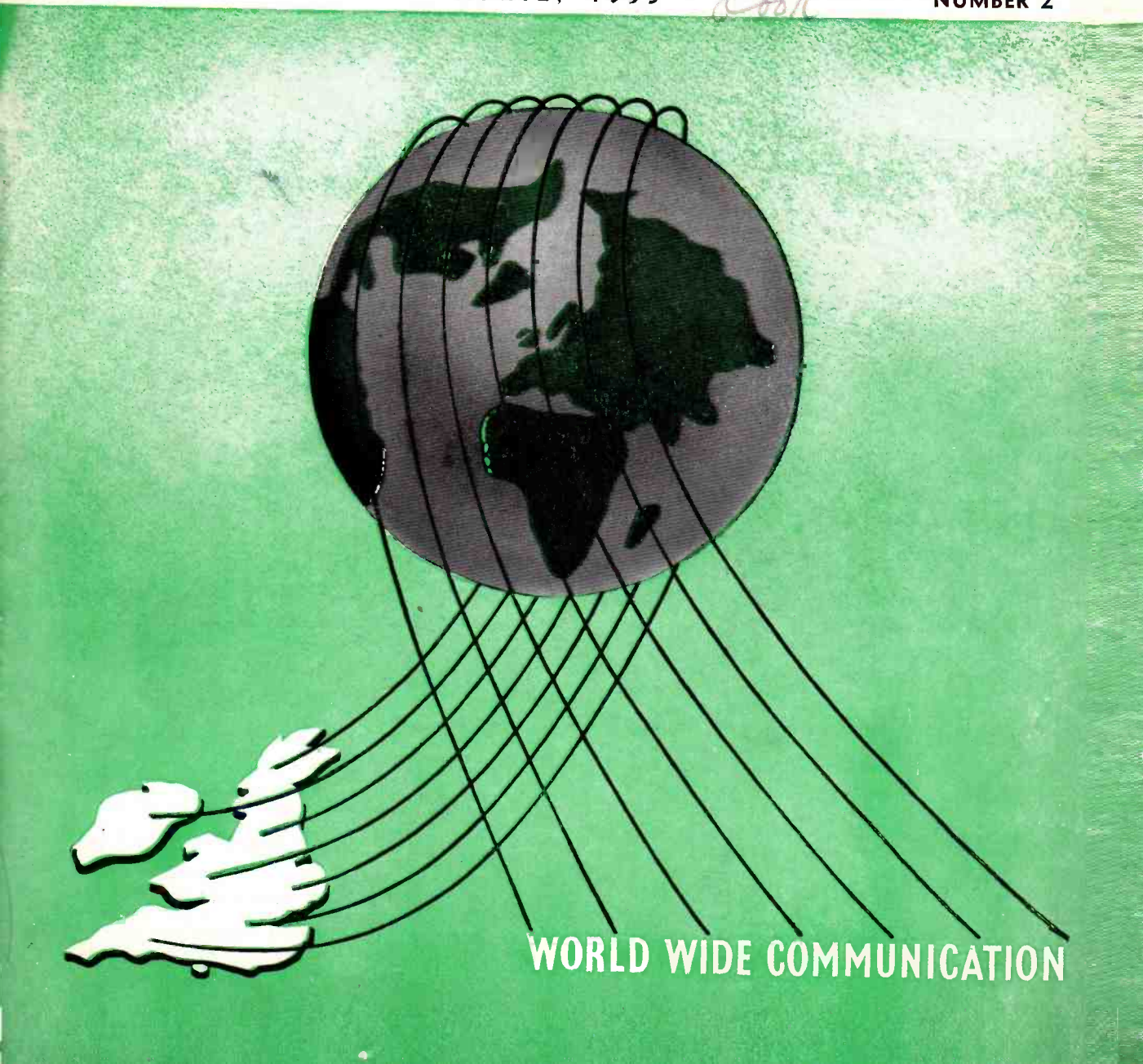
The SHORT WAVE Magazine

2/-

VOL. XIII APRIL, 1955 NUMBER 2



have to cultivate is that easy, swinging rhythm, at any speed, which makes your sending as readable as print. Morse is like music—it has style, grace and rhythm and, for the perfectionist, is an art in itself. Of course, a lot of people get by with something much less than this, but a good operator is always a pleasure to copy; moreover, he can go at speeds much higher than the usual stuttery 12-15 w.p.m. stuff because his spacing and timing are so good that he is always readable.

There are operators and operators — from the newly-licensed G3 + 3 about to put out his first *dah-dit-dah-dit dah-dah-dit-dah* to the commercial telegraphist, known to the writer many years ago, who could take the French official press straight on to a typewriter—in English!

"PURETONE" MAGNETIC RECORDING TAPE

A new magnetic recording tape of exceptional performance has been introduced by Salford Electrical Instruments Limited, at an unusually low price. Sold under the trade name of "Puretone" at 20s. a spool, it is a paper-based material with an output and frequency response which compares favourably with those of plastic tapes costing almost twice as much.

The new tape is sold in lengths of 1,200 ft. wound on specially designed plastic spools slotted to facilitate rapid threading; other lengths of tape will shortly be available. The 1,200 ft. reels give 32 minutes' playing time at $7\frac{1}{2}$ inches/second or 64 minutes' at $3\frac{3}{4}$ inches/second. Twin track recording is also possible, and this doubles the playing time; the tape can be used on all types of recorders. The highest grade oxide, with a particle size range from 0.5 - 1.5 microns, is used in the magnetic coating. The base, which is superior to that of many other paper tapes, consists of a high quality super-calendered Kraft paper.

The coating has an unusually high gloss finish, which, coupled with the addition of a lubricant, greatly reduces the friction and wear on the recorder heads. Intimate contact with the heads and improved high frequency response is thus ensured. On a typical recorder the response curve is substantially flat within ± 1 dB over a range of frequencies from 50 c.p.s. to 10 kc.

OLD-TIMER G2WN

Another Old-Timer to have reached his 70th birthday is G2WN—A. H. Wilson, 3 Kent Street, Fenton, Stoke-on-Trent, Staffs., who commenced his activities about 1908, with the late G2VG. Except for his contribution during both wars, G2WN has been at it continuously and is at present on the air on all bands 1.8 to 28 mc, with home-built equipment.

NEW RADIO CATALOGUE

We commend to the attention of all readers the new *Catalogue of Radio Equipment* issued by Southern Radio & Electrical Supplies, Sorad Works, Redlynch, Salisbury, Wilts. It is a most excellent 56-page compilation, well illustrated, covering a wide range of items of direct interest to the radio amateur, constructor and experimenter—in fact, it is a very complete guide to what is available to the general public on the components market. A copy can be obtained free of charge direct from the address given.

BOOK REVIEW

"FUNDAMENTALS OF TRANSISTORS"

While much has been published in radio periodicals, few books have appeared, as yet, on the Transistor. This one, by a writer associated with the U.S. Signals Corps Laboratory, is probably the first intended for the technician and amateur at more than "popular" level. As such it also caters for the initial needs of engineers and students when first confronted with the transistor.

The emphasis throughout is on the transistor as a circuit element. The short first chapter deals with semi-conductors, and the second extends this to cover the transistor and its operation. Nothing is said of the methods of manufacture, although mention is made of the more important different types. The bulk of the book is concerned with a detailed analysis of the transistor and its associated circuits by means of equivalent networks. The active T-network leads to a comprehensive coverage of the grounded-base, grounded-emitter and grounded-collector circuits. Liberal doses of design equations are interspersed with examples of numerical values met with in practice. Measurement of basic characteristics is also covered briefly.

The amplifier is studied in all its possible forms, including Class-A and Class-B push-pull, phase invertors and complementary symmetry circuits. Also in this section we find discussion on biasing, cascading and gain controls.

Oscillators are covered comprehensively in Chapter 6. The feedback types (including Hartley, Clapp and Colpitts), negative resistance and relaxation oscillators are examined. Effects of phase shift at high frequencies and methods of crystal frequency control are considered. The transistor trigger circuits are also included in this chapter, perhaps rather too briefly in view of the great future of the transistor in counting and switching applications.

The transistor in high frequency applications occupies most of the last chapter. The concluding paragraphs cover life expectancy and failures, soldering techniques and printed circuits. A well-written book, adequately indexed with plenty of curves and circuit diagrams to illustrate the text, it should prove a welcome solution to the need for a serious but moderately-priced book on the subject of transistors.

Fundamentals of Transistors, pp.140, illustrated, by L. M. Krugman, published by John F. Rider Inc., New York, and Chapman and Hall, Ltd., 37 Essex Street, London, W.C.2, price 21s. *J.M.O.*

NEW QTH's

This space is available for the publication of the addresses of all holders of new U.K. callsigns, as issued, or changes of address of transmitters already licensed. All addresses published here are reprinted in the quarterly issue of the "RADIO AMATEUR CALL BOOK" in preparation. QTH's are inserted as they are received, up to the limit of the space allowance each month. Please write clearly and address on a separate slip to QTH Section.

DL2XZ, 4137946, L.A.C. Martin, J. C., Hambuhren, R.A.F. Station, Celle, 2nd T.A.F., B.A.O.R.23 *(QSL via G3JVC).*

EI2AB, D. O'Neill, 4 Main Street, Cahirciveen, Co. Kerry.

G3IMA, E. Collins, 1 Lynton Grove, Copnor, Portsmouth, Hants.

G3JSZ, Ilkeston & District Amateur Radio Society, Room 5, Ilkeston College of Further Education, Field Road, Ilkeston, Derbyshire. *(Tel.: Ilkeston 3545).*

G3JVC, J. C. Martin, 23 Aldensley Road, Hammersmith, London, W.6.

G3JVI, N. E. Jones, Castle House, Moreton, Ongar, Essex. *(Tel.: Moreton 223).*

G3JYB, C. Teale, 3 Berrow Park Road, Peverell, Plymouth, Devon.

G3JZJ, J. Noble. 18 Coronation Drive, Birdwell. nr. Barnsley, Yorkshire.

G3KBB, G. P. Winters, 22 Credon Road, London, S.E.16.

G3KBY, R. P. Lees, 49 Rocky Lane, Perry Barr, Birmingham, 22B. *(Tel.: Birchfields 5175).*

G3KDF, J. H. A. Roberts, 5 Saxon Road, London, N.22.

G3KDP, A. G. Bounds, 88 Redhouse Lane, Aldridge, nr. Walsall, Staffs.

GM3KDT, I. Anderson, 26 Kinellar Drive, Glasgow, W.4.

G3KDY, R. Folgate, 15 Cricklewood Broadway, London, N.W.2.

G3KEA, R. W. Appleton, 10 Searjeant Street, Peterborough. Northants.

G3KEF, T. J. Fishpool, 258 Brownshill Green Road, Coventry, Warks.

G3KEJ, Rev. C. B. Burke, St. Bernadine's College, Buckingham, Bucks. *(Tel.: Buckingham 3105).*

GW3KEN, K. J. Porter, 19 Bridge Road, Llandaff North, Cardiff, Glam. *(Tel.: Whitchurch 729).*

G3KEP, D. M. Pratt, 27 Woodlands Grove, Cottingley, Bingley, Yorkshire. *(Tel.: Bingley 3699).*

G3KEU, T. Leighfield, 2 Greens Lane, Wroughton, nr. Swindon, Wilts.

G3KFG, H. Taylor, 56 Sussex Avenue, Ashford, Kent.

G3KFG/A, Sgt. Taylor, H., Sgts' Mess, R.A.F. Station, Topcliffe, Thirsk, Yorkshire.

G3KFS, D. V. Preston, 93 Ulverley Green Road, Olton, Birmingham 27.

CHANGE OF ADDRESS

G2ACI, G. H. Mackereth, Langholm, Urswick Road, Ulverston, Lancs.

G2BVM, K. H. Pearce, Bathavon, Fornham Road, Great Barton, Bury St. Edmunds. Suffolk.

G2CKM, M. N. Salmon *(ex-VQ4MNS/ZE2JO/VQ2JO),* Hastings House, Ledsham, South Milford, nr. Leeds.

G2FDF, W. F. Limehouse *(ex-GW2FDF),* 106 Liberty Lane, Addlestone, Surrey.

GM2FKG, J. Kean, 16 Heathcot Avenue, Glasgow, W.5.

G2UW, A. J. S. Wilson *(ex-GW2UW),* 63 Officers' Married Quarters, R.A.F. Station, Upavon, Wilts.

G2WA, F. W. J. B. Piggott, Fairacres, Downsway, Tadworth, Surrey. *(Tel.: Tadworth 2145).*

G3AEP, R. P. Mackrell, Ferncliffe, Drewton Avenue, Cross Cop, Morecambe, Lancs.

G3AQZ, J. E. Cowley, 22 Wroxham Road, Woodley, Reading, Berks.

G3BAC, R. A. Bastow, 17 Leahurst Gardens, West Bridgford, Nottingham.

G3CUH, E. H. Butcher, 33 Southview Road, Rettendon, nr. Chelmsford, Essex.

G3CZY, P. B. West, c/o K. H. Pearce, Bathavon, Fornham Road, Great Barton, Bury St. Edmunds, Suffolk.

G3DHS, C. J. Beckinsall, 15 Fayre Oakes Green, Kingsacre, Hereford.

GM3EAK, R. Macfarlane, B.E.M., Moness, Robertson Terrace, Forfar, Angus.

G3ECI, D. W. McKay, 70 Bridge Road, Oulton Broad, Lowestoft, Suffolk.

G3EGC, J. V. Hoban, 96 Ashworth Lane, Astley Bridge, Bolton, Lancs.

G3EGQ, D. J. Griffen, c/o Cable and Wireless Ltd., Porthcurno, nr. Penzance, Cornwall.

GM3EOJ, C. F. Sherrit, 33 Kincorth Circle, Aberdeen.

GM3FAL, R. A. Robertson, 10 Jasper Avenue, Laurieston, Falkirk, Stirlingshire.

G3FNZ, J. A. Lambert, 109 Conisborough Crescent, Catford. London, S.E.6.

G3GHN, Clifton Amateur Radio Society, c/o 109 Conisborough Crescent, Catford, London, S.E.6.

G3GMM, E. McFarland, 247 Gorton Road, Reddish, Stockport, Cheshire.

GM3GSC, J. C. Johnson, 154 Bank Street, Irvine, Ayrshire.

G3HFW, E. F. Brooks, 1 Station Cottages, Weaverthorpe Station, Sherburn, Malton, Yorkshire.

G3HLW, D. A. Pilley, 150a Barrack Road, Christchurch Hants.

G3HTP, E. G. Drackley, Lescot Windsor Road, Chobham, Surrey.

G3HVG, A. P. W. Windle, 7 Sterndale Road, Dartford, Kent.

GM3IGB, C. T. Rylatt *(ex-GI3IGB),* 56 Trenchard Crescent, R.A.F. Station, Kinloss. Forres, Morayshire.

G3JGX, S/Ldr. H. W. Taylor, D.F.C., R.A.F. Station, St. Mawgan, nr. Newquay, Cornwall.

CORRECTION

G3JRM, Pye Marine Amateur Radio Club, School Road, Oulton Broad, Lowestoft, Suffolk.

Random Jottings by the Old Timer

WE regretfully suggest that the much-beloved word "amateur" has outlived its usefulness, as far as we are concerned, and that we should make every possible effort to find another title for ourselves. It seems that it is only in the world of sport that the term is not used in a detrimental manner. At the Parish Hall a play is put on. What do you hear, every time? "It was very good, really, *for amateurs.*" Somebody described as an "amateur astronomer" is visualised as a youngster with a crude home-made telescope in the back-yard; even an amateur photographer carries an aura of cheap box-cameras around with him. All absolutely and completely wrong, but you can't bludgeon the entire newspaper-reading public into changing their ideas. So we ought to do the reverse and shed our amateur label, which is ambiguous in many cases and really, nowadays, only means that we operate transmitters and receivers because we like it, and not for the purpose of making a profit out of it. (*A more exact and dignified appellation would be "radio experimenter" or "experimental radio operator."—Editor.*)

RESPECTED OR DESPISED?

The letter headed "What Do You Think?" in last month's issue has considerable bearing on the subject, but omits to mention one very important point. The good type of amateur is an all-rounder, to a degree seldom found in the professional field. He can break a QRP record on 160 metres with a transistor, design a beam for VHF, service his neighbour's tape recorder, build almost any piece of gear *and* operate it intelligently and efficiently. (Notice that we referred to the *good* type of amateur!) Most professionals simply have to become specialists these days, and highly skilled they are in their particular but necessarily narrow field. But, throughout the electronics industry, you will find that some of the most successful radio engineers are those who hold call-signs of their own. In the States the big firms actually publicise this fact, as you can see by referring to any advertisement section. Over here most firms apparently prefer to keep it dark; although in some very large concerns many of the departmental heads hold amateur call-signs.

IT TAKES ALL KINDS . . .

Let us be cheerful again and study a few of our own kind. Do you recognise them? The first one "Warms up his receiver and VFO for a week in advance of a contest, goes over his aerials, buys a dozen pencils, inflates his seat cushion . . . and fights right through to the last echo. When it's all over he shuts the shack for another year. Doesn't even empty the ash trays." Another one hotted up everything he bought . . . "changed everything in it except the fuse, and that blew the first time he switched on . . . he once wrote a letter to WWV and told them they were off frequency." The third case had "just a bunch of parts lying around with yards of loose wire hanging it all together. Looked like the picture in the health book showing the circulatory system—only with more colours." For many more of them, see the article called "Radio's Rugged Ranks" in the current issue of *CQ*, by W2GMU/1. He has obviously been around and studied his fellow-amateurs in a big way—he knows them all.

MUSEUM PIECE

Last month's paragraph about the possibility of building an "Emett" transmitter—one that looks like a Disney cartoon but works like a dream—brings forth an interesting letter from Bishop's Stortford. Our correspondent says "Not necessary to build the museum piece; it is here already. Vintage 1930's and still going strong. This clumsy One-Sixty transmitter is on a wood baseboard and front panel, and is housed in an oak cabinet. The final is a UX-210 triode, modulated by a pair of UX-250's in push-pull. Speech amplifier mainly 4-volt triodes. The only alteration to this ancient equipment has been the addition of a VFO, which is anything but an improvement over the former crystal oscillator from the point of view of 'quality' CW, but is satisfactory. Phone is mostly used, and reports confirm that I should gain nothing from a rebuild except compactness." We feel bound to add that a possible economy in watts would also result, but that is not a serious matter. There must be many such up and down the country, but few of them in such regular use.

OUR YL OPERATORS

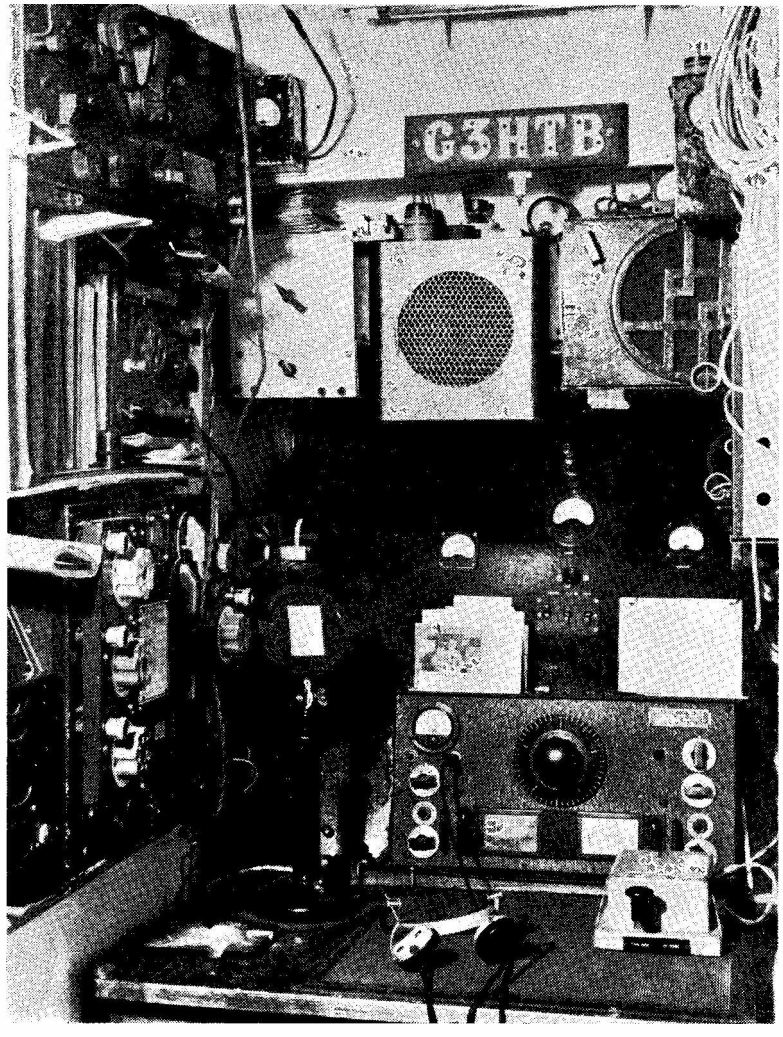
Apropos "Random Jottings" in our March issue, from G3IDG, of London, S.W.12—a keen student of the history of Amateur Radio and a compiler of statistics on the subject—we have received an impressive list of no less than 24 call-signs held by U.K. YL's in their own right. As it would be unfair at this stage to disclose identities, we will merely say that the list shows one G2, 17 G3 + 3's, a G3, a G6 and a G8, and three GM's. If any of these ladies care to write in with details of their stations and their activities, we shall be very glad to have them—and what about a showing as "The Other Man's Station"? Photographs for publication welcome, too!

PRICE-RING INVESTIGATION

It was announced recently that the Monopolies Commission has been charged by the Government with the investigation of trade practices in connection with the marketing of radio valves and cathode-ray tubes.

THE OTHER MAN'S STATION

G3HTB



A DESCRIPTION of the original G3HTB, owned by M. P. Squance, was published in the March 1953 issue of SHORT WAVE MAGAZINE, when the QTH was Dewsbury, Yorks. Business compelled a move to the present address—118 Wolfreton Lane, Willerby, Hull—and the shack has become the cupboard under the stairs instead of the spaciousness of a spare bedroom. This necessitated some compression of the station, to say the least, and it is now as illustrated here.

On the left is a small power pack to operate the BC-348 stand-by receiver, seen at top left; at lower left is a T.1154, used for CW and phone working on the 80-metre band and run at 54 watts on phone and 78 watts on CW. It is interesting to note that this transmitter has been modified (with great success) from the article by G2ASY in the December 1953 issue of SHORT WAVE MAGAZINE. Above this is a 19-in. case containing an LM7 frequency meter, and beside it is space for the log and a few reference books; the spare BC-348 receiver is above this again. The aerial tuning unit is out of sight behind, with the aerial change-over relay and another relay connected in the centre-tap of the HV power pack, to cut HT from the transmitter; the aerial ammeter can just be seen to the right of the BC-348. A 3-in. m/c speaker, mounted in a case on a candlestick holder, is used as a microphone. On the right can be seen the side of the B2 transmitter, screwed to the wall by its case, which is used for operation on the 80, 40 and 20 metre bands.

The operating position is the table top which has been made a permanent fixture across the width of the cupboard. The station main receiver is an HRO, inset in a panel of fibre board which slopes at an angle from the table to the reverse of the stair treads forming the ceiling. The panel carries the lighting switches and the switch for the main power pack feeding the T.1154. The meters are in various circuits, whilst the larger central dial is an AC voltmeter on the mains supply. Above is a neon glow lamp which shows when power is on, together with a small warning lamp to indicate when the main HT supply is alive.

The aerial at G3HTB is an end-fed wire 125 feet long, the aerial tuning unit being a Collins coupler. There is no Top Band transmitter at the present QTH, as the Hull district is right in the small-ship phone area, with a high level of local interference on 160 metres. The Top Band equipment is kept at Dewsbury, and is brought into operation when visiting mother-in-law at week-ends! So if ever you work G3HTB/A you will know where he is!

THE MONTH WITH THE CLUBS

By *"Club Secretary"*

(Dead-line for May Issue: APRIL 15)

WITH the late winter snow still on the ground, Clubs get together with members huddled round a warm fire to discuss the summer's plans. The trouble is that we all think in terms of by-gone summers, when the sunshine was just taken for granted. (Why, when your Club Secretary was a young Club member, any week-end chosen at random was certain to give us perfect Field Day weather—or was it? Memory has rose-coloured spectacles, too!)

Outdoor activity (apart from the ordinary social type) comes under three headings. Roughly speaking, they are competitive Field Days (either VHF or DX bands), D-F Contests, and ordinary portable expeditions of the less organised type. The latter can be quite good value, but somehow there isn't much in erecting a portable station and just working fixed stations at random with it. The fact that the other portables are out in the field adds savour to the expedition.

An excellent idea for the summer months is for three or four neighbouring Clubs to get together and stage a portable event, competitive or otherwise. This is being done more and more, and where the "neighbours" are possibly some twenty miles apart, not the least enjoyable part of the proceedings is afforded by the inter-station visits—inspecting each other's hilltops, so to speak. We hope to see more of this during the coming summer—which must surely be better from the weather point of view than last year's dismal affair. It certainly couldn't be worse.

CLUB ACTIVITIES

Sutton and Cheam staged their Annual Dinner and Ladies' Festival on March 12, and a turn-out of eighty made the event a great success. On March 15 the Club heard G2YG's lecture on the Police Radio Network. The A.G.M. is fixed for April 19, at the Harrow Inn, Cheam.

Chester heard a talk by G3ERB on the subject of emergency working, which increased the local level of interest to such an extent that even mobile operation is now contemplated. The field of tape-recording is also becoming popular. G3HPM and 3ITY both having lectured on the subject. Meetings are on Tuesdays, 7.30, at the Y.M.C.A.

One of the Clubs which never meet is the **British Two-Call Club,** whose object is to bring together those holders of a "G" call who have also at some time operated from overseas. The 1955 President is Lt.-Col. Sir Evan Y. Nepean, Bt. (G5YN), and the Vice-President Major Ken Ellis (G5KW). Membership is open to all two-call, two-country (or more) British amateurs.

Clifton heard talks on VHF and on the New Zealand ZC1 Mk. II transmitter/receiver. They also visited Electra House (P.O. Cable and Wireless Services). The subjects discussed at **Gravesend** were Resonant Circuits and BK Operating, dealt with respectively by G3HLF and G3JLB.

Hawick have been catering well for beginners.

Dead-line for next month's reports is **Friday, April 15.** They should be addressed to: "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

BARNSLEY: P. Carbutt, G2AFV, 33 Woodstock Road, Barnsley.
BOURNEMOUTH: J. Ashford, 119 Petersfield Road, Boscombe East, Bournemouth.
BRADFORD: F. J. Davies, 39 Pullan Avenue, Bradford 2.
BRITISH TWO-CALL CLUB: G. V. Haylock, G2DHV, 63 Lewisham Hill, London, S.E.13.
CHESTER: N. Richardson, 23 St. Mary's Road, Dodleston, Chester.
CLIFTON: C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.
COVENTRY: J. H. Whitby, 11 St. Patrick's Road, Coventry.
GRAFTON: A. W. H. Wennell, G2CJN, 145 Uxendon Hill Road, Wembley Park, Middlesex.
GRAVESEND: R. Appleton, 23 Laurel Avenue, Gravesend.
HAWICK: G. Shankie, 17 Ettrick Terrace, Hawick, Roxburghshire.
LANCASTER: A. O. Ellefsen, G3FJO, Silver Birches, Manor Lane, Hest Bank, Lancs.
LEEDS: B. A. Payne, 454 Kirkstall Road, Leeds 4.
MITCHAM: D. Tilcock, G3JYV, 16 Taffey's How, Mitcham, Surrey.
NORTH KENT: A. Wills, 42 Anne of Cleves Road, Dartford.
RAVENSBOURNE: J. H. F. Wilshaw, 4 Station Road, Bromley, Kent.
ROMFORD: N. Miller, 55 Kingston Road, Romford.
SCARBOROUGH: P. Briscombe, G8KU, 31 St. John's Avenue, Scarborough.
SLADE: C. N. Smart, 110 Woolmore Road, Birmingham, 23.
SOUTHEND: J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend.
SPEN VALLEY: N. Pride, 100 Raikes Lane, Birstall, near Leeds.
STOKE ON TRENT: A. Rowley, G3JWZ, 37 Leveson Road, Hanford, Stoke-on-Trent.
SUTTON AND CHEAM: F. J. Harris, G2BOF, 143 Collingwood Road, Sutton.
TORBAY: L. D. Webber, G3GDW, 43 Lime Tree Walk, Newton Abbot.
YORK: J. O. Yarker, G3GJY, 14 Bewlay Street, Bishopthorpe Road, York.

with lectures on One-Valve Receivers, and "Adding the Second Valve." The clubroom is now in use, and constructors are making full use of the workshop.

