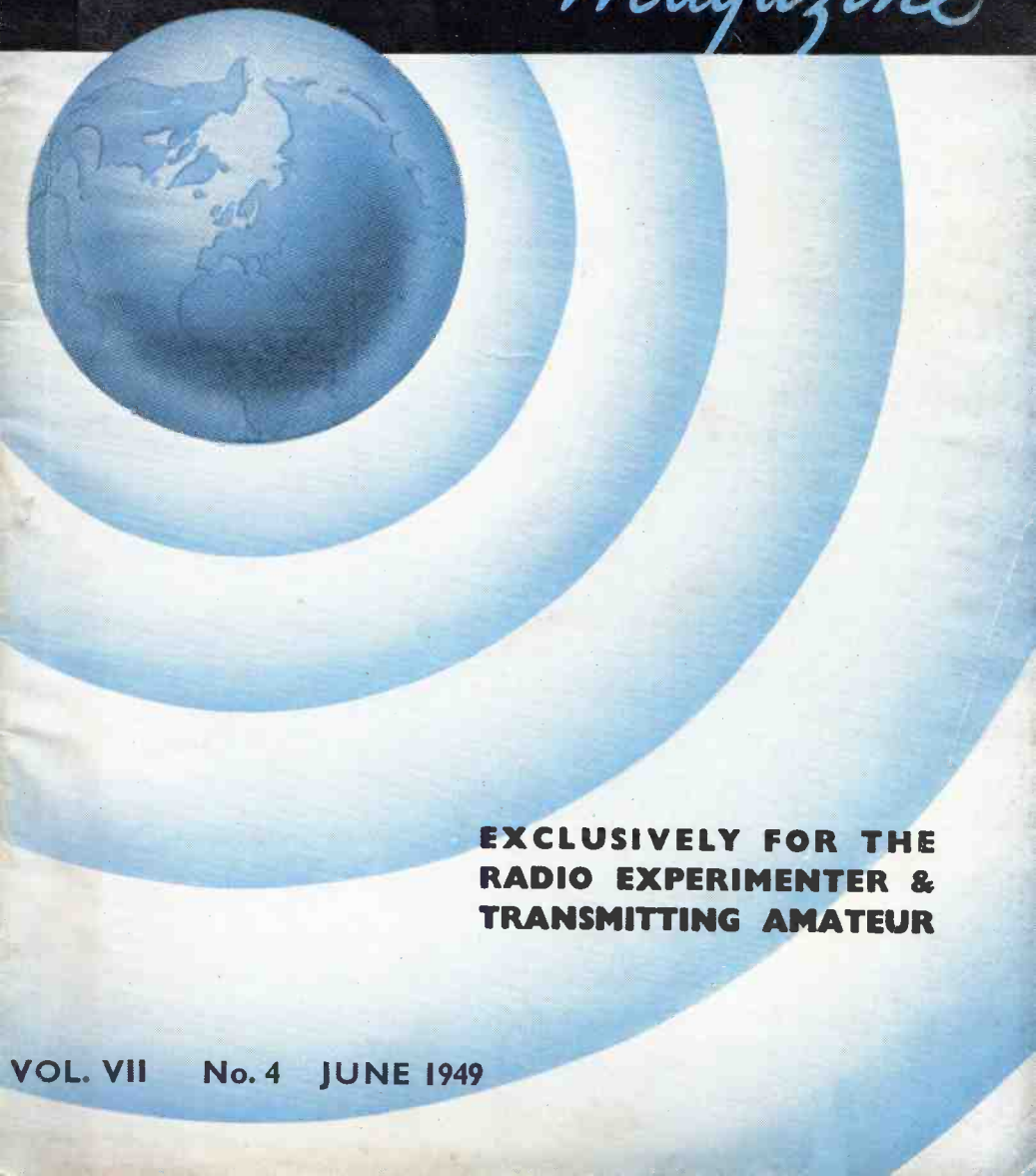


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*The*  
**SHORTWAVE**  
*Magazine*



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

**VOL. VII No. 4 JUNE 1949**

Largest stocks,  
Best selection **CLYDESDALE**  
and Bargains in Ex-Service Radio and Electronic Equipment

For those 144 mcs. experiments.

### Brand New, Rack Mtg. VHF R/T Receiver Units

RI481. Frequency 65-86 mcs.  
RI132. Frequency 100-124 mcs.

Each a 10-valve (plus stabilizer) superhet with 4 VR53's (EF39), 2 VR65's (SP61), VR54 (EF34), VR57 (EK32), VR66 (P61), VS70 (7475), plus precision S.M. tuning dial assy. "S" meter, screened R.F. unit, 4 tuned circuits, 3 I.F. trans. (12 mcs.). B.F.O., etc., etc.



