents), Réne Klein, Alec Watson, J. W. Mathews and D. N. Corfield (Vice-Presidents).

The Toasts

Mr. Orr-Ewing, in proposing a toast to "The Society," said how refreshing it was to find such an intense enthusiasm as must exist in an amateur movement of this kind to have 11,000 members. "It is not the 'couldn't care less' spirit, but the 'let's have a try'—'let's help each other' of the true enthusiast," he said.

There was laughter at his oblique reference to late sittings in the House of Commons when he said that the "training of long hours in the shack" had probably been a very good basis for training him for "long hours in another place"—and spontaneous applause showed the sincerity of the endorsement of his tribute to "the women-folk of the movement who never know when we are going to come out of the shack." (He added as an afterthought—". . . or home from the House of Commons!")

Mr. Orr-Ewing spoke of how he joined the R.S.G.B.—"Clarry inveigled me in"—and how, whenever he found amateurs they were always only too willing to help him, which was typical of the spirit of friendliness to be found in the movement. He thought the Society had a great future, but felt is was a pity the Services had not dipped into its pool of enthusiasm more thoroughly. Of the increasing facets of the hobby of radio, he referred to the development of v.h.f. techniques and paid particular tribute to those who are pioneering Amateur Television. "It surely shows guts," he said, "to make up amateur equipment, with all the complexity that television needs; it surely shows some achievement that with very small power you can send television signals over distances of several miles." Mr. Orr-Ewing appealed to the industry to take all possible steps to give a helping hand to the television-minded amateur by making camera tubes available at low prices—"a good investment for the future."

The President, Mr. F. Charman, B.E.M. (G6CJ), in his reply, said how proud the Society was to be accorded Royal patronage and read a letter from the Private Secretary to the Duke of Edinburgh in which regret was expressed that the Duke's impending trip to Malta would prevent him from visiting the Exhibition. "But I am sure," concluded the writer, "he will be very happy to consider a similar invitation another year."

Mr. Charman paid tribute to the pioneers of the amateur movement, and referred to the fact that next year the Society would be celebrating its 40th birthday. In 1926 the present Articles of Association were drawn up and it was significant of the care with which that had been done that only today had it proved necessary to modify them. The original objects of the Society, however, would remain unchanged. "If we can continue to carry them out I am sure the Society will remain a valuable component in the complicated structure of the world in which we live," he said.

The Radio Industry

A toast to "The Radio Industry" was proposed by the President-Elect, Mr. Leslie Cooper (G5LC).

Sir Ian Fraser with Dr. Smith-Rose, Sir Noel Ashbridge, and Charles Ian Orr-Ewing at the Reception.

who also welcomed representatives of the Army, Air Force and Post Office. He hoped the Exhibition would serve the purpose not only of displaying equipment of particular interest to the amateur, but also of allowing the manufacturers to meet the amateurs and to discuss with them their problems. Of the support the Society received from the industry, he said that BULLETIN advertising revenue was now running higher than it ever had done in the annals of the Society.

Captain H. de A. Donisthorpe (General Electric Company), responding, said that if it had not been for the Wireless Society of London—forerunner of the R.S.G.B.—the radio industry might not have started so early. He recalled that it was through a petition sent by the Society to the Postmaster-General in 1922 that a regular broadcast service was inaugurated. It was due to the early efforts of such people as Capt. P. P. Eckersley, the late Leslie McMichael and Sir Noel Ashbridge that the present British broadcasting service is second to none in the world. Captain Donisthorpe recalled that the first Patron of the R.S.G.B. was the Prince of Wales, and that Sir Oliver Lodge and Senatore Marconi were but two of the many distinguished men of science associated with the Society in the early days.

As suggestions for the future he thought it might be a good idea for representatives of the radio industry to serve on the Council and for the Exhibition to be advertised in the national Press. He gave an assurance that the industry would continue to co-operate with the amateur movement to the best of its ability.

Sir Noel Ashbridge responded on behalf of the Society's guests at the informal luncheon which followed the opening of the Exhibition. From left to right, Brigadier Eric Cole (G2EC), Charles Ian Orr-Ewing, the President, and Dr. R. L. Smith-Rose.

Sir Ian Fraser examining a miniature receiver on the Regular Army stand.

The Guests

The General Secretary (Mr. John Clarricoats, G6CL), proposing a toast to the guests, said how happy they were that Sir Ian Fraser had found time in a busy life to open the Exhibition. On behalf of all members he extended to Sir Ian a very warm welcome. Mr. Clarricoats spoke of the respective guests and their associations with Amateur Radio, both in the past and at the present time, and of the invaluable support and help they continued to give to the Society.

Sir Noel Ashbridge, in reply, congratulated all concerned with the organisation of the Exhibition. Speaking of the B.B.C. transmissions in the 7 Mc/s band, Sir Noel explained the difficulties of wavelength shortages and the problems of "jamming."

He concluded with a humorous reference to the early days. "It's a funny thing," he said, "but some 30 years ago I was very nearly an employee of your Society. At the time I was a member of the team running 2 Emma Toc at Writtle—the very first broadcasting station. The Marconi Company was paid to do the job by the Radio Society of Great Britain whose members, curiously enough, in those days *wanted* to hear broadcasting! Now, the *last* thing they want to hear is the B.B.C.!"

After the luncheon, guests accompanied the President on a tour of inspection of the Exhibition.

G3ERQ.

Mic. Shy!

Star B.B.C. Announcer, Philip Slessor, with P. W. Winsford (G4DC) at the Amateur Radio Station, GB3RS.

DX TOPICS
THE MONTH ON THE AIR

by A. O. Milne* G2MI

Notes and News

WE should like to begin these shorter than usual notes—due to poor conditions and lack of material—by drawing attention to two matters of general interest. First, transmitting members are asked to observe the provisions of the R.S.G.B. European Band Plan, with particular reference to the new 21 Mc/s band. Those who disregard the plan should be told about it and if they continue the practice their calls should be ignored. Second, we would ask those who use the R.S.G.B. QSL Bureau to take special care in despatching cards. It is quite extraordinary the way in which some members pack their cards in flimsy envelopes, stuffed to capacity. These merely break loose in the post and we have no guarantee that all the contents ever finally reach the Bureau through the Dead Letter Office. Some trouble is also being experienced with those who persist in understamping their packets of cards, necessitating the payment of excess postage by the Society. We appeal to members to use common sense when they send envelopes to the Bureau to see that they will hold an ordinary postcard at least! Something a bit bigger is better as it avoids folding cards.

DX Worked and Heard

B.R.S. 18017 of Coventry offers LB6XD on Jan Mayen Is., 14030, 2155; JY1AJ, 14040, 1815; CR5AD, 14050, 2150; MP4BBD, 14075, 1605; ZD2DCP, 14040, 2150; and ZS6ZU/P, on Marion Is., 14040, 1755. This looks like a chance for the T.V.I.-proof brigade! On 28 Mc/s, B.R.S. 7594 of Yeovil has heard a few VE and W signals between 1400 and 1900, the best DX being CR6BX, 28515, 1455; CR7IV, 28360, 1624 and VQ2DC, DT and HW. W2ECP/MM and W2PFL/MM (Wallace E. Pratt) off Florida and W3NED/MM on the "Marven" in the western Mediterranean have also been heard.

G5JL has heard VK1RG on 7045 kc/s at 1845 G.M.T. and believes G6ZO worked him. He says the "G5JZ" in G3AAT/OX's list last month should be G5JL. He heard plenty of W6s around 1500 on 7 Mc/s during the "*CQ*" Contest. W6AL was working Europeans. G3HKC states that W1LYV is looking for Gs every weekend from 0300-0700 G.M.T. on 1816 kc/s.

Bob Pybus (Manchester) says U.S.A. medium-wave b/c stations have been coming through well after 2230. On one night he identified 69 of them, some at over S9, including WMEX, WTOP, WLAM, WOKO and WCKY. We ourselves recently had trouble with the B.B.C. Light programme and discovered the QRM was due to a W! G3CHW worked MF2AG on 1834 kc/s at 0058 and was followed by G3ESY, who gave him 589. G5DQ, a welcome newcomer to this feature, wonders if he was the first G to work ZS7A on 21 Mc/s; time 1005, date October 19. On 3.5 Mc/s his best were ZD4AB, 0500, and VP9BF, 0605. Seven megs yielded VQ4DO, 2340; ZE3JP, 0025; W6AM, 1452; KL7PI, 1647; ZS9I, 1920; VK1PN, 1850 (Heard Is.); VK1RG, 1855 (Mcquarrie); VS6CG, 1650; AP2K, 1653; and CT3AA, 1857.

G2DPY found time from his F.O.C. secretarial duties to work ZS9I on 14, and was his first G on c.w. G2LA worked G3AAT/OX on 3539 at 2230 on November 13, receiving 549 with an input of 35 watts. 'AAT reported "All well" at 77N and 19W. 'LA was the expedition's first G on 3.5.

According to GM3DHD, ZC5VR is genuine. His full QTH is Vic. Randall, c/o B.B.T. Co. Ltd., Sandakan, British-North Borneo. He uses an 1154 and 1155. His pal is ZC5SF. Apparently the Borneo Post Office is under the impression that ZC5 is the correct prefix for the colony. We are sorry to contradict them, but it is VS4 and always has been. ZC5VR was worked by GM3DHD on 14180 at 1400. Other good ones were KC6QL, 1020, 14290; VQ8AL, 1730, 14280; VP5BF (Turks Is.), 2100, 14105; and VK1PN (Heard Is.), 1600, 14082.

Ian Davies (A1182) gives the QTH for MP4BBI as c/o I.A.L. Bahrein and says ZS9I can be reached c/o 46 Laurel Road, Durban 8. He comments on the generally poor conditions on all but the l.f. bands. GC2CNC, who has moved to a new site which is 350 ft. above sea level, has acquired a 40 ft. mast. He will be limiting his input to 2 watts on all bands and is going to try to show the high-power operators a thing or two.

Who's Who

LU2DAW (ex-VP8AD) reported during a 21 Mc/s QSO that he had QSL'd all his VP8 contacts. If anyone is still missing his card, they should write

The Amateur Radio Society of Perak was the first Malayan group to organise itself as a town, and later as a State, group after the war. This photograph features some of the leading members of the Society. From left to right: Tan bin Hussain, B.E.R.S.740 (Hon.Secretary), V. Rajloo, B.E.R.S.88, M. Ariffin, B.E.R.S.795, Mrs. Jones, K. E. Jones, VS2DG (President), Dr. G. Bloomfield, G2NR (who was on a visit), Koay Joo Hye (Hon. Treasurer). A Federation of Malaya Radio Society is in the process of formation.

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

to R. McLaren, Arenales 3232, Florida, Buenos Aires, Argentina, giving details and enclosing return postage. (In a more recent letter to headquarters Mr. McLaren states he is now LU5AAS.) MP4HBK is held by R. Barry, A.M.W.D., c/o R.A.F. Sharjah, via Bahrein, M.E.A.F. 24. Incoming cards are being received from him and outgoing ones may be sent *via* the R.S.G.B. G2ARI reports that ZL3KS and his wife will be visiting the U.K. during May and June next year and would like to meet as many Gs as possible.

In connection with the note last month about the VS7 visitors, VS7TC and VS7IC are the twin brothers. VS7MA is accompanying them and was at the Amateur Radio Exhibition with them, where they met VS7XG and ex-VS7PS (G3BGL).

Hong Kong

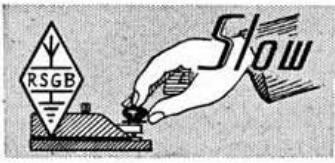
Ron Clegg, VS6CH, who has taken over the secretaryship of H.A.R.T.S. from VS6BA, says the VS6s hope to be active on 21 Mc/s. Ron is also the QSL Manager. He says there seem to have been a lot of VS6 pirates, as he has had to destroy a lot of cards. He asks amateurs who are stationed there and at other places overseas to leave envelopes with the local QSL Manager so that cards can be forwarded. He has cards on file for VS6AC, AS, AX, BC, BI, BK, BL, BN, BS, BT, BX, CA, CB, CE and CF. These will be held for six months after the appearance of this notice and if not claimed, they will be destroyed.

Stop Press

VR4AE QSLs. His QTH is Honiara, British Solomon Is. YJ1AB is active; he is VK2QZ and QSLs. B.R.S. 7594 says there have been a few good mornings on 14 Mc/s, but nothing much to report. CR6AT, BX, FF8AP, GP, FQ8AD, KA2IM, KH6IJ, KV4BB, VE8OP and ZP5AF have been heard. The only station logged on 28 Mc/s was ZS6ZK. He has had a card from EQ3FM, so he *does* QSL sometimes! SV5UN is operated by W3CHV and W4VUM, who are connected with the Voice of America broadcasts. They are on the floating relay station "Courier" and operate as SV5UN/MM at times when on board.

Maritime Mobile Licences

QUALIFIED U.K. radio amateurs, desirous of operating Maritime Mobile equipment on 28 Mc/s frequencies, should write to O.T.D., Headquarters Building, G.P.O., London, E.C.1.



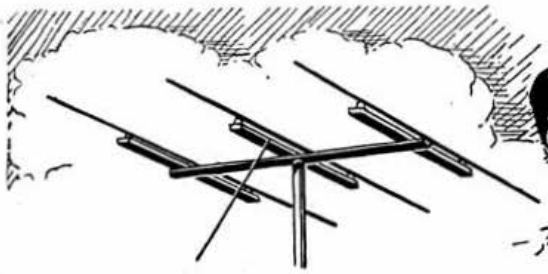
Slow Morse Practice Transmissions

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.*
† S.S.B. telephony announcements.