CONTROVERSIAL TOPIC

North Kent were, of course, asking for trouble on March 10, when G3ISX and G3KCN proposed that "this Society believes that contests and ladders are contrary to the Ham spirit." G3HOZ kept order in the resulting *fracas*, and G3JBK and G3IQG spoke against the motion, which was defeated when put to the vote.

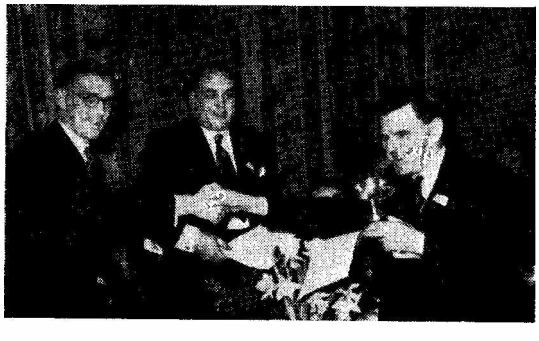
Bournemouth, who have now changed their title to "Bournemouth Amateur Radio Society," are visiting the Vickers-Armstrong factory at Hurn Airport, where they will see Viscount aircraft being assembled, on April 15. Their last meeting was also somewhat off the beaten track, the subject being — Sewage Disposal in Bournemouth!

Lancaster are responsible for the Amateur Radio stand in their Rotary Club's Hobbies Exhibition, April 13-16. **Scarborough** say that their members' calls will be heard "/P" on all bands from One-Sixty to Two this summer. Their phone net operates on Tuesdays, from 7.30 p.m. onwards, around 3620 kc. Visitors have recently dropped in from ZC2, ZD2 and ZB1—all on leave at the time. **Grafton** have an event of their own on the Saturdays, April 30 and May 7, when they run a 160-metre contest, for their president's cup, to be competed for by their newly-licensed members, to give them contest experience—Grafton are already thinking of the next MCC! If you hear "CQ GRS," that will be them.

Stoke-on-Trent have held their A.G.M., and have started work on the club transmitter, G3GBU, which will soon be on the air on Thursday evenings. G3KCZ is a new call among their ranks—on 3.5 mc CW. New members always welcome.

Please note that the QTH of Romford's Hon. Sec. was given incorrectly in last month's list as Brentwood, whereas it is, in fact, Romford (*see* this month's panel for full address).

Southend recently heard an interesting lecture on Frequency Modulation and its applications to regional broadcasting. They also visited the Southend Fire Station and were lucky enough to be present when a real 999 call came through and caused a genuine turn-out. Apart from this, they were given demonstrations of fire-fighting, life-saving and the use of appliances. At a later meeting a form of "Any Questions" was very successfully tried out.



G3IQO receiving the Liverpool society's "Malcolm Cohen" trophy for that club's annual D/F contest. G6KS is making the presentation. G3JMQ and G3JPJ were the other members of the winning team.

G2AK demonstrating his new all-band transmitter to the Slade Radio Society on March 4 last; the occasion was a display of members' apparatus.

Mitcham ran a Ragchew Night on March 11, and had a Junk Sale on the 25th. Next meeting after publication is on April 22, when an HB member will talk on Receiver Design and Practice.

Torbay are busy preparing for NFD, and also helping a new blind member to get his gear together. The AGM is on April 16, and will be followed by a Junk Sale.

York now meets on Thursday evenings at the clubroom in Fetter Lane, where the Club Tx is in operation on 160 and 80 metres on most Club nights. Morse classes, lectures and demonstrations are a weekly feature. Visitors and new members welcomed any Thursday evening. (*See* panel for new Secretary's QTH).

On March 4, **Slade** held a display of apparatus built by members; exhibitors were G2AK, G3HHD, G3HKC, SWL Simmonds and SWL Walley, the gear ranging from 160-metre and all-band transmitters to two-metre equipment, and test apparatus.

NEWS IN BRIEF

BARNSLEY: April 15, G8WF on "Q"; April 29, G5IV on "Propagation of Radio Waves." King George Hotel, Peel Street, Barnsley.

BOURNEMOUTH: First Friday, 7.45 p.m. at the Cricketers' Arms, Windham, Bournemouth.

BRADFORD: April 26, "Two Metres and 70 Cm," by G2FCL. At Cambridge House, Little Horton Lane, Bradford.

CLIFTON: April 15, G3HZI on Direction Finding;

April 22. Junk Sale; April 29. Constructional Evening. 225 New Cross Road, London, S.E.14, at 7.30 p.m.
COVENTRY: April 25. G5BJ on Civil Communications. May 1. Two-metre Field Day.
GRAVESEND: April 14. G3HLF on Receivers; April 21. Sale of Equipment; April 28. Debate—"Going on Phone." Terrace Hotel, Gravesend, at 7.45 p.m.
LEEDS: April 20. G4AD on "Aerial Coupling"; April 27. W. Appleby on "FM"; May 4. "Simple Short Wave Receivers." by G4AD. May 22. visit to Humber Radio.
NORTH KENT: Fourth Thursday, at the Congregational Hall, Clock Tower, Bexleyheath.
RAVENSBOURNE: Every Wednesday, 8 p.m., at Durham Hill School, Downham, Kent.
SPEN VALLEY: April 20. Visit to GPO Repeater Station, Burley Street, Leeds. May 4, "Elementary Direction Finding."

GRAFTON CLUB CONTEST

The Grafton Radio Society is running a members' Top Band CW contest on the Saturdays April 30 and May 7, 2230-0100 clock time. This is to give the many newly-licensed members of Grafton some experience of contest operating; they will be competing for the president's trophy, known as the "G2AAN Cup." The co-operation of 160-metre CW operators will be appreciated in making the event a success.

CASCAP CERAMIC CONDENSERS

A new range of inexpensive ceramic condensers, known as "Cascaps." has been introduced by Plessey. The material used is of the barium titanate type, having high permittivity and dielectric strength, enabling miniature condensers to be produced, suitable for operating at high voltages over a wide temperature range, and satisfactory in those applications where precision of capacity value is not of primary importance. "Cascaps" are available in two basic types—one for purposes such as RF decoupling, and the other for radio interference suppressors. By varying the composition of the ceramic, special requirements can be met.

The normal types are constructed in capacities ranging from 0.0005 to 0.01 μF, 500v. DC or 300v. AC working, with a breakdown voltage of 4,000v. DC, and an insulation resistance of 10^{11} ohms. With these excellent electrical characteristics, a 0.005 μF condenser measures only 0.664 ins. in diameter and is 0.187 ins. thick.

VHF MOBILE BROADCAST LINK

The Mullard VHF Mobile Broadcast Link GME 550 MKII, now made generally available for the first time, is a compact high-quality frequency-modulation transmitter/receiver equipment for use as a programme channel for outside broadcasts or similar functions. It was used by the BBC for the Boat Race Sound broadcast last year.

The equipment consists of a crystal controlled transmitter and receiver operating in the frequency ranges 65-80 mc and 80-100 mc. The receiver is used for cueing signals and instructions. By using two aerials, duplex working is possible. In the transmitter, the output of a phase-modulated crystal oscillator is multiplied 32 times before being fed to a push-pull tetrode power amplifier giving 20 watts RF output into a coaxial aerial feeder.

The receiver is a double superheterodyne with a variable first IF in the range 7.85 to 11.35 mc, and a second IF of 1.5 mc. The first frequency changer is fed from a crystal-oscillator frequency-multiplier chain which selects the ninth harmonic of the crystal. The fundamental frequency of the crystal is injected into the second mixer to produce an IF of 1.5 mc. The frequency range and the stability, better than one part in a million per °C, are identical with those of the transmitter.

NORWICH TV STATION

Regular transmission from the temporary low-power station at Tacolneston, 10 miles south-west of Norwich, started on February 1st, on 53.25 mc for sound and 56.75 mc for vision, horizontally polarised. The contract for the 560-foot stayed mast for the permanent intallation has now been placed, and it is hoped that the station will be ready for service about the middle of next year. The engineer-in-charge will be Mr. E. N. B. Hammond, who will also be responsible for the Home Service transmitting station at Postwick, near Norwich.

STILL AVAILABLE

A few back-number copies of Vol. XII, at 2s. 2d. each; the *DX Zone Map*, at 3s. 9d.; the *Principles of Short Wave Reception*, 1s. 8d.; and the *DX Operating Manual*, 2s. 8d. All prices are post free, and delivery is by return, of the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FORTHCOMING EXHIBITIONS

The R.E.C.M.F. exhibition, for which a badge of entry must this year be obtained, takes place during April 19-21, at Grosvenor House, Park Lane, London. The exhibition staged by the Physical Society, also an invitation-only show, will be from April 25 to 28, at the Royal Horticultural Hall, London, S.W.1. In previous years, these two exhibitions have been held in the same week.

LECTURES ON COLOUR TV

A course of eight lectures, by Prof. W. D. Wright, D.Sc., A.R.C.S., entitled "The Science of Colour Applied to Colour Television," will be given in the Physics Dept., Imperial College, Imperial Institute Road, London, S.W.7, on Tuesdays and Thursdays at 4.30 p.m., commencing on Tuesday, April 26. The fee for the course is £2 2s. 0d., and application for admission should be made to the Registrar, Imperial College, Prince Consort Road, London, S.W.7. Each lecture will be followed by a question-and-discussion period.

SMALL ADVERTISEMENTS

9d. per word, minimum charge 12/-. No series discount ; all charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). No responsibility accepted for errors. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1

APPOINTMENTS

TRINITY HOUSE, LONDON

RADIO MAINTENANCE ASSISTANTS WANTED: Radio Maintenance Assistants are required to maintain radio and radar equipment in shore stations and ships. Candidates must possess a knowledge of the fundamental principles of radio and radar and must have had practical experience in the maintenance and use of such equipment. They should be medically fit and of British nationality. Some of the appointments are permanent and pensionable subject to one year's probation. Salary scales £565, rising to £695 (minimum linked to age 26) or £452 10s., rising to £610 (minimum linked to age 25) depending on qualifications and experience. Applications to be made in writing to The Secretary, Trinity House, London, E.C.3, not later than 18th April, 1955, stating age, present occupation, qualifications, experience, and enclosing copies of testimonials.

TECHNICAL INSTRUCTOR (BROADCASTING) required by the BROADCASTING SERVICE, NIGERIAN FEDERAL GOVERNMENT for two tours of 12 to 15 months each, with possibility of permanency. Salary scale (including expatriation pay) £1,307, rising to £1,453 a year plus GRATUITY at rate of £150 a year. Outfit allowance of £60. Liberal leave on full salary. Free passages for officer and wife. Assistance towards cost of children's passages or grant up to £150 annually for maintenance in U.K. Candidates should have instructional experience and should have a good theoretical and practical knowledge of radio communication as applied to MF, HF, and VHF transmitters and receivers, with a knowledge of mathematics, electricity and magnetism. —Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2C/30513/SQ.

DRAUGHTSMAN, interested in spare-time work (at home), preparing radio circuits and drawings from roughs for publishing house, invited to apply, with specimens of style and lettering, and indication of remuneration expected. Present volume of work averages 15-20 hours a month, and is normally handled entirely by post.—Box 1565, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

TRADE

QSL's and **LOGS** by **MINERVA.** The best there are.—Samples from Minerva Press, 48, Queen's Road, Brentwood, Essex.

WANTED: TUNING UNITS TN17, TN18, TN19, and R54/APR4 ; £50 each offered.—Box 1383, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

BRAND-NEW, original cartons : RF Units, Types 26, 27/6 ; 25, 15/- ; 24, 11/- ; postage 2/6.—E.W.S. Co., 69 Church Road, Moseley, Birmingham.

QSL CARDS AND LOG BOOKS. APPROVED G.P.O. SAMPLES FREE. — ATKINSON BROS., PRINTERS, ELLAND, YORKS.

SMALL ADVERTISEMENTS, TRADE—*continued*

LEARN IT AS YOU DO IT.—We provide practical equipment combined with instruction in Radio, Television, Electricity, Mechanics, Chemistry, Photography, etc.—Write for full details to E.M.I. Institutes, Dept. S.W.47, London, W.4.

MORECAMBE HOLIDAY: Overlooking Bay and Lakeland Mountains. Ham Shack.—Write, brochure, G3AEP, Ferncliffe, Drewton Avenue, Morecambe.

WANTED: BC-610 Hallicrafters, ET-4336 Transmitters and spare parts for same. Best prices. —P.C.A. Radio, Beavor Lane, Hammersmith, W.6.

READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Box Numbers 1/6 extra. Replies to Box Numbers should be addressed to The Short Wave Magazine, 55 Victoria Street, S.W.1.

WANTED: Latest model USA HRO-60, SX71, etc.; Rx, brand-new or brand-new condition, in complete guaranteed factory condition; unmodified, etc.; good cash price paid. — Write, giving fullest details, Box 1544, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: R109 Receiver, 1.8-8.5 mc (slight attention needed, otherwise perfect condition); £2 10s.—R. Evans, 146a High Street, Tonbridge Kent. (*Phone : Tonbridge 2008,* after 6 p.m.).

ET4336B, complete with all valves, master and crystal oscillators, home-built speech amplifier, handbook, £100. Buyer collects. Q'fiver, 50/-; AR77 3-gang Tuning Condenser, 20/-.—Fletcher, 132 Tean Road, Cheadle, Stoke-on-Trent.

BC348L, separate p/pack and speaker, new condition, £15. Callers preferred.—Crook, 205 St. Helen's Road, Daubhill, Bolton, Lancs.

EDDYSTONE 680X, practically unused, as new, with speaker, £80. London (preferably buyer collects). WANTED: Eddystone Cat. No. 669 S-meter.—Box 1561, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Wooden HRO coil stowage box, Type 1131, enclosed rack, Variac.—Jones, Beirut, Albert Drive, Deganwy, North Wales.

FOR SALE: Radiovision "Hambander," little used, perfect condition, £16 (plus carriage).—R. B. Stanley, 16, North Gyle Drive, Edinburgh, 12.

WANTED: Communications Receiver, good condition. Consider AR77, AR88, 750, 680X. Offers after March 23rd to Wigg, 9 Beckenham Lane, Bromley, Kent. (*Tel : Ravensbourne 7022*).

SALE: 1082, 1084, 1116, 394 A/W Trawler Set; two 1-V-2 TRF B/S Sets, Eddystone coils; W/M 1117; two R.1132. All F/B condition, complete with service manuals. No reasonable offer refused. All letters answered.—T. Port, 125 Daneland, E. Barnet, Herts.

VALVES, new and unused: 931A, 37/6; TZ40, 12/6; 8019, 15/-; 813, 50/-; 866, 17/6 (post free). Fair number available.—Box 1564, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

SALE: Tx VFO/Dblr./829PA, fully screened, 500-500-300v. power supplies, £7; Hallicrafters Speech Amplifier 614E, with modulator for Tx above, £7 10s. Buyer collects.—Giddens, 89 Pollards Oak Road, Oxted, Surrey.

WANTED: Manuals for 107, 109, Receivers; indicating unit type 230 with W1653; ZC1, Mk.I.—Box 1560, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Manual for CR100. SALE: S640, built-in preselector, extra IF stage, manual. £16. —Edwards, 20 Fairway, Leigh-on-Sea, Essex.

CR100, excellent condition and performance, noise limiter and tuning indicator, £20. Delivered free within reasonable distance.—47 Allen Street, Maidstone.

WANTED: Vibrator for Eddystone 750, or Valradio 75 watts, 12 volt. Also Eddystone S-meter.—Edwards, 2 Parsifal Road, N.W.6 (*Hampstead 1779*).

BC312, rebuilt AC, £15; SCR522 Wavemeter, £1; Keyboard Perforator, £4; PSU No. 3 (new), £3; PCR receiver rebuilt AC. £5. Dozens of other items, plus 140 valves; all cheap; s.a.e. list.—Box 1559, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Set of B2 Tx Coils; also a B2 Rx; state conditions and price.—Reply by air-mail letter to: Stone, Signals Section, R.A.F. Tengah, Singapore, 24.

TOP BAND CRYSTALS, 1.8 to 2 mc, wanted.—Brand, 137 Surbiton Hill Park, Surbiton, Surrey. (Evenings: *Elmbridge 1941*).

EXCHANGES: SX28 Receiver, external condition as brand-new, inside very good; 12 new valves and Woden output transformer just fitted; terrific performance; complete with Hallicrafters matching 12in. speaker in original cabinet, also maker's manual, beautifully bound; probably the best SX28 outfit in the country. Exchange only considered for one of the following items: Grundig Tape Recorder or brand-new Pamphonic 1002 Amplifier; MARCONI CR150, 13 valves, double superhet, 2-60 mc, four IF filter crystals, 5 mc crystal calibrator, mechanical and electrical bandspread, switched current check and S-meter; separate p/pack and 8in. LS in small matching cabinet. Immaculate condition. (*See* Marconi's illustrated advertisement, March *Wireless World*. Similar, except coverage). With new Marconi manual. Fuller details on request. Exchange for Hi-Fi Amplifier, preferably Leak TL/10 or best Tape Recorder offered. In either case, amplifier must be delivered and receiver collected.—Semmens, 26 Trescoe Road, Long Rock, Penzance, Cornwall.

BC348, AC mains, in wooden cabinet, perfect condition; exchange for wooden hut, or sell £12 (offer).—Kirk, South Road, Chapel-St.-Leonard's, Lincs. (*Phone: 437*).

TEST SET 210: 20-88 mc in four bands and noise output, crystal calibrator, mains p/pack with stabiliser, £7. WANTED: CYNI manual; coils and output lead termination for TF517 signal generator.—Hacker, Easton House, Obridge Road, Taunton, Somerset.

SMALL ADVERTISEMENTS, READERS—*continued*

MAKERS' MANUALS, 15/- each: SX28A. SX43, SX88, RME69, 84. Photo versions, National 173, HFS. 7/6 each.—Box 1563, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Communication Receiver, with or without valves. Also required: 750-0-750v. Transformer.—Box 1562, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

FOR SALE: Manuals on the following equipment: AR88D, BC221, BC224, BC348 (less circuit diagram), BC375, BC640 (two), SCR269, SCR274N (Command trans. and rcvrs.), SCR522, MN26, Packard Bell preamplifier.—Offers to: Box 1564, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: To borrow few weeks, Hallicrafters S20R Sky Champion manual. Cash offered in return.—Parker, 133 Station Road, Cropston, Leicester.

HRO, Coils, Power/Pack, £22 10s.; Hammerlund Super Pro, power/pack and matching Jensen dynamic 12in. speaker, £30 ; Receiver B21, coverage 500 kc to 20 mc, with speaker, £12. Also 805's, 25/-; 866's, 15/- ; 6V6, 6/-.—Cole, Saracen's Head Hotel, Daventry. (*Phone : 351*).

ZEISS IKON *Ikonta,* 35mm. Camera, with f2.8 tessar, 1-1/500th compur rapid ; complete with HRC, proxar, lens hood, filter, range-finder and Essex daylight tank ; all as brand-new. Will exchange for late model HRO Senior Receiver with B/S coils, o.g.o.—Box 1566, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SALE: 6in. TV VCR517 with lens in Premier cabinet; buyer collects ; £15 (o.n.o.).—G3BFP, 5 Ridgemount Ave., Shirley, Croydon, Surrey.

EDDYSTONE 840 Rx, perfect ; diecast speaker. Browns headphones Type A, mounting feet, aerial ; £30 (o.n.o.).—Ridgway, 57 Pinner Court, Pinner, Middx.

SALE: 829 (two), 30/-; ME1001 (three), 15/-; EF50 (four), EF55 (two), X81M (one), 4/-; 45 mc IF strip, 25/-; HM sound Rx 30/-; BC1066B Rx, 30/-; P/Pack 247, 580v. 250mA, 40/-; 58 Set Vib. Pack, less Vib. and Acc's, 20/-; 150w. Mod. Trans., 10/-; Co/Mult. 3EF50, 15/-. Postage extra.—G3HZK, 77 Manchester Road, Wilmslow, Cheshire.

CRYSTAL 3505 kc, two-pin base, wanted.—L.D.E.L., 22 Chippenham Avenue, Wembley, Middlesex.

WANTED: HRO5T or HRO7T, condition brand-new ; no modifications ; complete with full set general coverage and bandspread coils. Also Power/Pack. Sale: Eddystone 640, as new, £16 ; CR tube 5CP1, £1 5s., new (both add carriage).—G2FZU, 18 West End Crescent, Ilkeston, Derbys.

FOR SALE: 813 (CV26STC), brand-new, original carton, £3, post free.—Heightman, 68 Moss Way, Croxteth, Liverpool, 11.

FOR SALE: BC-348L, unmodified except for built-in power/pack ; three 85 kc IFT's ; two 813's, unused ; 1.6 mc Denco xtal filter.—Box 1568, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SMALL ADVERTISEMENTS, READERS—*continued*

CR100, excellent condition, £20 (o.n.o.). — D. Watts, Aldwick, Wrington, nr. Bristol. (*Phone: 305*).

G3IDG needs *CQ*, January, March, April, June, November, December (or complete volume), 1945; any *Radio* before 1936; any *R/9* before April 1935; any *QST* before 1924; *Calling CQ* (de Soto). What *Amateur Radio, Break-In, Radio ZS, Xtal* have you?—95 Ramsden Road, London, S.W.12.

OFFERS INVITED: Eddystone S640, German spy, CR100, excellent condition; exchanges considered; buyer collects.—Fawkes, St. Chloe Green, Amberley, Stroud, Glos. (*Phone: Amberley 3130*).

WANTED: CW Tx 75-100 watts, 14/21/28 mc, or similar, FD/PA unit; Top Band Phone/CW (VFO) Tx; also universal ATU, metered. All compact and good.—Offers, full details: Box 1569, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

R1155 RECEIVER; power/pack, three stages amplification; steep-cut filter and 15-Ohm speaker (not in cabinet); £8 15s. BC-312N (American), six wave bands, 1.5 to 18 mc, neat power/pack and speaker, £8 15s.—Box 1570, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Two-metre Tx of good appearance; Manchester area.—Price and gen. to Box 1571, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Table-top Tx, Panda or similar.—R. J. B. Morgan, 11 Sussex Ring, North Finchley, London, N.12. (*Phone: Hillside 9705*).

R1155 FOR SALE; also numerous oddments. Any offers?—Phone or write: 51 Brockley Park, S.E.23, or *FOR. 3760*.

BC-348, £11; with BC-453, £12 10s. R103, £5 10s.; SCR522 Transmitter, £1 10s.; TU Transmitter, £1 10s. Other items.—Armstrong, 40, The Oval, Mirehouse, Whitehaven.

FOR SALE: Receivers, 1132, 1116A (range 142-20 mc), 1155 (75-18 mc). Offers (week-ends).—Morle, 90 Perryhill Road, Quinton, Birmingham.

G3GDA going overseas, as previous advertisement, Box 1557, March: Transmitter, £40; Receiver, £10; BC221, £10. Any reasonable offer taken; must sell.—Box 1573, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

B2 MINOR, complete, for AC. Offers?—G5ND, 161 Penrose Avenue, Blackpool, Lancs.

FOR SALE: Hammarlund Super Pro. Rx, 125 kc-40 mc; Super Pro. Rx, 100-400 kc, 2.5 mc-20 mc; Super Pro. power unit. Valves: 805 (two) with bases; V7OD (three); 8019 (three); 866A (four); 813 (two); PX4 (two); some used slightly. Assortment of German valves; 7-14-28 mc Labgear wide-band couplers. Transformers: 500v. at 250mA (two); 2000v., 400mA; 1400-1200v., 250mA; 1400-1000v., 250mA; 2000-1500v., 500mA; 500 mA Modulation Transformer. Offers?—G3AHU, J. L. Monk, 14 Angell Road, Brixton, S.W.9. (*Brixton 2363*).

SMALL ADVERTISEMENTS. READERS—*continued*

SALE (buyer to collect); can be seen by appointment; reasonable offers entertained: AR88D with manual, £55; HRO Senior and p/pack in rack, 4 bandspread coils, 1.4-30 mc, with manual £25; RCA CRO 3in. tube with spare tube and manual, £15; RCA Junior VoltOhmyst and manual, £10; one special mains transformer for above two units. Taylor Meter 85A and manual, £12; Mullard C x R Bridge and manual, £7; Wilcox-Gay master oscillator, slightly modified to include Top Band, and crystal multiplier modified for Top Band amplifier, can be modulated externally, separate units, manuals for both, £7; Rich & Bundy transformers, 1,000v., 120 mA, and 4v., 3a. and 7.5v. 6.5a., £6 pair. All the above in excellent condition. Advance No. 3 signal generator, £8; B-Max B4/40, modified, 807 final and speech clipper, D104 mike and two Q.C.C. crystals, 3514 and 7003 kc, £25.—G2AIM, 64 Cecil Park, Pinner, Middx.

BARGAIN SALE: A number of small SW receivers, cover all bands, fully calibrated, spread, etc., and other gear, all excellent condition, in full working order. Very cheap. All enquiries welcomed, with s.a.e. for full descriptions.—Box 1572, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

WANTED: Preselector or Pre-Amp for HF bands, with or without power/pack; in good condition.—Box 1574, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

SWL, SELLING UP, has Eddystone 740, fitted additional RF stage; 4-valve LW receiver; Super-regen receiver, 100-150 mc (above built into wood rack, 20in. x 38in.); "Editor" tape recorder, July 1954; Pullin series 100 multi-meter, January 1955; G.E.C. Miniscope. (All the above are in mint condition). AVO Minor; about 75 various valves; 2 dozen variable condensers; 100 used fixed condensers and resistors; 2½in. panel-mounting meters, DC 0-80A, 0-5 mA, 0-500 MicroA, 0-300V.; 3 mains transformers; various valve-holders, knobs, coils, speakers, etc.; 75 radio magazines; soldering iron with spare element; £160 the lot (or near offer). Might separate; must clear; buyer collects.—B. Cheffings, Grimoldby, Louth, Lincs.

AMATEUR, going overseas, selling AR88D, all components, handbook, etc.; in good condition. Offers? BC-348, £11; BC-453, unmodified, £3 10s.; El-Bug, £1 10s.; Class-D Wavemeter, £4 10s. S.A.E. lists.—G3IXL, 4 Cherrydown Road, Sidcup, Kent. (*FOO, 1544*).

CR100, working order, £20. Valves: EF37 (one), EF37A (one), 6SL7GT (two), 6J7M (two); 17/6 the lot.—Box 1567, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

EXCHANGE: HRO Senior with 6 coils and AC power/pack, perfect condition, for CR100 or similar. Must be in new condition.—G3ISQ, 40 Parkwood Road, Wimborne, Dorset.

HAMMARLUND Super Pro. (BC-779), with power/pack, £30; HRO Senior, with power/pack, coils, £28. Both very good condition.—17 Kent Road, Atherton, Manchester.

Short Wave Magazine Advertising gives World-Wide Coverage.

HENRY'S

(RADIO LTD.)

We have over 20,000 American and B.V.A. valves in stock.

