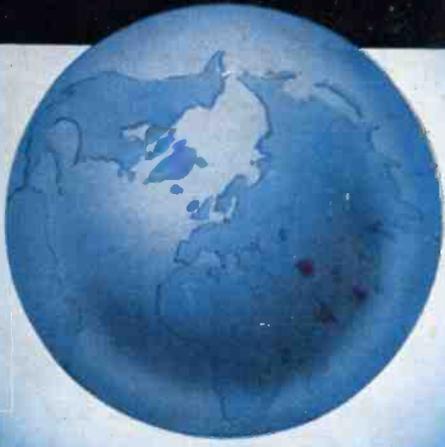


2/-

*The*

# SHORTWAVE

*Magazine*



**EXCLUSIVELY FOR THE  
RADIO EXPERIMENTER &  
TRANSMITTING AMATEUR**

**VOL. VI No. 11 JANUARY 1949**

# WEBB'S RADIO



## The EDDYSTONE '670' Receiver is now available for the Home Market

This interesting receiver was designed primarily for ship's cabin use, where good performance and utmost reliability is essential. Its specification will also appeal to the discriminating home user who wants a high performance receiver capable of giving first-class results from

A.C. or D.C. — 110 — 200 — 230 volts

**Eddystone '670' Receiver: PRICE £37.10**

**PLUS PURCHASE TAX £8.10.7d.**

FREQUENCY COVERAGE :—30 to 5.8 Mc/s and 2.75 Mc/s to 522 Kc/s (10 to 51 and 110 to 575 metres) in four bands.

VALVE CIRCUITRY :—R.F. stage—Freq. changer—I.F. Amplifier — A.F. Amplifier and Sig. Det.—Phase Inverter and AVC—Push Pull Output.

INTERNAL LOUD SPEAKER — D.C. MAINS SAFETY PRECAUTIONS ADEQUATELY COVERED — THERMISTOR REGULATES INITIAL SURGE.

*The "670" is not a communications receiver but nevertheless carries all the EDDYSTONE hall-marks of high grade design.*

*AVAILABLE EX STOCK AT WEBB'S RADIO.*

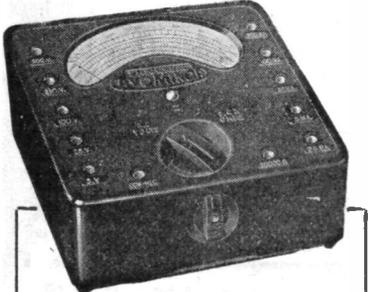
**Webb's Radio \* 14, SOHO ST., OXFORD ST., LONDON, W.1.**

Telephone : GERrard 2089

(Shop hours 9 a.m.-5.30 p.m. Saturdays 9 a.m.-1 p.m.)

# 'AVO' Precision ELECTRICAL TESTING INSTRUMENTS

A dependably accurate instrument for testing and fault location is indispensable to the amateur who builds or services his own set. Stocks are now available of these two famous "Avo" Instruments. If you have any difficulty in obtaining one locally, please send us the name and address of your nearest Radio Dealer.



<b>D.C. VOLTAGE</b> 0-75 millivolts 0-5 volts 0-25 " 0-100 " 0-250 " 0-500 "	<b>A.C. VOLTAGE</b> 0-5 volts 0-25 " 0-100 " 0-250 " 0-500 "
<b>D.C. CURRENT</b> 0-2.5 milliamps 0-5 " 0-25 " 0-100 " 0-500 "	<b>RESISTANCE</b> 0-20,000 ohms 0-100,000 " 0-500,000 " 0-2 megohms 0-5 " 0-10 "

## The UNIVERSAL AVOMINOR

A small but highly accurate instrument for measuring A.C. and D.C. voltage, D.C. current, and also resistance. It provides 22 ranges of readings on a 3-inch scale, the required range being selected by plugging the leads supplied into appropriately marked sockets. An accurate moving-coil movement is employed, and the total resistance of the meter is 200,000 ohms.

The instrument is self-contained for resistance measurements up to 20,000 ohms and, by using an external source of voltage, the resistance ranges can be extended up to 10 megohms. The ohms compensator for incorrect voltage works on all ranges. The instrument is suitable for use as an output meter when the A.C. voltage ranges are being used.

Size: 4½ ins. x 3½ ins. x 1½ ins.  
Nett weight : 18 ozs.

Complete with leads, interchangeable prods and crocodile clips, and instruction book.

Price : £8 : 10 : 0

### GUARANTEE

The registered Trade Mark "Avo" is in itself a guarantee of high accuracy and superiority of design and craftsmanship. Every new Avominor is guaranteed by the Manufacturers against the remote possibility of defective materials or workmanship.

<b>CURRENT</b> 0-2 milliamps. 0-5 " 0-30 " 0-120 "	<b>VOLTAGE</b> 0-5 volts. 0-12 " 0-60 " 0-120 " 0-300 " 0-600 "
<b>RESISTANCE</b> 0-10,000 ohms 0-60,000 " 0-600,000 " 0-3 megohms	



## The D.C. AVOMINOR

A conveniently compact 2½-inch moving coil precision meter for making D.C. measurements of milliamps, volts and ohms. The total resistance of the meter is 100,000 ohms, and full scale deflection of 300 v. or 600 v. is obtained for a current consumption of 3mA. or 6mA. respectively.

Size : 4½ ins. x 3½ ins. x 1½ ins.  
Nett weight : 12 ozs.

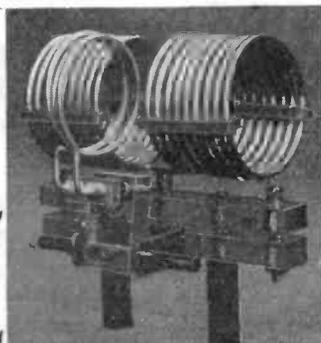
Complete as above.

Price : £4 : 4 : 0

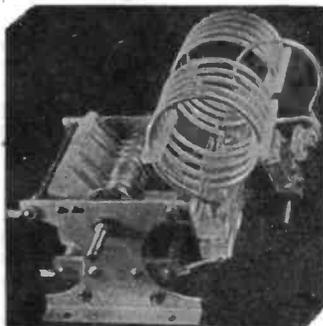
● Complete descriptive Booklet available on application to the Sole Proprietors and Manufacturers:—

**THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.**  
WINDER HOUSE · DOUGLAS STREET · LONDON · S.W.1 · TELEPHONE: VICTORIA 3404/9

PLUG IN  
**SWINGING  
 LINK COILS**  
 FOR ALL PURPOSES



TYPES DSL/28, DSL/21, DSL/14, DSL/7, and DSL/3-5, for 10, 15, 23, 40, and 80 METRE BANDS, RESPECTIVELY



**1949  
 EQUIPMENT**

Conservatively rated 150 watt plug in inductances, with swinging links (DSL series) are shown in top photo for front panel or rear control, and in lower photo similar coils and links in our P.A. Tank tuning unit (Cat. E5009). Coil losses are at an absolute minimum through the use of heavily silver-plated hard drawn copper wire and highest quality dielectric material. Send stamp for full details.

**MODERNISE  
 WITH . . .  
 Phone 249415**

**Labgear Ltd.**  
 WILLOW PLACE, CAMBRIDGE

## Lyons Radio

3 GOLDHAWK ROAD,  
 SHEPHERDS BUSH, LONDON, W.12

Telephone : Shepherds Bush 1729

### Rothermal Crystal Microphones

These new Rothermal crystal "torpedo" microphones are precision built instruments and have been specially designed for stage work, cinema studios and general public address systems. A driver type of crystal element is employed and a new method of suspension eliminates unwanted peaks and background noise. The case is streamline bakelite moulding with handsome polished chromium grille. Sensitivity level is minus 54 d.b. High impedance of 80,000 ohms at 1,000 c.p.s. The frequency response is fairly flat from 30 to well above 6,000 c.p.s. The swivel piece having a standard English thread will accommodate the average telescopic floor or table stand. These microphones are not Govt. surplus but are brand new ex-maker's stock. The list price is £18/18/-, but a very special purchase enables us to offer them at a fraction of this. Price only £4/4/-, post paid.

### Magnetrons

Brand new Raytheon type 2J27 (2965-2992 mcs, 275 kW). In protective casing for safe transit. 30/- (postage 1/6).

### Valve "Special" for this month

Brand new Mullard EC52 (VHF triode). Fully guaranteed. 6/- each (postage 9d.).

### Portable Radial Earth Mats

Consisting of 18 coils of highly flexible copper braid (each 30 ft. long) attached to pickets designed to act as winders. These are housed in special compartments each side of strong wooden carrying case. Forms a highly efficient earth mat quickly and easily laid out and taken up. New and unused. 15/- (carriage 5/-).

### Receiver Type R1355 (ex-R.A.F.)

Very useful unit containing 7-7 mcs I.F. strip. Includes 10 valves (8-VR65's, 1-SU4, 1-VU120). Practically new. 45/- (carriage 5/-).

### VCR97 Cathode Ray Tubes

Brand new in maker's packing. 42/6 (carriage 4/6). We can also supply the correct type of holder for these tubes at 2/- each, plus 6d. postage.

# Are you interested in 145 Mc/s?

If so, make a point of seeing the new **EDDYSTONE 145 Mc/s GUIDE**. It describes a compact and efficient converter using readily obtainable valves and a crystal controlled transmitter capable of an excellent performance. Both units are tried and tested, and you can rely on getting really good results.

Advice is also given on aerials. Perhaps you are a little doubtful about 2 metres? It is an easy band on which to get going, and the units described in the Eddystone 145 Mc/s Guide will not take you long to put together. Or do you just want a receiver? The converter in the Guide is very fully described, and construction has been simplified without sacrificing performance. Difficult metal work is avoided if you obtain the ready drilled chassis, etc. The converter can be used with any receiver which tunes to 10 Mc/s.

**EDDYSTONE 145 Mc/s GUIDE** - - - - - **PRICE 1/6**

## EDDYSTONE SHORT WAVE COMPONENTS

The new illustrated **EDDYSTONE CATALOGUE** is now available at your Dealer. Many new lines are included and the range of components and accessories offered is very comprehensive. Prices have, in a number of cases, been reduced. You will find it most interesting to scan through the catalogue, which represents a really good sixpennyworth. By choosing Eddystone you get quality and reliability.

**ILLUSTRATED EDDYSTONE CATALOGUE, 6d.**

Please obtain from your Eddystone Dealer—we do not supply direct



### STRATTON & CO., LTD.

EDDYSTONE WORKS,

WEST HEATH

BIRMINGHAM 31



### TELE-RADIO (1943) LTD

offer the following "American"

AT LOWEST PURCHASE TAX

type new valves "all in stock"

1-4v range	6AC7	18/3	6SS7	12/10	7C5	12/10	DAF91	15/10	6L6	36/6 pr.
1A3	12/10	6AG7	12/10	6U7	12/10	7C6	DL92	14/-	6V6	25/8 pr.
1A5	11/-	6B8	15/3	6V6	12/10	7H7				
1A7	12/10	6C5	9/2	6X5	11/-	7Q7				
1C5	11/-	6C6	18/11	6Z4/84	11/-	7R7				
1G4	12/6	6C8	18/3	6Z7G	18/3	7Y4				
1G6	12/10	6D6	18/11							
1H5	9/2	6F5	12/2							
1LC6	12/10	6F6	12/10							
1LN5	11/-	6F8	18/3							
1N5	11/-	6H6	9/2							
1P5	11/-	6J5	9/2	6E5	10/5					
3Q5	11/-	6J7	12/10	6U5	10/5					
		6K6	12/10	Y63	10/5					
		6K7	12/10							
		6K8	14/-							
		6L6	18/3							
5v range		6L7	12/10							
5R4GY	18/3	6N7	18/3							
5T4	12/10	6O7	11/7	VR75/30	12/6					
5U4	18/3	6R7	11/7	VR90/30	12/6					
5V4	11/-	6SA7	14/-	VR150/30	12/6					
5W4	11/-	6SC7	18/3							
5Y3	11/-	6SF5	11/7	885	18/-					
5Z3	18/3	6SG7	12/10							
5Z4	11/-	6SH7	12/10							
		6SJ7	12/10							
		6SK7	12/10							
6-3 range		6SL7	18/3							
6A7	21/11	6SN7	18/3	78A	14/-					
6AB7	18/3	6SQ7	11/7	7B5	12/10					
6A8	14/-	6SR7	11/7	7B6	12/7					
				7B8	12/3					

### TELE-RADIO (1943) LTD.

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Phone: AMB 5393. PAD 6116. PAD 5606

# H. WHITAKER G3SJ

10 YORKSHIRE STREET, BURNLEY Phone 4924

**MICROPHONES.** Roethermel Xtal Torpedo,  $8\frac{1}{2} \times 3\frac{1}{2}$ ", with chrome grill and chrome swivel arm, complete with plug and socket, and 8 ft. of screened cable. Sensitivity level minus 54db., impedance 80,000 ohm at 1,000 cycles. Flat response from 30 to 6,000 cy. List price £18/18/-. Brand new and boxed, limited quantity at £5 each. **ROTHERMEL D104**, at £5. **SHAFESBURY RIBBON**, £12. **STANDARD TEL. M.C.** "Ball mike," £5. **SHAFESBURY xtal**, £3/10/-. U.S. Condenser, with push to talk button, T24, £5. **POST OFFICE desk**, 7/6. T17 hand with push to talk switch, 5/-. M.C. hand, 7/-. R.A.F. Throat magnetic, 3/-. U.S. Lip, 2/6. **SHURE** carbon inserts foundation of a perfect mike by world-famous maker, 1/6.

**U.S. POWER SUPPLY UNITS. TYPE 34H.** Input 110/250v 50 cy. OUTPUT 1,100v 350 mills. D.C. 12v 14 amp. A.C. 10v 2 amp. D.C. for relays, mike energising, etc. **FAN-COOLED THERMOSTATICALLY. PUSH-BUTTON STOP-START. ONE MINUTE THERMAL DELAY SWITCH FOR HIGH VOLTAGE. PROVISION FOR REMOTE CONTROL BY RELAY. THREE-AUTOMATIC CIRCUIT BREAKERS**, which trip if a short on TX. In welded steel cases with black crackle finish size. Weight 180lb. net. 230lb. packed in original transit cases. **PRICE COMPLETE WITH TWO 866 RECTIFIERS, £12.** Carr. for.

**CLAPP OSCILLATOR.** Constructed from the well-known T.U. units, this Osc. rapidly coming to the fore with a stability equal or better than xtal. Its chief feature is its ability to key with a lag circuit **WITHOUT CHIRP.** The Clapp overcomes this difficulty with ease. Break in is an easy matter with a real T9 note. The unit has three stages with the 6CS osc. stage, keyed for break in. This is followed by a 6F6 isolator with a 6V6 output, with a vr150 voltage stabiliser. The units are accurately calibrated with approx. 3 divisions per KC., and provided with CO-AX lead for either coupling to an existing xtal socket, or link coupling to the grid of a buffer, doubler. Three models available, 160/80, 80/40, 40/20, all of which are band-switched, and complete with valves and VR-150, but less power supply; a nominal power pack of 250/300v D.C., and 6-3 A.C. required for immediate operation. A really quality V.F.O. at the competitive price of £7/10/-. (Due to heavy demand delivery is approx. 7 days.)

**MULLARD RES. CAP. BRIDGE. GM4140/1** 230v A.C. mains, brand new in original cartons, £7. **METERS PER.** 0/150 mills 2" square, 7/6; **WESTON** 0/50, 0/200, 0/500, 2½" round flush, 10/- each. 0/1 Weston, ditto, 14/-. **Electrostatic Voltmeters**, 4½" round flush, 0/5000v, 17/6. **TAYLOR** 0/500 mills, 3" round flush, 17/6.

**XTALS.** Ex-U.S. SIGNAL CORPS. Over 2,000 amateurs are already using these xtals with complete satisfaction. They are unrepeatable at the prices offered. Have you had yours? To commercial users and others we have good stocks available in most freqs. Your enquiries welcomed. All are by the leading American manufacturers, Bliley, R.C.A., Stand, M.P., etc. All are in sealed holders, with raised edge air gap plates, in standard U.S. FT4 type holders, with half-inch pin spacing, except B.C.610 type, which are ½".

7,000/7,300 kc., any freq., plus-minus 1kc., 12/6. 3,500/3,800 kc., any freq., plus-minus 1kc., 15/-.

**FOR 144 MC BAND.** 6,000/6,083 kc., 8,000/- 8,220 kc., 9,000/9,250 kc., any freq., 15/-. For I.F.'s 290/400 kc., 800/1,040 kc., with the exception of 1,000 kc., 12/6.

R.C.A. 100kc., 30/- (U.S. 3-pin HOLDER). **PRACTICALLY ANY FREQ. OUTSIDE THE AMATEUR BANDS.** Quotations by return.

**XTAL MULTIPLIERS. WILCOX GAY.** Type M.I. 19468. A xtal osc., using 807 valve switched bands, 2/7 Mc., incorporating grid meter for a following stage. B.C.610 Xtal holder on front panel for quick change of xtals., complete in original sealed cartons with spare 807 valve and manual, 45/-.

**ELECTROLYTIC CON.** Metal can, 20mf. 50v wkg., one-hole fixing, in sealed cartons and perfect condition, 1/-, 10/- doz.

**VALVES T.X.** 805, 45/-; 807, 12/6; 808, 37/6; 811, 45/-; 813, 70/-; 814, 40/-; 100th, 60/-; 250th, 100/-; 304th, 100/-; HK257b, 60/-; 1,625, 6/- (60/- doz.); 2C26, 10/-; 2C22, 4/- 36/- doz.).

**RECTIFIERS** RG240/A 20/-; 866, 25/-; 836, 20/-; 6X5, 5W4, 5U0, 5V4, all 7/6. 5U4, 10/-; 5R4 GY, 7/6.

**BUTTON BASE.** 1001, 1A3, 1S5, 1T4, 3S4, 3A4, 1R5, all 7/6; 955 acorn, 7/6.

**VALVES.** RX.6J7, 6SJ7, 6K7, 6SK7, 6G6, 6SH7, 6AC7, 1852, 6SC7, 6J5, 6C5, 6C5, 6R7, 6SG7, 6H6, 6SL7, 6K6, 6Q7, 6Y6, 1LNS, 1A5, 117Z6, 12SK7, 12A6, 12SR7, 12SG7, 12K8, 12SA7, 12J5, 12C8, all at 7/6. 6V6, 6N7, 6SN7, at 8/-; 6L7, 1316, at 10/-; 6L6, 12/6.

**VALVES UNBOXED.** A large quantity of 6H6, and 6SH7, taken from IFF units. All are new and guaranteed perfect to clear at 24/- a doz.

**TUNING INDICATOR.** 6E5 at 8/-. Selenium cell, R.C.A., 923 UX base, 17/6.

**VALVE HOLDERS.** ALL CERAMIC. OCTAL, 1/-; 4-PIN UX, 1/-; 807, 1/3. R.C.A. 813, 7/6. LOCTAL, 6d.

**SMOOTHING CHOKES.** 1,500v, 500 mills 15hy, 25/-; 1,000v, 10hy 150 mills, 10/6; U.S. Potted, 150 mill, 5/9; 250-mill, 7/6. **SWINGING,** 2½ to 24 hy, 450 mills, 10,000v insulation, 30/-.

**VITREOUS RESISTORS.** 225 ohm, 20 watt, 5,000 ohm 20 watt, 35,000 ohm 35 watt, all at 1/-; 50,000 50 watt, at 2/-; 20,000 120 watt, at 2/-.

## TO AR88 USERS

Are you satisfied with the performance of your AR88, or would you like to improve it? The signal to noise ratio can be improved beyond all recognition, especially on 10 metres, by the simple expedient of replacing your first R.F. amplifier valve 6SG7, by a 717a, and re-trimming the R.F. stage only. It has to be heard to be really believed, especially on 10, and makes a wonderful difference to be able to turn up that R.F. gain, and hear signals Q5 that are normally S3 due to noise. We can supply this valve R.F. Pen 717 a mushroom Amp. at 12/6:

# THE RADIO & ELECTRICAL MART (G3BSW) of 253-B PORTOBELLO ROAD, LONDON, W.II

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Take pleasure in offering the following items—carriage paid :—

**R.A.F. Type 22.** Transmitter receivers, 2-8 mcs. Crystal controlled. This superb 13-valve set, complete with 12v power pack, mike and head-phone set, comes to you tested and ready for use in green canvas (with leather corners) holdall carrying case, as new, for bargain price of £15. Add 10/- for wood crate (returnable.)

**U.S. Signal Corps 15-Watt Amplifiers.** Complete except for power pack—contains 2 1619 tubes (better than 6L6's). Price 50/-.

**R.A.F. 12v Vibrator Pack** with P.P. audio amplifier, complete at the low price of 30/-.

**Type BC347.** U.S. Signals Interphone Amplifier. 6F8 twin triode in P.P. Case measures 5½" × 2½" × 4". Excellent mike amplifiers. Price 10/-.

**Test Set, Type 46.** New battery-operated frequency meters, 2 to 23.5 mcs. Made by Marconi Instruments. Can be adapted to all-wave by inclusion of LW and MW coils. 40/- each.

**Type T.G. 10-F.** U.S. Signals Morse Keyer Unit. This beautifully made 25w amplifier in black

crackle finished case, 21" × 14" × 11", also contains a variable speed motor, photo-electric cell, and exciter lamp. Ideal for conversion to sound unit of cine projector. New, £15. Add 10/- for crate (returnable).

**Type 2.** Valve tester. Contains 5" 0-500 micro-ammeter. Price £3/15/-.

**Type 3002.** R.A.F. UHF Units, containing 10 valves—easily adaptable for 2-metre use. Price £1.

**B.C.453 A or B.** If you own one of these excellent receivers, we can offer you a medium band coil pack which has been designed by Meteor Electronics at our request and is easily mounted. Complete circuit diagrams and coil pack, 17/6. You will be delighted with the results.

**2-Metre Oscillator or Signal Generator.** Using CV1197 Acorn. Requires only LT 6.3v and 120v HT supply to work. Complete with circuit, 16/6.

**Khaki Canvas Parachute Cases.** New. Ideal for conversion to school satchels, tool holdalls, shopping bags, brief cases, etc. Price 2/- each.

Write for lists containing hundreds of items in short supply. Send us your requirements.

Remember, money-back guarantee.

# INSTRUMENT CO.

244 HARROW ROAD, LONDON, W.2.

**EX-R.A.F. AMPLIFIER 1134.** Ideal for use with a microphone, or can be used as an amplifier without modification. Complete with wooden transit case. **16/9**  
Post free

**MAINS TRANS.** Stand up and Drop-through type. Primary 200-250 volts. Secondary 350-0-350 80mA, 5 volts 2 amps, 4 volts 3 amps. **£1**  
Post paid

**EHT TRANSFORMER** giving 2,500 volts and 6.3 volts at 5 amps and 4 volts at 3 amps. **£2/18/0**  
Post free

**SCREENED FLEX.** 10/-  
Suitable for mikes. 100ft.

**12 ASSORTED RELAYS** for experimental purposes. **12/9**  
Post free

**INFRA-RED TUBE.** 14/6  
Post free

**2½" FLUSH MOVING IRON AMMETER 0-25.** 7/6  
Post free

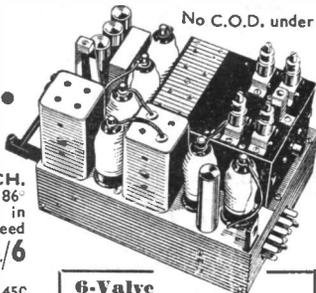
**THERMOSTATIC SWITCH.** Breaks automatically at 86° Fahrenheit. Can be used in some of your circuits that need temperature control. **3/6**  
Post free

**CONDENSERS.** 8 Mfds., 450 volt working. **1/9**  
Post free each

**R1355 RECEIVER.** Ideal for modification to television. Complete with RF25 unit. **47/6**  
Plus 5/- pkg.

**TYPE 6 INDICATOR** with VCR97 Cathode Ray Tube. Plus 15/- carriage. **7/6** refunded on return of packing **£3/19/6**  
case.

**PUMP** for exhausting, compressing or liquid pumping. Brass construction. Spring loaded. **7/6**



No C.O.D. under £1

## 6-Valve SUPERHET

Receiving Unit of the well-known TH1196 which covers 4.3 to 6.7 mc/s. Among the many useful components are:—1 pr. standard IF transformers (460 kc/s), iron dust cores, 2, 1 MFD, 500v working condensers; 4, 1 metal tubular condensers, 1 MFC transformer; 1 phone output transformer, 2 pot meters, 10 fixed condensers of standard values; more than 2 doz. resistors from 200 ohms to 1 megohm; 6 International octal valve holders; 2 tag boards; 1 Vaxley switch; 4 pre-set '0001 condensers and tuning coil. In fact a 6-valve superhet mounted on steel chassis, size 8½" × 6" × 2½". Less valves, post free, 10/-. With valves, 29/6, plus 2/6 pkg. and ins.

This Set can be easily modified for Car Radio or 4-Station Push Button Receiver. Data Book, 1/6 extra.

Write for full list of bargains to Dept. "M"

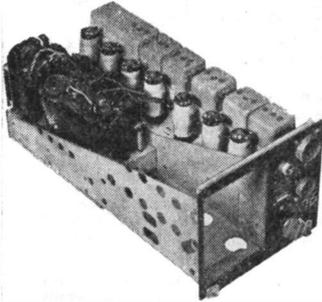
**INSTRUMENT CO., 244 Harrow Road, London, W.2**

Telephone : CUN 0508

# CLYDESDALE

For Bargains in Ex-Services Electronic Equipment

## EX-R.A.F. IF/AF AMPLIFIER UNIT RI355



5 stages of I.F. amplification, 8 valves, etc.  
 A first-class receiver by plugging-in R.F. units, 24, 25, 26 or 27 (not supplied) in metal case, 18 x 9 x 8 ins. Used.  
 Clydesdale's price only **30/-** each Carriage paid

R.F. Unit 26, for 65—50 mcs.

R.F. Unit 27, for 85—65 mcs.

With variable tuning, suitable for alteration.

Brand New in maker's cartons **35/-** each

or used, **19/6** each

Post paid

R.F. Unit 24, for 26—30 mcs.

Preset, switched tuning, suitable for alteration.

Used, good condition **12/6** each

Post paid

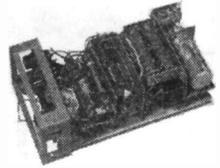
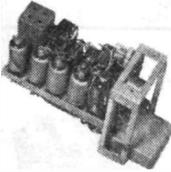
BRAND NEW, IN MAKER'S CARTONS

## 38 A.F.V. XMTR./RCVR. UNIT, with Power and L.F. Amp. Unit

Frequency 7-3 9 mcs, 6 valves, 3/VP23's, 2/V248A's, SW75 (pen), metal rectifiers, Vibrapack, for 12 volts in two units. Xmtr./Rcvr. size 10½ x 4 x 6½ ins. Power Amp. 11½ x 4 x 6½ ins., plus spares, aerial and instruction Book, less junction cable.

Clydesdale's price only **79/6** per set

Carriage paid



## Co-axial Cable

Coil (12 yds.) first-class co-axial cable, approx. 80 ohms, 12 mm.

At **7/6** per coil. Post paid

Any length top grade co-axial cable, 52 ohms 12 mm at 6d. per yd. Minimum length 20 yds. 10/-, post paid.

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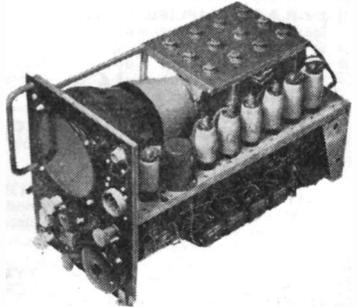
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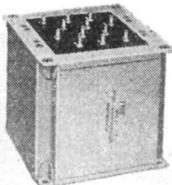
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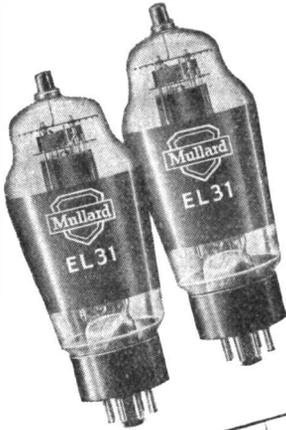
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## EDITORIAL

## Resolutions

It is again the season for Sound Advice and Good Resolutions—and it hardly needs saying here that in our world of Amateur Radio much useful advice could be given and a long list of excellent resolutions could be catalogued.

But as always amateurs will remain as individuals who pursue a great hobby as the spirit moves them—they are not really much concerned about what others may be doing or thinking.

Now, the interest may be DX and the thrill of beating the other man to a new contact—incidentally, a manifestation of the game almost entirely of post-war origin and the root cause of many of the ills afflicting our communications bands. Later, it may be the interest of building a new piece of equipment : Or an excursion on a new band : Or the satisfaction of helping a newcomer to obtain his first results : Or a hundred-and-one other possible lines of activity.

The very fact that there are so many aspects of Amateur Radio is one of the reasons why it always remains so fascinating, even after years of activity and a long experience on the air.