Present range covered by air spaced inductances and variable ganged microcondensers, could be changed to suit personal requirements. Rack-mtg. enclosed chassis, 19 x 10½ x 11 ins., finish (RI481) dark grey, (RI132) light grey. Circuit supplied, all units tested and guaranteed working before despatch. Clydesdale's price only **£4/19/6** (either) Carriage paid

Power requirements are H.T. 210v 55 ma. smoothed D.C. L.T. 6-3v 3-5A, provision to just plug in.

### Ex-R.A.F.

#### Gryo Angling Power Unit

Directional Control gear drive unit, ideal for 2 metre or light-weight beams. Comprising 24v D.C. motor with worm gear drive allowing for 360 deg. rotation 7 times per minute. All ball race type bearings. Can be wired for either clockwise or anti-clockwise rotation. Housed in die-cast box 5" x 5" x 2½".

Clydesdale's **17/6** each  
Price only

### Circuits

Circuits available. British : 38AFV, 1/6 ; Type 76 Rx., 1/6 ; Type 78 Rx., 1/6 ; RI355, 1/3 ; RF24, 1/3 ; RF25, 1/3 ; RF26, 1/3 ; RF27 1/3 ; C.R. Ind. 6K, 1/3 ; C.R. Ind. 62, 1/3 ; C.R. Ind. 62A, 1/3 ; RI147, 1/3 ; RI132/RI481, 1/3 ; RI224, 1/3 ; RI124A/RI125A and P-U, 1/9 ; RI11C/A, 2/3 ; RI155, 1/3 ; TI154, 2/3 ; A1134, 1/3 ; A1368, 1/3 ; MCRI, 2/9 ; Type 53 Tx, 1/6. American : R28/ARC5, 1/9 ; BC-1236, 1/6 ; IFF (ABK), 1/9 ; BC-348-L, 1/3 ; SCR-269-G (Compass), 2/6 ; SCR-274-N (Command), 4/6 ; BC-453, 1/3 ; BC-454, 1/3 ; BC-455, 1/3 ; BC-946, 1/3 ; BC-456, 1/3 ; BC-696, BC-457, BC-458, BC-459, 1/3. All post paid. Others in preparation.

### Brand New Mains Transformers

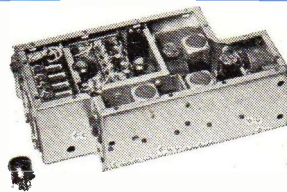
Ideal for RI355 Receiver. E542. Pri. 0-250v tapped 200, 220, 240. Sec. 350-0-350v 100 ma. Capable of delivering up to 150 ma. with slight temperature rise. 6-3v 6A, 5v 2-5A. Size 4½" x 4½" x 4", weight 7½ lb.

Clydesdale's price only **30/-** Post paid

E.531. EHT Transformer, ideal for VCR-97. Pri. 0-250v, tapped 200, 240v. Sec. 2,000v 5 ma., 4v 1-1A, 2-0-2v 1A. Upright mtg., dim. 3½" x 3½" x 3".

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for VFO conversion. TUSB. 1,500-3,000 kcs, black crackle case 17½" x 7½" x 8". Unused but scratched and dented. Clydesdale's price only **19/6** each

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Two valve, two stage, audio amplifier with built-in 24-v. vibrapack, 12SJ7, 25L6, fully smoothed, complete with transformers, etc., in metal case 13" x 8½" x 3½". Clydesdale's price only **35/-** Post paid

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A 2-valve, 2-stage amplifier, for inter-com. and Xmtx mod. pre-amp. Complete (less Batteries) in black metal case 7" x 4½" x 4½". Improved version of A1134 : H.T. 120v, G.B. 6v, L.T. 2v. Clydesdale's price only **11/6** each

### Brand New

#### R.C.A. Vibrapack

E.952. Input 6v. Variable output, 200-240v 40-50 ma. Controlled by 4-position output switch, complete with 6p UX synchronous vibrator, OZ4 rectifier, in metal case, 4½" x 4" x 6". each **29/6**  
Clydesdale's Price only

### Brand New—in maker's cartons

#### Ex-U.S.A.A.F. Mallory Synchronous Vibrapack

E.953. Input 12v, output 250v 70 ma. (Unsmoothed). Complete with 6-pin synch. vibrator, etc., in metal case. Dim. 5½" x 2½" x 5". Clydesdale's Price only **19/6** each

### Ex-U.S. Navy

#### R28/ARC5 Mobile UHF Receiver

For 144 mc/s operation. Frequency 100-150 mc/s. A 10-valve superhet complete with 4/717A's, 2/12SH7's, 2/12SL7's, 12SK7, 12A6, 24v motor tuning, etc. (less dynamotor and xtals). In metal case 13½" x 7" x 4½", for 24v operation.