ALL VALVES NEW AND GUARANTEED

ID8GT	10/–	6V6G	7/6	7H7 ...	8/6	805 ...	35/–	KT61	10/–
1G6 ...	6/6	6V6GT	7/6	7B7 ...	8/6	813 ...	105/–	KT66	12/6
1R5 ...	7/6	6V6M...	10/–	757 ...	10/–	866A ...	12/6	KT2	5/–
1S4 ...	7/6	6J6 ...	9/–	8D2 ...	4/–	872A ...	25/–	PEN25	6/6
1S5 ...	7/6	6AK5	9/–	9D2 ...	4/–	9001/2/3	6/–	PEN46	7/6
1T4 ...	7/6	6U5 ...	7/6	4D1 ...	4/–	9004 ...	6/–	QP25	6/6
1A7GT	12/6	6U5G	7/6	12A6 ...	7/6	9006 ...	5/–	QP21	8/–
1A5GT	10/–	6J7G ...	6/6	12C8GT	7/6	954 ...	5/–	QP230	8/–
1H5GT	10/–	6J7M ...	8/6	12H6	7/6	956/7	6/–	5P61	4/–
1N5GT	10/–	6K7G...	6/6	12K7GT	8/6	1299A	4/6	5P41 ...	4/–
1Q5GT	10/–	6K7GT	6/6	12AH7GT	8/6	ATP4	6/–	TP22 ...	8/–
1C5GT	10/–	6K7M	7/6	12K8GT	8/6	CV66	5/–	TP25 ...	8/–
1L4 ...	7/6	6K6GT	8/6	12Q7GT	8/6	CK510AX	2/–	TH233	10/–
1LN5	7/6	6G6G	6/6	12SA7GT	8/6	D1 ...	5/–	U17 ...	5/–
1LD5	7/6	6H6GT	4/–	12SQ7GT	8/6	D41 ...	5/–	U19 ...	10/–
2X2 ...	5/–	6H6M	5/–	12SG7	8/6	D42 ...	5/–	U22 ...	8/6
3V4 ...	7/6	6K8G...	9/–	12SH7GT	7/6	D63	2/–	U52	8/6
354 ...	7/6	6K8GT	9/–	12SC7	10/–	EA50 ...	3/–	VP23 ...	6/6
3Q5GT	10/–	6L6G	10/–	12J59T	7/6	EB34 ...	8/6	VP41 ...	7/6
5U4G	8/6	1622		12SJ7	8/6	EBC33	6/6	VU111	4/–
5Y3GT	8/6	(6L6)	11/–	12SK7	8/6	EF36 ...	6/6	VU133	4/–
5Z3 ...	8/6	6L7M	8/6	12SR7	7/6	EF39 ...	6/6	VU120A	4/–
5Z4G...	8/6	6N7GT	7/6	14A7 ...	8/6	ECH35	12/6	VT501	7/6
6A7G...	8/6	6Q7GT	8/6	25A6G	8/6	SP13C	4/–	VR105/30	8/6
6A6 ...	10/–	6R7M...	8/6	25Z5 ...	8/6	VP13C	4/–	VR150/30	8/6
6C6 ...	6/6	6R7G	8/6	25Z6GT	8/6	EF91 ...	9/–	STV280/40	
6D6 ...	6/6	65C7M	10/–	35Z4GT	8/6	EB91 ...	9/–		15/–
6A8G...	8/6	6557M	7/6	35Z5GT	8/6	EF50 (Ex-		5130 ...	7/6
6AC7	6/6	65G7M	6/6	35L6GT	8/6	Units)	5/–	VS70	
6AG7...	10/–	6X5GT	8/6	50L6GT	8/6	EF50		(7475)	7/6
6B8 ...	7/6	65H7	6/6	50B5 ...	10/–	(Red Syl)	10/–	XH (2v)	4/–
6C4 ...	8/6	65A7 ...	8/6	50C5 ...	10/–	EF54 ...	6/–	XP (1.4v)	4/–
6C5M	7/6	65Q7	8/6	42 ...	8/6	EL32 ...	7/6	Y63 ...	8/6
6J5GT	5/–	65N7GT	9/–	43 ...	8/6	EL33 ...	10/–	TZ40	35/–
6J5M ...	7/6	65L7GT	9/–	46 ...	10/–	HL23/DD	6/6	R3 ...	8/6
6AM6	9/–	65J7 ...	8/6	75 ...	8/6	GU50	12/6	OZ4 ...	7/–
6AG5...	7/6	6SK7 ...	7/6	80 ...	8/6	KTW61	7/6	OZ4A	7/–
6BA6	8/6	7C5 ...	8/6	807E ...	7/6	KTW62	7/6		
6F6G ...	7/6	7A7 ...	8/6	807U5A	10/–	KTW63	7/6		
6BE6 ...	10/–	7C7 ...	8/6	803 ...	35/–	KT33C	10/–		

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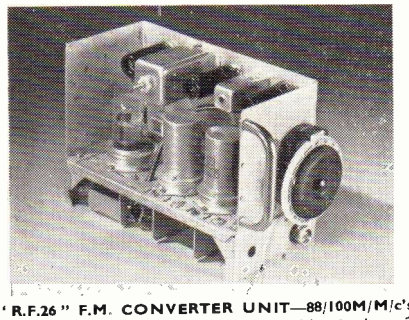
210LF	3/6	TP22 ...	8/–	M5/PEN B	7/6	354V ...	5/–
P2 ...	4/–	TDD2A	8/6	41MP ...	7/6	ML4 ...	7/6
2155G	4/–	FW4/500	10/–	U10 ...	8/6	PX25 ...	12/6
VP2 ...	8/6	FC135/C	10/–	42SPT ...	6/–	MU14 ...	8/6
5P2 ...	8/6	FC13C ...	10/–	PEN4VA(7)	10/–	MH4 ...	5/–



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FOR THE EXPERIMENTER AND THE RADIO ENGINEER

The SHORT WAVE Magazine

EDITORIAL

Offence *Many readers will have seen the newspaper reports of the radio piracy case heard at Nottingham on March 14 last. Briefly, a misguided individual was entertaining his neighbours with so-called "request programmes" on gramophone records — without a licence, and on a frequency outside authorised amateur bands.*

With the merits or demerits of his action in so doing we are not concerned—local piracy of this sort is nothing new, and similar cases of puerile enthusiasm have been cropping up at intervals for the last thirty years.

What we are most assuredly concerned about, however, are some of the statements attributed to the solicitor prosecuting for the G.P.O. He is reported to have said

> **"In the interests of national security it was essential that the Post Office should know where amateur transmitters were situated. Some of these stations were cluttering up the air and spoiling programmes."**

It would be difficult to imagine an utterance—made in open Court, on behalf of the Post Office, and reported in a number of newspapers—which is at once more ignorant, misleading and damaging, as well as being grossly offensive to some ten thousand licensed amateurs.

So there are a number of questions that need to be asked here, to which answers must be given: How was it that the Post Office, with all its elaborate detection apparatus, allowed the pirate station to remain on the air, openly, for some twelve months or more? Why should the individual concerned have been described, officially, as an "amateur" instead of as a pirate, when the G.P.O. must be well aware of the connotation of the term "amateur"? Since when has it been necessary, "in the interests of national security," to keep such a close check on licensed amateurs, when the facts are that they made a contribution to the winning of the last war out of all proportion to their numbers? Was the prosecuting solicitor keeping to the brief supplied him by the G.P.O.? If so, who in the Post Office is responsible for his outrageous statements? If the prosecuting solicitor's statements were outside his brief and made on his own initiative to add some colour to the proceedings, what is being done to correct them?

The only fair way to resolve this disgraceful business is for the A/PMG to stand up in the House of Commons and make an unqualified apology and for the solicitor in the case to repeat it in the Nottingham Court.

Austin Forbes G6FO.

CW Keying by Magnetic Tape

ADAPTING A TAPE RECORDER FOR AUTO-CALLING

N. P. SPOONER (G2NS)

Our contributor describes in detail an ingenious method of recording CW on tape, and then making the recorded signal key the transmitter. With the erasure and long-playing facilities given by a tape recorder, many interesting possibilities are suggested — and one of the advantages is that the CW signal as radiated is not so much "perfect" Morse as the true keying characteristic of the originating operator.
—Editor.

IT occurred to the writer that it should be possible to put out, by automatic means on a Tape Recorder, a reasonably prolonged and directional CQ — or other wanted call — while listening for possible break-in replies. Unorthodox as this may at first seem, the "new" Amateur (Sound) licence sweeps away the old three-minute calling and the ten-minute sending period restrictions.

Scope

The technique for break-in working has been known for years, but how does one produce automatic CW easily? With a Tape Recorder, home constructed or otherwise, all that is needed is a very simple one-valve triggering unit. The triggering unit described here will serve many other purposes, such as directional WAS and WAZ CQ's; TTX transmissions; two-metre and 70-centimetre automatic calls; over-the-air slow Morse transmissions; Club Morse instruction with feed-back hummers; amateur-built Inker actuation direct from strong receiver signals; triggering voice-operated carrier systems and local net calling circuits.

With the exception of the "surplus" automatic transmitters once used by the Services, most amateur keyers have in the past incorporated a clockwork or motor-driven drum surfaced with metal Morse characters wiped by a springy contact. The disadvantage of this type of auto-keyer is that every change of message necessitates the removal of unwanted metal characters and the laborious cutting of new ones while, with the ex-Government TG series of Keyers, fresh signals on new paper tape have, in the absence of an Undulator, to be carefully inked-in by hand.

Some other method that provides good keying and gives no wastage may therefore interest readers, and especially County-chasers who realise its possibilities. A train of thought, started by the increase in telephony play-back transmissions heard on the air, led to the conjecture that either borrowers of Tape Recorders have become more plausible, that home-assembly has become more popular along the lines of G3GFN's articles on the subject in the March, April and June, 1952, issues of *Short Wave Magazine*, or else that complete tape recorders are at long-last finding their way into many more amateur stations.

Whatever the reasons, no apologies are felt necessary for suggesting the use of such a medium as magnetic tape, especially as it is virtually indestructible and allows immediate erasure and alteration. The most obvious value of recorded matter lies, of course, in home instruction and in re-transmission for the benefit of the originating station. Without considering the very infrequent MCW use, a tape recorder is normally thought of as being restricted entirely to telephony, so, with this in mind, the writer recently hooked-up a simple triggering circuit (referred to by a local visiting amateur as "the heap") to ascertain whether magnetic tape might not lend itself to automatic keying of a CW transmitter. This it did very successfully after preliminary juggling with the buzzer and relay; while admittedly there is nothing new under the sun, the present set-up seems a novel adaptation.

Recording

Under the conditions required by the circuit of Fig. 1, the response of a triggered relay can be affected to some extent by the quality of the recorded Morse signals. Many buzzers will be found to fail in this respect while the hang-over alone of the more raucous is itself often quite sufficient to trigger a relay! By using, instead, a feed-back Hummer — which has other uses in the station such as monitoring, Morse practice and bug-key adjustment— a very pleasant T9 note can be obtained that records well and actuates relays in a determined manner. For this, a single low-resistance headphone, a carbon microphone insert, a key and a battery are wired up in series, as shown by Fig. 2. By wedging the headphone into one end of a short cardboard tube, the microphone insert can then be presented to it from the other end, and if an audio feed-back note

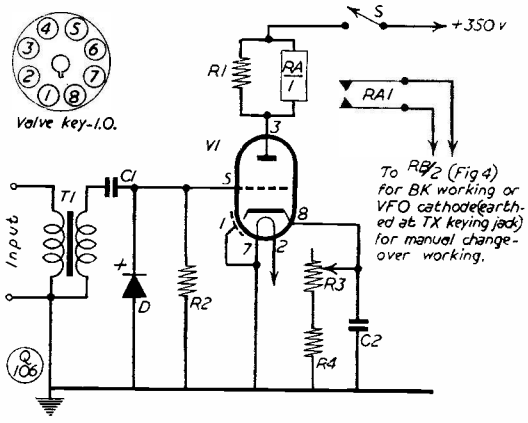


Fig. 1. The triggering circuit for the G2NS auto-sender using a tape recorder. The tape output, with the recorded CW signals, is fed to T1, relay RA/1 then operating to follow the recorded keying. The contacts RA1 control the actual change-over and keying relay, RB/2 in Fig. 4.

of the desired pitch and quality is not produced by their proximity when the key is closed, then the leads to the phone should be reversed. With the (unorthodox) addition of the tubing, the writer finds that a surplus DLR headphone, an old G.P.O. carbon insert and a 4½ volt battery give a "599 signal" when the insert is at right angles to the phone. The speed at which the tape will be run, when recording the hummer signals, need not be considered because one simply keys at the normal speed used for any "live" CQ. As the prescribed maximum speed for the call-sign itself has now been lowered from 20 to 12 w.p.m. the entire transmission can be made at the latter speed, or less if desired, with the recorder bass and treble controls at a minimum and the recording microphone plugged into its high-gain socket, sitting a suitable distance away from the hummer. This will be found if, with the tape stationary, the recording level control is adjusted according to the magic eye or other indicator, while the hummer is keyed and its position altered in relation to the recording microphone.

When satisfactory, the tape can be started and a keyed run made of the "CQ Scilly Sark Shetland de G3——BK" or other exhortation. If, upon play-back for personal criticism, any mistake is detected that will go uncorrected and repeated *ad nauseum* over the air, the whole should be rejected and a fresh recording made. In contrast to mechanical keyers, there is a distinct advantage in all this—what is put on the tape will be faithfully repeated over the air and the fist heard calling will be the same as that heard during any resultant contact.

Table of Values

Fig. 1. The Triggering Circuit.

C1	=	0.1 μF
C2	=	25 μF, 25v.
R1	=	22,000 ohms, ½ watt
R2	=	470,000 ohms, ½ watt
R3	=	10,000 ohms, potentiometer
R4	=	100 ohms, ½ watt
S	=	On-off Toggle Switch
T1	=	100:1 mike transformer (*see text*)
D	=	Any type, diode (or OA60)
V1	=	6J5, 6C5
RA1	=	Modified surplus Type 3000 (*see text*) relay, 10,000 ohm coil, or highest available

In other words, although calling is done "automatically," there will be no let-down as one so often hears with commercial transmissions, in which the arrogant stride of perfect machine-made Morse is at times suddenly broken off for the interjection by an unsure hand of some almost unreadable instruction, before tape traffic is hurriedly resumed.

As the average twin-track run is about 30 minutes, the upper track might be filled with three separate groups of directional CQ's, each lasting some nine minutes, while the lower track is left free for the recording of normal items. It might perhaps be mentioned that over-recording usually makes erasure more difficult, and if, as a last resort a bar magnet is used to wipe the tape, a permanent background of high noise-level is often acquired thereby.

Triggering

As the station modulator pack will not be required during CW operation, its heater and HT supply might perhaps be conveniently diverted to the triggering unit, for switching together with the transmitter. The play-back output of the recorder, with its internal speaker switched off, can be taken from the external speaker terminals and fed by twin

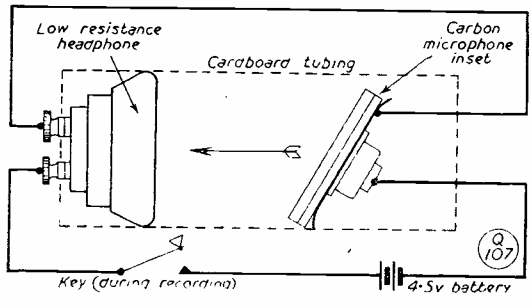


Fig. 2. To obtain the CW recording on the tape, a feed-back hummer is used, the audio tone so produced being picked up by the microphone of the tape recorder. There are other ways of getting the CW signal on to the tape, such as by using the output of an audio oscillator plugged directly into the recorder microphone circuit. Whatever method may be used, the recorded CW is a true reproduction of the operator's own keying characteristic.

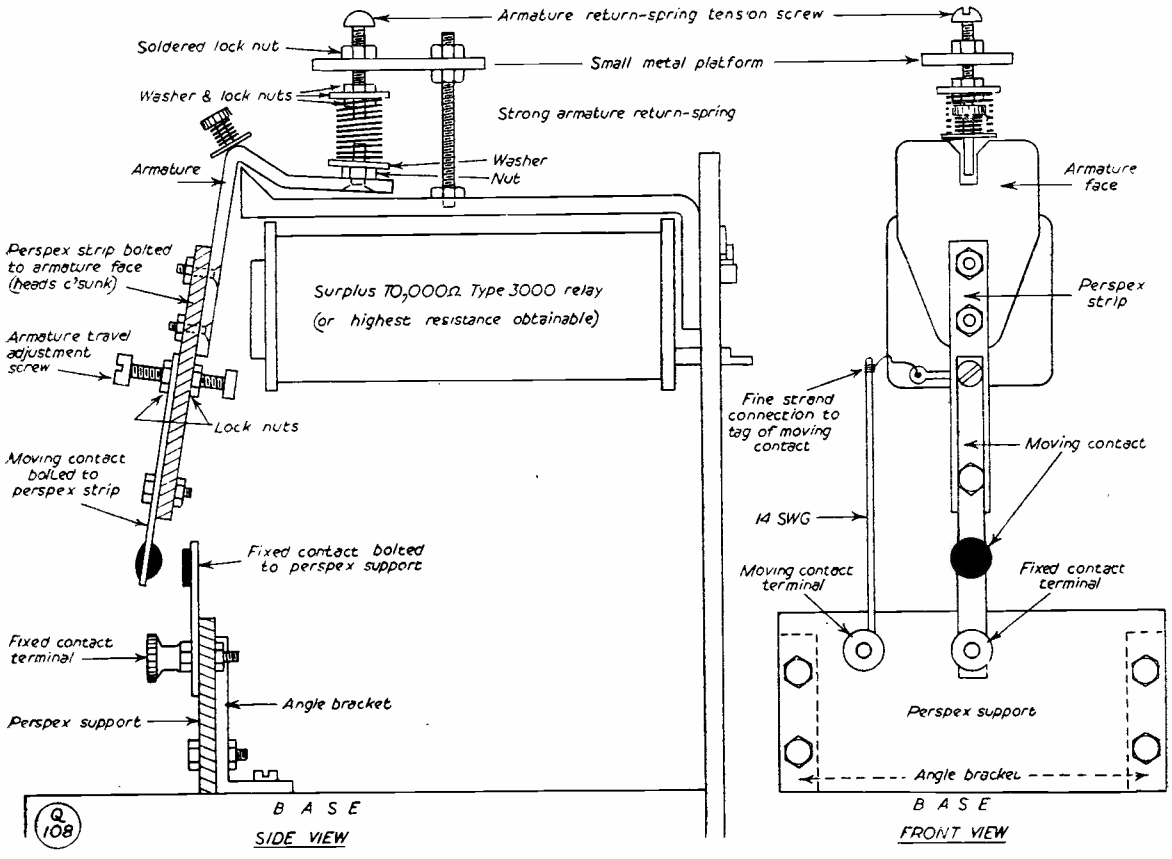


Fig. 3. Descriptive sketch showing detail of the mechanical modifications and mounting of the keying relay to follow the taped CW signals, as described by G2NS in his article. This is relay RA/1 in Fig. 1, controlling RB/2 in Fig. 4.

shielded cable to the input terminals of the triggering unit. Looking again at Fig. 1, the 100 : 1 microphone transformer provides the necessary voltage step-up, and, failing this, the highest ratio of an output transformer can be used if it is connected " the wrong way round " (back to front, low to high). The crystal diode in use happens to have " OA60 " marked on its glass body, but any other types should be tried and the best chosen. The cathode potentiometer adjusts the standing current level and, with the 6J5 valve amplifying besides triggering, the anode resistor is intended to act as a peak-limiter and protect the relay coil windings. In the theoretical absence of this resistor, the relay might presumably become agitated in the manner of an output transformer running without a load.

During tests and initial setting-up, the best of three different methods of monitoring can be chosen by connecting an 0·1 μF condenser and a pair of headphones in series between anode and chassis; by using the output contacts RA1 (Fig. 1) to key the hummer ; or by listening to the station CW monitor while using a dummy load. The relay described, taking about 3 mA, is a surplus Type 3000 with all its spring contacts taken off to make way for an upright bolt holding a small metal platform that secures the armature return-spring tension screw. The return-spring itself is seated on a metal washer slipped over a small upright bolt through the armature tip ; more robust contacts could preferably be stripped from other types of relay. One fixed contact, held by a perspex or other insulating support that is angle-bracketed to the chassis, should be firmly struck by one moving contact held by a strip of similar insulation bolted to the face of the armature.

Setting Up

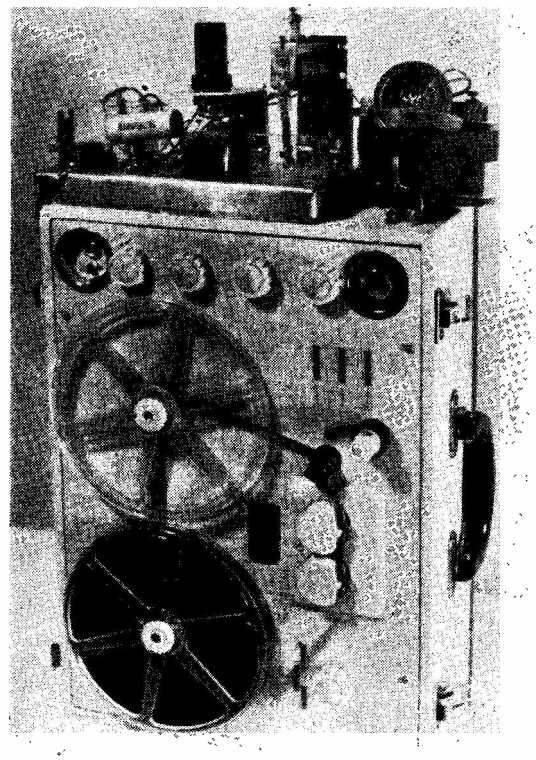
The travel of the moving armature is adjusted by a screw passing through this insulat-

ing strip; when initially setting up the unit, the recorder play-back volume control, the cathode potentiometer, the spring tension and armature travel are all adjusted in turn until optimum energisation and release of the relay is obtained and it eagerly follows the signals fed to it. If in so doing it keys the monitoring hummer cleanly, then it will key the transmitter equally well. For additional confirmation in the present case, the headphone output of a Teleplex machine was fed *via* a 1: 1 ratio transformer into the recorder, switched neutrally as a straight amplifier. The output of the amplifier went into the triggering unit and the clockwork-driven perforated tape signals of a single-valve Telepex audio-oscillator then keyed the hummer very cleanly.

Breaking-In

Automatic calling can be operated very well without listening through simply by substituting " AR K " on the tape for " BK," and changing over manually at intervals for replies. It is logical, however, to lighten work by a BK system and the circuit suggested is one that has stood the test of many years' use in amateur circles. By means of a separate receiving aerial and keying of the VFO cathode—which is very satisfactorily done with a Clapp oscillator and especially if screen and plate HT are both stabilised—the receiver is simultaneously protected and muted by the contacts of the surplus Type 3000 relay, circuited as in Fig. 4. Providing the contacts give the necessary change-over action, no modifications are necessary. When the key is closed, the transmitter is keyed in the VFO cathode while the receiver is protected by a shorted aerial input and muted by a greatly reduced RF gain; R2 is the auxiliary RF gain control to limit the strength of the outgoing signal heard in the receiver. When the key is opened, this auxiliary control is shorted to chassis and normal receiver gain is immediately restored for incoming signals. RF chokes may be inserted, if found necessary, in the aerial lead, across the key (with or without a series fixed condenser) and/or between key and relay and in the lead to the VFO cathode. With manual change-over, the VFO cathode or other stage is keyed by being earthed in the normal way at the transmitter keying-jack while, with BK working, the VFO cathode is keyed by earthing at relay contacts RB2. Study of the circuitry will make the action clear.

While readers will readily agree that uninterrupted contacts cannot be expected on



The assembly described by G2NS, for using any tape recorder as an auto-sending device for CW. On the right is the " blooper " or hummer for producing the CW signal to be recorded on the tape, and on the left the triggering unit, actuated by the tape signal, which enables the transmitter to be keyed. As shown, this is a test set-up to prove that it does work; obviously, final construction could be with both units neatly built into a cabinet.

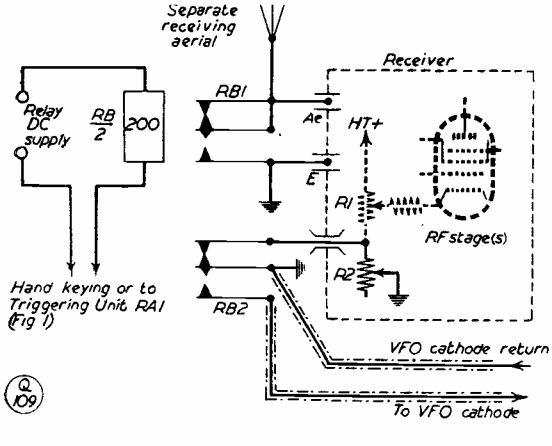


Fig. 4. Circuitry for VFO keying and muting of the receiver in the G2NS auto-sender system which, as shown here, allows for " listening through " if the action of the relays is crisp and accurate. Relay RB/2 is controlled by RA/1 in Fig. 1, and can be any suitable " surplus " type with one pair of change-over contacts. R1 is the receiver RF gain control, and R2 an auxiliary gain control of the same value as R1 (see text).

Top Band in the established ship-shore traffic channels, a considerable number of 160-metre CQ's are launched fairly and squarely thereon, perhaps by enthusiasts who do not themselves live on the doorstep of a Coast station, as many of their unfortunate fellow-amateurs do. It is always more comfortable for all concerned if these "perturbed frequencies" are avoided as much as possible. Although these strong Coastal transmitters are spread right across the band, in many cases at regular 7 kc intervals, there are still frequencies upon which an amateur may profitably dawdle. They depend upon one's location in the British Isles, but those worth trying are: 1800 to 1820, 1830, 1837, 1844, 1851, 1858 to 1866, 1872, 1879 and 1900 to 1905 kc. Unauthorised fish-fone springs up anywhere at anytime by agreement between the perpetrators, of course, and an OH, OK, HB or ZC4 victim may unwittingly lure the Top Band wolf-pack into previously calm waters!

When the thrill of striving for WABC, GDX and the working of far-away places ceases to be of interest, the recorder can still be used for its intended purpose, the BK system and the hummer will both function separately, and the few humble components put into the triggering unit are not likely to be sorely missed from the average junk-box.

THE McVITIE WESTON VALVE COLLECTION

The original valve of 1904 has undergone manifold changes and, even now, is constantly being improved and its application widened. Until 1915, development was relatively slow, but in the last 35 years it has been so rapid that very few people can appreciate clearly the many changes leading to the highly efficient and reliable valves of today. Literally thousands of types have been made, only to be replaced by others still better. The stimulus of two world wars has had much to do with this progress, and it is not surprising that the purely historical aspect of these developments has been almost overlooked, even by those most closely associated with valve design and production.

It was very fortunate, therefore, that about 1920, Mr. Robert McVitie Weston, a solicitor with scientific leanings, began to take, as an amater, a serious interest in the history of the valve. In addition to the types then current, he started collecting valves of every age and category, much of his spare time being spent in searching for specimens. By 1934, he had assembled a fine collection of several hundred valves, including one of Fleming's original diodes and a Lee de Forest triode with a descriptive label in Fleming's own handwriting. Housed on the top floor of Mr. Weston's Reigate home, the collection rapidly expanded, till by 1938 the exhibits numbered about 2,000 valves, including a specimen of the rare Lieben-Reisz relay.

After the 1939 war, he came to the conclusion that his museum had become too large and too important for a single individual to handle. He therefore decided to hand it over to a commercial concern to ensure the preservation of the exisitng specimens and the expansion of the collection by the addition of new types.

So it is that this historically priceless selection of valves and tubes is now assembled in the radio building at the New Southgate works of Standard Telephones & Cables, Ltd. Mindful of the responsibilities associated with its custody, the company hopes to enrich the McVitie Weston Collection with further examples of really significant valves from every possible source. To this end, the co-operation of valve manufacturers and others, throughout the world, will be welcomed in obtaining items suitable for inclusion. It is hoped that students of the subject will appreciate this permanent record of the history of the valve. A complete catalogue of the Collection, which may be inspected by arrangement with the curator, is in preparation.

DOMESTIC INTERFERENCE SUPPRESSION—OFFICIAL

As foreshadowed on p.657 of our February issue, draft regulations were laid before Parliament on March 1st, aimed at the suppression of interference with television and sound broadcasting. In effect, all small domestic machines — vacuum cleaners, hair driers, electric drills, refrigerators and similar appliances—will have to be suppressed by the user if interference is being caused with local reception. The GPO hopes that those concerned "will co-operate by having the trouble put right when it is pointed out to them by the Post Office." If the owner refuses to have his appliance suppressed, the GPO will use their new powers—well, to suppress him! Since the standards as laid down are intended to give adequate suppression not only on normal BC and TV frequencies, but also on FM/VHF and Band III CTV as well, it can be expected that radio amateurs will likewise benefit by local suppression having to be effective over such a wide range of frequencies.

It is noteworthy that the Post Office states specifically that domestic appliances "are the commoner sources of interference." In future, no amateur need hesitate to contend the issue if next-door's vacuum cleaner, or hair-dryer, or whatever, is known to be causing any sort of interference with reception. For those who may wish to pursue the technical aspects of suppression problems, two publications are available: *Components for Radio Interference Suppression* (BS.613) and the BS Code of Practice on *The General Aspects of Radio Interference Suppression*. Both are available from the British Standards Institution, British Standards House, 2 Park Street, London, W.1.

Multi-Stage Transistor Superheterodyne

RECEIVER FOR THE LF BANDS, USING TRANSISTORS THROUGHOUT

C. L. WRIGHT, B.A., B.Sc. (G3CCA)

The author of this article is well-known as an active exponent of the art of Transistory, in both transmission and reception. He has been particularly successful on the 160-metre band with his all-transistor station, with numerous CW and phone contacts over good GDX distances. This is probably the first detailed design to be published for a wholly transistorised communications receiver; G3CCA has had it in operation for some time now, having previously done a good deal of original experimental work to establish the principles.—Editor.

THE receiver which is described was designed for the sole purpose of an investigation into the properties of transistors in communication equipment. The prototype was made to cover the 1·8 to 2·0 mc amateur frequency band, but by careful selection of the transistors it has been possible to extend the frequency range to the upper limit of 4·0 mc, thus making reception possible over the 80-metre band.

Before attempting the final design a complete study was made of all the available information on transistor physics and a series of experiments carried out on various types of circuits.

Particular attention was paid to the frequency mixing stage and several circuits were tried, but for simplicity it is thought that the one chosen for the final circuit is most efficient. During the experimental tests a new type of transistor was developed, but as this is not available for general use, the circuit described usese a standard point-type transistor.