So instead of offering advice for the New Year to those who may glance over this page, we would simply say that we wish all our readers, all over the world, the best of luck, happiness and good fortune for the coming year, and success in whatever direction their amateur activities may lead them.

*Austin Fordy 4060.*

# Multi-Band Radiating System

## Fixed Top with Three-Wire Open Feeder

By D. WESTWOOD, B.Sc., M.I.R.E., A.M.I.E.E. (G8WF)

*(The aerial arrangement described here is an ingenious approach to the problem of multi-band operation with some control of directivity. The design data given cover a system which can be operated on 7, 14 and 28 mc ; three radiating modes can be obtained on 14 mc, two on 28 mc and one on 7 mc, any of which can be selected at the station end simply by appropriate connection of the feeders.—Ed.)*

**T**HIS aerial system was designed to give optimum performance on 14 mc while permitting efficient operation also on 7 and 28 mc. The final arrangement, although simple in construction and operation, allowed the following alternative methods of use:

On 14 mc

- (a) Extended double-Zepp.
- (b) Two half-waves out of phase (Zepp fed).
- (c) Single half-wave (Zepp fed).

On 28 mc

- (a) Full-wave Zepp.
- (b) Five half-waves, centre fed.

On 7 mc

"Extended dipole," centre fed.

In each case balanced feeders are adopted and no external switching or phasing is necessary, all adjustments being made at the transmitter end.

A resonant feeder system using open-wire line is employed, since not only does this permit maximum flexibility in operation but also if constructed as suggested here the losses are almost as low as can be obtained on these frequencies with the best type of matched non-resonant line. The fact of using air spacing is a decided advantage, especially when compared with certain solid dielectric feeders obtained as surplus. Some of the dielectrics used, especially those manufactured during the

early war years, seem to be adversely affected by exposure to the weather and although the outward appearance may be normal, the RF losses are often excessive. It is true that a good solid-dielectric line accurately matched can give high transfer efficiency, but it is equally true that many amateurs are using for reasons of convenience or economy solid dielectric feeders which fall in the former category rather than the latter. If a radiating system combining efficiency and flexibility with economy and simplicity of construction is required, this multi-band aerial with resonant feeders has many points in its favour and it is particularly recommended to those users of solid dielectric

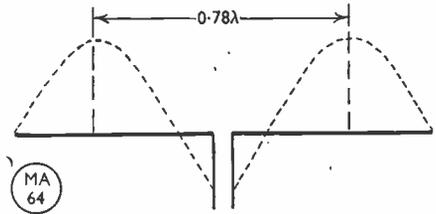


Fig. 2. Current distribution on the "extended double Zepp"—see text for discussion.

feeders who suspect that their results are not all they should be.

### Operation on 14 mc

The main requirement on 14 mc was some method of altering the direction of the major lobes of radiation of a fixed aerial. The writer had found from past experience, using the commoner types of aerials, that good results were often obtained in certain directions, but in others the signal was negligible. In particular, a long-wire Zepp gave good

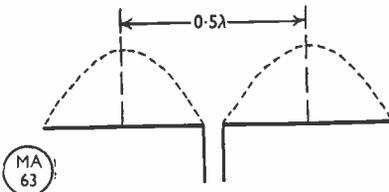


Fig. 1. Current distribution for two half-waves in phase.

signals into all continents except Africa, whereas a half-wave dipole at the same location gave the same effect with South America the missing continent. The present aerial does not suffer from this defect.

In the broadside direction a choice of either narrow or wide lobes is possible, while for working in other directions four major lobes are produced at an angle of 47 deg. to the wire. This pattern is very similar to that obtained with a normal full-wave end-fed aerial which has a lobe angle of 54 deg.; so for working in directions off the ends of aerial the present design is slightly better.

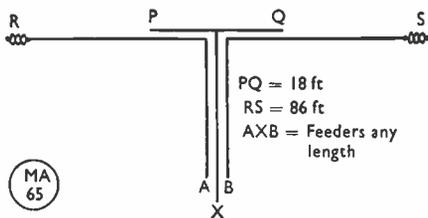


Fig. 3. Schematic diagram of G8WF's aerial and feeder system for choice of operation on either 7, 14 or 28 mc, with dimensions. Feeder connections for different bands and radiation patterns are shown in Fig. 8.

**Extended Double-Zepp**

In the narrow lobe broadside position a definite gain over a half-wave dipole is produced by the use of the extended double-Zepp. This aerial has been described elsewhere, but for those who may not be familiar with the principle, it is a development of the full-wave centre fed aerial known commonly as "two half-waves in phase." When the distance between the two current maxima is 0.5 wavelength (as in the case of a full-wave centre-fed aerial) the gain over a dipole in the broadside direction is 1.8 dB; but as the spacing is increased, the gain also increases, up to a maximum of 3.2 dB, before it starts falling off again at spacings greater than 0.78 wavelength. This gain may not seem very impressive in comparison with the figures claimed for some parasitic arrays, but in practice the increased signal is very noticeable; further, this method does not result in increased losses due to lower radiation resistance as in the case of a close-spaced beam. The actual gain for an aerial height of about 30 ft. seemed to be greater than indicated by the above figure; presumably

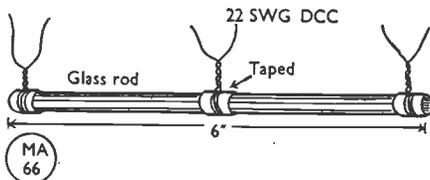


Fig. 4. Construction of the feeder spacers: glass rod is used, taped as shown to provide adhesion for the binding wire.

earth reflection effects reinforced the radiation at the lower angles useful for DX communication.

If any choice of aerial orientation is possible, then in order to utilise this directivity to the fullest advantage, the aerial should be arranged at right angles to the direction in which most consistent and reliable communication is desired, since this extra gain is not produced with the alternative methods of aerial excitation described below.

The current distributions of the two half-waves in phase (full wave) and the extended double-Zepp are shown for comparison in Figs. 1 and 2. The complete aerial and feeder system with dimensions is shown schematically in Fig. 3.

**Methods of Feeding**

Feeders A and B (Fig. 3) energise the aerial as an extended double-Zepp. The third feeder, X, is used to allow alternative modes of aerial excitation. The reason for extending the centre feeder X for 9 ft. in each direction at the top in the form of a "T" is to permit reasonably balanced feed

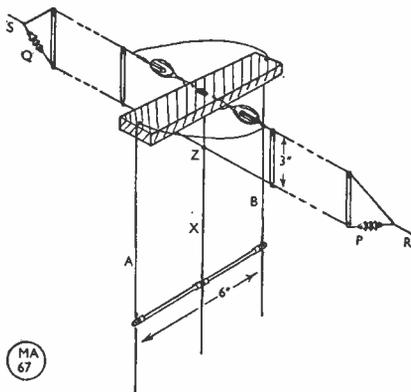


Fig. 5. Construction of the centre section of the aerial—compare with Fig. 3.

in all cases. Thus, to excite the aerial as two half-waves out of phase on 14 mc, A and B are strapped together at the bottom and treated as one leg of the feeder, X being the other. This permits working in directions roughly off the ends of the aerial. It may be found that certain intermediate directions (about 75 deg. to the wire) are not covered satisfactorily either by the extended double-Zepp or the two half-waves out of phase. If so, the ordinary half-wave aerial may be employed since its polar diagram overlaps the other two. This is done by feeding X and A (or X and B), leaving the unused feeder floating.

### Operation on Other Bands

On 7 mc, feeders A and B are used and the aerial functions as a doublet approxi-

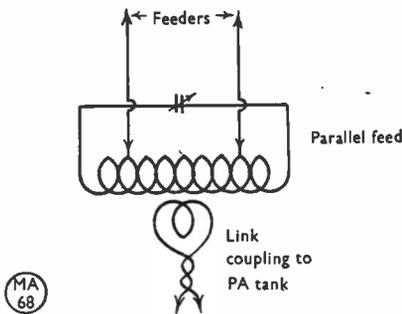


Fig. 6. Parallel tuned feeder connection.

mately 0.65 wavelength long. The increased length should give higher radiation efficiency as compared with a half-wave dipole. This was borne out by the results obtained, which were distinctly better than with the writer's previous 7-mc aerial, a half-wave, fed with matched open wire line.

On 28 mc, good general coverage is obtained by energising X and A (or X and B), the unused feeder being left floating. One half of the top is then employed as a full-wave aerial. An improved signal in the wire direction is obtainable by leaving X floating and energising A and B. The aerial is now centre-fed and almost five half-waves long.

Feeder length is unimportant, but the type of aerial tuning circuit (Figs. 6 and 7) will depend on whether a current maximum or minimum appears at the transmitter end. In the writer's case, the feeders were just

over 30 ft. long and parallel tuning was used on all bands. If a feeder length is encountered which will not load properly with either series or parallel tuning, then the usual expedient of adding extra length at the station end may be adopted.

### Details of Construction

Glass spreaders were used throughout. These were made from  $\frac{1}{4}$ -in. glass rod (not tube), purchased in lengths of approximately 4 ft.; 6-in. lengths were obtained by nicking with a file, after which the rod was snapped quite easily. The spreaders were prepared for attachment to the feeder by wrapping each end and the centre with about  $\frac{1}{2}$  in. of black friction tape, warmed before application. Only a small amount is required since this tape is used for its adhesive, not for its insulating properties. Each of the three portions of tape is then tightly bound with three or four turns of 22-gauge DCC wire, leaving free ends about  $2\frac{1}{2}$  in. long to act as binders (shown in Fig. 4). One spreader per  $2\frac{1}{2}$  to 3 ft. of feeder is required.

Ten shorter spreaders, for the top section, each 3 in. long, are then prepared, but with binders at the ends only in this case.

Made up as described, the spreaders are not only very effective but also very cheap. In the writer's case, the 6-in. spreaders worked out at less than a penny each.

The aerial centre-piece is made up of two porcelain egg-type insulators and a strip 6 by 2 in., one  $\frac{1}{4}$  in. in thickness. This may be of any material which has low RF loss, is strong enough to take the pull of the aerial and will withstand exposure to the weather.

Five holes must be drilled in the strip, as shown in Fig. 5, two near the ends to take the outer feeder wires, one at the centre for a brass nut and bolt to support

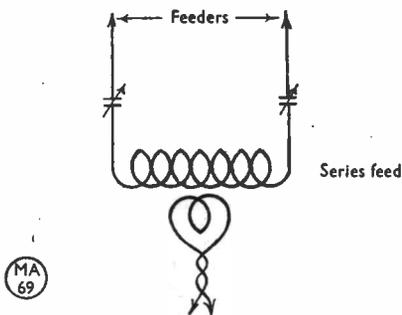


Fig. 7. Series tuned feeders.

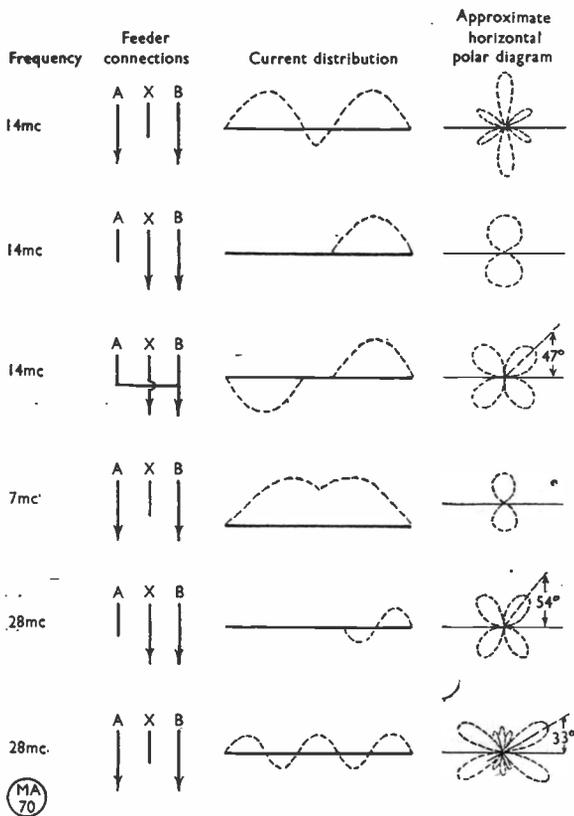


Fig. 8. The current distribution for different feeder connections from band to band, showing also the approximate radiation pattern under different conditions.

struction it is desirable to have the assistance of a second person. The two halves of the aerial should first of all be attached to the halyards at each end and to the centre portion, then raised to a convenient height for working. Next, the 18-ft. top section should be attached to the aerial by means of the 3-in. spreaders as shown in Fig. 5. If enamelled wire is used for the aerial a little insulating tape should be wrapped round at the point of attachment to prevent slipping of the binders. The centre of the "T" portion is connected to the centre feeder at Z (Fig. 5) by binding with tinned copper wire and soldering, or by means of a brass nut and bolt. Small insulators are inserted at PR and QS. Note that the connections between the two outer feeders and corresponding aerial sections must not be pulled taut. The process of attaching the 6-in. spreaders is facilitated if one person fastens the spreaders while the assistant maintains a light tension on the feeders lower down. If the ends of each spreader are attached before the centre, this will assist in maintaining equal tensions in the three

wires. The first spreader should be attached about 1½ ft. from the top of the feeder and the rest at uniform intervals of, say, 2½ ft.

If this method is adopted a feeder of neat appearance is obtained which in windy weather swings as a single unit and spacing is unaffected.

Using the method of suspension shown in Fig. 5 it is not necessary for the feeder to be vertical and it may be taken away from the aerial at any angle.

**Feeder Coupling—Results Obtained**

At the station end the three wires may be secured to ceramic stand-offs, connection being made to the aerial coupling circuit via flexible leads with clips. Fig. 8 shows the various feeder connections and

the centre feeder and the other two holes are for securing the insulators.

If a flat piece of ceramic is available, of the type used for coil mounts, having holes in the right positions, this will make an ideal centre-piece.

The wire used for the top may be either stranded or single, 14 or 16 gauge (or equivalent). The feeders, however, do not have to take any appreciable strain and 18 or 20 gauge is adequate. The writer used 20 SWG DCC for the initial tests and this gave a feeder strong enough to withstand heavy winds, and at the same time light enough to avoid undue sag at the aerial centre.

**The Three-Wire Feeder**

To make a neat job of the feeder con-

the corresponding radiation patterns.

Concerning practical results, a mere catalogue of DX contacts would not serve any really useful purpose, but it may be of interest to note a selection just to illustrate how effectively the aerial succeeds in producing the required all-round radiation on 14 mc. Contacts on this band (with the aerial running approximately E-W) include KH6, KL7, VR5, C, J, VK2 to 7, ZL1 to 4, VU, AP, VQ2 to 5, ZS1 to 6, PY, LU, VP6, VP9, and all W and VE call areas.

On 7 mc, W, VE, VP4 and VO have been worked and on 28 mc the results have been equally satisfactory.

While most of the tests have been carried out on CW, occasional excursions using 'phone have not been entirely unrewarded, and on 14 mc, LU, OX, TI, VK, VE7 are typical contacts, while on 7 mc 'phone, in QSO's with British and European stations, S9 reports are average.

The input never exceeded 80 to 90 watts on any band, and on many occasions 25 watts proved to be more than adequate.

## Valve Voltmeter

### A Practical Design

By A. G. WOOD (G5RZ)

SEEKING some means of measuring the stage gain of an amplifier which was in course of construction, the writer turned with some trepidation to the construction of a valve voltmeter—and found, much to his surprise, that the work was intensely interesting, most instructive and, above all, that the instrument worked and has since proved to be of immense value.

The basic circuit is shown in Fig. 1, from which it will be seen that the applied AC volts are rectified by the diode and appear as a negative potential at the grid of the triode amplifier.

The triode is biased automatically to a point on the linear portion of the slope and the milliammeter is connected from the cathode to a point of equal potential on the voltage divider chain of resistors in the HT supply.

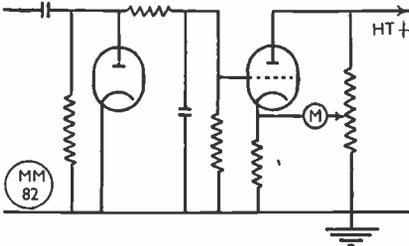


Fig. 1. Basic circuit of the valve voltmeter.

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A well-constructed valve voltmeter will measure AC voltages over a very wide range of audio and radio frequencies, and can be scaled to cover several convenient voltage ranges. This article, dealing with the construction and calibration of such an instrument, will be of great interest to all who like to build their own bench equipment.—Ed.

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In this way, with no applied input the milliammeter reads zero. Any increase of negative bias will cause current to flow and enable the meter to read from left to right in the ordinary manner.

### Construction

Turning now to the constructional side, all the parts required were available in the spares box; a steel container was chosen, approximately 7 in. × 4 in. × 4 in., which at one time had housed a trickle charger unit. The valve used was an EF50, triode-connected, although other types would do equally well so long as they have adequate *G<sub>m</sub>* to maintain the sensitivity of the instrument.

The pre-set potentiometers and variable resistors were suitably arranged around the sides of the box, with their spindles cut short and slotted. At one end is the three-way double-bank Yaxley switch for controlling the ranges, at the other end the "zero set" potentiometer and the meter, which in the writer's case was a 500  $\mu$ A instrument fitted flush on the top of the box. The resistor values shown in the detailed circuit diagram, Fig. 2, suited this particular design and gave full-scale deflection of 2 volts, 25 volts and 250 volts AC. But in the first instance it is strongly advised to wire up the circuit bread-board fashion, making rough calibrations to be certain that the ranges will work out as required. This will save a great deal of



The instrument complete, with the diode probe on a wandering lead.

blood-pressure at a later stage because in the space allowed there is scarcely room left for dust to enter after all the pieces have been packed into place! In this connection, it is as well to mention the method of wiring up. Each part had flexible leads soldered on at the commencement—and be sure there are no bad joints to come adrift after assembly—and was then fitted into position. With everything in place they can then easily be connected up and cross-checked at every stage, the leads being cut to length as the work proceeds. Any bare soldered joints should be taped to prevent subsequent trouble.

A three-core cable is led out from one end of the box (or from suitable terminals),

connecting to HT+, LT and common earth return. Power is supplied from any convenient power pack giving not less than 150 volts at 30 mA. In the writer's case a 330-volt supply is used with a suitable dropping resistor, as shown in Fig. 2. LT required is 6.3 volts at 0.6 amps, or 4 volts if valves of this type are used.

A second three-core lead about one yard in length is led out at the other end of the box, the far end of which is connected to the diode probe.

#### The Diode Probe

This consists of an EA50 diode with its associated resistors and condensers, as shown in Fig. 3. The probe assembly was

packed into a moulded shaving-soap holder, the screw-base of which was drilled to take the three-core lead and two 6 BA rods. The closed end of the tube was turned off in a lathe (or it could be sawn off) and replaced with a disc of perspex, drilled to take the two 6 BA rods and the two probe heads. One of the 6 BA rods is earthed to the common return lead and a short flexible connection with crocodile clip is connected to the top of the rod where it projects through the perspex disc. Fig. 4 shows the construction in detail.

It will be seen that one probe head is used for measuring AC. The other is used for measuring DC and should be connected to the negative source of supply with the crocodile clip taken to positive. It was found that when measuring a DC source of low resistance false readings were obtained. This was corrected by connecting the DC input across a high resistance potential divider. It was found that 11.2 megohms, with the feed to the

amplifier connected exactly half-way, i.e. two 5.6 megohm resistors in series, gave a full-scale deflection on DC of 5 volts, the multipliers for the other two scales being 12.5 and 125 respectively. In this connection, it is as well to remember that whilst, in theory, Scale 3 should read  $5 \times 125$  or 625 volts full scale, in practice this is inadvisable as this voltage is in excess of the working voltage of the shunt condensers employed.

**Calibration**

Turning now to methods of calibration. The meter is switched on and allowed a few minutes to warm up. The zero-set potentiometer is then adjusted until the meter reads zero. A 50-cycle supply voltage is chosen which will give about 10 volts and 50 volts. Taking the 10-volt tap first, an adjustable resistor of about 10,000 ohms is connected in series and a potential divider of 9 : 1 ratio is placed across the output. This may well be a 2,000-ohm potentiometer with the arm adjusted to give 200 and 1,800 ohms. Across the 2,000-ohm section is connected an ordinary AC voltmeter and the variable resistor adjusted until the meter reads 7.07 volts. As this is RMS value, the corresponding voltage across the 200-ohm portion of the divider is now 1 volt peak. Now connect the earth clip and AC probe head of the voltmeter across the 200-ohm load and adjust the 300-ohm sensitivity control with the switch on Scale 1 until the meter reads exactly half scale. Check the linearity of the scale by taking alternative readings. It will be found that the scale is virtually linear except at very low readings.

**Table of Values**

Fig. 2. The Main Instrument

- C1 = 0.1  $\mu$ F
- R1 = 4.25 megohms
- R2 = 500,000 ohms
- R3 = 150,000 ohms
- R4 = 100,000 ohms
- R5 = 200 ohms
- R6 = 300 ohms
- R7 = 7,000 ohms
- R8 = 140 ohms
- R9 = 18 ohms
- R10 = 70 ohms
- R11 = 3,300 ohms
- R12 = 4,500 ohms
- R13 = 1.5 ohms
- V2 = EF50
- M = 0.500  $\mu$ A meter

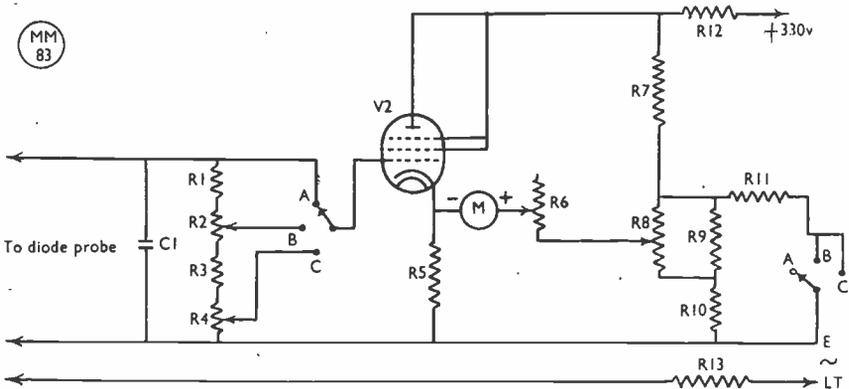


Fig. 2. Working circuit for a valve voltmeter ; values are given in the table.

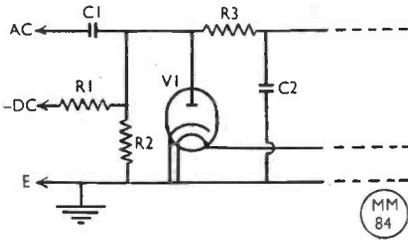


Fig. 3. The diode probe, described in the text.

**Table of Values**

Fig. 3. The Diode Probe Section

- C1 = 0.1  $\mu$ F
- C2 = .001  $\mu$ F
- R5, R6 = 5.6 megohms
- R3 = 1.5 ohm
- V1 = EA50

Next, readjust the supply voltage to 7.07 volts RMS, switch the voltmeter to Scale 2 and connect the probe across the full 7.07 volt supply. Adjust the 500,000-

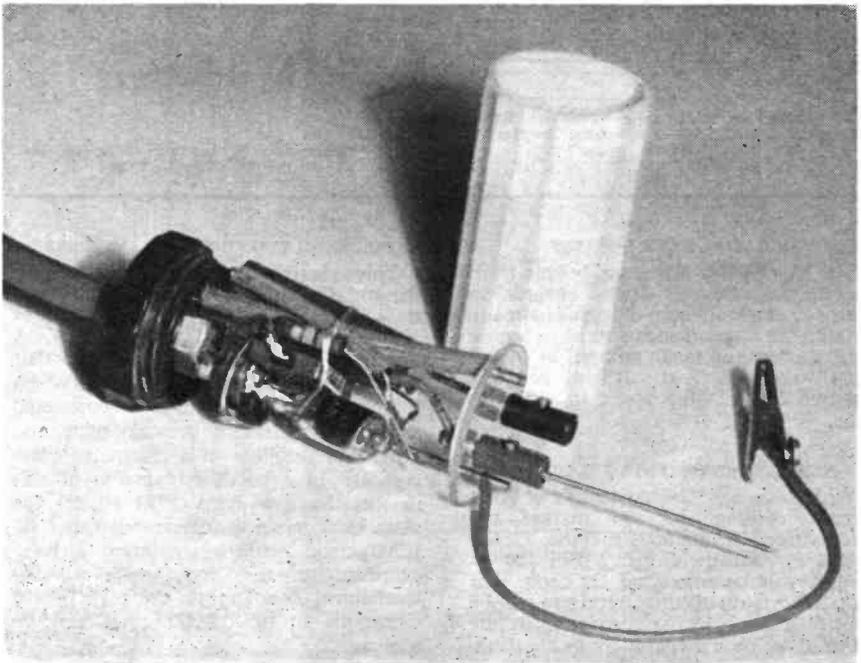
ohm potentiometer pre-set control until the meter reads two-fifths full scale. This is 10 volts peak and will give 25 volts full scale.

Finally, alter the supply set-up from the 10-volt to the 50-volt tap; adjust this to give a suitable RMS reading of, for example, 35.3 volts, which is equivalent to 50 volts peak; switch to Scale 3 and adjust the 100,000-ohm pre-set control until the meter reads one-fifth full scale, giving the equivalent of 250 volts full scale. Fig. 5 shows the method of calibration.

It will be found that by using the two pre-set potentiometers in the amplifier grid circuit, quite wide scale ranges can be achieved so that if the full-scale readings given are not suitable, others can be chosen.

Once calibration is complete the only control requiring adjustment is the zero-set; the remainder are pre-set originally and then forgotten. It will be found that when switching from Scale 1 to Scale 2 or 3 there is a slight alteration in zero adjustment. To prevent the necessity of re-setting zero when changing scales adjusting

Detail of the diode probe with the cover removed.



resistors are connected to the second half of the Yaxley switch. These values will have to be found by trial and error; the figures shown in Fig. 2 were correct in the writer's case. The 1.5-ohm resistor in the filament supply has the effect of reducing the voltage applied to the diode and amplifier filaments slightly, thereby reducing space charge effects which tend to upset the zero setting on the meter.

No originality is claimed for this circuit and according to text-books on the subject the instrument should be reasonably accurate for voltage measurements at frequencies between 50 cycles and something approaching 50 megacycles providing care is taken to keep the input capacity of the diode probe as low as practicable, with a good quality input condenser.

In conclusion, the writer would say that once made this little instrument is a very useful asset indeed for all constructional or test work, and the making of it afforded no little pleasure in itself.

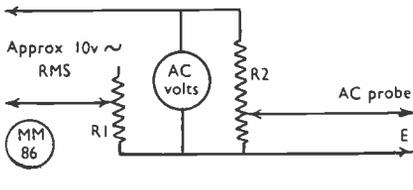


Fig. 5. Calibration of the valve voltmeter; R1 is 10,000 ohms, and R2 1,800 + 200 ohms. See text for details.

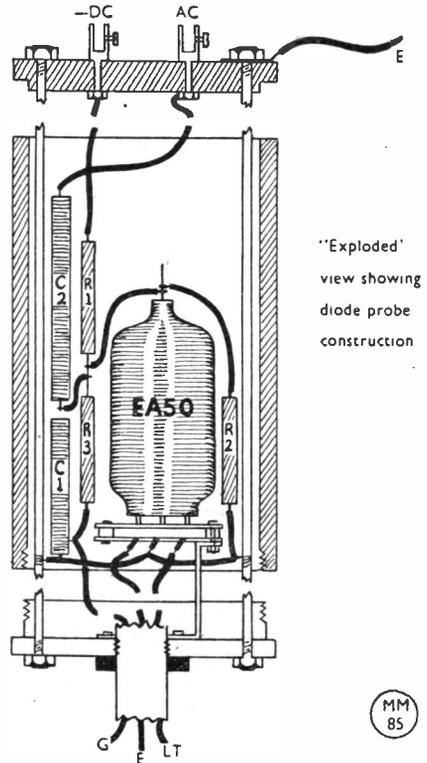


Fig. 4. Construction of the diode probe—see text.

#### MAGAZINE CLUB CONTEST

The *Short Wave Magazine* 1.7 mc Club Transmitting Contest finally brought in nearly 40 entries; from the results already to hand the Contest seems to have been a great success and much enjoyed by everybody who took part. It will be fully reported in the Club space in our next issue.

#### NEW COMMUNICATION RECEIVERS

With three new British designs of great interest coming on the market—the Radiovision "Commander," the Denco "DCR 19" and the G.E.C. "BRT-400"—readers will be interested to know that Test Reports on all three receivers will be appearing in these pages as soon as the material has been prepared for publication.

#### MECHANO-ELECTRONIC TRANSDUCER

This describes a remarkable little valve designed to translate mechanical vibrations into electrical current variations which can be observed and measured. A free plate is mounted in a triode so that displacement of the external shaft to which the plate is mechanically connected changes the distance between plate and grid, thus resulting in a change of plate current. In a particular version of this device (the new RCA 5734 triode) the plate shaft has a cantilever resonance of 1,200 c.p.s., with a maximum angular deflection of 0.5 deg; with suitable mechanical coupling to the plate shaft, vibrations up to 12,000 c.p.s. can be observed.