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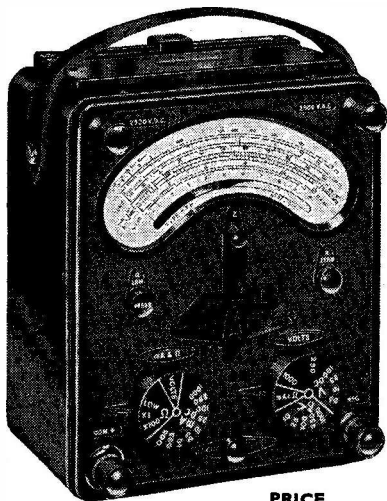
This recently developed High Resistance AvoMeter has a sensitivity of 20,000 ohms per volt on the D.C. voltage ranges and 1,000 ohms per volt on the A.C. ranges.

It is a compact and portable multi-range instrument, having many advantages which will commend it for use in laboratory or workshop. A 5-inch clearly marked scale with an anti-parallax mirror is used for the following ranges of readings :

**D.C. CURRENT :** 50  $\mu$ A to 1,000 mA.  
**D.C. VOLTAGE :** 2.5 volts to 2,500 volts.  
**A.C. VOLTAGE :** 10 volts to 2,500 volts.  
**RESISTANCE :** 0.1 ohm to 5 megohms.  
(with internal battery)

The instrument can be supplied, if required, fitted with magnetic screening for protection against stray magnetic fields. It will stand up to heavy overload and is protected by an automatic cut-out.

In addition to its multi-range facilities it can be used as a Galvanometer, for which purpose the zero can be offset to the extent of 30% of full-scale deflection by a simple knob adjustment.



PRICE

**£19 : 10s.**

Size : 8 $\frac{1}{2}$ " x 7" x 4 $\frac{1}{2}$ "  
Weight 7 $\frac{1}{2}$  lbs.

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## 36-ft. Steel Aerial Masts

Known in the R.A.F. as aerial mast type 50, these are made up as complete kits of 9 tubular sections each 2" dia. with base plate, full set of pickets, picket marker, insulators, head section with pulley, 60-ft. lanyard and all fittings. Nothing else required for this really super mast. Easily erected. Brand new in canvas bag with leather handles. Price £3/12/6 (carriage 10/-).

## Receiver Type R1132A

11-Valve superhet., frequency range 100 to 125 mc/s. Brand new in maker's transit case, fuller particulars in April issue of *Short Wave Magazine*. Price £4/19/6 (carriage 10/-).

## Thermal Delay Switch

Standard "Varley" pattern, for 6 or 4v operation. Please state clearly voltage required. Price 3/9 post free.

## Valves

Brand new and tested; Acorns, type 954, 6/6 each; 6K8, 8/6 each; 5U4G, VU133, 7/6 each; 0Z4, 6/- each; 6H6, metal, 3/- each. Postage free.

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2 Wafer each 11-way single-pole, 3/6 each.  
2 Wafer each 3-way 3-pole, 2/9 each. Single wafer 4-way 2-pole, 2/- each. All post free.

## New Radio Publications

"Radio Experimental Circuits," No. 72; "Radio Test Equipment," No. 73; "Radio Anti-Interference," No. 76; "Radio and Television Laboratory Manual," No. 78; "A.C./D.C. Receiver Construction," No. 82, all 2/8 post free. "Radio Modernisation Manual," No. 79, 3/8 post free. For convenience when ordering, Publication No. need only be quoted.

## Wheatstone Transmitters

Brand new unused weight driven Wheatstone Transmitters, standard Post Office type. Price £9/15/- (carriage 5/-).

## G6YA

**1196 TRANSMITTER RECEIVER.** Operates phone and M.C.W. from 4.3-6.7 Mc/s. Easily modified for other frequencies. 45/- each. Transit case, 2/6. Type 12, push-button controller with trans. rec. switch, 5/- ea. Crystals 6180, 6720 kc. 4/6 each. Carriage, add 5/- goods, 7/6 passenger train in England and Wales.

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**EIMAC & JENNINGS.** High voltage vacuum condensers. 50 pf. and 100 pf. 7/6 each.

**BC610 EXCITER TUNING UNITS.** Brand New, TU 61, 1.5-2.0 Mc/s, 8/6 ea. TU 62, 1.0-1.5 Mc/s, 6/6 ea., plus 1/3 postage.

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**2-pole 2-way c/o relay.** Made by Leach, U.S.A., large positive contacts, 24v D.C. coil. Size 2 3/8" x 1 3/8" x 1 1/2". 10/- each, including post.