G.M.T.	Call	kc/s.	Town
Sundays			
09.00	G3LP	1850	Cheltenham
10.00	G6MH	1990	Southend-on-Sea
10.30 *	G3AAZ	1780	Welwyn
	G3EPK		
	G3EWG		
	G5UM		
10.30	G3GIO	1915	Guildford
10.30 *	G3CYS	1990	Pontefract
	G3ESP		
	G3HEX		
	G3HNC		
	G3IDT		
	G3US		
11.00	G2FXA	1900	Stockton-on-Tees
12.00	GI5UR	1860	Belfast
14.00	G5AM	1900	Witnesham, Ipswich
21.00	G2FIX	1812	Nr. Salisbury
Mondays			
19.00	G3NC	1825	Swindon
20.30 *	G3BFP	1875	Croydon
	G3BLP		
	G6LX		
21.00	G3BHS	1720	Eastleigh, Hants
21.00	G3BLN	1900	Bournemouth
22.00	G3GIO	1915	Guildford
22.15	G2BRH	1900	Ilford
22.30	G8TL	1896	Ilford
Tuesdays			
18.30	G2FXA	1900	Stockton-on-Tees
19.00	G3IBL	1883	Derby
19.30 *	G3HGY	1830	Coventry
	G5PP		
	G5SK		
20.30	GW3BKP	1745	Wrexham
21.00	G3EFA	1855	Southport
22.00	G3ELG	1772	Rotherham
22.00	G2BND	1890	Dalston, E.
22.00	G3GIO	1915	Guildford
23.00	G2XG	1735	Chingford
Wednesdays			
14.00	G3ADZ	1910	Southsea
19.00	G3ADZ	1900	Southsea
19.30 *	G3HBX	1870	Warwick
	G6XA		
21.30	G3HKC	1770	Birmingham
22.00	G3DLC	1800	Grays, Essex
22.00	G3HXN	1850	Cambridge, Glos.
22.00	G3GIO	1915	Guildford
22.45	GM3GUS	1800	Dunfermline
Thursdays			
19.00	G3NC	1825	Swindon
19.30	G3GRM	1815	Derby
19.30 *	G2DOF	1830	S. Birmingham
	G3DTG		
	G3ENH		
	G6KI		
	G8JI		
20.00	G3FVH	1920	Hull, Yorks
20.30	GW3BKP	1745	Wrexham
21.30	G6DL	1760	Birmingham
21.30	G3ICX	1900	Sutton Coldfield
22.00	G2NK	1730	St. Mary Cray
22.00	G3GIO	1915	Guildford
22.30	G3OB	1803	Manchester
23.00 *	G3LA	1915	Brentwood
	G4AK		
	G8RC †		
Fridays			
19.00	G3BLN	1900	Bournemouth
20.00	G3CSG	1870	Wirral
21.00	G3BHS	1720	Eastleigh, Hants
22.00 *	G3AUF	1785	Rugby
	G3AUT		
	G3CBV		
	G3GTX		
22.00	G3GIO	1915	Guildford
Saturdays			
09.30	G3ICX	1800	Sutton Coldfield
13.00	G2FXA	1900	Stockton-on-Tees
14.00	G3ADZ	1910	Southsea
22.00	G3GIO	1915	Guildford

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)*

Organising the 70 cm Band

THE seventy cm band is still, relatively speaking, in its infancy and little is yet known of its propagational peculiarities outside optical ranges. This is not to belittle in any way the excellent work being done by certain operators who are, and have been for some time, working fairly regularly over distances far in excess of optical range and whose correlated results, when published, will no doubt add considerably to our knowledge of u.h.f. propagation.

The band is, therefore, extremely useful territory for experimental work for those with the ability, time and facilities to undertake it. The width of the band makes it ideal for testing wide-band techniques such as television and pulse transmission which, although of limited appeal, are legitimate fields for amateur investigation. There is also ample room for communication networks using simple apparatus provided reasonable precautions are taken to avoid interference with the serious experimental work being conducted with fully stabilised equipment.

This brings us to the suggestions which have been arriving from various quarters for dividing the 70 cm band between various amateur activities. Views so far expressed vary somewhat in detail but all have the same ultimate aim—to utilise in the best possible way the 40 Mc/s wide channel allotted to us in this valuable portion of the spectrum.

G3DA (Liverpool), writing on behalf of several members in that area, points out that the present—and technically correct—trend of receiver design, involving a converter with c.c. oscillator, fixed-tuned mixer cavity or lines and a tunable i.f. amplifier, effectively limits frequency coverage to the bandwidth of the mixer tuned circuit. This added to the restricted bandwidth of the aerial systems normally employed and the great difficulty of searching even the 6 Mc/s section in harmonic relationship with the 2 m band—432 to 438 Mc/s—suggests that operating all c.c. stations in the country within a comparatively narrow band would be an advantage to all concerned. That this sub-band should be around 1 Mc/s wide was proposed by G3DA at the Region 1 O.R.M. in September last. The limits of the suggested c.c. band favoured in the north are 432 to 433 Mc/s or, if those in other parts of the country prefer, from 437 to 438 Mc/s.

Opportunity was taken at the November meeting of the newly-formed London U.H.F. Group to place this view before the 33 members present, the majority of whom are active or about to become active on 70 cm. The unanimous opinion was that the proposed 1 Mc/s sub-band was unnecessarily narrow and as most amateurs tended to graduate from 144 Mc/s to the higher frequency, the entire 6 Mc/s in harmonic relationship with the 2 m band should be searched. It was confirmed, however, that all those present at the meeting happened to operate between approximately 434 and 436 Mc/s. No one had encountered any insuperable difficulties, either technical or otherwise, in searching a band 6 Mc/s wide.

In East London an attempt to popularise operation on 70 cm with simple apparatus has followed a recent lecture by Dr. A. H. Koster, G3ECA, on the subject and many members have constructed transmitters and receivers on the lines suggested by him. In a discussion following the lecture a proposal was made that the band should be divided as follows:

420—430	Mc/s.	Self-excited apparatus.
430—440	,,	Crystal controlled apparatus.
440—460	,,	Amateur television.

The question of the possible widespread employment of self-excited transmitters and super-regen. receivers is also dealt with by G8DV who, as DL2DV, was active in Germany on 2 m at a time when those with s.e. transmitters and super-regen. receivers outnumbered the stabilised stations by about two to one. This experience convinced 8DV that the *ordinary* super-regen. should be absolutely barred as it can make reception impossible over a wide area and with its flat tuning makes it equally impossible to confine operation to a section of the band which might be set aside for unstabilised transmissions.

On the transmitting side there is a definite advantage if the simpler apparatus can be made sufficiently stable to be received on the conventional converter plus communications receiver as this provides the stimulus for improving apparatus and prevents the formation of "poor relation" cliques. A suggestion by G8DV for a suitable transmitter would be a p.p. oscillator using, say, a pair of type 7193 valves followed by a plate-modulated doubler such as a CV53 or CV82. Alternatively a 70 cm "pot" or coaxial oscillator could be employed followed by a plate-modulated p.a. For the receiver a simple crystal-diode converter with a fixed-tuned s.e. oscillator could be followed by a tunable super-regen. Such a receiver would require only three or, at the most, four valves.

There is an ever-growing pressure for frequencies in the u.h.f. and s.h.f. regions as military and civil requirements expand. These interests will be our competitors for places in the u.h.f. spectrum and if we are to keep the 70 cm and other bands we must use them now or regret it in years to come.

The Two Metre Band

During the past month G3EHY (Banwell, Som.) worked G3ANB (Brightlingsea, Essex) at 170 miles on several occasions and G2CYN (Birkenhead, Ches.) nearly every evening at 160 miles under what were never very good conditions. The latter

* 32 Earls Road, Tunbridge Wells, Kent.

station is working with a 12-element indoor beam. From October 8 to November 8 solid contact was made between G3EHY and GI3GQB on 14 occasions while signals were received from Belfast on nine further evenings. 'EHY lost his 8-element transmitting stack in a gale, but replaced it next day with a 5-element c.s. Yagi with an improvement of an S point or two on the Belfast sked. A 3-over-3 array is in use for reception.

G2AHP (Perivale, Middlesex), using a new transmitter, succeeded in working stations in 14 counties, including G2IQ, 3EHY, 3FAN and 5UD, during the week-end November 8/9. Several stations in the Northampton area were called without result. 2AHP finds that although activity is generally low during TV hours he can always find someone around London willing to carry out tests during these times. New calls noted include G3FOL (Ewell, Sy.), G4GT (St. Albans, Herts) and G3IQU, whose aerial is within 10 ft. of G2AHP's!

G3GBO (Denham, Bucks) has now worked more than 300 stations on 2 metres with 35 watts to an 832. Raising his 4-over-4 to a height of 41 ft. produced a great improvement over the previous arrangement which was only 27 ft. off the ground, particularly towards the south where local screening was worse. Results to the west and north-west appear unchanged, but to test this point, GBO would welcome a regular sked, with a station in either Gloucestershire or South Wales.

G2HIF (Wantage, Berks) asks whether one of the reasons for there being fewer stations around on the 2 m band during the winter months is because the large and elaborate aerial systems generally employed will not stand the winter gales, or is it that, winter bringing less chance of exceptional openings, operators consider that others will not be active and therefore if they went on there would be no one to work? His solution is to promote activity periods much as is being attempted on 70 cm and suggests that Sunday mornings and Thursdays between 1900 and 2200 G.M.T. would be suitable; the latter time because on that evening TV normally offers a repeat of a previous programme and there should be, therefore, less distraction for the TV-minded amateur. That TV rather than TVI keeps people off the band would seem to be borne out during contests.

Much more should be heard in future of GC2CNC who is now living on a hill 350 ft. a.s.l. at Trinity in Jersey. Aerials will be 40 ft. above ground and consist of a 4-over-4 on 2 m and a 6-element w.s. Yagi beam for 70 cm.

The Royston and District Radio Club, under the call-sign G3GIT, is active on 2 m and would appreciate reports from anyone towards the east, west or south. Transmission towards the north appears satisfactory. Consideration is being given to the design of a permanent aerial and co-operation with tests would be welcomed. Two transmitters are available on frequencies of 144.18 and 144.4 Mc/s with inputs up to 18 watts. A neutralised 6J6—6J6 mixer—c.c. osciliator/multiplier converter is now in use and a Cascode under construction. Regular 2 m transmissions take place every Tuesday evening between 1930 and midnight and on alternate Wednesdays from 2030 to midnight but tests can be arranged at other times. The club possesses a well equipped workshop and welcomes visitors for whom refreshments—to taste—are available.

GW4CG is active most evenings from 1900 to 2000 G.M.T. on 145.65 Mc/s.

70 Centimetres

G8TL and G2QI recently carried out tests with G3ECA on 70 cm from a stationary car using the simple gear referred to earlier in this article. Two masts were attached to the rear bumper, one carrying a loaded whip for the ¼-watt 1.7 Mc/s "contact" gear and the other supporting a 70 cm turnstile array, the combination apparently attracting considerable attention from passers by! The 70 cm transmitter comprised a s.e. CV6 modulated by an SP61 driving an 807 and the receiver was a 955—6J5—6F6 combination. All the 70 cm equipment and the 1.7 Mc/s transmitter were powered from a rotary converter producing outputs of 6 and 230 volts d.c. from a 12-volt input and costing 7/6. (Enquiries to G8TL please.—Ed.) Results showed that apart from small patches where the u.h.f. signal disappeared entirely, two-way contact was possible over distances up to 10/15 miles or so with reports ranging from S5 to S9 both ways. It is hoped to continue the tests over greater distances with a higher aerial at the fixed station.

The Royston Club will soon be carrying out 70 cm tests and would value assistance. Offers to 115 Melbourn Road, Royston, Herts.

G3IRA, a newly licensed station in Swindon, is to be congratulated on making his debut on the air with a n.b.f.m. contact on 70 cm.

London U.H.F. Group

When the Group met on November 6 discussion centred around promoting more activity on 70 cm and several pieces of u.h.f. apparatus were displayed. It was agreed that although it is virtually impossible for many people to guarantee being on the band at a certain time daily, the best way to promote activity is regular operation by known stations. To this end G5DT (London, W.1) and G6NF (Croydon) will endeavour to be on every evening from 1900 to 2000 G.M.T. on 434.88 and 435.4 Mc/s respectively, while G5CD (Hendon) on 435.6 Mc/s will put out a call at 2230 G.M.T. or immediately after the conclusion of the evening TV programme, whichever is the earlier. A further period of activity is planned for 1100 to 1200 G.M.T. on Sundays. This group meets at 7.30 p.m. on the first Thursday of each month at the Bedford Corner Hotel, Bayley Street, London, W.C.1, which is just off Tottenham Court Road and only a few minutes' walk from the Underground station. All those active or interested in v.h.f. or u.h.f. operation are welcome. A dinner will be held at the same place on January 15, 1953, and the Chairman, Phil Thorogood, G4KD, 35 Gibbs Green, Edgware, Middlesex, would be pleased to hear from anyone who intends to be present on that occasion.

Regional V.H.F. Ladder

Only four alterations have been reported in the "Ladder" published last month. G3GBO moves into 14th place with a score of 9—127—3, while G2YB and G5MR have raised their stations worked totals to 152 and 55 respectively. G2AHP makes his appearance for the first time with a score of 8—73—2 and lies 20th. The ladder will again be published in full in January.

Season's Greetings

The writer would like to take this opportunity of wishing all supporters of this feature the compliments of the season, coupled with the hope that there will be much of interest to report in the coming twelve months. Contributions for the January issue by December 20, please.

Designation of Emissions

IN accordance with regulations drawn up at the Atlantic City Radio Conference in 1947 all emissions are designated according to their classification and the width of the frequency band occupied by them and are classified and symbolised according to the following characteristics:

(1) Type of modulation.
(2) Type of transmission.
(3) Supplementary characteristics.

Types of Modulation	Symbol
(a) Amplitude	A
(b) Frequency (or Phase)	F
(c) Pulse	P

Types of Transmission	
(a) Absence of any modulation intended to carry information	0
(b) Telegraphy without the use of modulating audio frequency	1
(c) Telegraphy by the keying of a modulating audio frequency or audio frequencies or by the keying of the modulated emission (special case: an unkeyed modulation emission)	2
(d) Telephony	3
(e) Facsimile	4
(f) Television	5
(g) Composite transmissions and cases not covered by the above	9

Supplementary Characteristics	
(a) Double sideband, full carrier	(none)
(b) Single sideband, reduced carrier	a
(c) Two independent sidebands, reduced carrier	b
(d) Other emissions, reduced carrier	c
(e) Pulse, amplitude modulated	d
(f) Pulse, width modulated	e
(g) Pulse, phase (or position) modulated	f
As an exception to the above principles, damped waves are designated by	B

Types of Emission Available to U.K. Amateurs

By referring to the above classification tables and symbols the various types of emission available to U.K. amateurs (as set out on Page 208 of the November issue of the BULLETIN) can be readily identified.