# DC Mains Operation

## Practical Transmitter Circuits

By W. G. MORRIS (G3AWG)

HAVING now operated successfully for two years with a mains supply of 240v DC it is felt that the following description of the equipment in use may be of interest, particularly to those who are thinking of becoming transmitting amateurs but are deterred by a DC mains supply. Rotary or vibratory converters have never been employed at this station, and the voltage has never exceeded 240.

The transmitter, the circuit of which appears in Fig. 1, is probably one of the simplest. It was originally built for crystal control, but has been used with a VFO. The first stage is a conventional triode oscillator, plug-in coils being employed for anode and cathode circuits, thus facilitating band changing. The valve in this stage is an 807, decided on, after several possible types had been tried, because it

There are still districts in which the local mains supply is DC. The equipment described in this article is being used successfully on the DX bands with a maximum of 240 volts HT only.—Ed.

maintains a high degree of stability with low operating voltages. This type also gave the greatest output. It was found that the potentiometer on the screen was necessary to prevent frequency drift. As the Tx is used mainly on 28 mc this stage is run as a 7-mc triode with the anode circuit tuned to 14 mc.

The output is capacity coupled to a 6L6 frequency doubler, or buffer, depending on which band the final is operating. A plug-in coil is again used in the anode circuit; this stage is conventional, except that no screen-dropping resistor is used, it being found that maximum output is obtained when screen and anode volts are the same; bias is obtained from a combination of cathode and grid leak. The amount of cathode bias is kept to the absolute minimum necessary to prevent the valve passing excessive current in the event of the drive failing, since the bias voltage subtracts from the plate supply. A 100-ohm resistor is used in the Tx being described. It was found necessary when operating this stage as a buffer on 14 mc to

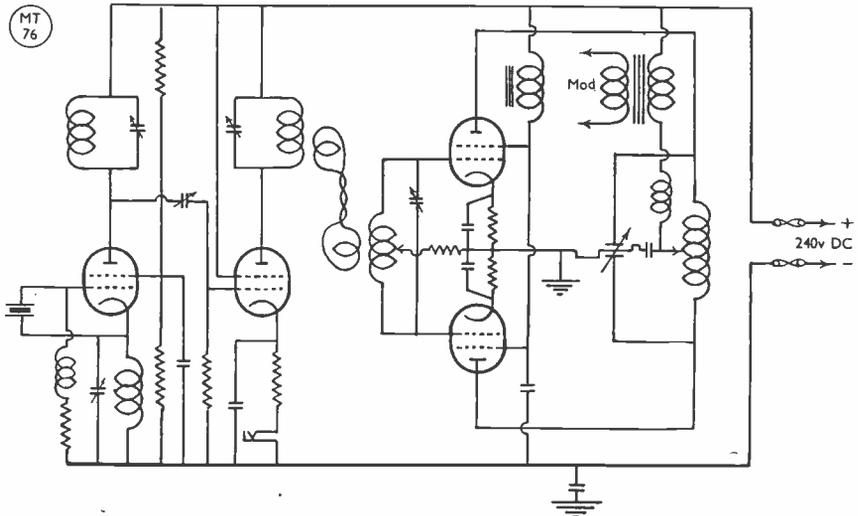


Fig. 1. Circuit for a 3-stage transmitter operated off DC mains for both HT and LT. Values would be as normally employed for the bands required. The main earth connection *must* be through a large condenser (2  $\mu$ F or more) rated over the working voltage.

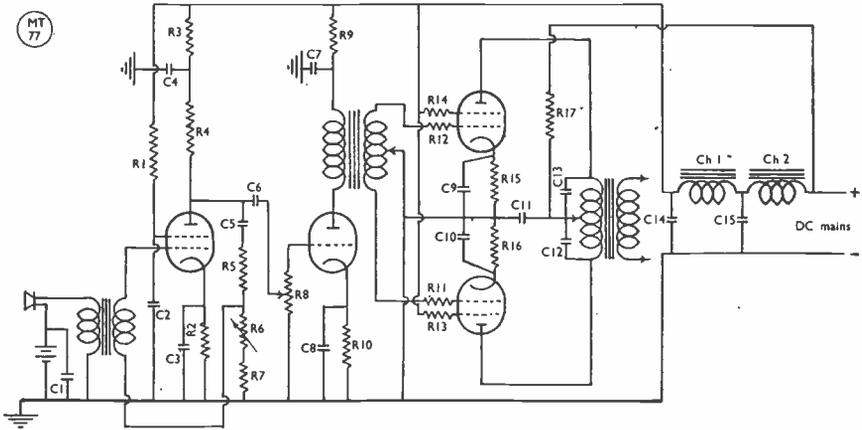


Fig. 2. DC-mains operated speech amplifier and modulator.

**Table of Values**

Fig. 2. DC Mains-operated Speech Amplifier-Modulator

- C1, C2, C7, C9, C10, C11 = 4  $\mu$ F
- C3, C8 = 50  $\mu$ F
- C4 = 16  $\mu$ F
- C5, C12, C13 = .001  $\mu$ F
- C6 = 0.1  $\mu$ F
- C14, C15 = 32  $\mu$ F
- R1, R8 = 1 megohm
- R2 = 1,500 ohms
- R3, R9 = 10,000 ohms
- R4, R5 = 200,000 ohms
- R6 = 100,000 ohms
- R7 = 2,000 ohms
- R10 = 750 ohms
- R11, R12 = 33,000 ohms
- R13, R14 = 100 ohms
- R15, R16 = 220 ohms
- R17 = 3,000 ohms, 12 watts

include a grid stopper of 10,000 ohms to prevent parasitic oscillations.

The PA stage consists of a pair of 6L6's operated in push-pull. Biasing is again obtained from a mixture of cathode and grid leak, and again the same remarks apply here as for the doubler stage. The doubler is linked in to the PA tuned grid circuit by a two-turn link on each coil. The PA is plate-modulated by the usual modulation transformer. The screens of the PA valves are, however, connected together, and returned to the unmodulated HT supply via a 20H LF choke; thus, the screens are self-modulating. The tank coil is of the usual two-section plug-in type, and is tuned by a split-stator condenser. The small amount of neutralisation that may be found necessary can be obtained by taking a short length of insulated wire

from the grid of each of the final valves and twisting it round the anode lead of the opposite valve.

The HT supply for the whole transmitter is the 240v DC mains supply, applied directly to the valves via a fuse without any smoothing of any sort. In spite of this, negligible hum is present on the transmission, as local listeners to G3AWG could testify. The heaters of all valves are connected in series, one side of that of the crystal oscillator being earthed. The general arrangement of all heater supplies is dealt with later.

The PA stage described will load to an input of about 28 watts, the PA current being 120 mA at 240v. Meter jacks are

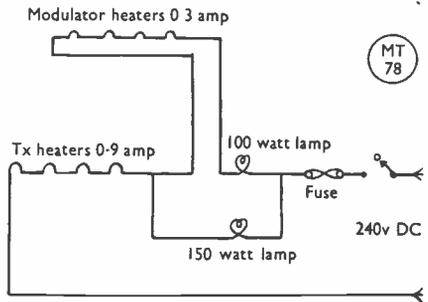


Fig. 3. Connections for the heaters on transmitter and modulator, fed direct from the DC mains. The lamps are taken out on wandering leads, and the power they dissipate as series resistors lights the station!

incorporated in the grid circuits of the PA and doubler stages, and also in the doubler and oscillator anode circuits. A separate meter is permanently connected to read PA anode current.

### The Modulator

This is also of very simple construction and uses valves with 0.3-amp heaters. A circuit diagram appears in Fig. 2.

The microphone is a carbon type and is at present polarised by a separate battery. The first stage of the speech amplifier is a 6SJ7, to which the microphone is transformer-coupled. This stage has a variable negative feedback arrangement, which has been found useful for making slight variations in the frequency response, but the main purpose is to reduce hum in the speech amplifier. The 6SJ7 is resistance-capacity coupled *via* the audio gain control to a 6J5 second speech amplifier. This is in turn transformer coupled to a pair of KT33c's working in Class-AB1. Originally four KT33c's were used, triode-connected in Class-A parallel push-pull, but whilst these gave very good speech quality it was thought that the former scheme was more economical. The heaters of all these valves are connected in series and need a 0.3-amp. supply.

The HT for the two speech amplifier valves is obtained from the 240v DC supply *via* a two-stage choke-capacity filter. It was found that very careful filtering is necessary on these valves to keep the hum level down. The unsmoothed DC mains supply is used for the HT to the two modulator valves through a small resistance-capacity filter, which is there mainly to reduce the 240v to 200v, which is the maximum permissible on the anodes of the KT33c's. The modulator valves are transformer-coupled to the PA plate circuit.

The switching of the rig is performed by relays, one of which is used to make and break the Tx and modulator HT supplies, and the other for aerial change-over. The Tx on/off relay is a standard 24v type and is operated with a series resistance, whilst the aerial relay is operated directly from the 240v supply. A separate switch is incorporated in the modulator to enable the HT to be switched off that unit when using CW and a jack is fitted in the cathode circuit of the frequency doubler for keying purposes.

### Heaters

The heater arrangement is as shown in

Fig. 3. Lamps are used for voltage dropping, and to obtain 0.9 amp for the Tx heaters a 100-watt and a 150-watt lamp are connected in parallel. The modulator heaters, which require 0.3 amp, are in series with the 100-watt lamp. These lamps can be brought out on extension leads and used to illuminate the operating position. This system has been found very satisfactory and the lamps act as very good barreters!

It is hoped that the foregoing notes will help to encourage those on DC mains. As to results, with this rig as described G3AWG has now worked 41 countries and all continents on 14 and 28 mc.

### XTAL XCHANGE

As it appears that many readers have been able to effect satisfactory exchanges of crystals, we shall be continuing this feature. In future, however, insertions will only be accepted for crystals already within one of the bands, or for 100, 200, 500 and 1000 kc bars. Set out your notice in the form shown below, on a separate slip headed "Xtal Xchange—Free Insertion"; all negotiations must be conducted direct.

G3AGX, Conniston Bungalow, Hollym Road, Withernsea, Yorks.

Has QCC 1776 kc and Biley 7181 kc crystals, holdered. Wants frequencies in CW areas of 3.5 and 7 mc bands.

G3BPB, 115 Heathfield Road, Grantham, Lincs.

Has 200 and 500 kc bars, holdered. Wants 1000 and 1785 kc crystals.

G3COI, 59 Darlington Street, Wolverhampton.

Has QCC 1800 kc crystal, with certificate. Wants similar crystal in 3.5-3.6 mc band.

G3EEM, Station House, St. Margarets, Ware, Herts.

Has 7192 kc crystal, mounted,  $\frac{1}{2}$ -in. pin spacing. Wants similarly mounted crystal 3500-3530 kc.

G3EYI, 11 Naunton Crescent, Cheltenham, Glos.

Has DC9 1000 kc crystal (BC-221). Wants DC24 100 or 200 kc crystal.

G3END, 40 Elkesley Road, Welbeck Colliery, Mansfield, Notts.

Has 14209 kc crystal, mounted. Wants 14100 kc.

G2AO, Branksome, Worcester Road, Malvern, Worcs.

Has 7040, 7073, 7075, 7100 and 7173 kc, mounted,  $\frac{1}{2}$ -in. pin spacing. Any two for one 14 mc crystal 14000-14100 kc, mounted.

SWL, 57 Longley Lane, Northenden, Manchester.

Has 500 kc bar,  $\frac{1}{2}$ -in. pin spacing. Wants frequency in CW area 7 mc band.

# Modulator Pre-Amplifier

## Design for a Useful Unit

By C. B. RAITHBY (G8GI)

THE unit which is here described was evolved after considerable difficulty had been experienced in overcoming hum and RF feedback troubles in a high-gain modulator when the early stages were in close proximity to the main transmitter.

### Advantages

The amplifier has three main ad-

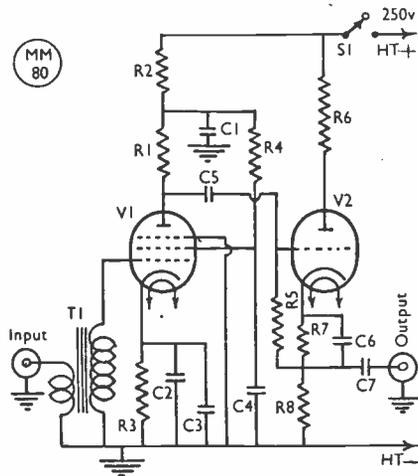


Fig. 1. Circuit of the pre-amplifier.

### Table of Values

Fig. 1. Pre-Amplifier Unit

C1	= 8 $\mu$ F elect., 350 volt DC working
C2, C6	= 25 $\mu$ F elect., 25 volt DC working
C3, C4, C5	= 0.1 $\mu$ F paper, 350 volt DC working
C7	= 0.5 $\mu$ F paper, 350 volt DC working
R1	= 100,000 ohms 1 watt
R2, R6	= 50,000 ohms 1 watt
R3	= 500 ohms $\frac{1}{2}$ watt
R4	= 500,000 ohms $\frac{1}{2}$ watt
R5	= 1 megohm $\frac{1}{2}$ watt
R7	= 1,000 ohms 1 watt
R8	= 4,700 ohms 1 watt
S1	= Toggle on-off
T1	= Microphone transformer, mu-metal screened
V1	= 6J5 (or 6J7 or EF36)
V2	= 6J5 (or equivalent)

In many stations, it becomes desirable, if not essential, to provide a pre-amplifier between microphone and speech amplifier-modulator: this enables the microphone lead to be kept short and also facilitates disposing the various units in such a way as to eliminate hum pick-up. A small input amplifier of this kind is useful for other purposes, as our contributor suggests in his article below.—Ed.

vantages: (a) Freedom from RF feedback, as it can be located well away from the PA and easily screened; (b) Freedom from induced AC hum, for the same reason; (c) Versatility; it can be used to feed any type of modulator or public address amplifier, even if located at considerable distances from the pre-amplifier, provided a suitable input stage is added.

### Circuit Considerations

Low impedance coupling is advisable between the pre-amplifier and the main modulator to avoid hum pick-up on the coupling line. Originally, identical transformers with 600-ohm windings were used "back-to-back" to couple from the pre-amplifier to the main modulator. However, even when parallel-fed, a serious loss in quality resulted, together with some hum pick-up by the input transformer at the main modulator end. Eventually, the circuit of Fig. 1 was evolved for the pre-amplifier.

V1 is in an orthodox circuit and can be altered to suit a crystal microphone if desired. The output from this stage feeds V2 in a cathode follower circuit, the output being taken from V2 cathode via 72-ohm coaxial cable.

### Main Modulator Input Circuit

At first the output from the pre-amplifier was fed into the 600-ohm winding of a transformer which drove the grid of the first valve of the main modulator. This was fairly satisfactory, but distortion and hum still existed and it was obvious that some type of input which did not need an input transformer was wanted. After much trial the arrangement shown in Fig. 2 was tried and has proved most satisfactory. The grid of V3 is earthed and cathode injection is used. V4 was originally the first valve of the main modulator.

### Controls

It may appear strange that no volume control is fitted to the pre-amplifier. In many installations one would probably be desirable and should be fitted in place of R5 in Fig. 1; such a control was not

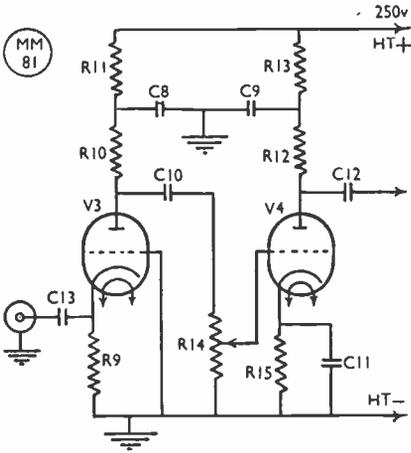


Fig. 2. Circuit for the input stage of the main modulator.

**Table of Values**

Fig. 2. Input Stages of Main Modulator

- C8, C9 = Dual 8  $\mu$ F elect., 350 volt DC working
- C10, C12 = 0.1  $\mu$ F paper 350 volt DC working
- C11 = 25  $\mu$ F elect., 25 volt DC working
- C13 = 0.5  $\mu$ F paper 350 volt DC working
- R9 = 330 ohms 1 watt
- R10, R12 = 50,000 ohms 1 watt
- R11, R13 = 20,000 ohms 1 watt
- R14 = 1 megohm variable
- V1, V2 = 6J5 or equivalent

used in the writer's case because the gain control (R14 in Fig. 2) happens to be conveniently placed.

**Construction**

The unit is built on a small 16 gauge aluminium chassis, completely enclosed in a dural cabinet. The various input and output sockets are Pye type 10H526 used in conjunction with plugs type 10H3911.

**Power Supply**

Any well smoothed power unit giving 250-300 volt DC will suffice for the HT supply and as the drain is only about 3 mA an existing supply can probably be used. The LT requirement is 6.3 volts 0.9 amps. In the original model minimum AC hum was found to be when one side of the heater supply was earthed at the power pack end. This may not always be the case, however, and it might be necessary to put a "hum-dinger" of 50 ohms across the heater supply, earth the slider and adjust for minimum hum.

**BRITISH OLD TIMERS' CLUB  
FIRST ANNIVERSARY**

A year ago this month we printed the first list of members of the B.O.T.C. Now we add three more names, which bring the total membership up to the very gratifying figure of 129. The new members are :

A. W. Fawcett (G2HQ), ASX in 1912 ; F. C. Crocker (G2NN), XCP in 1914 ; and F. J. Barnett (G3DRR), VS2AC in 1927.

**3,218 Years of Amateur Radio !**

We have celebrated the anniversary by drawing up a complete list of members in order, so to speak, of seniority, and it reveals the following interesting figures. Members go back as far as 1904, although only one (G5PS) can claim that distinction. So we have 1904, 1 ; 1910, 1 ; 1911, 2 ; 1912, 6 ; 1913, 4 ; 1914, 4 ; 1919, 2 ; 1920, 3 ; 1921, 3 ; 1922, 7 ; 1923, 16 ; 1924, 16 ; 1925, 13 ; 1926, 20 ; 1927, 27 ; and 1928, 4.

The accumulated volume of experience of Amateur Radio represented by these Old Timers still on the air is enormous, and if the formation of the B.O.T.C. has done nothing else it shows that many of the pioneers are still actively pursuing their old hobby.

May we point out that the turn of the year makes eligible for membership all those who held a licence before the end of 1928, advancing one month for each of our issues, since 20 years with a ticket is the qualification. Can we make the 200 mark ?

The B.O.T.C. exists to bring on record all those of British nationality (home or overseas) who, having held a full transmitting licence at any date prior to December 31, 1928, are still active to-day. The current B.O.T.C. membership list to December 31, 1948, with addresses in full, has been circulated to all members, as it is thought that many would like to know the present whereabouts of old friends made over the air in the early days. This list is being sent only to members of the Club and will not be otherwise circulated.

In response to many enquiries, the present intention is that the projected Old Timer Dinner be held in London in the coming spring.

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*The Short Wave Magazine covers the whole field of Amateur Radio*

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# DX COMMENTARY

## ON CALLS HEARD, WORKED & QSL'd

First of all, thanks to all those readers who have been kind enough to send us messages of good cheer, Christmas Greetings, and exhortations to behave in the New Year! We really are touched to know that there are so many people who have an interest in our doings—thanks, everyone, and may *your* DX never diminish.

Secondly, we have to hand this over for a few paragraphs to our demented friend Arabackle Oblifork, who has carefully prepared his New Year resolutions and insists on airing them. Many years of Amateur Radio have driven poor old Arabackle quite crackers, but he says he wants to save others from the same fate. So for anyone who would like to start 1949 right, make out a set like this—and see how long you can keep them!

**Resolved:** (a) That I will *not* call a DX station until I *know* that he has finished a QSO or that he has just called CQ. The occasional "chancy" call gets one the name of Spiv, even if the call was made in all innocence.

(b) That I will *not* call CQ DX without first listening on my frequency to make sure that there is no DX station calling "CQ DX" thereon. (If one comes up the second after I've started, that's *his* business, not mine.)

(c) That I will *not* send "VA" at any time unless it means that I have ceased to listen to the other bloke and am available for a call from anyone else. It is just as easy to send "K" after all the 73's and things, if there's the faintest chance that the other chap will send something that necessitates my replying once more.

(d) Likewise, that when on phone I will *not* sign off or announce my final until I really mean it; and that I will *never* at any time or place sign *overoffanclar*, even if I am crazy.

(e) That I will pay even more attention to giving honest reports to the other chap, meaning that if I have the crystal filter in, and am holding the dial with one hand all the time, he will get 459 rather than 559. Furthermore that if he has a VFO which is not all that it might be, he will get T9c ("c" for chirp) or T8x or even plain T7, and not an unthinking T9.

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

(f) That when I operate phone I will *not* natter, but rather behave as if there is someone outside the call-box clinking his two-pence. I will say my piece and shut up, finally moving off the frequency before starting up again, unless I am called a second time on the same frequency.

### Can He Keep Them?

Well, so much for good old Arabackle. We will say this: That if everyone kept those resolutions the bands would be much pleasanter, and no one (including the keepers of them) would be any worse off. Of course, he hasn't included any of the obvious ones, like "I will not tune up my newly-built Parasitic Amplifier on the 14 mc band in the middle of a Contest," because he has a certain amount of sense and gave up such practices many years ago. Think 'em all over, some of you OT's, NT's

### G CALLS HEARD OVERSEAS

Most G stations, and particularly those licensed fairly recently, are interested in seeing where they have been heard in distant parts. We should therefore be very grateful if overseas readers would be good enough to let us have for publication lists of G's heard on 1.7, 3.5 and 7 mc—the 14 and 28 mc bands are not so important, as DX results are to be expected on these bands.

and Young Squirts alike, and let us all have a grand clean-up in 1949.

And as a reward for reading the above (if you have read it) you are not going to be afflicted with a Grouse-and-Grievance Section this month.

### All Competitive Stuff

The Four-Band DX Table seems to have caught on well, and several readers tell us that they think this is an excellent scheme for interesting people in all the



Early in 1929, G6XJ (now a director of Stratton & Co., Ltd., manufacturers of Eddystone equipment) operated this station in Birmingham. Two TPTG transmitters were run off the DC mains boosted by HT accumulators, and the receiver was a 1-V-1. Time marches on!

bands. Certainly we notice from the figures that some of the 14 mc diehards have suddenly started pushing up their scores on 7 mc.

Last month the 7 mc band decided the order of precedence and the column was headed by G5FA with his fine score of 68. This, actually, was hard luck for G5GK, whose letter just missed the date. He would otherwise have headed the column with his score of 78 countries on 7 mc. So these two now have about four months to decide who will head the list when the 7 mc turn comes round again.

This month's listing is based on 3.5 mc, and is easily led by G8VB with his terrific total of 41 countries on that band. Congratulations, VB. Next month's order will be decided by the 28 mc score (the only one which has not yet been used); and if no one owns up to a better total than 105 we shall (reluctantly, of course) have to plant ourselves at the top of the list. So get weaving on 28, some of you DX-kings, while we are working G's on the top band, and see what you can do. And, by the way, please note that the figure shown in col. 6 of the "Four-Band DX" Table is the total of countries worked and not the sum of cols. 2, 3, 4, 5, which show the different countries worked on each band.

Talking of the top band, it is so good

these days that we surely ought to have some sort of friendly competition up there. (No, we didn't say "Contest"—there are plenty of those, if not too many, already). We hesitate to suggest a "Countries Worked" top-band table—it lacks originality—but what do readers think?

Note the arrival of Jules Elias, ON4JW, in the Four-Band DX Table, with his truly colossal score of 171 countries on the 14 mc band only!

#### The 1948 WAZ Marathon

Next month we shall know the winners of the 1948 Marathon. Handsomely in the lead at the time of writing are G8KP (40/168) and G2EC (40/167) in the Phone and CW Section, with G3DO (35/112) the potential winner in the Phone Only Section. There are only a few days to go before the end of the year and the end of the Marathon.

And now for the pill. . . . We *must* carry out a check before announcing the winners, so will the top three in the Phone and CW Section, and the top two in the Phone Only Section, please send in, as soon as possible after December 31, a list of the contacts on which their claims are based. All we want is this: Date, Time, Callsign—for each Zone and for each Country. We cannot possibly judge the

winner without this information, because of affairs like YA3B, AC4AK, PX1A and the like. So we will submit the leading scores to our little DX Committee and give the winners a suitable Honourable Mention next month.

There will be no 1949 Marathon as far as we are concerned. We may not even run

#### FOUR-BAND DX

Station	Countries Worked					Power
	3.5 mc	7 mc	14 mc	28 mc	Total	
G8VB	41	29	88	13	110	150
G6QB	27	53	145	105	171	150
G3AGQ	25	35	22	5	50	6/150
G3EIZ	25	2	25	1	35	25
G3ATU	24	34	137	37	147	10/150
G2DLJ	24	36	112	19	115	120
ON4JW	22	44	171	2	173	35/75
G3AKF	22	30	64	21	83	60/150
G2VD	21	39	148	64	156	150
G3AKU	21	12	123	11	130	30
G2AVP	19	44	139	2	151	25/120
G4QK	19	22	70	2	74	100
G3AAE	18	28	128	38	131	75/125
G2YS	18	22	99	14	100	150
G8VG	17	48	96	24	117	60/75
G3ACC	16	3	102	2	122	150
G2AVC	15	22	55	7	?	10/100
G3DO	14	28	136	91	166	150
G8IP	13	30	109	59	125	3/150
G2DHV	12	21	52	2	53	35
G8QX	11	17	93	61	117	150 Phone
G8LO	10	27	106	10	106	150
G8PG	10	28	25	1	38	1-5/14
GC2CNC	8	51	132	43	152	10/50
G5FA	7	73	112	8	121	100
G2HIF	6	9	37	24	58	130 Phone
GW3ECH	6	2	30	5	34	25
G2BJY	4	24	46	78	102	25
G2VJ	4	12	59	41	84	25/150
G5GK	3	78	92	4	174	150
G5WC	1	49	112	12	114	45

the Zones Worked list ; but please let us have your scores for the latter next month, at all events. And, of course, the Four-Band DX Table will go on from strength to strength ; it might even become a Five-Band affair.

#### DX of the Month

Time we talked about DX instead of competitions ; but it's the readers themselves who ask for the latter, and they must be served. Incidentally, *please* don't keep writing in and saying "So-and-so doesn't work much DX but he has a mighty fine rig and does excellent work ; why don't you ever mention him ?" How can we, if he doesn't tell us of his existence ? We report *all* the news that comes in, but we have no crystal ball—if we had we'd use it to find out AC4YN's operating hours, anyway. And also please remember the title of this feature, which keeps out the man (however clever he may be) who works, say, admirable 7 mc phone and specialises in modulation experiments—and all such-like amateurs. Of course they're all mighty fine fellows and we know there are many of them ; probably most of them are doing more useful work than we are, scratching about after the DX, but this particular feature is *for the DX man*. (The others shouldn't really read it, but we know they do because of the letters they write !)

We have already referred to G5GK (Burnley) and his doings on 7 mc. This month he has worked W7, VE7, PY, LU, FE8, KP4, KZ5, ZL, ARI, and ZC1. On 14 mc he has hooked PJ5KO (phone) ZD1PW (phone) and CR6, KP6 and F18 on CW. G5FA (London, N.11) has raised his total on 7 mc to 73, new ones being KV4, ZC1, ZB1, ZB2, and IS. He made a one-day WAC on 7 mc, including a three-way with a ZL and a W7 !

G2EC (London, W.1), who works only on 14 mc CW, has bumped his score up with ZK2AA, FF8OA, VK9NR (Norfolk Island) and LZ1AA. G8KP (Wakefield) collected, on 28 mc, AR8BM (1030), ZS3G and ET3AG (0900), MT2FU (0930), ZD4AU (1000) and CPIAP (but he keeps the latter's time to himself !) On 14 mc he dug for UN1AB, PK4KS, PK1AC, HP4Q, ZA2AB, PJ5C, PK6HA and VP8AP—rather a nice-looking lot. 'KP has three DXCC Certificates—one pre-war, one temporary post-war and now a shiny new one.

G4CP (Dudley) has also found some nice new DX, such as ZK2AA, VK9BI and ET3Y. G8OJ (Manchester), using 14 mc CW only, made a two-hour WAC one

afternoon with VK6KW, VS6AE, W4BO, PZ1NB, ZS2F and OK3IQ; he also reports ZC8AG (Nablus), ZC1UN (Amman) and UA1KEC (our old acquaintance in Franz Josef Land).

**Conditions—Good or Bad ?**

Last month we remarked that conditions had possibly never been so good before—at which several people have leapt to their feet and cried that they have been terrible for months. Is it the difference between North and South ? Or East and West ? Or are some folks expecting too much ? G3ATU (Sunderland) says, "As far as we up here are concerned, September and October were just about a dead loss for DX. November, if anything, was worse, with the exception of the Contest Weekend." But 'ATU goes on to report an improvement during December, and he has added ZD8B and ZD9AA to his collection during the month.