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12v input. Output, 120/150v. 50/30 m/a, including G.B. and L.T. For battery valves. U.S. made by Jefferson-Travers to A.M. spec. 19/6 each, plus postage.

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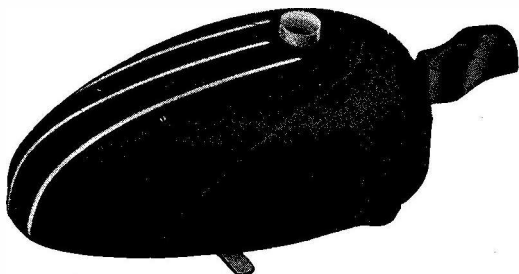
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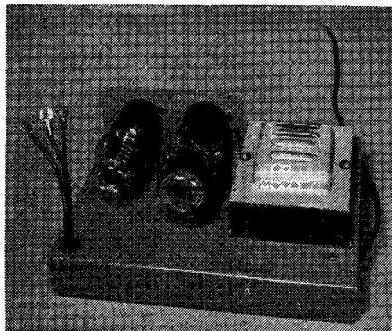
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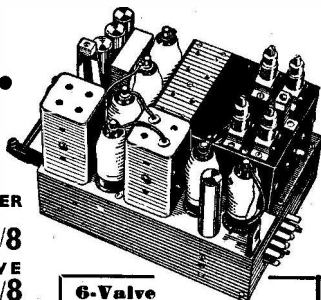
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## PUBLICATIONS

- AMATEUR TRANSMITTER CONSTRUCTION MANUAL 2/8  
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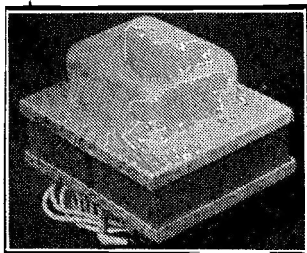
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And now full range of G3SJ CW/FONE TX's 50W to 1 kW.

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**FL8 AUDIO FILTER,** as described in March issue, 10/6 each. Plus 1/- postage.

**Type BC347 U.S. Signals Mike Amplifiers.** Small and compact. Case measures 5½" × 2½" × 4". Price 10/-.

**Test Set Type 46.** We still have a few of these excellent battery-operated frequency meters covering 2 to 23.5 mcs. Made by Marconi Instruments. Can be adapted to all wave by inclusion of LW and MW Coils. Circuit supplied. 40/- each. Aluminium Rod Aerials for use with same, 3/6 extra.

**Mains Transformers.** Input 160/180/200/220/240v. Output 585v 150 mA, 10v 4 amps., 2-0-2v 3.5 amps. 6.3v CT, 3.5 amps. Price 17/6, plus 2/6 carriage.

**Mains Transformers.** Input 110/210/230/250v. Output 2 × 4v at 4 amps., 9v at 4 amps., 85v at 1 amp. 285v 120 mA, 44v at 200 mA, 10v at 3 amps. Price 17/6, plus 2/6 carriage.

**Mains Transformers.** Input 200/230v. Output 350-0-350v at 250 mils. 6.3v 12 amps., 5v 10 amps. Price 35/-, plus 2/6 carriage.

**1 mA Selenium Rectifiers.** Measure ½" × ¼" × ¼". Price 4/- each, post paid.

**TR 1196** These 6-v Superhets are the best buy of the day. Just fit a 2-gang variable condenser and all-wave coil pack. Requires only five connections to frequency changer valve and slight modifications. Price 27/6 with circuit. Post. 2/-.

**Mains Power Supply Unit.** This neat and handy unit in black enamelled case, 9" × 6" × 6", contains heavy-duty transformer, rectifier valve, smoothing choke, condensers, panel light switch and fuses. Input 200/260v AC. Output 6.3v at 3.5 amps. H.T. 350v at 80 mA. Larger output available by changing rectifier valve. Price £3/5/-.

**250-watt Double-Wound Transformers.** 230v/110v. Made by G.E.C. With steel shroud. New. £2/7/6 each.

**RI132A.** This grand 10-valve superhet, covering from 100 to 126 mcs, is easily adapted to 144 mcs band by simply moving connections on tuning coils. Large slow-motion dials, S meter, etc. Case measures 20" × 12" × 12". Price £4/19/6. Plus 10/- carriage and packing.

Remember, money-back guarantee. Technical advice given. Please add postage when writing.



# LOOK! SAVE MONEY!

**COMMUNICATIONS RECEIVERS BC348.** Ten valves. Crystal filter. BFO. 200-400 kcs. 1.5-18 mcs. 200-400 kcs. 2 R.F. stages. Auto-noise compensation. Constant sensitivity. In excellent condition, complete with plug and book. £18/10/-.

