February 1950

The original front cover for this edition was not available.

The original front cover for this edition was not available.

HENRY'S

Ex-GOVT. VALVES. The following brand new and guaranteed valves are in stock :
PEN 46, 6L6 metal at **10/-** each. EF50, EF54, EF55, RL37, VU111, VU133, U18, 5T4, 5R4GY, RL18, 6F7, 6AG5, PM22A, all at **7/6** each. 5Z4, MU14, 6K7GT, 6J7GT, 6K8GT, ML4, 12SR7, 12SJ7, 12SK7, 6SL7GT, 6SC7GT, 6C6, 6V6G or GT, 7C7, 7T4, 7S7, 7B6, 7C5, 1299A, 9D2, VP23, P2, 12A6, 8D2, 15D2, EF36, EF39, EBC33, EK32, EL32, 6X5GT, 2X2, 6AC7, 6N7, 6SN6GT, 78, 9003, IN5GT, 6J5GT, 6C5, KT61, KTW61, DH63, TDD2A, VP2B, all at **6/6** each. Also 9002 and ILN5GT, **8/6**. 807, **7/-**. 4D1, **5/-**. EA50, SP61, 954, EB34, at **3/6** each. D1 Diode at **2/6** only. And the midget range of 1·4 V. battery valves. IT4 and IS5 at **6/6** each. IR5 and IS4 at **7/6**. 3S4 at **9/-** each. Most of these valves are boxed. Please note for current popular circuits we also have in stock ID8GT at **15/3**, and HIVAC XH at **10/6**. Both these latter are new and boxed. In addition we have over 10,000 new boxed BVA valves in stock at current Board of Trade prices. Let us have your enquiries.

No. 18 SET. RECEIVER PORTION. A four-valve superhet receiver operating from 6–9 Mc/s. (33–50 m). Valve line-up 3 ARP12 (VP23) and AR8 (HL23DD). Requires only 144 V. H.T., 12 V. G.B. and 3 V. L.T., in perfect condition, only **17/6**, plus 1/6 packing and carriage. An absolute bargain. Suitable brand new headphones can be supplied at **3/6** per pair.

RECEIVER TYPE 21. The receiver portion of the W/S 21 operating from 4·2–7·5 Mc/s. Incorporating B.F.O. and crash limiter. Valve line-up 7 ARP12 (VP23), and 2 AR8 (HL23DD) plus spare valve of each type, making eleven valves in all. Only **35/-** complete.

5 kV. ELECTROSTATIC VOLTMETER. 0–5 kV., panel-mounting, 3½" scale, brand new, **50/-** each.

MINIATURE MAINS TRANSFORMER. 250–0–250, 60 mA., 6 V. 3 A., 5 V. 2 A., fully shrouded, well finished, size 3½" x 3" x 2½". Price **21/-**.

RECEIVER TYPE 25. The receiver portion of the T/R 1196. Covers 4·3–6·7 Mc/s., and makes an ideal basis for an all-wave receiver, as per *Practical Wireless*, August issue. Complete with valves types EF36(2), EF39(2), EK32 and EBC33. Supplied complete with necessary conversion data for home use. Only **22/6**. Chassis only, **8/6**.

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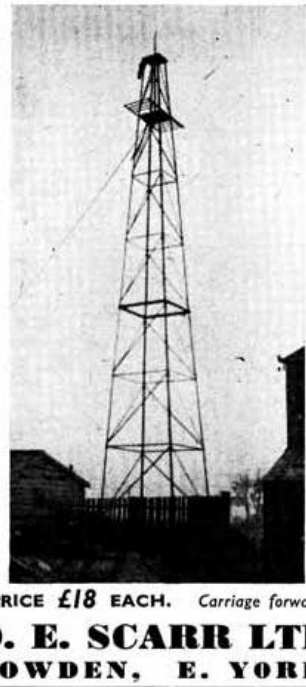

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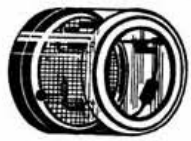

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Four-valve battery superhet chassis covering 6–9 Mc/s. (50–33 metres) for 'phone operation. Contains: 4–2 V. valves, slow motion drive, I.F. coils, etc. Size 9½" x 6" x 5". Power requirements approx. H.T. 100 V., L.T. 2 V.

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Wireless Set No. 48 MK. I Transmitter/Receiver

American version of the No. 18 set, modified to U.S. Army requirements.

Frequency coverage 6–9 Mc/s. 33·3–50 metres.

Complete equipment for 'phone and C.W. comprising:

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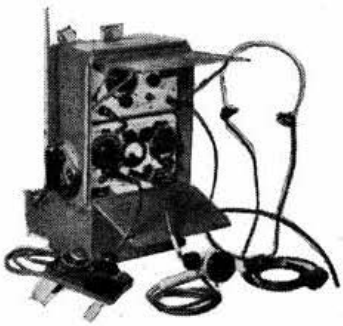

Receiver, superhet circuit, employing 6 valves, 1LN5 H.F. Amp., 1LA6 1st det. F.C., 1LN5 I.F. Amp., 1LD5 2nd det. and B.F.O., 1LD5 1st L.F. and A.V.C., 1A5 output, I.F. frequency 455 kc/s., etc.

Hand Driven Generator, supplying H.T. and L.T. (plus 12 V. bias, when switched for WS-18), with operator's seat.

Aerial, 10 ft. rod type (11 section), range 5 miles R/T, 10 miles C.W., greater ranges can be obtained with a normal aerial. Plus cables and **Instruction Book.** This equipment can also be used with dry batteries (not supplied) as a **Portable Walkie-Talkie.**

Power requirements, H.T. 162 V. 60 mA., L.T. 3·1 V. 0–3 A.

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Input 110 V. A.C. 50 c/s.

H.T. outputs: 2,100 V. 375 mA., 500 V. 400 mA., 450 V., 275 V. Bias 275 V., 250 V., 150 V., 80 V.

Components include: Transformers (1) 2,100–0–2,100 V. tapped, 500–0–500 V.; (2) 450–0–450 V., 13VCT, 6·3 VCT, 6·3 V., 5 V.; (3) 2·5VCT plus thermal starter 6·3 V. Chokes: 2/15 H. 375 mA., 15 H. 450 mA., 20 H. 162 mA., 2/15 H. 110 mA. HV condensers, etc. Valves: 2/6A3's, 6SJ7, 4/866A/866's, 5Z3, VR150/30, 1 V. starter tube. In metal case, finished in olive-drab crackle, with output and input sockets and switches. Dimensions: 2' 6" x 1' 6" x 1'. With shock-absorbing feet. Weight, 420 lbs.

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R.S.G.B. BULLETIN

OFFICIAL JOURNAL OF THE
RADIO SOCIETY OF GREAT BRITAIN (INC. 1926)

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

Editor: JOHN CLARRICOATS—G6CL
Editorial Office: NEW RUSKIN HOUSE,
LITTLE RUSSELL STREET, LONDON, W.C.1
Telephone: Holborn 7373
Honorary Editor: ARTHUR O. MILNE—G2MI

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

Contents

Forthcoming Events

REGION 1

Ashton-under-Lyne.—March 5, 3 p.m., New Jerusalem Schools.
Bolton.—March 7, 8 p.m., Y.M.C.A.
Bury.—March 9, 7.30 p.m., Atheneum, Market Street.
Darwen and Blackburn.—February 24, March 10, 7.30 p.m., Y.M.C.A., Limbrick, Blackburn.
Liverpool.—February 18, 2.30 p.m., 29 Derby Lane, Old Swan.
Manchester.—March 6, 7.30 p.m., Reynold's Hall, College of Technology, Sackville Street.
Oldham.—Alternate Wednesdays, 7.30 p.m., Civic Centre, Clegg Street.
Preston.—February 17, March 3, 7.30 p.m., Three Tuns Hotel, North Road.
Rochdale.—March 5, 3 p.m., Drill Hall, Baron Street.
Southport.—February 20, 8 p.m., 38 Forest Road.
Wirral A.R.S.—March 1 and 15, 8 p.m., Y.M.C.A., Whetstone Lane, Birkenhead.

REGION 2

Barnsley.—February 24, March 10, 7.30 p.m., King George Hotel, Peel Street.
Bradford.—February 28, March 14, 7.30 p.m., Cambridge House, 66 Little Horton Lane.
Catterick.—Tuesdays, 7 p.m., Loos Lines, Catterick Camp.
Darlington.—Thursdays, 7.30 p.m., Club Room, British School Yard, Skinnergate.
Doncaster.—Wednesdays, 7.30 p.m., 73 Hexthorpe Road.
Harrogate.—Wednesdays, 7.30 p.m., 7 Wetherby Road.
Leeds.—Fridays, 7 p.m., Swathmore Settlement, Woodhouse Square.
Middlesbrough.—Wednesdays, 7.30 p.m., Liberal Institute, Southfield Road.
Newcastle-upon-Tyne.—February 20, 8 p.m., British Legion Rooms, 1 Jesmond Road.
Sheffield.—February 22, 8 p.m., Dog and Partridge, Trippet Lane. March 8, 8 p.m., Albreda Works, Lydgate Lane.
Spenborough.—March 1, 15, 7.30 p.m., Temperance Hall, Cleckheaton.
York.—March 1, 15, 7.30 p.m., Rechabite Building, Clifford Street.

REGION 3

Coventry.—February 17, 7.30 p.m., Priory High School, Wheatley Street.
South Birmingham.—March 5, 19, 10.30 a.m., Stirchley Institute.

REGION 4

Derby (D. & D.R.S.).—February 15, 22, March 1, 8, 15, 7.15 p.m., Club Room No. 4, 119 Green Lane. March 17, Annual Dinner and Social, Irongates Grill Room, Iron Gate.
Loughborough.—March 8, 7.30 p.m., Limehurst School.
Mansfield (A.R.S.).—March 5, 3 p.m., Swan Hotel.
Peterborough.—March 7, 7.30 p.m., St. John's Ambulance H.Q., Cow Gate.

REGION 5

Chelmsford.—March 7, 7.30 p.m., 184 Moulsham Street.

REGION 7

London.—February 24, 6.30 p.m., Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2. Tea 5.30 p.m. Lecture on "Panoramic Reception" by Mr. B. H. Briggs, M.A., Grad.I.E.E. (G2FJD).
Barnes and Richmond.—March 14, 7.30 p.m., 22 Lowther Road, Barnes.
Brentwood.—February 17, March 3, 17, 8 p.m., Drill Hall, Ongar Road.
Croydon (Surrey R.C.C.).—March 14, 7.30 p.m., Blacksmiths Arms, South End, Croydon.
East London District.—February 19, 3 p.m., Town Hall, Ilford. "Modulators," by H. A. M. Clark, B.Sc.(Eng.), A.M.I.E.E.
Edgware (E. & D.R.S.).—Every Wednesday, St. Michael's School, Flower Lane, Mill Hill.
Enfield.—February 19, 3 p.m., George Spicer School, Southbury Road.
Finsbury Park.—February 21, 7.30 p.m., Albion Road, Stoke Newington, N.16.
Grays.—February 24, March 10, 8 p.m., Bairds Cafe, Grays.
Harrow.—February 16, March 16, 8 p.m., Eastcote Lane Junior School (between Tithe Farm and Eastcote Arms Hotel).
Hayes.—March 1, 7.30 p.m., The Vine, Uxbridge Road.
Hoddesdon.—February 16, March 2, 16, 8 p.m., The Salisbury Arms.
Holloway (Grafton R.S.).—Mondays, Wednesdays and Fridays, 7.30 p.m., Grafton School, Eburne Road, N.7.
Ilford.—February 23, 8 p.m., 78 Eccleston Crescent, Goodmayes. March 9, 32 Albemarle Gardens, Ilford.
Peckham.—March 6, 7.30 p.m., The Kentish Drover, Rye Lane.
St. Albans.—March 8, 8 p.m., The Beehive, London Road.
Slough.—February 16, March 16, 7.45 p.m., The Labour Memorial Hall, Chandos Street.
Uxbridge.—March 3, 7.30 p.m., The Vine Inn, Uxbridge Road, opposite Hillingdon Church.
Welwyn.—March 7, 8 p.m., Council Offices, Welwyn.

REGION 8

Brighton.—Tuesdays, 7.30 p.m., Eagle Inn, Gloucester Road.
Guildford.—February 26, 3 p.m., Cinema Cafe, Woodbridge Road.
Southampton.—March 4, 7.30 p.m., 22 Anglesea Road, Shirley.
Worthing.—Mondays, 7–8 p.m. (Morse class), Adult Education Centre, Union Place.
Reading (R.R.S.).—February 25, March 9, 7 p.m., The Abbey Gateway.

REGION 9

Exeter.—March 2, 7 p.m., Y.M.C.A., 41 St. Davids Hill.
Plymouth.—February 18, 7 p.m., Tothill Community Centre, Tothill Park, Knighton Road, St. Judes.
Torquay.—February 18, 7.30 p.m., Y.M.C.A., Castle Road.

REGION 13

Edinburgh.—March 2, 16, 7.30 p.m., Chamber of Commerce, 25 Charlotte Square.

REGION 14

Ayr.—February 22, 7.30 p.m., Royal Hotel, Prestwick.
Falkirk.—February 24, 7.30 p.m., Temperance Cafe, High Street.
Glasgow.—February 22, 7 p.m., 39 Elmbank Crescent.

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Heater Current (amps)	0.95	0.6	0.3	0.35	0.95	0.35
Max. Anode Voltage (volts)	250	250	250	250	200	250
Max. Screen Voltage (volts)	250	250	250	250	200	250
*MutualConductance(mA/v)	8.5	8.5	7.5	9.0	8.75	10.6
*Anode Impedance (megohms)	0.7	0.7	0.9	0.9	–	0.125
Inner μ	80	80	74	57	28	33
Max. Anode Dissipation (watts)	4.5	4.5	2.5	3.5	5.0	4.0
Max. Screen Dissipation (watts)	1.25	1.25	0.8	1.0	1.0	1.0

RATING	SP41	SP61	6F12	6F13	VIDEO SP42	VIDEO 6F14
Maximum Potential Heater/ Cathode (volts D.C.)	100	150	150	150	100	150
Base	B07	B07	B7G	B8A	B07	B8A
DIMENSIONS						
Max. Overall Length (mm)	95	95	54	67	95	67
Max. Diameter (mm)	32	32	19	22	32	22
LIST PRICE	10/6	10/6	17/6	15/6	10/6	15/6
*At Anode Current (mA) At Anode & Screen Voltages Grid Voltages	10.9 200 −1.5	10.9 200 −1.5	10 250 −2.0	10 200 −1.8	27 140 −1.25	27 135 −1.3

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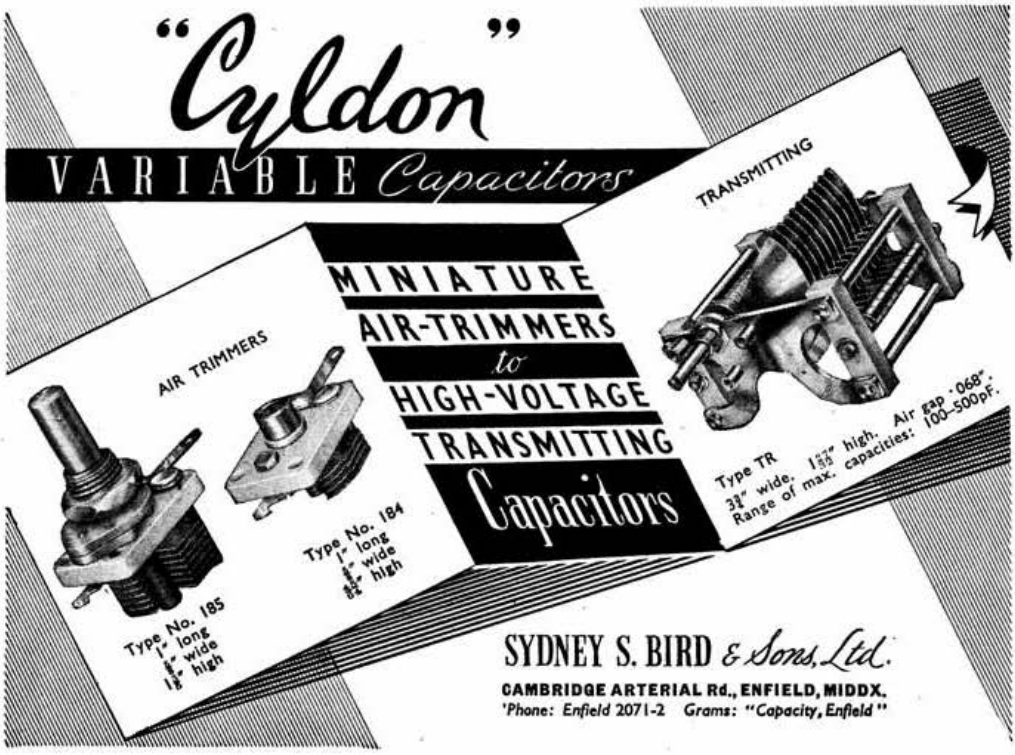


R·S·G·B

BULLETIN

For the advancement of Amateur Radio

VOLUME XXV No. 8 FEBRUARY 1950

PUBLIC MIS-INFORMATION

RECENT events have underlined the very real injury which the effects of television interference could, in a short space of time, cause to the good name of the Amateur Radio movement in this country. Last month we reprinted from a Worthing newspaper a letter which emphasised that radio amateurs were often blamed for interference caused by all kinds of electrical equipment. The knowledge that similar impressions exist in other localities is proved by the growing number of comments, often of a hostile nature, which have appeared of late in the correspondence and editorial columns of the local and national Press.

One way of tackling this difficult situation is to call a public meeting at which the problems of both the viewer and the radio amateur can be frankly discussed in the presence of impartial representatives of the G.P.O. Such a meeting was held a few weeks ago at Uxbridge, Middlesex. During the course of the proceedings—attended, incidentally, by more than 50 persons—it soon became clear that the local amateurs were responsible for only a small percentage of the interference for which they had been blamed. As a result of the full and plain discussion which took place that evening, we are led to hope that most of the viewers went away firmly convinced that the amateur is anxious and willing to assist in the elimination of his own occasional transgression and ready at all times to advise the layman on the possible sources of electrical interference in the district.

What else can the transmitting amateur do to dispel the hostile attitude of so many viewers? As a start he must make quite certain that he is not radiating troublesome harmonics during TV programme hours. It is useless for him to become a " sea-lawyer " and quote ambiguous conditions of his licence, or to claim that because he pays as much—or more—than the viewer, he has a right to enjoy his hobby regardless of any detriment he may cause to others. Such an attitude would be foolish in the extreme. Television is sweeping in on a spring tide and no amateur can hope to stem the flood merely by reminding the general public of the unquestionable value of Amateur Radio to the community—although there is no reason why he should be unduly modest when the occasion is appropriate ! Instead he *must accept* the technical challenge which the rising waters have brought, or find himself submerged.

No one would claim that the elimination of harmonic radiation is always an easy matter, particularly where TV signal strengths are low, but it *can* be achieved—at least in the vast majority of cases. In addition to the valuable guidance already published in the BULLETIN and in the booklet *Transmitter Interference*, further important articles are in course of preparation, including a detailed description of the fully suppressed 25-watt transmitter demonstrated recently by Mr. Louis Varney, G5RV, at a crowded East London meeting.

It cannot be stressed too often that amateurs must be prepared for an extension of television programme hours in the near future. To close down during such periods should never be accepted as a *permanent* solution. Where the Radio amateurs in a particular locality are convinced that they are becoming subjects for unfair criticism by ill-informed viewers it is their bounden duty to put a stop to this state of affairs. This can be done by sending to the Editor of the local newspaper a reasoned account of the true position. The letter should point out that there is an almost infinite number of potential sources of television interference: motor and aircraft ignition; commercial, service and aircraft transmitters; R.F. heating and welding plant and other industrial electronic equipment; medical diathermy and ultra violet lamps; a multitude of household appliances such as vacuum cleaners, sewing machine motors, hair-dryers, defective switches and—as has been proved on a number of occasions—even broadcast and television receivers. The letter should also stress that many of the cases of so-called interference are due to faulty or badly adjusted receivers or unsuitable aerial systems. It should explain that certain receivers are prone to interference through no fault of the amateur. Mention should be made of the fact that the G.P.O. will investigate all complaints submitted on the official forms available at the local Post Office. Finally the letter should leave the reader with the impression of a genuine desire on the part of the amateurs in the district to co-operate fully with the viewers so that each group may pursue their chosen recreation without mutual recrimination. In other words, let the public see that radio amateurs—like all other reasonable people—want to be good neighbours.

THE AMATEUR HORIZON

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

There is a tendency for most of us to accept our hobby almost without question; failing often to observe the gradual changes which are continuously taking place until it is too late for our personal efforts to affect the issue. In this comprehensive and stimulating address our new President seeks to examine the state of Amateur Radio, to-day, and to consider carefully the relationship between the amateur and his hobby; the amateur as a member of the Society; and the amateur as a world citizen. We feel certain that Mr. Scarr's conclusions will be studied closely and discussed at length by all who are concerned with the future well-being of the Amateur Radio Movement.

THE AMATEUR AND HIS HOBBY

IN times of rapid and diverse development, the student of any science is in danger of losing his sense of perspective, or in common parlance, of failing to see the wood for the trees. No one is more prone than the radio amateur to suffer this inability to remove himself to a psychological distance from his hobby and to survey dispassionately the whole field of his interest.

The aim of this brief address is to encourage every member of the Society to pause for a moment in the feverish pursuit of his hobby and to consider what it is and where it is leading. After four years of post-war conditions it is perhaps high-time we called a halt and took our bearings.

Those of us who have been " on the air " since the early days know only too well how the hobby to-day differs from the amateur activities of 20 or 25 years ago. The story of the past has now been told and written many times and it is not my intention to reiterate it here. Nevertheless, we may well reflect for a moment on some of the most recent changes in practice and technique.