Examples follow:

A 1	Telegraphy without the use of modulating audio frequency (on-off keying).
A 3	Amplitude modulated telephony, double sideband, full carrier.
A 3a	Amplitude modulated telephony, single sideband, reduced carrier.
F 3	Frequency modulated telephony.
P 1	Pulse modulated telegraphy without the use of modulating audio frequency.

European-North African Two-Metre Contest

ORGANISED during 1952 by R.E.F. on behalf of the I.A.R.U. Societies in Region 1, this contest took place on July 5/6 and attracted an entry of 125 from 14 countries. Many more stations were, however, active during the week-end. The Netherlands experimental station, PE1PL, worked 64 stations, for a total of 544 points, but as they asked to be regarded as not competing, their entry does not figure in the results. The leading competitor was therefore G5YV, who made 82 contacts and scored 510 points, 81 more than ON4BZ, who came second. G5YV thus becomes the winner of the Thorogood Trophy. Last year's winner, G3BLP, was third, 26 points behind ON4BZ. In all 17 stations in the U.K. took part.

A pleasant surprise was the seven Norwegian stations listed and we look forward to hearing some of them in this country next year.

Conditions were only fair over most of Europe but excellent on the Mediterranean, and stations in Southern France were able to contact others in North Africa, some at more than 1,000 km range. Other cross-sea contacts were made between G6LI and DL1JH (750 km), PA0HA and G3DXZ and G4LX (560 km), and SM7BE and DL1SJP (550 km). Among the best overland contacts were those between PE1PL and DL6RP (575 km) and ON4BZ and DL6BU (470 km). W.H.A.

Station	Placing	Points	Station	Placing	Points
G5YV	1	510	G4JJ	14	247
ON4BZ	2	429	G5DS	17	211
G3BLP	3	403	G2HDZ	24	175
DL6BU	4	304	GM3EGW	28	154
DL3NQ	5	302	G2DKH/P	35	135
DL1LS	6	287	G5MR	41	116
PA0WO	7	283	G3CYY	45	106
DL6RI/P	8	279	G8IS	54	101
G3CGQ	9	262	GI2FHN/P	50	98
G6LI	10	260	G4LX	79	59
G2ANT/P	12	252	G4MR	100	32
			GI3GQB	105	19

Leading Stations and U.K. Entrants.

Old-Timers Gay (G6NF) and Avery (G2KC), are intrigued—what at?

OFFICIAL MEETINGS

The President (Frederick Charman, G6CJ) addressing the meeting. On his right the London Regional Representative (Bill Matthews, G2CD), on his left the Honorary Secretary (Arthur Milne, G2MI), G2AIW, 6VV, and the South London D.R. (Charlie Newton, G2FZK) in the background.

London Official Regional Meeting

TWO hundred and five high teas had been laid in the Restaurant of Cornwall House, Stamford Street, S.E.1, on November 1, 1952, but two further tables had to be added; a credit to the estimation of the organisers and to members for purchasing their tickets early.

A well appointed bar on the spot made for an excellent start as well as a source of sustenance during the length of the meeting.

The privilege of using the facilities and the enjoyment obtained from an excellent meal, well served, was the result of valued assistance given by Arthur V. Dyer, G6VV (D.R. for the South-East part of the London Region) in collaboration with the Catering Committee of Cornwall House. The large, pleasant and well-lit floor was, however, built as a place for conversational hub-bub—for which the acoustics are well suited—not as a conference chamber. There was room for everyone but considerable acoustic difficulty was encountered during the first part of the proceedings. A happy suggestion at the commencement of the second half, of changing around the head table, overcame the trouble.

Business Meeting

In preparation for the business meeting a large number of questions had been submitted to the Council, and a period of ten minutes was nominally allowed for each reply and any subsequent discussion. The time schedule was well kept by the President (who was in the chair) supported by the President-Elect (Leslie Cooper), the Hon. Secretary (Arthur Milne), the Hon. Editor (Jack Hum) and, for the first hour, the General Secretary. The answers to the questions raised were dealt with completely and expeditiously.

After Proceedings

The customary "draw" for prizes—not very lavishly endowed with gifts because of the low cost at which the meeting was run—sent some away the richer, as did the more generous "Stewards' draw" at sixpence a time.

A lady photographer with a mischievous look in her eye and a "clic-clic" with her tongue, did much "damage" at sundry moments during the meeting! Some of the results of her activities appear on this page.

Their jobs, carried out excellently, earned for the Stewards a full quota of thanks at the conclusion of the meeting. The President and Members of Council also received an ovation for making the meeting a success.

Part of the large gathering present at the Business Meeting.

As a black mark against the function it can be noted that someone forgot to "lay on" the lift-man (five floors nearly killed the portly), whilst bad acoustics spoiled the first half, but the most distressing news, however, was of the unexpected cancellation two days before the event of seat reservations by the Telekinema authorities. This was due, according to a letter read to the meeting, to a change in policy brought about by the great popularity of the unique programme offered. This was a big blow to the organisers who had made plans for this special feature nine months in advance. As reported last month the National Film Institute did the very best they could in the short time available—and at considerable expense

Miss May Gadsden with four of the London D.R.s—Clem Jardine (G5DJ), Jimmy Hunter (G6HU), Fred Lambeth (G2AIW) and Arthur Dyer (G6VV).

Old-Timers, Jimmy Catt (G5PS) and Bill Pope (G3HT), with a near old-timer, George Spencer (G2KJ). Both Jimmy and Bill held licences prior to the 1914-18 war.

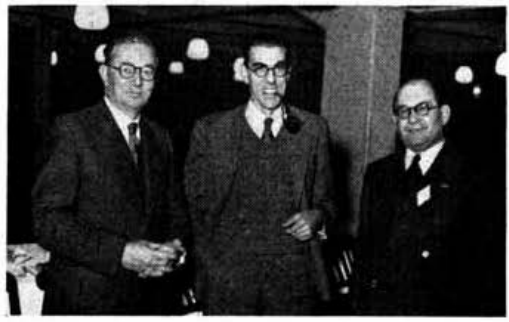
—by arranging a shortened show of four experimental and four three-dimensional films at the cinema of the British Council, in Hanover Street. This show was very varied and enjoyable but the cinema could only accommodate about half the number originally planned. Members who purchased tickets after a given date greatly assisted the organisers by surrendering them to the Stewards. This resulted in only four people having to stand through the show.

Another picture taken at the Business Meeting.

The Ladies

Ancillary to the O.R.M., two parties of ladies and children were taken on an escorted visit to Westminster Abbey, St. Margaret's, Westminster, and the Houses of Parliament—the latter being visited first because of Abbey services. Even this facet of the arrangements was dogged with some ill luck; on arrival at the Houses of Parliament a notice posted on the door announced that the place was closed on November 1!

Despite the black marks, it was a successful and enjoyable O.R.M.



The President, with the President-Elect (Leslie Cooper, G5LC) and the London Regional Representative.

London O.R.M. Photographs

Copies of photographs, size 6 in. × 4 in., taken at the meeting may be obtained from J. A. Fisher, 1 Russell Road, Northolt Park, Middlesex, price 2/6 each, post free.

Society News

Bulletin Deliveries

OCCASIONALLY an irate member writes to Headquarters and complains that his copy of the BULLETIN arrived a day or two later than copies despatched to members living in the same town. Bearing in mind that Headquarters staff have on frequent occasions given an assurance that all copies are handed-in for posting at the same time, the member concerned has been naturally puzzled, especially when he sees that the postmark carries a later date than wrappers containing copies sent to his colleagues.

The explanation is quite simple. All copies of the BULLETIN are *posted* on the same day, but the Post Office is fully entitled—and frequently does—delay second-class mail if it finds it convenient to do so.

Headquarters regret the inconvenience which this piece-meal handling may occasionally give rise to, but they are unable to take any action other than to publish this explanation.

London Members' Luncheon Club

AN attendance of 30 was recorded at the meeting of the Club held at the Bedford Corner Hotel, Tottenham Court Road, London, W.C.1, on Friday, November 21. The Bedford Corner has much to commend it and if the experience of the inaugural meeting at this new venue is anything to go by further gatherings seem assured of even greater support. Especially welcome were G3AWS/VS6AW, VS6BJ and VU5AB. The Chairman (Stanley Vanstone, G2AYC) presided.

The Christmas meeting of the Club will take place on Friday, December 19, at 12.30 p.m. when wives and friends of members will be especially welcomed. Those who propose to attend should advise Miss May Gadsden (HOL 7373) prior to the date of the luncheon.

Society Tie

ENQUIRIES have shown that it may be possible to produce a Society tie in silk for about 13/6 and in rayon for about 8/6, providing a substantial order is placed.

Members interested in the proposal are asked to send a postcard to Miss Gadsden indicating the type they would be prepared to purchase.

Members will recollect that a special Society tie was available prior to the war.

Huntingdonshire

ACTING on the advice of the Area Representative concerned it has been decided that, as from January 1st, 1953, Huntingdonshire and Cambridgeshire shall combine for Society purposes, under the leadership of the Cambridgeshire County Representative.

Amateur Radio Exhibition

A REVIEW of the equipment shown on the various stands at the recent Exhibition will appear in the January issue.

The photographs used to illustrate the Exhibition article in this issue were taken by Eric Yeomanson, G3IIR, to whom application should be made for copies. His address is 9 Trewsbury Road, London, S.E.26.

The Radio Amateurs' Examination

Model Questions and Answers

Part 5.—Valves.

A QUESTION on valves is generally set in the Radio Amateurs' Examination, since almost every item of equipment in a station depends on valve action. In general terms, the function of a valve is to vary the flow of current at a far greater rate per second than could be achieved by any hand or mechanically operated device. The valve may completely interrupt the flow of current at predetermined points in each cycle or it may allow the current to swing between predetermined maximum and minimum values.

List, briefly, typical applications for which valves are especially suitable.

1. The generation of oscillations for transmitters or superheterodyne receivers.
2. Amplification at radio or at audio frequencies in transmitters and receivers.
3. Frequency changing, in which a valve may be supplied with chosen frequencies in order that another frequency may be made present in the output circuit, *e.g.*,in the mixer stage of a superheterodyne receiver, or in the doubler stage of a transmitter.
4. The extraction of speech or music frequencies from incoming signals (detection or demodulation).
5. The combining of speech or music frequencies on outgoing signals (modulation).
6. The conversion of alternating current to direct current for the anode supplies of valves.

In what ways may a transmitting valve be expected to differ from a receiving valve?

In any of the above applications, valve action will be the same whether it takes place in a transmitter or receiver. A transmitting valve should, however, be capable of handling greater power and of operating at a higher temperature. The design must allow for this.

To handle the larger power, an increased emission of electrons is essential. This is obtained by employing additional surface area for the filament or cathode, resulting in increased filament or heater current. The anode will receive much of the heat dissipated by the filament or cathode and in addition will be raised to high temperatures by the bombardment of electrons. The anode dimensions must therefore be ample (without increasing inter-electrode capacitances excessively), and in some cases the surface is blackened to assist the radiation of heat. Metals such as molybdenum or tantalum, are often used for anodes, as they can be run at high temperatures without the liberation of gas. Carbon (graphite) anodes are often found in stages operating at inputs up to about 0.4 kW.

Because of the high temperature of the electrodes the valve envelope will also operate at a high temperature and for this reason it is commonly made of "hard" glass, such as Pyrex. Cooling by natural convection may be insufficient with larger valves, where a forced draught or water circulation may be imperative. Transmitting valves may show little or none of the mirror-like deposit on the glass envelope, often prominent in receiving valves. This deposit arises from the ignition and subsequent condensation of a substance called a "getter"—magnesium being a typical example—after the valve has been pumped and sealed, to remove traces of residual gas. The deposit may cause leakage between electrodes or reflect heat back to them. Consequently prolonged pumping may be used instead of a "getter," or the anode may be plated with zirconium which will absorb traces of gas when at high temperatures.

Finally the base used must be designed to keep leads as short as possible, to avoid loss of performance by the valve on the higher frequencies.

By

B. W. F. MAINPRISE

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

Electron Flow

When visualising valve action, it is essential to bear in mind that the valve emits myriads of electrons from its heated filament or cathode. As electrons are negatively charged particles, they will be drawn across the vacuum inside the valve to any positively charged electrodes, and will flow through whatever external circuits may be connected to these electrodes. Their path will take them through the power supply and finally back to the filament or cathode. The function of the h.t. supply is to keep the electrons circulating by drawing them in at the positive terminal and driving them out at the negative terminal.

Electrons, being negatively charged, will flow through windings or resistors in a negative-to-positive direction, so that once the direction of electron flow has been marked on a circuit, the relative polarities of the ends of such components can be shown.

In earlier times, before it was known that an electric current consisted of a flow of electrons, a decision had to be made as to the direction in which a current must be considered to flow. Unfortunately the wrong decision was made, and results in the conventional direction of current being from positive to negative, which is the reverse of the direction taken by the electrons. In radio and electronic matters, however, one soon becomes accustomed to visualising electron circulation first, and then inserting the direction of conventional current flow afterwards, and provided one makes clear which flow is under consideration no confusion arises.

Valve Constants

The candidate should study Chapter IX of "*Electrical and Radio Notes for Wireless Operators*," omitting at the first reading the rectification curves and the action of a valve as an oscillator. Attention may be concentrated on the meaning of *a.c. resistance, amplification factor* and *mutual conductance*; stage gain; inter-electrode capacitance; screen grid and pentode valves, and diagrams showing the assembly of electrodes.

A few additional notes on the valve constants may be helpful. The memory can be greatly assisted when writing these down by pausing for

* *48 Earlsfield Road, Hythe, Kent.*

a moment to consider the units in which they are expressed. Thus, *a.c. resistance, or impedance,* being a resistance, will be obtained from the ratio of a voltage divided by a current. The ratios deal with changes rather than with single values, so we have

$$\text{a.c. resistance} = ra = \frac{\text{Change in anode voltage}}{\text{Resulting change in anode current.}}$$

the grid bias being kept constant.

Amplification factor has no units, so we can anticipate that it results from the ratio of two similar units, leaving only a number. It is the ratio of two voltages and is expressed as

$$\text{amplification factor} = \mu = \frac{\text{Change of anode voltage to produce a given change of anode current.}}{\text{Change of grid voltage to produce the same change of anode current.}}$$

the units of the numerator and the denominator having cancelled out to leave a factor devoid of units, *e.g.*, merely a multiplier.