**NEW ACCUMULATORS.** Multi-plate. Teak cases. 12v 14 aH. Finest quality. Ideal for operating service gear. Limited stock. 35/-. Also Willard 2v high capacity. Fitted charging indicator. Celluloid case. 15/-.

**NEW TABLE MICROPHONES.** Carbon type. Black gloss finish. With jackplug and cord. 10/6.

**NEW CLOCKWORK CONTACTOR UNITS.** Precision movement. Incorporate elec. switch closing twice a sec. Useful for flashing signs, etc. 7/6.

**NEW FLEXIBLE DRIVE CABLES.** 7 ft. long. Numerous uses, handtools, tachometers, etc. Withstand hard usage. 5/-.

**NEW BLANK RECORDING DISCS.** 12". Finest quality, zinc base. Acetate coated. 15 Discs packed in metal box. 35/-.

**NEW ARGUS TUNGAR CHARGING VALVES.** Type AR60. Rating 6 amps, 7-110v. Fil. 2.5v at 6A. Why not build your own battery charger! Maker's price 35/-, our price 12/6.

**NEW AMERICAN PESCO FLUID PUMPS.** Gear type, directly coupled to heavy duty 24v motor. 45/-.

**DYNAMOTORS PE94.** The most suitable type for conversion. Fitted  $\frac{1}{2}$ " shaft. Full instructions supplied for simple modification to  $\frac{1}{8}$ " H.P. 230v A.C./D.C. motor. 18/6.

**FRACTIONAL MOTORS.** 230v A.C./D.C. Twentieth H.P. Fitted  $\frac{1}{2}$ " shaft. Unrepeatable at 16/6.

**BARGAIN PARCEL NEW RADIO COMPONENTS.** Forty items, including: Condensers, 25 mfd. 25v, 8+8+8 mfd. 450v can, 32 mfd. 350v, 1 mfd., .001 mfd., .025 mfd., twin-gang tuning. Volume controls, -l and l meg. Octal valve holders, Pye plugs, switches, etc. At fraction of cost, only 20/-.

**RECEIVERS R4/ARR2.** Freq. approx. 148 mcs. Button valves. 3 6AK5, 7 9001, 1 12A6. Similar in size BC453. 65/-.

Control cables, 7/6. Above sets ideal for mobile operation.

**CONTROL PANELS.** RU19, 7/6. Receivers, BC453, etc., 8/6; BC966, 3/6; SCR522, 5/6.

**NEW AMERICAN STAR IDENTIFICATION INSTRUMENTS.** In leather cases, with instructions. 3/-.

**AERIAL TUNING UNITS.** Type 126. Rotatable inductance. RF Ammeter. Tune 2.5-13 mcs. 7/-.

Also American type BC306A, variometer type, ceramic switch, S.M. dial, 11/-.

**NEW P.M. SPEAKERS.** 3", Goodmans, etc., 9/3; 10" Truvox, 20/-; 10" Rola, 23/-; 5" Plessey, in attractive cabinet, 19/6.

**BENDIX COMPASS RECEIVERS MN26.** Valves: 1 6L7, 2 6N7, 1 6B8, 2 6J5, 5 6K7, 1 6F6, 150-695 kcs., 3-4.7 mcs. 2 RF stages. Convert to high performance communication receiver. Complete with circuits, 90/-.

## Examine this list of Bargains. Better Surplus at Lower Prices

**E.H.T. CONDENSERS.** 7+11 mfd. 2kV., 6/6; .01 mfd. 2.5 kV., 1/6; .25 mfd. 2 kV., 2/6.

**UNISELECTOR SWITCHES,** 24-way. Electrically operated. Price greatly reduced at 15/-.

**GENEMOTORS, TYPE 33.** Ideal for car radio. Input 6-12v. Output 200v. Fully suppressed, 11/-.

**RECEIVERS:** Type RI125. Two valves. Freq. 300 mcs. In new condition. With circuits, 8/-.

Type SLC Radar, nineteen valves, EF54, SP61, Pen46, MU14, etc. Freq. 200 mcs. IF 11 mcs., 1.5 mcs. bandwidth. Splendid cabinet. A superb job for long range TV or amateur conversion. With circuits, 60/-.

Transmitter receivers RDF1. Valves: 1 5Z4, 2 P61, 5 SP61, 1 EC52, 1 EB34, 1 EI323, 3 EA50. Freq.: 156-170 mcs. IF 21 mcs., broadband. With circuits, 37/6.