Post-War Problems

With the restoration of licences after the war one major requirement soon became apparent. This was the accommodation, within the narrow channels allotted to the amateur, of all the signals being propagated, without the production of sheer chaos. Apart from the vast number of transmissions, there existed the problem of power, the increase of which so often leads to the obliteration of distant signals by nearer stations using at least maximum licensed power. In the opinion of many, far better conditions would have pertained had the permissible power been restricted to ten watts as in early days, but the use of very high power in other countries led the British amateur to seek permission to use sufficient power to enable him to some extent to hold his own with stations located overseas.

Band planning, single sideband transmission, the use of highly directional and rotatable aerials, single-channel working and the installation of variable-frequency transmitting devices have been amongst the most important developments of the last four years and all have in their different ways been introduced as counter-measures to the threatened chaos on our highly-congested bands.

Today the problem is but partly solved and the amateur will be well advised to redouble his energies to find a fuller solution. Even with the best equipment contacts with stations at long range are a gamble and often the best results go to those who by sheer brute force " shout down " their weaker competitors. This is a sad state of affairs and contacts made in this way can have little, if any, scientific value.

"DX"

Much more would be achieved if the amateur could shake off the feverish thirst for " DX," which in its most sinister form can transform him into a scarcely human animal devoid of all sense of time and utterly lacking in consideration of his family or his fellows. Everyone recognises the thrill with which the newly licensed amateur makes his first world-wide contacts. Even with humble equipment it is so easy to spray the antipodes with signals that once it has been done, one would expect the youthful operator to turn to more worthwhile aspects of his hobby. But no, once struck down with the fever, he must, it seems, suffer its tortures for year after year, at the same time collecting with a miserly hand the postcards with which he demonstrates to the world in general how badly the disease is affecting him.

No one will dispute that the establishment of world-wide contacts can be of great interest and value—particularly in the study of propagation characteristics on various frequencies and under various climatic and seasonal conditions. Unfortunately, however, hardly one amateur in a hundred pauses to give serious consideration to the scientific value of his DX work, the whole of his energies usually being devoted to secondary aims such as the scoring of points in a competition or the collection of cards.

Experimental Opportunities

Fortunately to-day there are signs that more and more members *are* turning away from these adolescent pursuits and seeking to make something really worthwhile of the opportunities given to them.

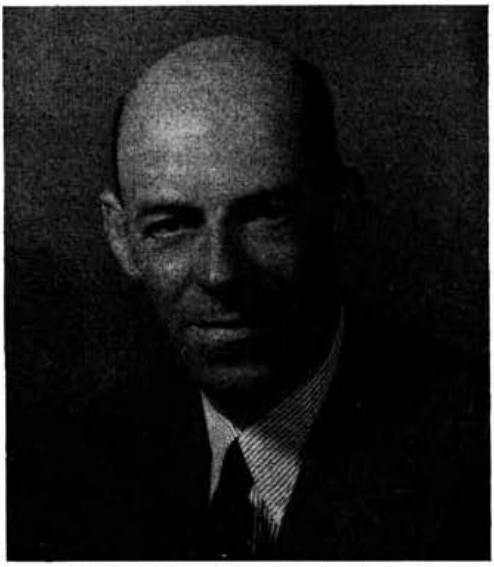
It is, I think, significant that the openers of our annual Amateur Exhibition have on two successive occasions stressed the need for more serious experimental work by the members. And yet it is safe to say that of the 14,000 members of the Society today, not more than four or five per cent. are doing work which can be said to have any scientific value.

Three possible reasons for this may be mentioned. The first is the belief that such work demands a workshop and a room packed with expensive apparatus; the second is a lack of understanding of the method of tackling a specific problem and the third, a popular belief that unlimited time is necessary if one is to do anything worthwhile. How often one hears these reasons put forward as excuses by the man who month after month, is just about to start on such and such a band or on some new piece of work. Usually the truth is that he is still in the throes of " DX " fever!

* *Delivered at a meeting of the Society held on Friday, January 27, 1950, at the Institution of Electrical Engineers, London, W.C.2.*

Undoubtedly the greatest opportunity for original investigation lies in the development of ultra-short-wave techniques. Scientists throughout this country are watching keenly the efforts of the amateur in this field. It remains to be seen whether the amateur has sufficient vision and resourcefulness to seize this great opportunity. Useful work is already being done by a comparatively small band of enthusiasts. Others seem merely anxious to strive for long distance contacts and one rather despairs on reading arguments as to whether 420 Mc/s. will be " as good as " 144 Mc/s., realising that " good " is merely a reference to " DX " possibilities. One need not be a scientist to appreciate that as the frequency of signals is increased, their properties approach more nearly those of light. Sharper and sharper become the "shadows" cast by intervening objects and therefore shorter and shorter will the normal ranges become. The " DX hound " will regard this as a drawback, but the real investigator will be intrigued by the corresponding possibilities of highly directional and secret communication which these bands offer, and will be inspired to set out on detailed exploration of their peculiar characteristics and methods of propagation.

Before leaving this part of the subject, I should like to indicate one or two other lines of advance



Mr. W. A. Scarr, M.A., G2WS, President 1950.

which should I feel, occupy the attention of the experimenter.

Much more could be done in the systematic study of ionospheric phenomena by both transmitter and listener. There is considerable scope for improvement in the design of feather-weight apparatus for short-range working on various frequencies and need for investigation into the reliability of communication over different paths with varying powers on different frequencies. The use of passive aerials as re-radiators and tests on the penetration of signals through water and through solids would all make interesting and valuable fields of experiment. Most of this work demands co-operation between pairs or groups of workers but is all the more interesting for this reason.

The opportunities provided in U.H.F. work have already been mentioned. Some will concentrate on the development of efficient apparatus (especially aerials), others will be more attracted to the study of propagation characteristics. It is safe to say that almost any carefully devised experiments on the centimetre bands will have some value at the present time.

Let us hope therefore that not only the few scientifically-minded members of our society but also those who spend their time parading their little knowledge and their domestic affairs over the air as well as those who find their greatest thrill in persuading lonely gentlemen on desert islands to talk to them, will spare time to make some small but worthwhile contribution to the more serious side of the hobby. Until they do, there is little hope that the amateur will be regarded as a blessing to the community and not a pest or that the Society will obtain the recognition from the licensing authorities and from the nation which we all desire.

THE AMATEUR AS A SOCIETY MEMBER

Let us now consider for a moment the individual member in his relationship to the Society. Many views have been expressed on this subject in recent months and it is obvious that the Society represents entirely different things to different people. So, as in any organisation, there are those who merely regard it as an investment, a service to be paid for in cash. This is membership at its lowest level and in the case of the R.S.G.B. it may be taken as payment for a monthly magazine written by other people and a convenient way of receiving and sending large numbers of postcards for a minimum outlay of time and money.

But if all the members held this point of view, the R.S.G.B. would certainly not merit the name " Society "—it would be a mere bureau, agency or publishing concern.

The essential feature of a Society is a body of persons associated together for a common purpose—in our case for the pursuit of a pleasurable and instructive hobby and the furtherance of a new science. It follows that the member who gets the most out of the Society is he who devotes himself wholeheartedly to it.

Many members undoubtedly give far more to the Society than they get *from* it and it is these stalwarts who in fact contribute not only their own share but the shares of those who do nothing beyond the payment of a subscription. The success of the Society will always depend not merely on the size of the subscription but on the number of members who in one way or another are prepared to put their knowledge and their services at its disposal.

The Society is deeply indebted to all who accept positions of responsibility as leaders or secretaries of local groups. The holding of local meetings is fundamental to the success of the Society. Nothing is more harmful than the practice of some members (fortunately only a small proportion) who spend day and night operating their transmitters, but never spare time to join their fellows for a friendly chat and so find an outlet for their pent-up feelings.

Publication of Results

There is to-day, I think, an increasing appreciation of the duty a Society member has, to make known, through the BULLETIN particularly, the special work that he is doing. Many have been prevented from such action in the past through a false sense of modesty whilst others have wished to keep their achievements to themselves for other reasons. Let us admit at once that however humble one's efforts may be, they should be shared with others if they are to become of value. The demonstration of the fact that you are at least attempting to do something worthwhile, is of the greatest value in itself. The Society's work would be greatly enhanced if more members would make their experimental work known through the columns of the BULLETIN.

At its highest level, the Society represents the focal point for amateur activity. It is the members' social club, source of information and advice, a court

of appeal in trouble, a centre through which one's own activities can be correlated and linked to those of others.

What the Society will become in future years depends on what the members put into it both in service and admittedly, in hard cash. One has been heartened in recent months to learn that some members can visualise a big future development in the Society—better premises, workshops, a research staff and so on. I believe that these things will come, not suddenly but by a steady move forward. The Society has I am sure, always given good value for money and will continue to do so. The Society will always be what the members choose to make it.

THE AMATEUR AS A WORLD CITIZEN

Lastly, I would dwell for a moment on the amateur's relationship to those in other lands.

As he presses the key or speaks into a microphone, the amateur is in possession of an uncanny power, greater in many respects than that of the statesman or politician. In a flash he can send out a message which will penetrate the furthest corners of the earth, respecting no political barriers, knowing no frontiers, speeding across unknown tracts to deliver its greeting to some other amateur—to bring, in a fraction of time, feelings of warmth and companionship between two people separated by race and creed, by ocean and desert—bringing to them in that annihilation of space the knowledge of their kinship as citizens of one world—as brothers in the family of nations—as fellow seekers after the wonders which the world holds for all who are prepared to seek.

And so where politicians fail, where governments are impotent and the peoples held apart by ignorance and misunderstanding, the amateur is able to kindle the spark, to touch the chord which can produce harmony between man and man, the harmony which this world needs so vitally in these days of doubt and anxiety. It behoves every one of us to ponder over this responsibility and to regard this power of engendering friendship as a sacred trust. Let us see to it that as amateurs we not only operate correctly and courteously but that we recognise and fulfil our wider and more poignant opportunities of acting as bearers of the message of peace and goodwill, extended through the magic of our science, to all peoples who on earth do dwell.

A 6K8 Low-Power Transmitter

IN the June, 1949, issue of *Break-In*—official journal of the *New Zealand Association of Radio Transmitters*—Mr. J. L. Rough, ZL3DT, describes a novel 3·5 Mc/s. QRP transmitter which uses a 6K8 triode-hexode frequency changer valve in order to obtain many of the advantages of a two-stage V.F.O. transmitter with a single valve.

The circuit, shown in Fig. 1, consists of a simple regenerative feed-back triode oscillator operating on 1·75 Mc/s. coupled *via* the hexode injection grid to a power doubler stage with output on 3·5 Mc/s. This system possesses the advantage that all coupling is through the electron stream. A small positive voltage is applied to the control grid of the hexode section of the 6K8 by means of a resistor network and both stages are keyed simultaneously by the use of cathode keying. The stability of the oscillator is ensured by tapping the grid down one third of the coil and using a large capacity fixed condenser (C1) across the control circuit. The connection of a voltage regulator tube VR150 between the anode end of R2 and earth would probably further increase stability; a well-smoothed power supply is advisable.

The plate current of the hexode section is approximately 15 mA. unloaded and T9 results should be obtained with up to 20 mA. to this stage, representing some 5 watts input. Under such conditions the 6K8 is operating considerably in excess of its normal ratings but ZL3DT comments that after 5 months working, his valve has suffered no apparent ill-effects and is still going strong.

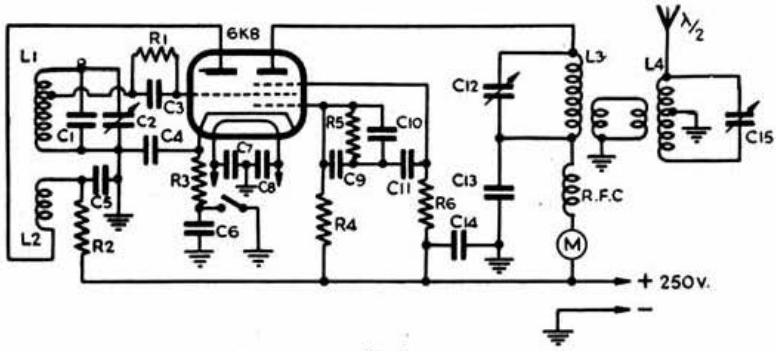


Fig. 1.
Circuit of ZL3DT's low-power 3·5 Mc/s. transmitter.

C1	500 $\mu\mu$F.	C7, 8	·002 μF.	R3	1,000 ohms.
C2	75 $\mu\mu$F. variable.	C12, 15	100 $\mu\mu$F. variable.	R4	·5 megohm.
C3, 9	100 $\mu\mu$F.	C13	·01 μF.	R5	50,000 ohms 2 watt.
C4, 5, 10, 11	·005 μF.	C14	·1μF.	R6	10.000 ohms 2 watt.
C6	·5 μF.	R1	·1 Megohm.	M	25 mA. F.S.D.
		R2	10,000 ohms 5 watt.		

COMMUNICATION RECEIVER DESIGN†

BY DENIS HEIGHTMAN* (G6DH)

In this paper the author—who was responsible for the development of the Denco DCR 19 receiver—discusses, with particular emphasis on amateur requirements, the factors which govern the design of a modern communications type receiver.

IT is proposed in this paper to review the main requirements and factors governing the design of a modern general purposes communications-type receiver from the point of view of (*a*) the potential buyer and operator and (*b*) the set designer and manufacturer. Consideration will be confined to A.M. (A3), M.C.W. (A2) and C.W. (A1) reception on frequencies between 150 kc/s. and 35 Mc/s., with emphasis on those bands assigned to amateurs.

The average operator, when asked to indicate the most important features he requires in a receiver, will produce a list such as follows :—

(1) Good sensitivity and signal-to-noise ratio, permitting the reception of the weakest useable signals.

(2) High selectivity, preferably controllable to extreme limits for C.W. reception.

(3) Good stability, both electrical and mechanical.

(4) Freedom from spurious responses (images, whistles, etc.).

(5) Convenient layout of controls with pleasing appearance.

(6) Accurate calibration of tuning controls with adequate band spread, preferably with a means for checking calibration.

(7) Accurate-reading signal-strength meter.

(8) Effective noise-limiter.

(9) General reliability and robustness.

(10) Reasonable price.

Inevitably the last feature—that of price—will be one which has to be closely watched by the manufacturer, who, normally, within limits, controls the designer. Without having to consider cost a designer could undoubtedly produce the ideal receiver but it would be beyond the reach of all but the chosen few.

Signal–to–Noise Considerations

To achieve good sensitivity we should be quite clear on what decides the maximum gain that can be effectively used. Actually, to a marked degree, this has been set by nature ! Cosmic and solar radiations set up in any receiving aerial small random voltages which produce noise in a sensitive receiver very similar to valve noise or hiss. The magnitude of this noise is dependent to some extent on the time of day, aerial gain and directivity, frequency and band-width. In the frequency band under consideration the noise generally tends to be greater the *higher* the frequency, due, it is thought, to the fact that on lower frequencies the ionosphere reflects or absorbs more effectively this incoming radiation. However on frequencies lower than about 15 Mc/s., the effects of static and electrical interference are more pronounced while the effects of extra-terrestial radiation are negligible. In general too, on the lower frequencies the receiver will be working with higher signal strengths due to the shorter distances involved, and the gain requirement will be less than that on the higher frequencies. Thus the ultimate gain requirements will be set by the aerial noise received at the highest frequency range of the receiver, for, obviously, a signal which provides *less* voltage at the receiver input than the aerial noise will be unreadable.

To consider actual figures, very roughly it can be stated that at 30 Mc/s. (nearly the highest frequency normally used in this class of receiver) with a band-width of 10 kc/s. the aerial noise will appear as a voltage of the order of 0·25 microvolt at the end of a 100-ohm feeder line. For a reasonably intelligible signal we should have at least a 6 db. signal-to-noise ratio. In other words our minimum usable signal becomes of the order of 0·5 microvolt, and neglecting other factors, the receiver has to provide a loud-speaker signal from this R.F. input voltage, preferably *not* introducing additional noise of its own making. An overall gain of the order of 120 db., *i.e.* voltage $\times 10^6$ will bring the 0·5 μV. to 0·5 V., which is the order of audio signal required to drive the normal audio amplifier and output stages in the receiver. This is in terms of a C.W. signal or 100 per cent. modulated telephony. Thus we can fix an approximate gain from the aerial input to the second detector output (*i.e.* the R.F./I.F. section) of 120 db., and further consider as to how this gain should be distributed over the various stages of the receiver.

High selectivity (2) and economy (10) dictate that as much gain as possible should be obtained at a low intermediate frequency, for it is much simpler to obtain optimum performance from stages operating at a single frequency, as with an I.F. amplifier, than from continuously-tuned R.F. stages. As the frequency is lowered so also will the band-widths of the tuned circuits be less for a given *Q*.

On the other hand good sensitivity and signal-to-noise ratio (1), as well as freedom from spurious responses (4), necessitate the use of a properly designed R.F. stage (or stages) to overcome the effects of mixer noise and a sufficiently high I.F. to give good image rejection.

Valve Noise

To revert to the " front end " once more it will be of interest to examine what is required of the R.F. stage. Valves produce noise voltages due to fluctuations in the electron flow between cathode and plate. It is convenient to consider these valve noise voltages as if the valve were perfect and the noise source were in the grid circuit, as a resistor or generator. The noise voltage, referred to the grid of a typical R.F. pentode, is of the order of 1·0–1·5 μV. at 10 kc/s. band-width. Modern miniature high slope pentodes of the American 6AK5 or the British EF91, 8D3, class produce a rather lower figure, of the order of 0·5–0·6 μV. Mixer valves unfortunately produce considerably more noise. On the same basis, the noise at the grid of a typical mixer is 5–6 μV.

To consider again the minimum signal-readable-above-aerial noise, *i.e.* 0·5 μV., the usual aerial coupling circuit will at 30 Mc/s. provide a step-up of the order of 3–4 times and thus the signal appears at the first grid at about 2 μV. Obviously, if this signal is applied to a mixer with 5 μV. of noise it will be unintelligible. Therefore our first requirement is to present the signal to the grid of the valve with the lowest noise figure and amplify it to a sufficient degree in the R.F. stage to overcome the extra noise of the mixer. The miniature pentode with the figure of 0·5

† *A paper read at a meeting of the Society held on May 27, 1949, at the Institution of Electrical Engineers, London, W.C.2.*

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μV. will add a negligible amount of noise to the aerial noise (which stepped up in the aerial coupling circuit will appear at the grid as 1 μV).

At 30 Mc/s. it is easy to obtain a gain of 20 db. in a single stage using one of these high-slope pentodes *i.e.* a 2 μV. signal at the grid can be presented to the following stage as 20 μV. which will be at a sufficient level to make the contribution of the mixer to the general noise negligible. (The amplified noise from the R.F. grid and aerial will appear as about 11·0 μV. at the following grid.) Thus considering requirements (1) and (10) it will be seen that a single R.F. stage, provided it is well designed, will be sufficient.

practice, by using three instead of the more normal two I.F. stages, it will be found that ample selectivity is obtainable. In other words one of the two R.F. stages needed with a 465 kc/s. I.F. can be replaced by an extra I.F. stage if a 1,600 kc/s. I.F. is chosen. The latter arrangement is more economical. An I.F. of 1,600 kc/s., is about the most convenient value in practice, falling as it does between the H.F. end of the medium wave-band (1,550 kc/s.) and the L.F. end of the 1·8 Mc/s. amateur band. With careful design and screening it will be found possible to work within 50 kc/s. of the I.F. before instability occurs, or considerably closer if the R.F. gain is reduced.

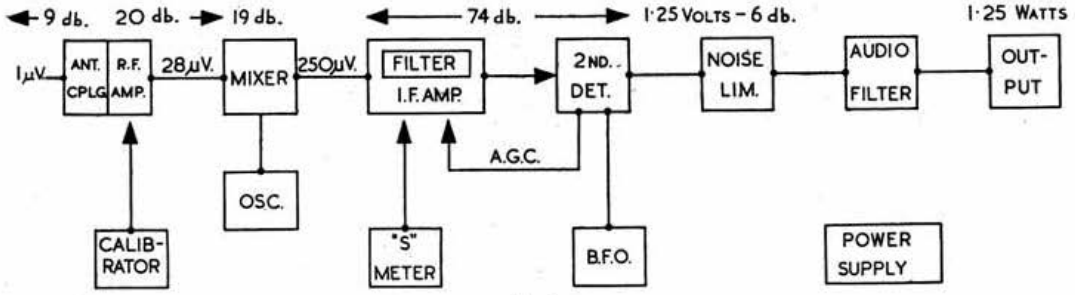


Fig. 1.

Block diagram of the receiver discussed in the text, showing approximate gains (db.) per stage and indicating the voltages appearing at various stages when a 1 μV. signal is applied to the aerial terminals.

Note that in the foregoing paragraphs a band-width of 10 kc/s. has been assumed. By using considerably narrower band-widths, particularly for C.W. reception, the general noise level, which is proportional to the square root of the band-width, will be reduced and it will be possible to receive a weaker signal with the same signal-to-noise ratio. For example, if the band-width were dropped to 2·5 kc/s.—*i.e.* ¼ the previous value the noise would be halved (*i.e.* $\times \sqrt{0 \cdot 25} = 0 \cdot 5$). Thus a signal of half the original voltage could be received (*i.e.* 0·25 μV. at the receiver input).

The picture can now be looked at from the point of view of selectivity (2) and freedom from spurious responses (4), particularly in regard to image rejection. Here the choice lies between using a few stages of low intermediate frequency with additional R.F. stages, or rather more stages at a medium I.F. with a single R.F. stage.

Image rejection will become progressively worse as the receiver is tuned higher in frequency. Hence taking the worst possible case and considering reception at about 30 Mc/s., it will be found that an average single R.F. stage with a 1,600 kc/s. I.F. (*i.e.* image 3·2 Mc/s. from the signal) will give a signal-to-image ratio of about 40 db., which is adequate for normal purposes. With one R.F. stage and a 465 kc/s. I.F. however, the rejection will only be approximately 20 db., *i.e.* an S9 image signal would appear at S5/6. On the 28 Mc/s. amateur band this is particularly undesirable since the images 930 kc/s. (I.F. × 2) away from the desired signal may still fall within the band. For example, a signal on 29·0 Mc/s. may be interfered with by transmissions on 28·07 Mc/s. Thus two R.F. stages are necessary with I.F.'s of the order of 465 kc/s. in order to give only the *same* image rejection as with one R.F. stage and a 1,600 kc/s. I.F.