Only the point-type and the *p-n-p* junction transistors have been employed in the design of the receiver under discussion. The polarity of the collector battery voltage is negative with respect to the base electrode in the case of the point-type, and with respect to the emitter in the case of the junction type.

In the ordinary radio valve, the input circuit is practically isolated from the output, but this is not the case in the transistor circuit, the input impedance of which is a function of the load impedance. This presents a problem of some importance when several tuned transistor stages are put in cascade, as the load impedance of the first stage will depend on the load impedance of the second stage, and so on. Also, in order to get a maximum power transfer from one stage to the next, the coupling between the stages of a transistor amplifier will have to be tighter than those of a valve amplifier. This means that to feed the correct amount of signal power into the following stage, an impedance step-up or step-down, according to circuit conditions, is required.

The final point to take into account in the design of high frequency amplifiers, is the stability criterion.

The transistor, being a device which has power gain, will, under certain conditions, even when employed as an amplifier, go into oscillation. When this occurs, apart from stopping the amplifying action, it can also damage the transistor. This situation is more likely to arise in circuits using the point-type transistor than in those employing junction type, so correct matching of the input and output circuits is important. The wiring of a high frequency amplifier should be so arranged that no additional coupling between the collector and emitter of a transistor takes place. If such a condition does occur, positive feedback is introduced into the circuit by virtue of the ground-base connection, and the transistor will oscillate.

RF Amplifier

In the interests of selectivity it was decided to use RF amplification with parallel resonance, impedance matched to the transistor.

Inspection of the RF section of the receiver circuit shows a resistor of 2,200 ohms connected between the emitter and the base. This is to make the circuit "broad-band resistive" so that a good stage gain can be achieved without the circuit going into oscillation.

The RF amplifier, like the mixer, is only tuned in the collector circuit, and this may appear very strange to designers of valve communication equipment. This is due to the high damping effect of the emitter-base circuit which appears across the inductance in that section. Experiments have shown that by peaking the RF coil at the mid-frequency, *i.e.*, 1,900 kc, it is possible to receive signals from 1,800 kc to 2,000 kc with little attenuation. When the frequency range of the receiver was extended to cover the 3·5 mc band another coil,

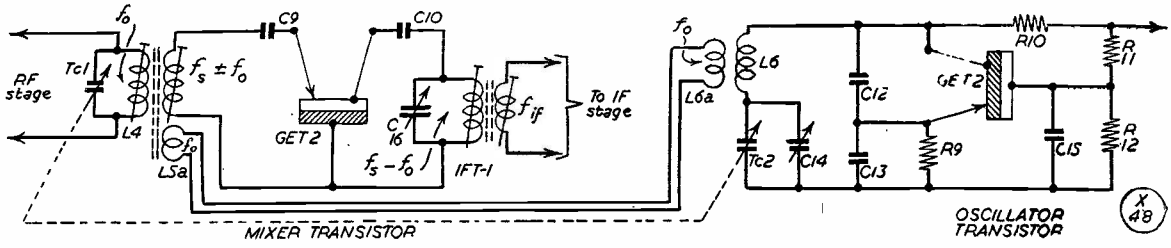


Fig. 1. The frequency changer stage with link coupling is an alternative method of injecting the oscillator output into the mixer transistor. The link is adjusted for optimum results. In this circuit bias voltages have been omitted for simplicity — see Fig. 7 for detailed arrangement.

complete with padding condenser, was switched in; this also was peaked to the mid-band frequency.

The RF gain control has been achieved by an unconventional type of circuit, the emitter voltage being obtained from a potential divider (R2 and R3) across the battery (B.1). This battery supplies the voltage to both the RF and mixer stages of the receiver and is not directly connected to earth. It is, however, at earth potential to the incoming signals by virtue of the capacity C3, which is connected to the slider of R3 and earth. Rotation of the gain control (R3) shifts the DC level of the base of the transistor with respect to the emitter and has the effect of increasing the positive voltage on the emitter with respect to the base. This, of course, alters the current flow in the emitter circuit and changes the stage gain.

The collector circuit of the RF stage is tuned to resonance by the main tuning condenser in conjunction with the oscillator stage.

Frequency Changer (Mixer) Stage

The mixer circuit presented many problems and a balanced modulator was the first type to be tried using germanium diodes. This was discarded because of the lack of stage gain, and because of impedance matching difficulties.

It was, after many experiments, finally decided to couple the oscillator signal in parallel with the incoming signal and by making the coupling condenser variable the level of the injected signal can be correctly adjusted to give a good frequency mixing action.

An alternative method of injecting the oscillator signal into the emitter circuit of the mixer stage is shown in Fig. 1. This circuit has a link coupling winding on both the emitter signal and oscillator coils, L5(a) and L6(a). The oscillator signal now appears with the incoming signal across the tuning inductance in the emitter circuit of the transistor which is used as the mixer.

In practice it is necessary to adjust the circuit for optimum signal injection in order to get maximum performance from the mixer transistor. This can easily be achieved with variable capacity coupling, but adjustment of the links on the coil present a certain amount of difficulty with inductive coupling. When both systems are correctly aligned there is little to choose between them, but as seen from the circuit diagram of the complete receiver, the capacitive coupling has been selected for ease of adjustment.

To obtain the maximum gain from the mixer stage and ensure its efficient operation as a frequency changer, the same arrangement is used for supplying the polarising voltages, to both the emitter and collector, as in the RF stage. The supply voltage to the emitter has a positive polarity and is set to the correct value for maximum gain and efficient frequency mixing by the pre-set variable resistor (R8). This resistor is part of the potential divider network R7 and R8 across the battery and its operation is the same as R3 in the RF stage. *See Fig. 7(A).*

In the prototype receiver [1] the IF was 30 kc and junction type transistors were used for the IF amplifier stages. Fairly good results were obtained and the tuning was reasonably sharp, but it was realised, on a standard signal

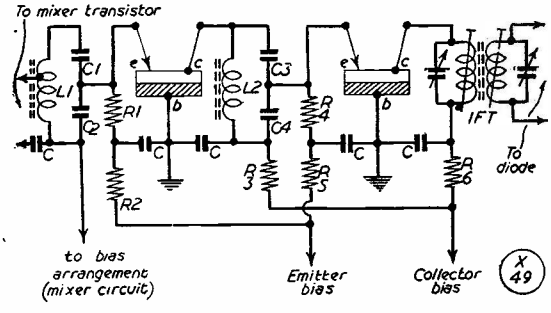


Fig. 2. An IF amplifier circuit which, with transistors, gives improved matching. L1, L2 are wave-wound and tapped 1/4th the number of turns from the top end; C1, C2, and C3, C4 are such that they resonate L1 and L2 at 465 kc and also act as an impedance match. Values are: C, all .01 μF; C1, C3, 100 μμF; C2, C4, .005 μF; L2, L3, 1.4 mH. *(Note: The collector of the first transistor should be shown tapped down L2).*

laboratory test, that the stage gain was very low.

The circuit was then modified to use point-type transistors and the intermediate frequency increased to 465 kc. This change resulted in an increase in gain in the IF stages, bringing an S4 signal up to S7. The collector circuit, therefore, in the receiver under discussion, has been designed to resonate on 465 kc and uses commercial IF transformers with a slight modification. This has simplified the construction of the receiver, the design of the diode detector coupling and the beat frequency oscillator injection circuit. Suitable transformers could no doubt be supplied by Amos Electronics—see p. 680, *Short Wave Magazine*, February, 1955.

Modification of IF Transformers

Standard IF transformers can be modified. One transistor manufacturer recommends [2] that when an inductive inter-stage coupling is used, similar to that in this receiver, the turns ratio from the collector to the following emitter should be approximately 4: 1. Where it is desired to tune the transformer to pass a certain frequency, a shunt capacity should be placed across the primary winding only.

To comply with the above requirement the secondary winding of a 465 kc commercial IF transformer is modified in the following manner:

(i): Remove condenser across the secondary winding.
(ii): Remove the tuning (dust-core) slug from the secondary section. (*Note*: leave the primary winding slug intact.
(iii): Remove approximately ¾ of the turns from the secondary winding.

The last move can easily be carried out by an inspection process only—that is, by unwinding the secondary coil until it looks as though only a quarter of the turns remain, as compared with the primary winding. The exact turns ratio between the primary and secondary windings is not too critical.

It is only necessary to modify two of the three IF transformers as the other is used unmodified between the last IF amplifier and the diode detector stage.

IF Amplifiers

Two stages of IF amplification are used, both stages being inductively coupled with the modified 4: 1 ratio transformers. This is a simple transistor cascade circuit and the base connections are taken direct to earth in the interests of stability.

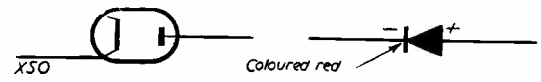


Fig. 3. The electrical comparison between a germanium crystal diode and a valve diode.

In the prototype receiver a 5,000 ohms potentiometer was inserted in the base lead of the second IF stage which introduced a heavy feedback, causing the circuit to go in oscillation, enabling CW signals to be received. This method has been discontinued because it is not a satisfactory way of obtaining oscillation for CW reception. While an alternative is suggested for this receiver, it is probable that the simplest arrangement is that given on p. 679 of the February, 1955, issue of the *Magazine*.

It is important to ensure that no additional resistance is added to the base circuit of either of the IF amplifiers. Badly soldered joints and long base connecting leads will tend to increase the positive feedback which is already present in the transistor, due to its internal base resistance, and will lead to instability and even permanent damage to the transistor.

The IF stage shown in the complete circuit has been designed for ease of construction, but the circuit shown in Fig. 2 will give an improved impedance matching between stages. Again, the specially tapped IF inductances can be supplied by Amos Electronics.

The two condensers in series in each of the tuned circuits form part of the parallel-tuned resonant coupling between stages and are tuned to the intermediate frequency of 465 kc. This coupling circuit gives a better power transfer than the double-wound transformer circuit.

Diode Detector

The output from the second IF amplifier is inductively coupled to the second detector by the unmodified IF transformer. The detector

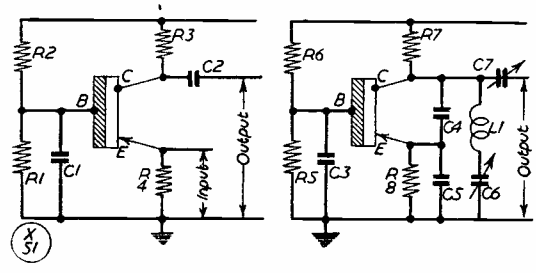


Fig. 4 (L) is a standard transistor amplifier which, by the addition of a phase-inverting circuit between input and output, becomes a transistorized Clapp oscillator (R). Values are: C1, C2, C3, .01 μF; C4, C5, 220 μμF; C6, oscillator tuning; C7, 30 μμF variable coupler; R1, R5, 47,000 ohms; R2, R6, 100,000 ohms; R3, R4, R7, R8, 12,000 ohms.

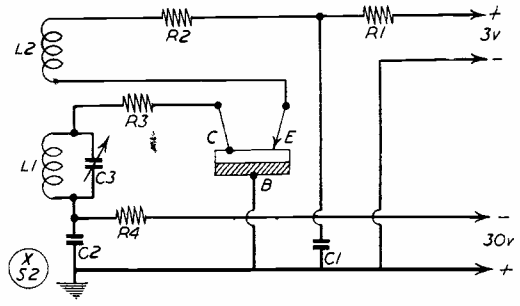


Fig. 5. Alternative oscillator circuit for the BFO, using a MW coil having a reaction winding. R2, R3, are inserted to give good waveform, and values are: C1, C2, .01 μF; C3, tuning; R1, 12,000 ohms; R2, R3, 4,700 ohms; R4, 10,000 ohms.

is a voltage doubler circuit using two GEX-34 germanium crystal diodes.

Fig. 3 shows how a germanium diode of the GEX series can be compared with the thermionic valve diode.

Local Oscillator

The variable tuned oscillator circuit chosen for the frequency changer circuit is the "Transistor-Clapp" because of its good frequencies stabiltiy. This circuit has been used by the writer in transmitter VFO applications with excellent results.

The operation of the circuit has previously been described [3] and may be compared with the thermionic valve version [4].

The circuit in Fig. 4(a) shows a transistor voltage amplifier with the input to the emitter. Now, if a tuned phase inverting circuit is placed between the input and output of the amplifier, the transistor will oscillate.

The capacities C4 and C5 in Fig. 4(b) supply the correct amount of feedback from the collector to the emitter and in the correct phase, the frequency being adjusted by the L/C network.

The oscillator is tuned to a lower frequency than the incoming signal by virtue of the inductance and capacity in the feedback circuit, and the main tuning condenser is ganged to the RF stage tuning.

The output from the oscillator is coupled into the mixer circuit by a small air-spaced trimming condenser, C7, which is adjusted to give maximum output from the mixer stage, as shown in Fig. 4. An alternative method of coupling has already been discussed.

Beat Frequency Oscillator

The beat frequency oscillator used in the receiver is exactly the same as the local oscillator, described above, with the exception of the frequency range.

A standard IF transformer is used for the tuning inductance with both the secondary winding and all condensers removed. The tuning is arranged so that the beat frequency can be varied to give a 1 kc note in the receiver.

Again, an alternative circuit is possible if it is not proposed to use an IF type of transformer. An ordinary medium-wave coil with reaction can be used in the circuit shown in Fig. 5. During the circuit experiments it was found that this circuit was not as stable as the Clapp over long periods, otherwise no trouble was encountered.

The 4,700-ohm resistors in the alternative circuit are inserted to reduce the waveform distortion which can be caused by overloading. They operate in a similar manner to the grid and anode stopper resistors in a thermionic valve circuit.

Audio Amplifier

There is enough output, on fairly good signals, from the diode detector voltage-doubler stage, to actuate a high resistance headset direct. However, if the output is fed into a suitable junction-type transistor audio amplifier (like the one shown in the circuit diagram of the complete receiver) it is possible to operate a small loudspeaker. The speaker used by the writer is 4½ inches in diameter and has a 3-ohm impedance.

The first stage of the audio amplifier consists of a grounded-collector which has a high impedance input and enables the output of the diode detector to be correctly matched. To reduce the shunting effect of the base potential divider, feedback is supplied by a 1 μF condenser which is connected between the emitter and the divider.

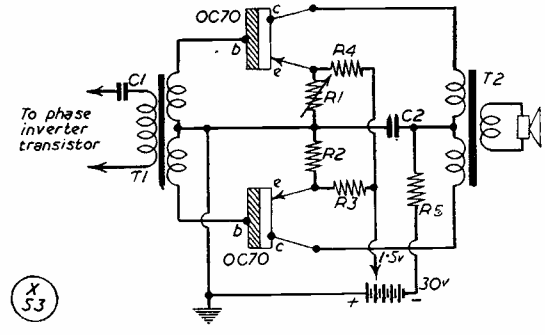


Fig. 6. Basic circuit of a Class-B push-pull transistor amplifier which will give more audio output than the Class-A connection used in the receiver as described. Values are: C1, 1.0 μF; C2, .01 μF; R1, R2, R5, 2,000 ohms; R3, R4, 4,700 ohms. Note that with a centre-tapped input transformer, phase inversion would not be required.

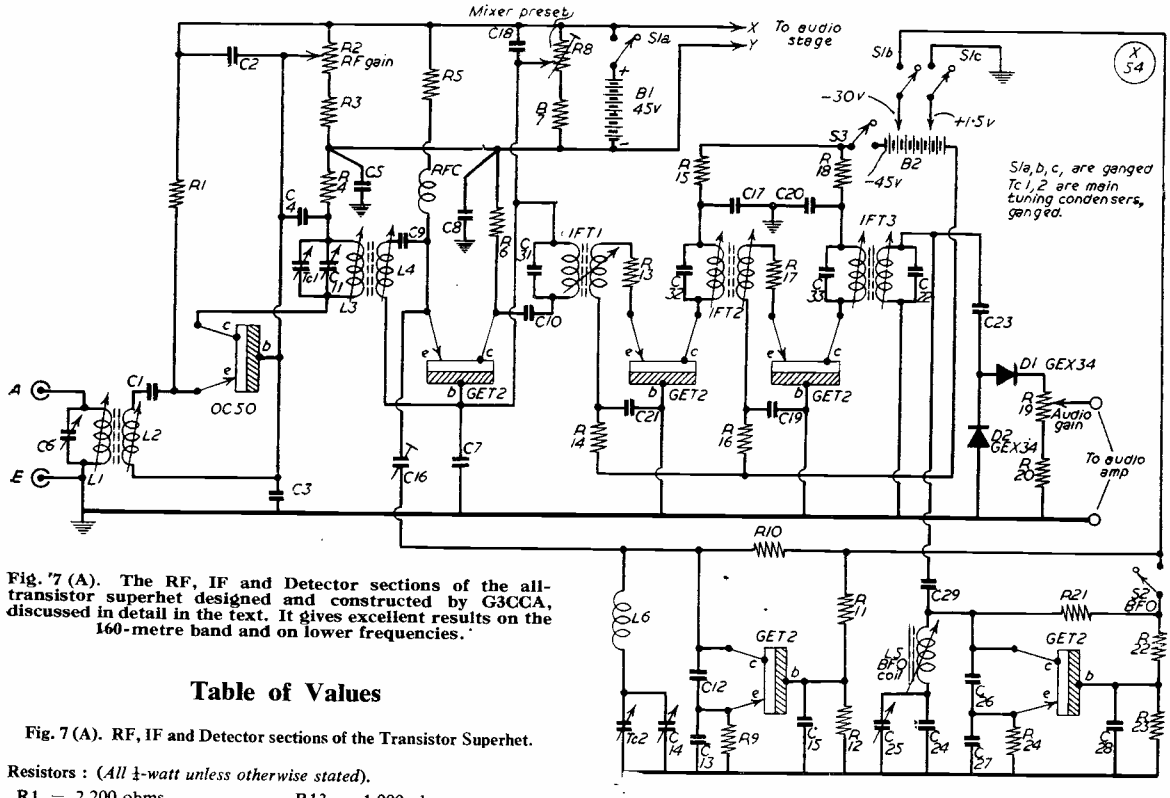


Fig. 7 (A). The RF, IF and Detector sections of the all-transistor superhet designed and constructed by G3CCA, discussed in detail in the text. It gives excellent results on the 160-metre band and on lower frequencies.

Table of Values

Fig. 7 (A). RF, IF and Detector sections of the Transistor Superhet.

Resistors : (*All ¼-watt unless otherwise stated*).

R1 = 2,200 ohms
R2 = 1,000 ohm variable potentiometer
R3 = 12,000 ohms (½ watt)
R4 = 3,000 ohms
R5 = 1,000 ohms
R6 = 2,200 ohms
R7 = 22,000 ohms (½ watt)
R8 = 500 ohms pre-set variable potentiometer
R9 = 10,000 ohms
R10 = 12,000 ohms (½ watt)
R11 = 82,000 ohms (½ watt)
R12 = 22,000 ohms (½ watt)
R13 = 1,000 ohms
R14 = 2,200 ohms
R15 = 4,700 ohms
R16 = 2,200 ohms
R17 = 1,000 ohms
R18 = 4,700 ohms
R19 = 500,000 ohm variable potentiometer
R20 = 47,000 ohms
R21 = 10,000 ohms (½ watt)
R22 = 100,000 ohms (½ watt)
R23 = 47,000 ohms (½ watt)
R24 = 12,000 ohms

Condensers :

C1 = 100 μμF silver mica
C2 = 0.01 μF paper
C3 = 0.01 μF paper
C4 = 0.01 μF paper
C5 = 0.01 μF paper
C6 = 100 μμF miniature air spaced variable
C7 = 0.01 μF paper
C8 = 0.02 μF paper
C9 = 100 μμF silver mica
C10 = 0.005 μF mica
C11 = *Incorporated in tuning condenser*
C12 = 200 μμF silver mica
C13 = 200 μμF silver mica
C14 = 100 μμF air spaced trimmer
C15 = 0.01 μF paper
C16 = 30 μμF air spaced concentric trimmer
C17 = 0.02 μF paper
C18 = 0.01 μF paper
C19 = 0.02 μF paper
C20 = 0.02 μF paper
C21 = 0.02 μF paper
C23 = 100 μμF silver mica
C24 = 100 μμF silver mica (or to suit BFO coil)
C25 = 25 μμF miniature air spaced variable
C26 = 200 μμF silver mica
C27 = 200 μμF silver mica
C28 = 0.01 μF paper
C29 = 5 μμF ceramic
C22, C31, C32, C33 = *All incorporated in the IF transformers*
TC1, TC2 = 100 μμF + 100 Fμμ twin gang tuning

Inductances

L1, L2 = Denco coils for appropriate frequency band. (*Note :* L1 is main tuning winding, L2 is the normal reaction winding)
L3, L4 = (*As above*)
L5 = Wearite (or similar) 465 kc BFO coil
L6 = Denco coil for appropriate frequency.

S1 (a)
(b) (c) = Three-pole on-off (actually made up from four-pole 2-way)
S2 = Bulgin on-off
S3 = On-off toggle

Transformers :

IFT's 1, 2, 3 = Wearite 465 kc (*see text*)

Batteries :

B1 = GEC BB500 45 volt
B2 = Five 9v. GB batteries, GEC BB.9

Transistors :

G1 = Mullard OC.50
G2-G5 = GEC. Type GET-2.

Diodes :

D1. D2 = GEC. Type GEX.34.

This circuit has a voltage gain approaching unity and the frequency response within the audio range is flat up to 6 kc.

Phase Inverter

The output from the first audio stage is fed into a simple phase inverter which has a balance control in the emitter circuit. If resistors of equal value had been placed in both the collector and emitter circuits of the phase inverter, perfect balance would not have been obtained due to a portion of the input current flowing to earth, through the emitter. Under such conditions the drive to the push-pull stage

would have unequal value. By making the resistor in the emitter circuit variable it is possible to adjust the phase inverter circuit to obtain a balanced output to drive the push-pull output stage.

Push-Pull Output Stage

The output circuit of the receiver employs two junction type transistors in a Class-A push-pull arrangement. The bias supplies have been so designed that only one battery is required for both the RF-mixer and audio amplifier stages.

The circuit used is a very simple type of push-pull output which gives enough audio to operate a loudspeaker on all normally readable signals. A phone jack has been incorporated after the first audio stage so that phones can be used if required.

It is possible, if so desired, to get a greater audio output from the two junction transistors by running them in Class-B. A basic circuit of that type of amplifier is shown in Fig. 6, and it will be seen that a slight alteration must be made to the phase inverter stage. In place of the emitter-collector phase splitting network a transformer is used and the balance control inserted between the emitters of the transistors.

The circuit shown is based on an American design [5] and although it has not been tried out in the receiver, an experimental audio amplifier has been constructed for circuit investigation. It has, of course, a higher distortion factor than the Class-A amplifier, but is quite suitable for normal telephony and CW operation.

It is also possible, by the use of four transistors in push-pull parallel Class-A, to design an output stage which will deliver 1 watt of audio at a low distortion figure.[6]

Alignment Procedure

The receiver was aligned with the aid of a signal generator, but realising that such an instrument is not always available, the following procedure will suffice. If the IF transformers have been modified as described, and assuming that the primary windings have been left intact, the two modified transformers should be approximately on the correct frequency. The transformer in the detector stage will certainly be near to the intermediate frequency. The local oscillator frequency should then be checked by listening to the signal on another receiver. This can be carried out by loosely coupling the output of the oscillator to the receiver.

Having checked the above frequencies an aerial can be connected to the transistor receiver and tuned to any steady signal. The IF and RF sections can then be adjusted for maximum output.

Noise Factor of Transistors

Most of the noise in the receiver comes from the stages using the point-type transistors as tests have shown that the junction transistor has a lower noise factor; furthermore, the greater the collector voltage the higher the noise voltage. The receiver here described has, it is true, a much greater noise factor than a valve communications receiver of the same rating, but it has been found in operation that even a weak signal can be heard above the noise level. The prototype receiver has a noise value of 70-80 dB over its entire range, but the design now described only has 25-30 dB of noise. It is hoped to reduce this value still further in the future by the use of a modified type of transistor.

Construction

The circuit described gives excellent performance on all frequencies up to 4·0 mc, with the appropriate coil assemblies, providing the local oscillator is operated on a frequency below that of the incoming signal.

Except in the soldering of the transistors into circuit, no special precautions have been taken in construction. It is essential that excessive heat is not allowed to reach the main body of the transistor during soldering as permanent damage is liable to occur. This can be prevented by the use of a heat-shunt in the form of a pair of pliers held close to the transistor body during soldering.

The complete receiver and batteries are enclosed in an electronic instrument case with dimensions 15 ins. long, 9 ins. high and 8 ins. deep; the actual chassis is $13\frac{3}{4}$ ins. x $6\frac{1}{4}$ ins.

Future Developments

During the experiments on the extension of the frequency range it was found that a varying performance can occur, through differences in transistor construction, in the mixer stage. An optimum efficiency can be obtained by adjustment of the mixer stage pre-set control, but it was thought that better results would be possible with a special mixer type of transistor. Modifications were first carried out on a G.E.C. GET-1 transistor by adding another emitter and applying the oscillator signal to the new electrode. This gave an increase in sensitivity over the whole of the working range and led to the development of a special mixer-transistor

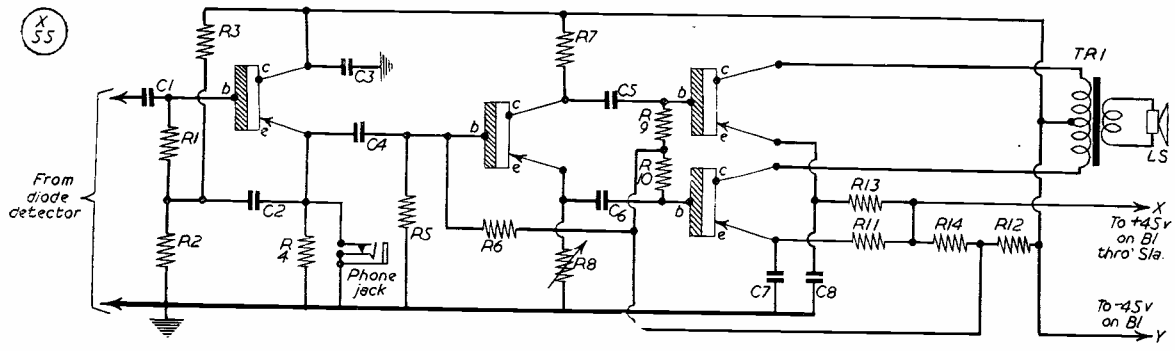


Fig. 7 (B). The audio side of the G3CCA all-transistor superhet receiver, which will operate a speaker comfortably on all normal signals on the 160-metre band and on BC wavelengths. A pair of 45-volt dry batteries will keep the set going for months, and the transistors used here are OC70 junction.

for that stage. The new type of transistor is not, at present, being commercially produced, but as soon as experiments have been completed on a test batch, details will be published.

At the present time experiments are being carried out on the possibility of extending the receiver range up to 30 mc by the application of *magnetic bias*. Frequency checks on circuits so biased are showing promise and with the improved types of transistors now available it seems possible that higher frequencies can be reached and the high noise level reduced.

Acknowledgments

The co-operation of G3IZS and other 160-metre operators is gratefully acknowledged, and the following firms have assisted with technical information: The General Electric Co., Ltd.; Mullard Limited; and R.C.A. Photophone, Limited.

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(2) *Application Report, GET-1*, pp. 1-7, June, 1954, issued by General Electric Co., Ltd., London.

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(5) Richard F. Shea, "Transistor Power Amplifiers," *Electronics*, Vol. 25, No. 9, pp. 106-108, September, 1952.

(6) Richard F. Shea, "Principles of Transistor Circuits," (Wiley), 1953, Fig. 6-12, p. 121.

Table of Values

Fig. 7 (B). Audio Side of the Transistor Receiver.

C1	= 1 μF	R5	= 100,000 ohms, ⅛ watt
C2	= 1 μF	R6	= 47,000 ohms, ¼ watt
C3	= 8 μF electrolytic	R7	= 12,000 ohms, ¼ watt
C4	= 2 μF	R8	= 20,000 ohms linear pot'-meter
C5	= 8 μF electrolytic		
C6	= 8 μF electrolytic	R9	= 47,000 ohms, ¼ watt
C7	= 8 μF electrolytic	R10	= 47,000 ohms, ¼ watt
C8	= 8 μF electrolytic	R11	= 4,700 ohms, ⅛ watt
R1	= 47,000 ohms, ¼ watt	R12	= 82,000 ohms, ¼ watt
R2	= 150,000 ohms, ¼ watt	R13	= 4,700 ohms, ⅛ watt
R3	= 150,000 ohms, ¼ watt	R14	= 5,600 ohms, ¼ watt
R4	= 68,000 ohms, ¼ watt		

Transformer :

TR1 = Push-pull miniature output, secondary to suit LS.

Transistors :

G1-G4 = Mullard OC70.