**NEW MOVING COIL HEADPHONES,** with moving coil hand mike, large comfortable earpieces. Finest obtainable. 10/6.

**AVIATION INSTRUMENTS** and Gauges. Large variety. Send stamp for illustrated list.

**NEW VALVES.** At 20/-, 703A doorknob, 10 20SD, PT15. At 10/-, 6AK5. At 7/6, 1R5, 5Z4 metal, 6AG5, 6F7, 6J7, 6G6, 6K7, 6SQ7, 6V6, 7C5, 7F7, 7Y4, 9D6, 12K8, VR150, 713A, 717A, 865, EF36 EF54, Pen46, KT33C. At 6/6, 2X2, 3Q5, 6B8, 6J5, 6K7G, 6Q7GT, 6S17, 1625, EF50, VR105, 5U4, RL7/EC52. At 5/-, 6AC7, 6SA7, 6SL7, 6SN7, 7V7, 12A6, 12S17, 12SK7, 12SR7, SP61, V960, VU133, 956, 9001. At 4/6, 6SH7, 8D2, 12C8, 12J5. At 2/9, 6H6, 7193, EA50, D1, SP41. All guaranteed. Two or more valves post free, otherwise add 6d.

Terms: C.W.O. Prices include carriage. Send stamp for lists.

61 BYROM STREET, LIVERPOOL, 3.

'Phone: CENTral 4430

**BRAND NEW PETROL ELECTRIC PLANTS.** ONAN 600 watt. 12-15v D.C. Single cyl. four-stroke motor. Unit construction. Self-starting. Voltage control. Complete with tools and extensive spares, in maker's cases, £28.

**KOHLER**  $\frac{1}{2}$  kW. 110v A.C. Four-cylinder water-cooled motor. Voltage controlled. The "Rolls Royce" of small lighting plants. Complete with tools and most comprehensive spares in factory cases. Maker's price £174, offered at £85.

**VILLIERS** 550 watt. 18v D.C. Single-cyl. four-stroke motor. Unit construction. Vast array of tools and spare parts. Maker's cases. £22.

**NEW AMERICAN BOX KITES M357A.** Large size. Alloy folding frame, beautifully constructed. Originally employed for elevating long aerial. Lift substantial weight. Original cost \$9. 15/6.

**NEW AMERICAN HYDROGRAPHIC BALLOONS.** Inflate to 6 ft. Useful for hoisting aeriels, or stratosphere and radar experiments. Complete with special hydrogen generators. Only 7/6.

**R.A.F. NAVIGATORS' BINOCULARS.** 6x. Special lenses, high light factor. In quality leather case, fitted shoulder strap. £6/5/-.

**NEW RECEIVERS.** Type 76. 3 valves, inc. freq. changer ECH35. Dusted cored IF. Illuminated slow-motion dial. Two wavebands, switched. Complete with circuit, cased. 28/-.

# LAWRENCE

# RADIO CLEARANCE LTD.

## 27 TOTTENHAM COURT ROAD, W.I

## MUS 9188

### U.H.F. RECEIVERS R.1481

To clear space in our warehouse prior to rebuilding, we are offering the remainder of our stock of these well-known receivers at clearance price. Freq. range, 65-86 Mc/s, 6" S.M. Dial, 10 6.3v Valves, 2 VR65s, 4 VR53, 1 VR66, 1 VR54, 1 VR57, 1 VR67. I.F. Freq. 12 Mc/s. B.F.O. These receivers are 19" rack mounting, brand new in transit cases, with circuit diagram. £4/4/-, carriage paid.

### RECEIVERS R.U. 19

6-valve straight receiver with 3 R.F. stages, using plug-in coil packs, H.R.O. type. Valves: 3 78's, 2 77's, 1 1642. Black crackle case, 15" x 8" x 8". Provision for remote or local control. Dial cal. 0-100. Supplied new, complete with valves and 5 coil packs covering: O, 187-305; P, 281-455; Q, 524-844; E, 1285-2155; G, 2960-4620; H, 3865-6265; M, 5075-7780. £3/10/-, carriage paid.

### PERSONAL RECEIVERS B.C.728C

7-valve receiver with 1.4v valves, R.F. VT173, mixer VT171, osc. VT173, I.F. VT173, det. and audio VT172, output VT174, bias rect. VT174; covers 2-6 Mc/s, with 4 push buttons adjustable 2-2.6, 2.6-3.5, 3.5-4.5, 4.5-6.0 Mc/s respectively. Operates from 2v acc by 2v vib., with 12v vib. for charging 2v acc. Carried slung on shoulder. Supplied brand new with valves, telescopic aerial, 2v acc., 2 vib., mounting accessories and instruction book. Built-in loudspeaker. £8/19/6.