Two stages of R.F., with their attendant tuning, band-change, multiple coils, instability problems, etc., are costly in production and, as has been shown by the foregoing remarks, only confer the advantage of permitting the use of a lower I.F. If sufficient I.F. selectivity can be obtained at 1,600 kc/s., then it is obviously desirable to choose this frequency. In

Frequency Range

Having sketched the broad outlines of a suitable receiver, it is now opportune to consider further, in rather more detail, other aspects of the design. Of these the first to be decided is the frequency range to be covered by the R.F. tuned circuits. For the lower frequencies a 3 : 1 tuning ratio is satisfactory. If continuous coverage is required from, say, 175 kc/s. (*i.e.* including the long wave broadcast band), this can be achieved by using three bands, namely, 175–525 kc/s.; 515–1,545 kc/s. (allowing 10 kc/s. overlap); 1,650–4,950 kc/s. (leaving a gap at the I.F. of 1,600 kc/s.). On the higher frequencies a 2 : 1 ratio is more desirable in a continuous coverage receiver, both in the interests of less critical tuning and also of circuit performance from H.F. to L.F. limits of any particular range. This can be achieved by adopting three more bands, namely, 4·8–9·6 Mc/s.; 9·4–18·8 Mc/s.; 18–36 Mc/s. The restricted ratio on these ranges can be easily obtained by the insertion of suitable fixed condensers in series with the main tuning condensers, without materially compressing the greater part of the frequency range to one end of the tuning scale.

Good performance necessitates the keeping of circuit capacities to a minimum, *i.e.* maintaining a high L/C ratio. The lower the minimum circuit capacities, the lower the maximum value of tuning condenser required (since higher value inductances will be used). In practice a tuning condenser with a maximum capacity of about 310 μμF. and a minimum capacity of about 11 μμF. will allow the required coverages to be obtained. A low value air trimmer can be used for adjusting circuit minimum capacities, within the tolerances required for production. Including valve input capacity, wiring and other stray capacities, a total circuit minimum of the order of 35 μμF. is permissible.

Low minimum capacities and questions of electrical stability are arguments in favour of mechanical methods of band-spread in preference to the addition of small variable condensers in parallel with the main tuning as is frequently done. The question of band-spread will be considered later, however.

Constant Gain

Whilst not very obvious, there are distinct advantages in a circuit arrangement which gives substantially constant gain over the receiver tuning range. In particular, requirement (7)—accurate "S" meter readings—necessitates such an arrangement. With many receivers the gain in the R.F. and mixer circuits is progressively greater the higher the set is tuned on any particular coil range. Often the amount of gain is decided by such questions as that of preventing instability at the H.F. ends on the tuning ranges with a consequent falling off in performance at the L.F. ends.

Obviously the gain in the I.F. circuits is constant. Constant overall gain therefore will be dependent on the characteristics of the aerial input, R.F. and mixer circuits. In the case of the first tuned circuit with its aerial coupling, the gain will increase with frequency on any particular range. This rising characteristic can be offset if an anode circuit which has a falling characteristic is used in the R.F. stage. This falling characteristic can be obtained if a fixed high L circuit, tuned to a frequency about 0·6 of the lowest frequency on a particular range, is employed as the primary of the coupling transformer between the R.F. anode and the mixer grid circuits. The gain on any particular range can also usefully be determined by correct choice of the L/C ratio in this circuit. A very small coupling capacity (about 2 μμF.) between the R.F. anode and the mixer grid circuit will correct a tendency for excessive drop in gain towards the H.F. end of the tuning ranges.

The actual figure of overall R.F. stage gain which can be used over the receiver tuning range must be decided by the maximum that can be obtained on the highest range, namely 18–36 Mc/s., since on these frequencies the valve input impedance and tuned circuit dynamic resistance will be lowest. With valves of the EF91 class it will be found that, if due precautions are taken, stable performance at a gain of 20 db. plus 9–10 db. in the aerial coupling can be obtained. Care should be taken to see that all unwanted or unapparent couplings from R.F. grid to anode circuits are eliminated. For instance it has been found necessary to isolate the rotor spindle of the R.F. section of the tuning gang condenser from that of the mixer section, as sufficient coupling in the common earth return through the spindle and wiper arm can take place to produce instability.

As has already been mentioned, the gain on the lower ranges can be made equal to that on the highest frequency range by careful adjustment of the L/C ratio in the R.F. anode circuit and also the coupling factor to the mixer grid circuit. In this way stability is also assured since, obviously, excessive and uncontrollable gains would be obtained on the lower frequencies if a valve of this class were used without some such limiting arrangement.

Correct matching of the aerial or aerial feeder into the receiver is necessary for optimum performance. For a fairly wide range of impedance variations this can be effectively taken care of by a capacity potentiometer network shown which, in practice, takes the form of a 100 μμF. differential variable condenser.

Mixer Stage

Mixer requirements for constant gain or conversion are somewhat rigid when considering the wide range covered by the receiver. With many forms of mixer valve there are stray internal couplings of which the effect, and consequently the conversion conductance, varies with frequency. On the higher frequencies small capacity couplings introduce grid injection which increases the conversion as the tuning capacity is reduced. If a high impedance D.C. grid circuit is used for A.V.C. application on frequencies over 25 Mc/s., a small amount of grid current flows which tends to bias the grid negatively and to reduce conversion conductance. In order to maintain constant conversion the injected oscillator voltage must not vary to any great extent over the tuning range. The restricted tuning ratio on the higher frequencies is advantageous in this respect, as is also the use of a separate high slope oscillator valve.

Of the present-day mixer valves, the ECH35 class has been found to be the most suitable, bearing in mind the above requirements, but it is preferable, in the interests of constant conversion and stability, to use a separate oscillator valve. On spot frequencies it is, of course, possible to obtain a much higher conversion conductance than the 0·6 mA./V. of the ECH35 but it is almost impossible to maintain the higher figure over a wide frequency range. With the suggested mixer an approximate gain from signal to I.F. of 16 db. can be maintained.

The effect of variation of D.C. potentials on the grid and screen grid of the mixer is important when using high selectivity in the following I.F. stages, even with a separate oscillator. Variation of the negative grid voltage as obtained by A.V.C. action is sufficient to produce a reflected variation, by capacity, of the order of 500–1,000 c/s. in the oscillator frequency, particularly on frequencies over 10 Mc/s. The effect of screen voltage variation is the opposite to that of the grid. If the H.T. supply regulation is not good, such variation can occur with A.V.C. action. For these reasons it is considered preferable to exclude A.V.C. from the mixer grid and it has been found that the overall characteristic does not suffer materially thereby.

The screen voltage of the ECH35 mixer is fairly critical for optimum conversion. Owing to the fact that the screen current varies over wide limits with small variations in injected oscillator voltages, etc., and with the usual tolerances met in valves and components, the screen supply should be obtained from a potentiometer network or from a stabilised source, with no series feed resistor exceeding 25,000 ohms.

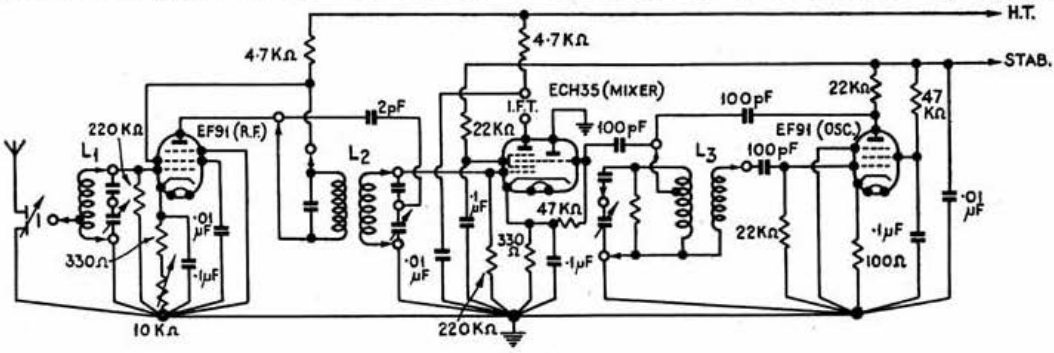


Fig. 2.
R.F., mixer and oscillator circuit.

Oscillator and I.F. Stages

The requirements of the oscillator have been largely considered under the mixer heading. Questions of tracking will not be dealt with here for the subject has already received considerable attention in various publications. In the interests of stability, maintenance of calibration, etc., great care, both electrical and mechanical, must, of course, be paid to this circuit, probably more than to any other section of the receiver. Stabilisation of the H.T. supply is most desirable. In the interests of standardisation it has been found that the same class of valve as that used in the R.F. stage performs satisfactorily as an oscillator. The high slope permits resistance damping of the tuned circuit so as to maintain constant output.

Thus far gains have been obtained of say 10 db. in the aerial circuit, 20 db. in the R.F. stage and 16 db. in the mixer—a total of 46 db., leaving an overall I.F. amplifier gain requirement of 74 db. to meet our previous estimate of 120 db. necessary up to the second detector. A gain of 74 db. *could* be obtained in two stages but the use of an additional stage allows better selectivity. Three stages also provides a more stable arrangement as it will be no longer necessary of 1 megohm in order to avoid a positive voltage building up on the A.V.C. line due to residual gas effects, etc., in these valves.

The use of three I.F. stages also permits a good A.V.C. characteristic to be obtained without the necessity of applying A.V.C. to the R.F. or mixer stages. For certain purposes, manual control of I.F. gain is desirable. This can easily be provided by the inclusion of a potentiometer in the negative H.T. supply line.

Selectivity

Considering feature (2)—high controllable selectivity—it has to be decided what arrangement will meet the average practical requirements. Generally speaking for reasonably good quality A.M. 'phone reception, a band-width of the order of 8–10 kc/s. for 6 db. down is required if excessive cutting of the higher audio frequencies is not to take place. For 'phone reception under difficult adjacent channel interference conditions, an equivalent figure of 3 kc/s. or less would be desirable. Unless, however, a rather expensive and complicated band-pass crystal filter is used the value of 3 kc/s. is too wide to achieve in a normal crystal filter. A value of 1·5 kc/s. band-width, however, can be obtained with a single crystal filter

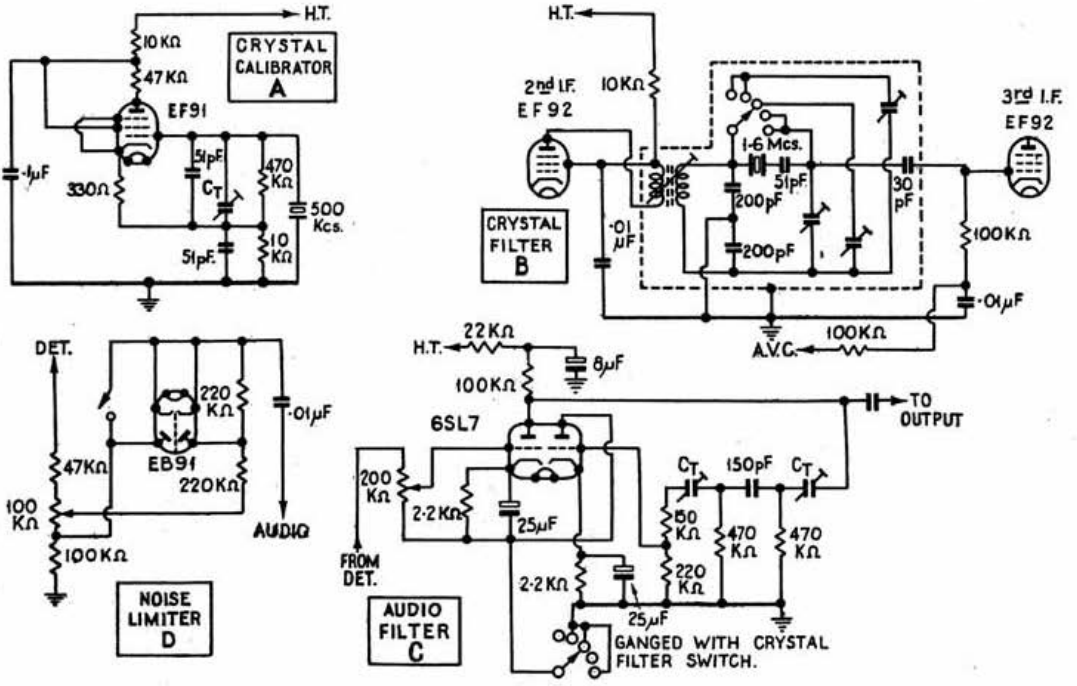


Fig. 3.
Circuit Details of (A) crystal calibrator, (B) crystal filter, (C) audio filter, and (D) noise limiter.

to squeeze the utmost from each stage. In fact, other considerations may favour the *loss* of some of the possible gain of three stages; first, to improve selectivity by using under-coupled I.F. transformers (about 0·3 coupling factor); second, to avoid detuning effects of A.V.C. action and give wider tolerances in production by using fairly high fixed tuning capacities in the I.F.'s, and lastly to provide a gain-compensating arrangement in order to equalise gains when a crystal filter is brought in and out of operation.

Suitable valves for the I.F. stages to conform with the B7G series used in the R.F. stage, etc., are the 9D6, EF92, variable-*mu* type. When used together with modern pot-cored small type I.F. transformers a compact form of construction is possible. The A.V.C. decoupling and feed resistors should not exceed a total at 1,600 kc/s. when it is tuned for maximum band-width and in practice this value has been found to be about the narrowest useful band-width for intelligible 'phone reception under bad conditions of interference.

C.W. reception can be accommodated in much narrower band-widths provided both the transmitter and receiver frequencies are sufficiently stable. A value of 500 c/s. can be obtained with the simple crystal filter circuit shown and this has been found adequate, used in conjunction with a tuned audio filter, for reception under the worst conditions of C.W. interference.

Thus is arrived at a minimum selection of degrees of band-width. Modern trend, which is probably desirable, is to pre-align the crystal filter to the required band-widths and use a switch to control the selectivity

rather than bring various filter controls, which are tedious to adjust, to the front panel. Provided good quality air trimmers are used in the crystal filter it will " stay-put " almost indefinitely.

The crystal filter is most conveniently placed between the second and third I.F. stages where it is unaffected by other variable factors. If inserted in the

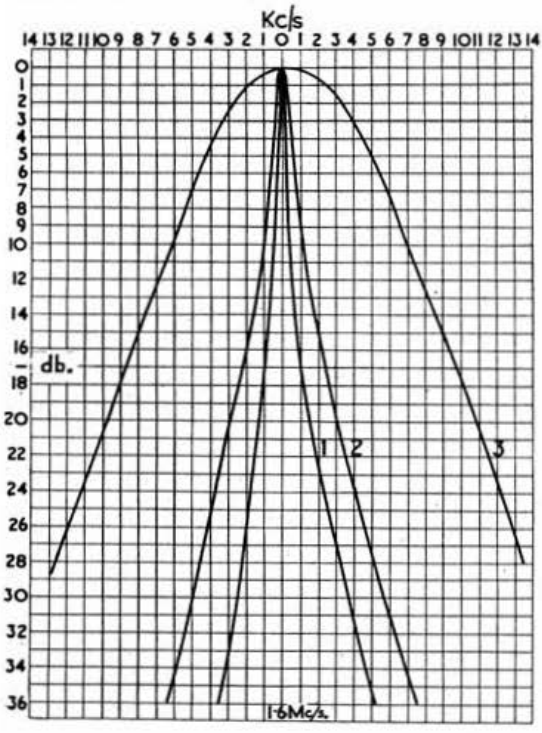


Fig. 4.
I.F. response curves obtainable with the circuit of Fig. 3. (1) 0·5 kc/s. crystal (2) 1·5 kc/s. crystal (3) 8 kc/s. crystal out.

mixer anode circuit difficulties arise at certain frequencies due to the untuned primary of the filter transformer causing regeneration.

In the complete receiver a ganged switch can be arranged for selectivity control which also adjusts the value of cathode resistor in the final I.F. stage in order to compensate for any loss of gain when the filter is switched in. This switch can also control on a further position, the switching in or out of the audio filter, of which more later.

The second detector/A.V.C. rectifier should preferably be of the isolated double-diode type in order to avoid unwanted stray capacities which occur in double-diode-triodes, etc. The 6AL5 or EB91, B7G series, are most suitable.

The I.F. transformers may be designed so that the A.V.C. diode, fed from the I.F. amplifier, receives approximately three times the voltage applied to the detector diode from the secondary of the last I.F. transformer This allows for a reasonable delay voltage to be used to improve the A.V.C. action. The delay is arranged so that A.V.C. action will just commence with 1 μV. input to the receiver.

It is convenient to measure signal strength by a meter which indicates changes in voltage, due to A.V.C. action, at an I.F. valve cathode. Other methods require a meter amplifier stage or a very sensitive meter both of which are uneconomical. Obviously, the meter will not register until the signal has overcome the delay voltage of the A.V.C. diode. Thus 1 μV. will produce the first meter reading. From experience a 1 μV. signal under average conditions is S2 (see letter R.S.G.B. BULLETIN, April, 1949). It is therefore preferable to omit the S1 meter reading (which will be about a 0·5 μV. signal) and commence at S2 with 6 db. steps to S9, which will be equivalent to an input of 125 μV.

For C.W. reception the B.F.O. is an important consideration. Stability of a high order can be obtained by the use of high C/L circuits, using an electron coupled or similar oscillator circuit. It is desirable to use A.V.C. even for C.W. but normally this cannot be done, due to the output from the B.F.O. leaking into the I.F. stages and operating the A.V.C., etc. If considerable care is taken in screening the entire B.F.O. circuit (including the injection feed line and with R.F. chokes in the heater circuits) this detrimental effect can be overcome. Using a longer time constant in the A.V.C. circuit enables signal strengths to be read and effective A.V.C. action to be obtained with C.W. reception.

A built-in crystal calibrator, consisting of a very simple 500 kc/s. oscillator circuit, rich in harmonics, provides the only certain manner of checking accurately the calibration of the receiver and should be considered almost essential.

Noise limiters have received considerable attention in the technical press, and for that reason will not be dealt with in detail here. The circuit shown is automatically adjusted to the signal level by bias derived from the detector load resistor and has an adjustment for modulation depth—both desirable features. It should be noted that, due to A.V.C. action with strong noise or interference, it may be preferable for improved limiting to use the manual I.F. gain control.

An audio filter circuit is a decided advantage in providing still greater selectivity for C.W. reception. The circuit shown, avoids the use of an iron-cored choke or transformer, both of which tend to give hum pick-up troubles and which are liable to more service troubles than a resistor capacitor network. The filter arrangement can most conveniently be switched-in (as already mentioned) by means of the I.F. selectivity switch. In the " off " position the first half of the double triode acts as a straight-forward audio amplifier. In the filter position the second triode is switched in series with the cathode of the first triode, and provides considerable negative feed-back, attenuating all frequencies other than a small band at 1,000 c/s. or as determined by the constants of the R/C network between the anode of the first triode and the grid of the second. With this arrangement an audio band-width of the order of 100 c/s. is provided. Even when used without a crystal filter (for example, with the 8 kc/s. I.F. band-width), the audio filter is found

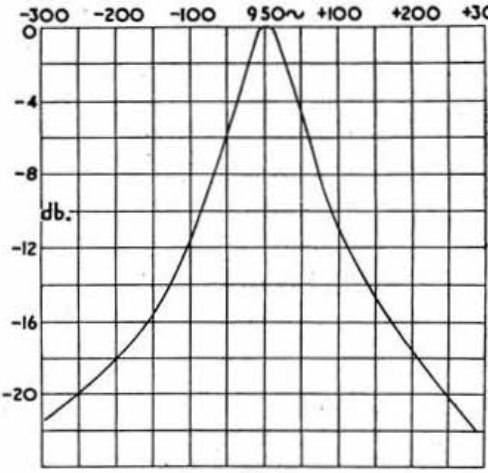


Fig. 5.
Audio Filter response curve.

to be an extremely useful feature for C.W. reception.

The audio stage needs no comment as the usual modern output pentode or tetrode provides 3–5 watts of audio power. Power supplies are also more or less standard practice. Frequently a mains transformer of insufficient wattage rating is used, tending to overheat with continuous running, particularly in the tropics. A stabilised supply should be provided for the B.F.O. and oscillator stages.

Mechanical Considerations

Having dealt fairly comprehensively with the electrical design of the receiver, it is now possible to consider mechanical matters. The final receiver layout will be largely decided by the factors (5) and (9) in the original list of operator's requirements, with some compromise in view of electrical requirements. These factors are convenience of layout of the controls, general reliability and robustness.

Since most operators are *right* handed and require to be able to *write* with the right hand whilst operating or tuning with the left, it is obviously preferable that the most frequently used controls should be towards the *left*-hand side of the front panel.

Probably the two controls used most in operation will be band-spread tuning and audio gain. The control knob operating the band-spread arrangement should therefore be placed at a height which allows the arm to lie comfortably on the operating desk so that the wrist and hand do not tire. The audio gain and other controls will preferably be fairly closely associated with this tuning control thus allowing for a mere movement of the wrist in order to change rapidly from one control to the other. Less frequently used controls can be distributed on the panel as decided by convenience of electrical connection. Normally the band-set and band-change controls will be comparatively seldom operated and thus their positions are not so critical.

Band-spread and band-set dials should be large and clearly marked. Long-term reliability and accuracy make it desirable that they should be directly connected (mechanically) to the tuning condenser or band-spread arrangement, rather than be dependent on cord or some other form of drive. The *drive* to the dials may, for economic reasons, take the form of a reliable spring tensioned cord and drum drive device, provided cord replacements do not entail a major operation.

It was indicated earlier in this paper that there are arguments in favour of mechanical as compared to " electrical " methods of band-spread. These may be summarised as :—

(1) Lower and less " distributed " circuit capacities resulting in better performance at the highest frequencies with less possibility of feed back.

(2) A more even band-spread ratio at all positions of the band set dial, especially in the case of general coverage receivers.

(3) A more compact arrangement is usually possible.

The arguments against mechanical band-spread lose their point if the design of the device is good. They are (1) backlash (2) insufficient band-spread.