Mutual conductance, being a conductance, will be obtained from a ratio of a current divided by a voltage. It is normally expressed in milliamperes per volt and can be written as

$$\text{mutual conductance} = gm = \frac{\text{Change of anode current}}{\text{Change of grid voltage producing it.}}$$

Thus it is the slope of the anode current/grid voltage characteristic, generally provided in valve data sheets.

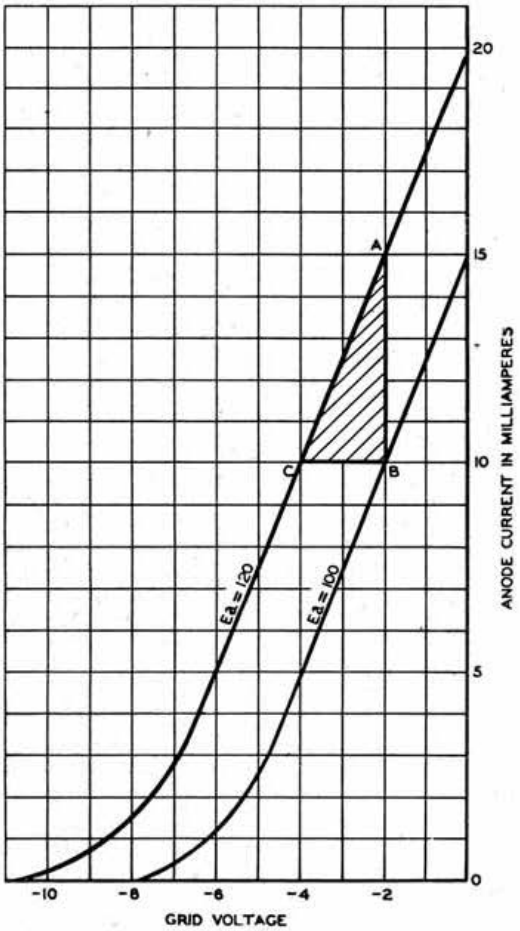


Fig. 1.—Anode Current grid bias curve for small triode valve.

It should be remembered that if any two of the constants are known the third can be readily obtained from the relationship

$$\mu = ra \times gm$$

Fig. 1 shows the anode current of a small triode plotted against the grid bias for anode voltages of 100 and 120 V.

Using the ratios just considered it will be seen that for this valve (if a right-angled triangle ABC be drawn between the two curves to guide the eye),

$$\text{a.c. resistance} = \frac{(120-100)\text{ volts}}{\text{AB amps.}} = \frac{20\text{ V.}}{.005\text{A.}} = 4{,}000\text{ ohms.}$$

$$\text{amplification factor} = \frac{(120-100)\text{ volts}}{(4-2)\text{ volts}} = 10$$

$$\text{mutual conductance} = \frac{.005\text{A}}{2\text{ volts}} = 2.5\text{ mA per volt.}$$

A change of 3 volts in the grid bias of a valve causes a change of 6 milliamperes in the anode current. The same change in anode current occurs if the anode voltage is altered by 45 V. Find (a) the a.c. resistance, (b) the amplification factor, (c) the mutual conductance of the valve.

From the relationships given (N.B.—In an examination they should be written out in full),

(a) $\text{a.c. resistance} = \frac{45\text{ volts}}{0.006\text{ amperes}} = 7{,}500\text{ ohms.}$

(b) $\text{amplification factor} = \frac{45\text{ volts}}{3\text{ volts}} = 15$

(c) $\text{mutual conductance} = \frac{6\text{ milliamperes}}{3\text{ volts}} = 2\text{ mA per volt.}$

The Amateur's Guide to Valve Selection

THIS new 48-page Mullard publication (obtainable from Headquarters, price 1s. 9d. post free) has been prepared to assist radio amateurs, and particularly those who wish to construct their own equipment, to select suitable Mullard valves and tubes and to operate them under conditions which will assure the satisfactory performance of which they are capable.

The book lists 32 receiving types and 3 picture tubes from the "preferred" ranges. These are arranged in a table from which it is an easy matter to select the correct type for any particular application. Typical operating conditions are quoted for each application and some general recommendations concerning each valve and tube listed are provided.

Radio Amateurs' Examination Instruction

A COURSE in radio theory for the Radio Amateurs' Examination and in home servicing fundamentals is being given by G. V. Haylock, (G2DHV), at the Downham Men's Evening Institute, Durham Hill School, Downham, Kent. The class is held on Wednesdays at 8 p.m. New students will be welcome. Sessional fee is 7/6.

LONDON MEETINGS, 1952/3

All meetings are held at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2. Buffet Tea from 5.30 p.m. Meetings commence at 6.30 p.m.

Friday, December 19, 1952: **Annual General Meeting.**

Friday, January 30, 1953: **R. H. Hammans, G2IG.** "SINGLE SIDEBAND TRANSMISSIONS."

Friday, February 27, 1953: **F. Hicks-Arnold, G6MB.** "OSCILLOSCOPES."

Friday, March 20, 1953: **F. Charman, B.E.M., G6CJ.** "V.H.F. AERIAL DEVELOPMENTS."

Tests and Contests

B.E.R.U. Contests, 1952

THE following tables give the placings in the various sections of the 1952 B.E.R.U. Contest. A report will appear next month.

Senior Telegraphy

Pn.	Call	QSO	Pts.	Pn.	Call	QSO	Pts.
1	G6CJ ††	153	1963	44	G2QT	46	713
2	ZL1MB	199	1846	45	G3EKG	53	701
3	VP6AA	203	1820	46	VE2OL	60	700
4	G5WP *	131	1710	47	ZC4XP *	164	697
5	VQ4HJP *	180	1674	48	G5MR	49	681
6	G5RI *	128	1607	49	G3EBH	46	641
7	VK2DI *	143	1594	50	G3RB	51	625
8	VE3KE *	138	1547				
9	DL2RO	160	1530	51	VK5FO	60	620
10	VK9XK	202	1527	52	VK2VN	54	604
				53	G6BS	43	602
11	VE7VO	159	1514	54	ZS5LA	48	601
12	VQ4AQ	209	1372	55	MD5GO	107	594
13	VK2ANN	121	1298	56	ZL1HY	43	591
14	GW3FSP	99	1265	57	ZS1Z †	44	586
15	ZL3JA	113	1260	58	G8QZ	41	582
16	VQ4CM	159	1255	59	G5JU	44	572
17	G5DQ	86	1169	60	VE1IM	65	569
18	VK6RU *	131	1161				
19	VE3AGX	97	1129	61	VS6AE	43	556
20	ZE3JP	123	1126	62	GM6IZ	39	545
				63	VK2RA	43	542
21	G5PQ	84	1117	64	G2FYT	39	539
22	VE1BV *	172	1092	65	VS7NG	41	499
23	VK6LJ	101	1025	66	GM3CIX	35	492
24	VE1PA	123	1016	67	G2BW	31	450
25	VK2AWU†	85	1012	68	VS2CR	54	445
26	ZS5U *	73	990	69	G6BB	31	444
27	VK2GW	90	983	70	G5DF	31	402
28	ZL1MQ	86	962				
29	VE3BBR	84	919	71	GM6MD	27	382
30	VE3ZW	93	874	72	ZB1BJ	97	368
				73	VS7TM †	32	340
31	GM2FHH	64	848	74	VE2CK	37	328
32	VE5QZ	85	843	75	VK3ADW	25	325
33	G3FXB	59	811	76	G5ZK	23	319
34	ZL3AB	74	809	77	ZL3GR †	27	317
35	ZS3K	60	799	78	VE1CU	22	315
36	G6GN	57	790	79	G3GWO	22	307
37	VP8AI	56	773	80	VQ8AF	23	302
	VK3XB	69	773				
39	VQ5AU	78	759	81	VE1DB	19	295
	G8PB	54	759	82	G2AOW	23	292
				83	VE1HG	25	284
41	G3GAF	53	756	84	ZS6DZ	19	223
42	VE2WA *	94	745	85	VE1RY	17	150
43	VE1EX	108	726	86	G3WP	8	118

Junior Telegraphy

Pn.	Call	QSO	Pts.
1	ZS6QF	96	1198
2	VU2JP *	86	982
3	VS6CG	89	745
4	ZD6DU	64	720
5	VK3RJ	69	708
6	VP1AA	55	705
7	ZB2I *	137	531
8	VS2CN	50	517
9	GW3AHN*	38	487
10	G3FDV	36	477
11	ZE3JO	37	401
12	VQ4BY	41	397
13	G5MP	27	368
14	G3GNS	24	341
15	VS7XG	24	322
16	ZS2U	22	278
17	ZL1MT	14	179
18	G3IAH	7	101

Telephony

Pn.	Call	QSO	Pts.
1	VQ4AQ	170	1232
2	VQ4RF	145	1114
3	G2DPZ *	89	1049
4	ZS6BW	87	943
5	VQ4BU	120	914
6	VP6SD	76	807
7	GW3FSP	55	714
8	ZS6Z	58	649
9	VK2AWU†	37	485
10	VK9GW	39	457
11	ZL1MQ	34	446
12	DL2RO	44	439
13	G2QT	20	279
14	VS7IC	27	270
15	VK5FO	20	250
16	VK4HD	15	208
17	G5JU	13	166
18	VE3KF	10	140
19	G2BW	6	88
20	VE1HG	4	54

* Zone Award. † Not eligible under Rule 7 or 8.
†† Member of Contests Committee.

The B.E.R.U. Contests, 1953

Full details of, and rules for the Coronation Year B.E.R.U. Contests, will appear in the January issue of the BULLETIN. Note the dates—March 28 and 29 (Telegraphy) and April 11 and 12 (Telephony).

Receiving Telegraphy

Pn	Name	Pts.
1	R. S. Stott BRS 18013 ...	2295
2	C. A. Bradbury BRS 1066 ...	1593
3	J. L. Hall BRS 19107 ...	1566
4	A. R. Gilding G3GZP ...	1299
5	R. W. Thomas BRS 15822 ...	1212
6	E. Trebilcock BERS 195 ...	1026
7	J. Burgess ...	915
8	E. Jones G3EUE ...	306

Receiving Telephony

Pn	Name	Pts.
1	Tan Bin Hussain BERS 740 ...	478
2	E. Trebilcock BERS 195 ...	447
3	B. Kendall BRS 14261 ...	430
4	I. Davies A 1182 ...	405
5	L. Shearlaw BRS 15846 ...	403
6	J. Burgess ...	348
7	V. Rajloo BERS 788 ...	230
8	N. Barnacle BRS 18989 ...	225
9	M. Ariffin BERS 795 ...	157

R.S.G.B. D/F Contest: National Final

FOURTEEN of the 15 qualifying competitors participated in the National Final which took place over neutral territory on September 28. The start was made from Hexton, near Hitchin, Herts, at 1400 B.S.T.

The transmitter had been carefully concealed in a rather inaccessible position a little over one mile from the start, and it would appear that the close proximity caught many of the competitors unawares and upset their carefully laid plans. One or two, in fact, went so far beyond the transmitter before taking their second bearing that the signal was hardly audible.

The main approach was along a disused section of the Icknield Street, and a large-scale motor-cycle trial which used part of the area as an observed section added to the confusion of the early arrivals, but J. A. Walley, unperturbed by all these difficulties, successfully located the transmitter at 1443, to be followed by R. Seabrooke at 1453. By the end of the day only two competitors had failed to find the transmitter.

The favourable weather of the first hour turned to heavy rain in the later stages, and a damp but cheerful assembly sat down to tea at The Chequers Inn, Whipsnade, soon after 1700, when, to the disappointment of all present, a message was received from the President indicating that he had run into mechanical trouble on the road and was unable to reach the venue.

Votes of thanks were recorded to the umpires (G3ERO and G3CWW) and to the operator, G8VZ. The event was organised by G. T. Peck, winner of last year's National Final.

Results of D/F Contest, 1952

Posn.	Name	Town or Group	Time of Arrival
1	J. A. Walley	Slade	1443
2	R. Seabrook	Southend	1453
3	A. Glozier	Romford	1501
4	A. J. Hallett	Romford	1504
5	R. Charlton	Twickenham	1509½
6	J. Watson	Burgess Hill	1510
7	N. B. Simmonds	Slade	1527
8	G. Walford	Edgware	1537
9	G. C. Simmonds	Slade	1538
10	H. Drury	Romford	1553
11	C. Smart	Slade	1554
12	W. Holdaway	Romford	1607

A Word of Thanks

The 1952 Direction Finding programme was made possible by the efforts of a small group of keen enthusiasts. To all those who helped in any way, whether as organisers, transmitter operators and crew, drivers, navigators, "provision merchants" and umpires, not forgetting the competitors themselves, the Contests Committee offers its best thanks.

Not far short of 250 people drawn from groups in Birmingham, Edgware, High Wycombe, Luton, Oxford, Peterborough, Romford, Rugby and Southend have been active in their various capacities and it is to be hoped that they will all endeavour to convert others to the art, so that the 1953 programme—details of which will have been arranged before this appears in print—may be even more successful than the one just concluded.

Second Two-Metre Field Day, 1952

CONDITIONS during the second 2-metre field day were poor, an opinion which is confirmed by the distances covered. Forty portable stations were active, an increase of one on last year's figure, but only 27 submitted entries, a decrease of two compared with the 1951 figure. Seven check logs were received and were useful in checking. Scores were higher than in 1951, as they should be in view of the changes in the scoring system. No contacts were made outside the British Isles.

The winning station, G2HCG/P, operated throughout by B. Sykes, was located at Honey Hill, Cold Ashby, a few miles north of Northampton, and scored 266 points from 86 contacts. Best DX was 240 miles.

The runner-up, G3ABA/P, holds the same position as in this contest last year. Working from a location 2 miles N.E. of Meriden, several operators at this station scored 224 points from 69 contacts, including the best DX of the event—a 256-mile contact with GM6WL/P.

The third position is held by G5BM/P, a former winner, who operated from a point 4 miles S.E. of Cheltenham. 224 points were scored from 64 contacts.

Whether G2HCG's 4-stack skeleton slots with reflectors did a better job than G3ABA's 24-element stack at 60 ft. is a matter for students of 2-metre equipment, and G5BM may have the opinion that conditions let his 6-element wide-spaced Yagi down—perhaps a higher pole than 12 ft. would have put him in his old position.