G8QX (Malvern) says that the bands have seemed pretty dead over in his part of the world, so he has spent a lot of time on 2 metres—but he promises to return to DX.

G6CB (London, S.W.19) wants to know the present record for a Phone WAC. So far as we know, the record set up by G2CDI (now VP6CDI) is unbroken; he

**1948 MARATHON**

Station	Z.	C.	Station	Z.	C.
<b>'Phone and CW</b>			<b>'Phone and CW</b>		
G8KP	40	168	G8PL	34	102
G2EC	40	167	G4AR	33	97
G3AAE	40	113	G2DFR	33	75
G4CP	39	149	G5MR	32	45
G3DO	39	130	G3BNE	31	89
G2VD	39	127	G3FNJ	31	67
G3BI	39	126	G2BJY	30	95
G2AVP	39	126			
G3ATU	38	137	<b>'Phone only</b>		
G2AJ	38	110	ZC1CL	37	122
G81P	38	97	G5FA	37	112
			G3DAH	37	112
			G3ZI	32	81
			G3AAG	36	103
			GM3CSM	36	91
			G2VJ	29	72
			G6CB	28	66
			G2WW	35	112
			G8KU	35	97
			G2DC	35	92
			G2BXP	28	65
			G8QX	27	86

worked a 28-mc WAC, all phone, in 20 minutes—not one hour and twenty minutes as 'CB appears to think. G6CB also passes on the news that ex-ZD2KC is now in South Africa awaiting a ZS6 call; his log books were unfortunately destroyed by sea water, so he can't send any more QSL's, but every one who QSL'd him in Nigeria has had a reply, and the late ones will have to be unlucky.

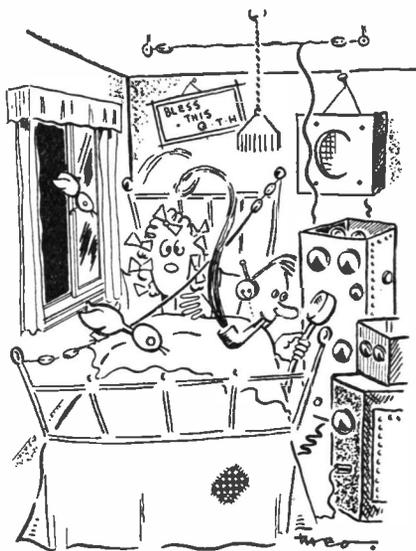
**Some 7 mc News**

G2AVP (Stradishall) has been plugging away on 7 mc with the following results: ZD4AC (1605), ZD4JT (0540), ZC1CL (1605), ZL4HI (0840), VK4EL (1930), TF2AN (0040), PY7LN (2300), KP4HU (2230), TI2KP (2200), and practically all Russian districts. 'AVP says, "There is no doubt that the DX is there, but the opposition is overpowering—locals working phone on 7010 and big empty patches around 7200 or thereabouts."

On 3.5 mc G2AVP has been working W1, 2, 3, 4, 9 and VE1, 2 and 3—and he has also heard 4X4C. Several of the regular DX-chasers have been working W's and ZL's in the mornings on 3.5, but haven't bothered to write about it, so presumably it is considered fairly commonplace this year.

**3.5 mc DX**

One very staunch supporter of the band is G3EIZ (Liverpool), whose score is already up to 25 countries on 3.5 ! Recent



" . . . I thought I could stand anything, but now—birds roosting! . . . "

additions have been CT3AB (0100), VO2R (2245 and 2355), FA8BG and YU7DX. 'EIZ has also heard ZC8PM, 4X4AC and ZB1AN, but he heartily dislikes the way the phone stations are crowding down to the LF end. Let's have some more news next month from the 3.5 DX'ers—there must be plenty going on.

### CQ's DX Contest

A few more scores are to hand, the list being easily topped by GI6TK (Belfast) with the amazing score of 452,454 points! 'TK unfortunately had a septic finger on his right hand and had to use his left during the Contest—otherwise he thinks he would have made a real good score!! Runner-up (among those we have heard from) is GW3ZV (Rhigos) with 185,262 points. OK1HI scored 102,116. All these figures are for the CW half of the Contest.

### Shorts

G3DKF (Coventry), working on 7 mc, made his first "CQ W" call, and back came W2DKF! G6ZA (Sheffield) says anyone using his callsign on phone on any band is a pirate. . . . G3UZ (London, N.16) has an aerial in a block of flats which curls round the furniture and rests on two window-sills. Wondering about a sudden jump in a report from 559 to 579, he investigated; found the XYL cleaning the windows and sitting on the aerial! GC2AWT (Jersey) has received a specially printed card from a W asking why he has not QSL'd. He has never had a proper QSL from the station in question, which, furthermore, has busted into one of his QSO's since then and proceeded to tick him off. (Say, is this a hobby, or what?)

G3DER (Compton Bassett) has added some nice 14 mc DX to his score, including YA3A, complete with Box No. and all. But we still say he's a phoney until we see his card, complete with stamp. G3EMI (Birmingham) reports for the first time. In his first seven days on the air, using 7 to 10 watts CW on 7 mc only, 'EMI worked 14 countries; by three weeks it was up to 24 countries in four continents. Contacts included EK1LT, LX1AK, VP8AU, PY, W, CN8, and others. Nice work, 'EMI.

Re TU2LO, mentioned last month, G2FAS (Lancaster) worked him also—the op's name was Charchew and the QTH given as Ankara. G2DFR (Newbury), who uses one crystal and 24 watts, has been trying to get WAZ and WAS in his first year on the air. Score, with some time left, is 33 Z and 46 States. New ones recently were PZ1NB, J2AHI, KL7JS and ZC1CL.

## ZONES WORKED LISTING

POST-WAR

Station	Z.	C.	Station	Z.	C.
'Phone and CW			'Phone and CW		
G8KP	40	188	GC2CNC	36	152
ON4JW	40	173	G6BB	36	102
G6QB	40	171	GM3CSM	36	99
G8IH	40	168			
G2AJ	40	167	G8VR	35	104
G4CP	40	166	G2YS	35	98
G3DO	40	166			
G2WW	40	163	G5WC	34	114
G2AVP	40	151	G8PL	34	109
G3AAE	40	131			
G8IP	40	125	G2BJY	32	102
			G3BNE	32	82
G2FSR	39	162			
D2KW	39	158	G3ACC	31	102
G2VD	39	156			
G3BI	39	146	'Phone only		
G4AR	39	131	G2ZB	39	144
ON4MS	39	130			
G5CW	39	126	G3ZI	37	136
G3AAG	39	124	G3DO	37	134
G5MR	39	109			
G6PJ	39	85	G2BXP	36	81
G3ATU	38	147	G8QX	35	117
G3AKU	38	130			
G5FA	38	120	G3DAH	34	99
G8KU	38	116			
G2AO	38	114	G6CB	31	87
			G2VJ	31	84
G3DAH	37	113			
G8LO	37	104			

G2CBA (Rochester) worked KA1ACF on 28 mc phone last April and has now received his card. It was the KA's first G QSO. 'CBA has just worked his 100th VK on 28 mc 'phone, which strikes us as nice going. G3AGQ (Benson) has broken out on the top band and was delighted to work OZ1W up there. . . .

### From Overseas

G3CHN (T.E.V. Francine Clore) has been covering the 1.7 mc band and reports S9 signals from G5AU ('phone) and G6GM (CW) when 465 miles S.W. of Land's End. But he awards the DX record on 1.7 to G3AUR, heard at 449 when 135 miles S. of the Azores.

ON4JW (Brussels) is concentrating on 3.5 and 7 mc in future. He is fed up with 14 and lives next to a main highway, which makes 28 very difficult. . . . J4BDL (QTH in list) finds G contacts very elusive, but wants more of them. . . . ZD4AM (Tafo, Gold Coast) sends some nice Calls Heard, including his first G's on 7 mc.

VE3DBA (QTH in list) was just awaiting his G ticket when he left this country. He now has a 250-watt rig built entirely from "junk" pooled by local amateurs, whom he wants to thank for the



General view of the outfit at G2YI, Reading, Berks. ; his transmitter (on right) is a completely rebuilt 1154 for 1.7 and 3.5 mc operation. Receivers are Sky Champion and BC-342 and the trophy is the Reading Society's Lewis Cup, won by G2YI last year.

really fine spirit of friendship they have shown. . . . ZB1AR (Malta) wants to work G's on 7 or 3.5 mc. He can't yet squeeze into the Four-Band table because of a "zero" on 3.5. . . . ZS1MM (QTH in list) is ex-G2FMM and GW2FMM. He operates on 28250 and looks for G's. . . . G3AWR (M.V. *Tornus* in Far Eastern waters) has found conditions bad for G's, but sends some useful QTH's.

AC4RF (Lhasa) lives near AC4YN and expects to be there for some years, mostly travelling in Tibet. He will be on 'phone and CW on 28 and 14 mc, but can't manage more than a 6L6 final. He repeats AC4YN's statement that *there are no other AC4's*. AC4RF is Bob Ford, ex-AC3SS.

Anyone want a VQ1? (So far as we know, we are proud holders of the only genuine VQ1 card up to date—from VQ1HJP). But VQ4CUR expects to be VQ1CUR for a week or so early in January. He hopes to operate with 20-40 watts on 7, 14 and 28 mc. 'CUR remarks that some G's seem to think the 28 mc band is dead just because the W's are not coming in, and he hears them working each other at anything from S5 to S9. . . .

#### Stop Press

G8PL (London, N.W.3) has pushed up his score with VQ5JTW, ET3Y and

AR1OD. He also mentions CZ1AB (giving QTH as Monte Carlo), UP2AA, UP2KBC and TF3ZM, the interesting point about the latter being that he QSL's. G3DBO (Kirkheaton) is ex-VU2KM, and has already been the victim of a pirate, who has *sent out cards* with 3DBO's callsign on them!

G3EMW (Hayes, Middx) is ex-ZC6JL and says someone else has been using that call since he left in April 1948. This is embarrassing, as the old 6JL is now receiving stacks of cards asking for QSL's which he naturally can't give.

G3BNE (London, N.W.3) has heard a station signing VQ9LS on about 14000—any gen., please? G5WC (London, S.E.19) has been working on 7 mc and asks what has happened to the band? There are about five commercials between 7010 and 7080, yet no one seems to operate CW above 7080. He has collected ZC1CL, CM6AH, UF6AA and plenty of W's and VE's. But he has *heard* VP2KS, VP3AJ, UA9KCA, HZ1JE, MP4BAB and ZS1M, which shows that the band is pretty interesting still.

G3CQU (Coulsdon) works 3.5 mc, and managed to get W1BPX with only 15 watts. He protests about 'phone stations on his two crystal frequencies—3514 and 3525. GM3CSM (Glasgow) laments the

## DX QTH's

AC4RF	R. W. Ford, Lhasa, c/o Gyantse PO, Tibet, via Siliguri, West Bengal, India.
AR10D	QSL via W3KXS—station in Damascus.
ET3AH	F. Frost, Box 858, Addis Ababa, Ethiopia.
HZ1JE	Dave Leeke, c/o BMM, Saudi Arabia, MELF
J2AFB	APO 994, c/o PM, San Francisco.
J2GUY	Box 143, APO 925, c/o PM, San Francisco.
J2RJD	APO 243, Unit 1, c/o PM, San Francisco.
J4BDL	Maj. J. T. Lake, HQ Signal Regt., BCOF, Kure, Japan.
MD1A	Signal Officer, 13/18 Royal Hussars, MELF 6.
MD2KP	Sgt. Mackintosh, 1st Sqdn., 1st Inf Div., Signals Regt., Tripoli.
MI3SC	Radio Marino, Asmara, Eritrea.
OA4BG	Box 538, Lima, Peru.
PK2KK	Box 222, Soerabaja, Java.
TF3ZM	Hannes Thorsteinsson, Box 1080, Reykjavik.
VE3DBA	J. Hughes, 1314 3rd Ave. East, Owen Sound, Ontario.
VS1CW	Sgt. S. Clark, No. 2 Sgts. Mess, R.A.F., Seletar, Singapore.
VS1GX	RAF, Seletar, Singapore.
ZD1PW	c/o GPO, Waterloo, Sierra Leone.
YV5ABX	Box 1247, Caracas, Venezuela.
ZB2F	J. Swain, 16 Kings Bastion, Gibraltar.
ZS1MM	J. Dain (ex-G2FMM), Kilbrow, 10 Park Avenue, Camps Bay, Cape Town.

absence of Russian QSL's (we received 33 of them in one packet this very morning!) G3CVG (Wakefield) is another 7 mc fan, and has worked ZCI, ZBI, KP4, VP4, TI, OX, UF6, PY, VE7 and others on that band. His score on 7 mc CW is now 58 countries.

GC3GS (Jersey), commenting on our tirade about Phone-Phools last month, says he doesn't mind if they all congregate on one channel. What he really objects to is the "Dirty Dog" who insists on breaking into a QSO by all means, fair or foul, including the relaying of the BBC on the channel! G2DLJ (Derby) has worked KP4UH on 3.5 mc; and on 7 mc he has collected XA7UV—said to be in Monaco. GC2CNC (Jersey) heartily disapproves of contests. As he says, if you only get to the rig at week-ends you don't want to settle down to endless exchanges of 599123, and so on. And being a "GC" must make it a lot worse! Never mind, 'CNC, there are still a few clear week-ends left.

And so to the end of 1948. We have only missed a few days of 1949, so it is not too late to wish you all a Happy New Year. If you don't mind three words of advice, we suggest "Take It Easy." All notes, claims, news, and so on for next month are wanted ("DX Commentary," *Short Wave Magazine*, 49 Victoria Street, London, S.W.1), by first post on January 12—and will the top-scorers in the Marathon please try and get their check lists in well before that date? Many thanks again, everyone; 73 and BCNU.

## G CALLS HEARD OVERSEAS

## 1.7 mc

3PU (579), 4DC (559), 5HB (559), 8LG (449).

G3CHN, T. E. V. "Francine Clore," Sheerness to Corpus Christi, Texas.

November 19, 465 miles S.W. of Land's End.

CW: G2PU (579), 3AEX (589), 3AMF (579), 3AQM (579), 3BLA (589), 3EHX (579), 3EIT (578), 3GX (569), 4DC (569), 4IV (599), 5XF (579), 5ZX (568), 6BQ (599), 6FA (589), 6GM (599), 6KP (589), 6NC (578), 8HI (579), GW8SU (589).

\*Phone: G2ACV (58), 5AU (5), Peaking to 24 dB over 9).

November 22, passing Azores.

CW: G3AMF (559), 3AQM (559),

November 23, 135 miles south of Azores.

CW: G3AUR (449). (Rx: RME 45).

## 7 mc

ZD4AM, West African Cacao Research Institute, Tafo, Gold Coast Colony.

CW: G2DHR (44), 2HFO (55), 3BYD (34), 3COL (33), 3DMG (33), 3KP (43), 6HL (44), 6UT (55), 8MF (45), GM3AHQ (56). *Head, 4, 5, 22 and 24 November. (RS in brackets, all T9).*

## 14 mc

ZD4AM, West African Cacao Research Institute, Tafo, Gold Coast Colony.

CW: G2FHV (55), 3AKA (456), 3BCI (57), 3BDS (578), 3BMM (57), 3BNE (54), 3BNU (45), 3BOV (55), 3BQJ (55), 3CAF (55), 3CEI (44), 3CMJ (57), 3CQQ (55), 3CSE (55), 3CUD (56), 3DER (568), 3DFF (56), 3DOK (54), 3EES (56), 3EKK (56), 5LP (55), 5SR (56), 6LC (56), 8DD (57), G13ECD (55), GM4NR (55), GW3AHN (558). *Heard, November 1-30. (RS in brackets, T9 unless otherwise stated.)*

For the Best Information on the Latest News, Read the Short Wave Magazine

# BK with the AR88

## Combined Muting, Protection and Monitoring

By N. P. SPOONER (G2NS)

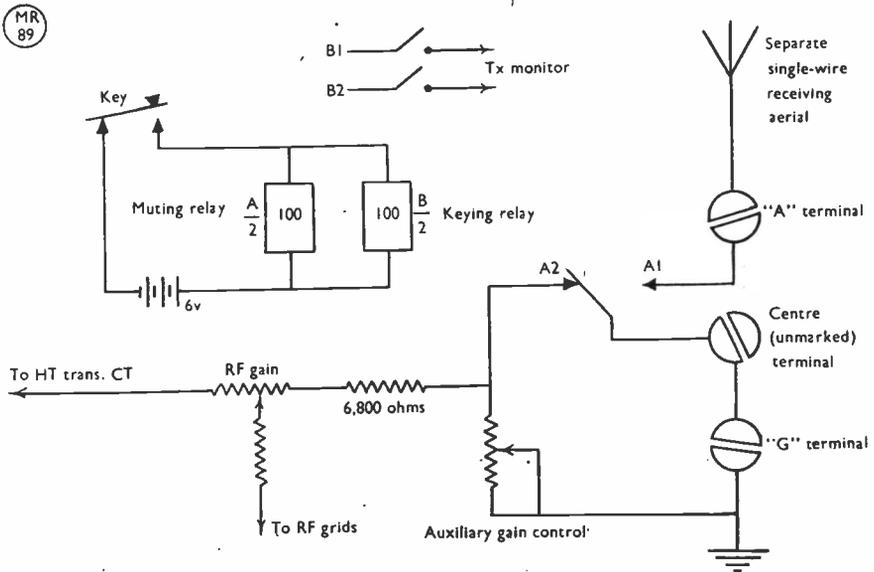
**I**n the July 1947 issue of the *Magazine* a system for muting and protecting the AR88 was described by the writer. It employed a slugged relay that swung receiver aerial terminals between aerial and earth and at the same time applied (or removed) an external source of bias to and from the diversity reception terminal in order to grid-block all the valves along the AVC line during the key-closed position.

Slugged relays are not always easy to obtain and as, moreover, the system may have proved noisy owing to the making and breaking of the aerial circuit, an alternative method is now suggested. This offers quieter break-in working with self-monitoring on spot-frequency and optional buzzer or audio-oscillator monitoring when listening off one's own frequency.

### Monitoring

While a check on the transmitter need not be continuous one should nevertheless always listen to one's own keying. But if a CW monitor (which requires a power supply) is used for this purpose it will be found that the receiver is heterodyned thereby and spot-frequency breaking-in signals are thus lost. On the other hand, a buzzer and an audio-oscillator are both silent when the key is open and they have the additional advantage that the former requires no other power than that already provided for relay energising, while the latter is satisfied with a total supply of only 2 volts for combined HT and LT.

However, as a CW monitor should already have been included in the equipment of every amateur station, there is, of course, no reason why it should not be used if it is switched off when nearing spot-frequency. The monitoring signal then heard in the headphones will be from the transmitter itself, but at a strength set for comfortable volume by an auxiliary gain control, the inclusion of which is the only work required upon the receiver. In regard to relays, it will be found that one single relay with multiple contacts will carry out all the keying and switching operations required ; but as most amateurs



Circuit of the arrangement devised by G2NS to obtain break-in operation and full receiver protection with the AR88.

place the transmitter a little distance away from the receiver long keying leads are always best avoided.

### Circuitry

Two relays are therefore used, of the easily obtainable and reasonably priced telephone Type 3000, one for keying the transmitter together with a buzzer or audio-oscillator, and the other for simultaneously muting and protecting the receiver. Both are operated by the key, the contacts on the keying relay being two pairs of "make" (single-pole single-throw ; contacts close when relay is energised) while those on the muting relay are "change over" (single-pole double-throw ; moving spring breaks from one contact before making on the other). If full advantage is being taken of all the AR88 controls, transmitter HT is already relay-operated ; when the front panel send-receive switch is moved to "Transmit," receiver HT is switched off but the heaters are left running while the two rear terminals marked "Transmitter Relay" close to energise any relay that will switch on transmitter HT. When the send-receive switch is moved to "Receive CW" the receiver HT is switched on, the BFO is automatically brought into circuit and the transmitter HT is switched off.

To run both the receiver and the transmitter together at the same time for break-in working an additional on-off toggle switch brought out to a convenient position must therefore be wired across the "Transmitter Relay" terminals, so that transmitter HT can be switched independently of the receiver.

### Action

The action of the entire system outlined can be described as : "HT on transmitter and receiver, key closed, keying and muting relays energised, transmitter keyed together with monitor, receiver protected by shorting of aerial terminal to earth and muted by auxiliary gain control setting." When using the audio oscillator for off-spot-frequency monitoring, its output can be fed into one side of a 1 : 1 transformer, the other side of which goes to receiver and headphones.

Reversing the key-closed process we have : "HT on transmitter and receiver, key open, relays de-energised, transmitter and monitor silent, receiver aerial circuit restored for incoming signals at normal gain."

It will be seen from the circuit diagram that a separate aerial is suggested for receiving. This is because beams are

chiefly employed on the DX bands, where break-in working is not so much in evidence as it is on the LF frequencies. Highly directional working on both transmission and reception not being required on the LF bands, pride of place out-of-doors can thus be given to the transmitting aerial and advantage taken of the capability of the modern receiver to give a good account of itself with an indoor aerial of the attic, passage, stair well or round-the-shack type. This saves the expense of a sturdy relay that will change the transmitting aerial over from send to receive with a speed and certainty to follow keying.

### Application

To carry out the few minutes' work required, the AR88 is removed from its cabinet and turned up on one side. Between the RF gain control and chassis will be found a resistor (in most models) of about 6,800 ohms. The lead from this resistor to chassis is cut and the resistor is joined on the cut side to an auxiliary gain control and fixed contact A2 of the muting relay, one wire from the resistor being fed through the nearest existing hole in the chassis and brought up to a position behind the front panel ; the auxiliary gain control is mounted on a piece of metal held by one of the retaining bolts on the condenser assembly cover. By lifting the cabinet lid this control may be conveniently reached for setting. The other wire from the resistor below chassis is taken over to the rear of the set and out through any existing hole to be joined to muting relay fixed contact A2. The moving spring contact goes to aerial centre unmarked terminal which in turn is strapped to the "G" terminal. Fixed contact A1 goes to the "A" aerial terminal and any single-wire separate receiving aerial.

Finally, any 6-volt source of energy, say, from an old charger, together with the keying relay, completes the entire system shown in the circuit diagram.

### SMALL ADVERTISING

The back pages of the *Magazine* now carry much small advertising of great interest ; we would again draw attention to similar facilities in our *Short Wave Listener*, in which the rates are 2d. per word (minimum 3s.) for readers' insertions, and 6d. per word (minimum 7s.) for trade announcements. Copy date for the next (February) issue of the *Short Wave Listener* is January 10, or February 7, for the issue dated March. Address : 49 Victoria Street, London, S.W.1.

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100K	1	2
2K	2	1
15K	2	1
5K	1	1
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2 meg	$\frac{1}{2}$	2
30K	2	1
20K	2	1
500	$\frac{1}{2}$	1
250	$\frac{1}{2}$	1
20K	$\frac{1}{2}$	1
75K	1	1
50K	1	2
10K	$\frac{1}{2}$	1
10K	1	1
500K	$\frac{1}{2}$	1
3K	1	2
25K	1	1
350	$\frac{1}{2}$	1
250K	1	1
1-5K	$\frac{1}{2}$	2
15K	1	1
1K	$\frac{1}{2}$	2
1-5K	1	1
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100K	$\frac{1}{2}$	2

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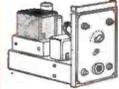
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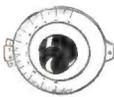
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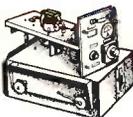
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### "LETTERS TO THE EDITOR"

When the new Vol. VII starts with the March issue, we hope to be able to make some space available for the regular publication of letters from readers. This is always a very popular feature in any periodical, but for some time now it has unfortunately not been possible to print letters from readers *in extenso*. It is in any case not proposed to publish such letters as would normally be dealt with through "DX Commentary" or "The VHF Bands," which already mirror the opinions and activities of a very large circle of readers; they are in that sense sections of the *Magazine* reflecting readers' views on particular topics.

Henceforth, a selection will be made from the Editor's general correspondence; and it should be noted that any letter to the Editor is liable to appear in print as such, unless the writer expressly states that he does not wish it to be published.

★

### GIFT SUBSCRIPTIONS

A number of readers have taken out subscriptions for friends overseas, to whom the *Short Wave Magazine* is welcome not only as a gift, but also for its own sake as one of the world's leading Amateur Radio publications. An overseas subscription costs 22s. for a year of twelve issues, despatched direct promptly on publication.—Order to The Circulation Manager, Short Wave Magazine, Ltd., 49 Victoria Street, London, S.W.1.

### IS YOUR CALL HERE ?

If so, please let us have a large stamped addressed envelope, with name and call sign, addressed to BCM/QSL, London, W.C.1. Cards for you will be forwarded on the next G clearance. It should be noted that the only call signs now appearing here are those for which we have no address on file—if you would like yours to appear in "New QTH's" please mention it at the same time. All QTH's we print are automatically reproduced in the *Radio Amateur Call Book*.

G2ACS, 2FAD, 2FGQ, 2FZN, 2HHT, 2KB, 3BMD, 3CDM, 3CHQ, 3CML, 3CNJ, 3CUA, 3DDO, 3DKH, 3DWP, 3EKX, 3ELW, 3EMA, 3YC, 4JG, 6UL, GM3NP, GW8WP.

### FIRST CLASS OPERATORS' CLUB

President : Gerald Marcuse, G2NM

Hon. Secretary : Capt. A. M. H. Fergus, G2ZC

With the President, G2NM, in the chair, the Club mustered 50 members for the first dinner in FOC history, in London on November 20 last.

This gathering brought together many members who had never met before, and was such a success that it has been voted an annual event; the whole of the committee was present, and one overseas member travelled over from PA specially to attend. Formal speeches were cut to a minimum, thus allowing everyone more time to make those personal contacts which are so prominent a feature of all Amateur Radio gatherings.

### Marathon Contest

For the second year in succession G4FN has won the Club's own marathon contest; he worked the necessary 75 members in 17 days, using QRP on three bands; a medallion for the 1947 contest and the cup itself for this year's event were presented to G4FN at the dinner.

The QRP Contest was won by G5JP, this being the second time running that the palm has been taken by an FOC member.

### Membership

The second year of FOC post-war activity has been completed with a membership of over 180, in all parts of the world. The 1947-48 Committee, consisting of G3JZ, G5PS, G5RV, G6JJ and G8VG, with the Editor of the *Short Wave Magazine* as an *ex-officio* member, has been voted back for a further term of office.

The new FOC certificates of membership have now been posted to everyone; if any member has not received his, will he please communicate with the Hon. Secretary direct, at 89 West Street, Farnham, Surrey ?

### Election Notice

In accordance with the rules, the following have been elected to active membership of the First Class Operators' Club :

F. Juniet, F3AD (Paimboeuf); D. I. Wiggins, G3ATL (Rochdale); F. A. Lynes, G3DKZ (Leafield); G. C. Hill, G3DFL (Birmingham); F. G. Goodman, G8AV (S. Devon); W. E. Bartholomew, G8CK (Watford); M. A. Meunier, ON4QF (Brussels); W. E. Corbett, G4RS (Bebington); F. A. Barrell, G3DCN (West Harrow); and V. Iversen, LA2OA (Bergen).

# Single-Control Two-Metre Converter

## Broad-Band RF Stages and Tuned Oscillator

By W. R. JOSS (G2AJ)

*(In the VHF world, there has been much discussion on the relative merits of two possible converter arrangements—one which employs a crystal-controlled oscillator on, say, 140 mc, with the main receiver tuned between 5 and 6 mc to cover the 145-146 mc band, and the other using a conventional self-excited oscillator tuned in the usual way. In the design here a stabilised harmonic oscillator (doubling 70-140 mc) produces a 6 mc fixed IF; and by making the RF and mixer stages broad band, alignment difficulties are avoided and the unit becomes "one-knob control," tuned on the oscillator only. By careful construction a good quality signal should be obtained, with a high degree of stability after due warm-up. A converter built on these lines will go a long way towards solving the receiver problem on our two-metre band.—Ed.)*

SINCE the opening of the 145 mc band the writer has, in common with many other VHF enthusiasts, spent a considerable time constructing various converters for use at this frequency; it is thought that the design described below may meet the need of some who are still endeavouring to solve their receiver problem on the two-metre band.

The merits of crystal-controlled con-

verters and those incorporating self-excited oscillators have been discussed elsewhere, and it is not proposed to develop that argument here. The writer has for some time past had a converter of each type in operation, and although there are very definite points in favour of each, in this article it is only proposed to discuss the latter.