There is much to be said for the provision of a complete angular framework as a basis for the receiver chassis. Not only does this provide a very strong and stable arrangement but also in either assembly or service readily allows the receiver to be placed upside down or in any other position without damage to internal components. The front panel, sides, top, back and bottom (all of which should be capable of being easily unscrewed for service purposes) may then be affixed directly to this framework in order to form a cabinet.

A point worthy of attention is that the alignment of the receiver should not be affected when placed in its cabinet unless provision is made for final adjustment by means of holes suitably positioned to give access to trimmers, etc. Careful internal layout and screening, however, should avoid this necessity.

Strong handles suitably fixed on the panel are not only useful for handling a receiver but provide important protection in transit.

Considering individual components and chassis layout, attention will be focused largely on the tuning condenser, band-change arrangement and coil assemblies. Nowadays the typical gang condenser is a well engineered job and is likely to give very little trouble, although in order to avoid microphony the vanes should be well braced. Ceramic insulation of the stators is much preferable to phenol-impregnated-laminated-paper material not only because of the better insulation provided, but also because of the lower minimum capacity possible. The earlier reference to the need for the isolation of the R.F. gang-section should also be noted. Trimmers should be of the air-spaced type.

Coils have a better long-term stability if wound on formers of a non-hygroscopic, efficient insulator such as polystyrene. Careful positioning and screening of the coils to avoid stray couplings, instability, etc., is essential. For band changing, a turret arrangement, which rotates the coils to their respective contacts, has decided advantages over the more frequently used wafer switch. The turret arrangement allows for (1) shorter circuit connections, (2) lower capacities between switch contacts and wiring, (3) longer leakage paths, and (4) easier service.

Adequate ventilation and the placing of the tuning unit away from hot valves, etc., will reduce the effects of temperature drift to a minimum. Compensation for drift, by means of special fixed condensers, may be desirable in the oscillator circuit.

The tuning unit, by virtue of the fact that it is closely connected with the tuning dials, will normally occupy the central front portion of the receiver chassis. The remaining stages may then be positioned to either side and to the rear of this unit. Of these the most critical will be the I.F. stages which should closely follow one another from the mixer anode in order to avoid feed-back and other troubles. The aerial and R.F. circuits should be well isolated or screened from the I.F. circuits (particularly from the first I.F. stage), in order to prevent direct I.F. pickup, etc.

To facilitate relay switching for communication purposes it is an advantage to bring out the connections to the H.T. switch to a suitable termination at the rear of the receiver. The provision of fuses in the mains and/or H.T. circuits will often save service expenditure at a later date !

If the power supply is adequate, another desirable feature is to bring out H.T. and L.T. connections to a socket at the rear of the receiver to enable a V.H.F. converter, etc., to be used in conjunction with the receiver.

OUR FRONT COVER

THE photograph on our front cover this month depicts tests being carried out on part of a receiver in process of conversion for Sutton Coldfield reception. The " Avo " Wide-range Signal Generator (*on right*) is providing the signal for band width checking, whilst the " Avo " Electronic Test Meter (*on left*) is indicating I.F. output at the diode. Members interested in either of these instruments can obtain fully descriptive pamphlets free on application to the manufacturers, The Automatic Coil Winder & Electrical Equipment Co., Ltd., Winder House, Douglas Street, London, S.W.1.

AN ELECTRONIC KEYER

By BO BRÖNDUM-NIELSEN* OZ7BO

The February, 1949, issue of OZ, official journal of the E.D.R., contained a description by OZ7BO, one of Europe's most proficient C.W. operators, of the construction of an electronic keyer freely adapted from a QST design by W6OWP. The excellent results obtained, both with the original model and with the many reproductions, have encouraged P. C. Scheller (OZ4FT) and Jack Davis‡ (G5XY) to co-operate with OZ7BO in the preparation of an English version of this valuable contribution to the art of good C.W. operating. G5XY has also supplied much additional information on suitable types of relays available in this country. Those who have handled or monitored such keyers will agree that with practice the "El-Bug," as it has been called, is capable of producing Morse symbols which compare most favourably with those of an automatic tape transmitter.

A FEATURE of post-war amateur telegraphy operation in Europe has been the increasing use of the semi-automatic ("bug") key, long popular in the United States. It is now generally recognised that a *correctly adjusted* "bug" is capable of continuous high-speed working over a long period with much less effort on the part of the operator and without adverse effect on character formation when compared with a straight key.

With a normal "bug" key, however, only the spacing and length of the dots are automatically controlled, the spacing and length of the dashes being left to the judgment of the operator. Unless care is taken with the adjustment, this fact too often results in the sending of dots at a speed out of all proportion to the length of the dashes. For some years it has been realised that many advantages would accrue if the length and spacing of the dashes could also be automatically controlled, preferably by electronic means. Many designs have been published both during and since the war, but the results—at least in the writer's experience—have not always come up to expectations. In the October, 1948, issue of *QST*, however, W6OWP described an electronic keyer which, despite its simplicity, appeared to have overcome many of the snags associated with the earlier circuits. Tests soon confirmed this opinion, although in order to make use of readily available components, a considerable number of circuit modifications and simplifications have been introduced. A description of these results was published in *OZ* with the result that many similar "El-Bug" keyers have since been constructed with equal success to that of the original model, the performance of which left little to be desired.

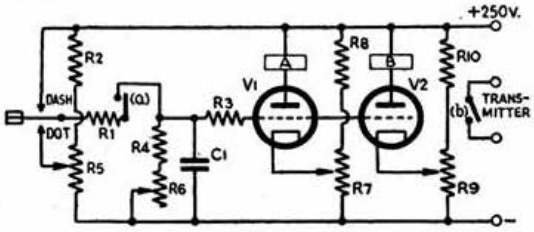


Fig. 1.
Circuit of the electronic keyer.

C1	·2 μF.	R6	1 megohm variable carbon type.
R1	500 ohms ½ watt.	R8, 10	35,000 ohms 5 watt.
R2	15,000 ohms 5 watt..	V1	½ x 6SN7GT (see text).
R3	2 megohms ½ watt.	V2	½ x 6SN7GT.
R4	200,000 ohms ½ watt.	A and	(a) "break" relay.
R5, 7, 9	10,000 ohms variable, wirewound.	B and	(b) "make" relay.

Circuit Details

The circuit arrangement shown in Fig. 1 possesses the advantage that if the operating lever, or "paddle," should be released before the end of a dot, the keyer will automatically complete the dot. Similarly if the dash contact is made for only a fraction of a second, a dash of correct length will be sent whether or not the paddle is held over for the full dash period. Even if the paddle is moved to the dot contact after a momentary "make" on the dash contact, the "El-Bug" will complete the dash, pause for the correct one dot spacing, and only then commence to send dots!

In order to achieve these results, a twin triode valve is used with each section cathode biased to cut-off value by means of the resistor networks R7, R8 and R9, R10. Two relays are connected in the anode circuits; relay A being provided with a "break" contact (*a*) which opens when the relay is energised; while relay B, which is the keying relay, has a normal "make" contact (*b*) which closes when the relay is energised. The operating key consists of a simple change-over contact and is similar in mechanical construction to the well-known "side-swiper" type of key. If the paddle is held over in the "dash" position, the condenser C1 will be rapidly charged to the full supply voltage. It will be noticed that R1 serves as a limiting resistance for the charging current in order to prevent sparking at the relay contacts (*a*), while R3 is included to limit the grid current of the valves. When C is thus charged, the grids will be at a high positive potential and anode current will flow in both sections causing the two relays to operate. The contacts (*a*) will open and condenser C1 will then immediately begin to discharge through R4 and R6 at a rate determined by the value of these resistances. When the voltage across C1 has dropped below a certain value, the anode current will be insufficient to hold relay A, with the result that the contacts (*a*) will close again, thus permitting the cycle of operations to recommence. If the keying paddle is held in the "dot" position a similar sequence will occur with the difference that the charge across C1 will be lower due to the action of the potentiometer R5.

It can now be seen that the relay A will be energised during long or short periods according to whether the keying paddle is held in the dash or the dot position. Unfortunately, however, the spacing between the elements is far too short to allow the immediate use of this relay for the keying of a transmitter. For example, if an additional set of "make" contacts were available on relay A, the keying effect would be as shown in Fig. 2 (*a*). In order to obtain the correct spacing between the elements, the second triode V2 is incorporated. The grid of this valve is connected in parallel with the

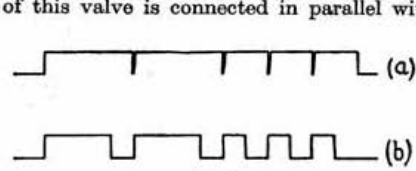


Fig. 2.
(*a*) Keying characteristics which would be obtained without the use of V2.
(*b*) Correct keying characteristics.

* *10 Christiansholms Parallelvej, Klampenborg, Denmark.*
‡ *St. Magnus, Eastern Road, Havant, Hants.*

grid of V1 but the cathode bias can be controlled separately by means of the network R9, R10. If V2 is biased to a higher voltage than V1, current will begin to flow through relay B at practically the same instant as through relay A (due to the rapid charging of C1) but current will cease to flow through relay B slightly before the corresponding dropping off of current through V1. This difference in the release time of the two relays can be adjusted so as to give the correct inter-element spacing (*i.e.* mark-to-space ratio) as shown in Fig. 2 (*b*).

It should also be observed that immediately the contacts (*a*) have opened, the keying paddle becomes out of circuit. It is this feature which enables the keyer to complete correctly each dot or dash before commencing on the next element.

To summarise the use of the circuit controls: R5 determines the dot/dash ratio; R6 adjusts the speed of the keyer; R9 determines the correct mark-to-space ratio; R7 adjusts the bias of V1. Further notes on the method of adjusting the keyer are given later.

Construction

The use of a twin-triode valve such as the 6SN7GT considerably simplifies construction although it is not essential. Similarly the ECC40 and ECC34 twin-triodes have also proved satisfactory but the 6SL7 is less appropriate. The 6J6 cannot be used for this purpose as the cathodes are not brought out to separate pins. Two small triodes such as the 6J5, or pentodes strapped as triodes, could, of course, be used. The potentiometers are all wire-wound with the exception of R6 which is a carbon type. The top speed of the keyer is limited by R4 which is 200,000 ohms. Both R8 and R10 should be of 5-watt rating. The potentiometers R5 and R6 may be replaced by fixed resistances once the correct values have been determined since they are not varied after the original adjustment.

The power unit for the keyer should be capable of supplying 40 to 50 mA., at 250 V., and the appropriate heater voltage. The unit need not be stabilised and the filtering is comparatively unimportant. The "El-Bug" can easily be adapted for D.C. mains by the use of suitable valves.

The two relays need not be very sensitive, but they must be capable of functioning quickly and accurately when energised with a current of approximately 5 mA. The reliability of the keyer and its ease of adjustment depends to a large extent on the use of a suitable relay in the "A" position. In the original model both the A and B relays have a D.C. resistance of 5,000–6,000 ohms. The Post Office type 600 relay is satisfactory if fitted with high resistance coils. Such relays fitted with two sets of change-over contacts and 3,000 ohm coils can be obtained to order from *Messrs. Siemens Brothers & Co., Ltd.*, of Woolwich, price 15/9. As the delivery time for small quantities exceeds three months, members may wish to improvise with the normal P.O. type 600 relay which can be obtained through the surplus market. The contact assembly should be reduced to a maximum of two change-over actions and the bobbin rewound with as many turns of 44 S.W.G. enamelled copper wire as can be accommodated on the former. It must be noted that the official P.O. rating for the contacts of the 600 type relay is only 50 volts. However, this is an extremely conservative rating, and for normal operation there is little danger of the insulation breaking down when used with the 250 volts keyer supply.

Some members may wish to make use of the "High Speed" type of relay which has also been available through surplus channels. Although this type can be used satisfactorily in the "B" position provided the contact ratings are not exceeded and the bobbin resistance is high enough to permit operation at approximately 5 mA., it is not recommended for the "A" position, as the break-operate time can be less than the charging time of C1 under certain operating conditions. The difficulty could be overcome by reducing the value of C1 to say ·02μF. and increasing R4 and R6. The problem does not arise with the type 600 and similar relays. The "twin contacts" of these relays also help to increase their efficiency.

Adjustment

The adjustment of the keyer is comparatively simple. The potentiometers R7 and R9 are first set so as to give zero anode current in both V1 and V2 with the paddle in the neutral position. Then with the paddle held over in the "dash" position, R6 should be adjusted to give a series of dashes at approximately the correct rate for what is to be the average speed of sending. The next step is to establish the correct mark-to-space ratio for the keying contact (*b*). This can be done aurally by simply connecting an audio oscillator to the output of the keyer, but a more accurate method is shown in Fig. 3. In this system a milliammeter is placed in series with a battery and variable resistance so that when keyed it gives a direct and precise indication of the two

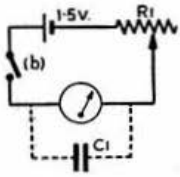


Fig. 3.

Precision method of adjusting the mark-to-space ratios. R1 500 ohms variable. C1 25 μF. (see text). M 0–5 mA. f.s.d.

mark-to-space ratios. While almost any low reading milliammeter can be employed, a 5 mA. f.s.d. type is suitable for the circuit shown. The relay contacts (*b*) are first shorted and the variable resistance is adjusted until the meter shows a reading of 4 mA. Then with the short across (*b*) removed and with the keying paddle in the dash position, R9 should be adjusted so that the mean current reading is 3 mA. The needle of the milliammeter may require damping and this can be done by connecting a 25 μF. condenser across the meter as shown in Fig. 3. The paddle is then changed to the dot position and R5 adjusted until the mean current reads 2 mA.

These two readings are a direct indication of the mark-to-space ratios. The drop from 4 mA. to 3 mA. on dashes indicating that the dashes last for three-quarters of the total time and are then three times as long as the spaces, while the 2 mA. reading shows that the dots are the same length as the spaces between them. It should be remembered that although the dots are one-third the length of the dashes, over any given period *twice* the number of dots should be produced when compared with dashes. With the correct mark-to-space ratios established it should now be possible to vary the speed of keying by means of R6 over a fairly wide range, both above and below the speed at which the keyer was adjusted, with little or no deterioration in the spacing.

This method, which incidentally can also be used for adjusting the mark-to-space ratio of the dots on a normal "bug" does not take into account the possible lagging effects introduced by the key-click filter components on the transmitter. If necessary a final slight adjustment can be made by means of a V.T. volt meter fed with a small voltage obtained from the P.A. coil *via* a link; the readings being compared as described above.

One final word of warning must be given: many amateurs will experience considerable difficulty at first in handling an electronic keyer. Just as it is

(*Continued on page 262*).

In the Workshop

By "DONEX"

THE TECHNIQUE OF SOLDERING

THE technique of soldering has been chosen as the subject this month, as it undoubtedly takes precedence over all the processes in radio construction. On its effectiveness, the whole question of operation, performance, and reliability, of every piece of apparatus and equipment depends. Yet, sad to relate, it remains one of the most slovenly discredits to the amateur's skill. The complexity of modern electronic apparatus coupled with the parallel development of "miniaturised" components, calls for an ever-increasing skill in circuitry, layout, and soldering.

It is extraordinary that, although the dangers and annoyances of indifferent soldering are only too well known, the same lack of care recurs time after time. The picture is common—a soldering iron with a corroded and encrusted bit, often filed away to a mere stub; a coiled handful of dirty and oxidised cored solder; the iron plunged in among the "works" to the accompaniment of hisses and wisps of smoke from tortured components; a length of solder applied, some adhering to the joint and the rest running in blobs or slivers into the most inaccessible recesses of the apparatus there to be forgotten until the first switch-on.

The Origins of Soldering

The general idea of soldering and fluxing is old, dating from the late middle ages, although even in Roman times lead-burning was widely used in the construction of pipes from sheet. Soldering, as we know it, came with the industrial revolution; while acid fluxes (killed spirits or zinc chloride) arrived with the expansion of the tinsmith industry. The use of resin as a flux did not appear till the middle of the 19th century, and cored-solder containing a resin flux, in the last decade of that century. Since then the whole subject has been developed scientifically, and emerges as one of the most important processes in electrical engineering. All the earlier troubles of corrosion due to flux have disappeared and to-day soldering is applied even to the most delicate instrument work.

Modern cored solder, which now forms the subject of British Standard Specifications for a diversity of applications, is an alloy of tin/lead varying from 18/82 to 95/5 per cent. of each constituent. Impurities which may exist in the form of iron or arsenic are controlled to very small limits, with a total impurity content of a maximum of a quarter of one per cent. For general radio work 40/60 to 60/40 per cent. tin/lead content is employed.

The manufacture of cored solder is a specialised industry. Briefly, a billet of alloy is forced through a die to approximately the correct gauge, the flux being introduced in the process, and then extruded through a circular die which produces a uniform tube. The final product is available in sizes from 10 S.W.G. to 22 S.W.G. to meet various requirements. In radio work 14 or 16 gauge is most suitable.

Practical Soldering

Now to the practical points of soldering. The cardinal observances are:—

(*a*) Cleanliness; (*b*) avoidance of the use of acid-flux (killed spirits); (*c*) the use of a clean iron at the correct temperature; (*d*) the use of good quality, clean (non-oxidised) cored solder.*

Cleanliness

Make sure that all wires, tags, etc., are clean and free from oxidation before attempting to solder. Continuous application of the iron and cored solder is not the easy alternative to initial cleaning. In set construction a good rule is to tin the wires or tags of all components (even including valveholders) before assembly. In small miniaturised assemblies the use of a liquid flux of resin base is recommended as joints can be made with great rapidity thus avoiding lengthy application of the iron.

To clean fine gauge enamelled wires of transformers, etc., heat in a spirit lamp flame, plunge into methylated spirits and then wipe. Do not attempt to scrape with a knife or use emery cloth as this will damage the wire.

The Iron

Use a reliable make of iron rated at about 65 watts and having, for general work, a "pencil" bit. Its voltage rating should be as near as possible to the mains supply with which it will be used. Keep the iron clean by brushing with a piece of carding and avoid filing the tinned face of the bit as much as possible. It is difficult to determine the temperature at which the iron is running, which should, for effective soldering, be approximately 50° C. above the liquifying point of the solder employed. An indication of overheat is a vicious "spit" when the cored solder touches the iron; while "plasticising" and the tendency to draw off a thread of solder from the joint when the iron is removed shows that the bit is not hot enough. Remember, it is the "heat-content" of the iron which is the effective agent in iron—*not* the "temperature" characteristic.

If, by reason of mains voltage variation, the iron runs consistently cool, an improvement can be effected by lagging the portion of the iron containing the heating element with asbestos string (to make a neat job, wet the string before winding). Should the iron run hot and persistently burn the tinning of the bit, there is no alternative but to reduce the mains voltage by inserting an appropriate resistance in series with the element, determined by trial.

A stand for the iron is a necessity. A square "[ ]" form can be fashioned from a piece of 14 or 16 S.W.G. aluminium with two "V" notches to carry the iron. The point of the iron should slope upwards with the handle near the bench, so that the mains lead will not cause it to tilt over.

Making the Joint

It now remains to consider the correct procedure in making a joint. To the inexperienced, it at first seems apparent that three hands are essential; one to hold the components of the joint; another to apply the iron; and a third the solder. However, in a short time one becomes adept at making do with two!

Wherever possible the iron should be applied *beneath* the joint to be made, and the cored solder applied to the top. If all is well, the solder should run evenly all round the joint and the iron should not be allowed to remain in contact more than the

* The cored solder used by the author over a lengthy period of years is "Superspeed" cored solder manufactured by *Messrs. H. J. Enthoven, Ltd.*, who also make the liquid resin-based flux referred to.

one or two seconds required to ensure that the flux has dispersed.

Wher jointing wire-ended components a half-loop is sufficient to locate the component to its contact. A complete twist, or several twists are quite unnecessary, and make any subsequent removal much more difficult. Do not try to bunch a number of wire-ended joints in order to make a " plumber's joint " by applying dose after dose of solder. The difficulty of " undoing " such an arrangement for some future change or replacement is great.

" Dry " Joints

While not, perhaps, and happily, a very prevalent occurrence in modern soldering, " dry " joints must be mentioned as a source of the most elusive faults in radio equipment. A dry joint is one in which the solder is " adhered " to the connection by a layer of undiffused resin and thereby introduces resistance into the circuit. This resistance can vary from a few to an infinite number of ohms. The main cause of such joints is an iron, which is either too cool or not applied long enough. The remedy is to locate the area of the fault in the circuit and reheat every joint in the neighbourhood with a hot clean iron.

Aerial Connections

All " outside " connections to aerials, feeder lines, etc., are best made with a small blow-lamp unless a really large electric or other iron is available. Here again cleanliness is the first order of importance and no difficulty should be met with in obtaining a good run of solder into the joint. Care in applying the heat, is, of course, important to avoid burning the wire. The methods adopted by Post Office wiremen of forming such joints is rather outside the scope of this article, but may be described later, if of sufficient interest.

Soldering Aluminium

The soldering of connections to aluminium or " dural " is not considered an effective or lasting process, although a conducting " cake " of the special solder used, may be built up. As an interesting tail-piece, however, it may be stated that an effective process has been evolved and developed by a well-known firm, using a tin/zinc based solder and an iron whose bit is subjected to magneto-striction action at supersonic frequency, which so disturbs the fluxing metal that oxidisation is prevented.

Radio Amateurs' Examination

AS the fateful date of May 10 draws steadily nearer, candidates for this year's Radio Amateurs' Examination are busy making last minute preparations. Here, to help them, are a few words of advice on examination technique:

Read the paper through carefully—at least twice—to make sure that you grasp exactly what the examiner requires.

Attempt to answer all the questions. Allot yourself a certain time for each—and then stick reasonably closely to your schedule.

Don't necessarily keep to the order in which the questions are set; gain confidence by tackling first those which come easiest to you.

Before starting a question, jot down in your answer book a short list of the main points which you intend to cover. Afterwards draw a line through your summary to show that it is not part of the answer.

Don't drag irrelevant information into your answer just to show you know it. You can only obtain marks by giving the information asked for.

Help the examiner by writing legibly. Be sure to read through what you have written to correct possible mistakes in grammar and spelling. Check all circuit diagrams.

Do not use slang or " radiese " abbreviations.