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G2ABK, Main Road, Hundleby, Spilsby, Lincs.
Has crystals 7008, 7016, 7020, 7033, 7181, 7500 and 8146.15 kc. Wants 100 kc bar, and frequencies for 1.8 and 3.5 mc bands.

G3IKA, 12 Chiltern Bank, Peppard, Henley-on-Thames, Oxon.
Has 6030 kc crystal, ½-in. pin spacing. Wants any frequency 6053-6060 kc, any pin spacing.

G3IOZ, The Gables, Kilsby, Nr. Rugby, Warks.
Has 6080 kc crystal, ½-in. mounting. Wants 6 mc crystal for multiplying into Zone E, 144.40-144.65 mc (any mounting).

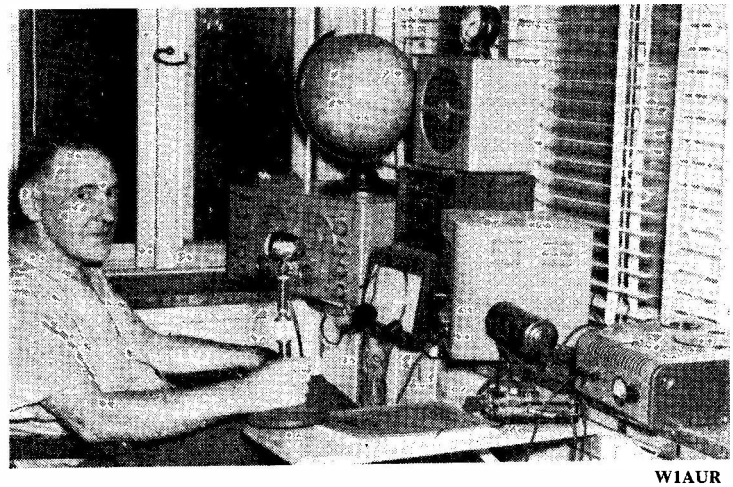
SWL, 85 Ethelston Crescent, Hereford.
Has crystals (frequencies in megacycles) 6.45, 20.2, 20.5, 21.1, 21.2, 21.3, 21.4, 21.6, 21.8, 21.9, 23.1, 23.3, 23.4, 23.6, 24.1 and 25.0. Will exchange any four for a 1515 or 1685 kc crystal.

THE NEW CALL BOOK

With effect from the next (Spring 1955) issue of the *Radio Amateur Call Book*, the price of the Full Edition will be 31s., and of the Abridged Edition (less only the W's) 15s., both post free. These increases are necessitated by rising costs of production to the American publishers and the increase in size with each new edition of the *Call Book*, with so many more fresh entries. The Winter 1954 issue of the full edition runs to just on 500 pages and is one inch thick! At 15s. post free, the Abridged Edition remains excellent value for money, as it gives the call-sign/address of nearly every radio amateur in most countries outside the United States, with many pages devoted to the latest U.K. and Commonwealth listings. Either edition of the most recent issue of the *Radio Amateur Call Book* can be obtained from the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

DX COMMENTARY

L. H. THOMAS, M.B.E. (G6QB)



W1AUR

FROM all sides one hears that the new sunspot cycle is progressing nicely. Conditions don't always suggest it, but we must be patient. At any rate, one knows for certain that they are not going to get worse, and also that we have safely survived the lowest minimum yet recorded.

From our own Royal Observatory come reports of two large sunspots of the new cycle, both observed during the first half of January. From Mount Wilson, over on the other side, it is reported that sunspot activity for the first two months of this year was the greatest since 1953; that the minimum was reached in April, 1954; and that during February, 1955, as many as 56 spots were recorded in one single day.

The climb is likely to be rapid, and the maximum should be reached by 1958, or even as early as 1957. At all events, if 1957 duplicates the conditions of 1946, eleven years back, we should all be pretty happy. Meanwhile, we may say that Spring is coming, both the sap and the MUF are rising (not to mention the temperature in the shack), and that we should be seeing some very interesting DX activity this summer.

Around the Bands

As usual, the two main centres of attraction are the Top Band and 20 metres. The 14-metre band is shockingly neglected still, in spite of the fact that it is known to be open for long periods. Ten metres is stirring quietly; Forty and Eighty are always good if the QRM will allow them to be, which, these days, is hardly ever. May we ask once more for some *all-round* activity, and, in particular, for more entries for the Five-Band DX Table? If that continues to stagnate, with only the same faithful few recording their scores therein, we shall seriously think of removing it from these pages and starting something else.

CALLS HEARD, WORKED and QSL'd

Top-Band Topics

You will find the Trans-Atlantic Tests fully written up elsewhere in this issue. For that reason, we come back, in this column, to the realms of medium DX, GDX and semi-local work. The popular pastime of county-chasing continues unabated, and the Top-Band Ladder is, without doubt, the liveliest of our tables, since it needs a complete overhaul every month. Stations change places all the time, new ones arrive at the bottom end, and there are now very few passengers.

G3IGW (Halifax) reports working UB5CF and ZB1BJ for a couple of nice DX pieces, and confirms that his own private expedition will take place at Easter, as announced last month (Selkirk on April 9, East Lothian on the 10th, Kinross on the 11th).

A new reporter is GM3JZK, Isle of Mull (Argyll), who, in twelve days of activity, worked 28 counties, mostly the "rarer" ones; G3HYZ (Oxford) and GW3CCZ (Flint) were both raised on phone. 'JZK asks if there is any demand for Inverness, because he might be able to get on from there.

G6VC (Northfleet) is up to 88/88 and looking forward to Selkirk and East Lothian. G3JEQ (Great Bookham) gets his feet on the 87/87 rung and also has hopes of Easter. G3GYR (Stoke-on-Trent) reports a daylight QSO with HB9CM, while using only 5 watts; he needs only Hereford and Rutland to complete his list of English counties, and wonders whether there is now any activity in either place.

G3FNV (Chester) has returned to the band after two years, and joins the ladder with his score of

15/31. G2DHV/P expects to be active from the Norfolk Broads during May, and has applied for a mobile licence. G3HEV (Downham, Kent) is a Club station operated by G2DHV and G3FTI. G3KEP (Bingley) has scored 15/50 since January 29, and has also raised eight OK's, 2 HB's and PAØRC.

OK1HI (Prague) has sent the necessary cards for his WABC Certificate and is, of course, the first OK to qualify. Nice going! G3DGN (New Barnet) makes a considerable jump to 39/57, and hopes there will be some activity from Rutland at Easter. G3IQO (Liverpool) has now worked 87, but doesn't give the figure for confirmations. During the DX Tests he heard YU, EA, ZB2 and EA.

GM3GZA will be operating from the Outer Hebrides until May 30, and says he will be on most evenings and every week-end; he is willing to stay up *all night* if there is anyone to work! His address for direct QSL's is D. J. West, GM3GZA, Radio Technician, c/o S.T.O., Ministry of Civil Aviation, Stornoway Airport, Isle of Harris. Those who send him a QSL will get one in return; otherwise cards will be sent out when he returns to Bristol in June. His aim is to make a WABC from Harris during the period of his stay.

G3JJZ (London, S.E.14) wonders whether the bogus SV1AZ mentioned last month is the same as the queer "KV1AZ" who appeared on the Top Band. This type was 589 in London when the W's were barely readable. G3JHH (Hounslow) has collected Oxford at last, and thinks he has now reached the maximum possible except for expeditions. Easter will be a busy period for him! He was very pleased to work EI9Q for his first Eire station.

G3JJG (London, S.W.16) rolled in GM3GZA, GM3JZK and GM3IXR (the latter in Inverness). He can't get a card from Aberdeen or Angus, and fears that the activity on the band is now dropping off somewhat. G3JBK (Bexleyheath) is another who raised GM3GZA—a comfortable QSO, too.

G2NJ (Peterborough) was listening on Eighty and heard "CQ Top Band de PAØQU." He called him and had a nice cross-band QSO, followed up by G3HYJ, who joined in the fun.

G3KEF (Coventry) is a 16-year-old reporting for the first time. He spent this first week on Top Band without very much luck, so migrated to Eighty, where he is now using 40 watts.

G3EJF tells us that the Army Wireless Reserve Squadron, while holding their annual Camp (May 7-May 21) will do their best to provide some activity from Westmorland. Call-signs are not yet known, but all stations will sign G———/P Wmrlnd. A newcomer to One-Sixty is G3JMJ (Hove, Sx.) who in one month has accounted for 26 counties, and GC, GD, GI and GM—all on an 80-foot aerial.

DX on Eighty

We all know what this band sounds like to a casual listener—just a mess of wildly-excited, chirpy, ripple-laden and generally unsavoury signals. If you can ignore the top layer you will find some nice T9 signals which eventually prove to be quite strong—they are the local or semi-local amateurs. Three or four layers below these, you will find the DX, if you listen at the right time.

On the other hand, if you are a real night-bird, and prepared to spend the hours between 1 a.m. and 6 a.m. exploring the 80-metre band, your way will be a lot smoother, and the DX will probably only be *two* layers down. Even the period 0700-0800 will bring its rewards.

GW3HEU (Wrexham) has just received cards from KP4KD and EA6AU for contacts on Eighty, and he recently had a three-way with KV4AA and KP4YX. HR1AT has also been heard in the early mornings.

G3IAD (Wakefield) was one of the lucky ones who raised TI9MHB (0600 on February 17). Others worked were ZD2DCP, FA, ZC4, ZS and W's. G3FXB (Hove) collected ZD2DCP, ZE3JP, ZS5U, VP9, VO6 and other smaller fry. G3JJZ raised a few W's, but was delighted to manage a real contact with KV4AA (0030) although his aerial is end-on to that part of the world.

G3JHH has hitherto failed to penetrate what he calls "the mass of dribbling beacons (or teleprinters, or whatever they are) and slap-happy commercials." But he recently went QRO (from 9 watts to 151) and is now getting round Europe nicely, which is at least a

GI3HJA, Omagh, Co. Tyrone, is mainly on 80-metre phone with paralleled 1625's in the PA, modulated by a pair of 807's. The transmitter is band-switched for 80 to 10 metres, and it is hoped to get on 160 metres when a suitable receiver is obtained — at present it is an unmodified R.1155. The aerial is a 132-foot end-fed wire.

start for him.

G3JAF (Lymington) works Eighty only, and managed to get his 35 watts through to ZL's during the latter half of February; ZL3GQ and 4IE both gave him 569, and even a CQ pulled in a reply from an unidentified ZL, who was a casualty in the QRM.

Members of the West Gulf DX Club (W5-land, of course), have, according to their excellent *Bulletins*, been working the following on the 3.5 mc band: ZD2DCP, TI9MHB, HA5KBA, VP7NX, VP8BD, KH6AFS, PJ2AA, KG4AJ, TI2PZ, UB5CF, FP8AK/VP2 and DU7SV. Even if our chances with some of these are poor, it's nice to know that they are really there.

DL7AA (Berlin) mentions FA8BF, HZ1HZ, OQ5RU, TI9MHB, UA9DH, UB5CF, UO5AA, worked on Eighty, with ZD2DCP and ST2AR in the "wanted" category.

Forty-Metre Topics

This appears to be the least popular band of all. Competition with broadcasting stations seems to have little future, we admit. There is now a Pakistani broadcaster on 7010 kc, which is not only illegal but seems unnecessary. However, there are a few reports of interest. G3FXB managed to work ZD2, ZD6, FF8, VQ2 and 4, MP4, VS9, PJ, TI, 4S7 and ET3. ZD9AC was a gotaway.

G6TC (Wolverhampton) has been an early riser, and says there was hardly a morning in the first half of March on which he didn't raise VK, ZL or W6. All this with 75 watts to a doublet, so he thinks anyone should be able to do equally well. Consistency prizes go to ZL2FI, VK2CMB and VK2QD; VE8 has also been heard, around 0700-0800.

G3KEA writes from Oundle School, and tells us that since he was licensed, two months ago, the band appears to have been improving steadily. During the day the BC QRM seems to clear from the LF end; with 45 watts his best DX as yet is YU2CL/MM, off the Greek coast. With a W/S 12 and R.107, to which he has access, G3KEA has also worked MD5FA.

The West Gulf Club boys, of course, are quite differently situated for Forty, and produce, every week, long lists of mouth-watering DX which is quite lost to us here in Region 1. Quick samples: JZØDN. HKØAI, VP8BH, VQ8CB, DU1SCS, KC6CG, ZS3HH, VR2CG. Let's not go on with this . . .

". . . . It's Twin Feeders . . . ."

The DX on Twenty

Old Faithful, though still patchy, is noticeably improved at times. The main cause of hopefulness is that QRK is definitely going up. Some of those Far East signals around lunch-time have been fantastically strong, compared with the level we have been used to for the last four years or so.

G4ZU (Croydon) raised FG7XB and VP5AE (Turks Is.) as well as PJ2MA on St. Martin, who is our old friend PJ2AA; TI9MHB and a KC6 both got away. G6VC found two new ones with CR6AI and ZD6EF, but didn't think conditions good in daytime.

G3IGW strayed on to Twenty from his usual platform on the Top Band, and worked VQ8AY. The same station was worked by G5BZ (Croydon), who also succeeded with TI9MHB, MP4QAL, FG7XB, FB8BR, AP2U, DU7SV, ET3GB, YV5BX and UA4KPA!

G3IAD's is another list that starts off with TI9MHB and VQ8AY. Others were FP8AP, KP6AF (1730), VP8BD, PJ2CJ, VP6AM, MP4QAL, EL2L and VE8WN. G3TR (Southampton) put up a new beam and worked DU1AP on the first contact and VK3AD on the second (both phone and both 5 and 9). So he is happy for the time being.

Phone gave G3FXB some nice ones, including YK1AH, CT2AG, ST2DB, ZD3BFC, EL2X and VE8MD; CW brought him FK8AC, VS6's, VK1DY and 1EG.

DL2RO (Hamburg) confirms our suspicion that DX signals are getting much stronger, and has found the MP4's outstanding, including the Q's in Qatar. VK's have been "good, plentiful and strong" from 1200 to 1400 GMT. ZD8AA has been heard several times, but is very elusive. Other DX worked—VE8PF, FY7YE, ZD6EF, YV5DE, VS6DB, VP6GT and VP9BM.

G3ABG (Cannock) started up in a new QTH, from which his two very first CQ's raised two new countries for him—ZD6BX and VP8BD. This on temporary aerials, too! (We should let those "temporaries" become permanent while the luck holds good!) G3BLG (Malvern) reports recent

contacts with FK8, CE, ZC5, F8QV/FC, JAØ and ZD6.

Fourteen Metres

This is the band that will be coming into its own in a big way by next year. Meanwhile, although conditions are often known to be good, it still suffers from neglect. DL2RO confirms this, but he raised MP4BBR on phone, and says that the American /MM stations off the West African coast are especially good. Our old 10-metre friends W5AXI/MM and W8QOH/MM are active again. Other contacts were EL2X, CR6AI, KZ5KA and ZD6BX.

G3HCU (Chiddingfold) has again been mopping them up on phone, with FR7ZA, MP4KAC and MP4BBR for three new ones; the rest of his long list includes 4S7, CX, EA8, EL, three VK's, three ZL's, lots of W's and a vast number of Central and South Africans. He heard KG4AV but couldn't get him before he faded out; two more now wanted for DXCC. 21 mc Phone-only.

G3FXB collected ZD2DCP, ZD6BX and VS2CR on CW, as well as HC1FS, CO2CY and FB8BP on phone. G3TR's phone also brought back FB8BP, and the regular South Africans report that his signals have improved.

G5BZ worked several W's during the DX contest, and finds plenty of odd DX signals on the band, but not enough inhabitants to make it worth while. (That's what most of us think, and that is precisely why the band always seems deserted!)

Three new ones for G4ZU were OK1PI (CW) and FB8BC and MP4KAC (phone). These put him at the head of the ladder again with a total of 115, 110 of them on phone.

If you want a quiet DX band on which to start up and get yourself established without having to compete in the hurly-burly of 20 metres, Fourteen is that band—provided you are not in too much of a hurry. The time must come when 21 mc is carrying a lot more DX traffic. Why not be there, ready for it!

The Overseas Mail

DL2VO has now returned from Germany, and all contacts will be QSL if they will send their cards *via* the Bureaux. VE2AFC (Quebec) writes to say he is on Forty CW and Fourteen phone, and would welcome all reports. Times on Fourteen are usually between 1900 and 2100 GMT, 21250-21350 kc.

ZD8AA (Ascension Island) reports in person to say that he really is active on Twenty, but nearly all his contacts up to date have been W's. Look for him, Sundays to Fridays, 2200-2300 GMT, around 14003 kc, although he is also on at other times. QTH: J. Shepherd, c/o Cable and Wireless Ltd.

Next is a long letter from XZ2OM, who is about 28 miles north of Rangoon and in the Burmese Air Force. He runs 30 watts to a couple of dipoles, but is building a separate 10-metre rig with a 3-element rotary; he is

21 mc MARATHON

(Starting July 1, 1952)

STATION	COUNTRIES
G4ZU	115
GW3AHN	112
G4ZU (Phone)	110
G5BZ	109
VQ4RF	108
G2BW	100
DL2RO	100
G3HCU (Phone)	98
G2WW	98
G3TR (Phone)	91
GW3AHN (Phone)	85
G6QB	82
G2BJY	81
G2VD	80
G2YS	79
G3FXB	77
G3DO	74
G3CMH	71
ZS2AT	70
G3CMH (Phone)	68
GM2DBX	67
ZB1KQ	64
ZB1KQ (Phone)	63
5A2CA (Phone)	60
GM2DBX (Phone)	58

TOP BAND COUNTIES LADDER

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G5JM	94	94
GM3OM	93	95
G8KP	92	92
G2NJ	91	91
GI6YW	91	91
GM3EFS	89	91
G6VC	88	88
G3JEQ	87	87
G5LH	87	87
G3HIW	84	89
G3EUK	77	83
G3BRL	76	76
G2AYG	75	76
G3FTV	73	81
G3JHH	73	74
G3IGW	72	82
G3GYR	69	70
G3DO	67	67
G3HQX	66	73
G3JKO	65	73
OK1HI	62	62
G2HAW	61	70
G3HZM	61	62
GM3JNW	58	68
G3JJZ	55	62
G2HKU	55	56
OH7OH	53	55
G3JBK	52	58
G3FTV/A	47	65
G2CZU	46	47
G3JJG	42	55
G3FAS	40	49
G3DGN	39	57
G3IAD	38	59
G3JYV	33	48
EI8J	30	45
GC3HFE	30	44
G3JVK	24	39
G3JZG	22	39
G3HQT	20	29
G3KEP	15	50
G3FNV	15	31
GM3JZK	10	28

FIVE BAND DX TABLE
(POST-WAR)

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	678	96	159	219	100	104	222
G6QB	598	52	108	221	82	135	235
G5BZ	577	62	113	228	109	65	231
G2VD	511	48	94	180	90	109	189
G4ZU	504	12	45	212	115	120	216
G3FXB	492	67	121	181	77	46	187
G2WW	488	23	70	190	98	107	198
G3DO	449	24	46	198	74	107	222
G2YS	405	59	77	144	79	46	160
G2BW	368	24	57	144	100	43	165
GM2DBX*	359	33	31	156	58	81	167
G8KU	335	22	50	160	28	75	168
ZB1KQ	284	6	34	118	64	62	139
G8VG	280	36	76	124	18	26	141
G3IAD	251	41	88	112	9	1	140
G2DHV *(Phone)	177	20	23	108	11	15	112

most active on Twenty, CW and phone, 1230-1530 GMT daily; also on Forty phone (7120 kc) and CW, Sundays 0200-0600 and 1100-1230 GMT. On Fourteen he can sometimes be found between 0730 and 1030 GMT, but cannot always operate at those times. Quite a bunch of G's have been worked on Twenty; also G2TR was heard at 5 and 9 on phone, but no luck.

VK2AAB (Sydney) provides a surprise by telling us that he actually had a Top-Band permit from the PMG, and was active during the Tests. But he heard nothing at all, not even a ZL, although he had heard them before. He is now active on Twenty and Fourteen and looking for G's.

W2GT (New York) passes on the word that FG7XB works on Forty and Twenty only, and that the fellow on Eighty using the same call is "Ungood." Concerning the TI9MHB expedition, W2GT remarks that he worked Cocos (TI5FI) 'way back in 1932! After a few years, he caught up with the operator, who was a VE, and got a *home-made* card from him! DL7AA asks for the QTH's of HH2BL (1948), ST2FT (1947), VP9AS, (1951) and VU7BR (1947). DL7AA has now worked ZL1BY on five bands and SU1XZ on four—he is wanted only on 7 mc.

JA1AQ (Tokyo) is a reader of this piece who writes to report his interest in G contacts.

General Patter

G3ABG (Cannock) informs us that the Tops CW Club is holding its annual "Hester Trophy" Contest on Saturday, April 23, from 2100-2400 (clock time) on the Top Band. Competitors earn points for contacts with non-members, and several of the Tops members will be operating from rare counties in GM, GW and GI. It is also hoped that members in EI, OZ and PA may be able to obtain special permits, and OH2YV will almost certainly be active. Some overseas members who are not allowed to work Top Band will be operating on Eighty, listening for replies on One-Sixty. G3ABG hopes that this note will help to ensure a high level of activity that night.

G3ABG also reports that ex-G3AAU has recently acquired VE3BWY's complete station; whether our old friend "Ham" Whyte is QRT or starting up again we do not yet know—as he will probably see this note, he had better keep us informed!

From G3JHH comes a "Radioddode" with a moral, which we think should have the widest publicity. Here it is:

When one's feeling somewhat vocal,
And would talk to stations local,
'Tis better far to use one watt
Than all the watts wot one has got!

From an SWL in Dawley, Shropshire, we get it that a French station was recently heard stating that FD8AA does not exist; we have had sundry reports about this mysterious FD8AA, but no one seems to think he is genuine. Further news awaited.

G3JEQ puts up a request for propagation forecasts covering the DX bands. Curiously enough, this has been answered almost before being made. Elsewhere in this issue you will find the first of the new series.

G3IDG (London, S.W.12) pleads for more activity on Ten, and reminds us that he heard 27 countries on the band last year—mostly on phone. He is a QRP CW man, and would like to find more stations that come within the range of 10 watts and two indoor dipoles. He will be on the band from 1830 to 1930 GMT, Mondays to Fridays, and 0900 to 1800 GMT Saturdays and Sundays. Any skeds welcome, on 28056 kc. Short-skip, long-skip or no skip at all—*anything for QSO's*, and we'll get the 10-metre band showing some kind of life again.

Modern Glossary

Herewith a few simple explanations of terms that are known to bother newcomers to our bands. Strictly unofficial and entirely without malice!

"*Ur sigs 599*" (on Top Band):

Either you're not using ten watts or you have a much better aerial system than you ought to be allowed.

"*Ur sigs 559*" (on any band):

Quite good sigs, really, but I don't want a long QSO. I'm chasing DX.

"*That's about the story here*":

Can't think of any more this moment, but I'll go on for ten minutes next time it comes round.

"*I'll be quite brief about the rig*":

I'm going to describe this junk right down to the most sordid detail, and just see if anyone can stop me. And, by the way, I forgot to tell you that the VFO uses a rather ingenious little gadget that I . . . .

"*Your modulation is not quite so smooth as I have heard it*":

You normally sound pretty shocking, but today you must have filled that carbon mike with lumps of clinker.

Additions to the Glossary will be welcomed.

DX Strays

KP6AK is said to be on Twenty phone; HC8GI is likewise active, same mode . . . PJ2MA, St. Martin, near Puerto Rico, may possibly count as a new one . . . Plenty of Qatar activity, with MP4QAK and 4QAL on Twenty nearly every day . . . Any activity

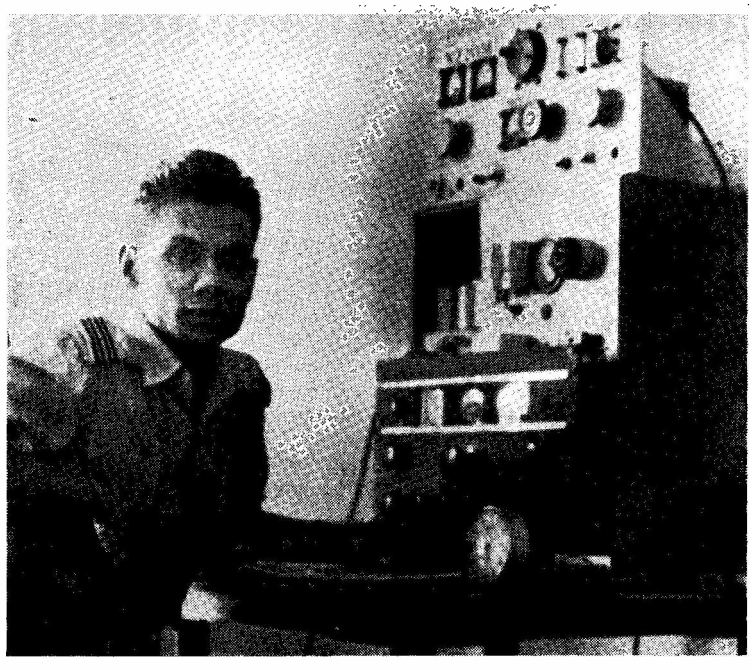
on Tokelau Island will probably *not* show up with a ZM7 prefix, as formerly expected. VR2BZ/A has been on from there . . . VR2AB/A has also been heard, probably from same location . . . VK1DC and VK1ZM are listed as being on Macquarie Island in the Australian Antarctic.

UPOL3 and UPOL4 are Russian Polar stations, and do work W's. Whether they work other DX we don't yet know . . . VP5BP, if you hear him, will probably be in the Cayman Islands . . . KS6AW is anxious to work Europe on 14250 kc phone . . . FR7ZA is now on 21180 phone, and ZD9AC is reported on the same band.

FB8BR is very active, and is an old-timer with French calls dating back to 1922. Twenty CW only, at present . . . VP8AQ, South Shetlands, is on 14106 phone . . . FP8AK/VP2 was at Tortola, British Virgin Islands (Leewards) . . . G2RO operated as VLØRO from Nauru, but made only eight contacts (no Europeans).

Look for VS4NW or VS5NW from Sarawak or Brunei. He is genuine. EA9DF may get on from Ifni in May . . . LB1LF is on Jan Mayen and quite genuine, but long delay in QSL's.

Thanks to Southern Calif. DX Club, West Gulf *Bulletin* (W5), and KV4AA for some of the above items.



This is XZ2OM, Rangoon, who came on the air in 1952, and now runs 30 watts to an 807, modulated by a pair of 6V6's. Aerials are separate dipoles for 7 and 14 mc, with the 40-metre aerial used third-harmonically on 21 mc. XZ2OM, who has already heard "all the VS6 stations on Top Band," will be coming on 160 metres. He has worked a number of G's on 14 mc.

No more for this month. Please note that next month's deadline is **first post on Friday, April 15.** For the benefit of overseas readers, the following one will be *Friday, May 13.* Send everything to "DX Commentary," *Short Wave Magazine,* 55 Victoria Street, London, S.W.1. Until next month, Good Hunting. 73, and BCNU.

XYL VIEWPOINT — THE OTHER SIDE

Why I *like* my husband to be a radio amateur: It is a boon and a blessing of a hobby. How sorry I am for those wives whose husbands find their interests outside the home—golf, fishing or the local, to say nothing of other attractions! These husbands who indulge their hobbies away from home seldom share their experiences with their wives, who very rarely know everything that goes on. The wife whose husband is a keen amateur knows exactly where he is for all his spare time! She can see him when she wants to, and he's never in the way. He has one interest only, which makes him easy to talk to—she can even gain a reputation for sweet womanliness and understanding by commiserating with him on the rare DX that got away and helping him by holding things when he's busy with the soldering iron. If a man's hobby is some sporting activity and his wife is anxious to share his interests, she is either laughed out of it or it becomes a case of the expert and the rabbit. But in Amateur Radio, all men believe that women can never really master the technicalities, so if the XYL wants to go on the air herself, he is only too happy to do all the preliminary work for her. Since in this age of stress and strain everyone should have a hobby, that of Amateur Radio, with its friendliness and good fellowship, is surely the one to encourage. (*See p.670, February issue, for the other opinion!—Editor.*)

ARMY WIRELESS RESERVE SQUADRON—CAMP 1955

The special Royal Signals unit for radio amateurs will assemble this year for the fortnight May 7-21, in the Catterick area. Outside working hours, amateur operation is likely to consist mainly of portable and mobile tests on Top Band and the UHF's. These activities are planned by G3EJF, 24 Beryl Avenue, Tottington, Lancs., who will be glad to hear from anyone who would like the co-operation of A.W.R.S. amateurs in tests or other activities. A report on the last A.W.R.S. Camp appeared on p.684 of our February issue.