The accompanying design has the fol-

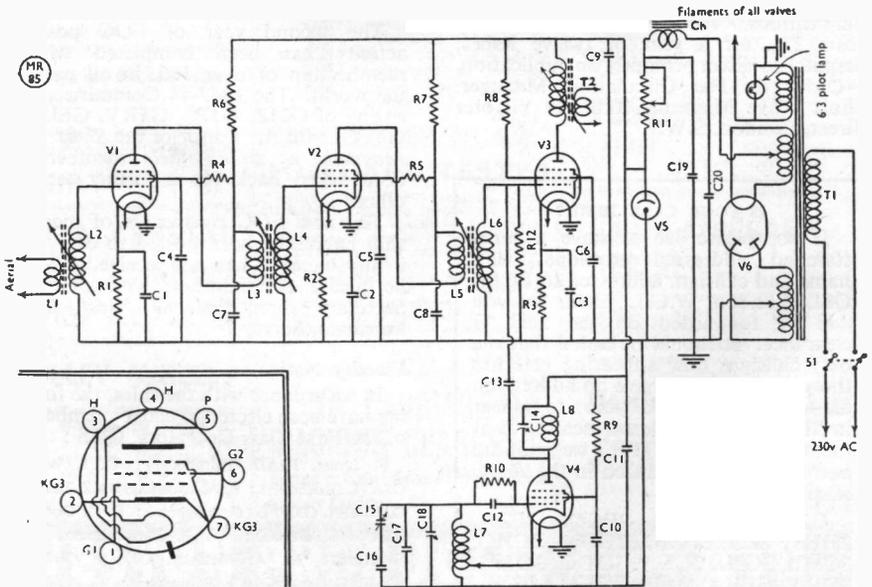
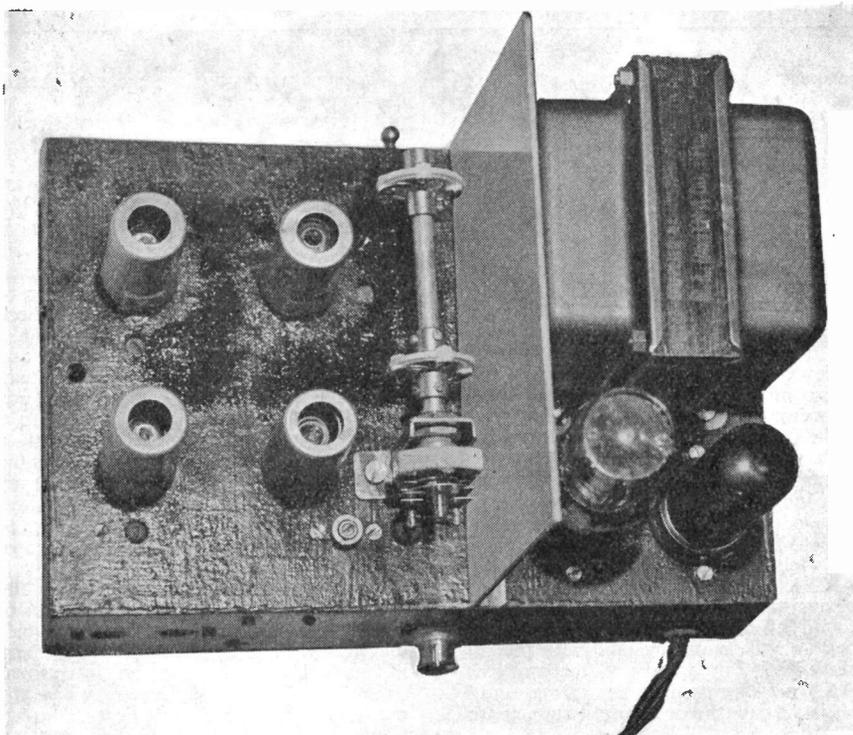


Fig. 1. Circuit of the 145 mc converter; the RF stages are broad-band so that the oscillator circuit only is tuned. Diagram inset shows base connections of the 6AK5 or 6AG5.



The RF, mixer and oscillator valves are in sprung screening cans and with the oscillator tuning condenser are separated from the power unit by a vertical screen.

lowing points to commend it :

(a) By the use of broad-band RF and mixer circuits the problem of ganging and tracking is eliminated and only the one tuning control is required.

(b) By running the oscillator on 70 mc

and doubling to 140 mc in its anode circuit the oscillator stability is greatly improved.

(c) As tuning is carried out on the converter and the IF is fixed (6 mc) there is no need for any exceptional precautions to eliminate "break-through," such as are

### Table of Values

Fig. 1. Self-Contained Two-Metre Converter.

C1 to 11 inclusive = .001 $\mu$ F, mica	L1 = 3 turns No. 34 DCC, interwound at earthy end of L2
C12 = 100 $\mu$ F, ceramic	L2 = 4-5 turns No. 22 enamel, spaced 1 turn
C13 = 15 $\mu$ F, ceramic	L3 = 4 turns No. 34 DCC, interwound with L4
C14 = 3-30 $\mu$ F, concentric trimmer	L4 = 4 turns No. 22 enamel, spaced 1 turn
C15 = See text	L5 = 3-4 turns No. 34 DCC, interwound with L6
C16 = 8 $\mu$ F, ceramic	L6 = 3-4 turns No. 22 enamel, spaced 1 turn
C17 = 15 $\mu$ F, ceramic	L7 = 6 turns No. 16 enamel, $\frac{3}{4}$ -in. dia., 1 in. long, self supporting, tapped approximately 1 turn from earthy end
C18 = Pre-set, air-spaced, approx. 5 $\mu$ F	L8 = 4 turns No. 18 enamel, spaced 1 turn
C19-20 = 8+8 $\mu$ F, 350 volt DC electrolytic	Note : All coils except L7 wound on $\frac{1}{2}$ -in. dia. formers with iron-dust adjustable slugs.
R1, R2, R3 = 510 ohms $\frac{1}{2}$ watt	CL5 = 25H, 60 mA smoothing choke
R4, R5 = 50,000 ohms $\frac{1}{2}$ watt	T1 = 250-0-250 volt 60 mA with 6-3 volt and 5 volt filament windings
R6, R7 = 5,000 ohms, $\frac{1}{2}$ watt	T2 = IF transformer. Aladdin $\frac{1}{8}$ -in. dia. former with dust core, filled with No. 34 enamel wire. Output link, 4-5 turns No. 34 DCC on cold end
R8 = 1 megohm $\frac{1}{2}$ watt	
R9 = 12,000 ohms $\frac{1}{2}$ watt	
R10 = 10,000 ohms $\frac{1}{2}$ watt	
R11 = 5,000 ohms 15 watt	
S1 = SPST, toggle type	
V1, V2, V4 = 6AK5	
V3 = 6AG5	
V5 = VR150/30	
V6 = 5Z4	

necessary with converters using fixed oscillators.

(d) The incorporation of a built-in power supply makes the converter self-contained, whilst the use of a VR-150 stabiliser helps to contribute to the overall stability.

**The Circuit**

The circuit shown in Fig. 1 consists of two RF stages using 6AK5's in each, followed by a mixer with the IF output taken at 6 mc. As previously stated, all the RF circuits are broad band, this being achieved by means of slug-tuned coils, over-coupling, and the use of fine wire for the primary windings in order that the Q of the coils be kept low. All the RF coils are wound on 1/4-in. diameter polystyrene formers with iron-dust slugs, the secondary winding being interwound between the turns of the primary. The mixer circuit uses a 6AG5, and as the capacities of this are slightly different from those of the 6AK5 it was found that the grid coil had to be reduced somewhat compared with the second RF stage. Eventually, 3 turns were tried and the circuit peaked with the slug pretty well in the middle of the former. A 6AK5 may be used as the mixer, and if this is the case the coil should be increased

to approximately the same size as that of the second RF stage.

Several harmonic oscillator circuits were tested before the present one was decided upon. An attempt was made to take the fourth harmonic out of a 6AK5 with the grid side tuned to 35 mc, but this did not give enough output—though at one time it was discovered that the oscillator was actually tripling, thus producing 105 mc, which enabled the converter to receive quite good signals from stations operating on 110 mc! The circuit finally adopted is a conventional Hartley and some adjustment of the cathode tap was necessary before a satisfactory note was obtained. The anode coil, 4 turns on a 1/4-in. diameter former, is tuned with a 3-30 μμF concentric trimmer. Tuning with a trimmer was found to be more satisfactory than with a slug, so the latter was removed and the trimmer mounted above the former, as shown in the photograph.

Various methods of injection into the mixer were tried and finally the system of grid leak injection shown in the circuit diagram was adopted. In other converters it has been found that no intentional means of injection is necessary where the oscillator anode coil (L8) is reasonably

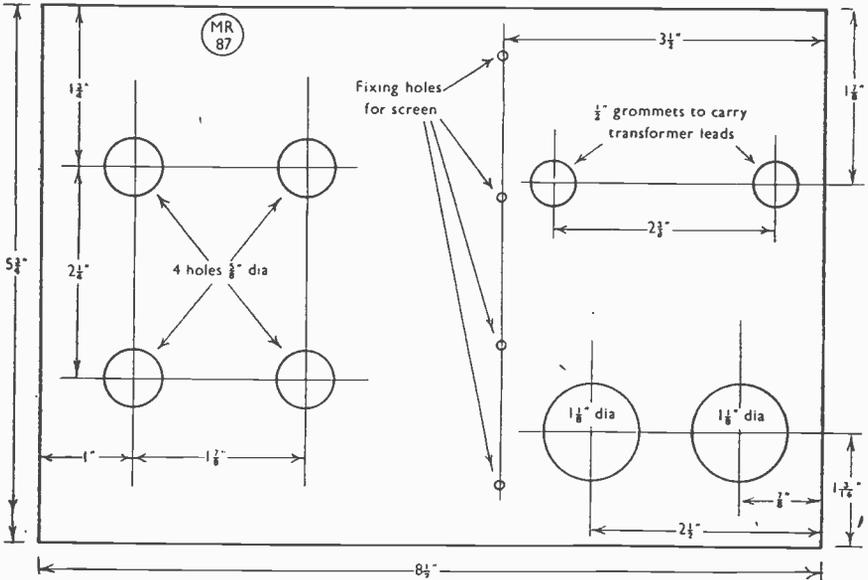
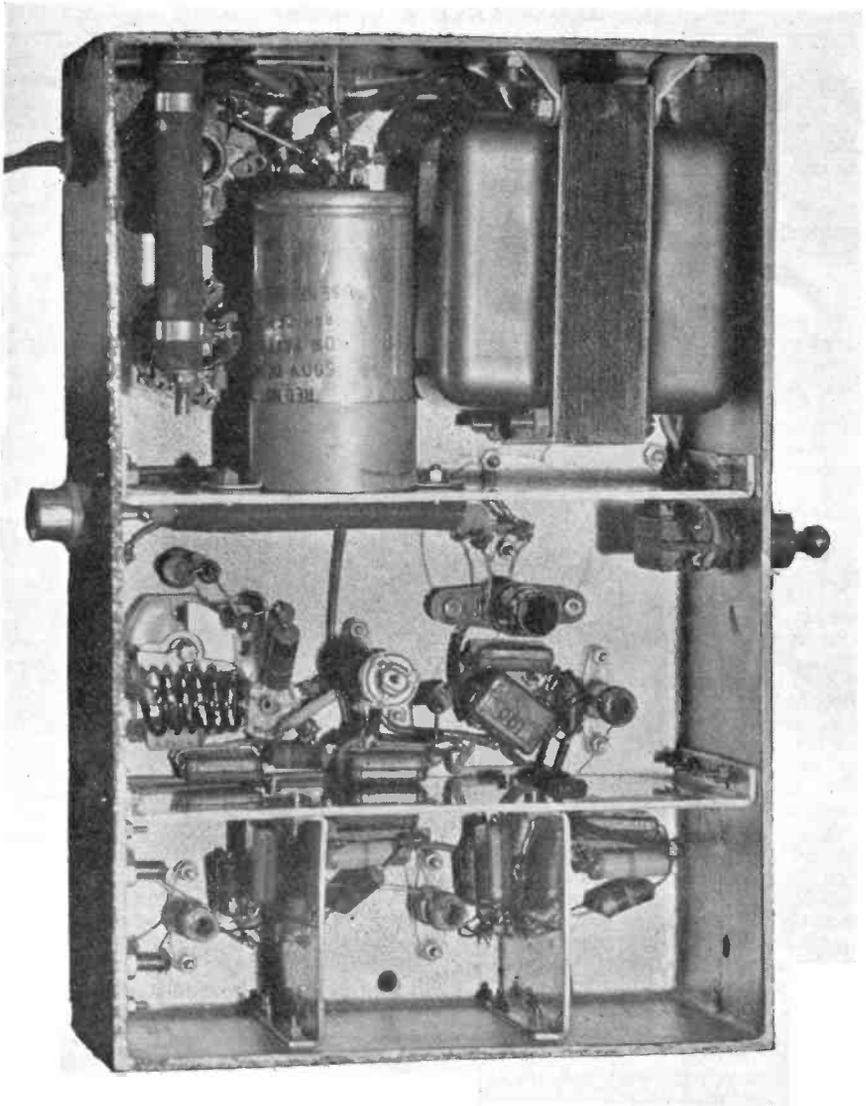


Fig. 3. Chassis detail for the converter; in the original, a standard Eddystone die-cast aluminium chassis was used (see photographs).



Underneath the converter chassis : each stage is in a screened compartment, and the overall dimensions of the chassis are only 8½-in. × 6-in. × 2½-in. deep. Miniaturised components are used throughout, including the Smith smoothing choke (top right) in the power compartment.

close to the mixer grid coil (L6), whilst in other cases a short length of covered wire, loosely coupled to each coil, produced adequate injection. After all these methods had been tried it was decided that the best conversion was obtained with the grid leak system. But readers are recommended to experiment in this direction, as individual

layouts and circuits are bound to differ to a certain degree.

The power supply is quite straightforward, with 250 volts HT and suitable filament windings, a 5Z4 as rectifier, and the smoothing consisting of a 25 H. choke and a double 8 μF electrolytic condenser. The entire HT supply for the converter is

stabilised with a VR-150 neon stabiliser. This has a variable resistor, R11, wired in series, which should be adjusted to such a value that the tube just strikes under full-load conditions.

### Construction

The general construction and layout will be quite clear from the photographs and should offer little difficulty. An Eddystone die-cast chassis is used, with the major holes and position of screen shown in Fig. 3. The screen was cut from 16-gauge aluminium, and should be sufficiently rigid without any support other than the 4 holes shown in the chassis. The under-chassis screens are shown in the photograph, and it is recommended that as much of the under-chassis wiring as possible be done before the screens are bolted into position. The easiest method is to bolt each of the small copper screens to the side of the chassis as each RF stage is wired. The earthy filament pin on each valve base is soldered to the screen and all the by-pass condensers associated with each stage should also be soldered to the screen at the same point. After the two RF stages are wired up the  $5\frac{1}{2}$ -in. screen can be bolted into position, thus completely enclosing the RF stages. The mixer and oscillator can now be wired, before the second screen is bolted into position.

All the power pack components are seen in the photographs, and provided the electrolytic condenser is fixed in position after the rest of the wiring has been completed no difficulty should be encountered. The choke and the transformer are both of the shrouded variety, from a new miniature line recently introduced by H. L. Smith & Co., Ltd., the choke being of such dimensions that it fits comfortably beneath the chassis.

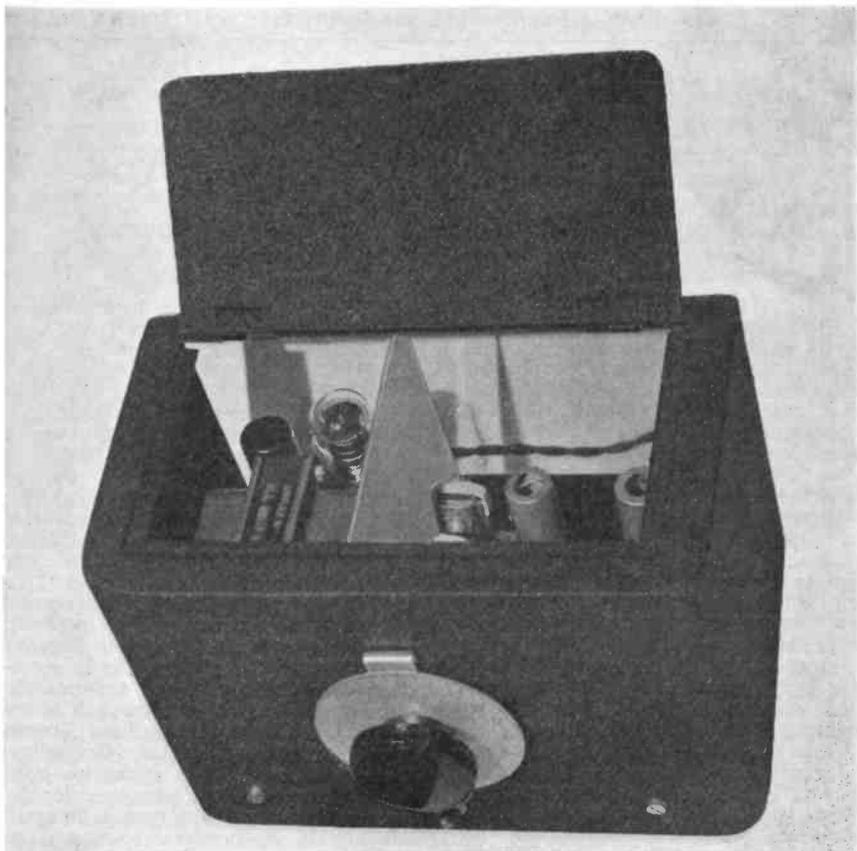
A word on assembling the coils might be helpful. The writer has found that the easiest way is to wind the secondary on a  $\frac{1}{4}$ -in. drill and, having done this fairly tight, the winding can then be pushed on to the former. As the formers are a fraction over a  $\frac{1}{4}$ -in., it will be found that the winding will stay in position without any difficulty. The former should now be mounted on the chassis before winding the primary. When this is done, one end of a piece of 34-gauge cotton-covered wire should be soldered to the anode pin of the preceding valve and the wire interwound between the turns of the secondary, and then anchored to the HT tag-board, which can be seen in the

under-chassis photograph. By this means both windings will be fairly tight and should "stay put" on the former. After the converter has been lined up the formers can be "doped" with polystyrene solution (Denfix) to hold the wire permanently in position, but this should *not* be done initially as it may be necessary to adjust the windings in order to get all circuits to cover the appropriate band.

### Adjustment and Lining-Up

The first step is to ensure that the oscillator is operating on the required frequency and that the condenser, C15, is covering the band. This condenser is one of the small double-spaced air trimmers so readily available and has been stripped of all but one moving and two fixed plates. If an S.27 receiver is available this is useful for checking the oscillator, or a wavemeter or lecher-wire system can be used. The writer has found that the BC-1255-A wavemeter/monitor is a most useful piece of equipment for this job. Although not accurate to more than 1 megacycle, it is extremely useful in a multiplicity of ways. A 180-deg. rotation of C15 should cover 138 to 140 mc. This condenser should be set at minimum capacity and the trimming condenser C18 adjusted until the oscillator is on 140 mc. Tuning C15 to maximum capacity should now give 138 mc. If it is found that the band is not being covered by a complete 180-deg. rotation of C15 then the series condenser C16 will have to be altered slightly. The writer found the value of this condenser to be approximately  $8 \mu\mu\text{F}$ , but individual circuits will vary slightly and some adjustment may be necessary in order to achieve the best possible band-spread.

Having got the oscillator functioning correctly the converter should now be connected to the main receiver, and the receiver set to 6 mc. The IF transformer in the converter must then be tuned for maximum noise in the receiver; this should occur with the slug fairly near the "hot" end of the winding. The trimmer, C14, across the oscillator anode coil should next be tuned for another slight increase in noise. This having been done, only the three grid circuits remain to be adjusted. These can be peaked roughly on noise, but it is recommended that final adjustment be carried out by listening to an actual signal on 145 mc, with the S-meter of the receiver in circuit, or if necessary by ear alone. Each slug should in turn be tuned for maximum response, and the process repeated at least once. The



The self-powered 145-mc converter complete, in its Eddystone cabinet ; the dial is the same makers' 637, with vernier, having a 10-1 reduction ratio.

first RF stage will be somewhat "flatter" than the following stages, but a definite peak will be observed. Should any circuit fail to peak the winding should be moved slightly relative to the slug, or the number of turns adjusted until a satisfactory condition is obtained. The converter should now be fully operational, with the 144 to 146 mc band occupying the entire scale of the slow-motion dial, which is coupled to C15.

When switching the converter on from cold there will inevitably be considerable drift, and no attempts should be made at

calibration until after it has been running for at least 30 minutes. After the unit is thoroughly warmed up it will be found to be remarkably stable, and the band-spread is such that once a station has been logged it should be found again without any difficulty.

In use with a 5-element wide-spaced beam at the writer's station, this converter has given excellent results, and it is recommended that those who follow this design should pay as much attention to the efficiency of their aerial as they do to the construction of the converter itself.

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*Mention the Magazine when writing to Advertisers—It  
Helps You, Helps Them and Helps Us*

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# THE VHF BANDS

By E. J. Williams, B.Sc. (G2XC)

**T**HIS month, the subject first for discussion is the November Contest Results. As most entrants prophesied, G5BY ran away with everything, and put up a magnificent performance—though he is the first to admit that the conditions of the Contest favoured him.

To devise a scoring system which will be fair whatever conditions prevail is next to impossible. Had conditions been bad, the London area, would have been favoured; had North-South conditions been as good as East-West were across Southern England, the northerners might have been at the top of the list. But as it happened (to use G5BY's own words), the Contest was just handed to him, and with the necessary endurance to keep going on both bands throughout the week-end he could hardly help but win.

These remarks do not, of course, in any way underrate G5BY's enthusiasm, technical ability and operating skill, without which such scoring would not have been possible. But it would be unfair to others to suggest that G5BY's mammoth score could have been achieved in any other part of the country under conditions existing and with the level of activity during the Contest. Apart from any other consideration, there is, too, the fact that G5BY gave many operators the thrill of a GDX contact on 145 mc, and in any Contest such as this it always adds greatly to the interest to have stations consistently active at GDX distances.

So while congratulating G5BY on his achievement in winning both 5- and 2-metre sections and being *Victor Ludorum*, we must also commend the leading stations in other parts of the country. Looking at the combined scores, G2AJ's performance from the London area and G5JU's achievement from the Midlands are noteworthy. On 5 metres, G3HW/A was a very creditable runner-up, while G3CWW in Cambridgeshire, G3ABA in Coventry and G2AOL in Kent put up the leading scores in their respective areas. G6VX obtained an excellent total on 2 metres from South London, and G2IQ produced the best 2-metre score from the

*November Contest Results—  
G5BY Wins Both Sections—  
Impressions of the Contest—  
December Conditions—  
15 Miles on 70 Centimetres—*

North. All these are very fine efforts and the operators concerned are to be congratulated on their results.

## Conditions

The cause of the remarkable conditions experienced during the Contest was a temperature inversion of nearly 20 deg. F. between the ground and 1500 ft. up. In addition (and of great importance), the air at the top of the inversion was very dry compared with that at ground level. This produced a falling off of dielectric constant at the rate of  $65 \times 10^{-6}$  per 1000 ft., compared with the more normal  $24 \times 10^{-6}$ . As a result, there was increased bending of rays and the VHF horizon was effectively extended. This is something approaching a duct, and not the more usual elevated inversion such as has been responsible for most of our 5-metre GDX in the past two years. One of the more noticeable features of this low-level phenomenon was the almost complete absence of fading. With space tight again this month, we must not continue the discussion here—we shall take up the theme again at the first opportunity.

## Equipment and Comments

G5BY used his normal gear, "all-acorn" converters, and wide-spaced beams; five elements at 40 ft. for 2 metres, and four elements at 45 ft. for 5 metres. His 5-metre PA is now in its thirteenth year and the converter in its eleventh! G5BY found 145 mc terrific on the Friday evening, signal strengths being twice or more the best ever heard on 58 mc. Sunday evening was best on five. His Zone G (over 200-mile) contacts were

### Two-Metre DX Working

Worked	Station
Over 350 miles	G2IQ, G5BY
300 to 350 miles	G2BMZ, G2MA, G4LU, G6WT
250 to 300 miles	G2XC, G6OS, G8DM
200 to 250 miles	G2AJ, G2CIW, G2OI, G3DEP, G5MQ, G5TZ, G6DH, G6PG

with G2XS, 3APY, 3BK, 3WW, 5BD, 5IG, 5MP, 5VT, 6MN and 8UZ on 5, and with G2CIW and 3BTL on 2 metres.

The 5-metre runner-up, G3HW/A ran 25 watts from accumulators to an 832A PA. The Rx was a modified R1481 with a 2-EF54 pre-selector. A 4-ele. w.s. beam completed the line-up. The Zone G contacts were with G3APY, 3BK, 3WW, 5MP, 6MN and 8UZ.

G3WW worked every station heard with the one exception of G4IG. A mains failure cut his activity on the Saturday night. The Tx at Wimlington was a Type 37 driving an 829B, while the Rx was EF54-EF50-EC52 converter into a 1.6 mc IF strip, with a 4-ele. c.s. beam at 51 ft. G3WW comments that he has "not enjoyed any other radio activity so much as this Contest." His Zone G contacts were with the Devon stations.

G3ABA used a 35T PA on 5 metres, feeding a 3-ele. c.s. beam, with a EF54-EF50-EC52 converter. On 2 metres G3ABA's converter did not come up to expectations and he offers his apologies to those who called him in vain. The 5-metre band did not open to the North from Coventry and several well-known counties were unrepresented.

G2AOL, who put up the best 5-metre performance in the South-East, used an 807 power doubler (!) with 20/25 watts, and an RF27 into a CR100 for Rx. A 4-ele. beam assisted. G2AOL says that for him the outstanding feature of the Contest was the signal-strength from the Devon stations, in contrast to the none-too-good conditions to the North. In all, 23 new stations and six new counties were worked.

G6VX, who operated on 2 metres only, had G5BY and the Shropshire stations G2ADZ and 4LU as his best DX. Other Zone F contacts included G2IQ and the Torquay group. G2IQ obtained the best 2-metre score in the North, where activity on 145 mc was comparatively poor. He is using an all-6J6 converter with a noise factor of 4.7 dB. His DX included G2NM, 3AUA, 5MA, 6DH, 6PG and 6VX.

G2AJ, who put up a very fine combined score, suggests we have a Contest every week-end if this was a sample of the conditions we can produce! (No, this was not the result of any influence we have with the Met. people at Air Ministry!) On 5 metres, G2AJ used an acorn Rx, with a 4-ele w.s. beam and an 829B Tx. The 2-metre transmitter was that described in the November 1948 *Short Wave*

## FIVE-METRE COUNTIES WORKED LIST

Starting Figure, 14  
From Fixed QTH only

Worked	Station
43	G3APY (224)
42	G3BLP (250)
41	G5WP
40	G6CW
39	G2AJ (317), G2ADZ, G2OI (186), G5BD (225), G5JU
38	G2MR, G3ABA
37	G2CIW (219), G3DCV (140), G5MA
36	G6OS (186), G8UZ
35	G5YY (179)
34	G2NH (270), G2R1 (150), G5VB, G5BM, G6LK, G6VX
33	G5BY, G5GX (147), G6MN (147), G6XM
32	G2XC (320), G3IS (141), G3WW (141), G4LU, G5BJ (114), G6OH
31	G2AXG, G5PP, G5RP (201), G8KL (145)
30	G2KI (171), G5PY (241), G3BK
29	G2IQ, G4AP, G8WV
28	G5MQ, G6HD (175)
27	G3BOB (130) G4IG
26	G5LC (144), G6NF (170), G8SM (157)
25	G2AOK/A, G8UR
24	G4RO, G6VC (137), G8GX, G8KZ (192), G8WC
23	G3CGQ (130), G5LQ
22	G2HLF (134), G5IG, G6LC, G8QX
21	G2AUA, G2KF (121), G2NM, G3CWW (192), G6KB (152), G6SM (115), G8LY
20	G2AOL, G2BMZ, G3BW, G5CP, G6TF, G8PX
19	G2LC (136), G5MR (110), G5UM (142), G6ZQ
18	G2ADR, G3BK, G5HN, G6UW
17	G3COJ, G3YH
16	GWSSA
15	G3EHY, G6CB, G8IC, G8TS (170)
14	G3BTC (108), G8JO

Note: Figures in brackets after call are number of different stations worked. Starting figure, 100.

Magazine, while the Rx was a crystal-controlled converter.

### General Impressions

So far as we can gather everyone in the South enjoyed the event. Activity was good on both bands, although some stations reached saturation point well before the end of the Contest, having worked everyone who was audible.