Avoid dogmatism. Set out, if required, the advantages and disadvantages of a system without prejudice.

Remember the other candidates are just as nervous and anxious as you are—so keep cheerful.

Television Exhibition for Birmingham

THE date is now announced by the Radio Industry Council of the exhibition of radio and television which it is to organise at Castle Bromwich, Birmingham, on behalf of the British Radio Equipment Manufacturers' Association. The exhibition will be open to the public from Wednesday, September 6, to Saturday, September 16, not including the Sunday. The B.B.C. will be co-operating.

An Electronic Keyer–*Continued from page* 260

necessary to learn the art of using a semi-automatic key, so it is equally necessary to be prepared to spend some time in mastering the slightly different technique of the "El-Bug." But the patient operator will be more than rewarded by the almost perfect sending which is possible. Poor keying is practically impossible, transmissions are either " copper plate " or completely unreadable. For this reason no attempt should be made to use the keyer on the air until complete confidence has been gained on a practice circuit. It is perhaps a disconcerting feature of the electronic keyer that one soon becomes painfully aware of former errors in keying characteristics. Any attempt to incorporate " individual styles " into electronic keying is liable to result in a strange variety of symbols such as were never visualised by Samuel Morse.

Ten Minute Quiz

A pot-pourri of questions for the radio amateur.

1. *In an audio amplifier with a limited supply voltage, which of the following classes of operation gives the highest power output?*
   *A*1. *AB*1. *AB*2.
2. *What is the* Phon?
3. *Which is " odd man out "—and why?*
   6*X*4. 5*Z*4. 5*V*4*G*. 83. 80. 6*X*5.
4. *Is the resistance of a conductor to D.C. different from that to A.C.?*
5. *What is a current antinode?*
6. *On what frequency and during what times does GB*1*RS operate at present?*
7. *Are all atoms the same?*
8. *What type and range of meter would be most suitable to check the current in a* 600 *ohms balanced two wire aerial feeder fed by a transmitter of* 100 *watts output?*
9. *What is the qualification for a W.A.S. certificate?*
10. *What are the call-sign prefixes for: Burma, Ceylon, Fiji.*

Now turn to page 275 to discover if you have beaten the question-master.—H. E. B.

Bright Ideas

A New Monthly Feature Conducted By L. M. GUNNELL (G8HB)*

Stabilising the 813

BEAM tetrodes, with their low grid-plate capacity, are assumed by many amateurs to be quite stable without neutralisation. When the stage is loaded this assumption seems to be usually justified. But if the load and drive are removed, and the grid bias adjusted until the valve draws plate current, it is almost invariably found that the stage is—in fact—far from stable, at any rate on 28 Mc/s. Two forms of instability may be present, parasitic oscillation and what may be called tuned plate-tuned grid oscillation, at or near the operating frequency. The former is usually of the V.H.F. type and can often be cured by a suppressor in the grid lead to the P.A. The only effective cure for T.P.T.G. oscillation is neutralisation. After trying all the usual methods of capacity

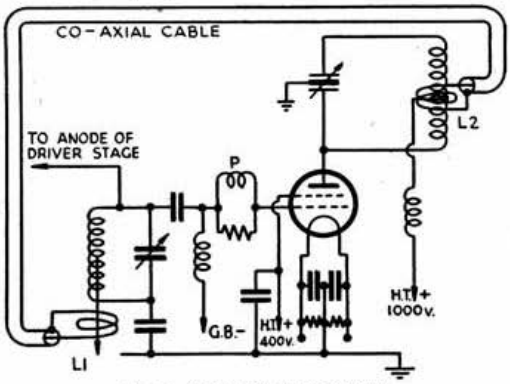


Fig. 1. Stabilising the 813 Valve.
The 813 can usually be operated without neutralisation only up to about 15 Mc/s. The circuit shows a simple method of inductive neutralisation which does not require a split-stator condenser. If an unbalanced output circuit is used the link should be placed at the cold end of the coil.

L1	1 turn link, variably coupled to driver tank circuit.
L2	1 turn link fixed coupled to P.A. tank coil.
P	Parasitic suppressor, consisting of ten turns of 18 S.W.G. enamelled wire wound on a 100 ohms, 1 watt, resistor.

Other circuit valves are conventional.

neutralisation without success W1DRM discovered (Hints and Kinks, *QST*, June, 1948) that inductive neutralisation was the answer. The 813 can be completely stabilised using this form of neutralisation, which is simple and docile to put into operation.

The circuit is shown in Fig. 1. In theory, either the anode or grid link can be made adjustable. In practice however it is usually simpler—and certainly safer—to adjust the grid link so as to avoid proximity with the high voltage on the anode of the P.A. when making adjustments. The setting-up procedure with inductive neutralisation is the same as with capacitive neutralisation, except that mutual inductance and not capacity is varied. If the stage will not neutralise then positive rather than negative feedback (with reference to the feed-back *via* the grid anode capacity of the valve) is taking place and the connections to *one* of the single turn links should be reversed.

Improving Selectivity

Little can be done to improve the selectivity of receivers having an I.F. of the order of 1·6 Mc/s., other than to use a second frequency changer with a much lower second I.F. This is in fact, probably the most efficient way of improving the selectivity of almost *any* type of communications receiver. With receivers having an I.F. around 460 kc/s., however, a great improvement can usually be effected, particularly if only one stage of I.F. amplification is employed, by the use of an outboard I.F. stage with a loosely-coupled I.F. transformer.

Most I.F. transformers have a coupling greater than the critical coupling, with an adverse effect on selectivity. If the windings on each of the transformers are moved as far apart as possible, then a considerable improvement is noticeable. How this is done will depend on the type of transformer, but it can normally be effected by melting the wax fixing the winding to the former, or cutting the wood dowelling (if such is used), and using pieces taken from the ends to provide additional spacing in the centre. Unfortunately as a result of the above modifications, there will probably be a considerable loss of gain. The addition of an extra stage of I.F. amplification is therefore necessary to bring the amplification back to normal. Fig. 2 shows such an add-on amplifier; the valve can be any variable-mu pentode, and the I.F. transformer should have been modified in the manner already described.

The unit can be built on a small chassis about 4 inches by 2 inches, and then bolted to any convenient point on the main chassis. If the coaxial leads are connected as shown in the diagram A.V.C. will take place on the additional stage and *not* on the I.F. stage in the receiver. Should A.V.C. be required on both stages, then two screen leads must be taken

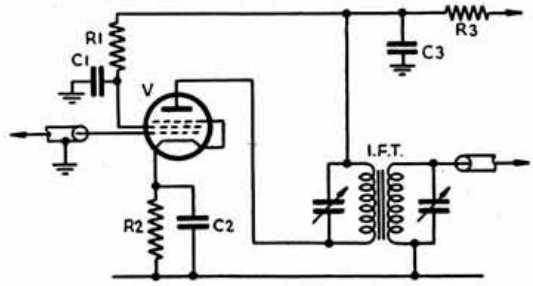


Fig. 2. An outboard I.F. Amplifier.
An amplifier such as this will usually result in a considerable improvement in the selectivity of a receiver with an I.F. of 460 kc/s. Power supply can normally be obtained from the receiver power pack.

C1, 2, 3	0·1 μF.	R3	10,000 ohms.
R1	100,000 ohms.	I.F.T.	See text.
R2	500 ohms.	V	See text.

from the secondary of the I.F. transformer of Fig. 2; one, as shown from the grid of the following stage; and a second from the earthed side to the A.V.C. line in the receiver. For re-alignment, a signal generator or test oscillator is almost essential if the calibration of the receiver is to remain unaltered. It is advisable to make a note of the exact I.F. before the modifications are started, as receivers are often found to be 5, or even 10 kc/s. off the stated I.F.

S.S.B. Suppressed Carrier

Mr. H. C. Woodhead, G2NX, 46 Oak Drive, Oswestry, Shropshire, will appreciate reports on his single side-band suppressed carrier transmissions. He operates on 3695 kc/s. most week-ends.

* 79, *Pollards Oak Road, Limpsfield, Surrey.*

IT'S TOPICAL

Standard Frequency Transmissions

IN September, 1948, the Department of Scientific and Industrial Research announced that arrangements were being considered for an experimental service of standard frequency transmissions from the United Kingdom. A committee under the chairmanship of Dr. R. L. Smith-Rose established the need for such a service and, at the request of the Department, the General Post Office has assumed technical responsibility for the transmissions, which will take place from the Rugby radio station. The service began on February 1, 1950. The frequencies used are 60 kc/s., 5 Mc/s. and 10 Mc/s. The transmissions on 60 kc/s. should be received throughout the United Kingdom and Western Europe and enable local standards to be calibrated with high precision. The transmissions on 5 and 10 Mc/s. form part of an international programme designed to give reliable world coverage on one or other of the frequencies 2·5, 5, 10, 15, 20, 25 Mc/s. which have been allocated to standard frequency services. The transmissions on these frequencies from the U.S.A. National Bureau of Standards station WWV are not always satisfactorily received in the United Kingdom and farther east. It is hoped to learn from the experimental service now being initiated to what extent reception in the European area is improved by transmissions from the United Kingdom and also to what extent the usefulness of both the U.S.A. and U.K. transmissions may be impaired by mutual interference.

The frequencies, which are to be maintained within two parts in one hundred million of the nominal values, will be monitored at the National Physical Laboratory and all enquiries or comments concerning the transmissions should be addressed to the Director, National Physical Laboratory, Teddington, Middlesex, England. Information about reception conditions and interference with the U.S.A. transmissions will be particularly useful.

Details of the daily experimental service are given below. It is regretted that at present it is not possible to transmit on 5 and 10 Mc/s. at times more convenient to users in the United Kingdom.

Experimental Service of Standard Frequency Transmissions.

G.M.T.	Carrier Frequency.	Power.
0544–0615	5 Mc/s.	10 kW.
0629–0700	10 Mc/s.	10 kW.
1029–1045	60 kc/s.	10 kW.

Each transmission will be modulated in accordance with the following 15 minute cycle where applicable.

Minutes past the hour.	
59–00, 14–15, 29–30, 44–45	Slow Morse call-sign MSF followed by a speech announcement.
00–05, 15–20, 30–35, 45–50	Carrier modulated with 1,000 c/s. tone.
05–14, 20–29, 35–44, 50–59	Carrier unmodulated.

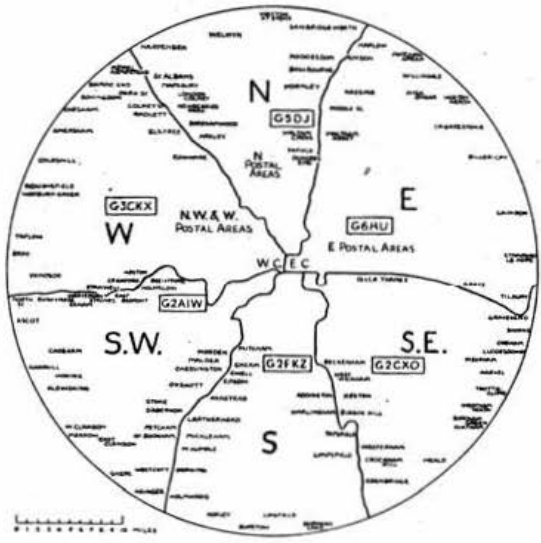
It is proposed to add in due course 1 c/s. pulses during the first five minutes of each period at present unmodulated.

London Region

THE Council have approved the appointment of D.R.'s for North, South-East and South-West London to serve with those nominated and elected for West, South and East London.

It was decided at a meeting convened by the London Regional Representative (Mr. W. H. Matthews, G2CD), to form the six London Districts according to the divisions depicted on the map produced herewith.

The D.R.'s are responsible for Society activities within a radius of 25 miles from Charing Cross and are appointed as follows :—



LONDON NORTH. Mr. D. C. Jardine, G5DJ, 77 King James Avenue, Cuffley, Herts.

LONDON SOUTH-EAST. Mr. G. Miles, G2CXO, 33 Silverdale Road Petts Wood, Orpington, Kent.

LONDON SOUTH. Mr. C. E. Newton, G2FKZ, 105 Underhill Road, S.E.22.

LONDON SOUTH-WEST. Mr. F. G. Lambeth, G2AIW, 21 Bridge Way, Whitton, Twickenham, Middx.

LONDON EAST. Mr. J. Hunter, G6HU, 63 Aintree Crescent, Barkingside, Essex.

LONDON WEST. Mr. S. F. Sharpe, G3CKX, 64 Windsor Avenue, Hillingdon, Middx.

POSTAL DISTRICTS. The grouping of the London Postal Districts is as follows :

North : All Northern Postal Districts.

South : S.E. 1, 4, 5, 11, 14, 15, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27 ; S.W. 2, 4, 8, 9, 11, 12, 16, 17, 18.

South-East : S.E. 2, 3, 6, 7, 8, 9, 10, 12, 13, 16, 18.

South-West : S.W. 1, 3, 5, 6, 7, 10, 13, 14, 15, 19, 20.

West : All North Western, Western and West Central Postal Districts.

East : All Eastern and East Central Postal Districts.

The D.R's are also responsible for Society activities outside the London Postal District area up to a distance of 25 miles from Charing Cross.

Coupe du R.E.F.

IN order to mark the 25th anniversary of the *Reseau des Emetteurs Francais* and of the International Amateur Radio Union, the annual French contest, known as the "Coupe du R.E.F." participation in which is normally limited to French, Belgian and Luxembourg amateurs, will this year be open to amateurs throughout the world. A brief summary of the rules is given below.

The contest will be held in two sections, C.W. and telephony on the following dates.

C.W.: 1200 G.M.T., Feb. 25, to 2400 G.M.T., Feb. 26.

Telephony: 1200 G.M.T., March 4, to 2400 G.M.T., March 5.

In order to facilitate DX operation, inter-European contacts made after 2200 G.M.T. and before 0600 G.M.T. will not count for points. All French stations will transmit their Region number after their callsigns, while Swiss stations will indicate the Cantons in which they are located by means of a two-letter code. Three points will be scored for each contact completed. Overseas stations, who should call "CQ R.E.F.," will multiply their total points obtained on all bands by the number of R.E.F. Regions, Swiss Cantons and different countries contacted on each band. Separate logs should be submitted for C.W. and telephony. The call-sign, name and address, input, P.A. valve and type of aerial should be shown in the heading, with columns for band; date; time (G.M.T.); call-sign of station worked; Region (F), Canton or Country; report sent; report received; number ot points claimed. A summary must be provided showing final number of contacts, number of Regions, Cantons and countries, number of points and the final total. A signed declaration that the submitted log conforms with the official station log must be attached to each entry. A certificate will be awarded to the leading two entrants in each country. All communications must be addressed to: "Coupe du R.E.F.", 72 rue Marceau, Montreuil S/S Bois (Seine), France.

Post Office Morse Test

IN reply to an enquiry made by the Society the Post Office have confirmed that there would be no objection to a candidate for the Morse Code examination for the amateur licence being examined on his own test set, provided the key is of the usual type and the oscillator output is satisfactory.

A suggestion, made by members in Falkirk that candidates are sometimes required to read a T1 type of buzzer note after having been trained to read a high pitch note, is not accepted by the Post Office who state that the notes produced by the buzzers normally used for these tests are not of such a low pitch that any difficulty would be experienced by a candidate.

"Voice of America"

APROPOS of the paragraph on page 222 of the January BULLETIN, it is understood that the Radio Amateurs' programme (Sundays, 1915 G.M.T.—1930 G.M.T.) is relayed by the B.B.C. on 6,070 kc/s. (49·42 metres), 7,200 kc/s. (41·67 metres) and 12,095 kc/s. (24·80 metres), but not, as stated, on 1,122 kc/s. (267 metres). The programme, which consists of interviews with prominent amateurs, weekly propagation predictions, technical items, reports on contests and other news of amateur interest is also relayed by Munich on 6,170 kc/s. (48·62 metres) and 7,250 kc/s. (41.38 metres).

The Birmingham Areas

MEMBERS living in Birmingham are asked to note that the Birmingham North and South Areas comprise the following postal districts:

North: 1, 2, 3, 4, 6, 7, 8, 18, 19, 20, 21, 22, 23, 24 and Sutton Coldfield.

South: 5, 9, 10, 11, 12, 13, 14, 15, 16, 17, 25, 26, 27, 28, 29, 30, 31, 32 and 33.

Mr. W. J. Butler, G5LJ, 32 Pilkington Avenue, Sutton Coldfield, is Area Representative for North Birmingham, and Mr. T. F. Higgins, G8TI, 391 Rednal Road, Birmingham, 31, Area Representative for South Birmingham.

THE MONTH ON THE AIR

By ARTHUR MILNE (G2MI)*

Top Band

THE general opening-up of the lower amateur frequencies has been most marked during the past month, and in particular the 1·7 Mc/s. band has produced some very interesting results. G2PL, 2YS and 6AB have all worked EK1AO on this band and G2YS was previously heard by EK1OI. HB2IW is another new one but no information about him is as yet available. GW3CDH who has worked both EK1AO and HB2IW, wonders if he has made the first GW/EK QSO on top band. A number of U.K. stations have worked W1BB and W4NNN. G2PL contacted the former on 'phone. G6BQ worked both of them and also VE1EA between 0530 and 0700 G.M.T. on January 15. He says his Marconi aerial is little use for transatlantic work, but a ½-wave doublet is "the goods" on this band.

BRS250 has logged W1BB and W4NNN at 449 and says both OK1AA and DL2DV have been heard around 1845 kc/s.—in fact it needed only a ZL to make the band sound like 3·5 Mc/s.! G3BTP thinks location is all important in working 1·7 Mc/s. DX.

Just a little reminder—despite the DX, the licensed power on this band remains at 10 watts.

Thought for the Month

Have you ever thought
that maybe
the station who is blotting out
the station you want to work
is only repeating
to the station he wants to work
the remarks
which you blotted out.

Eighty

G3ESY made a good start on eighty by working VE1BV and VE1ZC using 20 watts to a B2 and a 66 ft. Zepp. His signals were RST 469. G3AUT gave VO4AJ his first transatlantic contact on the band.

Although eighty continues to produce plenty of DX at certain times, it is also still the mainstay of the ragchewers. G3FED for example, recently completed a 2¼ hour QSO with LA5QB on C.W. Despite QRM they stuck to it and won through.

The Society has been officially informed by the Australian Post Office that the station signing VK5AL heard and worked on 3·5 Mc/s. is a pirate. The real VK5AL lives in Adelaide, not Darwin and works only on 28 Mc/s.

Forty

There is little doubt that this much maligned, much pirated by commercials, section of ether is fast becoming our main long distance communication band, in fact, most of the reports this month concern DX on 40. GM3GDX, a significant call-sign, reports working W7DZ at 0620 G.M.T. on New Year's morning and hearing HC2IH and TF3AC. He comments on the large number of UQ's to be heard these days. G3ATU who raised three good ones in VS7BJ, ZD9AA and HZ1CK, says the active calls in Cyprus at present are MD7BL, DC, GR, WE, VC and XP. QSL *via* R.S.G.B.

ZD9AA was probably the plum on forty during January when quite a number of British stations contacted him before he closed down. By the time these notes appear, the operator ("Red" Fenton) will have returned to South Africa and the call-sign ZD9AA will have passed into history.

G5DQ of Cambridge reports that VK9NR has now left Norfolk Is. and will shortly be operating in Samoa with a ZM6 call. 'DQ has been pulling them in on 7 Mc/s. Here are some of the best with the times:—KH6IJ, 0850; ZE2JN, 1825; EA6AF, 1855; VQ4HJP, 1945; W7DL, 1615; VK7JB, 1915; VK6RU, 1950; VQ4SC, 2250; VP6AT, 0157; ZE2JV, 0450; AP5B, 1725; KG6GM, 1800; CZ2AC, 1907; VQ3KIF, 2230. That little list should convince the most sceptical doubter of the possibilities in the old forty metre band! Incidentally, there are, as G3ATU rightly points out, some dreadful notes to be heard at times.

G8KP is another enthusiast with a splendid bag. Using one half of his 14 Mc/s. dipole as an end fed aerial and with 100 watts to a single 808, he worked 40 countries in 10 days including, VK, VP6, VSI, W7, KV4, UF6, ZD9, VS6, KG6 and PY. He asks, does anyone know the present address of MP4BPC?

Writing from Scotland, old-timer Bill Stirling, GM6RV, recalls 7 Mc/s. conditions in 1931 when he had QSO's with J5CC and J4CU at 1945 and 2010 G.M.T. In the B.E.R.U. contest that year his log looked much like the reports above from G5DQ and G8KP!

Notes and News

G3EYD forwards some interesting comments on a QRP contact which he had with F9PC on 14016 kc/s. at midday on December 13, 1949. The French station, situated on the Spanish frontier, was using a single battery-valve transmitter running from 80 volts of dry batteries, yet his signals were RST 5 6/7 9 at G3EYD.

MP4BAE late of Bahrein handed over his station to Norman Webber who is now operating as MP4BAB.

The story of the first post-war transatlantic contact on 1·8 Mc/s. was published in the January issue of the *Bulletin*. Here is a recent photograph of Robert W. Denniston, W4NNN, Falls Church, Va. showing some of the equipment used during his QSO with G3PU of Weymouth, on December 18, 1949. The 200-watt transmitter consists of a 6V6 V.F.O., 807 doubler and P.P. 8005's with two 135 ft. aerials loaded to form a composite half-wave radiator. The receiver is an SX28A. Incidentally it is believed this was the first-ever G–W4 contact on Top Band. Any other claimants?

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

It seems rather a pity that these rare DX calls are reissued so quickly because it renders the delivery of QSL cards *via* the Bureau extremely difficult. MD4GC reports that MS4UU left Somalia on July 13, 1949, and is now MI3UU. One of the operators of MS4UU is now MS4FM. All contacts with MS4UU subsequent to this date were with an unlicensed station.

BRS18017 of Coventry has heard VQ8AX at S8 on 14 Mc/s. 'phone. Cards have arrived at the Bureau from CR4AD. US1BX on 7060 kc/s. claims to be in the Russian zone of Germany.