Mr. J. Walley, winner of the D/F Contest National Final.

Results of Second Two-Metre Field Day, 1952

Posn.	Station	Portable QTH	Points
1	G2HCG/P	Honey Hill, Cold Ashby	266
2	G3ABA/P	2 m. N.E. Meriden, Warks.	224
3	G5BM/P	4 m. S.E. Cheltenham, Glos.	181
4	G3ERD/P	Harboro' Rocks, Massington	173
5	G3DIV/P	South Downs, Nr. Eastbourne	160
6	G3APY/P	Crich	144
7	G3AVF/P	4 m. W. Bovey Tracey, Devon	124
8	G3MY/P	6 m. W. Sheffield	115
9	G3BEX/P	4 m. N.W. Brighton, Sussex	110
10	G3HSD/P	2 m. S. Bristol	105
11	G6WR/P	Tarn-Flatt Farm, Sandwith	91
12	G3FD/P	6 m. W. Wantage, Berks.	89
13	G3MA/P	5 m. E. Gloucester	82
14	GW5MA/P	8 m. S. Bala	80
15	G3AZT/P	11 m. S. Rugby	77
16	G3AGS/P	4 m. N.W. Rochdale	74
17	G4JJ/P	8 m. N.W. Barnsley	62
18	G3FFV/P	5 m. W. York	59
19	G4BP/P	2 m. S. Scarborough	57
20	G3GOP/P	12 m. N.E. Southampton	56
21	G3FMK/P	Detling, Maidstone	55
22	G5ML/P	4 m. W. Coventry	48
23	G3IKW/P	1 m. S. Woolwich	47
24	GM3EGW/P	6 m. N.N.E. Duns	37
25	G5MP/P	11 m. W. Dover	29
26	G2DEP/P	4 m. N. Arundel	28
27	GM6XW/P	Tomtain, Nr. Carronbridge	9

The assistance from other operators, now allowed by the rules, was greatly appreciated by some contestants, who wish this point to be recorded.

The weather was not kind, nor were conditions, so several entrants felt that the contest should have terminated earlier and some are now inclined to think that, after all, one 2-metre field day will suffice for any year.

Check logs from the following are acknowledged with thanks: G2KI, 2DHV, 3BPM, 3EHY, 3FGB, 2HCJ, 3FKO/P.

Low Power Contest, 1952

DESPITE the extremely poor inter-G propagation conditions during the hours of darkness—scoring was almost negligible before about 0430 B.S.T.—low-power enthusiasts again demonstrated their prowess during the 1952 QRP Contest, held on October 4-5. Though the entry of 25 is considerably below that of 1951, it is abundantly clear that the event maintains its own special appeal for both old-timers and newly-licensed stations. At the top of the table this year is W. S. Hall, G2AOL, of Otford, Kent, closely followed by A. M. Smith, G3IAS, of Warlingham, Surrey, both of whom succeeded in reaching the 2,000-point mark.

Equipment

Equipment, generally, followed the lines of previous events, though it is noticeable that the single-stage transmitter has given way, in most cases, to two- or multi-stage transmitters: G3GDW, with a 6C4 Hartley/C.O. provided the sole representative among the leading ten stations. GC2CNC who also remains faithful to the single-stage C.O. is handicapped by the persistence of Continental stations requiring "QSL for W.A.E." The recent growth of interest in pi-matching networks is reflected in the designs, permitting efficient matching to the popular long-wire aerials,

Results of Low Power Contest 1952

Place	Call sign	Power (watts)	Contacts	Counties	Points
1	G2AOL	0.5	84	38	2050
2	G3IAS	0.41-0.48	85	35	2000
3	G3AGQ	0.40-1.50	82	39	1975
4	G3BMY	0.45	79	33	1910
5	G4NS	0.45	60	32	1520
6	G2AVC	0.5	60	23	1430
7	G6GM	0.5	56	30	1420
8	GW3EFZ	0.5	53	28	1340
9	G3GDW	0.5-1.0	55	34	1330
10	G5MP	0.5	54	24	1320
11	G3CGD	0.48	52	26	1260
12	G3AID	0.47	41	23	1050
13	G5JL	0.48	41	21	1030
14	G3HRK	0.45	39	19	970
15	GC2CNC	0.42	35	21	910
15	G5LQ	0.45	37	17	910
17	G3HQQ	0.45-0.95	34	23	680
18	G5HH	1.0	30	19	490
19	G4AL	0.9	25	19	440
20	G3CWL	0.9	23	12	350
21	G3CNO	4.5	57	28	337
22	G3DWW	1.0	14	7	210
23	G2BYA	2.0	13	11	175
24	G3HZG	3.0	16	10	148
25	G3GOX	0.47	4	3	110

mostly between 120 and 270 feet in length. G3AID, who found the contest well worth the effort of building a special transmitter, was delighted with the freedom from TVI, although his aerial passed within five feet of the TV aerial. In order to qualify for the maximum rate of scoring most transmitters were run at less than 0.5-watt input, either from stablised power packs (usually 70/140 volts) or from h.t. batteries.

Equipment at the leading three stations was as follows.—G2AOL: 6J6 Clapp oscillator driving an EL91 p.a., VR105 stabilised power pack, 160-ft. end-fed aerial, and CR100 receiver. G3IAS: TT11 e.c.o., EF50 f.d., QVO4/7 p.a. with a CV45 stabilised power pack, 200-ft. end-fed aerial, and *Eddystone* 640 receiver. G3AGQ: 6K7 m.o. driving a 6K7 p.a. with an STV280/40 stabilised power pack giving either 70 or 140 volts, 205-ft. end-fed aerial, and 10-valve superhet receiver.

Comments and Suggestions

Most entrants commented upon the extremely unfortunate consequences of the clash of dates with another 3.5 Mc/s event, giving, as it did, a decided advantage to some entrants. The Committee, who published the date of the 1952 QRP Contest in November, 1951, understands that steps are being taken by the F.O.C. to avoid a similar happening next year.

Several useful suggestions were received concerning the planning of the 1953 contest; in particular, the elimination of over-night operating would appear to be generally desired. Support is also given to a proposal to include European contacts, and a good case is made for introducing a new calling procedure that would immediately distinguish between QRP entrants and those QRO stations who wish to help them. Check logs were received from G2KF, 2RO and 3EOC.

Two Metres in the U.S.A.

IT is learned from *QST* that due to a series of v.h.f. openings commencing on the evening of September 7 last, a large number of 2 m contacts were effected at distances up to and in many cases exceeding 1,000 miles. W0EMS (Iowa) succeeded in working W1RFU (Mass.) at nearly 1,200 miles.

Slow Morse Transmissions

Will the Bristol member who volunteered for the above at the Amateur Radio Exhibition kindly send details to the Organiser (Mr. C. H. L. Edwards, A.M.I.E.E., G8TL), as the original information has been mislaid.

Contests Diary

1953

January 24-25	"Top Band" (No. 1)
February 7-8	Affiliated Societies
March 28-29	B.E.R.U. (Telegraphy)
April 11-12	B.E.R.U. (Telephony)
May 3	D.F. Qualifying (Edgware)
May 9-10	144 Mc/s Open
May 31	D.F. Qualifying (Peterborough)
June 13-14	National Field Day
June 21	144 Mc/s Field Day (No. 1)
June 28	D.F. Qualifying (High Wycombe/Oxford)
August 16	D.F. Qualifying (Rugby/Slade)
August 30	144 Mc/s Field Day (No. 2)
September 6	Low Power Field Day
September 6	D.F. Qualifying (Romford/Southend)
September 13	420 Mc/s Tests
September 27	D.F. National Final
October 3-4	Low Power
November 7-8	"Top Band" (No. 2)

The W.F.S.R.A. Bedfast Club

THIS Club exists to link those amateurs temporarily or permanently bed-ridden with their more fortunate colleagues. Its activities include the distribution of reading matter of all types, the organisation of personal visits to invalids by local members and aid in keeping them on the air. The Club appeals for magazines and books (which should be sent to John Gill, 30 Sholebroke View, Leeds 7) and for surplus gear (which will be gratefully received by D. Auton, G3IHI, 36 Elborough Road, Moredon, Swindon).

The names of "bedfast" amateurs who are not yet members of the Club should be sent to Ray Scarborough, 149 Averil Road, Leicester. No subscription is payable, as the Club relies entirely on voluntary donations.

CONTEST RESULTS

Low Power Field Day 1952

1. F. W. Miles G5ML/P.
2. P. J. Naish, C. J. Spackman } G3GYQ/P.
3. E. Banks GC2CNC/P.

Second "Top Band" Contest 1952

1. J. C. Foster G2JF.
2. D. E. Davies GW3FSP
3. E. Banks GC2CNC/P.

Reports will appear next month.

* * *

As winners of the two events recorded, Mr. F. W. Miles will be awarded the Houston-Fergus Trophy and Mr. J. C. Foster the Victor Desmond Trophy respectively for the current year.

REPRESENTATION

THE following members, having been duly nominated, will take office as County Representatives on January 1, 1953.

Region 1 (North-Western)

CHESHIRE
H. M. Synge (G3BOC), Gipsy Corner, Willaston-in-Wirral.

CUMBERLAND
J. Hudson (G4NS), 16 Monkhouse Road, Salterbeck, Workington

LANCASHIRE WEST
F. H. P. Cawson (G2ART), 113 Waterloo Road, Southport.

Region 2 (North-Eastern)

NORTHUMBERLAND
L. G. Spencer (G4LX), 31 Harley Terrace, Newcastle-on-Tyne 3.

YORKSHIRE NORTH
G. A. Kenyon (G3YK), 32 Emerson Avenue, Middlesbrough.

Region 3 (West Midlands)

STAFFORDSHIRE
A. Higgins (G8GF), 28 Kingsley Road, Kingswinford.

WORCESTERSHIRE
J. Timbrell (G6OI), Englefield House, Kinver, Stourbridge.

Region 4 (East Midlands)

DERBYSHIRE
W. R. Chaffe (G2DLJ), 147 Pear Tree Road, Derby.

LEICESTERSHIRE & RUTLAND
K. G. Chapman (G3AFZ), 292 Gwendolen Road, Leicester.

LINCOLNSHIRE
G. E. Wegg (G3ANM), Cobgate, Moulton, Nr. Spalding.

NORTHAMPTONSHIRE
L. Critchley (G3EEL), 36 Waterloo Road, Peterborough.

NOTTINGHAMSHIRE
A. Goode (G2DTQ), 128 New Victoria Street, Mansfield.

Region 5 (Eastern)

CAMBRIDGESHIRE & HUNTINGDONSHIRE
T. A. T. Davies (G2ALL), Meadow Side, Comberton, Cambs.

NORFOLK
E. G. Lark (G3CWC), North Farm, Raveningham, Norwich

Region 6 (South Central)

GLOUCESTERSHIRE
B. L. Horton (G3CBH), Prescott, Haven Avenue, Stonehouse.

HAMPSHIRE
E. R. L. Bassett (B.R.S. 16075), 42 Norham Avenue, Shirley, Southampton.

Region 7 (London)

LONDON: NORTH
D. C. Jardine (G5DJ), 77 King James Avenue, Cuffley, Herts.

LONDON: SOUTH
C. E. Newton (G2FKZ), 105 Underhill Road, S.E.22.

LONDON: SOUTH-EAST
A. V. Dyer (G6VV), 96 Bladindon Drive, Bexley, Kent.

LONDON: SOUTH-WEST
F. G. Lambeth (G2AIW), 21 Bridge Way, Whitton, Twickenham, Middlesex.

LONDON: EAST
W. J. P. Hayes (G3CJQ), 129 Altmore Avenue, East Ham, E.6.

Region 8 (South-Eastern)

KENT (outside Region 7)
L. S. King (G4IB), Glenisla, Maidstone Road, Pembury.

SUSSEX
J. D. Heys (G3BDQ), 58 Burry Road, St. Leonards-on-Sea.

Region 9 (South-Western)

BRISTOL
R. T. Poeton (G3CTN), 37 West Broadway, Henleaze.

DEVON
T. W. A. Smith (G3EFY), 98 Ladysmith Road, Exeter.

Region 10 (South Wales)

PEMBROKESHIRE, CARDIGANSHIRE & CARMARTHENSHIRE
Capt. G. C. Price (GW2OP), Bangeston Hall, Pembroke Dock.

Region 11 (North Wales)

CAERNARVONSHIRE & ANGLESEY
G. N. Roberts (GW3ENY), Montclare Hotel, North Parade, Llandudno.

DENBIGHSHIRE
O. Postle (GW3EFZ), Glan Aber, Bont, Trevor, Nr. Wrexham.

FLINTSHIRE
F. C. Dorken (GW3GCZ), 3 Saithaelwyd Park, Holywell.

Region 12 (Scotland—Eastern)

ABERDEENSHIRE, BANFFSHIRE & KINCARDINESHIRE
B McK. Davidson (GM3ALZ), 42 Smithfield Drive, Aberdeen.

Region 13 (Scotland—South-Eastern)

BERWICKSHIRE, ROXBURGHSHIRE, SELKIRKSHIRE & PEEBLESHIRE
J. Forrester (GM3IPU), 20 Spylaw Park, Kelso, Roxburghshire.

Region 14 (Scotland—Western)

AYRSHIRE, BUTE, DUMFRIESSHIRE, KIRKCUDBRIGHTSHIRE & WIGTOWNSHIRE
Wm. Forsyth (GM3FVX), Gasworks House, Auchinleck, Ayrshire.

STIRLINGSHIRE & CLACKMANNANSHIRE
R. Collumbine (GM3HVC), 4 Namoyo Avenue, Laurieston, Falkirk, Stirlingshire.

Ballot

Messrs. K. N. Senior (GM3AEI) and D. A. E. Sansom (GM3EQY) having both been nominated for the office of C.R. for East, Mid and West Lothian, an election becomes necessary.

Voting

Corporate members resident in the three counties concerned are invited to record their vote in favour of one of the above candidates, and to forward same on a *postcard* addressed to the General Secretary, Incorporated Radio Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1, by not later than December 31, 1952.

Prescribed Form of Voting Card

Election of Representatives, 1952/3.

I ..... *being a fully paid-up Corporate Member of the Society, wish to record my vote in favour of Mr.* .....

as Representative for .....

Call-sign (or B.R.S.) ..... *Signed* .....

Address .....