DX COMMUNICATION FORECASTS

FINDING THE BEST TIME ON THE RIGHT BAND

R. NAISMITH, M.I.E.E.

With the sunspot cycle well past the trough, we can expect steadily improving propagation conditions. This article introduces a new feature which will be of interest and practical value to all whose main activity is world-wide DX on the HF communication bands. The objective of our contributor—who is professionally engaged in radio forecasting in D.S.I.R. and has written many papers on the subject—will be to produce, each month, data to enable radio amateurs in the U.K. to come on the right band at the correct time for working over any desired DX path. The reliability of the forecasts depends upon various factors, and it will be of particular interest to check actual results against the predictions. This article is by way of being an explanation of the manner in which the series is to be presented.
—EDITOR.

THE minimum of the sunspot cycle has once again passed, and we may therefore look forward to an increasing range of frequencies becoming available for long-distance radio communication. Alternatively, it will be possible to use the higher-frequency amateur bands for longer periods each day as the cycle advances. It is now possible to make a fair estimate of the best frequencies and the best times of day for any given DX path. Although these estimates are based on certain known aspects of radio propagation, there are still a great many unknown factors, and it is hoped that the amateur, with the special facilities which he has available, will continue to make a valuable contribution in this field.

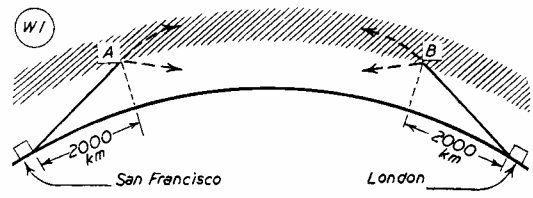


Fig. 1. For the method described here, and for proper use of the forecast charts, it is necessary to determine what are known as the "control points" over the DX path to be worked — see text for explanation. For those who possess our DX Zone Map this is quite simply done, since the map is scaled for distance, and Lat./Long. are also marked. For all practical purposes, 2000 km is 1,250 miles, which is 1-1/8 ins. on the scale of the Zone Map.

As a beginning, it is proposed to provide, for an experimental period, a forecast each month of the various amateur bands which are most suitable for use in communicating with different parts of the world. In order that an element of planning may be included, the forecasts will refer to the *month following* the month of publication of the SHORT WAVE MAGAZINE. The information will be given mainly in the form of charts, and these will be accompanied by notes on how to use them. It is not intended to repeat the instructions, so it would be advisable for those interested to retain the first few articles for future reference!

The basic plan is set out in the Table. Each of the six areas of the world which are likely to be of most interest are named after the geographical region which it approximately covers. The exact boundaries of the areas are also given, with the DX Zones or parts of Zones which lie within each area. When a whole Zone lies within an area, the number of the Zone is in bold. The Zones are, of course, accurately drawn on the *DX Zone Map* (published by SHORT WAVE MAGAZINE). On this map it is possible to measure distances from London to any part of the world along a straight line. The DX Zone Map can also be used to obtain the true direction from London of the other end of the circuit — an essential aid when the directivity of aerials is involved. Thus, the DX Zone Map will be of great assistance in using the forecasts.

The areas given in the Table can easily be sketched on this Map, and the forecast charts which will appear month by month can then be directly related to the Map. (In a later article a method of using other types of map will be described. It will be slightly more complicated and rather less accurate).

TABLE

AREA NUMBER	POSITION		DX ZONES
	Approximately	Exactly	
1.	*Europe*	Long : 30°W.—30 E. Lat : 30°N.—78°N.	***14, 15,*** 20, 33, 34, 40.
2.	*North America*	Long : 60°W.—120°W. Lat : 20°N.—60°N.	2, 3, ***4,*** 5, 6, 8.
3.	*Far East*	Long : 90 E.—135°E. Lat : 0°—40°N.	22, 23, 24, ***25,*** 26, 27, 28.
4.	*Australia New Zealand*	Long : 120°E.—180° – 165°W. Lat : 10°S.—50°S.	29, 30, 32.
5.	*Africa*	Long : 0°—45°E. Lat : 30°N.—30°S.	21, 34, 35, 36, 37, 38, 39.
6.	*South America*	Long : 30°W.—75°W. Lat : 10°N.—50°S.	9, 10, 11, 12, 13.

Basic Principles

In long-distance radio communication we make use of the "2000 km control point" method. As we shall be working in "miles" because the Zone Map is scaled in miles, we may call it the "1250-mile control point" method. It can be illustrated thus: Supposing we wish to transmit from London to San Francisco, our signal will travel directly along the shortest, or great circle, route between these two places, and, in the process, it may be reflected several times between the earth and the ionosphere (Fig. 1). In this method, it is assumed that the control points of the ionosphere which are most effective in maintaining communication are situated 2000 km (1250 miles) from either end of the path. Thus, it is most important to note that in this case we are not interested in the ionosphere either at San Francisco or over London itself, but at the two points "A" and "B" (*see* Fig. 1) which are situated 1250 miles along the path in the direction of the other station.

If, therefore, we have a copy of the DX Zone Map, we need only lay a ruler on it from London to San Francisco and note the position of these two control points ("A" and "B" in Fig. 1.) We then look at the forecasts given for these two points in Areas 1 and 2, and, if these differ, we choose the lower. The reason for this is simply that the frequency specified in the forecast is always the *maximum* frequency, so that if we read 14 mc at "A" and 21 mc at "B," then it can be assumed that 14 mc will also be reflected by the ionosphere at "B."

There is, of course, a day-to-day variation and the forecasts can only apply to the "average day." It is, therefore, preferable to keep slightly below the actual frequency read from the forecast. (In commercial practice it is usual to work on the basis of 85% of the maximum value.) The forecasts are based on reflections in the F2 region in the ionosphere, which is mainly responsible for long-distance radio communication. However, there are days, particularly in Summer, when a sporadic layer is formed in the lower E-region, and communication may sometimes take place by reflections from that region.

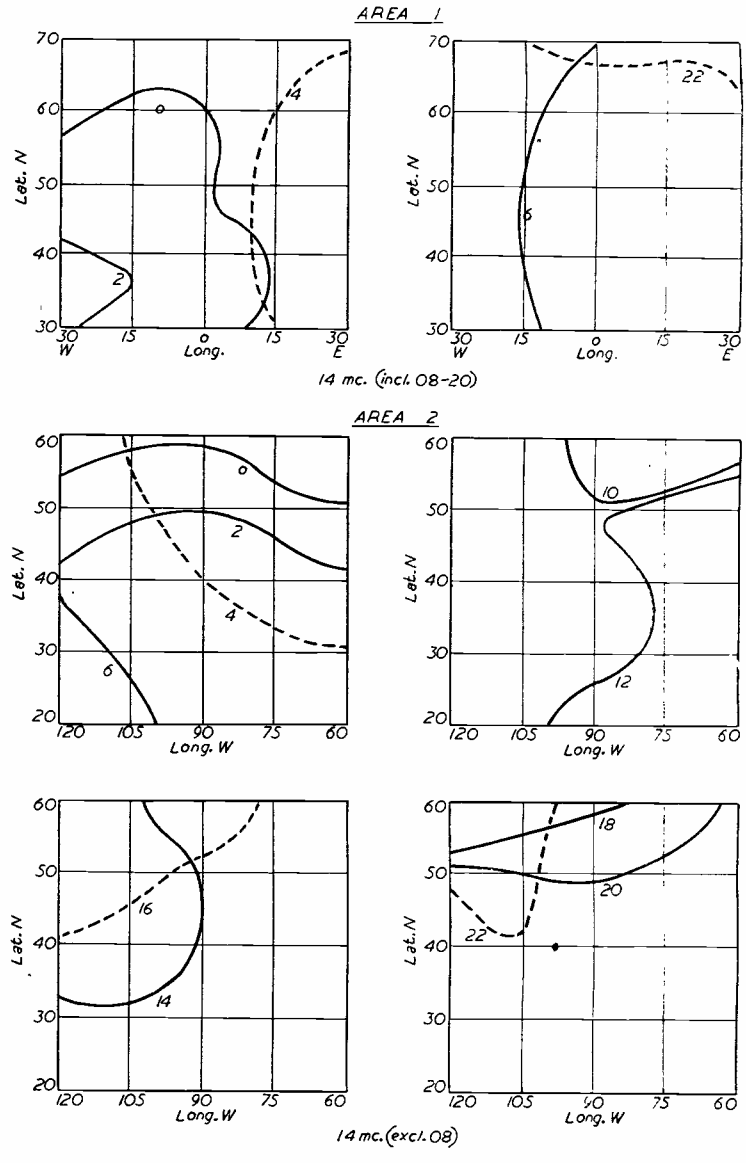


Fig. 2. The geographical areas to which these figures refer are given in the Table. In future issues, similar charts will be given for each area and the most favourable band, so that by determining the "control points" (see text) the right band and the correct time can be found for DX communication, from the U.K., with any part of the world.

The Forecasts

The forecasts, which will be given for each two hours GMT, are illustrated by the samples shown in Fig. 2. The first two charts refer to Area 1 and to 14 mc. The figures below the charts indicate the hours of the day during which the band may or may not be available. In this case, the hours available are 0800 to 2000 GMT, and denoted shortly by "incl. 08-20." The remaining hours of the day are

written against lines on the charts. Each line divides the chart area in two. *The part of the area in which the frequency may be used is that on the side of the line on which the hour is written.* Thus, referring to the first chart in Fig. 2, at 0200 GMT, 14 mc is only available in the bottom left-hand corner. At midnight (0001 GMT) nearly half of the western area of the chart may be used. In the second chart for Area 1, at 2200 GMT, the whole area with the exception of a small strip along the top is available for the 14 mc band. When lines cross on the chart, one of them will be shown dotted to distinguish it from the others. In these cases care will be taken to place the figure representing the hour in such a place that there can be no doubt to which line it refers. The second group of charts refer to Area 2 (North America). This shows that the 14 mc band is not available at 0800 GMT (written "excl. 08).

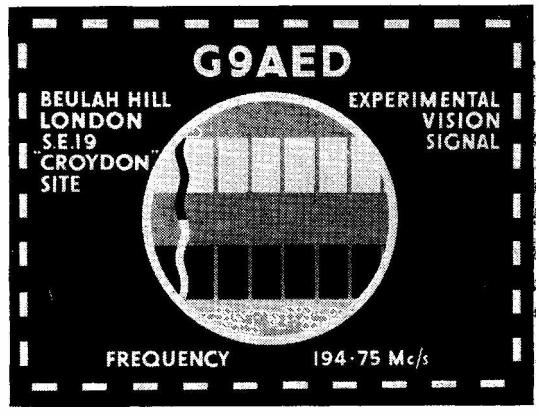
Finding the Control Points

Suppose we wish to communicate between London and San Francisco on the 14 mc band: We first find the positions of the *control points* at either end of the path. The one at the London end is situated near the top left-hand corner of Area 1 (Lat. 60°N, Long. 30°W, approximately), and the other control point is situated in a similar position in Area 2 (Lat. 50°N, Long. 105°W approx.). This shows that at midnight GMT 14 mc may be used at both control points. Further, we may note that this band is not available at 0200 GMT at *either* end. We may also note that, since both control points lie very near to the line at midnight, the path should be a favourable one at this hour.

We will return to this type of secondary information in later articles. In the next issue a group of forecasts for the month of June 1955 will be given. The examples discussed above are taken from that group of forecasts.

BELLING-LEE BAND III EXPERIMENTAL TRANSMITTER

Continuing their enterprising investigation into propagation problems on Band III (174-216 mc), Belling & Lee Ltd. commenced operation of their experimental station G9AED from Beulah Hill, Croydon, on April 1st. (The map reference of the site is 333696 on the one-inch Ordnance Survey sheet No. 170). G9AED is on a frequency of 194.75 mc, with an effective radiated power of one kilowatt, vertically polarised. The transmitter, designed and constructed in its entirety at the Enfield works of Belling & Lee, gives an RF output of 250 watts into a stacked array with a power gain of four; the aerial system consists of four stacked bays, each of four vertical dipoles, designed for all-round coverage. At present, the transmitting period is 1000-1200 clock time on week-days only, with certain unspecified transmissions during the afternoon; since stand-by equipment is not available for every stage, and the transmitter is just as liable to "technical hitches" as any other (particularly at the frequency in use), there may be some unavoidable inconvenience due to break-downs. The vision signal radiated is a test card primarily designed to trace ghost images, so devised and scaled that either negative or positive ghosts can be identified and the distance of reflecting objects worked out.



Test card radiated by G9AED, the Belling-Lee experimental station on 194.75 mc, operating from Beulah Hill, Croydon, for the investigation of propagation effects using vertical polarisation in Band III. We would be very interested to hear from any reader who can receive these signals.

BBC ON VHF

The first of the BBC's FM/VHF stations, at Wrotham in Kent, goes into regular operation on May 2. The programmes carried will be Light on 89.1 mc, the Third on 91.3 mc and Home on 93.5 mc. The effective radiated power of each transmitter is 120 kW, horizontally polarised.

CTV APPOINTMENT FOR AMATEUR

It is announced that R. G. Hammans (44), formerly with the BBC in charge of the TV unit in the Corporation's planning and installation department, has been appointed chief television engineer to Granada Theatres. This organisation has the I.T.A. contract for "Monday to Friday CTV programmes in the Manchester area"; their new chief engineer is also known as G2IG, of Orpington, Kent.

HALLICRAFTERS COMMUNICATIONS EQUIPMENT

It will interest many readers to hear that the products of Hallicrafters, the well-known American radio communications equipment manufacturers who used to do such a large business in this country before the last war, are becoming available again over here, albeit slowly. The current range of Hallicrafters receivers includes the SX-99, covering 540 kc to 34 mc, with separate calibrated bandspread, crystal filter, S-meter and noise limiting; the S-38D, a less elaborate design but covering approximately the same frequency range; and the S-85, which has calibrated bandspread on each of the amateur frequency ranges 3.5 to 28 mc inclusive. We shall have more to say about these receivers in forthcoming issues of SHORT WAVE MAGAZINE.

Top Band Trans-Atlantics, 1954-'55

SUMMARY OF RESULTS IN THE FIFTH POST-WAR SERIES

L. H. THOMAS, M.B.E. (G6QB)

This report completes a run of five years of seasonal DX tests on the 160-metre band. First started by SHORT WAVE MAGAZINE *in pre-war years, the passage of time has shown a steady increase in DX activity and interest on 1·8 mc —indeed, the main object of the Tests has always been to show that real DX is possible on our lowest frequency band, in spite of the widely-held belief that it is only suitable for short-haul work over U.K. distances. The volume of traffic now carried on the Top Band, both local and DX, makes it one of our most useful and interesting channels—so much so, that the objective can be said to have been achieved, and it is doubtful whether specially organised Trans-Atlantic Tests on 160 metres would be justified during the next few seasons. Ever since 1938, we have had the enthusiastic co-operation, as American organiser, of Stewart Perry, W1BB, who year after year has been in with us on the Tests; unquestionably, the present healthy state of the 160-metre band as a DX channel is very largely due to his efforts.— Editor.*

NOW that the Trans-Atlantic season, 1954-55, is behind us, one feels, on reviewing them, that the tests were both disappointing and interesting. The former, because our statutory ten watts gives us so little hope of working real DX unless we have a superb location and aerial system; and the latter because of the ever-increasing activity on the American continent.

In our first post-war series of Tests, we had the U.K. stations on the one hand, and some twenty W's and a VE or two on the other. Now there is regular activity all the way from Canada down to Argentina, with a constant stream of DX contacts going on.

All this is of far greater interest to us as *listeners* than as transmitters. British SWL's (including many licensed operators who realised that they were just wasting their time by trying to work the DX) put in some extremely interesting reports this year, and it seems that very little can happen across the Pond without it being overheard somewhere in this country.

On the transmitting side, one has only to look at the second column of Table I to see that the same favoured few get across every time. True, there are one or two welcome additions to their ranks this season, but it is only the same dozen or so call-signs that figure over and over again in the lists.

How is it done? Aerials, without a doubt, are the most important factor; and yet one or two who are not particularly blessed in this way have been very successful. There is also the saying that "A watt in the West is worth ten in the East" . . . and certainly some of the further-West stations seem to have been able to work the stuff, even on bad nights.

No doubt other factors, of which we know little, are also involved. The whole thing remains most intriguing, but not particularly informative!

There was so much activity on the other side this season that we have no longer attempted to list all the W stations *heard* in this country. Instead, Table I has been produced; it shows the North Americans *worked* here; the U.K. stations worked there (with, in some cases, those heard in parenthesis); and any other DX activity of interest.

Then, in Table II, the SWL's have come into their own, for it lists all the DX logged on each day, presenting the W's in only a summarised form. Several new countries were heard over here, and several first contacts took place. We will try to comment on these as they crop up, in chronological order.

The Opening Stages

Long before the beginning of the organised tests activity commenced. The ever-present W1BB was around as far back as October 10 and 17, when he worked G6GM and G3PU. W2EQS also worked G6GM. Then a lull as far as we were concerned, although some W's were lucky with TI2BX on October 24, and a notable happening on November 5 was the logging of W8KFY on *phone* (S7/8), by LU3EL.

On November 21 W1BB, W1ZL and W2EQS were worked on this side by G3PU, G5JU and G6GM; and on the same morning W1BB and W9PNE both worked YV5DE. A week later, on November 28, there was nothing doing for us, but three important "Firsts" were recorded on the other side—W1BB/LU3EL; KP4KD/YV5DE; and KP4KD/LU3EL. On the same morning W3RGQ worked W4KVM/VO6. Terrific signals were heard in the U.K.

from W4ZQ, an unfamiliar call in these tests. Subsequently it was found that he was using a 210-ft. vertical broadcast radiator !

The First Test, December 5

On this first morning of the Tests, conditions were moderate, with the KP4's and some W9's coming over well, but apparently only three G's got across. KP4KD, a very old-timer, but a welcome newcomer to this band, was putting in a fine signal and was actually heard that morning by ZC4JA. Various " pests " were reported, in the form of G's calling W9PNE and WØNWX on their own frequencies. The latter was still coming in well at 0815, and during the course of the morning he was heard working TI2BX.

On December 12 things were not too good, and W1BB worked G5JU for the only reported contact in this direction. A few W's also worked YV5DE, who was heard (probably for the first time here) by SWL N. C. Smith.

The Second Test, December 19

Conditions were better this week-end ; in fact, the season's peak occurred within a few days of this. It was noticeable that there were far more contacts between G's and W's, but that there was less evidence of the Central Americans and West Indies stations. (In fact, the only non-U.S.A. station reported on this side was KV4AA). The phenomenal W4ZQ was logged over here at S9 ! A new Asian station, OD5LX, made a brief appearance, but vanished again after working three ZC4's. G3JOJ, down in Cornwall, was heard on the other side, and from now on he figures prominently in the results. He was reputed to be using an aerial only 50 feet long, with the coil wound on a " Vim " carton !

During the week following this test, conditions were apparently at their best. W9PNE, for instance, worked twelve G's, three ZL's and YV5DE. SWL's logged plenty of W's on December 22, 23, 24 and 25, and the general opinion is that December 24 was probably the best day of the season.

December 26, being a Sunday, saw a lot of activity, and on that morning KP4KD heard G3PU, G5RI and G6GM. During the morning W9PNE logged ZL3RB.

On December 29 SWL Smith logged W8GDQ's phone at S7/8 (0730) and also heard W8BJM, W9CZT and W9PNE at the best strengths hitherto observed.

The Third Test, January 2

This one was interesting chiefly for the notable first G contacts with KP4. G5JU worked KP4DV and KP4KD, while G2AJ and G5RI both raised KP4KD. VP7NM and a doubtful VP7NO (7NG ?) were logged over here, with the usual goodly assortment of W's from five districts.

January 9 was another interesting morning for KP4KD, who worked G2PL, G3BKF, G3JVI, and G3PU. G5JU raised a nice bunch of Ws', although no 8's or 9's appear to have been heard that morning.

Conditions were obviously tailing off now, however, and absolutely no reports were received for the ensuing week until Saturday, January 15, when we were notified of one solitary contact, between G2HX and W9PNE.

The Fourth Test, January 16

This one was not easy to judge, the band being occupied by a local U.K. contest, a most unfortunate clash. However, a goodly assortment of W's was logged, but the only contacts appear to have been between W1BB and W4VNE on the far side, and G5JU and G6GM over here ; G3ERN, G3JOJ, G3PU and EI9J were all heard across the Atlantic, and W1WY reported reception of HB9CM. There is no more to say about that one.

January 23 was apparently a very good DX morning, but not for us. W2QHH worked G3JOJ, and three stations (G3JVI, G3PU and G6GM) were heard on the other side—and that's all. But it seemed to be a great day for OK1HI, who came on and worked at least four W districts. ZL1BY, too, made an appearance, and raised W8ANO, W8GDQ, W9CZT and W9KOK. YV5DE also had a busy time, working W1WY, W2DLO, W4LXA and W8GDQ, and W1WY worked VP7NM.

The band was open on January 25, 26 and 28, when a few stray contacts were reported. On the 29th it was still more active, with G3JVI, G3PU and G5JU getting across. The latter succeeded with W2GGL, W3DGM, W3FBV and W3RGQ—all 579 !

The Fifth Test, January 30

This was the so-called " Novice Morning," on which it was hoped that sundry newcomers, who had never worked across the Atlantic before, would find a quiet band and at least a chance of doing so. Alas for our plans . . . as you will see from the Table, the only ones making contacts were G2AJ, G3ERN, G3JOJ, G3PU, G6GM and EI9J. Ah, well ! Several W's worked OK1HI, OK1LM and HB9CM ; ZL1BY was worked by W4KFC and W9PNE ;

TABLE I

160-Metre DX Transmitting Results, 1954-'55

DATE	NORTH AMERICANS WORKED IN U.K.	U.K. STATIONS WORKED IN NORTH AMERICA	OTHER DX ACTIVITY
Oct. 10	W1BB, 2EQS	G6GM	
Oct. 17	W1BB	G3PU	
Oct. 24			W's worked TI2BX
Nov. 5			LU3EL heard W8KFY on phone
Nov. 21	W1BB, 1ZL, 2EQS	G3PU, 5JU, 6GM	W1BB and 9PNE worked YV5DE
Nov. 28			W1BB worked LU3EL, KP4KD worked YV5DE and LU3EL
Dec. 5	W8NSF/9, 9NH, 9PNE, ONWX	G3PU, 5JU, 6GM	WONWX worked TI2BX, KP4KD heard by ZC4JA
Dec. 12	W1BB	G5JU	W1BB, 2GGL, 3EIS worked YV5DE
Dec. 19	W1BB, 1EPE, 1ERX, 1ORP, 1WY, 2QHH, 3RGQ, 9PNE, KV4AA	G2AJ, 3PU, 5JU, 5RI, 6GM, EI9J (*G3HRW, 3JOJ, 6LB heard*)	OD5LX worked ZC4's, W1BB worked TI2BX, W2GGL, 8KIA, 9PNE worked YV5DE
Dec. 26	W3RGQ, 8ANO, 9PNE	G3BKF, 3GGN, 3PU, 5RI, 6GM	W9PNE heard ZL3RB, KP4KD heard G3PU, 5RI, 6GM
Jan. 2	W1BB, 1EPE, 1UXS, 2EQS, 2QHH, KP4DV, KP4KD, KV4AA	G2AJ, 5JU, 5RI, 6GM, EI9J (*G3BKF heard*)	KP4DV worked G5JU, KP4KD worked G2AJ, 5JU, 5RI. KV4AA worked TI2BX
Jan. 9	W1AHX, 1BB, 1WY, 1ZL, 2GGL, 3RGQ, KP4KD	G2PL, 3BKF, 3JOJ, 3JVI, 3PU, 5JU	KP4KD worked G2PL, 3BKF, 3JVI, 3PU. WIBB, 8ANO worked YV5DE
Jan. 15	W9PNE	G2HX	
Jan. 16	W1BB, 4VNE	G5JU, 6GM (*G3ERN, 3JOJ, 3PU and EI9J heard*)	W1WY heard HB9CM
Jan. 23	W2QHH	G3JOJ (*G3JVI, 3PU, 6GM heard*)	OK1HI worked W1, 2, 3, 4, ZL1BY worked W8ANO, 8GDQ, 9CZT, 9KOK. YV5DE worked W1WY, 2DLO, 4LXA, 8GDQ
Jan. 25	W1TCR, 3FNF	G5JU	
Jan. 26	W3FBV, 3RGQ	G5JU	
Jan. 28	W8GDQ	G3ERN, 3JOJ	
Jan. 29	W2GGL, 3DGM, 3FBV, 3RGQ	G3JVI, 3PU, 5JU	
Jan. 30	W1BB, 1WY, 1ZL, 2QHH, 3DGM, 3EIS, 3RGQ, 4KFC, 8GDQ, 9PNE	G2AJ, 3ERN, 3JOJ, 3PU, 6GM, EI9J	ZL1BY worked W4KFC, 9PNE. W's worked OK1HI, 1LM, HB9CM. W's worked or heard T12BX, 2WR, YV5DE
Jan. 31	W3RGQ	G6GM	W3RGQ worked OK1AJB
Feb. 6	W1BB, 1LYV, 1ME, 2PP, 2WH, 3RGQ, KP4KD	G3ERN, 5JU, 6GM (*G3JOJ, 3PU heard*)	G5JU worked YV5DE. KP4KD worked OK1HI
Feb. 13	W1BB, 1WY	G3JEA, 5JU, EI9J (*G3ERN, 3PU heard*)	W's worked TI2BX. G5JU worked KV1AZ

TI2WR, a new one, was active. YV5DE was logged by SWL's over here, and there is a possibility that ZL1BY was also heard. The log of W's and Central Americans heard on this morning is one of the best for the whole season. (Another record broken, according to listeners, concerned the number of G's calling W's on their own frequencies and at the wrong times !)

On January 31 W3RGQ worked G6GM and OK1AJB, but otherwise there was no activity until the following week-end. Then, on February 6, G5JU had a big success by working YV5DE at 0715, as well as KP4KD and at least five W's. This, we like to think, was G5JU's reward for keeping off the air the previous Sunday out of consideration for the novices.

The Sixth Test, February 13

This was a really dull one, with W1BB working G3JEA, G5JU and EI9J, and nothing else reported from any quarter. A week later, on February 20, G5JU heard TI2BX, and worked W1SFE and a VE2, but things had obviously tailed off. Whereas, some years back, we had

a season in which conditions were improving all through January and February, to reach a peak in March, this season's pattern seems the same as last, with the peak in late December.

General Notes

From the very comprehensive and invaluable bulletins issued at weekly intervals by Stewart Perry, W1BB, we take the following odd points at random. W9PNE thought last December was the outstanding month of all time—for him, at least. His biggest thrill was a solid, bug-key QRQ contact with G3PU . . . On December 24 W1BB says G5RI's signals were "boiling through" at 599, and conditions stayed good until 0900 . . . W9FIM worked XE4XE 'way back in August . . . W1BB is convinced that a *good* horizontal aerial is best —preferably a doublet . . . VP7NG was using a rhombic firing at U.S.A., with 600-ft. legs, 70 feet high.

W2QHH achieved his 160-metre WAS on January 23 by raising W7ANR . . . W8GDQ worked the same station on phone and completed his 160-metre WAS-*phone* ! It is also reported that the first claimant to a WAS on 160 metres was W9NH, who apparently made it in February, 1953 !

On February 20 the Cocos Is. expedition, TI9MHB, made a surprise appearance, and worked several W's, including W1BB, W2QHH, W2EQS, W3EIS, W3KLA, W4KFC, W8ANO, W8DUY, W9NH, W9FIM and some W6's. On the same morning KP4KD gave himself yet another "First" by working HB9CM.

We now hear that VK2AAB was on for the Tests, specially licensed, but neither heard nor worked any DX ; but he says he will try again.

On March 1st W9PNE worked VP4LZ for the latter's last QSO, as he is on the move ; he hopes to show up again on 160 from another QTH. On March 6 some further G/W contacts took place, although static was very bad on the other side ; and YU1GM was heard over there. A note from G5JU covers the period February 20 to March 6, during which he had about a dozen contacts with W1, 2, 3, 4 and 9, and with VE2WK on February 20. Interesting DX heard included TI2BX, VO3X, WØNWX and YV5DE—all on February 27. For this Test series G5JU has been one of the consistently successful G stations, with a long tally of good DX worked.

Summing Up

Readers can draw their own conclusions from the foregoing account of what, after all, was a great deal of activity on the part of a great many people. It is of necessity compressed, but, for that reason, full of meat. There is no doubt that the Americans had the best of the bargain this year, but as long as we are restricted to ten watts that will always be so. We also suffer, in a way, from the fact that so few European or African countries are allowed to use the band at all. Whereas the Americans have a large number of countries to choose from when the actual Trans-Atlantic conditions are difficult, we have virtually none.