In the North things were not so good, and once again we must congratulate the Newcastle stations G3CYY and 4LX for putting in a gallant entry after what must

THE SHORT WAVE MAGAZINE  
VHF CONTEST  
NOVEMBER 12-14, 1948  
COMBINED SCORES

Pos.	Call	Location	Points			Total
			5-m	2-m	Bonus	
1	G5BY	Bolt Tail, Devon	827	317	60	1,204
2	G3HW/A	Telmouth, Devon	605	—	—	605
3	G2AJ	Hendon, Middlesex	121	119	65	305
4	G5MA	Ashtead, Surrey	109	111	45	265
5	G3WW	Wimblington, Cambs.	225	—	—	225
6	G5RP	Abingdon Berks.	124	60	40	224
7	G5JU	Birmingham, Warw.	162	41	5	208
8	G3APY	Kirkby-in-A., Notts.	144	54	—	198
9	G6VX	Hayes, Kent	—	175	—	175
10	G3ABA	Coventry, Warw.	169	5	—	174
11	G2BMZ	Torquay, Devon	—	153	—	153
12	G8TS	Farnham, Surrey	76	50	25	151
13	G2AOL	Oxford, Kent	143	—	—	143
14	G6WT	Torquay, Devon	—	141	—	141
15	G2NM	Bosham, Sussex	46	64	25	135
16	G5LC	Molesey, Surrey	130	—	—	130
17	G3CGQ	Luton, Beds.	127	—	—	127
18	G5PY	Clapham Park, London	125	—	—	125
18	G2IQ	Sheffield, Yorks.	—	125	—	125
20	G4AP	Swindon, Wilts.	71	38	10	119
21	G3BOB	Hayes, Kent	118	—	—	118
22	G5NF	Farnham, Surrey	—	116	—	116
23	G5JM	Southall, Middlesex	112	—	—	112
23	G6NK	Weybridge, Surrey	112	—	—	112

Pos.	Call	Stations worked by Zones										Total Points
		A	B	C	D	E	F	G				
1	G5BY	—	1	3	1	7	34	10	827			
2	G3HW/A	1	2	1	2	15	28	6	605			
3	G3WW	2	3	10	20	4	—	2	225			
4	G3ABA	2	3	6	19	3	2	—	169			
5	G5JU	3	1	5	10	10	1	—	162			
6	G3APY	2	4	4	—	9	—	2	144			
7	G2AOL	18	9	9	3	5	2	—	143			
8	G5LC	29	9	5	4	3	2	—	130			
9	G3CGQ	5	21	5	5	2	2	—	127			
10	G5PY	27	5	10	2	3	2	—	125			
11	G5RP	3	19	12	3	4	2	—	124			
12	G2AJ	32	6	9	2	2	2	—	121			
13	G3BOB	19	4	4	3	5	2	—	118			
14	G6NK	23	7	3	2	4	2	—	112			
16	G5JM	26	6	6	2	2	2	—	112			
16	G5MA	19	6	2	4	5	1	—	109			
18	G2AUA	2	6	18	1	6	1	—	105			
19	G3CWW	31	8	8	—	1	2	—	103			
20	G6HD	28	4	6	3	1	2	—	101			
21	G5LO	23	4	8	1	2	2	—	100			
22	G8UZ	2	2	2	1	4	—	—	99			
23	G5IG	2	8	12	1	1	1	—	96			
24	G4C1	24	6	3	2	1	2	—	87			
25	G2KI	20	4	7	3	1	1	—	84			
26	G6MN	3	2	3	—	—	—	—	81			
27	G8WC	3	2	16	—	3	—	—	79			
28	G6SM	14	3	2	2	2	—	—	76			
28	G8TS	12	19	2	—	1	1	—	76			
30	G4AP	2	1	11	1	3	—	—	71			
31	G5UM	4	10	3	1	2	—	—	62			
32	G2BRR	17	3	3	1	2	—	—	61			
32	G3EHY	—	—	—	3	5	—	—	61			
32	G8LY	3	1	1	2	2	—	—	61			
35	G2NM	3	3	7	—	—	—	—	46			
36	G2LC	16	2	3	—	—	—	—	41			
37	G8HC	17	5	—	2	1	—	—	30			
38	G8FA	17	1	1	—	—	—	—	22			
39	G3BTC	9	1	1	—	—	—	—	19			
40	G2RY	—	—	—	—	—	—	—	5			
40	G2DHW	5	—	—	—	—	—	—	5			



have been, for them, an extremely dull week-end. We hope that before long someone will break through to Newcastle and give them their first 2-metre DX. G3BW in Whitehaven is also ready and waiting.

Several entrants commented favourably on the two-band operation, as it enabled a comparison of conditions to be made on both bands. Stations with good receivers appear to have found 2-metre propagation somewhat better than 5, but with many factors in the picture it would be difficult to assess the relative conditions at all accurately.

As usual, the length of the Contest came in for some criticism, and on this point we must again record such a wide variation of opinion that it would obviously be impossible to please everyone! At the same time, there was a large number of entrants who agreed that the period was just right.

Operating technique was generally good, although some long CQ's without call-signs were logged on both bands. Several criticised the stations who called "CQ F" and "CQ PA" during the Contest period, but as the stations concerned were non-entrants and no one was *compelled* to enter this contest, we cannot really complain! Nevertheless, one does realise how irritating this sort of thing can be. On the other hand, almost everyone seems to have taken time off from the contest to work these Europeans.

### Checking

All entries have been thoroughly scrutinised and many scores have been amended, some up and some down. The distances were checked on the Ordnance Survey Ten-Mile Map, which uses the National Grid, and no score was altered unless there was no doubt at all that an error had been made. The entries were well set out and that eased our work considerably, for which many thanks. Useful check logs from G3ENY, G5OO, G8DM, G8QX and G8SM are also gratefully acknowledged.

### Some Contest Figures

The Contests results given herewith show some interesting figures which are worth quoting for the record: A total of 59 different stations entered, in the sense of sending in their results; of these, 41 appear in the 5-metre section, and 31 on 2 metres; but only nine stations gained bonus points for two-band operation, and four stations, actually working on both bands, were unable to claim any bonus

points. *Exclusive* use of the bands shows 28 stations on 5 metres only, and 18 operating solely on 2 metres.

### Contest Quickies

G2BRR used an 807 tripler as his final. . . . G2BMZ only operated for 7 hours and G2CJW only managed 6 hours for their very good 2-metre scores. . . . G2DHV had input of 1.5 watts from batteries. . . . G2NH used his 5-metre beam on 2 metres, back to front. . . . G3CGQ worked the West Country for the first time on 5. . . . G3CWW heard 67 stations on 5. . . . G3CYY has CC converter and 9002 mixer and a modified 1143 for Tx. . . . G3EHY's beam came down on the Friday evening and delayed operations for 24 hours. . . . G4LX heard several weak 'phone signals on 5. . . . G5JM thought operating procedure poor, with two many repetitions, and bemoans LF end crowding. . . . G5LQ says if all the stations he heard and called had come back he would have had a good score! . . . G5RP thought the time he spent on 5 more profitable than on 2. . . . G5MR found G3HW/A, G3WW and G3ABA to be outstanding signals. . . . G5UM worked Devon off a dipole fixed to radiate NW/SE. . . . G6MN heard only G3BLP from London way on 5. . . . G6PG called "CQ North" and an F8 came back to him on 145 mc (these beams!). . . . G6SM wished more stations had listened as high as 59.175 mc. . . . Before the Contest G6UW had heard no 2-metre DX at all. . . . G8FA at his new location worked more stations on 5 during the Contest than he had in two years in Devon. . . . G8IC heard the Devon stations. . .

### More Quickies

G2ADZ used a TRF receiver on 2 metres during the Contest week-end, but found body-capacity effects too bad—though he worked G5BM and G6VX with it. New Rx has 6J6 converter and ON and PA

### VHF CENTURY CLUB

#### NEW FULL MEMBERS

G2AXG P. Lambourne  
(Sanderstead)  
G8SM A. Mears (East Molesey)

#### NEW ASSOCIATE MEMBER

G8LY Miss C. Hall  
(Lee-on-Solent)

Total : 41 Full Members

have been worked. . . . G2AOL is on 5 daily, 1830 and 2215. . . . G2AXG (Sanderstead) has 6AK5-6J6 osc. into BC-454; he heard a GM but only got part of the call. . . . G2CIW is now CC on 145.2 mc. . . . G2FLC (Chevely) has worked Midlands and North on 145 mc. . . . G2FVD (Wimbladon) is on 145.692 and commends the CW signing policy. It enabled him to identify G2XC, anyway! . . . G2IQ has worked F8OL at about 370 miles. . . . G2MA has worked ON4FG at 300 miles. . . . G2WS has a 5-ele. beam on 145 mc. . . . G3BW (Whitehaven), active nightly on 145 mc, has heard no signals as yet. He asks for schedules with suitable stations and would like the circuit of the 522 Tx. He has the Rx circuit if anyone needs it. . . . G3DCV (March) hopes to have 24 elements on 2 metres before long. . . . G3EHY found November 27-29 good on five. . . . G3EMK (Bournemouth) is active on 2 metres with an 832PA; Rx is the G2IQ converter. . . . G3ENY (Chertsey) got his licence on the Wednesday before the Contest and intends to stay on 58 mc until we lose it. He has 9 watts to a VT501. . . . G3YH (Bristol) is on 145.8 and beams East from 2030 to 2130. His Rx is an S27, with 4-ele. w.s. beam. . . . G4LU (Oswestry) worked ON4FG and PAØZQ. He has a regular schedule with G5LJ at 2000. . . . G5GX (Hull) has a 12-ele. beam and works F, ON and PA with ease when conditions are good. . . . G6LC (Warrington) is on 145.35 with SCR522 Tx and a 4-ele. beam in the roof, and asks where are all the fellows who were not on five because its loss was so near, and claimed to be ready for two? . . . G6WT has worked PAØPN as well as F8OL and ON4FG on 145 mc. He reports G3TN and G4LP active in Dorset. . . . G8AO continues to strive for a MM permit, and in the meantime logs quite a lot of 2-metre signals while seaborne off the East Coast. . . . G8SM's first 2-metre contact was with G5BY at 170 miles.

GW3ON and GW5UO are active in North Wales and GW5SA in the South, the latter on 145.26 mc, and chiefly at week-ends (Friday to Monday inclusive). The North Wales stations are there most evenings at 2100.

ON4FG (Antwerp) has 50 watts to an 829B and a 12-ele. beam 56 ft. up. The Rx is 6AK5-6AK5-9002 into 3.2 mc IF. His first contacts were with PAØPN on September 10, G6DH September 25, F8OL November 13.

## TWO-METRE COUNTIES WORKED LIST

Worked	Station
25	G2AJ, G2AXG
19	G2NM, G5NF
18	G2CIW, G5BY, G6PG
17	G2XC, G4LU
15	G8KZ, G8QX
14	G2NH, G6LK

### Seventy-Centimetre Band

Some interesting new results fall to be recorded on the 420 mc band. G3AHB/A, operating from the roof of the E.M.I. building at Hayes, Middlesex (100-ft. a.s.l.) has obtained two-way contact with G2FKZ (East Dulwich), at 220-ft. a.s.l., over an airline distance of 15 miles. G2FKZ used MCW and was R5, S8-9; G3AHB/A was on 'phone and reported R5, S5, the contact being held for 70 mins. Gear at Hayes was an APS-13 Tx/Rx running 10 watts input, into a  $\frac{1}{2}$ -wave aerial in a paraboloid reflector, vertical polarisation being used at both ends. This contact, which took place from 1920 on December 20, is the GDX for 70 cm., and shows that given the right gear and location, plus a degree of enthusiasm and persistence, useful distances can be worked. G2RF (Hillingdon) has also been heard at G3AHB/A, who is on 436 mc for the Wednesday Schedule; we hope to hear of more results!

### Rest of the News

A second spell of good conditions coincided with the foggy weather at the end of November, outstanding date being November 25. As recorded in the Quickies above, numerous 300-mile 2-metre contacts were made and almost everyone from Yorkshire southwards worked some Continental DX. The first two weeks of December were very poor, little or no DX being heard. This coincided with that unsettled and stormy period of weather. The 2-metre DX record stays with G5BY for his contact with PAØZQ, the distance being 379 miles. The distance G2IQ/F8OL is somewhat shorter—about 370 miles. These contacts were all made under low-level inversion conditions, which favours 2 metres more than 5 metres. It remains to

be seen how we fare when the more frequent elevated inversions are formed.

On higher frequencies, G3APY (Kirkby) has been improving his 430 mc receiver. He hears G8UZ at (Sq) 9 plus, using a P58 Rx. G3APY hopes to be on 2300 mc soon, in co-operation with G4DS. G2WS (Beckenham) suggests 2000-2200 on Wednesdays as an activity period on 420 mc each week, and we commend this to all interested.

### The New Bands

As most of you will know by now, several new VHF and UHF amateur allocations became available with effect from January 1. These include the remainder of the 2-metre band, i.e. 144-145 mc, and 1215-1300, 5650-5850 and 10,000-10,500 mc. Inputs of 25 watts will be permitted on all bands, and FM may be used from 420 mc up. The five-metre band will, we understand, continue to be available for amateur use "until a date not later than March 31."

### Fiveband Club Meeting

Arrangements are in hand for a London area FBC dinner, a possible date being January 29; all London members will be notified direct in due course, but the purpose of this notice is to invite Fiveband Club Members who could come from outside the district. If you can make it, please write the London area representative, G6VX, *immediately*—QTH: 16 Abbotsbury Road, Hayes, Bromley, Kent.

### In Conclusion

In closing we should like to record our grateful appreciation of your support during the past 12 months, and to wish all of you the best of good luck on the VHF and UHF bands during the coming year. Reports for next month should be in by January 14, addressed E. J. Williams, G2XC, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. CU on February 2.

## TWO-METRE ACTIVITY REPORT

ON4FG, Boomstraat 21, Bornem.

**WORKED:** G2ADZ, 2HCG, 2IQ, 2MA, 3APY, 3DEP, 3DMU, 4LU, 5BY, 5TZ, 6BX, 6DH, 6OS, 6PG, 6WT, PAØPN.

**HEARD:** G2AXG, 2BMZ, 2FLC, 2KG, 2NM, 2XC, 2YC, 3DUP, 4LY, 5BM, 5JU, 5MA, 5MY, 5NF, 5YM, 5ZQ, 6VX, 8DM.

G2FVD, Wimbledon Park, Surrey.

**WORKED:** G2AJ, 2AXG, 2MV, 4CG, 5AA, 5DT, 5KH, 6VX, 8KZ.

**HEARD:** G2IQ, 2MR, 2NH, 2WS, 2XC, 2YC, 3APY, 3DMU, 3FD, 4RO, 4ZU, 5MA, 5OO, 5TP, 6DH, 6NF, 6OS, 8DM.

G2MA, Rotherham, Yorks.

**WORKED:** F8ZF, G2AJ, 2AXG,

2FLC, 2IQ, 2OI, 2XC, 3DA, 3DEP, 4LU, 5BD, 5GX, 5MA, 5NF, 5TZ, 6DH, 6DP, 6NF, 6VX, 6YO, 8SM, ON4FG, PAØPN, ØZQ.

**HEARD:** F8OL, G2WS, 5TP, 5YM, GW5UO.

G2WS, Beckenham, Kent.

**WORKED:** G2AJ, 2AXG, 2IQ (146), 2NH, 3BXN, 3DEP, 3DMU (152), 3EJL, 3FD, 4ZU, 5BY (186), 5MA, 5NF, 5RP, 5TP, 5TZ, 6OH, 6WT (166), 8TS.

G2FLC, Chevely, Cambs.

**WORKED:** G2IQ, 2MA, 3DMU, 4LU, 5GX, 5JU, 5YM, 6BX, 6YO.

**HEARD:** G2HCG.

G3DEP, Ryde, Isle of Wight.

**WORKED:** G2ADZ, 2AXG,

2BMZ, 2CIW, 2HCG, 2IQ, 2MA, 2NH, 2NM, 2UJ, 2WS, 2YC, 3APY, 3BXN, 3DMU, 3DUP, 3EJL, 3FD, 4IG, 4LU, 4RO, 5BD, 5BM, 5JU, 5MA, 5NF, 5TP, 5TZ, 5UM, 5US, 5YM, 6DH, 6OS, 6WT, 6YO, 6ZO, 8DM, 8KZ, 8QX, 8SM, 8TS, GW5SA, ON4FG, PAØAD, ØPN, ØZQ.

**HEARD:** G2AJ, 2MR, 2XC, 3ABA, 3RI, 4AP, 4IF, 5BY, 5KH, 5RP, 6VX.

G4LU, Oswestry, Salop.

**WORKED:** G2ADZ, 2AJ, 2AOK/A, 2AXG, 2CIW, 2FLC, 2HCG, 2MA, 3APY, 3BMY, 3DEP, 5BD, 5BM, 5JU, 5LJ, 5MA, 5YM, 6DH, 6OS, 6VX, 8SM, ON4FG, PAØZQ.

**HEARD:** F8OL, G2DYM, 2NM, 3DUP, 5AA, 5TZ, 8WV, PAØPN.

### VOLTAGE REFERENCE TUBE

This is a new Mullard product designed to provide a high degree of voltage stability over a current range of 1.8 mA, with a striking voltage of 125 volts and working at 85 volts. The stability is better than 0.1 per cent. over a period of 100 working hours, and 0.2 per cent. over 1000 hours. By operating the tube at a current of 4.5 mA, it can be used as a source of voltage reference; as the temperature coefficient is less than -3.5

mV per deg. C., in most applications the necessity for temperature compensation is eliminated. Of all-glass construction with a loctal base, this is clearly the type of voltage regulator to use for stabilising the oscillator in, say, a VHF receiver. The price of the Mullard 85A1 Voltage Reference Tube is 35s. list. Mullard Electronic Products, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

# Here and There

## Radio Amateurs' Examination

Candidates for the next R.A.E. are required to put their names forward not later than March 1, 1949. Entry for the examination can be made either through the local Technical College or the office of the Education Authority. Exemption can be claimed by those suitably qualified; in the case of ex-Service candidates the appropriate technical trade classification or grading must have been held while serving at some period during the last two years. These exemptions (for both Service and civilian candidates) are set out in full in Form E-in-C 428, obtainable on request from the Engineer-in-Chief, Radio Branch W5/5, General Post Office, London, E.C.1.

Whilst on this topic we might add that in the Radio Amateurs' Examination held in May last (when 528 candidates were passed of the 700 who sat) the number of entrants who had taken the correspondence course provided by E.M.I. Institutes, Ltd., ran into three figures.

## Medway Radiolympia

During the four days it was open the Exhibition organised by the Medway Amateur Receiving and Transmitting Society brought no fewer than 2,000 visitors in to the New Corn Exchange at Rochester. The Mayors of the Medway Towns were present at the opening of the Exhibition on November 24, the ceremony being performed by Miss Sylvia Peters of the BBC Television service.

This exhibition, in every way a local effort, was very well supported by the trade and is a great credit to M.A.R.T.S. It is certainly one of the biggest of the kind yet to have taken place outside London.

## Deepest Regret

Is what we feel in having to announce that the internationally infamous callsign G9BF has at last been officially allotted to a very well-known radio engineering organisation for research and experimental work on non-amateur frequencies. Calls in the G9 series are reserved for this purpose.

However, not only are we quite certain that the new owners of the callsign will

achieve great and lasting success with it, but we are also sure that they will take in good part any bantering references to G9BF in these pages. His shade still haunts the amateur bands!

## German Amateur Licences

This tiresome business has not been settled even yet, and all the DA's, DK's and others you may hear or work are still pirates. So far as the Allied Administration is concerned, the German authorities were long ago informed of the conditions under which transmitting licences can be issued to German nationals, using the prefix DL, as reported here some months back. The fact that the Allied Administration has agreed to licences being granted has apparently done little else but encourage piracy on an even wider scale—we have had another "official list of district prefixes for Germany," and there appear to be two or three organisations claiming to represent the German amateur. Just as this issue was being put down, we received official information that the Allied D2, D4, D5 calls have been re-prefixed DL2, DL4, DL5; these are *not* German national callsigns, which will be DL1, DL3, DL6-Ø, when (and if) eventually issued by the German Post and Telegraph authorities themselves.

We are full of sympathy for the thwarted DL's, and can only say that they will be very welcome when they are officially licensed.

## R.C.M.F. Exhibition

The Sixth Annual Exhibition of the Radio Component Manufacturers' Federation—from the purely technical point of view by far the most important and interesting radio show to be staged in this country—is being held in London early in March. About 100 exhibitors are expected, and the Exhibition will cover radio, electronic and telecommunication components, valves and test gear. Special arrangements are being made for overseas visitors, and full information can be obtained from the Secretary, R.C.M.F., 22 Surrey Street, Strand, London, W.C.2. As in previous years, admission to this exhibition is by invitation only.

## NEW QTH's

This space is available for the publication of the addresses of all holders of new call signs, or changes of address of transmitters already licensed. All addresses published here are automatically included in the quarterly issue of the Call Book in preparation. QTH's are inserted as they are received, up to the limit of the space allowance. Please write clearly and address on a separate slip to QTH Section.

IE16X	B. Fogerty, 104 O'Connell Street, Limerick, Eire.	G3DTC	Secondary Modern Mixed County School, Lichfield Road, Wednesfield, Wolverhampton.
G2ALA	W. P. Smith, 18 Grebe Gardens, Frenchay Park Road, Stapleton, Bristol.	G3DTZ	I. L. Fear, Bishopstrow, Hucclecote, Gloucester.
G2AQO	K. J. Dodds, 78 Plumstead Road, Norwich, Norfolk.	G3DVJ	K. T. Hardie, 18 Cambridge Road, Great Crosby, Liverpool, 23.
G2AZO	G. E. L. Morgan, 42 Beechfield Road, Bromley, Kent.	G3DVK	F. F. Oldfield, 15 Northfield Avenue, Monkwood Estate, Rawmarsh, Rotherham, Yorks.
G2BAL	G. J. Smallman, Waterside, River Road, Taplow, Bucks.	G3DWO	Dr. A. Balthasar, London House, Guilford Street, London, W.C.1.
G2CFG	C. J. Dimond, 14 Woolacombe Road, Blackheath, London, S.E.3.	GC3DXL	L. Lewis, 100 St. Saviours Road, St. Heller, Jersey, Channel Islands.
G2CKF	S. Smith, The Factory, Castle Eden, Co. Durham.	G3DYX	F. E. Ellis, 50 Glaisdale Grove, Hull, Yorks.
G3AMV	W. J. Coleman, The Gables, Stapehill, Wimborne, Dorset.	G3DZP	B. R. King, 4 Armistice Cottages, Layer-de-la-Haye, Colchester, Essex.
G3ATD	J. J. Burchell, 4 Kangley Bridge Road, Lower Sydenham, London, S.E.26.	G3EAT	W. H. Burden (ex-D2DC), 3 Arcade Terrace, Swanage, Dorset.
G3AWL	T. Luxmore, 40 Vane Street, Wingate, Co. Durham.	G3EAU	A. V. C. Gianville, 22 Cabot Street, Westminster, Bristol, 3.
G3BHL	F. G. Pilke, 17 Cambridge Road, St. Mary Church, Torquay, Devon.	G3EBO	G. R. Garland, 98 Wolverton Road, Stony Stratford, Bucks.
G3BLE	J. E. Swaine, 53 Malcolm Road, South Norwood, London, S.E.25.	GC3EBU	K. C. Woodman, 62 New Street, St. Heller, Jersey, Channel Islands.
G3BLK	J. H. Wood, 293 Lower Morden Lane, Morden, Surrey.	G3EDE	N. Clark, 23 Worthington Street, Whitchurch, Shropshire.
G3BSO	C. L. Turville, 16 Linden Road, Abington Park, Northampton.	G3EEN	C. G. Clark, The Spinney, Wigan Lane, Chorley, Lancs.
G3BTH	J. Hucker, 18 Uxbridge Road, Slough, Bucks.	G3EFC	J. W. Waddington, 13 Allsprings Drive, Great Harwood, Blackburn, Lancs.
G3BUZ	W. G. Crundall, 35a Central Hill, Upper Norwood, London, S.E.19.	G3EFE	A. R. Bryant (ex-JAAP), 74 North Street, Bedminster, Bristol, 3.
G3BYA	E. A. Pounney, 164 Tennial Road, Harborne, Birmingham, 32.	G3EFU	J. C. Hopkins, 46 Conygre Road, Filton, Bristol.
GM3CAN	D. McFarlane, 23 Gateside Avenue, Bonnybride, Stirlingshire, Scotland.	G3EGQ	D. J. Griffen, 4 Gerad Road, Bourne-mouth, Hants.
G3CBE	R. H. Hill, 37 Theford Road, Dagenham, Essex.	G3EHB	W. Larsen, South Leigh, Witney, Oxon
G3CBP	P. Graham, 3 Southcroft Road, Wallasey, Cheshire.	G3EHG	R. V. Jordan, 70 Westbourne Road, Penn, Wolverhampton.
GW3CBX	F. Smith, 6 Northgate Street, Pembroke, S. Wales.	G3EHM	K. H. Parkes, 159 Belgrave Road, Longton, Staffs.
G3CDZ	T. H. Plater, 43 Timberhill, Norwich, Norfolk.	G3EIG	C. Colson, 1 Elgin Road, Wood Green, London, N.22.
GM3COQ	D. Oswald, 14 King Street, Montrose, Angus, Scotland.	G3EIJ	A. W. Joyner, 11 Naunton Crescent, Cheltenham, Glos.
G3COX	F. W. Bennisier, 3 Englewood Road, Balham, London, S.W.12.	G3EJC	D. Flowers, 2 Temple Gardens, Woolston, Southampton, Hants.
G3CTG	J. Hemphill, 145 Burngreave Road, Sheffield, 3.	G3EJO	W. Bates, 39 Kingsbury Road, Erdington, Birmingham, 24.
G3CWO	A. J. Butcher (ex-D2HV), 4 Bruce Castle Road, Tottenham, N.17. (Tel: TOT. 6902.)	GW3EJO	P. G. Gibson, 8 Fairwater Green, Fairwater, Cardiff, Wales.
G3CXH	G. T. Barlow, 58 Caledonian Road, West Hartlepool, Co. Durham.	G3EJX	M. H. G. Ellwood (ex-ZL3FE), 42 Battle Road, St. Leonards-on-Sea, Sussex.
G3CYM	J. Bailley, 8 High Park Crescent, Heaton, Bradford, Yorks.	G3EJZ	J. W. Cobb, 28 New Park Road, Salford, 5, Lancs.
G3CZM	G. Chalwin (ex-VS1RU), 25 Victoria Avenue, Camberley, Surrey.	G3EKN	F. J. Taylor, 228 Robin Hood Lane, Hall Green, Birmingham, 28.
GW3DCY	S. Richards, 36 Club Road, Tranch, Pontypool, Mon., S. Wales.	G3EKT	F/Lt. A. E. White, Middleton St. George Amateur Radio Club, No. 2 Air Navigation School, R.A.F., Middleton St. George, Darlington, Co. Durham.
G3DFG	J. R. Colton, 18 Burtleigh Road, West Bridgford, Nottingham. (Tel: 32332.)	G3ELB	A. R. Tunsate, (ex-Y1ZAT), 432 Watlington Road, Southdowns Estate, South Benfleet, Essex.
G3DFG/A	J. R. Colton, 115 Farnborough Road, Farnborough, Hants.	G3ELG	H. N. Gubby, 15 Bents Green Road, Sheffield, 11, Yorks.
G3DHQ	Section Station, R.A.F. Amateur Radio Society, No. 1 Radio School, R.A.F., Cranwell, Lincs.	G3ELH	P. R. A. Dolphin, Wood Farm, Godalming, Surrey.
G3DKC	J. E. Wags, B.Sc., 276 Sutton Road, Walsall, Staffs.	G3ELS	B. Rudd, 45 Windermere Road, Muswell Hill, London, N.10.
G3DNB	W. Cameron, 3 Saltburn Square, Springwell, Sunderland, Co. Durham.	G3ELT	E. Sayer, 7 Verdun Avenue, Salford, 6, Lancs. (Tel: Eccles 1785.)
G3DQB	J. Scotcher (DZJF), 41 Hadley Gardens, Norwood Green, Southall, Middx.		

- G3ELZ F. R. Peterson, 58 Peaksfield Avenue, Grimsby, Lincs.
- G3EMC R. J. R. Jefferson, 137 Sevenoaks Way, St. Paul's Cray, Kent.
- G3EMW R. D. J. Leslie (*ex-ZC6JL*), 89 Hurstfield Crescent, Hayes, Middlesex.
- G3EMX P. R. Lockwood, 1149a Christchurch Road, Boscombe East, Bournemouth, Hants. (*Tel: Southbourne 1272.*)
- G3ENB W. E. Gates, 67 Broad Street, Dewsbury Yorks.
- G3ENI Lt. A. J. R. Pegler, R.N., 6 Fanshawe Terrace, Hooe, Plymouth, Devon.
- G13ENI/A Lt. A. J. R. Pegler, R.N., R.N. Air Station, Eglinton, Londonderry, Northern Ireland.
- GD3ENK T. R. Moore, Brackenhill, St. John's, Isle of Man.
- G3ENV P. H. Poole, 9 Fore Street, Eastcote, Pinner, Middlesex.
- G3ENX D. M. Webber, Millswood, South Brent, Devon.
- G3EOL A. W. Whitehead, 25 Westmoreland Street, Skipton, Yorks.
- G3EOU J. Dorman, c/o Bett, 65 Pavilion Road, Aldershot, Hants.
- G3EPC R. V. Shenton, 63 Neville Street, Oak Hill, Stoke-on-Trent, Staffs.
- G3ESH T. W. Mansfield, 32 Newton Road, Wimbledon, London, S.W.19.
- G3LK H. G. P. Williams (*ex-EP3H*), 13a Western Road, Hove, 2, Sussex.
- G3LK/A H. G. P. Williams, Tattenhoe Hostel, near Blechley, Bucks.
- G4BW H. L. Williams, 48 Napier Court, Hurlingham, London, S.W.6.
- G4HM J. I. Myers, 6 Strines Road, Strines, Stockport, Cheshire.
- G4LV (*ex-GM4LV/JAAAK*), c/o The Poplars, Uxcelby Road, S. Killingholme, Grimsby, Lincs.
- G4RZ T. A. Studley, 274 Kings Road, Harrow, Middlesex.
- G5TU J. C. Tucker, Five Oaks, Hampton-in-Arden, Warks.
- G8FC H.Q., R.A.F. Amateur Radio Society, No. 1 Radio School, R.A.F. Cranwell, Lincs.
- GM8SV A. G. Fowler (*ex-VS7SV*), Roadside Cottage, Aboyne, Aberdeenshire, Scotland.
- CHANGE OF ADDRESS
- G2AAA R. E. Durrant, 108 Holly Road, Northampton.
- G2GC W. W. Field, Fylands House, Green Lane, Bishop Auckland, Co. Durham.
- GM2HCL F. Walsh, 9 Barn Green, Arbroath, Angus, Scotland.
- GM3ALZ B. McK. Davidson, 42 Smithfield Drive, Aberdeen, Scotland.
- GW3AUX Dr. K. L. Owen, Tan-y-Bryn, North Road, Caernarvon, N. Wales.
- G3AXZ S. E. Slade, Middlesex Hospital, London, W.1.
- G3CEW W. Sansom, The Jolly Sportsman, East Chiltoning, Lewes, Sussex.
- G3CFM C. W. Henwood, 114 Burns Way, Heston, Middlesex.
- G3CUZ L. Keates, 3 Ball Haye Terrace, Leek, Staffs.
- GM3CV W. McMahon, 10 Drumlanrig Place, Hawick, Roxburghshire, Scotland.
- GM3DIQ W. C. Bradford, 19 Sidney Street, Saltcoats, Ayrshire, Scotland.
- G5KT K. T. Harvey, 35 Hillside Avenue, Two Mile Hill Road, Kingswood, Bristol.
- G6SX V. C. Slight, 56 Parsonage Barn Lane, Ringwood, Hants.
- CORRECTION
- G3ECL H. A. Farrow, 135 Wembley Hill Road Wembley, Middlesex.