County Representatives

Representatives who are retiring from office at the end of December are asked to forward to their Regional Representative the card file of members which was issued to them earlier in the year.

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, October 14, 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, J. Hum, F. G. Lambeth, H. McConnell, A. O. Milne, R. Walker, P. W. Winsford and John Clarricoats (General Secretary).

Apologies.—Apologies for absence were submitted on behalf of Messrs. T. L. Herdman and W. A. Scarr.

* * *

Membership.

Resolved:—

(a) to elect 92 Corporate Members and 24 Associates;
(b) to grant Corporate Membership to 11 Associates who had applied for transfer.

Applications for Affiliation.

Resolved to grant affiliation to the Army Apprentices' School Radio Society, the University of Birmingham Radio Society and the Scarborough Amateur Radio Society.

Staff.

It was reported that Mr. J. A. Rouse, G2AHL, and Miss M. Crouch had joined the staff as Assistant Editor and Clerk-Typist respectively.

Annual General Meeting.

Resolved that the undermentioned Special Resolution be placed on the Agenda for the Annual General Meeting to be held on December 19, 1952.

"That to enable the Council to increase members' subscriptions to meet the Society's expenditure the Articles of Association shall be amended so that:—

"Article 19 shall read:

"'The annual subscription shall be £1 10s. for Corporate Members and 15s. for Associates or such lesser sums as the Council may decide from time to time. Corporate Members shall pay an Entrance Fee of 10s. upon admission and Non-Corporate Members shall pay a Transfer Fee of 5s. upon transfer to Corporate Membership,' and

"Article 27 shall read:

"'At any time after having been a Corporate Member of the Society for five consecutive years, such Member may, subject to the approval of the Council, commute all future annual subscriptions by a payment of Twenty Pounds, which shall entitle such Member to all privileges and rights of ordinary membership for the remainder of his life.'"

Audited Accounts.

The Treasurer presented, and explained at length, the Audited Accounts for the year ended June 30, 1952. Mr. Findlay also read the Auditor's Report to the Council.

Resolved to accept and adopt the Audited Accounts as submitted and to authorise same to be printed for presentation to the membership.

The Balance Sheets were then signed by the appropriate officers.

Contests Committee.

The Council accepted two recommendations of the Committee relating to the award of trophies in connection with the 420 Mc/s Tests and the D/F Final.

The Council referred back to the Committee a recommendation relating to National Field Day, 1953.

Adjournment.

Due to the lateness of the hour it was resolved to adjourn the meeting until 6 p.m., Wednesday, October 29, 1952.

The meeting was adjourned at 10.15 p.m.

* * *

The Council reassembled at 6 p.m. on Wednesday, October 29, 1952, when the following were present:—

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

Apologies for absence were submitted on behalf of Messrs. T. L. Herdman, J. Hum and W. A. Scarr.

* * *

National Field Day, 1953.

The Rules for the 1953 National Field Day event were approved for publication.

Arising from the discussion thereon it was agreed to record that the action taken by the Council in fixing the date for the weekend of June 13/14 was contrary to the initial wishes of the Contests Committee who had recommended that the event be held during the weekend of Coronation Week (June 6/7). The Chairman of the Contests Committee explained that the Committee had recommended the period June 6/7 because, by tradition, National Field Day invariably takes place during the first weekend in June except when Whitsun occurs at that time. Additionally the Committee felt that Coronation Weekend would be a fitting period for the 1953 event.

Articles of Association.

Careful consideration was given to a suggestion that the revised Provincial and Overseas subscription rates should be 25/- (instead of 30/-), but after a full discussion it was agreed to adhere to the proposed rates as set out in the printed draft of the revised Articles of Association.

Messrs. Charman, Findlay, Milne and Walker, together with the General Secretary, were instructed to examine all relevant correspondence received from members and to report thereon to the Council.

Special Resolution.

It was reported that the Board of Trade would raise no objection to the proposed alterations of the Articles of Association relating to subscription rates as set out in the motion adopted at the earlier meeting held on October 14, 1952.

Proxy Forms.

It was agreed to send proxy forms to members on request.

Finance & Staff Committee.

Long and careful consideration was given to the Minutes of a Meeting of the Committee held on September 25, 1952, when the Financial Budget for 1952/3 was discussed.

The meeting terminated at 10.40 p.m.

Silent Keys

With very deep regret we announce the death—quite suddenly—of Mr. S. B. D. Young, G2YY, of Scremerston, Berwick-on-Tweed. First licensed in 1935, Syd soon made a name for himself on the DX bands with his battery-driven transmitter. After the war, he worked mainly on the lower frequencies, and had a number of first contacts to his credit. Syd was of Scottish extraction, and derived much pleasure from the Group's success in this year's N.F.D.—a success to which he himself contributed very largely. During the war, he carried out much outstanding work.

This photograph, taken at the Falkirk O.R.M., on October 18th, 1952, shows the late Sydney Young (G2YY), of Berwick-on-Tweed, receiving the Scottish N.F.D. Trophy from the President of the Society (Mr. Frederick Charman, B.E.M., G6CJ).

Radio amateurs from a wide area were among those at the funeral. Floral tributes were sent from local Groups of Society members including one from Aberdeen.

He leaves a widow and young son, to whom we offer our deepest sympathy.

R.L.

* * *

With deep regret we record the death of Mr. Roy Westmorland, G4RH, on November 5, 1952.

Roy was first licensed in 1947 and operated telegraphy on the 3.5 and 7 Mc/s bands until ill-health curtailed his activities about 18 months ago. He served with the R.N.V.W.R. before the war, was a telegraphist in the Navy during the war, and was later commissioned.

Mourned by all who knew him, he leaves a widow and three children, to whom we extend our deep sympathy.

R.T.O.

A Radio Amateur's

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Orders for certain of the following American publications can only be accepted from residents in the United Kingdom and British Empire. Prices quoted include cost of postage and packing.

RADIO HANDBOOK, 13th Edition *(Editors & Engineers Inc.)*	48/-
RADIO AMATEURS' HANDBOOK, 1953 Edition (available approximately February, 1953)	31/6
RADIO ANTENNA MANUAL *(Editors & Engineers Inc.)*	27/-
SURPLUS CONVERSION MANUALS, Vol. I & II *(Editors & Engineers Inc.)* per vol.	18/6
ANTENNA BOOK *(A.R.R.L.)*	11/-
COURSE IN RADIO FUNDAMENTALS *(A.R.R.L.)*	4/6
HINTS AND KINKS, Vol. IV *(A.R.R.L.)*	9/6
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PERIODICALS

QST. Monthly journal of the *A.R.R.L.* Yearly subscription	36/-
CQ. Monthly publication of *Cowan Publishing Press.* Yearly subscription	29/-
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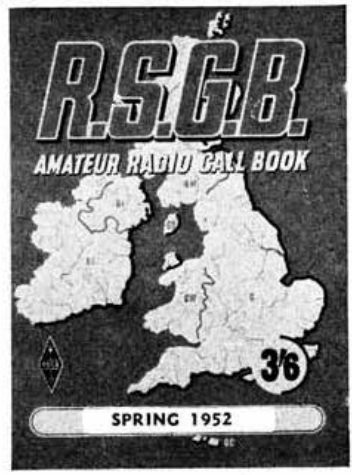
All prices for American publications are subject to alteration without notice.



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REGIONAL AND CLUB NEWS

BRADFORD AMATEUR RADIO SOCIETY.—" Above 200 Mc/s " and " Industrial Electronics " are the titles of the lectures to be given on December 23 and January 6 respectively. Meetings commence at 7.30 p.m. and are preceded by 30 minutes' Morse practice. New members and visitors are very welcome.

BRIGHTON & DISTRICT RADIO CLUB.—Forthcoming lectures include talks on " The construction and repair of meters " and " Fluorescent lighting." The A.G.M. will be held on January 6. New members will be welcomed at all meetings. *Hon. Secretary:* R. T. Parsons, 14 Carlyle Avenue, Brighton 7.

BRISTOL.—Over 70 members attended the demonstration of projection television by Philips Electrical Ltd. at the November meeting.

A c.w. contest, open to all transmitting and receiving members resident within the area covered by the Bristol R.S.G.B. Group, will be held on Sunday, January 4, 1953. Full details from Roy Poeton, G3CTN, 37 West Broadway, Henleaze, Bristol.

CAMBRIDGE & DISTRICT AMATEUR RADIO SOCIETY.—The Christmas Social Meeting is to be held at the Jolly Waterman, Cambridge, at 7.30 p.m. on December 19, and members are asked to bring a guest. *Hon. Secretary:* T. A. T. Davies (G2ALL), Meadow Side, Comberton, Cambridge.

CHESTER & DISTRICT AMATEUR RADIO SOCIETY—Recent meetings have featured a mock auction, station descriptions and a T.V. film strip. *Hon. Secretary:* A. N. Richardson, 1 Victory Villas, Newton Lane, Upton, Chester.

CHINGFORD.—The Chairman of The Hague group of amateurs (C. Van Slingerlandt, PA0CMC) was a welcomed visitor at the meeting held at G3ICY on November 12.

COVENTRY.—The R.R., J. N. Walker, making his first official visit to the Coventry Group, attended the A.G.M. Many points regarding the new Articles of Association were discussed and various suggestions made. W. W. Westacott (B.R.S. 15332) was re-elected Secretary and J. E. Francis (G3HGY) Treasurer to the Group.

On November 8/9, G5PP/P was active in Rutland during the " Top Band " Contest, making 84 contacts. Further excursions to " rare " counties under /P working are being planned for 1953.

COVENTRY AMATEUR RADIO SOCIETY.—Lectures have been given at recent meetings on " Direction Finding " and " Workshop Practice." Future meetings, at which new members will be very welcome, are on December 22 (Open Night) and on January 5 when Les Gardiner (G5GR) will give a talk entitled " DX on a landline." The 21st Anniversary Dinner will be held on February 27. *Hon. Secretary:* K. Lines (G3FOH), 142 Shorncliffe Road, Coventry.

DARLINGTON & DISTRICT AMATEUR RADIO SOCIETY.—Meetings are held every Thursday at 7.30 p.m. in the Clubroom, 129 Woodland Road. There is a film show on the first Thursday in each month.

EAST LONDON.—An attractive eight-page monthly newsletter, edited by G2FWJ, has just made its appearance. This venture merits the support of all members in the district.

EAST SURREY RADIO CLUB.—The Club now meets at the British Legion Ex-Servicemens' Club, High Street, Redhill. *Hon. Secretary:* L. G. Knight (G5LK), Radiohme, 6 Madeira Walk, Reigate.

EXETER.—The Group's Annual Dinner will now take place at " The Globe." Topsham, on Saturday, December 20, and not as previously announced.

GRAFTON RADIO SOCIETY.—At the invitation of the Arts Festival Committee, the Society ran a stand at the Islington Borough Council Festival Handicrafts Exhibition. Two club transmitters were in operation, under the club call G3AFT/A. Excellent results were obtained, many contacts being made. At the opening ceremony, performed by the Deputy-Mayor (Councillor Mrs. J. M Barnes), a contact was made with the town of Peterborough by the way of station G3GCK. Thanks are due to all who contributed to the success of the show. Grafton members look forward to the " next time."

HASTINGS & DISTRICT AMATEUR RADIO CLUB.—" Fundamentals of Radar," by J. D. Heys, and " Relays," by W. E. Thompson, have been the subjects of recent talks. Meetings will be held at the Saxon Cafe, Sea Front, Hastings, at 7.30 p.m. on December 16 and December 30. *Hon. Secretary:* W. E. Thompson (B.R.S. 19773), 8 Coventry Road, St. Leonards-on-Sea, Sussex.

HULL.—The Christmas Party which was to have been held at the R.E.M.E. Barracks, Walton Street, will now be held at the Rampant Horse, Paisley Street, Hull, at 7 p.m. on December 29.

LOWESTOFT & BECCLES AMATEUR RADIO CLUB.—The Club transmitter operates on 3.5 Mc/s c.w., using the call G3IFI, on the second and last Wednesdays of each month. D. Woodyard (G3ETP) recently demonstrated his tape recorder. *Hon. Secretary:* E. J. Hartley (G3DDK), 1 Boyscott Lane, Bungay, Suffolk.

MID KENT AMATEUR RADIO SOCIETY.—Meetings are held at the Elms School, London Road, Maidstone, on Fridays at 8 p.m. New members will be welcome. *Hon. Secretary:* C. Pratt (G2BMP), 29 Devon Road, Shepway, Maidstone.

PRESTWICK.—Meetings of the R.S.G.B. Group covering the counties of Ayrshire, Bute, Dumfriesshire, Kirkcudbrightshire and Wigtownshire will, in future, be held on the third Sunday in each month at the Royal Hotel, Prestwick, at 7 p.m. The new C.R.-elect, W. Forsyth, GM3FVX, Gasworks House, Auchinleck, Ayrshire, will be glad to hear from members in any of the counties he is to represent.

PURLEY & DISTRICT RADIO CLUB.—There is no meeting in December, but the winter programme will be resumed on January 22. The Annual Dinner is to be held at the Railway Hotel, Purley, on February 28. *Hon. Secretary:* A. Frost (G3FTQ), 18 Beechwood Avenue, Thornton Heath.

RAVENSBOURNE AMATEUR RADIO CLUB.—Meetings are held every Wednesday at the Downham Men's Evening Institute, Durham Hill School, Downham, Kent, at 8 p.m. *Hon. Secretary:* W. H. J. Wilshaw (B.R.S. 18936), 4 Station Road, Bromley, Kent.

SHEFFIELD AMATEUR RADIO CLUB.—The Annual Exhibition for the Hallam Trophy was held recently at Albreda Works. Tickets for the Annual Dinner at the Arcade Restaurant on January 7 can now be obtained from the *Hon. Secretary:* E. Walker (G2LT), 20 Dalewood Road, Sheffield 8.

SLADE RADIO SOCIETY.—A recent lecture on tape recording drew a record attendance. Future meetings at the Church House, High Street, Erdington, are on December 19 (" Fun and Games Evening ") and on January 9, when there will be a lecture on " Radio Frequency Heating." *Hon. Secretary:* C. N. Smart, 110 Woolmore Road, Erdington, Birmingham 23.