### MASTER OSCILLATORS

V.F.O. by Wilcox Gay. Type M.I. 19467A. Uses 807 electron-coupled osc., very stable, well screened. Employs 2 circuits: (a) Using cath. grid, screen, tuning 1-5 Mc/s in 6 bands. (b) Plate circuit as multiplier; tuning 2-10 Mc/s in 3 bands. Incorporates grid choke, grid leak, grid current meter (0-10mA) for intermediate amplifier. Supplied brand new in original cartons, with installation accessories and instruction book. £5, carriage 5/-.

### CRYSTAL MULTIPLIERS

Wilcox Gay, Type M.I. 19468. This is a xtal osc. using 807. Freq. range 2-7 Mc/s. Also incorporates 0-10mA grid current meter, etc. Supplied brand new in original cartons, with accessories, book, etc. 40/-, carriage paid.

### MAINS TRANSFORMERS

Primary, 0-110-200/250v 50 c/s. Secondaries, 230-0-230v, 100mA, 5v 2A, 6.3v 2A, C.T. 15/6.  
Primary 200/250v 50 c/s. Secondaries, 270-0-275v, 120mA, 4v 2A, 4v 3A, 13/6.  
Primary, 200/250v 50 c/s. Secondaries, 460v 200mA, 210v 15mA, 6.3v 5A. 15/6.  
Primary, 200/250v 50 c/s. Secondary, 110v. Rating, 60w. Enclosed. 18/6.

### SMOOTHING CHOKES

15H, 200mA, 150 Ω, size 6½" x 4½" x 3½"	...	7/6	6H, 200mA, 100 Ω	...	6/-
20H, 300mA, 150 Ω, Weight 13 lb., size 7" x 5" x 5"	...	20/-	5H, 200mA, 90 Ω	...	7/6
20H, 40mA, 220 Ω	...	3/11	5H, 120mA, 140 Ω	...	5/-

### ELECTROLYTICS

8mF 170v, 1/3; 8mF 350v, 2/-; 8mF 450v, 2/3; 16mF 350v, 2/6; 16mF 500v, 3/-; 8+8 450v, 4/-; 16+16 500v, 4/6; 8+32 450v, 4/6; 16+32 450v, 4/6; 16+24+8mF 450v, 5/-; 100mF 3v, 3d.; 100mF 6v, 6d.; 25mF 25v, 1/3; 25mF 50v, 1/3; 50mF 50v, 1/6. Special lines 16mF 350v card, 2/-; 24mF 350v can, 2/-; 8+24mF 350v can, 2/6; 16+8 350v can, 3/-; 16+24 350v card, 3/-; 60+100mF 350v can, 3/-.

### LOUDSPEAKERS, P.M.

5", less trans., 10/11, 5", with trans., 12/11; 6½", less trans., 13/11; 10", with trans., 21/-. All brand new boxed, with all. speech coils. Post extra.

### METERS, MOVING COIL

Metal cased, 2" circular, 0-500 micro/amp., 7/6; 0-15/600v (requires ext. res.), 6/6. 0-20 or 0-40 amp. (with shunts), 5/-; Bakelite cased, 2" square, 0-500 micro/amp., 9/6; 0-1mA, 7/6; 0-5mA, 6/-; 0-50mA, 7/-; 0-150mA, 6/-; 0-300v D.C. (series res. supplied), 7/-; Bakelite cased, 2½" circular, 0-100 micro/amp. F.S.D. scaled megohms 4-2.5m-inf., 18/6; 0-500 micro/amp., 16/6; 0-30mA, 7/-; 0-50mA, 8/6; 0-100mA, 9/6; 0-200mA, 9/6; 0-1mA, desk type, 15/-; 0-15v, 7/-; 100-0-100v, centre zero, 1mA F.S.D., 7/-.

### MODULATORS B.C.456B

3 Valves, 1-1625, 1-1215, 1 VR150/30. Brand new, 13/6.

### R.F. UNITS

Type 24, with valves, used, good condition	...	...	8/6 plus 1/6 post
Type 25, with valves, used, good condition	...	...	10/6 plus 1/6 post

### CONTROL UNITS

With 2 2" square moving coil meters, flush mounting, 0-5mA and 0-40v, toggle SW, 5- and 7-pin sockets. 8/6. Post 1/-.

### MODULATOR AND MIXER UNITS W6331

Ex-Admiralty units with 8 valves. 1-5U4G, 1-VR54, 2-6J5, 3-P61, 1-VR65, on chassis 10½" x 11½". Also 5H 200mA choke, large mains trans. (500 c/s), pots res, conds., etc. in metal case with louvres, 10½" x 11½" x 6½". 21/-, carriage paid.