#### ROYAL NAVAL VOLUNTEER (WIRELESS) RESERVE

We are officially informed by the Admiralty that the R.N.V.(W).R. has been reconstituted and is now open to accept applications for enrolment. Candidates in whom the Navy is specially interested for this Reserve are, of course, from amongst those who hold transmitting licences, but training can be given to suitable applicants who are not so advanced.

The terms and conditions of service in this post-war Reserve are most attractive, and will appeal to all who have any interest in the Royal Navy, whether ex-Service or as potential new recruits.

Local R.N.V.R. Headquarters have been established as Divisions for twelve areas, these being London (H.M.S. *President*); Sussex (R.N.V.R. Battery, Hove or Drill Hall, Newhaven); Severn (H.M.S. *Flying Fox*, Bristol); Mersey (H.M.S. *Eaglet*, Liverpool, or H.M.S. *Irwell*, Birkenhead); Clyde (R.N.V.R. Hq., Whitfield Road, Govan); Forth (H.M.S. *Claverhouse*, Leith); Tay (H.M.S. *Cressy*, Dundee); Tyne (H.M.S. *Calliope*, Newcastle, or H.M.S. *Satellite*, South

Shields); Ulster (H.M.S. *Caroline*, Belfast); Humber (R.N.V.R. Hq., Hedon Road, Hull); Solent (H.M.S. *Derg*, Southampton); and Cardiff (R.N.V.R. Hq., 245 East Dock, West Side).

Vacancies for officers in the Royal Naval Volunteer (Wireless) Reserve are at present restricted to those who have held temporary commissions in the Navy; but previous naval service is *not* a condition for those entering as ratings. Volunteers with previous service in the Navy will join with the substantive rating held on dispersal.

If you want to know more about the R.N.V.(W).R., write to the C.O. of the Division nearest your home—address as given above.

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#### NEW QTH LIST

With this issue, once again we are nearly level with the New QTH's which have been awaiting appearance. All those received to December 31, but not published here, will be in the next (February) issue, and should catch the Spring edition of the *Radio Amateur Call Book*.

# Clickless Keying

## Self-Biasing Oscillator

By W. VINICOMBE (GM8RV)

THE text-books offer several methods of keying, from use of a keying valve down to simply opening the HT supply. Each has merits or disadvantages depending on the particular position in which the key is inserted.

The method used at GM8RV is a combination of the merits with none of the disadvantages. It will be observed from the diagram that none of the circuits are truly opened and the key is safe when the potential is measured to the nearest earth point. When the key is down everything is earthed.

This arrangement consists essentially of keying the oscillator cathode by the over-biased grid blocking method. As far as RF is concerned the condenser C1, of  $.02 \mu\text{F}$  (or other value as may be convenient), offers a low-impedance path between cathode and earth. This means that the leads to the key may be of indefinite length (up to 20 ft. have been used), obviating the use of relays.

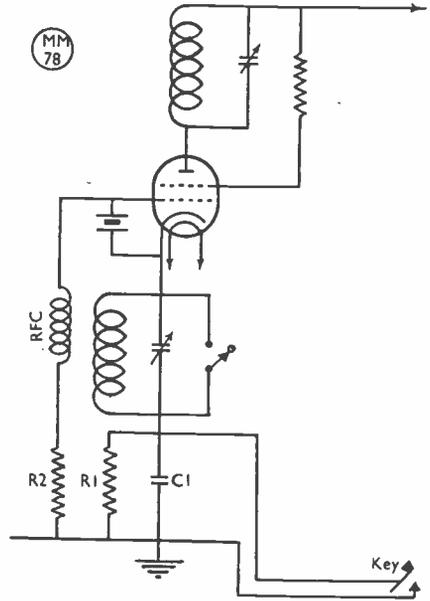
### How It Works

The DC in the valve must pass through R1, 10,000 ohms (or other as may be available). As is the case with a resistance in the cathode feed, there is a voltage drop negative at the earth end. This voltage appears on the grid, as bias, by way of R2 and the RFC.

It will be apparent that the valve will draw current in the key-up position or there would be no bias available. In the case under consideration, a 6L6G, the standing current is  $2\frac{1}{2}$  mA, giving a potential of 25 volts as bias. Oscillation is maintained at this value, but it is quite negligible, being only just audible on the receiver with the gains turned well up. An additional feature is that as the cathode is never on open-circuit there is no danger of the active material being stripped off.

Another advantage is the apparent absence of key clicks or thumps. No filter is in use and local reports say that no clicks are audible. It can be said with certainty that where reasonably low power is in use, no thumps are audible on a BC receiver in the same house. This is probably due to the small standing current.

The circuit herewith illustrates the method, and only essential components have been valued. The omission of any part or component does not constitute an error. The writer trusts that this small effort may be of assistance to those having trouble in keying.



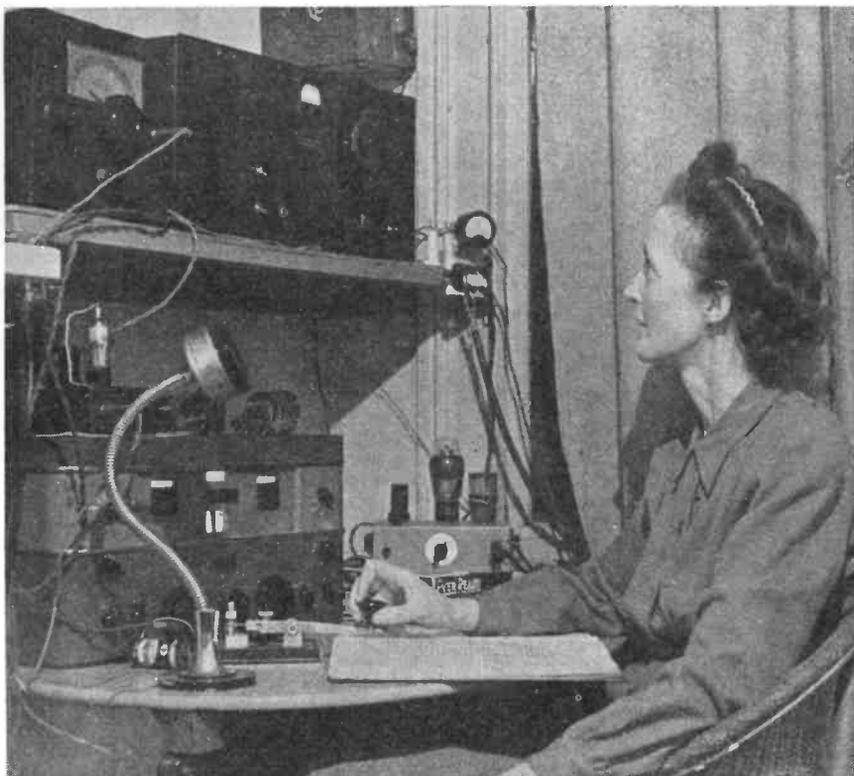
GM8RV's keying circuit: R1 is 10,000 ohms, and C1  $.02 \mu\text{F}$ . It involves a small standing current on the valve to produce a self-biasing voltage.

### "READERS' HALF-GUINEA IDEAS"

With the commencement of Vol VII with our March issue, it is hoped to run this again as an occasional two-page feature—if we can get the ideas! What we want are hints, tips, kinks or wrinkles with a touch of originality and a clear circuit diagram (where applicable) to illustrate them.

All those used will be paid for at the rate of 10s. 6d. each, and will appear over the name and address of the originator—see the August 1947 issue for the general format of this feature.

We shall be glad to see material for "Readers' Half-Guinea Ideas" in the new series as soon as possible now—and a few that we are already holding will of course be considered for publication when the feature is running again.



## The other man's station G3ACC

This time it should really be "The Other Woman's Outfit," for we show here Mrs. Margaret Mills and her station at 59 Upland Road, East Dulwich, London, S.E.22., licensed in July 1946.

The transmitter now in use is a self-contained CO-FD-PA operated on 3.5, 7, 14 and 28 mc, with an 813 in the final; the built-in 1,500-volt power supply provides stabilised HT for CO, FD and PA screen. This transmitter can be VFO-driven from an auxiliary unit comprising a conventional 6V6-807 buffer-doubler arrangement. For telephony working, control grid modulation of the 813 is used, with a carbon microphone and small speech amplifier. A QRP CO-PA transmitter, running 8 watts input, is available for Top Band and is also used occasionally on 80 metres; a crystal

calibration unit is employed for frequency checking.

The receiver is an AR-77, and the aerial a 67-ft. top fed by 80-ohm coax at a point a quarter-wave from one end; this is operated as a full-wave system on 14 mc, with a 67-ft. counterpoise on 3.5 mc, and against earth as a Marconi aerial on 1.7 mc.

G3ACC operates her station mainly on CW, and so far has rolled in 100 countries in 31 zones, chiefly on 14 mc. She is a well-known and very active member of the First Class Operators' Club, and is also one of that small but most distinguished body of ex-WAAF's who qualified as signals officers in the R.A.F. during the war. So when you work G3ACC, you QSO a trained operator who knows!

# THE MONTH WITH THE CLUBS

## FROM REPORTS

Despite the feverish activity occasioned by the MCC event in early December, no fewer than 33 Clubs have found time to report their activities to us before this month's closing date. As the latter was unavoidably a little earlier than usual we have no doubt that more reports will arrive during the next four or five days—but they will, unfortunately, have missed the boat.

May we appeal once more to all Club Secretaries and Scribes to *watch that date* in these paragraphs each month and to realise that anything arriving thereafter cannot possibly be published.

Of MCC we will say no more at this stage than that it was undoubtedly the most successful ever; and that scores will be much higher than in previous years. The full results and analysis will be published next month. And there is just time to remind Secretaries of the last few participating Clubs that results should be in this week—and please note particularly Rules 7-9!

So, for now, may we open the New Year by wishing all Clubs, and all their members, a Happy and Successful 1949 Season?

And so to business. . . .

**Liverpool & District Short Wave Club.**—At a recent meeting members heard a lecture on the design and manufacture of air-dielectric condensers from Mr. H. B. Morgan (Wingrove & Rogers, Ltd.), and a demonstration on the lining-up of gang condensers followed. A party of members also spent a Saturday afternoon at the Port Radar Station, when the working principles of the gear were explained and discussed.

**Lothians Radio Society.**—The next regular monthly meeting will be on January 24, 7.30 p.m., at the Chamber of Commerce Rooms, Charlotte Sq., Edinburgh. An extensive programme is being planned for the coming season and new members will be welcomed.

**Wirral Amateur Radio Society.**—Members received the resignation of G2AMV from the post of Hon. Sec. with regret; a vote of thanks and appreciation was duly recorded. (New Secretary's QTH in panel). During December Mr. G. L. Flint gave a talk and demonstration on Metal Working. January meetings are on the 5th and

19th, both 7.30, at the YMCA, Whetstone Lane, Birkenhead.

**Basingstoke District Amateur Radio Society.**—The forthcoming season's programme will include lectures on Radio (AC Theory), Frequency Modulation, Television, American Communications Receivers, 144 mc Equipment, Fault Finding, Commercial Receivers (1912-1948), and Components—their Use and Layout. A film show, an exhibition of members' gear, a visit and a dance have also been arranged.

**Reading Radio Society.**—The subject of a recent talk was Balanced Modulators, wherein SSSC Transmission and speech inverters were discussed. The forthcoming programme includes: January 8, Talk on Converters; February 12, Talk on Oscilloscopes; March 12, Talk on Pulse Modulation.

**BTH Recreat'on Club (Rugby): Radio and Television Section.**—This is purely a "house" social organisation, but welcomes visiting lecturers, who will be made more than welcome if they will apply to the Secretary (QTH in panel).

Members of the BTH organisation who wish to join should also contact him. The winter session opened with lectures on a Television Receiver and on a Magnetic Recorder. The club transmitter (G3BXF) also took the air officially at a recent meeting—the section boasts seven licensed transmitters.

**Rhigos & District Radio Club.**—A most successful annual dinner and Hamfest was held in December, with an attendance of 150! Several other Clubs and Groups were represented, and the evening session included a concert party, an exhibition of home-made gear, and the usual "swindle," thanks to the generosity of several manufacturers. It was the biggest gathering of amateurs ever to be held in South Wales, and everyone present seems to have had a wonderful time. Congratulations to all concerned.

**Petersfield & District Radio Society.**—Meetings are now held at Winton House, High Street, Petersfield, on the second and fourth Tuesdays at 7.30. The club licence has come through, with the call G3FRS. It is hoped to hold "a bit of a do" for members and friends early in the New Year.

**Thames Valley Amateur Radio Transmitters' Society.**—At the December meeting G8IP gave a talk on his experiences and on the construction of compact short-wave aerials. The annual dinner was held on December 11 and was attended by over 60 members and friends; and the AGM is to be held on January 5. First meeting thereafter is on February 2; subject, Model Control.

**Chester & District Amateur Radio Society.**—This club continues to meet every other Tuesday, 7.30, at the United Services Club, Watergate Street, Chester. Recent lectures have been on Receivers, Transmitters and Modulated Light Beams. A constructional



General view of the hall at Rochester for the Medway Towns Radiolympia, promoted by the Medway Society. The exhibition was a four-day affair attracting 2,000 visitors, and was supported by six national manufacturers and a number of local traders. M.A.R.T.S., with their secretary, G5FN, are to be congratulated on a very enterprising effort which brought them many new members.

contest is running at present and will be judged at the next meeting—January 11. Membership is 25 and new members will be heartily welcomed by the Hon. Sec.—see panel.

**Radio Society of Harrow.**—Programme of forthcoming events is as follows: January 11, AGM; January 18, Transmitter Evening; January 25, joint meeting with Edgware—Talk and Demonstration of 145 mc gear; February 1, Transmitter Evening; February 2, Joint meeting at Edgware; February 8, Theoretical and Practical Circuit Analysis.

**Southend & District Radio Society.**—At the December meeting Mr. Ritchie (Messrs. E. K. Cole) gave a talk on Pulse Modulation. First meeting in the New Year is on January 7; AGM follows on January 21.

**Wanstead & Woodford Radio Society.**—The television and transmitting groups are doing well and the latter will soon be on the HF bands as well as 1.7 mc. SWL's and others are welcome at the meetings, held every Tuesday.

**West Somerset Radio Society.**

—Though the club has been very busy preparing for, and coping with, "MCC" no formal meetings have been held.

**Morley Radio Club.**

Welcome to another newcomer, recently formed at the Wymondham Teachers' Training College, Norfolk. It has a membership of 34, including six YL's! The club is active over G3ABG/A on all bands from 1.7 to 14 mc, CW and Phone. See panel for Secretary's QTH.

**Barnet & District Radio Club.**

—This is an entirely new club, formed in October 1948. It has an old schoolroom for a "shack", and an ambitious programme of Morse classes, lectures and workshop practice has been arranged. A transmitting licence is awaited. The club meets every Wednesday at 7.45; beginners, juniors and Old Timers will be welcomed.

**West Middlesex Amateur Radio Club.**

—Recent meetings covered the subjects of NBFM and the Stroboflash, and an interesting programme has

been laid down for the next few months. Many members participate in the Top Band net, every Thursday at 8.30 p.m. Meetings are on the second and fourth Wednesdays at the Labour Hall, Southall—7.30 p.m.

**Romford & District Amateur Radio Society.**

—After twelve years as Secretary of the Society G3FT has sailed for Canada with his family. He hopes, however, to be working his Romford friends again, as he has taken a 28 mc rig with him. The new Secretary is G3BNI (QTH in panel). The club transmitter is operating on "top band"; Tuesday evenings are devoted to lectures, demonstrations and workshop practice, and Wednesdays to television lectures.

**South West Essex Radio Society.**

—An interesting series of talks is being run, the subject being the building of a television receiver from Government surplus. The top-band transmitter has been built and a further stage is being added. Several new members have joined, and a welcome awaits all others who care to look in on any Tuesday evening.

**Wolverhampton Amateur Radio Society.**—Recent events have included lectures on CRO's, on Television and on Regulated Power Supplies. A full and attractive programme is arranged, with a Christmas Social on December 20. Meetings are held on alternate Mondays.

**Nottingham Short Wave Club.**—New premises have been adopted, owing to increased membership, and meetings are now held every Monday, 7.15, at The Old Boys Club, Middle Street, Beeston. The club Tx, G3EKW, was opened up officially on December 6—it is active on 1.7 mc only, and operates from Chilwell. New Secretary's QTH in panel.

**Coventry Amateur Radio Society.**—An interesting afternoon at Droitwich was followed by a lecture by Mr. A. W. Rhodes, of M.A.R.S., on Receiver Design, in which he proved that the home constructor can turn out a first-rate communications job. A 'phone receiving contest coincided with the last day of MCC

and rounded off a busy week. The Club newsletter, with the nice title of "Calling All CARS" has just made its successful debut.

**Grafton Radio Society.**—This club, which meets every Monday, Wednesday and Friday, continues to cater for all interests. Members are building a television receiver from ex-Govt. gear; others are cannibalising ex-Service equipment for use in other gear; much interest is displayed in the top-band transmitter, and lectures for the RAE, together with Morse instruction, are well attended.

**RAE & Farnborough District Amateur Radio Society.**—The AGM in December marked the club's second year of activity. The future programme will deal more exclusively with Amateur Radio and the Morse classes are already being well attended. Meetings are at the RAE Assembly Hall on alternate Mondays at 7.30, as from January 3, but Morse classes are on Wednesdays at 7 p.m.

**Gravesend Amateur Radio Society.**—Meetings are on Wednesdays, 7.30, at the Club Room, 30 Darnley Road, Gravesend. Morse classes are held at every meeting, and lectures on Basic Principles are a regular feature. During November there were talks on Crystal Oscillators, Pre-Selectors, S-Meters, and a Junk Sale.

**Edgware & District Radio Society.**—Recent lectures, by members of the BBC staff, have been on Short Wave Propagation Problems and on Stable Frequency Generators. MCC kept several members busy for a week. The Harrow Club and Edgware are "mixing it" for two days in January and February.

**Oxford & District Amateur Radio Society.**—Welcome to this newcomer to our pages, which already has a membership of nearly 60. A comprehensive programme of talks has been arranged, and Morse Practice is also available to members. Meetings are held

#### NAMES AND ADDRESSES OF CLUB SECRETARIES

*Prospective members are invited to get into touch with the local Club Secretary.*

- BARNET (Amateur Radio Society). M. R. Jenkins, G3EIM, 1193A High Road, Whetstone, London, N.20.  
 BARNET (Radio Group). C. J. Spencer, 31 Byng Road, Barnet.  
 BARNESLEY. R. Hickling, 179 Barnsley Road, Wombwell, Yorks.  
 BASINGSTOKE. L. S. Adams, 16 Bramblis Drive, Basingstoke.  
 BRIGHTON. F. Harrop, G3DVL, 12 Park Street, Brighton 7.  
 BTH. Hon. Sec., R. & T. Section, c/o Gen. Sec., BTH Recreation Club, Rugby.  
 CHESTER. S. H. Dutton, 17 Victoria Pathway, Queens Park, Chester.  
 COVENTRY. J. W. Swinnerton, G2YS, 118 Moor Street, Coventry.  
 EDGWARE. R. H. Newland, G3VW, 3 Albany Court, Montrose Avenue, Edgware.  
 FARNBOROUGH. R. J. Corps, B.Sc., Armament Dept., R.A.E., Farnborough, Hants.  
 GRAFTON. W. H. C. Jennings, G2AHB, Grafton LCC School, Eburne Road, Holloway, London, N.7.  
 GRAVESEND. R. E. Appleton, 23 Laurel Avenue, Gravesend.  
 HARROW. J. R. Pike, 93 Whitmore Road, Harrow.  
 LIVERPOOL. W. G. Andrews, G3DVW, 17 Lingfield Road, Liverpool 14.  
 LOTHIANS. I. Mackenzie, 41 Easter Drayton Drive, Edinburgh 4.  
 NOTTINGHAM. N. W. Adcock, Bryn-Gates, Harlaxton Drive, Long Eaton, Nottingham.  
 OXFORD. R. H. Clifton, G3CGU, 86 Victoria Road, Summertown, Oxford.  
 PETERSFIELD. C. Watts, Hylton House, St. Mary's Road, Liss, Hants.  
 READING. L. Watts, G6WO, 817 Oxford Road, Reading.  
 RHIGOS. F. Hamer, GW8BW, 7 Neath Road, Bungalows, Aberdare, Glam.  
 ROMFORD. D. L. K. Coppendale, G3BNI, 9 Morden Road, Chadwell Heath.  
 SLADE. C. N. Smart, 110 Woolmore Road, Erdington, Birmingham 23.  
 SOUTHEND. J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend-on-Sea.  
 SOUTH-WEST ESSEX. L. G. Barratt, 367 Rush Green Road, Romford.  
 STOURBRIDGE. W. A. Higgins, G8GF, 35 John Street, Brierley Hill, Staffs.  
 THAMES VALLEY. A. Mears, G8SM, Broadfields, East Molesey, Surrey.  
 WANSTEAD. R. J. C. Broadbent, G3AAJ, Wanstead House, The Green, London, E.11.  
 WEST MIDDLESEX. C. Alabaster, 34 Lothian Avenue, Hayes, Middx.  
 WEST SOMERSET. T. C. Bryant, G3SB, 29 Lower Park, Minehead.  
 WIRRAL. R. A. Browning, 24 Norbury Avenue, Bebington, Cheshire.  
 WOLVERHAMPTON. H. Porter, G2YM, 221 Park Lane, Wolverhampton.  
 WORTHING. F. T. Tooley, 62 Becket Road, Worthing.  
 WYMONDHAM. Morley Radio Club, Wymondham Teachers' Training College for Men, Morley St. Botolph, Wymondham, Norfolk.



Cheltenham Club photograph. Seated front row, left to right, are G3LP (glasses), G6ZQ, G3E1Y (secretary), G8LB (president), G5BK (chairman), G5BM and G8DT. Of the 27 members in this group, 21 hold tickets.

on alternate Wednesdays at the Clubhouse, Magdalen Arms, Ilfley Road.

**Barnet Amateur Radio Society.**—This club (the original Barnet Radio Group with a new name) meets on the first Saturday after the 10th of each month, at Bunny's Restaurant, 15 Station Road, New Barnet. It is hoped to arrange a lecture for each meeting, and new members will be welcomed.

**Stourbridge & District Amateur Radio Society.**—At the December meeting members heard a talk by G3DMV (GEC, Ltd.) on The Photo Electric Cell. This was illustrated by slides and apparatus. Next meeting (before publication) takes the form of a talk on 2-metre operation by G5JU.

**Worthing & District Amateur Radio Club.**—Meetings are now held at the Adult Education Centre, Union Place, on the second Monday at 7.30. The club is running a 7 mc receiving contest at the end of December, for which the prize is a silver cup to be retained by the winner for one year.

**Slade Radio Society.**—The programme for the near future includes a lecture on High Fidelity Equipment (January 7), a D-F Night (January 21), a talk on Test Equipment (February 4) and a "D-F Night, Technical" on February 18. At this latter meeting the experts will tell members how they do it!

**Barnsley & District Amateur Radio Club.**—Recent talks have been by G6LZ (Radio Receivers, Part 2), G3AMH (Servicing Loudspeakers), G6TF (Practical 2-metre Working). Future events include a Dinner and Social Evening, to be held at King George Hotel, Peel Street, on January 15. Next regular meeting is on January 7.

**Brighton & District Radio Club.**—Meetings take place every Thursday, 7.30, at St. Mary Magdalene Hall, Bread Street, the first Thursday in the month being reserved for a talk by a visiting or professional lecturer. On January 6 Mr. de Waard, PAØZX, is to speak on amateur television in Holland.

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#### WINDSOR MULTI-RANGE TEST METER

A modified version of their well-known (Taylor) Model 70A multi-range test meter is being made available as the Model 70B at a popular price. The 70B will have a total of 50 voltage-current-resistance ranges, with a sensitivity on both AC and DC of 1,000 ohms per volt; six decibel ranges will also be provided, and the

instrument incorporates a self-contained buzzer for quick continuity tests. The movement is the Taylor moving coil meter, with knife-edge pointer and mirror scale. The price of the Windsor 70B Test Meter will be £14-14s. Taylor Electrical Instruments, Ltd., 419-424 Montrose Avenue, Slough, Bucks.

**G6YA****WESTERN GATEWAY HEADQUARTERS  
FOR RADIO EQUIPMENT AND COMPONENTS****G2BAR**

**EXCITER UNIT.** BC610, see "Radio Handbook", p. 570, and "Q.S.T.", July, 1948. 1-0-1-5 mcs. 6/6; 1-5-2-0 mcs., 8/6, plus postage.

**TANK COILS.** BC610 top band. 5-pin plug-in, swinging link, made by Barker & Williamson. 7/6 ea., plus postage.

**INDICATOR UNITS.** Type 73, with VCR138a tube, 4 SP61's, 2 Siemens high-speed relays, resistors, condensers, etc. Ideal for 'scope work, attractive case. Only 39/6 ea. Plus 6/- pass. carr. The VCR138a tube sold separately, with base, 30/- ea., plus 1/6 postage.

**Type 62, with VCR97 tube, complete, in nice condition, bargain, £3/12/6, plus 7/6 carr. and packing.**

**TRANSFORMERS.** R.C.A. plate transformers, 2,000v at 800 m/a. £6/10/-. R.C.A. modulation transformers, beautifully made, £4/10/- each. "Permador" modulation transformer. Modulate 400 watts, shrouded. £2/10/-.

**SPECIAL OFFER.** 350-0-350v 5v, 5A; 6-3v, 6A; 230v, 50 c.p.s. input, wt. 12lb. (H.T. marked to supply at 100 m/a, but will give over 200), 27/6. Don't miss this one. Carriage paid on the above in United Kingdom.

**L.F. CHOKES.** 10H. 100 m/a 100 ohms, 7/6. 20H 100 m/a, 350 ohms, 10/6. 12H 200 m/a shrouded in cast case, 20/-. 15-20H 500 m/a 80 ohms, first-class swinging choke, 25/-, carriage extra.

**VALVES.** See last month's special prices, still available at time of going to press.

**R.F. UNITS.** Type 24 and 25, used but in nice condition, 12/6 ea., plus 1/6 post. 1355 receivers, for the above units. Soiled, makes an excellent television sound receiver, 35/-, plus 6/- carr. and packing.

**BC342.** In beautiful condition, at £15/17/6. Suggest you call and inspect.

**BC348.** Modified, with P.P. 6V6 output and Goodman's 12" speaker in fine cabinet. 10 watts undistorted output. Excellent quality. Modified for dance band enthusiast for long-range listening (U.S.A., South America, etc.), offered at £30. Also BC348, ready for use, less power supply, £16/10/-.

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**METERS, MOVING COIL.** Metal cased 2" circular, 0-500 micro/amp., 7/6; 0-15 or 600v, 6/6 (requires ext. res.); 0-20 A (with shunt), 5/-; 0-40 A (with shunt), 5/-; bakelite cased 2" square, 0-500 micro/amp., 9/6; 0-1 mA, 7/6; 0-5 mA, 6/-; 0-50 mA, 7/-; 0-150 mA, 6/-; 0-300v (with ext. res.), 7/-; bakelite case 2½" circular, 0-100 micro/amp., scaled megohms, 4-2-5-inf., 18/6; 0-500 micro/amp., 16/6; 0-30 mA, 7/-; 0-50 mA, 8/6; 0-100 mA, 9/6; 0-200 mA, 9/6; 0-1 mA desk type, 15/-; 0-15v, 7/-; 100-0-100v centre zero, 1 mA F.S.D., 7/-.