SOUTHEND & DISTRICT RADIO SOCIETY.—Meetings are now held on alternate Fridays at 7.45 p.m. in Room " QL," at the Municipal College, London Road. *Hon. Secretary:* G. Chapman, B.E.M., Bell Hotel, Leigh Hill, Leigh-on-Sea.

SOUTH MANCHESTER RADIO CLUB.—A Special General Meeting will be held on January 2 to consider amendments to the Club's constitution. On December 19, G2BDR will give hints and tips for the would-be licensee, and on January 16 there will be a lecture and demonstration of tape-recorders. *Hon. Secretary:* F. H. Hudson, 21 Ashbourne Road, Stretford, Manchester.

SURREY RADIO CONTACT CLUB. — On January 13 G3BCM will deliver an introductory talk on Amateur D/F at the Blacksmith's Arms, South End, Croydon. The Club's Annual Dinner is on January 16 and tickets are now available. *Hon. Secretary:* S. A. Morley (G3FWR), 22 Old Farleigh Road, Selsdon.

STOCKPORT RADIO SOCIETY.—Lectures have been given recently on " Aerials," by K. Birch (G2FOS), " Tape

No fewer than 72 members and friends were present—including 42 licence holders—when the Welwyn Garden City Town Group were hosts on November 4, 1952, to other Hertfordshire and Bedfordshire Town Groups and Clubs. The picture shows one-half of the gathering in the Council Chamber at W.G.C. Nearest camera is R.S.G.B. Council Member Dick Walker (G6QI), who is also T.R. for Barnet. Near to him is Clem Jardine (G5DJ), North London District Representative. At the rear, second from left, is Jack Hum (G5UM), Hon. Editor and T.R. for Welwyn Garden City.

Recording," by M. O Heggs, B.Sc., and "Television," by a representative of Pye Ltd. Classes for the Radio Amateurs' Examination are held regularly. Club membership is now 65. *Hon. Secretary:* G. R. Phillips (G3FYE), 7 Germans Buildings, Buxton Road, Stockport.

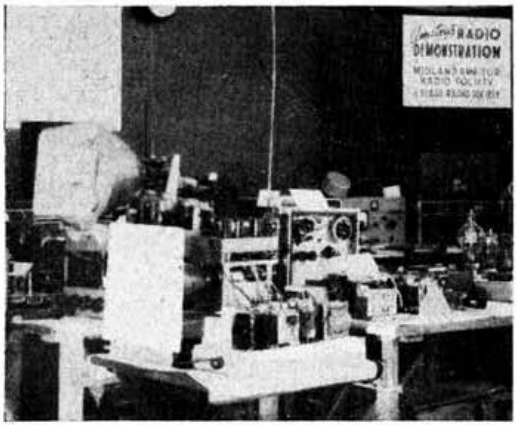
The stand of the Grafton Radio Society at the recent Islington Exhibition, showing G3AFC at the microphone of G3AFT/A with Frank Moore (who hopes shortly to secure his licence) doing the logging.

BRITISH TWO-CALL CLUB.—Membership now totals 104. New members who have held an overseas as well as a British call will be welcome. The Club's Service Diploma has been awarded to Norman Joly (G3FNJ) but no claims have yet been made for the W.T.C. or W.C.T.C. certificates. *Hon. Secretary:* G. V. Haylock (G2DHV), 63 Lewisham Hill, London, S.E.13.

Representation

Messrs. R. M. Strickland, G8KB, G. Mason, G3CKF, L. W Limb, G2DTD, L. A. Hensford, G2BHS, and S. H. Ledbrooke, G3FDV, have resigned as representatives for the towns of Sheffield, Loughborough, Bletchley, Reading, and Dulwich and New Cross, respectively.

Nominations for their successors should be made in the prescribed form and sent to reach the General Secretary, by January 15, 1953.



The joint stand of the Midland Amateur Radio Society and Slade Radio Society at the Sutton Coldfield and North Birmingham Model Engineering Society's Exhibition.

Lunar DX

DEAR SIR,—In their new book "Radio Astronomy," Drs. Lovell and Clegg give a fascinating account of how echoes were obtained from the moon. In common with other workers, they found that the echoes faded and disappeared in a manner so far unexplained, bearing in mind that the ionosphere should be virtually transparent to signals of the wavelength used (4.2 metres). Lovell and Clegg suggest that if the echoes could be received and recorded at a number of scattered receivers, much would be learned about transmission conditions between earth and moon. Standing, as we are, at the beginning of an age when space travel becomes a possibility, such information may be of vital importance.

I suggest, therefore, that those in charge at Jodrell Bank, where the intriguing researches are being carried out, should be asked by the Society whether members could participate in the receiving side of this work. Except for the automatic recording gear, which would have to be provided, no part of the receiver is unduly complex.

If sufficient power could be directed at the moon—and here the giant paraboloid now planned at Jodrell Bank could be of use—echoes should be strong enough for a directional receiving aerial to be dispensed with. To obtain an adequate signal-to-noise ratio, however, the receiver would need to have a bandwidth of the order of 10 c/s, requiring an exceptionally stable local oscillator. This difficulty could, however, be overcome if a suitable reference signal were made available.

I hope those at Jodrell Bank will seriously consider whether they can use the Amateur Radio organisation in their researches.

Yours faithfully,
J. G. RATCLIFF, B.A. (B.R.S. 3381).

Knowle, Birmingham.

Frequency Measuring. Are the Post Office Requirements Too Severe?

DEAR SIR,—F.C.C. amateur regulations in the U.S.A. require that an operator should be able to measure whether he is in an amateur band or not. For this a simple crystal standard only is required. We in the U.K., on the other hand, are required to measure our frequency on all occasions to an accuracy of 0.1 per cent., or in other words to one part in a thousand. This is a pretty high order of accuracy. In these days of v.f.o.s then, almost every operator *must* have a crystal checked frequency meter of high precision, costing (at present) about £18 for a BC.221, or £6 for a Class D. Alternatively he must purchase components costing a few pounds and build a frequency meter. Yet as far as I can gather, this expensive and "essential" item is rarely used in the average amateur station.

Is there any purpose in the regulation? I agree that one should know what band one is in—but a crystal checker and absorption wavemeter could take care of that. What does it matter whether I transmit on 1,865 kc/s or 1,870 kc/s, provided I am not interfering with other services (and the most accurate frequency meter will not tell me that)? Is there not a case for trying to get a repeal of the regulation which most amateurs contravene, without upsetting anybody?

Yours faithfully,
W. FARRAR (G3ESP).

Ackworth, Pontefract, Yorks.

QSL'ing on 144 Mc/s

DEAR SIR,—In the past it has been my practice when completing a QSO on 144 Mc/s to ask for a QSL card and to repeat that request on my own card sent *via* the R.S.G.B. Bureau. If the card is not forthcoming after several months, I send a reminder *via* the Bureau followed by a second reminder, if necessary. As several very belated QSL cards addressed to me arrived with statements to the effect that one, two or three cards had already been sent to confirm a specific contact (and had not been received by me) I wrote to the R.S.G.B. QSL Bureau Manager on this matter, giving him nine specific cases and a list of 54 stations from whom I was still awaiting cards—some even after the third "application"—for contacts going back to early 1950.

I have now seen replies from the QSL Sub-Managers, not only in respect of the nine specific cases quoted but also with regard to the other 54 call signs quoted by me—since reduced by nine cards received by hand or by post. It is clear from these replies that no fault lies at the door of the R.S.G.B. QSL Bureau in holding up cards addressed to me, because there were only two cards waiting for me in the G3 section. What the inquiry did show, however, was that:

(a) despite more than one reminder, several members fail to send even one replacement envelope to the Bureau for their accumulating cards;
(b) several stipulate that a large number of cards (*e.g.* 25) must accumulate before being sent on, and
(c) many have so few cards sent to them that a single card may wait months for the other two to join it to make the minimum of three, before the envelope is dispatched!

Since I first wrote to the R.S.G.B. QSL Manager, I have received three cards from another Bureau. One card was from a station I contacted in 1950 and to whom I had sent three applications for his card *via* the R.S.G.B. Bureau. The card received was for a repeat contact in May, 1952, sent separately by post the very next day to the other Bureau. I received it with the two others early in October, 1952. Why couldn't he have sent it to me direct?

Yours faithfully,
R. F. G. THURLOW (G3WW).

Wimblington, Nr. March, Cambs

Ohm's Law

DEAR SIR,—With reference to the article *The Radio Amateurs' Examination, Pt. 1*, by B. W. F. Mainprise, in the August issue of the R.S.G.B. BULLETIN, I wish to draw attention to the statement made by the author that "the ratio of the voltage across a circuit, divided by the current through the circuit, is constant."

The dangers and pitfalls to the student of electrical or radio engineering, however elementary his knowledge, who accepts this statement at its face value, is only too well known.

I suggest to Mr. Mainprise that it would have been better if he had amplified the statement by adding the words "providing the temperature of the circuit elements remains constant." This would then cover both the d.c. and a.c. cases, and would not confuse the student when, at a later stage in his development, he is introduced to out-of-phase currents.

Yours faithfully,
H. M. BEAVEN (B.R.S. 6832).

Bournemouth, Hants.

Shielded Link Coupler

DEAR SIR,—There appears to be a small error in Fig. 1b of Mr. Millington's article on page 68 of the August issue. A moment's consideration will show that the inner connection should not be soldered at the point "A" (as this would result in a doubled-back turn) but should be attached to the braiding at the edge of the hole "B."

Yours faithfully,
H. S. Woodhouse (G2AHY).

Wokingham, Berks.

[*Replying to this point, the author (H. Millington, GW2BMN) states that the braiding should not be considered as one turn in making up a multi-turn link. Its function is to shield the inner wire, and it is normally connected to earth.*]

New Book

TV FAULT FINDING. Compiled by the staff of *The Radio Constructor*. Page size 8½ in x 5½ in. 80 pages, 98 illustrations. Published by the Amalgamated Short-Wave Press, Ltd. Price 5/-.

Profusely illustrated, this book is the fifth in a new *Data Book* series. This method of illustrating faults ensures that the reader speedily becomes familiar with the more common types and automatically associates them with their causes and appropriate remedies.

The book opens with a comprehensive Fault Finding Guide listing no less than 40 different types of fault with probable causes. Subsequent sections deal with r.f. stages, receiver alignment, interference and synchronisation, television aerials, time bases, power supplies and cathode-ray tubes.

A good deal of research has gone into the production of this book which should appeal to all who are concerned with the adjustment of television receivers.

FORTHCOMING EVENTS.—(Continued from page 234.)

REGION 10

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

REGION 13

Edinburgh (L.R.S.).—December 23, January 6, 7.30 p.m., Edinburgh Chamber of Commerce, 25 Charlotte Square.

REGION 14

Falkirk.—January 9, 7.30 p.m., The Temperance Cafe, High Street.

Prestwick.—December 21, 7 p.m., The Royal Hotel.

NEW MEMBERS

The following have been elected to membership:—

Corporate Members (Licensed)

G2BM G. R. FOSTER, 67 Chauncy House, Sish Lane, Stevenage, Herts.
G2QG J. G. HOBBS, The Grange, Church Lane, Pinner, Middlesex.
G2CZU S. G. MARSH, 10 Vernham Grove, Odd Down, Bath, Somerset.
G2DSU †J. GUNN-BOYSEN, 1 Fieldway Crescent, Highbury, London, N.5.
G2HMK †T. G. BROWN, 7 Brinkburn Drive, Darlington, Co. Durham.
G3AKH †D. G. LUCAS, 33 Broad Chare, Newcastle-on-Tyne, Northumberland.
G3BSS E. SNELL, Barkla Farm, Barkla Shop, Nr. St. Agnes, Cornwall.
G3CZO H. BUCKLEY, 10 Regent Avenue, Park Lane, Macclesfield, Cheshire.
G3GHP C. F. MARJORAM, 231 Spring Road, Ipswich, Suffolk.
G3GNM †A. C. WILLOUGHBY, 114 Kingshill Avenue, Kenton, Harrow, Middlesex.
G3HWJ *R. F. WARREN, 84 Chiltern Drive, Surbiton, Surrey.
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FOR SALE.—Army 12 sets, £12 H.R.O. coils, all ranges, 30s. each. Wanted: 813s, 808s, also AR.88, S.27, BC.221. Exchanges or cash adjustment. Will collect.—Box 684, National Publicity Co., Ltd., 36-37 Upper Thames Street, London, E.C.4. (684

FOR SALE.—Brand-new Command receiver, CBY.46104 (1.5-3.0 Mc/s), complete with plug on rotary transformer, control box for three receivers, 14 ft. control cable, circuit, plugs, in polished wooden cabinet, £5 10s. R.1224B (1.0-9.0 Mc/s), converted to dial reading, A.M. eliminator (h.t.) accumulator, circuit, new valves, £6 5s. Collaro a.c. mains gram. unit, used few times, three speeds, autostop, centre drive, complete with crystal pick-up, £5 10s. No offers please. Cash or exchange. Wanted: MCR.1, S.640, R.107, W.H.Y. Please add something for carriage.—Dorling, Fox Cottage, Haughley, Suffolk. (748

FOR SALE.—Eddystone 750, good condition, little used.—Offers to B.R.S. 3779, Clickemin, Ponteland, Newcastle-on-Tyne. (736

FOR SALE.—R.C.A. 813s, new, unused, unboxed, £2 each. Also 82 transmitter and receiver, in steel case with all transmitter coils.—Offers to G3BTL, 64 Mayfield Avenue, Southend, Essex. (768

FOR SALE.—Seven volumes Bulletin, July '45 onwards. December '48, June '49 missing. One volume bound and some covers stripped for binding; £3 or highest offer.—Rutherford, 56 Chipperfield Road, Birmingham 34. (733

GENUINE Bargains.—1s. 6d.: RK34, VR54, 2C22. 5s.: 9001, 9002, 9003, 6J6, 6AJ5, TT11, U22, PGI, 12A6, EF37, EL32, 12A8, 6V6, EF55, ECH35, VR56, VR57, OZ4, 6AR6, 12BA6, 6AG5, 1T4, 3S4, 6CB6, 6BA6, 1S5, 1Z2, 1X2A, 6AQ5, 50B5, EC52, 6AQ7, 6F6, 117Z3. 7s. 6d.: U12/14, RK75, EL37, 705A, 1SU7, 6SL7, 6X5, VR105, 6L6, 6C4, 6X4, EL42, 6AK5. 10s.: 807, 6SN7, ECC35, PT15, 723A/B. 15s.: CV90, QVO47. 20s.: 832. 25s.: 832A. 42s. 6d.: 813. Also ASB8, as new, £8. 33 ft. telescopic whip aerial, 30s. Shrouded choke, " Parmeko," 10 H 650 mA 125 ohm, weight 44 lb., £3. — 129 Cambridge Road, Trumptington, Cambridge. Please add 3d. each item, post and packing. (740