GM3CSM who has 38 zones and 124 countries confirmed says several of the GM's are on the top line for WAS. For example, he and GM6MS need Montana, whilst GM6MD is short of a card from Utah. Incidentally, GM3CSM has received his card from SP8XA. Cards are also in from PK2ZZ (Dutch operator). QSL *via* VK7LZ.

G5YV reports that the call MC1BH is held by Brian

Hollands (ex-MP2BH) and that the station is now at Benghazi. Brian, who will be active on 14 Mc/s., has ordered a supply of cards but delivery may be delayed somewhat.

Mr. C. B. Lewis, BRS18448 (ex-VS7CL) now back in England, writes to say he has QSL'd all his contacts. He will be pleased to forward a duplicate of any card not received if application is made to him (enclosing stamps for reply postage) at " Lee Mount," Hillcrest Rd., Redcliffe Bay, Portishead, Somerset.

TA3FAS, now operated by W5HBQ will acknowledge all contacts and listener reports. Cards should be sent *via* the R.S.G.B. Bureau. W5HBQ, who is a member of the Society, mentions that the station signing AJ3F on 27994 kc/s. is run by the military and therefore cannot work amateurs.

VP8AD has forwarded more than 200 cards and promises more. In a covering letter he states that the mail service, both to South Georgia and the Falkland Is. is very poor and that up to the time of writing he had not received the cards sent to him from R.S.G.B. He asks for patience and says he will QSL everyone eventually, so please don't send any more " sob-story " letters *via* your long-suffering QSL Manager !

VS6JH is G2FSR, once VS4JH, so there should be no difficulty in making contact with Hong Kong from now on. Yes, MP4KW is our old friend Ken Ellis working from Saudi Arabia.

G6BB, who has an 829 going nicely with 85 watts input, raised VP6AT on 28, MP4KW on 7, 14 and 28, MD7DC on 7 and VS6AX, VQ3SS on 14, just to show it works. He has heard VS5KEA on 14. Any information on this one ? He says LZ1SM on 7 appears to have no receiver ! Call-signs in the series ZE3 are now being issued. ZD6HJ is OK, using 12 watts.

G8NV has made an analysis of QSL returns. From countries outside Britain the percentage is 79 and from 58 Mc/s. G contacts 53 per cent. in a six months period, which seems about average. He would be interested to know how others have fared.

BRS17991 of Frinton, who uses an 1132 and a 16 ft. aerial seems to hear everything. He wonders if there is any connection between FF3CN, FF8CN and FU3CN. He says there is a YL operator at EL2A.

G5BS comments on the usefulness of Amateur Radio for keeping in touch with old Service friends. He has recently worked HZ1KE, ST2AM, MP4BAB, AP2J, and ZB1AB, all of whom he had met or worked with in Service life. He asks who is UA7QD ? He remarks that SV0 " Wobbling Frequency " should bear in mind that many a true word may be spoken in jest !

Associate 1069, Ian Cameron of Glasgow, has commented on early evening activity on 14 Mc/s. After about 2030 the band goes out.

G3ATU has worked PJ5TR on 14120 (QSL *via* W4BYF) and heard 5M5F or 5M5C—it is difficult to tell which. He sounds rather like a certain 3V8 station who has been heard signing as FW5AA. VS8CE on 14 sounds like DX. Has someone at last been issued with the correct prefix for Bahrein ?

MP4BAO (Bahrain Is.) is held by Ian Thomson, GM3AFG, who can claim to have had almost as many call-signs as Ken Ellis—the best known were ZD2G and ZS6OL. Will anyone working MP4BAM please ring G3ZR on LABurnum 5015, who wishes to get into touch with him.

G3FWD (ex-MD1B) is now active in Wolverhampton.

PA0CB has worked DI2BC, mentioned last month. This station belongs to a German Institute at Linden in the Harz Mountains and claims to be carrying out ionospheric research on behalf of the German Post Office. Surely this type of service should be operated elsewhere than in the amateur bands.

Contests Diary

R.S.G.B. Affiliated Societies Contest
1500 G.M.T. to 2300 G.M.T. March 4 (Telegraphy)
1500 G.M.T. to 2300 G.M.T. March 5 (Telephony)

A.R.R.L. DX Contest. Telegraphy Section
0001 G.M.T. February 11 to 2400 G.M.T. February 12
0001 G.M.T. March 11 to 2400 G.M.T. March 12

A.R.R.L. DX Contest. Telephony Section
0001 G.M.T. February 18 to 2400 G.M.T. February 19
0001 G.M.T. March 18 to 2400 G.M.T. March 19

Low Power Battery Group Wanted

G2BJY has built a battery portable using miniature valves and has had some most encouraging results. We should like to hear from any member who would be willing to organise a " low power battery " group to exchange information on this fascinating phase of the hobby.

Code Copying Certificate

G3AEE wonders what support would be forthcoming for a code copying certificate on the lines of that offered by the A.R.R.L. Has anyone any ideas on the subject ?

Slow Morse Transmissions

G.M.T.	Call	kc/s.	Town
Sundays			
09.30	G6NA	1840	Guildford
10.00	G5XB	1950	Reading
Mondays			
13.00	G3AXN	1870	Southend-on-Sea
19.00	G3NC	1825	Swindon
20.00	G2AJU	1900	Stutton, Ipswich
20.00	G3DSR	1750	Derby
20.00	G2CLD	1775	Tunbridge Wells
21.00	G2BLN	1900	Bournemouth
21.00	G8VR	1850	London, S.E.2.
21.00	G3BHS	1820	Eastleigh, Hants
22.00	G8TL	1896	Ilford
22.30	G4GA	1896	Chingford
Tuesdays			
13.00	G3AXN	1870	Southend-on-Sea
19.00	G5XB	1780	Reading
20.00	GI2HLT	1900	Belfast
21.00	G3EFA	1855	Southport
22.00	G3ELG	1772	Rotherham
22.30	G6JB	1820	Salcombe, Devon
23.00	GM4AN	1820	Kirkcaldy
Wednesdays			
20.00	G2NY	1850	Preston
20.00	G3AFD	1783	Southampton
22.00	G6NA	1840	Guildford
22.00	G3DLC	1800	Grays, Essex
Thursdays			
18.00	G3AXN	1870	Southend-on-Sea
19.00	G3NC	1825	Swindon
22.30	G3ARU	1990	Wanstead
22.30	G3OB	1803	Manchester
Fridays			
13.00	G3AXN	1870	Southend-on-Sea
19.00	G3BLN	1900	Bournemouth
20.00	G2AJU	1900	Stutton, Ipswich
20.00	G3AKW	1860	Wirral
20.30	G8LZ	1868	Gravesend
21.00	G3BHS	1820	Eastleigh, Hants.
22.30	G6JB	1820	Salcombe, Devon
23.00	GM4AN	1820	Kirkcaldy
Saturdays			
23.00	G3CHY	1800	Ashton-u-Lyne

Month on the Air—*Continued from page 266.*

LU1ZA

We are glad to announce that the A.R.R.L. has agreed not to recognise the activities of this foreign pirate who operated on British territory. That we tolerated his impudence for so long is bad enough; to have recognised his activities for any kind of operating award would be the last straw of insult piled upon injury. In any case, no self-respecting Britisher, knowing the facts would have worked him!

Top Band Sussex League

A group under this name is being formed by the Sussex C.R. The object is to stimulate interest in top band working. Details may be obtained from the C.R. at 42, Southfarm Road, Worthing.

M.O.T.A.

Our appeal of last month has not fallen on stony ground. Thanks fellows. Please keep it up.

Congratulations

A UNIQUE event—in British Amateur Radio circles—occurred on December 10, 1949, when two licensed amateurs in the persons of Roland Duesbury, G3CTE, and Judy Bolton, G3EYO, decided to run in double harness.

Their many friends wish them happiness and trust that through the medium of their joint station they will derive much joy and pleasure.

QRP

THE growing interest in low power operation is reflected in the steadily expanding circulation of "*QRP*," a roneoed magazine and newsletter produced for the QRP Section of the *International Short Wave League* by Mr. J. Whitehead, 6, Abbot's Tilt, Hersham, Walton-on-Thames, Surrey. In six months the membership of this group, which is devoted to the advancement of low power transmitting and receiving technique, has risen from 18 to 58. The 16 page January issue provides evidence of the care expended upon the compilation of information useful to those who believe that there is still much interest and enjoyment to be derived from the development of simple, portable equipment for the amateur bands.

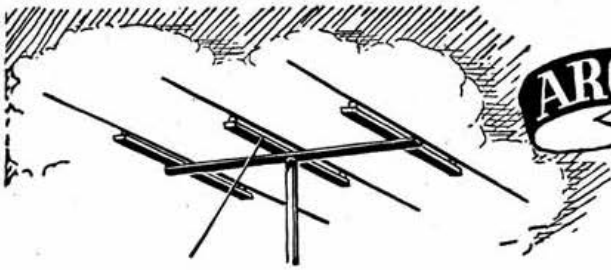
TO WHOM IT MAY CONCERN

At least one QSL Sub-Manager AND his Wife are seriously alarmed at the growing congestion of cards for British Amateurs who have forgotten to send any stamped addressed envelopes recently. If you don't want the cards, tell the Bureau to destroy them. If you do, then switch off the transmitter for a minute and get busy addressing envelopes before that XYL starts spring cleaning!

"Worked all Pacific" Award

AN amended country list has been prepared by the N.Z.A.R.T. for the W.A.P. award, details of which were given in the March, 1949, issue of the BULLETIN. Claims must include proof of contact with 30 or more of the following countries:

1.	Portuguese Timor	CR10
2.	New Caldedonia	FK8
3.	French Oceania (Tahiti)	FO8
4.	New Hebrides	FU8, YJ1
5.	Philippine Islands	DU, KA
6.	Baker, Howland, Canton, etc.	KB6
7.	Marianas Islands (Guam)	KG6
8.	Territory of Hawaii	KH6
9.	Johnston Islands	KJ6
10.	Midway Islands	KM6
11.	Palmyra and Jarvis Group	KP6
12.	American Samoa	KS6
13.	Wake Island	KW6
14.	Marshall Islands	KX6
15.	Java	PK1–2–3
16.	Sumatra	PK4
17.	Netherlands Borneo	PK5
18.	Celebes and Molucca	PK6
19.	Netherlands New Guinea	PK7
20.	Australia	VK2–7
21.	Papua	VK9
22.	Territory of New Guinea	VK9
23.	Gilbert and Ellice Islands	VR1
24.	Fiji Islands	VR2
25.	Washington (Fanning) Is.	VR3
26.	British Solomons Islands	VR4
27.	Friendly (Tonga) Islands	VR5
28.	Pitcairn Island	VR6
29.	British North Borneo	VS4
30.	Brunei	VS4
31.	Sarawak	VS5
32.	Cocos Islands	ZC2
33.	Christmas Islands	ZC3
34.	Cook Islands	ZK1
35.	Niue	ZK2
36.	Western Samoa	ZM6
37.	New Zealand	ZL1–4
and		
	Bonin Island	(KG6I–)
	Caroline Islands	(KC6)
	Palau Island	—
	Phœnix Islands (British)	(VR1)
	Tokelau and Union Islands	—



AROUND THE V.H.F.'s

G3LZ and G3BAK make first 3 cm. contacts.

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

This Also Means You

IN the January issue, Arthur Milne, G2MI, drew the attention of readers of " Month on the Air " to the fact that his feature relies largely upon the co-operation of members for its information; this month, with the post-bag at an all-time low of *three* reports, we feel that a similar reminder is due in respect of this column. Surely activity on the V.H.F.'s has not fallen to this extent ? It is quite impossible to compile a page from such slender means, therefore this appeal for more news for the March issue which, owing to the writer's departure for Sweden to attend the 25th Anniversary Celebrations of S.S.A., should not arrive later than February 21.

Definitely V.H.F.

In order to justify future claims for ether space for the Amateur Service, it is of the utmost importance that we use those allocations which we already possess, and it was, therefore, with considerable satisfaction that we received news of what is thought to be the first two-way contact on the 3 cm. band by amateurs in this country.

G3LZ/P and G3BAK (Glazebrook, near Manchester), operating on 10,020 and 10,080 Mc/s. respectively, exchanged S8 and S9 'phone signals between 1010 and 1040 G.M.T. on January 20, 1950, over a distance of 1¾ miles. Bearing in mind the high signal strengths obtained, and the fact that the world amateur record for this band, set up in the U.S. Third District in 1947, is no more than 7·65 miles, we hope that very shortly another V.H.F. record will cross the Atlantic.

The equipment employed by 3BAK and 3LZ was similar at both stations, and consisted of a modified 723A/B klystron which served as transmitter and receiver local oscillator, together with parabolic-reflector aerials. Modulation was applied to the reflector electrode in the klystron, and in the receiver the I.F. was 60 Mc/s. (Description and photographs please.—Ed.)

Two Metres

Activity appears to have waned somewhat on this band, but our regular contributor from Llanmynech, GW2ADZ, reports that conditions with him have been good since Christmas, with January 10 as the outstanding day. December 24 saw the band open up to at least 170 miles, and since that date he has contacted for the first time G6CB (Wimbledon) and 6LK (Cranleigh, Sy.) G2FNW and 3FOD have both been heard, but although the former often puts in a 599 signal to GW2ADZ, all efforts by that station to raise him have so far failed, as was also the case with five London area stations heard working between themselves on January 12. 'ADZ has now discontinued his sked. with G2XS (Kings Lynn), but maintains another one every night from 2100 to 2115 G.M.T. with G3VM (Norwich) and 2CPL (Lowestoft). Concerning the daily contact between the Welsh station and G3EHY (Banwell, Som.), fading is often found to be a one-way affair and these operators wonder what explanation the propagation experts can offer for this phenomenon.

*32 Earls Road, Tunbridge Wells, Kent.

V.H.F. Achievements

144 - 146 Mc/s.		
W4JFV—W0EMS	Sept., 1949	830 miles
G3BLP—GI2FHN	Aug., 1949	327 miles
OH2OK heard by G5QA	Dec., 1949	1325 miles
420 - 460 Mc/s.		
W6VIX/6—W6ZRN/6	July, 1949	262 miles
GM2JT/P—GW6DP/P	Aug., 1949	130 miles
G3AHB/A—G3FZL/A	Aug., 1949	63 miles
1215 - 1300 Mc/s.		
W1OFG/1—W1MZC/1	July, 1949	37 miles
G6CW—G8DD/P	Nov., 1949	4.5 miles
2300 - 2450 Mc/s.		
W6IFE/6—W6ET/6	Oct., 1947	150 miles
G3CBN—G8IH/P	Oct., 1948	24.4 miles
G6CW/P heard by G8DD/P	Nov., 1948	45 miles
10000 - 10500 Mc/s.		
W4HPJ/3—W6IFE/3	July, 1947	7·65 miles
G3BAK—G3LZ/P	Jan., 1950	1·75 miles

G4RX and G8IL (Bridgewater and Salisbury respectively) are now reported active, and there is a listener on two metres in or near Wick.

G3DCC (Harringay, Middlesex) during the spell of recent good conditions, heard G2IQ, 3AUH/A, 3ENS and, among others, five Cambridge stations—G2AIQ, FJD, XV, 4MW and 6SY—three of which were contacted. 3DCC who bemoans the general lack of activity would appreciate reports from other stations and B.R.S. members living more than 100 miles away. His equipment includes a transmitter (7 Mc/s. crystal) with two TT11's acting as quintupler and doubler, followed by a pair of CV6's as push-push doubler and another pair of similar valves in the P.A. with 15 watts input. The receiver employs 6J6 and 6AK5 R.F. stages, a 6J6 mixer, 6J6 oscillator, and an I.F. of 7 Mc/s. provided by a BC342. The aerial is a 4-element Yagi T-matched into 300 ohm *Telcon* feeder.

On the subject of receivers, GW2ADZ now uses a 6J6 push-pull oscillator working on fundamental frequency in his receiver, and regards it far more favourably than his previous harmonic oscillator both from the standpoint of stability and general efficiency.

G6LL (Cuffley), who is often on the band on both 'phone and C.W., using an 829B final, a c.c. convertor and a 4-element remote-controlled Yahi, would welcome contacts.

That, we regret to say, is all for this month. Can you help to fill it out a bit for the March issue ? A few lines, please, by February 21.

THE RADIO & ELECTRICAL MART (G3BSW)
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250-WATT DOUBLE-WOUND TRANSFORMERS. 230/110 V. Made by G.E.C. With steel shroud. New. **£2 7s. 6d.** each, post paid.

MAINS TRANSFORMERS. Made by *Western Electric*, fully shrouded with tag terminals. Input 100/110/120 V., output 450–0–450 V. 250 mA., 4 V. 4 A., 4 V. 4 A., 0–300 V. These are a super job. Size 6¾" x 5" x 4". **30/-** each, post paid.

VALVES. IT4–ISS–IS4, **6/6** each. 3S4, **8/6.** IR5, **7/6.** 5U4, **6/6.** V96O, EHT 5,000 V. 10 mA., **6/6** each. 6K7, metal, **5/6.** Acorn 955–954, **4/6** each. 9001, 9002, **6/6.** 9003, **4/6** each. 6V6G, **7/6.** Y63 Tuning Eye, **8/-.** All post paid. 6C8, **7/6.** 807, **7/6,** 6L6, **10/6.** EF50, **5/6.**

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SPEAKERS. 3½", **8/6** each plus 1/– postage; 5", **10/6,** postage 1/–. 8" P.M., **16/-,** postage 1/6. 10" P.M., **25/-,** postage 1/6.

Circuits available BC453/454/455 at **2/8½** set, and R1147A or B, **1/8½,** post paid.

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BC342. The finest communications receiver ever built, 18 to 1·5 Mc/s. in 6 bands for A.C. mains, individually checked and calibrated. Price **£20,** packing case and carriage 20/–.

MAINS POWER SUPPLY UNIT. In black enamelled case, 9" x 6" x 6", contains heavy-duty transformer, rectifier valve, smoothing choke, condensers, panel light switch and fuses. Input 200/260 V. A.C. Output 6·3 V. at 3·5 A. H.T. 350 V. at 80 mA. Price **£3 5s.** This power unit is suitable for R1155 and R1132A and is supplied with Jones plugs.

S.W. TUNING COIL TURRETTS 10 to 70 Mc/s.—8 coils with rotary switch in plated metal case 3¾" × 2¾", **5/-** each, post 9d.

TU9B UNITS, complete in cases, **17/6,** carriage paid.

OSMOR MINIATURE ALL WAVE COIL PACKS. Measure 3½" x 2" x 1¾" for 465 kc/s., I.F.'s, **33/6,** post paid.

TWIN-GANG VARIABLE CONDENSERS. ·0005 μF, **4/6.** 3-gang, **6/6,** post paid.

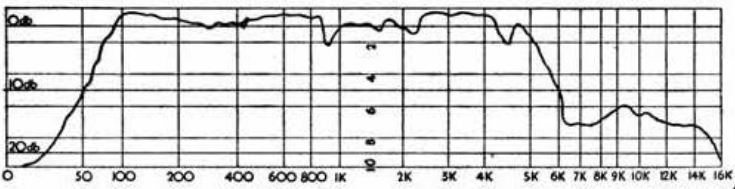
SELENIUM RECTIFIERS H.W. 120 mA. **6/6.** 60 mA. **4/6.** 6 V. or 12 V. 1½ A.F.W. **10/6** and 6 V. or 12 V. 4 A.F.W. **25/-** post 6d. F.W. 250 V. 60 mA., **10/6.** F.W. 120 mA. 300 V., **27/6.** Post 9d.

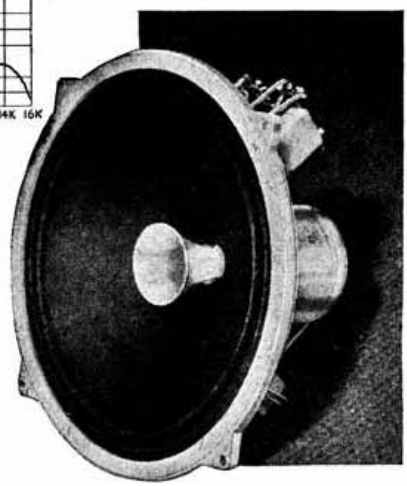
U.S. CARBON MICROPHONES. New, as used with Type 58 sets, **2/6 each,** post 6d.

MINIATURE slow motion dials, 2¾" x 2", 100·1 worm drive, **3/6 each,** post 6d.

RF24 UNITS CONVERTED TO 10 METRES, £2, post 1/6 Variable tuned with S.M. dial and drive.

MINIATURE ELECTROLYTIC CONDENSERS in ali. cans, all 450 V. D.C.W. 32 μF., **4/9.** 16 × 8 μF., **4/9.** 8 × 8 μF. **4/6.** 8 μF., **3/6.** All post paid.





The above curve will show you at once why this new twin-reproducer, incorporating two independent loudspeakers, has been so enthusiastically welcomed by quality fans.

Never before has so wide a range been covered so evenly by a small domestic instrument. Although moderately priced, this is a high-fidelity speaker in the best sense of the word. Leaflet on application, with pleasure.

SPECIFICATION : Series Gap magnet of Alcomax 3.
Flux in LF gap 12,000 gauss on 1" pole
„ „ HF „ 13,000 gauss „ „ „
Power handling capacity, 6 watts. Frequency range 50–14,000 c.p.s. Fundamental bass resonance, 65 c.p.s.

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NATIONAL FIELD DAY, 1950

AS announced in the January, 1950, issue of the BULLETIN, there are several important changes in the rules for N.F.D. this year. While the maximum power is again limited to 5 watts, there are new restrictions on aerials and equipment. Aerials may consist only of single *wire* radiators not longer than 285 feet for "A" stations, and 70 feet for "B" stations, excluding non-radiating feeder systems. The limitation of one receiver per station (Rule 5) will make it impossible to search for signals on a second receiver during contacts. It is hoped that the effect of these changes will be to allow the smaller Town Groups to compete on a more even basis with the larger organisations. It is not the intention of the Contests Committee, however, to discourage ingenuity in the design of efficient low-power stations.

The introduction of the exchange of *time* (in addition to RST reports) during contacts with other *portable* stations should be carefully noted. This exchange of time is not required for contacts between portable-to-fixed stations. Town Representatives are particularly requested to observe carefully the closing dates for entries and for logs in order to avoid the disappointment which has occasionally arisen in the past when applications and entries have been received up to several weeks late. Applications for portable permits must give an adequate description of the proposed locations: last year the G.P.O. commented upon the vagueness of certain sites.