We are by no means certain that the Tests will be held in this same form next season. The main reason for the doubt is this: That by arbitrarily choosing alternate Sunday mornings we stand a very good chance of missing the best conditions. Also, one feels that there are now so many individuals coming up for the Tests who either refuse to keep to the suggested time-and-frequency schedule, or disobey the normal code of ethics in various other ways, that the organisation no longer counts for much. Perhaps it would be a good thing to try one winter season in which there are no particular organised dates . . . but it must not degenerate into a free-for-all to such an extent that all and sundry try to work W's by calling them on their frequency, or *no one* will have any success *at all.*

We will see what readers have to say on the subject, and in the autumn will suggest plans for keeping this very interesting side of DX activity going next season.

TABLE II

160-Metre DX Receiving Results, 1954-'55

DATE	STATIONS HEARD
Nov. 28	W1, 3, 4, KP4KD
Dec. 5	W1, 2, 3, 4, 8, 9MKO, 9NH, 9PNE, ØNWX, KP4CC, 4DV, 4KD, KV4AA, 4BB
Dec. 12	W1, 2, 3, 9FIM, YV5DE
Dec. 19	W1, 2, 3, 4, 8, 9PNE, KV4AA, OD5LX
Dec. 26	W2, 3, 8, 9PNE
Dec. 29	W8, 9, (W8GDQ phone S7/8)
Jan. 2	W1, 2, 3, 4, 8, VE3AAZ, KP4CC, 4DV, 4KD, KV4AA, VP7NM, 7NO, ZC4
Jan. 9	W1, 2, KP4DV, 4KD
Jan. 16	W1, 2, 4, 8, KP4CC, 4KD, VP7NG, YV5DE
Jan. 23	W1, 2, 3, 4, 8, 9CZT
Jan. 30	W1, 2, 3, 4, 8, 8NSF/9, 9CZT, 9FIM, 9NH, 9PNE, VE2, KP4CC, 4KD, KV4AA, VP7NG, YV5DE
Feb. 6	W1, 2, 3, 8, 9PNE, KP4KD, YV5DE
Feb. 13	W1, 2, 3, 8

VHF BANDS

A. J. DEVON

Conditions and Activity—

G5KW/G8KW Mobile on Seventycems—

Reports on Recent Results—

Progress on 25 Centimetres—

IT can be said that, since our last appearance, VHF conditions have been changing more or less in step with the weather; at the moment of writing, we are again in a fair spell, the weather being warmer but the glass rather low. Each time there has been a rise in temperature, with the glass high but tending to fall, GDX has appeared and, on several occasions, Europeans have been workable from the central and northern areas of England.

The particularly good spells can be given as March 1-2, March 10 and March 13-15, the 14th being an outstanding evening. About the 24th-25th things started moving again, with all the signs pointing to another good week-end session—but to know about that, we shall have to wait another month.

Activity has moved with the conditions, and the totals in our calls h/w lists give a very good impression of the general level of activity—for instance, this time G6TA shows 87 different stations worked in the period, and an SWL in Erith, Kent, nearly 70 heard.

On this topic, we would very much like to see in the "Activity Report" more calls h/w lists from the northern areas of the country. Who is on up in Lancashire, working short-haul when conditions are low? And, though they have not had anything in the nature of a DX break yet this year, what is happening in Scotland, round Glasgow and Edinburgh? We don't want the GM's to feel cut off and left to their own devices behind the barrier of the Cheviots. The same, of course, goes for the GI's.

One of the most useful services any regular operator (or SWL) in the South Wales, North Midlands, North Wales/Lancs., Yorkshire, Northern Ireland and Scottish districts could render to his VHF colleagues (and to us) would be to put in a calls-heard list every month. When conditions are consistently poor for GDX, from where we sit there is no certain way of knowing what is happening in areas out of contact, unless somebody tells us. When the band is good, of course, it is a different matter, because the more prominent stations, like G5YV and G6XM, can be heard.

70 Cm Portable/Mobile

To G5KW/G8KW goes the honour, and the not inconsiderable credit, of achieving the first mobile QSO on the 70 cm band—probably the first such in VHF history, and certainly the very first under the G prefix. Both are /M on 430 mc! G5KW/M has a modified ASB8 into an HRO on the receiving side, with a QQV03-20A driven as a straight PA by a "Hamobile" with its output stage trebling. On G8KW/M the receiver is a 70 cm job designed for the purpose, with an ASB8 type of front end; the transmitter is a QQV03-20A tripler, plate-screen modulated by a pair of 6BW6's. Dipoles were used for transmission and reception in each case, with horizontal polarity, and G5KW/M also has a 7-ele Yagi array.

Their tests took place on Sunday, March 20; they started out from Dartford, "back-to-back," and were able to keep in contact for two hours while roaming the Kentish countryside that fine, sunny morning. For most of the time good contact was maintained, but there was much rapid flutter-QSB and, not unexpectedly, screening effects were much more pronounced than on the lower frequencies.

Both operators are to be congratulated not only on their results but also on their enterprise in going mobile at all on 430 mc—a band on which the great majority of VHF operators have not even started a fixed station yet. We shall look forward with much interest to further reports on the 'KW/M investigations on 70 centimetres.

More Portable/Mobile

The first report on two-metre mobile activity—the interesting G2ATK/G2HCG /M contact on November 3—appeared in this space in our December issue.

Now we hear of VHF mobile plans from G2HCJ (Warrington, Lancs.) and G3LB (Ripon, Yorks.). G2HCJ is fitting out a Morris Traveller and will be operating "in most parts of England except extreme east and south, most parts of Wales, and in Scotland as far north as Oban and Edinburgh." His receiver, under construction, is: Cascode, GGT, triode mixer, 10.7 mc 1st IF, 2nd mixer with local CO, 465 kc IF and AVC IF, detector and NL; the first oscillator will be a CO/VFO arrangement using an 8.1 mc crystal on its 5th overtone, mixing with the oscillator on about 4 mc, the sum frequency (44.4 mc approximately) then being tripled to give injection at 133.3 mc.

G3LB does not give details of his proposed equipment, but hopes to be /M in about a month's time. Any reports on signals from G3LB, either from Ripon or under /M conditions, will be very welcome.

If anyone should be thinking of looking round for G5MA under an exotic /P suffix this Easter holiday, there will be nothing doing—but this does not mean that he has swallowed the anchor. Bob is moving to another (home-base) QTH in Surrey which he hopes will be more favourable for

working GDX than the old one in Ashtead!

Equipment Notes

G3GHO (Roade) has changed to a new converter consisting of a neut. triode-connected 6AK5 1st RF into a pentode-connected 6AK5 2nd RF, with a triode-connected 6AK5 mixer; this is performing very well. The beam at G3GHO has been changed back from a 4/4 to a pair of slots at wavelength spacing.

G3DLU (Compton Bassett) has a 6-ele "City Slicker" on his 56 ft. transportable mast, with a winch for hoisting so that he can cope with it single-handed; he is building the modulator unit described in the November 1953 issue of *Short Wave Magazine*, and is also cutting himself a "CQ wheel."

G2CZS (Chelmsford) has a new head amplifier in the converter, with beneficial results, and will have a new beam up shortly—he is continuing with the development work on the impedance matching device mentioned here last month.

Over in Cambridge, G3IIT found that poor signal reports were due to the feeder system for his four skeleton slots having "gone astray": the trouble now being rectified, he is getting much better results with his 15w. to an 832.

G5MR (Hythe) has for long been using an acorn 954 in the osc.-tripler stage of his converter; this is connected Clapp-wise on a fundamental of about 22 mc. and gave good results when it was working properly; an "intermittent lack of output" was traced to the 954 having lost its emission, apparently because of excessive screen voltage. So he has now changed the 954 for a 6AK5, which gives ample reserve of output, controlled by a potentiometer in the screen.

Writing in for the first time, G3EGG (Claydon, Bucks.) reports that he is running a G2IQ converter into an AR77, with a 3E29 PA at 75 watts, topped off with a 3-ele Yagi, which is indoor due to local restrictions. Another new correspondent welcomed to this column is G3JZG, of Willenhall, Staffs., on since last October with 12w. into an SCR-522, a 4-ele beam only 20 ft. up, and receiver consisting of Cascode 6AK5-6J6, EF54 mixer, 955 osc., into a Collins TCS10 at 7 mc—frequency 144.65 mc.

Some 70-Centimetre Items

G2ADZ says that G5GD (South Molton, N. Devon) has a receiver for 430 mc. but no transmitter as yet. G3IIT is contemplating getting on to 70 cm, under the tutelage of G2XV.

G2XV (Cambridge) himself has under construction a 40-element array for 430 mc to replace the 12-ele stack; Gerry hopes that this will help him to climb the ladder a bit faster; he goes up one to 17C by having worked G3HKD, of Norwich. G3CVO (Great Baddow) is also on 70 cm, has worked G2WJ and heard G2CZS, and reports G3VI (Braintree) as building for the band. As regards ATV activities, on which G3CVO has always been very busy (he is secretary of the BATC, and responsible for the production of their *CQ-TV*). 70 cm TV pictures have now been received from G2WJ/T at G3CVO, using a converter built by G3GDR; work is in hand on a new TV

TWO-METRE ACTIVITY REPORT

(Lists of stations heard and worked are requested for this section, set out in the form shown below, with callsigns in alphabetical and numerical order).

G3GHO, Roade, Northants.

WORKED: G2AIW, 2ANS, 2HCG, 3FAN, 3GWB, 3HII, 3HXS, 3HZF, 3ISA, 3IYX, 3KEQ, 5MA, 6OX, 6TA, 8VN. GC3EBK, PAØFB.
HEARD: F8GH, G2ABD, 2ATK, 2CZS, 2FJR, 2HOP, 2NM, 2XV, 2YB, 3BII, 3BJQ, 3DOV, 3EPW, 3FYY, 3IIT, 3IOO, 3IRA, 3IWJ, 3SM, ON4BZ, PE1PL. (*February* 26 *to March* 14).

G3YH, Bristol.

WORKED: G3FIH, 3HSD, 6NB, 6OZ, GW2ACW, 5BI, 8UH.
HEARD: G2ADZ, 2HCG, 3DJX, 3FAN, 3FKO, 3GMN, 3GNJ, 4GR, 4SA, 5MA, 8TS, GM3EJM, 8SU. (*January* 23 *to March* 20).

GW3GWA, Wrexham, Denbs.

WORKED: G2AIW, 2HCG, 2XV, 3AWC, 3DQQ, 3FMI, 3IOO, 3IWJ, 3WW, 5AU, 5JU, 5YV, 6XA, 6XM, 8VN, ON4BZ.
HEARD: G2HOP, 3FAN, 6NB.

G3CVO, Great Baddow, Essex.

WORKED: G2CZS, 2HCG, 2WJ, 2WS, 3BSU, 3FNL, 3IJB, 3JMA, 3VI, 4AJ, 4OT, 5UM, 8RW.
HEARD: G3JXN. ON4BZ, PAØFB.

G3WW, Wimblington, Cambs.

WORKED: G2AHL, 2AIW, 2AOK, 2BVW, 2CZS, 2DDD, 2FNW, 2FQP, 2HCG, 2HOP, 2WJ, 2XV, 2YB, 3BDP, 3BII, 3BRX, 3BSU, 3FAN, 3FIH, 3GGJ, 3HAZ, 3IAM, 3IIT, 3IJB, 3IOO, 3ISA, 3JHM, 3JXN, 3KEQ, 5KW/P, 5ML, 5MR, 5SK, 6TA, 6XM, 6YP, 8KW.
HEARD: G2ABD, 2MV, 2RD, 3EGG, 3GHO, 3HXS, 4MW, 6NB, ON4BZ. (*February* 27 *to March* 16).

SWL, Erith, Kent.

HEARD: F9LD, G2BRR, 2CNS, 2CZS, 2HCG, 2MV, 2PU, 2SQ, 2VA, 2WJ, 2XV, 3ANB, 3BTC, 3BRX, 3CGQ, 3FAN, 3FD, 3GFE, 3GIZ, 3HZF, 3ISA, 3JEL, 3RD, 3VI, 3WW, 4AJ, 4FB, 4GT, 4HQ, 4MW, 4OT, 4OU, 5KW, 5KW/M, 5KW/P, 5TZ/A, 5UM, 5YV, 6CW, 6JI, 6LL, 6MV, 6NB, 6WU, 6XH, 6XM, 6YP, 8KW, 8LN, 8RW, 8UQ/P, ON4NZ, PE1PL.

G2BRR, Swindon, Wilts.

HEARD: DL3VJ, F3LP, 9YJ, 9LD, G2AOK, 2BAT, 2FQP, 2HCZ, 3WS, 3WW, 3AMI, 3BII, 3BJQ, 3BKZ, 3BRX, 3BVU, 3DBU, 3EGG, 3EUP, 3FIH, 3FMO, 3FYY, 3GKZ, 3HXZ, 3IAM, 3ION, 3ISA, 3IWJ, 3IYX, 3JFO (?), 3KEQ, 4AP, 4SA, 5KW, 5MA, 5MR, 5TZ, 5US (?), 5YV, 6CW, 6NB, 6OX, 6TA, 6XX, 8BP, 8DM, GW3EJM, 8SU, ON4BZ, PAØRV, PE1PL. (*March* 2-3 *and* 14-16 *only*).

SWL, Brentwood, Essex.

HEARD: G2AHL, 2AHP, 2AIW, 2AOK, 2BDF, 2BPC, 2BRR, 2CZS, 2DTO, 2HBG, 2HCG, 2MV, 2RD, 2TP, 2WJ, 2WS, 3BII, 3BSU, 3BTC, 3BYY, 3CLW, 3DVQ, 3ELH, 3EYV, 3FAN, 3FD, 3FIH, 3FUH, 3FUS, 3FYY, 3GOZ, 3IAM, 3IEX, 3IIT, 3IJB, 3ION, 3IRW, 3JEP, 3VI, 3WS, 3WW, 4AJ, 4AU, 4FB, 4GT, 4HQ, 4SA, 5DF, 5DT, 5KW/P, 5MA, 5RD, 5TZ, 5YH, 6AG/M, 6JK, 6LL, 6NB, 6OX, 6TA, 6WU, 6XH, 6YP, 8DM, 8KW, 8KZ, 8LN, 8RW, 8SK, 8UQ/P.

SWL, London, S.W.18.

HEARD: G2AHP, 2AHY, 2AIW, 2AOK, 2BDP, 2DTO, 2MQ, 2MV, 2RD, 3ABA, 3AGR, 3ANB, 3BII, 3BJQ, 3BYY, 3DF, 3EGG, 3ENY, 3EYV, 3FAN, 3FIH, 3FSG, 3FUH, 3FUL, 3FYY, 3GOZ, 3GSM, 3HGO, 3HWJ, 3IOO, 3IRA, 3JFR, 3JQN, 3JXN, 3KEQ, 3MI, 4AJ, 4SA, 5CP, 5DS, 5KW, 5KW/P, 5MA, 5UM, 5YH, 6CW, 6FK, 6LL, 6NB, 6OX, 6TA, 6XH, 6XX, 6XY, 8KW, 8KZ, 8UQ/P (Hogg's Back, Surrey), 8VN. (*February* 13 *to March* 10).

SWL, Coventry.

HEARD: G2ACU, 2AIW, 2AMK, 2AOK, 2ATK, 2BVW, 2BWV, 2COP, 2FNW, 2HCG, 2MV, 3ABA, 3BA, 3BJQ, 3CKQ, 3CRH, 3DKF, 3FAH, 3FAN, 3FUW, 3GKZ, 3HAZ, 3HHD, 3HHY, 3KEQ, 4SA, 5MA, 5ML, 5SK, 5TZ, 5YV, 6CW, 6NB, 6PO, 6SN, 6TA, 6XA, 6XM, 6XX, 6XY, 6YU, 8BP, 8VN. (*February* 19 *to March* 15).

G2CZS, Chelmsford, Essex.

WORKED: G2YB, 3ANB, 3DOV, 3IEX, 3ION, 3JXN, 3KEQ, 3VI, 3WW, 5AM, 5KW, 5TZ, 6FO, 6LL, 6OX, 8LN.
HEARD: F8AA, G2HCG, 2MV, 3BSU, 3BTC, 3FAN, 3FIH, 3IOO, 5MA, 5UM, 5YV, 6NB, 6TA, PE1PL. (*During March* 1 *to* 15).

G6TA, London, S.W.16.

WORKED: G2ABD, 2AHP, 2AHY, 2ANS, 2ANT, 2AOK, 2ATK, 2BBN, 2BDP, 2BVW, 2DUV, 2RD, 2WS, 2YB, 3ABA, 3AGR, 3ANB, 3BII, 3BJQ, 3BNC, 3BSU, 3BYY, 3DF, 3DKF, 3EGG, 3ENY, 3EPW, 3FAN, 3FIH, 3FSG, 3FUH, 3FUW, 3FYY, 3GGJ, 3GHO, 3GKD, 3GKZ, 3GOP, 3GOZ, 3GWB, 3IAM, 3IIT, 3ION, 3IOO, 3IRA, 3ISA, 3ITF, 3IWJ, 3IYX, 3JEP, 3JFR, 3JJH, 3KEQ, 3VI, 3WW, 4SA, 5BC, 5CP, 5KW, 5KW/P, 5LO, 5ML, 5SK, 5TZ, 5US, 5YH, 5YV, 6CW, 6FK, 6FO, 6GR, 6LL, 6NB, 6OU, 6OX, 6WU, 6XH, 6XX, 6XY, 8CK, 8KW, 8LN, 8RW, 8UQ. 8UQ/P, 8VN, 8VZ. (*February* 19 *to March* 18).

transmitter and modulator to return the compliment. For what he calls "sound work" on 430 mc, G3CVO is using a modified G2DD converter (*Short Wave Magazine*, March 1953).

Incidentally, the January issue of New Zealand's *Break-In* reports that the ZL's have increased their ground record on 430 mc to 75 miles — ZL3AR has worked ZL3QM.

Schedules and Contacts

By March 20, the G5CP/G5MA marathon had reached 113 contacts; during the breaks, G5MA raised GC3EBK in Guernsey (twice), G6XM, of York (who was a fine signal all over the southern part of the country on March 14) and various other semi-DX stations in the Midlands and the south.

For G3GHO, the open evenings produced GC3EBK and PAØFB, with ON4BZ and PE1PL heard at good strength on March 14. In Wrexham, GW3GWA *did* have a "winter contact" with ON4BZ, whom he worked from a CQ on January 23.

On March 14, G2ADZ (Woolacombe, N. Devon) succeeded with G3DA, G3IOO, G3IUD, G3IWJ, G6XM and G8SB—all good contacts, well to the north. And, much to the astonishment of both of them, G2ADZ also heard G6FO (Maids Moreton, Bucks.) at 589, the only station audible from that part of the country. By some miracle, G6FO was able to work G3FIH (Bath), G3FMO (Chard), G6XX (Howden, Yorks.) and GW8SU (Porthcawl) that same evening.

On March 15, G5MR had his first QSO with PE1PL, who is in Vernon's worst direction; earlier in the month, G5MR was working into the North Midlands and West Country — again only possible when conditions are good. Best QSO's for G3JZG up in Staffordshire were G5MA and G3KEQ. G3IRA (Swindon) is another who testifies to the potency of G6TA's signal; G6TA himself explains that, contrary to the broad statement made here last time, he is not clear in *all* directions, and is, in fact, screened to the east and south-east, making the Continentals difficult for him. In addition to the G6TA/G8VN schedule at 0935 on Sundays, there is now a daily "check band" between G3IOO/G6TA at 1900 clock time. G3CVO says his auto-sender "puts out a tremendous number of CQ's" on 145.1 mc, but apparently to little avail. G2CZS mentions G3ION, G6FO and G6OX as new stations worked.

The SWL Reports

For the time being in the VHF listener category is G2BRR, who puts in a very interesting calls-heard list from his temporary QTH in Swindon — he listens round every evening, 1930 onwards, and feels that if only he could get the Tx on, he would be "half-way up the ladder again," as the location is so lively. The receiving set-up, incidentally, is a Cascode into an old Philco BC set (no BFO, of course) with an indoor 3-ele flat-top supported by the bed-post —— well!

Our SWL correspondent from Erith, Kent (who will have to be known as "Squiggle" because our poor old eyes cannot decipher his signature) is running a G2IQ converter into an Eddystone 358; his aerial is a 4/4 at 30 ft., and a new 6BQ7 RF stage converter is under construction. SWL Drybrough (Coventry) remarks that the signal level from the FM station at Wrotham, in the 90 mc band, is a useful indicator of conditions, giving 400 μV/metre on good days, falling to 20 μV/metre or less when conditions are only average. As it happens, your A.J.D. also watches Wrotham (on an S.27) for the same purpose. SWL Drybrough, mortified to know that Continentals, which were off the end of his fixed dipole and inaudible in Coventry, were being worked during the good spells, is going in for a stacked Kooman's array of 8 elements. (We'll have this chap on the air yet!)

SWL Cox, London, S.W.18, sends a calls-heard list, as does SWL Ball, of Brentwood, Essex, whose 70 or so stations were received on an SEO-converter to the G2UJ design, but with two grounded grid RF stages; aerial consists of three stacked dipoles, balun matched into 75-ohm coax.

TWO METRES

COUNTIES WORKED SINCE SEPTEMBER 1, 1954

Starting Figure, 14

From Home QTH only

Worked	Station
40	G5YV
38	G3GHO
35	G2FJR
34	G5MA
33	G6TA
29	G3WW
28	G3FIH
26	G3FYY, G5DS
25	G8VN
24	G2CZS, G3BJQ
23	G2DVD
22	G3IIT
21	G3DO
20	G2ADZ, G2AHP, G3DVQ, G3HWJ, G3IRA
19	G5BM
18	G3DBP, G3IER
16	G5MR
14	G2HDZ, G3EGG, GM3DIQ

Note: This Annual Counties Worked Table opened on September 1st, 1954 and will run for the twelve months to August 31, 1955. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. The first list sent should give stations worked for the counties claimed; thereafter, additional claims need show only counties worked as they accrue. QSL cards are not required for entry in this table.

G5TZ, from the Isle of Wight, is nearly always an S9 signal with him, and in general he considers activity to be much higher than this time last year

This and That

G2CVY (Barnstaple) is on two metres . . . G2ANS is in Roade, about 200 yards from G3GHO, but there is no mutual QRM . . . G3WS (Chelmsford) is back from Yugoslavia, and found his gear still worked after several months' inactivity . . . G3FYY (London, N.W.2) discusses what appear to be the poor results that are now G2ADZ's lot, and suggests that it must be the soil . . . G2ADZ himself says that the whole problem intrigues him because, having

TWO METRES

ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14

From Fixed QTH Only

Worked	Station
71	G5YV
68	G3BW
64	G6NB
62	EI2W (209), G3BLP (630)
60	G5BD
59	G3EHY, G4SA
58	G8OU
57	G2OI (349), G3CCH, G8SB
56	G2FJR, G3GHO
55	G2HIF, G3WW, G5BM, GW5MQ
54	G3IUD (201)
53	G2AJ (519), G2HDZ (416), G3FAN, G4CI
52	G2NH, G3IOO, G5DS (571), G6XX, GW2ADZ
50	G3ABA
49	G5MA
47	G5WP
46	G4HT (476), G5BY, G5ML (280), G6YU (205)
45	G2XC, G6XM (356)
44	G3BK, G3HAZ (262), G8DA
43	G2AHP (500), G3BA, G3COJ, G4RO, G5DF
42	G3FIH, G3GSE (424)
41	G2DVD, G2FQP, G3DMU, G6CI (184)
40	G3BNC, G3CGQ, G3DO (274), G3HWJ, G5JU, G8KL
39	G2IQ, G3GBO (434), G3HBW, G3VM, G6TA (401), G8IL (325)
38	G2FCL (234), G3APY, G3WS (183)
37	G2DDD, G2FNW, G2FZU (180), G3DLU
36	G2DCI (155), G2HOP, G3BJQ (161), G3CXD, G6CB (312), G8IP
35	G3FZL, G3HCU (224)
34	G3BKQ, G3FYY (217), G3IER (128), G5MR (248), G8IC
33	G3HHY (125)
32	G2CZS (198), G2FVD, G8QY, G8VN (151), G8VR
31	G3HXO, G5RP
30	G3FRY G3GOP (208), G3GVF (129), G3IIT, G3IRA, G5NF, GM3DIQ, GM3EGW, GW8UH
29	G3AGS, G3AKU, G3FIJ (194)
28	G8DL, GC3EBK, GM3BDA
27	G3DAH, G3ISA (160), G6GR, GI3GQB
26	G3AEP, G3CFR (125), G3SM (211), G4LX, G4MR (189)
25	G3JMA, G5SK, G6PJ
24	G3CVO (190), G3FD, G3FXG, G3FXR
23	G3CWW (260), G5PY, GW3GWA
22	G3AGR (135), G3ASG (150), G3BPM, G3HIL, G3YH
21	G2AOL (110), G3DVQ, G3IWJ, G3JHM (104), G6XY
20	G3EYV, G3HSD, G3IOE
19	G3FEX (118), G3GCX, G5LQ (176)
18	G3CKQ, G3DBP, G8NM, GC2CNC
16	G3FRE, G5AM
15	G2BRR, G2DRA, G3EGG, G3IWA
14	G2DHV, G3CYY

Note: Figures in brackets after call are number of different stations worked on Two Metres. Starting figure for this classification, 100 stations worked. QSL cards are not required to verify for entry into this Table. On working 14C or more, a list showing stations and counties should be sent, and thereafter added to as more counties are worked.

regard to the site itself, he ought to be doing much better . . . G2AOK has had his card for the contact with LA8RV . . . G3YH (Bristol) writes in again after a long absence . . . G5YK will be coming on from Upwood, Hunts. to replace G2FQP on VHF; the latter is departing permanently for Weston-s-Mare in Somerset . . . G2HDZ is now on from his new QTH in Pinner, operational on both bands; results so far "have not been remarkable" . . . Conditions must have been good on March 14—G6CW, G6FO and G6LL were all heard in action at the same time, calling the same stations!

Nobody will get a QSL card for any contact with a station signing "G3KBB" on two metres. The licensed operator of G3KBB saw the remark on p.34 of our last issue and, very sensibly, forthwith wrote to the GPO to check with them whether two "G3KBB's" might have been issued in error (it has happened). The facts are that the legal owner of G3KBB is in London, S.E.16, and has not yet used his call on any amateur band.

To DL1LB, Weener/Ems, we are glad to issue VHF Century Club certificate No. 178. His total was made up of 37 DL/DJ's, two F's, 37 G's, three LA/LB's, four ON's, two OZ's, 12 PA's and three SM's. The balance of these figures just about represents the VHF activity-ratio as between the countries concerned. There are a great many DL/DJ stations on two metres, but, as is the case with us, it is only the more effective ones that are heard at EDX.

Membership of the VHF Century Club is open to those who can show cards for 100 two-way contacts on any VHF band(s) from 50 mc up. Claims, with the cards and a check list (this is essential for file purposes) should be sent by registered post addressed to A. J. Devon, "VHF Bands."

The Tabular Matter

This is up-to-date with all claims received by the dead-line, and though there have not been many changes this month, there is steady progress in Annual Counties. All operators who have worked 14C are eligible for entry in the Counties tables, merely by sending in a list of stations worked for the counties claimed. It would be helpful to everybody if Annual Counties could be made really representative of current activity on Two—by this we mean that there are a good many more stations that should be listed. If *you* can claim 14C or more worked (since September 1st of last year for the Annual) send it in.

Progress on 25 Centimetres

The articles by G5RZ in our recent issues have "started a movement" which it is hoped will justify, quite soon, a regular heading on this interesting band, which is crying out for attention.

Communication tests have been in hand between G5RZ (Leighton Buzzard) and G3CGQ (Luton), who also has G3FUL as a local collaborator. G5RZ is using one of his own oscillators (as described in the February-March issues), another of the same being available at G3CGQ, while a third one has been made by G3FUL; he has tried it as a trebler from his (CC) 430 mc transmitter. G3FUL also has a self-excited oscillator using a 703A door-knob.

Receiver at G3CGQ is an ingenious arrangement of his own—an acorn tunable oscillator on about 400 mc, tripled into a 1200 mc cavity using a crystal mixer, and a 6-stage IF strip; the oscillator frequency is adjusted to produce the IF, which is at present low, at 12 mc, merely for the convenience of using the IF strip that happens to be available.

On this receiver, with a 10-element stacked array (a pretty small item at this frequency), G3FUL can be heard 'cross-town by G3CGQ, on 25 centimetres. The distance G3CGQ-G5RZ is, however, 10½ miles, the path being somewhat obstructed. First attempts to get a signal across were abortive, though "something

was heard." The factors involved in working over such a path are, of course, accurate frequency setting at both ends, and correct beam alignment.

In order to prove the equipment and to get a physical check on frequency and the behaviour of the beams, a small meeting was held at G5RZ on March 26, with G2HCG, G3CGQ and G3FUL. Briefly, it was found that the gear was right for frequency; that heavy modulation of the G5RZ oscillator was needed to produce a good signal in the G3CGQ receiver; that the latter was working correctly in the band and was tuning across the G5RZ signal; and that directional effects on the aerial system were very marked; it was also found that a ½-wave plate reflector, as described by G5RZ on p.15 of the March issue, gave the best results.