HALLICRAFTER SX.28 for sale, table model, in perfect condition, complete with original instruction manual; £50 or nearest offer.—Box 777, National Publicity Co., Ltd., 36-37 Upper Thames Street, London, E.C.4. (777

HAM selling up.—R.1155N, p.p., o.p. R.208, 120 W, home-built transmitter with 200 V p.p. 48 receiver. 35 S.W. magazines, 50 Bulletins, Call Book, phones, odd components, £30 to clear or consider selling separately.—G3DSB, 88 Kingsway, Woking, Surrey. (760

HAS anyone bug key, 100 kc/s crystal for sale?—Sidwell, 7 Abbottsfield Cottages, Wareside, Nr. Ware, Herts. (729

H.R.O. receiver, Model M., 1.7 to 30 Mc/s G.C.; power pack, speaker. Offers or exchange Channel 2 TV chassis. Liverpool.—Box 728, National Publicity Co., Ltd., 36-37 Upper Thames Street, London, E.C.4. (728

(Continued on Page 276)

EXCHANGE and MART SECTION

(Continued from Page 275)

H.R.O. Senior, mint condition. Noise limiter as per H.R.O. 9 coils in cabinet. Power pack. Top-band transmitter. 6L6s, mod. p.a., mounted on 19 in. rack, 2 ft. 6 in. high. Beautiful job; £35. Collins TCS.12 receiver with power pack, mint condition; £12.—HALL, 27 Redcar Road, Blackpool. (782

H.R.O. Senior table model with power pack and matched speaker, 9 coils, 480 kc/s-30 Mc/s, B.S. 80-40-10, crystal phasing, "S" meter, b.f.o., £35. Wavemeter type W.117, continuous 125 kc/s-20 Mc/s, complete with manual, calibration chart, valves, less 500 mA meter, £3 10s. — L. DEVENISH, 13 Riverside, Hendon, London, N.W.4. (755

MARCONI Osram CR.100, as new, £18. Buyer collects. 22 transreceiver, complete 12 V power supply, 2-4½ and 4½-8 Mc/s, brand new, £12. R.1224A receiver with "Stentorian" speaker, 1 Mc/s to 300 metres, £5. 1134 amplifier, new, modified, 10s.—SIMPSON, Boston Road, Holbeach, Spalding, Lincs. (767

McELROY De Luxe Model Mac Key, good condition. Price 40s., carriage paid.—BOX 744, NATIONAL PUBLICITY CO., LTD., 36-37 Upper Thames Street, London, E.C.4. (744

METALWORK.—All types cabinets, chassis, racks, etc., to your own specifications.—PHILPOTT'S METAL WORKS LTD. (G4BI), Chapman Street, Loughborough. (99

MINT condition.—AR.88LF, unmodified, etc., manual; first £50. Prefer buyer collect. RME-VHF152A, brand-new condition, with manual, in original case; nearest £25. Original V.F.O. with NBFM by G6XY; bargain, £8 10s. Other items. Send S.A.E. for lists. Wanted: Wilcox-Gay V.F.O., unmodified, new condition preferred.—G3DAM, 37, B Offenham Road, Evesham. (735

NEW valves.—Four 866A/866, 15s. each; three TZ40, 25s. each; also other types. — LEWIS, "Nant-yr-Haidd," Nantmel, Radnors. (753

PATENTS and Trade Marks. Handbooks and advice free.—KINGS PATENT AGENCY LTD. (B. T. KING, G5TA, Mem. R.S.G.B., Reg. Pat. Agent), 146A Queen Victoria Street, London, E.C.4. Phone: City 6161. 50 years' refs. (98

PITCH prop motor wanted, also Class D wavemeter, H.R.O. 30 Mc/s bandspread coil, also interested in miscellaneous gear.—EI3Y, O'Rahilly Street, Ballina, Irish Republic. (725

PROFESSIONALLY made transmitter and receiver cabinet, in natural oak. Designed as a piece of furniture to take a complete station equipment where space is limited. Dimensions 48 in. × 48 in. × 15 in. with 10 compartments and operating position with hinged table, fitted with easy running castors. This is new and unused as G8UQ has managed to acquire a "shack." Offered at £29. — Phone G8UQ, WELbeck 4058. (742

QSLs and log book (P.M.G. approved). Samples free. State whether G or B.R.S.—ATKINSON BROS., Printers, Elland. (772

QUICK sale.—Modified 1155, five ranges, 200 kc/s-32 Mc/s, noise limiter; separate power pack, spare valves; first-class condition; £20 or offer. New 1191, eight ranges, 100 kc/s-20 Mc/s; Air Ministry calibration chart; spare set valves; £10.—N.H.H., Holywell Park, Wrotham, Kent. (731

RADIO and Television components, speakers, valves. New catalogue now ready. Sent free.—THE RADIO EQUIPMENT CO. (Dept. R.S.), Castor Road, Brixham, Devon. (671

SALE. — BC.342N, no crystal, 230/115 transformer. Simmonds crystal filter. 1000 kc/s and 100 kc/s crystals, power packs, 300 V 60 mA, 6.3/4, 450 V 100 mA 6.3/4 with rectifiers. New unboxed valves: 807 (7), 6V6, MKT4, MH41, TT15. Meters, 100 mA (2), .5 A RF (2) resistors, coils, condensers. £20 the lot. — G3HFF, Southview, Chalford, Glos. (730

SALE.—Eddystone S.640, £16, with instruction manual; also line output transformer, 10s.—G2ATD, 21 Barham Road, Dartford, Kent. (732

S.39 Hallicrafters battery a.c./d.c. portable communication receiver for sale. Set of spare valves. New. £25.—Box 727, NATIONAL PUBLICITY CO., LTD., 36-37 Upper Thames Street, London E.C.4. (727

SALE.—Mullard tube type MW18-2, 7 in. Focus coil. Scanning coil. Line transformer. Marconi type 6 amplifier, power pack, control unit with valves. 21 set. 1155 d.f. loop with perspex cover. (2) R.58 power packs. R.1147A, less valves. 4-wave coil pack. Atkins 3-wave coil pack, type HF.1. Atkins 6-wave coil pack, type CCP/1. Premier 5-waveband dial. (2) SLC indicator cases. — Offers, B.R.S. 7532, 8 Tower Parade, Whitstable, Kent. (741

SALE.—Packard-Bell 2-stage pre-amplifier, new, boxed, £2. Garrard Sapphire Stylus Pick-up with spare stylus, £2 10s. Haynes 4 kV e.h.t. trans. Line output trans. Scanning unit. Focus coils, used twice. H.R.O. "S" meter. Offers. 6L6 p.p. amp., p.p., gram. motor, pick-up; needs finishing; in rexine carrying case; case soiled; £12. 60 transmitter and receiver valves, £10. S.A.E. list.—G3BJK, 132 Barnhill Road, Wembley Park, Middlesex. (785

SALE.—60 W modulator, power pack, separate chassis, Woden transformers, chokes, Reslo microphone, chrome stand, £30. 2 V preselector, £2 10s. Type 247 power unit, £2 15s. Morse buzzer, valve, type 2, £1 5s. Matched PX25s, £2 pair. Labgear broadbend couplers, new, 15s. each. Phones, Browns "A," £2 5s. 1.6 Mc/s b.f.o. units, 12s. 6d.—G3XV, Sunny Cottage, Donnington Wood, Wellington, Shropshire.

SIX years' BULLETINS. Valves and other spares for sale. Res/capacity bridge, nul-indicator type, £4. R.1155, in crate, £8 or offer. 6 in. oscilloscope, £7. Walkie-talkie (Canadian).—6 King's Road, Shaw, Oldham, Lancs. (747

THREE volumes "Short Wave Magazine," March, 1949—February, 1952. Good, clean condition. Offers or exchange what have you.—G2HDT, 25 Alexandra Road, Winshill, Burton-on-Trent, Staffs. (746

USED VCR97, low emission but O.K. with 3 kV e.h.t., mask, base and new 6 in. magnifier. Lot 30s. Wanted: one or two radar units for stripping; must be clean.—ROBINSON, 71 High Hope Street, Crook, Co. Durham. (778

VERY nice 150 W all-band rack-mounted transmitter; PT15s final, 807 modulator, aerial coupler, exciter, liberal supplies; £20. Eddystone S.640, £15. Seen Bedford area.—Box 771, NATIONAL PUBLICITY CO., LTD., 36-37 Upper Thames Street, London, E.C.4. (771

WANTED.—BC.610 Hallicrafters, ET.4336 transmitters, SX.28s, AR.88s, receivers and spare parts for above. Best prices.—Write Box 864, SPIERS SERVICE, 21 Soho Square, London, W.1. (738

WANTED.—B.2 power pack, with or without transmitter. Handbook for Class "D" wavemeter.—JOHNSON, 35a Birdhill Road, Woodhouse Eaves, Loughborough. (783

WANTED.—Good communications receiver, prefer CR.100 in original condition. — Price and details to J. L. Coupland, 30 Revesby Avenue, Boston, Lincs. (765

WANTED.—High-grade microphone, Turner 211, ball-biscuit, or similar type in good condition.—Details to BISSETT, Dunipace, Stirlingshire. (774

WANTED.—H.R.O. coils and pack, or AR.88/D. Good condition essential.—B.R.S. 19202, SIMMONS, 32 Glebe Street, Loughborough. (769

WANTED. — H.R.O. coils, receivers, power packs, AR.88Ds, AR.88LFs, SX.28s, BC.348s, AR.77s, etc.—Details please to R.T. & I. SERVICE, 254 Grove Green Road, Leytonstone, E.11. (LEY 4986.) (101

WANTED.—Oscilloscope (working order), T.U. units (4), H.R.O. receiver only; condition immaterial.—G3HSS, "St. Martin's," Locksheath, Park Road, Locksheath, Southampton. (745

WANTED, preferably on standard chassis: All-band T.V.I.-proof exciter, with or without p.a.; no power supplies necessary.—Box 781, NATIONAL PUBLICITY CO., LTD., 36-37 Upper Thames Street, London, E.C.4. (781

WANTED.—R.C.A. speech amplifiers type MI-11220 J or K and aerial tuning units BC.939A, coils and tuning units for BC.610 transmitters.—Offers, stating quantity and price, to P.C.A. RADIO, The Arches, Cambridge Grove, London, W.6. (739

WANTED.—R.C.A. 4331 transmitters.—P.C.A. RADIO Cambridge Grove, Hammersmith, W.6. (Telephone RIVerside 3279.) (562

WANTED.—Vibrator unit for type A. Mk. III transceiver. Good condition essential.—G3IGK, 4 McBean Road, Wolverhampton. (754

107 Army receiver. Class D wavemeter. Admiralty type W6804 rotary converter, 24 V d.c. to 230 V a.c. B.P.L. test-meter. No reasonable offer refused; buyer to collect.—M. H. CAWKELL, Low Flatworth, Percy Main, Northumberland. (751

832s, brand new, unused but unboxed, 35s. each. Registered post free.—Box 752, NATIONAL PUBLICITY CO., LTD., 36-37 Upper Thames Street, London, E.C.4. (752

1155 Receivers (2), dismantled, in transit cases, with power packs and special crystals. Suitable rebuilding as dual diversity job. Offers invited. Stamp for list. Deafness causes sale.—H. W. TOPHAM, 76 Avenue Road, St. Neots. (756

APPOINTMENTS SECTION

Appointments vacant

CROWN AGENTS FOR THE COLONIES

ASSISTANT SIGNALS OFFICER required by the Government of Nigeria for the Aviation Department for one tour of 18 to 24 months in the first instance. Commencing salary (including allowances) according to qualifications and experience either (a) in scale £750 rising to £1,315 a year, with the prospect of permanency, or (b) in scale £807 rising to £1,453 a year, on a temporary basis with gratuity of £25 for each period of three months' satisfactory service. Outfit allowance £60. Free passages for officer and wife, and assistance towards cost of children's passages, or their maintenance in the United Kingdom. Liberal leave on full salary. Candidates must be Associate Members of the Institute of British Radio Engineers or possess City and Guilds certificates in radio communication, or technical electricity, or a satisfactory pass in the Ministry of Civil Aviation Radio Mechanics course. Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting on letter M.29637.G. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (788

(Continued on Cover iii)

APPOINTMENTS SECTION—(Continued)

CROWN AGENTS FOR THE COLONIES

RADIO OFFICER required by Nigeria Government Posts and Telegraphs Department for one tour of 18-24 months in the first instance with prospect of permanency. Commencing salary in scale £750 rising to £1,175 a year (including expatriation pay). Outfit allowance £60. Free passages for officer and wife and assistance towards cost of children's passages or their maintenance in this country. Liberal leave on full salary. Candidates must possess a Postmaster-General's Certificate in Radio Telegraphy, or an Air-Operator's Certificate or an equivalent Service qualification. They must have a thorough grounding in I.C.A.O. codes and procedures and have had recent experience with an administration or air operating company outside West Africa in operating wireless and direction finding ground stations for air services. Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting on letter M.29270 B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (186

FERRANTI LTD. (Moston) have a vacancy in the Circuits section of the Physical Laboratory for a circuit development engineer to work on specialised test equipment for investigation of cathode-ray-tube and valve characteristics. Applicants should be graduates in electrical engineering or possess a H.N.C. or equivalent qualification and have had at least three years' experience of the design and construction of this type of equipment. A sound theoretical and practical knowledge of television and radar circuit techniques is essential. Permanent staff appointment with pension benefits. Forms of application from Mr. R. J. Hebbert, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote reference LA.

AIR MINISTRY requires Civilian Instructors, Class I (Radio Fitter) for temporary posts, with prospects of permanency, at R.A.F. Radio Schools, Yatesbury (Wilts) and Locking (Somerset). Qualifications: At least 5 years' practical experience and ability to instruct. Trade test before entry. Pay is £480 at 26, rising to £597. Apply to: Air Ministry, S.5.(g), Cornwall House, Stamford Street, London, S.E.1. (758

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