Start organising *now* to make National Field Day, 1950, an event to remember!

Rules

1. The event will commence at 1700 B.S.T. (1600 G.M.T.), Saturday, June 3, 1950, and conclude at 1700 B.S.T., Sunday, June 4, 1950.

2. The event will be confined to properly constituted R.S.G.B. Town or Area Groups within the British Isles, which, for the purpose of the event, comprise the prefix zones G, GC, GD, GI, GM and GW.

3. Each Town or Area Group taking part will be permitted to place two stations ("A" and "B") into operation. Station "A" will operate on the 1·8 Mc/s. and 3·5 Mc/s. bands and Station "B" will operate on the 7 Mc/s. and 14 Mc/s. band. Both stations may operate from the same site or from different sites, provided they are located within the agreed limits of the area covered by their County Representative. It will be permissible for two or more towns or areas within a single county to amalgamate for the purpose of this event.

4. Each station must be licensed to use a different call sign. T.R.s are responsible for forwarding to Headquarters applications for N.F.D. permits. Such applications should be set out as follows:—

National Field Day, 1950

On behalf of the members in .....(*Town or Area*)
I submit this application for permission to operate portable stations for the duration of the above event, as follows;—

"A" Station Call Sign ...../P *Licensee* .....
Site .....

"B" Station Call Sign ...../P *Licensee* .....
Site .....

(*If applicable*) *I desire to combine with* .....
(*Town or Area*) *for the purpose of scoring.*

Signed .....(*T.R. or A.R.*)

Call Sign ..... *Address* .....
.....

The above application, which is necessary to obtain the permission of the G.P.O., will also be regarded as an entry for the event. Permission is normally sent to the licensee direct by the G.P.O.

Applications, duly signed, must be in the hands of the Hon. Secretary, R.S.G.B. Contests Committee, New Ruskin House, Little Russell Street, W.C.1, NOT LATER THAN APRIL 3, 1950. A list of portable stations and their locations will be published in the May issue of the BULLETIN.

5 Equipment at any "A" or "B" station must not exceed one transmitter and one receiver. Reserve equipment may be kept available, but not connected.

6. The total D.C. input to the anode circuit of the valve or valves energising the aerial or to any previous stage of the transmitter shall not exceed 5 watts. Power shall not be derived from supply mains.

7. Each station may use only one transmitting aerial which shall comprise a single wire radiator, not longer than a half-wave at the lowest frequency of the station, excluding any feeder system. A separate receiving aerial may be used. (Note.—This rule excludes the use of multi-element beams. A centre-fed aerial is considered as a "single wire.")

The height of the aerial at any point must not exceed 45 feet above ground level, nor may the point of suspension exceed 45 feet from ground level.

8. Stations must be operated from tents.

9. No apparatus may be erected on the site prior to 1200 B.S.T. on June 3, 1950. This rule includes aerial and aerial fittings as well as tented accommodation.

10. The event is restricted to the use of C.W. (A1) only. Any station receiving consistent tone reports lower than T8 may be disqualified.

11. All transmissions must be completed with an indication of the band in use; the numerals 1, 3, 7 and 14 signifying the four bands (e.g. ". . . AR 7 K").

12. An exchange of reports must be made before points can be claimed. In the case of portable-to-portable contacts, the report must include the time (e.g. QTR 1701 RST 569). The time to be sent is that entered in the log for the contact. Proof of contact may be required.

13. Points will be scored for established contacts on the following basis:—

A.—Between all Town or Area Portable Stations and Fixed Stations:— *Points.*
- (*a*) Outside the Town or Area (or Town or Area Group), but within the British Isles 1
- (*b*) In the rest of Europe (including Eire) 2
- (*c*) Outside Europe 3
- (*d*) In the British Empire 6

B.—Between G, GC, GD and GW portable stations on the one hand and:— *Points.*
- (*a*) Portable stations outside their Town or Area (or Town or Area Group), but within the prefix zones G, GC, GD and GW 3
- (*b*) Portable stations in the prefix zones GI and GM... 4
- (*c*) Portable stations in Europe (including Eire) ... 4
- (*d*) Portable stations outside Europe 6
- (*e*) Portable stations in the British Empire 12

C.—Between GI and GM portable stations on the one hand and:— *Points.*
- (*a*) Portable stations outside their Town or Area (or Town or Area Group), but within the prefix zones GI and GM 3
- (*b*) Portable stations outside the prefix zones GI and GM, but within the British Isles and Eire ... 4
- (*c*) Portable stations in Europe 5
- (*d*) Portable stations outside Europe 6
- (*e*) Portable stations in the British Empire 12

14. Only one contact with a specific station may be made on each band during the contest.

15. In addition to the *National Field Day Trophy* and miniature replica which will be awarded to the Town or Area Group obtaining the highest combined score, miniature replicas will be awarded to the Town or Area Groups with the leading "A" and "B" station scores. Should the winning Town or Area Group also lead with the highest "A" or "B" station score, it will only be eligible for one replica; the other would not then be awarded. A certificate will be awarded to the chief operator of the British Empire or foreign portable station contributing the largest number of points to stations taking part in the event.

16. Contacts with ships, or unlicensed stations located in countries where licences are obtainable, will not be permitted to count for points. The decision as to whether a station is to be classed as unlicensed will rest with the Contests Committee.

17. All entries must be submitted and signed by the T.R. or A.R., who will be solely responsible for the conduct of the event in his Town or Area.

18. Entries must be made on the approved log sheets which will be issued to all competitors by Headquarters. Log sheets must reach the Hon. Secretary, R.S.G.B. Contests Committee, New Ruskin House, Little Russell Street, W.C.1, postmarked *not later than* Monday, June 19, 1950.

19. The *N.F.D. Trophy* will be held by the winning Town or Area Group for one year and will be handed to the T.R. or A.R., who will be held responsible for its custody during the year.

20. Operators of portable stations competing in the event must be holders of a G.P.O. Amateur Transmitting Licence and must be fully paid-up corporate members of the Society.

21. The Contests Committee reserves the right to amend or alter these rules at any time prior to the commencement of the event. The decision of the Council of the R.S.G.B. will be final in all cases of dispute.

Amateur's Scholastic Success

Mr. I. R. Gibbons, G3FCZ, has been awarded a Minor Open Scholarship in Natural Sciences to King's College, Cambridge. This outstanding achievement follows his success when he won a State Scholarship on the results of his Higher Schools Examination last July. G3FCZ is a pupil at the Queen Elizabeth Grammar school, Faversham and has operated from there.

HEADQUARTERS CALLING

COUNCIL, 1950

President:
WILLIAM A. SCARR, M.A., G2WS.

Executive Vice-President: F. Charman, B.E.M., G6CJ.
Hon. Treasurer: A. J. H. Watson, F.S.A.A., G2YD.
Hon. Secretary: J. W. Mathews, G6LL.
Hon. Editor: Arthur O. Milne, G2MI.
Immediate Past President: V. M. Desmond, G5VM.

Members: W. H. Allen, M.B.E., G2UJ, A. P. G. Amos, G3AGM, L. Cooper, G5LC, D. N. Corfield, D.L.C. (Hons.), A.M.I.E.E., G5CD, W. N. Craig, B.Sc., G6JJ, C. H. L. Edwards, A.M.I.E.E., G8TL, P. A. Thorogood, G4KD.

General Secretary: John Clarricoats, G6CL.

December, 1949 Council Meeting

Resume of the Minutes of a Meeting of the Council of the Radio Society of Great Britain, held at New Ruskin House, on Tuesday, December 13, 1949, *at* 6 *p.m.*

Present.—The President Elect (Mr. W. A. Scarr, in the Chair), Messrs. W. H. Allen, A. P. G. Amos, I. D. Auchterlonie, F. Charman, D. N. Corfield, W. N. Craig, S. K. Lewer, J. W. Mathews, A. O. Milne, P. A. Thorogood, A. J. H. Watson and John Clarricoats (General Secretary).

An apology for absence was submitted on behalf of the President (Mr. V. M. Desmond).

Representation.

Letters were read from Mr. A. W. Watkins, the Hayes Area Representative, and Mr. L. Cooper, the President of the Thames Valley Amateur Radio Transmitters Society, protesting against the actions of certain members who had solicited votes for the East London candidate for the office of London Regional Representative whilst assisting on the Society's stand at the Amateur Radio Exhibition.

Resolved—

(*a*) To advise the complainants that the Council deprecates the practice, and to inform them that consideration will be given to the general question of canvassing prior to future elections.

(*b*) To place on record that the alleged soliciting of votes on the Society's stand was not done with the approval of the Council or Headquarters.

Radio Amateurs' Examination.

It was reported that at a recent meeting of the Advisory Committee set up by the City & Guilds of London Institute in connection with the Radio Amateurs' Examination, the Society's representatives had again put forward an urgent plea for the holding of two examinations each year. The plea had been supported by the Post Office representatives on the Committee, but the Institute authorities had again emphasised that it is not possible for them, at the present time, due to lack of staff and other facilities, to organise two examinations a year.

Resolved to instruct the Society's representatives on the Advisory Committee to enquire from other examining bodies whether they have facilities for conducting two examinations a year.

Bevan Swift Fund.

Resolved—

(*a*) To invest the proceeds of the Fund and to award the interest thereon annually to the person invited by the Council to deliver a lecture, to be known as the Bevan Swift Memorial Lecture.

(*b*) To request the Finance and Staff Committee to examine the financial aspects of the award and to report further thereon to the Council.

(*c*) to instruct the Secretary to bring forward draft rules governing the award.

Membership.

Resolved—

(*a*) To elect 104 Corporate Members, 24 Associates and 4 Junior Associates.

(*b*) To grant Corporate Membership to 11 Associates who had applied for transfer.

Affiliation.

Resolved to grant affiliation to the Chester and District Amateur Radio Society.

Television Interference.

Resolved to request the G.P.O. Liaison Committee to take early steps to arrange a meeting with the Post Office to discuss matters relating to television interference.

Amateur Radio Exhibition.

Resolved—

(*a*) To place on record the appreciation of the Council to those members who voluntarily manned the Society's stand and to recognise in particular the efforts of Messrs. Evens, Bond, Davie, Sharpe, Bennett and Evenett.

(*b*) To place on record the thanks of the Council to Mr. Freeman for the efficient manner in which he managed the Exhibition.

QSL Bureau.

Resolved to award honoraria totalling £153 to the fifteen members who had acted as Sub-Managers during the past 12 months.

Resolved to recognise the efforts of the Sub-Managers for Northern Ireland, the Isle of Man, and the Channel Islands by arranging for the Society to pay their subscriptions when next due.

Affiliated Societies Contest.

Resolved to accept and adopt the rules for an Affiliated Societies Contest as submitted by the Contests Committee.

Thanks to Retiring Members.

The Chairman, on behalf of his colleagues who had been elected to serve on the 1950 Council, thanked the two retiring members, Messrs. S. K. Lewer and I. D. Auchterlonie, for their past services to the Society. Both members made suitable reply.

The meeting terminated at 9.5 p.m.

Committees of the Council

The following members have been appointed to serve on Committees of the Council during the current year :—

Contests.—Messrs. F. Charman, W. N. Craig, B.Sc., P. A. Thorogood, R. T. Bowler, S. E. Fryer, C. J. Greenaway, T. L. Herdman, J. Hunter, W. H. Matthews and H. W. Pope.

Finance and Staff.—Messrs. J. W. Mathews, A. O. Milne and A. J. H. Watson, F.S.A.A.

Licence.—Messrs. J. Clarricoats, S. K. Lewer, B.Sc. and W. A. Scarr, M.A.

Membership and Representation.—Messrs. A. P. G. Amos, L. Cooper, V. M. Desmond and C. H. L. Edwards, A.M.I.E.E.

Scientific Observations.—Messrs. W. H. Allen, M.B.E., W. N. Craig, B.Sc., H. R. Hatch, D. W. Heightman, M.Brit.I.R.E. and A. G. Hill.

Technical.—Messrs. W. H. Allen, M.B.E., F. Charman, D. N. Corfield, D.L.C., A.M.I.E.E., A. O. Milne, J. W. Mathews, A. J. Bayliss, B.Sc., H. A. M. Clark, B.Sc.(Eng.), R. H. Hammans, S. K. Lewer, B.Sc., and R. H. Newham.

Representation

In addition to the three new London D.R.'s whose names are given on page 264, the Council has been pleased to appoint the the following members to serve as County Representatives :

Region 6.
Buckinghamshire ... B. Hayes, BRS9600, 8 Althorpe Crescent, New Bradwell, Wolverton.

Region 10.
Glamorganshire ... E. A. Hayward, GW2UH, 6 Kenfig Road, Gabalfa, Cardiff.

Region 11
Caernarvonshire and Anglesey ... ... A. Evans, GW4MZ, Bloomsbury, Rhuddlan Avenue, Llandudno, Caerns.
Flintshire ... ... E. G. Foulkes, GW5FU, 19 Kinard Drive, Rhyl.

Channel Islands
Group Representative. F. E. Atkins, GC3ZU, 50 Victoria Road, St. Peter Port, Guernsey.

A complete list of Regional, County, District, Town and Area Representatives will appear in an early issue. Members in Towns and Counties which at present have no representative should take urgent steps to put forward recommendations to their Regional Representative.

London Meeting

A large gathering was present at the Institution of Electrical Engineers on Friday, January 27th, 1950, when Mr. W. A. Scarr, M.A., G2WS, delivered his Presidential Address. The meeting was opened by Mr. S. K. Lewer, B.Sc., G6LJ, Past President who, in the unavoidable absence of the Immediate Past President (Mr. V. M. Desmond, G5VM), formally introduced and installed the new President.

Following the Presidential Address (which is published in full in this issue), Mr. J. Neale, B.Sc.(Eng.), A.M.I.E.E. of the Post Office Engineering Department delivered a lecture entitled "The use of V.H.F. on Radio Telephone Services." A description and demonstration of the V.H.F. telephone system used by the Metropolitan Police (given by a representative of the Police service) was followed by a demonstration of the recently-installed system which enables telephone subscribers to speak direct to shipping in the River Thames.

Mr. F. Charman, B.E.M., G6CJ (Executive Vice-President) voiced the thanks of the meeting to Mr. Neale and his associates.

Radio Amateurs' Examination

A course of lectures in preparation for the 1950 Radio Amateurs' Examination is now being given in the Belfast College of Technology. Mr. S. N. Johnson, GI5SJ (Theory), and Mr. J. E. Maxwell, G13ML (Practical), are the lecturers.

Classes covering both theory and Morse instruction have also been arranged by the Maidenhead Technical Institute. Details can be obtained from the Principal, Mr. F. W. Tweedell, Maidenhead Technical Institute, Boyn Hill House, Boyn Hill Avenue, Maidenhead.

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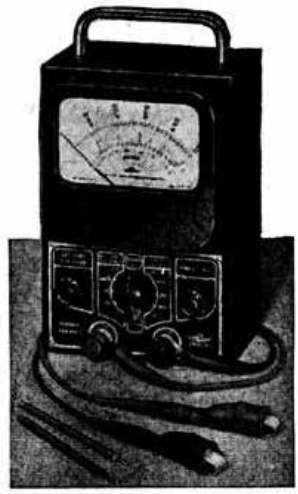

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HIC ET UBIQUE

Birmingham

The Birmingham Area Representatives (Messrs. W. J. Butler, G5LJ and T. F. Higgins, G8JI) have arranged for a meeting of R.S.G.B. members to take place at the Imperial Hotel, Birmingham, at 7.45 p.m. on March 21st, 1950 following the meeting of the Midland Amateur Radio Society which is timed to commence at 6.30 p.m.

All members living in Birmingham are urged to make a special effort to attend so that their views may be ascertained regarding the desirability of holding further meetings. Arrivals should be timed before or after the lecture.

Members with their wives and families entered into the spirit of a highly successful social—the second annual event of its kind—held in South Birmingham on January 21, 1950.

Coventry

At the meeting held on January 20 at the Priory High School, a full discussion took place as to the part which local amateurs could play in the Aircraft Distress Service, announced in the January issue of the BULLETIN. It was agreed that maximum degree of co-operation should be given whenever possible.

Coventry Amateur Radio Society

At a recent meeting G2LU gave a talk on "Working DX" which proved of particular interest to the several newly licensed amateurs in the Society. Morse instruction has been extended to include actual contacts, under the supervision of G3FAB.

East London

The 130 members, who attended the East London District meeting on January 15, witnessed a highly-effective demonstration by Mr. Louis Varney, G5RV of the suppression of television interference. During the meeting interference-free pictures were obtained while G5RV's 25-watt transmitter (which will be described shortly in the BULLETIN) was being operated. The television aerial, erected on the roof of the Town Hall, was less than 50 ft. from the 14 Mc/s. dipole: TV receiver and transmitter being on the same table, some 15 ft. apart. Local members took full advantage of this opportunity to obtain the latest information on transmitter interference suppression devices, which showed, so plainly, that TVI can be cured.

Gateshead Amateur Radio Society

Efforts are being made to form an Amateur Radio club in the Gateshead area. Prospective members are cordially invited to get in touch with Mr. T. Kellett, G3EGF, "Aysgarth," Lyndhurst Crescent, Low Fell, Gateshead 9.

When the Midland Branch of the Institute of Electronics held their first exhibition recently in Birmingham, the Midland Amateur Radio Society, the Slade Radio Society and local members of the R.S.G.B. combined to stage a comprehensive display of Amateur Radio activities. This view of the stand gives a good idea of the wide range of home-constructed equipment shown. It is hoped that the exhibition will become an annual event.

Harrow Radio Society

The Harrow Radio Society have kindly offered to act as hosts for local R.S.G.B. meetings. All members are cordially invited to the meetings on February 16 and March 16 (8 p.m.) at the Eastcote Lane Junior School, between Tithe Farm and the Eastcote Arms Hotel. Buses Nos. 114 and 158 pass the door.

Kingston and District Amateur Radio Society

A highly successful meeting was held on January 18 at Penrhyn House, Kingston. The ever-popular Junk Sale was followed by a Brains Trust the members of which were able to solve some particularly knotty technical questions. The future programme includes lectures on transformers, crystals and aerials. Details from the Hon. Secretary, 28 Grove Lane, Kingston-upon-Thames.

Northern Ireland

A Region 15 meeting will be held at the Presbyterian War Memorial Hostel, Howard Street, Belfast, on March 4, 1950, at 3 p.m., when all members will be warmly welcomed.

Plymouth

The annual Dinner and Social of the Plymouth R.S.G.B. Group took place on January 28 at the Lockyer Hotel. Some forty members, wives and friends attended, including the Regional Representative, Mr. H. Bartlett G5QA and the District Radio Inspector of the G.P.O. The Chairman was Mr. G. Maddock G3FSF.

Local members who have not been receiving circulars relating to the Group's activities are requested to advise the T.R.—Mr. J. Eddy, G3TX, 55, Greenbank Avenue, Lipson, Plymouth.

Members of the Barnsley and District Radio Club with their ladies recently enjoyed a happy evening under the chairmanship of old timer George Wigglesworth, G2BH.

Ten Minute Quiz

Answers to the questions set on page 262.

1. Class AB2.
2. The *Phon* is a measure of loudness. Average conversation level is about 60 phons.
3. The 83 is gas-filled—the others are all "hard" rectifiers.
4. Yes. The A.C. resistance is theoretically higher than the D.C. resistance due to what is called "skin effect." This is especially true at high frequencies, *e.g.* very high radio frequencies.
5. A point of maximum current.
6. 3,500·25 kc/s. for 2 minutes at each hour from 1800 G.M.T. to 0900 G.M.T.
7. No—there are about 95 known forms.
8. A 0–0·5 A. hot-wire or thermo-couple R.F. meter. The current should be about 0·4 A.
9. Confirmation of two-way contact with each of the 48 States of the U.S.A.
10. XZ2, VS7, VR2.

Why not make a note of No. 6 NOW in case you want a check of the lower frequency limits of the amateur bands.

R.A.F. Amateur Radio Society

The following programme of lectures has been arranged by the Headquarters' Section of the above Society :—

Feb. 9	Two Metre Converters ..	R. Weston, G6PZ
Feb. 23	Low Power Transmitters	J. Etherington, G5UG
Mar. 9	Hints on DX Operating	A. E. Seymour, ex-ZB1Q
Mar. 23	Keying Systems ...	F/Sgt. Wort, G3AIR

The lectures will be given in Hut 369, No. 1 Radio School, R.A.F., Cranwell, commencing at 6.30 p.m., and will be followed by discussions on Amateur Radio topics. Refreshments will be on sale at the conclusion of each meeting.

The President of the R.A.F.A.R.S. is Group Captain H. A. Evans Evans and the Vice-President and Chairman is Wing-Commander W. E. Dunn, O.B.E., G2LR. Mr. Norman Davis, G6TV, is the Hon. Secretary.

Shefford and District Radio Society

This newly-formed Society meets every Friday (7.30 p.m.) at the Wharf Buildings, Shefford. Current activities include a Morse Class, under the supervision of G2DPQ, and instruction in practical metal work. A series of lectures has also been arranged. It is hoped to cover as many as possible aspects of radio and electronics. New members, either novices or experts, will be most welcome.

Slough

The T.R. has organised a weekly top band contact with local members on the air. Any local member is welcome to join in at 1130 G.M.T. Sundays on 1904 kc/s.

South Manchester Radio Club

Plans for the extension of Club activities to include a local news-sheet *The Intercom* and awards for the best lecture and home-constructed equipment, are well under way. Meetings are held fortnightly and include classes in both slow and high-speed Morse, and preparation for the Radio Amateurs' Examination. Details can be obtained from the Hon. Secretary, Mr. M. I. Wilks, G3FSW, 57 Longley Lane, Northenden, Manchester.

Stourbridge & District Amateur Radio Society

Forthcoming events include participation in a local Hobbies Exhibition and a competition for which the President—G6OI—has donated two trophies. A talk on the Clapp V.F.O. was given to the Society recently by Mr. C. Naylor-Strong, G2RQ.