**MAINS TRANS.** Pri. 200/250v 50 c/s, Sec. 500-0-500v 120 mA, 4v 3-5 A C.T., 4v 3-5 A C.T., 4v 4 A C.T., 10v 1 A, 22/6 (post 1/-). Pri. 80v 2000-, 115v 50-, 180v 500-, 230v 50-, Sec. 350-0-350v 100 mA, 5v 5 A, 6-3v 6 A, 133 W rating Trans., 25/-. Pri. 230v 50 c/s, Sec. 6-3v 5 A, 210v 15 mA, 460v 200 mA, 17/6. Auto Trans. 60 W, 200/250v to 110v 50 c/s, 19/6.

**SMOOTHING CHOKES.** 20 H 40 mA 220 Ω, 3/11; 10 H 80 mA 150 Ω, 5/-; 5 H 200 mA 90 Ω, 7/6; 20 H 300 mA 150 Ω, 18/6 (weight 13 lbs., carriage 2/-).

**MANSBRIDGE CONDENSERS.** 4 mF 600v, 3/6; 4 mF, 1000v wkg., packed 2 in a packet, 8/-.

**ELECTROLYTICS.** 8 mF 500v, 2/6; 16 mF 350v, 3/-; 450v, 3/6; 8-8 450v, 4/-; 8-24 350v, 3/-; 16+24 350v, 4/6; 16+16 450v, 5/-; 8 16 450v, 5/-; 24 mF 350v, 2/6; 25 mF 25v, 1/6; 25 mF 50v, 1/9; 50 mF 50v, 2/-.

**MODULATORS.** BC456B, 3 valves, 1-1625, 1-1215, 1-VR150/30. Brand new. 13/6.

**R.F. UNITS.** Type 24, used, in good condition, 8/6; Type 25, used, in good condition, 10/6; Type 26, brand new, boxed, 28/- (post 1/6 extra).

**SELENIUM RECTIFIERS.** H.V. 250v 60 mA, 4/6; 350v 60 mA, 5/-; 400v 100 mA, 6/6.

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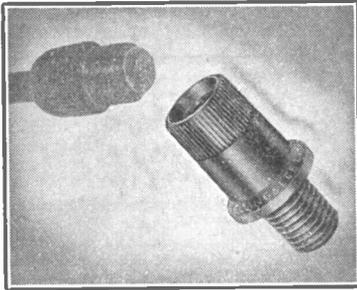
**WESTINGHOUSE ELECT. C.A.Y. 47155.** Transmitter tuning units, Type C. Covers 1-5-3 Mc/s. Variometer. Black crackle case, S.M. dials, etc., 17/6. Carr. 2/6.

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*An unsuppressed motor car can seriously interfere with Ultra short-wave and Television reception*



The "Belling-Lee" suppressor L630 screws into the central hole of distributor caps after removal of the H.T. lead terminal, which is then screwed into the top of the suppressor.

Many large concerns have suppressed "fleets" of vehicles which shows that the campaign for the voluntary suppression of car interference is proving a success.

One Televiwer, disgusted with seeing his picture spoilt by car interference, bought fifty suppressors and gave them gratis to his neighbours, tradesmen, etc., and owners of vehicles frequently passing his house. He now considers his total expenditure well worth while, but is fortunate in not living on a main road.

Everybody cannot do this, but everybody can suppress their own cars, and encourage their friends to do so, at a reasonable cost.

Distributor suppressors cost 2/- each, are easily fitted and do not affect engine performance.

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**TYPE ET1013** This is the ideal type of microphone for the Ham since it has a smooth and level response and is without the resonances inherent in microphones employing a diaphragm.

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Frequency response linear between: 30—10,000 c.p.s.  
Output level: — 66 dB.  
Load Impedance: 1 — 3 megohms.  
Internal Impedance: 0.01  $\mu$ fd.  
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**PRICE** complete with: plug-type connector, 15 ft. special cable, and desk stand. **6½ guineas.**

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Consists of a fully-wired and calibrated Coil Pack of the latest type. 5 Position Switch includes a Gram. position. Wavebands covered: 13-6-52 metres (22-5-10 mcs.), 51-200 metres (5-3-1-5 mcs.), 200-550 metres and 900-2,100 metres. Air Dielectric Trimmers on all Short-wave Coils. Unit consists of 3 Screened Sections, Aerial, R.F. and Oscillator. Dimensions of Pack, 6" x 4 1/2" x 2 1/2". Drive Spindle, Drive Wheel. Price with circuit diagram, 44/11/6 (including P.T.).

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## ALUMINIUM PANELS

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10" x 9" ..	3/3	10" x 7" ..	1/4
12" x 9" ..	4/-	12" x 7" ..	3/-
14" x 9" ..	4/6	14" x 7" ..	3/6
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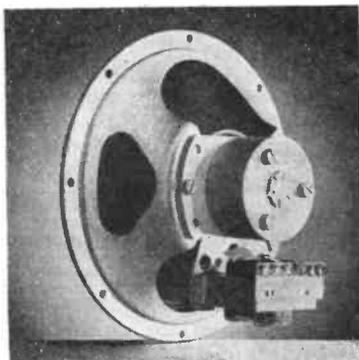
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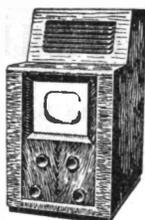
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18 SWG, 1/6	28 SWG, 2/2	36 SWG, 3/4	38 SWG, 3/4
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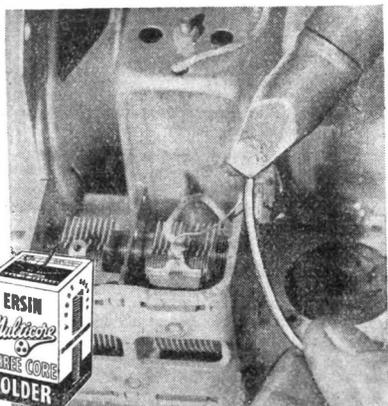
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**RADIOGRAM CABINETS AS NEW, SPECIAL BARGAIN PRICE, £10, WORTH 30 GNS. MASTS (EX-R.A.F.), SECTIONAL 33-FT. TUBULAR STEEL, COMPLETE WITH GUYS, ANCHORS, HALYARD, ETC. WILL SUPPORT A 3-ELEMENT BEAM! OUR PRICE, 45/-; A FEW, SLIGHTLY INCOMPLETE, 39/6. HIGH VOLTAGE 3000V SMOOTHING CONDENSERS, AMERICAN MANUFACTURE. 2 MF AND 4 MF IN PAIRS, 10/- PAIR. WILCOX-GAY OSCILLATOR UNITS, BRAND NEW, 25/- UNIT ONLY. VFO-CLAPP OSCILLATOR; SEND 7d. FOR CIRCUIT DIAGRAM USING WILCOX-GAY UNIT (ABOVE), TOGETHER WITH SERVICE VALVE EQUIVALENT DATA. HEAVY DUTY POWER UNITS, STABILISED 350V 200 MA, COMPLETE WITH 6 VALVES, INPUT 110 AC, £5. ALSO 1500V 200/300 MA POWER UNITS, COMPLETE WITH VALVES, INPUT 110 AC, £7/10/- . SPECIAL LINE IN VALVES: 813, 45/-; 1616, 10/- . EMAC 304H. Tx, 25/- . COMMUNICATION RECEIVER BY MAGNAVOX, PERFORMANCE EQUAL TO AR88, 1·5 TO 30 MC, COMPLETE WITH BUILT-IN SPEAKER, BRAND NEW, £25. CO-AX 6-WAY SWITCHES, AMERICAN MAKE, NEW, BOXED, 6/6. HEAVY DUTY T.P.D.T. SWITCHES, 4/6. 2½-IN. STAND-OFFS, SCREWED EACH END, SUITABLE FOR BEAMS, ETC., 1/- EACH. PLEASE INCLUDE SUFFICIENT POSTAGE, EXCESS REFUNDED.—R. H. ELECTRONIC SERVICE, 93 BUTTON LANE, SHEFFIELD, 1.**

**MANAGER** required for West Central London Retailers specialising in components, etc., for the radio constructor and short wave enthusiast. Wage and commission. Apply stating experience, etc., to Box No. 455.

**AR88'S**. If you are interested in these receivers see our ad. on page 773. G2AK.

### READERS' ADVERTISEMENTS

3d. per word, min. charge 5/-, payable with order. Box numbers 1/6 extra.

**MARCONI RS5E Rx**, 12-2,000 Metres, 5 W/Bands, 7v inc. BFO, plus Rect., 200-250 AC, Speaker, £12. R1116, Battery double S'h'et., 7v, 120 kc 23 mc, 7 bands, 3-ohm output, £6. R1224, 5v S'h'et., 1-10 mc, 3-ohm output, £5. 4v S'h'et., 3-5-15 mc, 3 bands, less power supply, £3/15/-—Clarke, 179 Beccles Road, Gorleston, Norfolk.

**DST100** 14-valve communications Rx, 30 mc-50 kc continuous, BFO, AVC, Noise limiter, etc., 230v AC. Offers?—22 Lightwoods Hill, Smettwick.

**SALE**.—Tx, 813 PA, VFO, all bands, built-in FM modulator, filament and driver power supplies. £22. Power Packs, 1,000v, 400 mA, 10v, 14 amps, 12v DC 3 amps, Superb U.S. make, with remote and overload relays, £14. 1,000v 400 mA, and 250v, 80 mA, £9. Pair 211's, with bases, £3. High-gain amplifier, P/P 6V6's ideal Sp. Amp, £10. Ribbon microphone, with matching transformers, brand new, £8/10/- . Pair Selsyn 45 lb. torque, complete with chain and sprockets, and 90 ft. of cable, £12/10/-—Box 441.

**T1131** smoothing chokes required. Please state price, condition, and reference numbers of types available.—17 Francis Street, Nottingham.

**SALE**.—30w Tx-Mike, wave meter, oscilloscope, motor-bevel gears. Cost over £80. Offers over £50. All new, unused.—Box No. 439.

**R5ARN7** airborne communications receiver, £9; dinghy transmitter, hand generator, 6J7G, 6V6G, 500 kc Xtal, 45/-; 25w multi-match mod. trans., 35/-; keying relay, midjet IP's cheap—Box No. 442.

## SMALL ADVERTISEMENTS

READERS'—continued.

**CR100**, BC348L, both pepped up and tested to WWV. Latter with separate AC pack. Also R1481, with associated power unit Type 3. Both new with Eddystone 5 & 10 coils, holders. Reasonable offers for lot, or individual items. Wanted SX28 or 28A, also reasonable.—BRS.144483. Box No. 438.

**F**OR Sale.—Hambander receiver as new, complete with new pair unused Ericsson 'phones. Will despatch in transit case carr. paid, £18/10/—Box 440.

**B2** Receiver with home-constructed Power Supply, good condition, £5 or nearest. Write, Perry, Post Office Wireless Station, Highbridge, Somerset.  
**2-3BP1** CR Tubes, with bases, 20/- each. 1 mu-metal screen for same, 7/6. Push-Pull Driver Transformer, 6L6's to 807's zero Bias, 35/- Filament Transformer, 7.5v 4 amp C.T., 10/- CR Bridge, £4. 6 1F Transformers, (Television), 10/- Crystals 100, 1000, 7412, 7182, 7085, 7068, 7100 kc.—GM3ATB, 31 Highburgh Drive, Rutherglen, Glasgow.

**HRO**—MX, excellent condition, recently revalved, re-aligned, coils .48-30 mc (bandspread 20/40/80) power pack, manual, Q5'er Preselector, 5m. converter, spares, delivered 25 miles. Offers.—G3AAV, 1 Welburn Avenue, Leeds 6. Tel.: 51277.

**SALE AR88**. Choice of two S meters, Spare valves. Inspection any time by appointment: delivered reasonable distance.—Ridley House, Mansfield, Ringwood, Hants.

**EDDYSTONE 5/10** metre converter (EF54-EF50-EC52), with midget power pack for same, perfect, £10 (cost 18 guineas). E.M.I. Service oscillator, LW/MW, battery operated, mod. output, with manual, £5; or would consider a good offer. Will sell together or singly.—Watts, 62 Belmore Road, Thorpe, Norwich, Norfolk.

**AR88** complete with instruction book, £50.—29 Silverston Way, Stanmore, Middlesex. Grimsdyke 211 (evenings).

**SALE**—500 kc crystals, 5/6. Type 38 sets (transceivers), less valves, 9/6. 2-valve transmitter units, Type 33, with crystal, less valves, 7/6. Transformers 220-230v to 154v 1.75 mA. 2v 2a, 4v 1a, 15/6: 465 kc IF's, 4/6 pair.—Box No. 443.

**T3180** Dinghy transmitter, complete with 1.5v miniature triode, in 1½ m. Colpitts oscillator circuit, dipole aerial, 7½ ft. telescopic aluminium mast, battery box, switch. Post paid, 10/6.—Chapel Street, Barford, Nr. Norwich.

**SALE**—B2 Xmt., BC342 Rx, 230v, BC342 Speaker. D104 mike, all little used. 35T's, HK54, RK20, new. Offers?—Box No. 444.

**BC221** New unused, £10. BC348, new, £15. R1155 perfect, no power pack, £6. Oscilloscope, £8. ARR5 28-145 mc, 3 ranges. FM/AM, noise limiter, S-Meter, £15.—G3DA, 91 Central Avenue, Speke, Liverpool.

**ADMIRALTY G56** wavemeter. Range 15 kc to 24 mc. with valves, calibration charts, £4/10/- including carriage.—Lee, Pandora, Battle Road, St. Leonards-on-Sea, Sussex.

**BARGAIN**—Super Skyriders SX17, £32; or exchange £22 and midget broadcast Rx in good condition.—J. Nosworthy, 67 Corrance Road, London, S.W.2.

**G3TW** Station for disposal, AR88, etc. Enquiries to G5MY, 268 Victoria Road East, Leicester.

**COMPLETE B2**, matched LS, phones, key, 80, 40, 20 coils, £12. Type U80 Trix amplifier and speaker (modulate B2), £15.—Box No. 445.

**QRT** Ham Selling BC-348, 230v input, wants offers over £10. Has other gear also. Stamp for photos.—Box No. 446.

**OFFERS** wanted for SX28 and SX24. Both in first-class order and appearance. SX28 has noise-limiter modification by makers, and handbook. Can be seen by appointment.—Box No. 448.

## MORSE CODE TRAINING

YOU CAN do what these students have done!

Ref. 5529 says:—"I feel sure you will be interested to learn that yesterday I took the G.P.O. test in Morse for an Amateur Transmitting Licence, and passed very comfortably. I sent a faultless 18 w.p.m. without effort and received at 14 w.p.m. with no errors; my numerals were also well on the right side, sending 12 and receiving 14 in the allotted one and a half minutes. I am now full of confidence as a result of this success and delighted with the progress I have made."—P. J. P.

Ref. 6160.—Many thanks for your letter regarding my son. I will pass your letter on to him, and ask him to reply to you. He told me quite definitely that he had derived great help from your course. You will be pleased to know that he was successful in passing his First Class P.M.G. He had to leave home at short notice to take up a position under Marconi Co., and is now at sea."—J. R. S.

The original letters can be inspected at London Office.

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**SMALL INSPECTION OR INDICATOR LAMPS.** Bakelite with clear perspex dome, M.E.S. lampholder. Ideal for car interior lighting, etc. Price 1/6.

**CRYSTAL VALVES.** Miniature crystal rectifiers, ideal for crystal Rx, signal strength meters, etc. Just the thing for VHF. Price 2/3.

**VALVES.** Ex-Govt., but all O.K. Suitable for nearly all present-day Rx. VR53 (EF39), 4/6: VR55 (EBC33), 4/6: VR56 (EF36), 4/6: VR57 (EF32), 4/6: 6H6, 3/6: VR135 (UHF triode), 3/6: SP41, 2/-: DI (6-3v), 2/6: VR91 (EF50), 7/6: VR67 (6J5), 4/6.

**INSULATED JACK PLUGS** for closed circuit jacks. Price 1/-.

**RIBBON FEEDER** for folded dipoles. Heavy duty twin lead, 300 ohm, 24d. per foot.

**CONCENTRIC CABLE,** ½". Average impedance, 72 ohms. Polythene insulation, finest quality available. Price 1/- per yard.

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## EDDYSTONE

'640' ..... £27 10s. 9d.

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Full range of components.

All C.O.D. orders promptly executed.

Send for Catalogue, 1/- post free.

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5 inch 13/-; 6 inch 14/-; 8 inch 16/-  
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Ideal for  
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**RUNBAKEN MANCHESTER**

## SMALL ADVERTISEMENTS

READERS'—*continued.*

**USEFUL** gear—RME HF10 Rx, 5 and 10 m., complete job one cabinet, £20. An American Tx, T14C/TRC1 70 to 100 mc, final 829, 110v, complete with book, £14. Nat 1-10 Rx, all coils and book, no power pack, £15. HT6 Tx, 160-80-40 'phone and CW, switched bands, 110v, £28. All the above items in good working order. From G5LJ, 32 Polkington Avenue Sutton Coldfield, Warwick.

**100 VALVES**, many unused, £5. Brookes Crystal, 7055 kc, unused, 10/-. Amateur band straight receiver, EF54's, Noise limiter, power supplies, no speaker or cabinet, coils for 10, 20, 40 m., illuminated dial, £4. Last 32 issues *Short Wave Magazine*, 10/-.—125 Wharfside Road Tyeley, Birmingham.

**B2 Tx**, with power pack, for sale, in very good condition, £8 carriage paid.—Priest, Market House, Port Isaac, Cornwall.

**G200** has now opened premises at 55 Union Street, which is close to the main shopping centre of Maidstone. See page 840.

**CANADIAN** 58 walkie-talkie, spares, telephones, batteries, aerials, £10. R.1155, with S-Meter and output stage, speaker and pack unit, £14. R103A, with valves, 1.7-7.5 mc, 100-250v AC, £6. 12-watt "W.W." amplifier, with power pack and Harley-Turner mains speaker, polished oak case, £15.—Galloway, Marlborough Gardens, Carlisle.

**WANTED**.—Murphy A40 Receiver. Condition and particulars to Box No. 447.

**NEW** and unused Brooks 147 HP 230v single-phase motor, 1,420 RPM. B2 Tx R/x and power unit. Rothermel D104 Xtal mike. Premier multi-match modulation transformer, 60 watts audio. Pair matched 810's. 805. Indicator unit (VCR97), time base and power unit. Offers for above. Wanted £29B, 832, 832A, 813.—G5YV, 8 Ashfield Avenue, Morley, Yorks.

**TELEVISION**. H.M.V. Model 900 radio and vision, in beautiful condition, 12 in. tube, perfect, £70. Television Murphy A56V console, in tip-top order, £45. National NC120 receiver 0.54 to 30 mc, noise limiter and S-meter, complete, £30. Eddystone 5 and 10 converter, as new, with all valves and coils, etc., £8. Wanted BC348. Phone : Bexhill 1006.

**R103A** (6v AC mains) 1.7-8 mc, modified with indirectly-heated rectifier and built-in output stage. Complete with 8 in. speaker and 10-metre converter. £9, or best offer.—W. H. Wakelin, 34 Bruton Road, Morden, Surrey.

**HRO** complete with instruction manual, power pack, 9 coils, amateur bands bandspread, £35.—Wilson, 1 Woodhall Ave., Hamilton, Lanarkshire.

**R107** Receiver : 20, 40, 80, 160 metres, first-class condition, £13. B2 Receiver 20, 40, 80 metres with AC Power Pack and phones, all new, £8.—GW3DFB, 33 The Parade, Barry, Glamorgan. Evening Phone Barry 1702.

**WANTED**—QST April, May, July, September and November, 1940, also March, 1941. Good condition essential. State price. Part requirement accepted.—GZALO, 163 Doiliss Hill Lane, London, N.W.2.

**B2 Tx/Rx** wanted. State lowest price and condition.—G. Whale, G2NZ, The Grove, Brompton Avenue, Colwyn Bay.

**BC342** modified, perfect condition, bargain, must sell, £15/10/-. Buyer collects.—Batey, 63 Darkes Lane, Potters Bar, Middx.

**CASH** offer wanted for complete B2 Tx/Rx, new condition. Steel cases, with two P5 xtals. Want quantity valves all types.—Cain, G3DAVF, 82 Gordon Street, Ambie, Morpeath, Northumberland.

**BRAND** new 803 and base, boxed, 30/-. FT15's, 10/-. D500 kc xtal, 30/-.—G13BVB, Cosy Lodge, Culmore Road, Londonderry.

**SALE**. SCR-522 complete, £7/10/-. Sig. Gen. S1-130A, 100-156 mc, £7/10/-.—Kimber, 7 Van Mildert Terrace, Stockton-on-Tees, Co. Durham.

## SMALL ADVERTISEMENTS

READERS'—continued.

**2-ELEMENT** 20m. rotary beam, dural boom, adjustable elmts, tee-match, centre fitting 2 in. mast, insulators etc. Offers—G6TC, Lynton House, Black-halve Lane, Wednesfield, Wolverhampton.

**COMPLETE B2 outfit**, brand new, unused. Complete with all accessories, instruction book, two crystals. Perfect, £20.—Box 451.

**SCR-522** transmitter and modulator section only, complete, £6. S-meters, M/C, 2-in. black bakelite, 17/6.—G3BK, 28 Regent Avenue, March, Cambs.

**LOOK!** Phone/CW Tx, 807 VFO-807 PA, 2/807 L Modulators : 160, 80, 40 metres, mike, 5v. superhet. Owner emigrating. £16 for quick sale.—Box No. 450.

**AR77E** for sale. This receiver has been in use for just over a year and has been maintained in perfect condition. Re-valved and re-aligned recently. Exceptionally good performance on 28 mc. £35 or best offer.—Apply G6QB.

**MULTI-MATCH** modulation transformer. Unused. 70 different ratios. Particulars supplied. Match push-pull amplifier 250 mA max. into power amplifier 425 mA max. or reverse. 14½ lbs. Heavy lugs. American manufacture. Bargain 58/- carriage paid.—Knight, 82 Fairfield Road, Widnes, Lancs.

**HAMBANDER** (1.7 to 28 mc) brand new, also 15 watt Tx (phone & CW), 1.7 and 3.5 mc, in excellent condition. Nearest to £30, or separate offers.—Marshall, 14 Greenway Close, Sale, Cheshire.

**MATEUR** must sell up.—HRO, power pack. A crystal filter, S-Meter, etc., perfect working order. Avo 70 as new. Home built Signal Generator. Megger. 100-watt Modulator. Over 120 almost new valves. Portable electric gramophone, with amplifier and built-in 10in. speaker. Lots of small components. Nearest £95, or separate offers to—BRS.11175, 30 Dollis Park, London, N.3. Fin 4582.

**AR88** or similar communications receiver wanted, A. S. Binks, G2DM, 20 Weston Avenue, Queenbury, Bradford, Yorks.

**WANTED**, MCR1 receiver, complete with phones, coils, power pack, must be in perfect working order, also add-on output stage for MCR1.—Box No. 449.

**BC342** as new, 130v AC, specially hotted up, 6AC7 RF stage, £16/10/-. Also 1-V-2 battery Rx in Eddystone cabinet, as new. Offers? Or exchange for what-have-you?—Hilland, Headly, Hants.

**WANTED** instruction manual for 16-valve Hammerlund Super-Pro receiver.—G. Sewell, 243 St. Helens Road, Bolton, Lancs.

**G2HAP** offers Dumont Oscilloscope model 224A, special job with wide-band amplifiers for television and FM work. A really beautiful instrument, brand new and unused—not "surplus" gear. Listed at £70. A bargain at £36. Delivered 30-mile radius. Also Variac, new, made in U.S.A., 0 to 260v. at 9 amps, price £7.—80 Lostock Road, Urmston, Lancs. \*Phone Urmston 3383.

**BC348** S-meter, power pack, high and low impedance output, separate gain controls, incorporated. Pair 813's and base. Offers? G6VS, 11 Cortsway, Greasby, Wirral.

**AMERICAN** Pre-war phone transmitter 14 valves (3ST final). 3 chassis in five-foot cabinet, completely metered. 110v AC input. Fundamentally perfect, needs overhaul. Spares, crystals, etc. Bargain £45. Smaller ditto (two TZ20's final), £30.—Tyler, 58 Rutland Street, Leicester.

**AR88** with S-meter, as new, £47, carriage paid or offers? Also Type 145 oscillator.—Peck Whiston, Park Avenue, Carlton, Nottingham.

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KENT****RADIO AND AERIALS****20-METRE  
FOLDED DI-POLE AERIAL**

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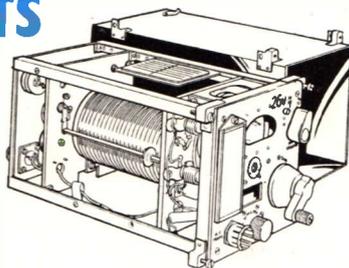
Eddystone "640" £27/10/-. Cat. 6d. 145 Mc/s  
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OUR PRICEType 25 or 73 Receiver **20/-**  
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OUR PRICE**SMALL ADVERTISEMENTS****READERS'—continued.****EXPERIMENTER'S** surplus. Valves, crystals, components, state wants? Examples; 807, 809, 866A, 9-, 954, 955, UY1, 7/6.—Jones, Box 45, Uitenhage, South Africa.**TRANSPORTABLE** rack mounted receivers, illustrated November issue *Short Wave Magazine*, comprising modifier HRO, power supply, Q-5'er unit and coil rack, Hallicrafter 5-10 receiver. £50 lot, no offers. Owner leaving for Canada—G6HL, Woodminto, Shepperton.**HRO** Senior Cov. coils 25/-. Crystal mike D104, with stand, £3/10/-. UM2, 30/-. Stamp Reply.—2 Cliff Road Gardens, Leeds 6.**G3BAE** (School Master) seeks lodgings with fellow amateur or SWL near Sale, Cheshire.—Apply, 187 Newton Drive, Blackpool.**WANTED HRO** 14 mc bandspread coil. Price to—GC3EML, Noirmont, Grouville, Jersey, C.I.**CR100/7** noise-limiter, as new, £20, carriage extra. Bandspread HRO, 3.5-7.3 mc, coil, £3. D104, metal diaphragm type, new, £4. 1,250v 350 mA transformer, £3/10/-. 2.5v, 10a transformer, £1. 10Hy 250 mA choke, £1; all by Woden. Must sell large amount good gear to make room. What do you want? R. H. Webb, Bigbury-on-Sea, S. Devon.**SALE.** Webster transformer. Input 110v, output 10,000v 23 mA CT, £5. Wanted, BC342N manual, G3CPM, 49 Lime Tree Avenue, Broadway, Worcs.**R208** Receiver, 10-60 mc, 100-250v AC or 6v DC, built-in speaker, excellent condition, £7. Fisher, 28 Dorcis Avenue, Bexleyheath, Kent.**TYPE 145 VFO plus Type 392 power pack, complete, spare set valves, £12. Mark II\* Wavemeter, 230v 50 cycle, AC mains, £3/10/-. Bug, transmitting variables, xtals for sale. E. Noakes, 36 Greenfield Road, Little Sutton, Wirral, Cheshire.****TU6B, TU7B, TU8B, TU9B, TU10B.** New, 11/6 each (carriage 2/6). Any 3, 40/-. carriage paid. Knight, 82 Fairfield Road, Widnes.**EDDYSTONE S504** Receiver, xtal, noise limiter, etc., with LS, 6 months old, hardly used, owner emigrating. What offers? Box 453.**1131** Tx for sale, or exchange for good communication Rx and medium-power 14 mc Tx. Box No. 452.**EDDYSTONE 640**, perfect order, still guaranteed. Complete outfit. Speaker, phones, jacks, etc., AC DC, best offer over £30. Forced to sell. Make appointment. Tickner, 15 Spencer Road, Twickenham.**AR88D**, spotless condition. Modified RF stages, S-meter, R.C.A. manual, re-valved, matched speaker in cabinet. Exceptionally quiet receiver, £50 or offer? London Area.—Box No. 454.**G3XI QRT**—complete station for disposal. 150-watt 813 Tx, 100 watt mod. 807's, 3 Xtal mikes, bandswitched exciter, rack built, BC-348. Tobe +24, 1132 converted 144mc, 25 watt VFO, Xtal calibrator. Spare valves, tools, etc. No reasonable offer refused for all or part.—19 Rivercourt Road, W.6. Riv. 6827.**HALLICRAFTERS SX23**, late model, condition as new, very FB on ten, manual, £35. National One-Ten complete, £10. Brand new Type 37 oscillator, offers? 25 watt PA, with self-contained power pack, four-band turret switching, £20. BC-221 AJ manual, 5/-.—Barnett, 14 Common Road, Evesham, Worcs.**NATIONAL 81X** receiver, AC/DC, amateur bands 1.7-30 mc, excellent condition, little used, auto-transformer, instruction manual, £23.—G5WP, Milestones, Mayford, Woking, Surrey.

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