The distance over which these tests were carried out was only a matter of 100 yards, as they were arranged for the sole purpose of checking the equipment for frequency and efficient operation. In this sense, so much was achieved at the meeting on March 26 that the prospects of opening the 10½-mile path G5RZ-G3CGQ on 25 centimetres have become much more encouraging.

It should be noted that the essentials of all the 1200 mc equipment involved have been amateur-built from first principles, no "surplus" or "modified surplus" apparatus being used.

Results and further details will be fully discussed in *Short Wave Magazine* as occasion arises, and in the meantime we would ask all who have any sort of equipment working on the 25-centimetre band to let us know about it.

Conclusion

And that, friends, just about wraps it up for the present occasion; dead-line for the next issue is **Monday, April 18**—please send all your claims, news, suggestions and ideas to: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

SEVENTY CENTIMETRES

ALL-TIME COUNTIES WORKED
Starting Figure, 4

Worked	Station
26	GW2ADZ
23	G3BKQ
17	G2XV
16	G6NF
15	G4RO
14	G3HBW
13	G3IOO
11	G2HDZ, G5YV
7	G2HDY, G3IRW
6	G3FAN, G3JMA
5	G3FUL
4	G2DDD, G3JGY

On working four Counties or more on the 70-Centimetre band, a list showing stations and counties should be sent in for this Table, and thereafter new counties worked notified as they accrue

With you again on May 6, all being well, by which time there may have been something good in the way of an EDX opening.

"STOP PRESS" ** CURRENT EDITORIAL

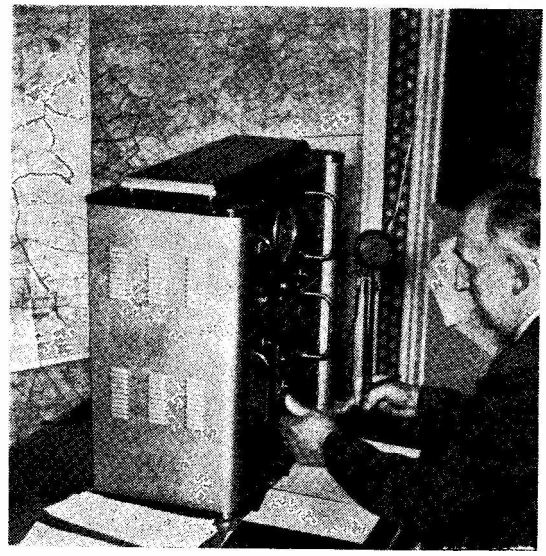
With reference to the Editorial in this issue, we have just been informed that Mr. Ian Orr-Ewing, Member for North Hendon, is putting a Question to the A/PMG in the following terms—"Whether he will deny the statement made in a Nottingham Court by the solicitor prosecuting for the GPO that amateur transmitters were cluttering up the air and spoiling programmes." The outcome will be reported in our next issue, with a quotation from the proceedings of the House.

FIRST BRITISH RECTANGULAR-FACED OSCILLOSCOPE TUBE

In radar and oscilloscope displays, it often happens that only a small horizontal strip in the centre of the screen of a cathode ray tube is occupied by the trace. If, instead of the conventional circular form, a face of rectangular shape is used, the trace can occupy the whole of the working screen area. Such a rectangular screen has been adopted in the new Mullard DG16-21 CR tube, which enables much equipment space to be saved. It is the first British tube of its kind.

Where it is desirable to compare visually the signals in several channels, DG16-21 tubes, because of their bulb shape, can readily be stacked close together, thus facilitating easy direct comparison.

The DG16-21 tube has a screen size of 5½" x 1½". The deflection sensitivity is of the order of 0.2mm/V. The angle alignment between X and Y plates is kept within one degree of the nominal value of 90 degrees; this close tolerance ensures the high order of perpendicularity necessary where accurate measurements have to be made. The tube has a 6.3v. heater, and would normally operate at a final anode voltage of 6kV.



One of the applications of commercial VHF — a Liverpool dealer keeps in touch with his service vans by means of Pye mobile equipment. The office can work the vehicles on two-way phone and keep a plot of their positions in the area of operations.

RADIO ASTRONOMY

FIRST EXTRACTS FROM A PAPER READ TO THE ROYAL SOCIETY OF ARTS

by

Prof. A. C. B. LOVELL, O.B.E., Ph.D., F.Inst.P., F.R.A.S.
(*Professor of Radio Astronomy, University of Manchester*)

Readers will find this discussion by Professor Lovell, the distinguished radio astronomer—shortly to have at his disposal the largest radio telescope in the world—of absorbing interest, not only for its subject matter but also for the bearing it has on much that happens on the shorter wavelengths in the amateur spectrum. The magnitudes of time, space and distance revealed by radio astronomy are of such immensity as to reduce this Earth and all our miserable affairs to a speck of dust blown away on the instant. The first part of his paper describes the discovery of radio waves generated in outer space—incidentally, the first radio telescope was built by an American amateur in the 1930's, to receive two-metre noise radiation from the Milky Way; this telescope was 30 ft. in diameter. The second part of the paper, to appear in a later issue, discusses the new radio telescope, 250 ft. in diameter, now under construction at the Jodrell Bank Experimental Station in Cheshire, and the general programme of work for the instrument.—EDITOR.

THE investigation of the universe by the great American telescopes during the past twenty-five years has been an imaginative enterprise unsurpassed in the history of man. When the hundred-inch Mount Wilson telescope started its work just after the First World War, astronomers believed that the entire universe was contained within the confines of the Milky Way—a system containing millions of stars scattered throughout a roughly spherical enclosure across which light would take about twenty thousand years to travel. Moreover, it was firmly believed that the sun and solar system were at the centre of this great assemblage. However, these beliefs were destined to survive the probings of the Mount Wilson telescope for only a few years. The light gathering power and penetration of that instrument were so superior to any existing telescope, that the scientists using it soon realized that the Milky Way system was built on an altogether more gigantic scale than had been believed. Instead of a spherical enclosure, the Milky Way system was revealed to be flattened with an extension of nearly one hundred thousand light years, but only a few thousand light years thick at the centre. This system is now known to contain something between one thousand million and ten thousand million stars, with the sun and the solar system much nearer the extremity than the centre.

Even more remarkable was the demonstration, by the distinguished astronomer Hubble, that the confines of the universe extended far beyond this gigantic system. Over a century previously Herschel had speculated that faint nebulous objects which he could see in his 48-inch telescope might, in fact, be outside the Milky Way. This belief was resurrected, and Hubble was able to show that these nebulæ were, beyond doubt, extragalactic and situated at enormous distances from our own Milky Way system. He found that the nearest of these was the great spiral nebula in Andromeda, at a distance which is now believed to be one and a half million light years. Many of these extragalactic nebulæ are similar to the Milky Way system, and each contain many thousands of million stars. The contemporary picture of the universe is, then, of a universe consisting of millions of nebulæ similar to the Milky Way, distributed throughout space to distances such that the light from them takes one thousand million years to cover the intervening space to the Milky Way.

Penetration of Light and Radio Waves Through the Earth's Atmosphere

Now all this kind of astronomical research, on which our beliefs about the universe are based, has been carried out with telescopes and other instruments receiving light waves emitted by the stars in the visual part of the electro-magnetic spectrum. Auxiliary instruments, such as photo-electric cells and photographic plates, can extend these studies somewhat beyond the visual limits into the infra-red and ultra-violet regions, but appreciable extension is impossible because of the absorption caused by water vapour and fine dust in the earth's atmosphere. The fact that our knowledge of the universe has come from such a small part of the total electro-magnetic spectrum has never worried astronomers unduly. The distribution of the energy in a hot body such as a star is well known, and it has seemed clear that our knowledge of the universe was not appreciably restricted by this absorption in the atmosphere. This belief seemed so well founded that there was little or "window" in the atmosphere at very much longer or window in the atmosphere at very much longer wavelengths, since it seemed impossible that any of the objects studied by astronomers could emit detectable amounts of energy on these long wavelengths.

This other gap exists in the radio wave region. At its short-wave end, it is again limited by atmospheric absorption near a wavelength of a few centimetres, and at the long-wave end by reflection in the Heaviside layer or ionosphere at a wavelength of about 20 metres or less, depending on ionospheric conditions. Any radio wave generated on the earth within this waveband can penetrate the atmosphere and ionosphere and escape into space, and conversely, if any radiation is being generated in space in this waveband it can pass through the atmosphere and ionosphere and be received on the earth.

Discovery of Radio Waves from Space

At the end of 1931 an American engineer, Jansky,

made the surprising discovery that radio waves apparently emanating from regions beyond the solar system were reaching the earth through this "window" in the atmosphere. Jansky's historic discovery was published in a radio engineering journal, and it seems doubtful whether many astronomers knew of his work. In any case, it roused little interest, and the only important additions to his results before the Second World War were obtained by Grote Reber, an amateur investigator who built apparatus of advanced design in the garden of his home in Illinois. In fact, Reber constructed the first radio telescope of the type with which we are familiar today. It was 30 feet in diameter and received on a wavelength of about two metres. This instrument could be readily aimed at different parts of the sky. With it Reber confirmed Jansky's discovery that radio waves were reaching the earth from outer space, and he made the first serious attempt to find out in more detail from where they came. He found that the radio signals were strongest from directions near the centre of the Milky Way, and that the radio signals were roughly proportional in strength to the concentration of stars in the direction to which the radio telescope was aiming. On the other hand, Reber failed completely to detect any signals from the bright stars or from other prominent features visible in ordinary telescopes.

This paradox led him to the view that the radio signals were being generated in the very rarified hydrogen gas which fills interstellar space. By 1945, this represented the extent of our knowledge of these radio waves from space. But the six years lost to fundamental research during the war were soon to appear as a rich investment for astronomical research. By a strange twist of rate, the Second World War placed in the hands of astronomers a new and enormously powerful tool for the exploration of space. The concentration of work on radio and radar for military purposes resulted in technical advances, in the space of a few years, which might have otherwise occupied a generation of research workers, and when these techniques were applied to the investigation of these radio waves generated in the cosmos spectacular results were obtained. The discoveries of the last few years have rivalled in excitement the more conventional developments with the American optical telescopes.

Discovery of Radio Stars

The first measurements confirmed Reber's results, and there seemed to be no direct connection between the radio signals and the astronomical objects which comprise the universe familiar to the human senses. Reber's idea, that the emissions were generated in the interstellar gas, remained for some time the only realistic suggestion, but in 1948 came the first of a sequence of discoveries which stimulated the interest of astronomers throughout the world. Bolton and Stanley in Sydney, followed immediately by Ryle and Smith in Cambridge, found that at least some of the radio waves were coming from discrete or localized sources in space, subsequently called "radio stars." The two most intense of these sources were in the constellations of Cygnus and Cassiopeia. If these radio sources had coincided with any prominent visual objects the discovery would not, perhaps, have occasioned much surprise, but although both lay in densely-populated *stellar* regions, there were no particular *visual* objects to which the radio emissions could be attributed.

Subsequently many other, less intense, radio stars were discovered, and there seemed to be no correlation with any class of star known to astronomers; neither did any of the common stars appear to emit radio waves which could be detected on the earth. The belief arose that we were dealing with a new type of body in the heavens, dark or only faintly luminous, but with the facility of emitting powerful radio waves; moreover, a type which appeared to be of frequent occurrence and distributed throughout the Galaxy in a manner similar to that of the common stars. For some time there was uncertainty as to whether the extragalactic nebulæ might be similarly endowed with the facility of emitting intense radio waves, but any such doubts were laid to rest in 1950, when the scientists at Jodrell Bank used a very large radio telescope and showed that the nearest extragalactic nebulæ in Andromeda behaved in a manner similar to the local Galaxy, as far as emission of radio waves was concerned. Subsequently, the emissions from many more remote nebulæ were detected, and it is now widely accepted that the type of radio source responsible for the emission in the Milky Way system must be widely dispersed throughout the extragalactic star systems which comprise the universe.

Identification of Radio Stars

In the last few years there has been very close co-operation between the scientists in this country and Australia using the radio telescopes and the astronomers with the big optical telescopes in America, in an effort to find a more precise relationship between the radio sources and objects which are visible in the telescopes. Although nearly two thousand of the radio sources have now been positioned—and in many cases the size and shape measured—the linkages which have been established with the common stars remain remarkably few, and the general paradox of the existence of the radio sources remains. We are, however, now certain of one connection which was suspected several years ago. Occasionally a star blows up—it becomes a supernova. The atomic processes which generate the energy inside the star get out of hand and Nature gives a replica on a really gigantic scale of an atomic bomb explosion. Instead, however, of an explosion of a few pounds of uranium or plutonium, the whole millions of tons of material in the star goes up. Only three such explosions of stars in the Milky Way have ever been recorded. The most famous of these occurred a thousand years ago, and the remains of the star can still be seen as an enormous cloud of tremendously hot gas travelling into space at a rate of seventy million miles every day. This object — the Crab Nebula — has now definitely been established as a source of strong

radio emissions. In fact, it is the third strongest source in the heavens. The other two supernovæ—those discovered by Tycho Brahe in 1572 and by Kepler in 1604—are also known to be radio sources, although very much weaker. Although these connections are of extreme interest, it seems unlikely that supernovæ can account for more than a few of the radio sources in the Galaxy.

A few years ago, the scientists in Cambridge measured the position of the most intense source in Cassiopeia with such precision that it became possible to carry out extensive photography of the sky with the great Palomar telescope. In the position of this radio source, the Palomar telescope has photographed a peculiar object which is certainly not a star as commonly understood. It appears as a faintly luminous cloud of gas, spread out over a distance which is large compared with a star. Some of the gas is in extremely violent motion, and it seems likely that the generation of the radio signals must be connected in some way with this motion. Recently, two or three other similar objects have been located in the position of less intense radio stars, and there is also a good deal of speculation that this type of diffuse gaseous agglomeration may be responsible for many of the radio stars. There is no answer to the question as to the place of this type of object in the sequence of stellar evolution. The objects are so faint that they can only be seen by taking long exposures with the world's biggest telescope, *and yet they generate powerful radio signals.* Some attempt has been made to link them with very old supernovæ, of an age such that they are not in the epoch of recorded history. On the other hand, they may equally well be stars at the opposite end of Creation —that is, those which are in the very early stages of formation.

The Collision of Nebulæ

Perhaps the most remarkable identification so far made is that of the second most intense radio source in the sky, which lies in the constellation of Cygnus. The early efforts to link up this radio source with a visible object, by inspecting the star maps, led to no result. There was nothing visible in the sky which seemed likely to be responsible for such a strong source of radio waves. About two years ago, however, as a result of the precision of the Cambridge measurements, already mentioned, it again became possible for the American astronomers to train the Palomar telescope on the precise region of the sky which contained this radio source. Their plates yielded the usual large number of faint stars and nebulæ, but in the position of the radio source there was an object with an unusual appearance. It has been interpreted by Baade and Minkowski as showing two great nebulæ in a state of collision. The distance of this celestial collision in Cygnus is enormous — a hundred million light years or just about the limit of the present observable universe. Why one result of such a collision should be the emission of powerful radio signals in quite unknown. The distance between the stars in a collision of two nebulæ is so great, that actual interactions are unlikely, and it seems probable that the generation of the radio waves must take place somehow or other in the turmoil created by the gas and the dust, as these two nebulæ pass through one another.

The establishment of the connection between this faint object at the limit of the observable universe, with the powerful source of radio emission in Cygnus, carries with it one of the most surprising implications in the whole of radio astronomy. The study of the radio records, coupled with the data about the distribution of these extragalactic nebulæ in space, leads one to conclude that this type of celestial collision is by no means unique, and that it might even be a fairly common event. In the space around the Milky Way system, the distance between nebulæ is of the order of a million light years. This is a fairly average distance between nebulæ in space, and the chances of collision are negligible. On the other hand, in some regions of space the galaxies are far more closely packed in clusters, and in these we find, perhaps, a thousand galaxies separated by only thirty thousand light years. Although this distance is still very great, the galaxies themselves are moving with a speed of about one thousand five hundred miles per second, and a simple calculation indicates that the chances of a collision are considerable. Now in the case of the Cygnus collision we receive a powerful radio signal, although the two colliding nebulæ are so distant that they are just at the limit of the universe observable by the big telescopes. If the galaxies were even further away so that they could just not be identified by the telescopes, it would still be possible to detect their radio emission, even with the present radio telescopes. In fact, it is fairly easy to calculate that even with the sensitiveness of present radio equipment, the colliding galaxies in Cygnus could be two or three times further away and still be measurable with the radio telescopes. Hence, if this type of celestial collision is as common as we now believe, even our present radio telescopes are capable of studying a volume of space which is, perhaps, *five or ten times* greater than the volume which is accessible to the greatest optical telescope in the world. This order of possibility will almost certainly be greatly enhanced when the new radio telescopes now under construction come into operation.

(To be continued)

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concluded from foot of page 97

and the anode proper choke-capacity coupled to the grid of the following stage.

This provides a high impedance output which matches correctly into the high-impedance input of the following stage, it assists in isolating the oscillator circuit, and it gives rather more output than a triode. This improved circuit is exceedingly stable, of high efficiency, and with an even output over the whole range of the tuning condenser. For break-in work, the cathode can be keyed without any trace of chirp.

Improving the Colpitts

MORE OUTPUT AND CLEAN KEYING

V. G. P. WILLIAMS, M.A. (G3FYY)

THE choice of good VFO's of high stability and adequate output has been narrowed down by experience to the two circuits now most generally used. These are the Clapp and the Colpitts.

The former is excellent, but the output tends to diminish as the series tuning condenser is reduced in capacitance towards the HF end of the tuning range. One frequently sees this circuit drawn with a grid condenser, but this is quite unnecessary as there is no DC path from grid to earth except through the grid leak.

The Clapp is always used with a high L/C ratio, but the Colpitts is generally regarded as one with an inevitably low L/C ratio and consequently develops a comparatively low RF voltage across the coil.

It can easily be converted, however, into one with as high an L/C ratio as the Clapp by one simple alteration.

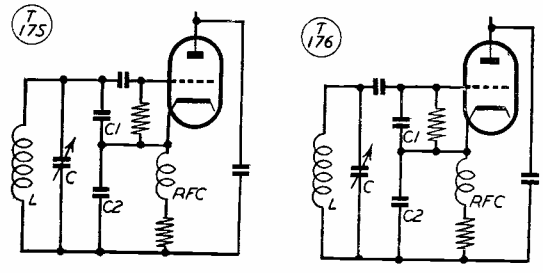
In the Colpitts a grid condenser *is* necessary, as otherwise there would be a DC path from the grid to earth through the coil ; and it is suggested that this grid condenser should be incorporated in the tuned circuit.

Fig. 1 shows how the Colpitts circuit is usually drawn ; the two condensers C1, C2, are sometimes given quite small values, but in such a case there is no " swamping " effect on the small changes of grid-cathode capacity of the valve and consequently the frequency stability suffers.

If C1, C2 are given values of, say, 1,000 $\mu\mu$F each, there is a high " swamping " effect, but also there is a capacity of 500 $\mu\mu$F placed in parallel with the tuning condenser which involves the reduction of the inductance L to a very low value.

If the circuit is connected as in Fig. 2, however, the large capacities of C1, C2 are placed in *series* with the grid condenser, and yet there is still C1 in parallel with the grid-cathode capacity of the valve for obtaining a high " swamping " effect.

The large reduction in capacity across the coil resulting from this alteration involves a corresponding increase in the inductance of the coil, with a greater RF voltage developed across the latter.



On the left is the Colpitts as usually drawn. On the right is the modification adopted by G3FYY, which brings the grid condenser in series with the coil, thus improving the L/C ratio and hence the voltage developed across the tuned circuit.

(Left, fig. 1. Right, fig. 2.)

Practical Considerations

If a VFO is to be designed for the Top Band, for instance, what values of inductance and capacitance would be suitable ?

A very usual value of grid condenser is 100 $\mu\mu$F (incidentally, this should be best quality silver mica, not ceramic, as also should be all other condensers in an oscillator circuit). The series value of the two 1,000 $\mu\mu$F condensers and the 100 $\mu\mu$F grid condenser is 83 $\mu\mu$F ; for this calculation the grid-cathode capacitance of the valve (usually of the order of 2·5 $\mu\mu$F) is so small that it can be neglected.

Let the capacitance swing of the tuning condenser be C, and allow 5 $\mu\mu$F for the minimum capacity. Let L be the required value of the inductance. From the usual formulæ it can be ascertained that:

At 1800 kc the value of L.C is 7817 (μH x $\mu\mu$F).
At 2000 kc the value of L.C is 6332 (μH x $\mu\mu$F)
From these figures we obtain L (83 + 5) = 6332.
From this, L = 72 μH.
Substitute this value of L in the equation L (C + 5 + 83) = 7817.
From this, C = 20 $\mu\mu$F.

As C is the capacitance swing required, and there is a minimum capacitance of 5 $\mu\mu$F, a tuning condenser of 25 $\mu\mu$F maximum will be suitable.

It might be as well to use a small air-spaced trimmer for the grid condenser, for by this means the circuit could be set dead on 1800 kc with the tuning condenser fully meshed.

Although the diagrams show a triode oscillator (for the sake of simplicity) it is preferable to employ a pentode such as the 6AC7, with the screen acting as the oscillator anode,

continued at foot column 2 opposite

AMATEUR RADIO For The Beginner

PART I

ON LEARNING THE CODE

By **A. A. Mawse**

ONE of the first problems facing most beginners is "How can I learn Morse, quickly and easily?"

There is, first of all, the excellent Candler Course, which is designed for learning at home and enables a high standard of proficiency to be reached. There is also the possibility of local tuition, either at a radio club or by some kind friend who is already a competent operator. If no club exists locally and no personal contact can be made with a qualified operator, a box number advertisement in the local paper will almost certainly bring an enquiry from somebody who knows the Morse Code well enough to get a beginner started. There can in these days be few districts where there are no ex-Servicemen who have had to learn Morse at some time or other.

Self Tuition

If our beginner is still without his helping hand, he can—strange as it may seem—learn Morse quite well all by himself! The first thing to do is to memorise the Code, in terms of dots and dashes buzzed vocally, remembering that the length of a dash, *dah*, is equal in time to three dots, *dit-dit-dit*.

This should be practised until any letter of the alphabet can be buzzed instantly, on sight, without having to sort it out in terms of *dits* and *dahs*. For example, the letter "Q" should *sound* like *dah-dah-dit-dah*, in the same way as it *looks* like "Q" as printed here, without having consciously to analyse its shape.

Having got thus far, and the alphabet memorised with confidence, tune round on the short wave (*not* amateur bands) till you hear some powerful station sending repetition signals in Morse—there are many of them, fast and slow, and between the sending of actual traffic, they hold the channel open by idling on the call-signs. These are the repetition signals, and what is being sent may be something like "VVV de WSC," or "ABC de OHX." For some little time, you may not be able to make much of this, especially if the repetition suddenly breaks into high-speed sending; then, you leave him, and tune on to some other station transmitting repetition signals. At first, when listening to these signals, all you will grasp is that it *is* repetition, because your ear will pick up the *rhythm*. After careful listening, you will start getting a letter here and there, till finally you have the whole sequence complete—VVV de WSC.

This will be you first big thrill—you have picked up something in Morse, entirely by your own efforts.

Now the factor of rhythm will assume its true importance, for if you have been lucky enough to pick out a steady, well-keyed repetition signal you will automatically begin to get your time values right. Your "VVV de WSZ" begins to sort itself out neatly, because there is a definite timing between the letters of each group and between the groups themselves.

Practice

Having learnt the Code by its sound values, and appreciated the importance of rhythm—which really means spacing, exactly as print in spaced in this sentence you are reading—the next thing is *practice*, and yet more practice.

Apart from the help your receiver will afford you in finding commercial stations to which to listen, you can also practise continuously, almost anywhere and any time, without even a receiver! How is this possible? By buzzing over to yourself in Morse such phrases as newspaper headings, advertisement posters, car numbers—in fact, any piece of print that happens to catch your eye. By this process you get the *sound* value of each letter and figure impressed on your brain. Remember, it is by *sound* that you read Morse, not by analysing each group of dots and dashes into their letter meanings. The importance of this cannot be over-stressed, for if you can acquire it, you cut out the one mental process which is every beginner's difficulty in acquiring speed and accurate reading, or "copying" as it is called by CW operators. "Q" must mean (buzz it) *dah-dah-dit-dah* to you, and nothing else. The aim must be to get the sound of each character, so that you read by ear in the same way as your eye reads print, without having to analyse the shape of each letter, or even the letters of a word.

General Guidance

There are no snags in this process—except perhaps that your family and friends may begin to look at you a bit sideways when they hear the buzzing noises!

Do not be discouraged by what may seem slow progress—in the preliminary stage, some people can learn the Code, letter by letter, very quickly. Others take much longer, especially if, as they should, the Code is learnt not in alphabetical order (which involves another mental process) but by putting letters and numbers down at random. Avoid anything in the nature of "memory aids"—that "A" is opposite to "N," or that "U" is "D" the other way round, or that "6" has one more dot than "B." These are not aids at all; they slow you up by giving your brain something else to remember and work out!

The time factor in learning is only important insofar as you should not overdo it and tire your

brain; one hour's practice a day is usually quite enough, unless you feel you really want to give more. A good check on your own progress by this standard is that you may find yourself able to read call-signs and previously-unheard repetition signals in about three weeks. The rest comes with continued practice, and you will probably be reading pretty confidently on the amateur bands in about two months. If you can do better than this, you are doing well. Remember, you are learning for the fun of it, so don't wear yourself out, or allow yourself to be influenced or discouraged by those who tell you either that it took *them* three weeks, or three years, or that they never could get on with it at all.

No Key or Buzzer!

Having decided to learn on your own by the method described here—which is, of course, only recommended where there is no expert tuition available—the one thing to avoid is practice with a friend who is at the same stage as you are! The worst and most difficult way in which to learn Morse is to sit down, with buzzer and key, with somebody who also has no idea, and then proceed to make unintelligible noises at one another. Unless one partner is an operator with a good knowledge of how properly-sent Morse should sound, the whole business will take very much longer and will almost certainly mean that much will have to be *un*learnt.

In the early stages, the commercial station that you find on your receiver, sending repetition signals, is your partner, sending to you all the time perfect Morse over which you can spend as long as you like.

By now somebody is probably thinking—What about the key and buzzer? How do I learn to send? The quick answer is that until you can read with some confidence and fluency, you should not even think of trying to send. Obviously, until you *can* read, you are like the unhelpful partner; you cannot send accurately or with any sense of rhythm and spacing. But start to learn sending after you can read, and you will find it easy, quick and altogether a much simpler problem than learning to read. It is for this reason that this article is not illustrated in any way, with buzzer circuits and pictures of the right way to hold a key! The way to hold a key is the way you find most comfortable for easy wrist action, and to "make the noise" you can use either a high-note buzzer or an audio oscillator. But we shall tell you what little you need to know about sending, and practising sending, after you have learnt enough Morse to read call-signs accurately.

The whole emphasis of this article is on the fact that once you can buzz the letters, vocally, you can learn Morse by yourself with only a receiver capable of tuning in commercial CW (Morse) stations, preferably on the short-wave bands, where they are strong and numerous. Nothing else is required to start you off. You can get your reading up to 15-20 w.p.m. without ever touching a key. Then, when you can read with fluency, you can practise sending, *knowing how it should sound*; you correct your own sending errors as you go along, aware that what you

SHORT WAVE MAGAZINE

NEW "BEGINNER" SERIES

The need for practical, down-to-earth guidance and information for those who, aspiring to an amateur transmitting licence, want to obtain a sound grasp of the working principles as rapidly as possible, has for long been appreciated.

We therefore start with this issue a series of articles which it is hoped and believed will fill this need. Much time and thought have been given to their preparation. Each article will be complete in itself and will either discuss and explain some important fundamental principle, or will describe in detail, with illustrations, the construction of an essential piece of equipment for the amateur station.

Any reader whose only present knowledge of radio is the ability to read simple circuit diagrams, and whose only contact with Amateur Radio as a live hobby is through his receiver, will find that, by following the series, he will be possessed of the necessary equipment for the efficient operation of a 25-watt CW station.

The series is intended to help not only those who will be taking the Radio Amateurs' Examination in the future but also those who, being qualified to obtain a licence, wish to start in the right way. It will be found, therefore, that the series is based on the principles "What do I need, and how do I build it as economically as possible consistent with reasonable efficiency."

This important undertaking is in the hands of an experienced amateur who has himself been through it all. His contribution will be on the lines of the very successful pre-war *Short Wave Magazine* series "Transmission for Beginners." This ran during the year 1938, and many an active operator of today derived his first knowledge and his inspiration from that series. Those articles were written under the pseudonym "A. A. Mawse," whose mantle now falls upon our new contributor. His line of approach will be much the same but the treatment will be right up-to-date.

Editor.