Thames Valley Amateur Radio Transmitters' Society

A most successful year was reviewed at the A.G.M. held at the Carnarvon Castle Hotel, Hampton Court. The social side of Amateur Radio activities has not been overlooked by the Society with the result that the fairer sex have participated in many of the year's outstanding events. Officers elected included: President, Mr. Leslie Cooper, G5LC and Hon Secretary, Major W. Eden, G3HAE.

Torbay Amateur Radio Society

At a well-attended meeting, held on January 21 at the Y.M.C.A., Torquay, Mr. Sands, A.M.Brit.I.R.E., gave a lecture on "Wire Recording," and followed this with a demonstration of a wire recorder of his own design. The demonstration, which included recordings of amateur 144 Mc/s. transmissions, conclusively proved the versatility of the instrument. Local members of the British Sound Recording Association attended the meeting.

Uxbridge

After criticism of local amateurs had appeared in the press Uxbridge television enthusiasts were invited to a meeting held on January 16 at The Vine Hotel under the chairmanship of Mr. S. F. Sharpe, G3CKX. More than 50 viewers and amateurs attended. Following an introductory speech by the chairman, during which he reviewed the local position and explained some of the causes of television interference, Mr. C. W. Cobb of the G.P.O. outlined the official procedure adopted in the investigation of all complaints and gave further information on the various electrical appliances which could cause interference. During the meeting—which lasted for more than two hours—a number of amateurs expressed their willingness to co-operate with viewers not only in the suppression of Amateur Radio interference, of which remarkably few cases were quoted, but also in the tracing of other forms of local interference. An opportunity was taken during the evening of stressing the value of the amateur movement to the community at large.

Hong Kong Amateur Radio Transmitting Society

The reinforcement of the Hong Kong garrison during the past year, has increased the membership of the H.A.R.T.S. to 36 of which 17 are full members. Due to the lack of suitable accommodation it has not yet been possible to establish a club station but monthly meetings take place at the China Fleet Club and good attendances are recorded. Local activity has been well maintained: a fact which has been much appreciated by overseas stations. The Society has endeavoured to encourage a high standard of operating in order to ensure that VS6 stations set a good example to all Far East operators. Officers for 1950 include: President, Mr. R. W. A. MacKichan, VS6BC; Hon. Secretary, Mr. K. A. Cook, VS6AJ; and Hon. Treasurer, Mr. P. O'Brien, VS6AE.

Norman's Hamfest

The fourth of the now famous "Hamfests" organised by Norman Turner (G4NT), was held at Chiltern Works, High Wycombe, on December 4, and proved as popular as ever, over 150 guests being present.

Proceedings commenced at 2.30 p.m. with a description and demonstration of the very latest measuring equipment by Mr. D. Pittman, of *Marconi Instruments Ltd.*, followed by a highly entertaining talk by Mr. T. D. Humphreys, of *Electronic Tubes Ltd.*, on how and how not to make cathode ray tubes. After tea a fascinating lecture illustrated by numerous and colourful experiments was presented by Mr. H. W. Cumming, B.Sc., A.R.I.C., Research Department, *Siemens Electric Lamps & Supplies Ltd.*, covering the development and history of artificial lighting from the early days of mankind to the present day and hinting at what the present trend of development may hold for us in the future.

After drinks and sandwiches had been served the programme continued with a presentation of "Report from the Sea Bed," a film taken entirely under water and introduced by Lt.-Cmdr. L. K. P. Crabbe, O.B.E., G.M., and a colour film dealing with the manufacture of porcelain and china ware entitled "Crown Derby."

After a lucky prize draw, Mr. Kenneth Alford (G2DX), spoke for the visitors to express their appreciation of the hospitality provided and their thanks to Mr. Norman Turner and his helpers for an extremely interesting day which more than upheld the very high standard set by previous gatherings. And so the guests departed on what for some was a long journey home to look forward to the 1951 Hamfest for which plans are already being made.

Following a recent dinner organised by the Dulwich and New Cross (London) Groups the annual awards of the "Anne Cup" and "Anne Trophy" were made for the best items of home constructed equipment. In this photograph Mr. H. F. Knott, G3CU (joint winner with G3FZL) is shown describing his entry, a single side-band suppressed-carrier exciter. Mr. W. D. Gilmour, G2VB, the donor of the trophy and cup is on the left with "Anne." Mr. C. E. Newton, G2FKZ (S.E. London D.R.) is on the right.

Happy Days, Joe

Members who have served in the Signals Branch of the R.A.F. and in particular those who were associated with the pre-war Civilian Wireless Reserve will be interested to learn that Wing Commander L. H. ("Joe") Stewart retired on February 2nd last after a long and successful career in the Service.

Wing Commander Stewart will always be remembered for the part he played in the formation of the C.W.R.—a reserve of radio amateurs. His appreciation of the importance to the community of Amateur Radio was based on practical experience gained as the result of operating an active Empire Link station in Singapore during the years 1930–1936.

Wing Commander Stewart's valued service to the R.A.F. was recognised in the recent Honours List when his name appeared as an Officer of the Order of the British Empire. He is President of the Hounslow Branch of the R.A.F.A. and his home address is 1 Hibernia Road, Hounslow (HOU.2885).

A happy group at the Annual Social and Dinner of the Ayrshire membership held on January 21 at the Royal Hotel, Prestwick. Mr. J. Elliott, BRS10053, was Master of Ceremonies. Mr. D. Macadie, GM6MD, Region 14 Representative, Mr. R. Eadie, GM4JO, Glasgow T.R., and Miss J. Rainie, GM3AKR, Prestwick & Ayr T.R., were present. After dinner the company visited the theatre.

Band Planning

DEAR SIR,—Some months have now elapsed since the Society published its recommendations on Band Planning. It is, therefore, extremely disappointing to hear so many British amateurs—including R.S.G.B. members of long standing—still using telephony in the sections of the bands allocated to C.W.

There is little or no excuse for this state of affairs. Most stations, to-day, use some form of V.F.O., while few of those who are "rock-bound" are limited to one frequency. Even where resources are particularly slender it should prove possible to exchange crystals to suit the usual mode of transmission, or to make use of the "shared" portions of the bands.

When Band-Planning was introduced, it was suggested: "Study the plan and adopt it in your own station. Bring it to the notice of other amateurs. If necessary, boycott persistent offenders—politely but firmly." Is this really being carried out? Judging by the shambles of telephony between 3,560 and 3,600 kc/s., I take leave to doubt it.

I have told some; I have written others (am I the only one?); I have even offered to help find suitable crystals; but the position seems to be getting worse every day. Some of the brighter types insist on adding insult to injury by playing personal "signature tunes" before calling CQ. (Please chaps, why not leave this to the B.B.C. who do it so much better).

Now I would appeal to all members to do everything possible to make the Band-Plan effective. Local Representatives in particular should help to further the cause. A few words from the T.R. would do so much more than the most persistent efforts of that solitary crank in remote Aberdeen, who signs himself,

Yours wrathfully,
JOHN DOUGLAS (GM2CAS).
Bridge of Dee, Aberdeen. (Region 12 Representative).

* * *

The recommended division of the current amateur bands is as follows:

3,500– 3,600 kc/s.	Telegraphy only.
3,600– 3,635 kc/s.	Telephony only.
3,685– 3,800 kc/s.	Telephony only.
7,000– 7,050 kc/s.	Telegraphy only.
7,050– 7,300 kc/s.	Shared.
14,000–14,150 kc/s.	Telegraphy only.
14,150–14,400 kc/s.	Shared.
28,000–28,200 kc/s.	Telegraphy only.
28,200–30,000 kc/s.	Shared.

Empire DX Certificate

DEAR SIR,—I must write to express my appreciation of and my admiration for the magnificently designed Empire DX Certificate and Badge.

It is gratifying that the Society continues to foster the close relationship and co-operation with the Commonwealth as it has done since its early days, thus strengthening the bond of friendship which must inevitably exist between amateurs of a kindred community.

My membership of the Society dates from the time when the BRS numbers had barely reached their first thousand and despite criticism levelled against it, perhaps occasionally deservedly but with some good purpose, I feel that the Society is still, as it has always set out to be, representative of British Amateur Radio.

With every wish for its future prosperity.

Yours sincerely,
L. F. VINEY, G2VD.
Watford, Herts.

Simple Equipment

DEAR SIR,—I should like to comment on the letter "Simple Equipment," written by Mr. Perkins and published in the January BULLETIN.

Generally I am in agreement with Mr. Perkins' remarks for the following reasons: Design and receiver construction is nearly an extinct art so far as most transmitting amateurs are concerned, especially for the DX communication frequencies. One has only to listen over the amateur bands to hear of the H.R.O's, AR88's, and the like in use to realise that most transmitting amateurs prefer to buy the ready-made article. The reason is I think that it is a very difficult job to design and build a receiver which will give a satisfactory performance for communication purposes. One can only conclude that most amateurs find the job too difficult.

An amateur should be respected more for building a decent useable receiver than for building a transmitter which after all is a relatively easy job. As an ardent S.W.L. of 15 to 20 years ago I well remember that then the majority of amateurs used highly successful home built receivers. I would like to ask any amateur with a commercial receiver and possibly a commercial or war surplus transmitter what possible satisfaction he can get from their use.

In my opinion it is bringing the amateur movement into disrepute with beginners and the public at large to use this streamlined and expensive equipment. It was a real pleasure to me when in QSO with AP2F a short while ago to hear that he was using an 0-V-1 receiver.

As Secretary of the West Bromwich and Handsworth Radio Society I should like to say that members like Mr. Perkins would be very, very welcome in our Society.

Yours sincerely,
GEOFF. JOHNSON (G2BJY).
West Bromwich, Staffs.

Around the Trade

Mullard Electronic Products Ltd., have recently announced that their range of sub-miniature valves is to be extended to include a wide variety of valves and tubes for use in lightweight communications equipment. Like the earlier valves in this range, which were produced specifically for use in hearing aids, most of the new types have 10 mm. diameter bulbs. An exception is the diode EA76, which has a maximum bulb diameter of 5·2 mm. The valves which have so far reached an advanced stage of development include both battery and 6·3 volt mains types. A voltage stabilizer 70B1 is also projected having a regulating voltage of 70 V. and a current range of 5–15 mA.

The battery sub-miniatures cover a wide range of applications and include the following types; DAF70 voltage amplifying pentode with single diode. DF72 R.F. pentode with sharp cut-off. DF73 variable-mu R.F. pentode, and DL75 A. F. output pentode. Mains types about to be released include: EA76 single diode having a maximum anode voltage of 150 V. and a maximum anode current of 9 mA. EC70 R. F. triode, primarily intended for use as oscillator at frequencies up to 500 Mc/s. EF70 high-slope R.F. pentode with short suppressor-grid base and a mutual conductance of 2·3 mA./V. EF72 high slope R.F. pentode with a sharp cut-off characteristic and a mutual conductance of 5 mA./V.

There seems little doubt that these new sub-miniatures will fulfil an extremely important need in the design of communications and other specialised radio equipment in which compactness and lightweight are of utmost importance.

A new method of solderless connection, introduced by *The Plessey Company Limited*, Ilford, Essex, ensures a reliable joint regardless of the skill of the operator, and eliminates troubles due to heat and flux corrosion. Thus, the conductor retains its natural flexibility right up to the point of entry into the connecting tag, and heavy vibration or abnormal handling will not destroy the high electrical and mechanical efficiency of the connection. Positive connection is effected by crimping two small indentations on opposite sides of the connecting tag, the conductor being gripped immovably as between the jaws of a miniature vice.

Connections are made by means of a hand crimping tool—known as the "Breeze"—a precision instrument designed to indent uniformly, and to swage, but not crush, the conductor. With four sets of easily interchangeable dies, the tool will crimp any conductor of outside diameter between 0·106 in. and 0·192 in. with a single closing of the pliers. The conductor is bared, slipped into the connecting tag, and placed between the opened jaws of the tool. Upon the pliers being closed, the jaws first grip the connector, completely enveloping it to prevent distortion; the crimping dies then make contact with the connector, forming two indentations.

Silent Key

It is with sincere regret that we record the passing of Mr. Eric Spencer, G4HV of Ruislip, Middlx. on December 30, last.

Mr. Spencer, who was first licensed in 1938, was well-known on 7 Mc/s. and for his daily schedules with Australia, New Zealand and the United States on 28 Mc/s. His business activities—he was at one time associated with *Webb's Radio*, and later a partner in *Odeon Radio*—also brought him into contact with many British amateurs.

Although confined to bed for more than a year, Mr. Spencer bore his illness with great cheerfulness and fortitude, and his many acts of kindness towards fellow enthusiasts will long be remembered by those who were privileged to know him. His death will be mourned by a wide circle of friends who offer to his wife, Joan, and her two children, Brian and Sandra, their heartfelt sympathy.

G3LO

BOOK REVIEWS

TERRESTIAL RADIOWAVES. By H. Bremmer. Published by Cleaver-Hume Press, Ltd. Price 36s.

Dr. Bremmer is associated with the Philips Research Laboratory at Eindhoven and in this work, which is entirely theoretical, he is concerned with the mathematical-physical principles of the radiating aerial.

The book is in two parts, the first of which discusses the field due to aerials in a homogeneous atmosphere, i.e. ignoring the effects of refraction and the ionosphere. In the second part the modifications of the field due to these latter effects are studied.

The work is rigorously mathematical and is essentially a book for the advanced worker. H. A. M. C.

* * *

RADIO ENGINEERING, Vol. II. By E. K. Sandeman. Published by Chapman and Hall. Price 40s.

This is the second volume of the work which was reviewed in the August, 1948, issue of the BULLETIN. The same high standard has been maintained in this volume which has chapters on radio receivers and a number of basic theoretical aspects of radio engineering.

The book opens with a description of Balanced and Unbalanced Circuits in which the principles of magnetic and electrostatic induction into circuits of various kinds are explained. Troubles due to multiple earths, badly designed screening and the incorrect use of screens, which are unfortunately so often encountered in practice, are discussed, with the means of avoiding them.

A chapter on Interference and Noise logically follows. This includes an account of the various types of interference encountered in radio reception, including the effects of cross-modulation and internally produced noise such as shot effect and flicker. Signal-to-noise ratio in receivers and the influence of the properties of the aerial on it are dealt with.

The third chapter is devoted to receiver design. Although all the basic parts of a receiver circuit are referred to, one chapter is too short to permit detailed discussion. Further, the broadcast receiver only is covered. There is no reference to communication or V.H.F. receivers.

A similar criticism might be made of the chapter on measuring equipment which deals with some very wide fields in the course of a single page in some cases.

Equalisers and level compression and expansion are the subjects of the two following chapters.

The main portion of the book is concluded by three important theoretical chapters on Feedback, Network Theory and Filters, which are all discussed very fully. The treatment of the latter follows the lines originally developed by Zobel and Shea in America and the terminology used should be studied carefully by those used to the methods of English authors, in order to avoid errors.

The later chapters of the book are concerned with some miscellaneous subjects chiefly of mathematical application, such as the use of complex quantities and Fourier series. There is also a chapter of useful formulæ.

The book concludes with a most extensive bibliography of over seventy pages. H. A. M. C.

New Books

TELEVISION EXPLAINED by W. E. Miller, M.A. (Cantab.), M.Brit. I.R.E. Third Edition. Published by The Trader Publishing Co., Ltd., and distributed by Iliffe & Sons, Ltd. 112 pages, including 59 diagrams and 17 photographs. Price 5s. net (postage 4d.).

Here is a book—now in its third revised edition—that meets the needs of those who want technical information of a straightforward nature on T.V.

The book is addressed to those who, having some acquaintance with radio circuits, are equally interested in their television counterparts; to radio service engineers as a grounding in the circuitry they will encounter in maintaining television sets; and to students in radio and television at technical colleges.

The book is non-mathematical, and is written in simple language. In addition to television reception circuits, aerials and aerial systems are fully explained, and receiver installation and operation are described and illustrated.

This new edition appears in improved format and contains much additional information on aerial systems, and, with the opening of the second television transmitter, at Birmingham, some notes on frequency allocations and suppressed sideband working. Other sections of the book have been brought up to date, while actual photographs of picture faults, taken by the author specially for this edition, are included.

* * *

INEXPENSIVE TELEVISION. Amalgamated Short Wave Press Ltd., 57 Maida Vale, Paddington, London, W.9. 24 pages, illustrated. Price 1s. 6d.

The second of a series of Data Booklets offered by *Amalgamated Short Wave Press Ltd.* containing in the main reprints of articles which have appeared in *Radio Constructor*. It describes the construction of a television receiver using ex-Government equipment. Of special interest is a double-page feature indicating picture faults. A useful booklet for the home constructor.

CATHODE RAY TUBE TRACES. By Hilary Moss, Ph.D. *Electronic Engineering*. 66 pages art paper. Page size 6¼ in. × 8¼ in. 52 illustrations and several tables. Price 10s. 6d.

This monograph is based on a series of articles which appeared in *Electronic Engineering* during the years 1944 to 1946.

The work is illustrated throughout with numerous photographs which are untouched reproductions of the originals taken straight from the screen of the C.R. tube.

Chapter one deals with the basic theory of the Lissajous figure. Sinusoidal time bases are discussed in chapter two and circular and spiral time bases in chapter three. Chapter four—the most important in the book—deals in an elementary way with complex wave-shapes and Fourier Analysis. The last chapter discusses amplitude modulated waves. The monograph presupposes some general knowledge of oscillography and electron physics.

A nicely produced book on a fascinating subject of absorbing interest.

* * *

INTERNATIONAL RADIO TUBE ENCYCLOPÆDIA. By B. B. Babini. Bernards (Publishers) Ltd. 410 pages, page size 6½ in. × 8¼ in. Price 42s.

This book presents in a practical and comprehensive manner the operating characteristics and pin connection of some 15,000 valves of all types manufactured throughout the world. Every care has been taken to ensure accuracy and to include every known valve.

The publishers propose to issue annual supplements which will give information not at present available, as well as data on new types.

A number of features are incorporated in the work among which are:

1. The valve types used by the Armed Services of the British Commonwealth, U.S.A. and Europe in addition to the CV and normal civilian patterns;
2. The base connections are given in continuous columns immediately following the particular valve characteristic columns thus obviating repeated references to the sections.

The book is divided into ten sections covering the main classes of valves in common use.

The section containing the technical matter and the instructions for using the tables has been translated by native technicians into no less than 14 languages including Russian, Polish, Czech, Hebrew and Turkish.

The printers are *Jarrold & Sons*, Norwich, who are warmly congratulated for an excellent production calling for much skill in the composing room.

* * *

BASIC TELEVISION. By Bernard Grab (R.C.A. Institute). McGraw Hill. 596 pp. fully illustrated. Page size 4¼ in. × 7 in. Price 55s. 6d.

This book presents a comprehensive course in television receivers and transmitters for radio service men and engineers, and is designed to bridge the gap between engineering and simplified texts.

Although based on American systems and practices there is much between its covers which will interest the British television engineer.

Review questions are included in each chapter and numerical problems are worked out in the text as samples.

* * *

TECHNIQUE OF RADIO DESIGN. By E. E. Zepler (Second Edition). Chapman & Hall, 394 pp., 283 illustrations. Price 25s.

The purpose of this book is to convey to the reader some of the experiences of a radio designer obtained over a number of years in a works laboratory. It deals mainly with those problems which are closely linked with the daily routine work of an engineer, both in the development and testing of radio equipment of all types. The present edition contains much new information, but the general treatment and application has been maintained. The assumption of knowledge of many fundamental facts, taken for granted in the first edition, has been modified so that the student may derive more benefit from a study of the book. The chapter on receiver noise has been rewritten and much more space has been given to negative feedback.

As a good combination of theory and practice this book should interest all who are concerned with the design of radio-receiving equipment whether of an experimental or commercial type.

* * *

ELECTRONICS MANUAL FOR RADIO ENGINEERS. By Vin Zeluff and John Markus. McGraw Hill. 879 pp., fully illustrated. Page size 7 in. × 9 in. Price 57s.

This book by the Associate Editors of *Electronics* is intended to provide the practical circuit information required by practising engineers, the mathematical foundations needed by radio design engineers and the measuring and operating techniques needed by radio operators, technicians and maintenance men for putting radio equipment into use and keeping it at peak efficiency.

The text is based on no less than 289 articles which appeared in *Electronics* during the period 1940–1948. The material is arranged according to major interests in the radio field and is well cross-indexed.

The book will no doubt save hours of research through technical literature and should reduce to a minimum duplicate laboratory research and experiment. There are 16 chapters ranging over the whole field of commercial radio engineering.

In common with other books published by *McGraw Hill*, the illustrations are excellent and the type face easy on the eyes. Incidentally it weighs just over 5 lbs.

J.T.L.

APPOINTMENTS SECTION

NEW MEMBERS

The following have been elected to membership :—

Corporate Members (Licensed)

G2DPZ J. ELLERY, Chapel Villas, Lostwithiel, Cornwall.
G2LD †H. F. M. BAKER, 200 Bourne Vale, Bromley, Kent.
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G3AKA N. STEVENS, 53 Madeley Road, Ealing, London, W.5.
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GM3FVX W. FORSYTH, 37 Ferry Road, Renfrew, Scotland.
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G3GDU B. KENDAL, 60 Munsbrough Lane, Greasbrough, Rotherham, Yorks.
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G3GEJ L. M. AIREY, 444 North Rd., Darlington, Co. Durham.
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G3GGS W. E. WARING, 43 Towngate, Leyland, Preston, Lancs.
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G3GHR K. N. CADY, 14 St. Andrews Road, Gillingham, Kent.

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18619 J. W. WOODFIELD, 5 Hitherbroom Road, Hayes, Middx.
18620 J. M. HORROCKS, 8 Dales Lane, Whitefield, Manchester.
18621 G. ARNOTT, 70 George Street, Oldham, Lancs.

* Denotes Transfer from Associate Grade.

† Re-elected to membership.

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ZB1BC R. STOREY, R.N. W/T Station, Dingli, Malta.
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LU7EQ H. BARTOLINI, Gral Alvarado 550, Ramos Mejia, Argentine.
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D. GREEN, 19 Merton Gardens, Petts Wood, Orpington, Kent.
E. L. GROVES, 41 All Farthing Lane, Wandsworth, London, S.W.18.
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