### ROTARY POWER UNITS

Input 24v D.C. Output 230v A.C. 50 c/s. Rating 75 watts. In metal case, 18" x 12" x 11", with 2½" 0-250v meter on output. Auto trans., slydlock fuses, output control switch to raise or lower volts. £3/10/-, carriage paid.

### CERAMIC SWITCHES

2P 3W 1 Bank	...	...	2/-	3P 3W 1 Bank	...	...	2/6
2P 6W 4 Bank	...	...	4/6	3P 3W 2 Bank	...	...	3/-

### VIBRATOR PACKS

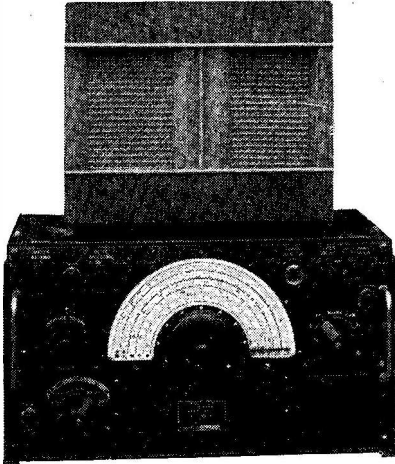
Input, 12v. Output, 250v 65mA, with 12v vibrator and OZ4 rectifier. Mounted on chassis 5½" x 3½" x 1½", with 8 ft. screened cable, on output. Brand New, boxed, 17/6.  
Vibrator Packs, 6v Input 250v 60mA Output, with Sync, vib., and 10+10mF Elect. Size 8" x 2½" x 4½". On/Off Switch, 14/6.

S.M. DIALS, as used on R.F.26, etc., less Curser, 3/11.

# TU5B TUNING UNIT

American Made precision temperature compensated coils and condensers. This can be turned into a v.f.o. which is really stable. The A.R.R.L. gave details of the alterations and we will supply a copy of the details with every unit. Alternatively the TU5B can easily become a transmitter and this Magazine has given details of at least three other units.

Price for this month only is 18/6 plus 3/6 carriage.



STATION RI155

# A DUAL PURPOSE RECEIVER

This is the way we might well describe the RI155 Communication receiver, for with this you can relax and listen to the B.B.C. or you can search out the weakest station on your favourite band. Frequency range 75 kc/s to 18 mc/s, 10 valves. Black crackle case. Ex-R.A.F. Not new so we have graded them into three classes according to external condition. Class A at £12/10/- being as new, class B at £10/10/- slightly soiled, and class C at £8/10/- being rather well used. Even the class C ones, however, are in thoroughly good working order for all classes have been checked, adjusted and serviced in our workshops. You can't go wrong by buying one of these for it will give you years of useful service. We shall be glad to dispatch a receiver to you if you can't collect, but please add 15/- extra to cover carriage charges, and wooden transit case. If you wish you may return the case, when 7/6 will be refunded.

To save you having to make any fiddling alteration to your RI155 we have developed a unit which is a combined mains power pack, loudspeaker 6V6 output stage and set switching unit. This is enclosed in a very nice cabinet and stands on top of the set as illustrated. It is fitted with two leads, one plugs into the mains, the other plugs into the receiver. Your RI155 is then mains operated, and will work right away without modification. The price of this unit is £7 carriage paid.

If you would like to buy your receiver or station on easy terms, then send only 25% of the price, and carriage, the balance can be spread over 12 months.

# VALVES AT BARGAIN PRICES

All are sold on the understanding that any not perfect will be replaced if returned within 7 days.

MISCELLANEOUS TYPES					
VR91 (EF50)	5/-	VR78 (D1)	2/3	VR65 (SP61)	4/9
VU39 (MU12)	7/8	VR33 (EB335/-)		VR54 (SP41)	3/9
VU111	7/8	VR136 (EP4)	7/6	EK32	7/6
VR56 (EF36)	5/-	9D2	5/9	EL32	7/6
VR53 (EF39)	5/-	8D2	5/9	8P4	7/6
VR54 (EB34)	3/3	VR92	4/9	Magie eye	6/6
PEN 25	7/8	HL23DD	6/6	2v H.F. pentodes	7/6
FP23	8/6	2v triodes	3/9	Hivac XH	6/6
FP25	7/6	2v screen grids	4/9	XP	6/6

# CONSTRUCTORS' COLUMN

Here is a list of high-grade goods which are available at very keen prices.  
**PLEASE NOTE.**—That unless otherwise stated all goods are new and unused, and of recent manufacture and not Government Surplus.

- ELECTROLYTIC CONDENSERS.** (Only new stock from best manufacturers) T.C.C., HUNTS, DUBILIER, B.I., E.H.C., etc.
- 2 mfd. 460 v. .. 1/2
  - 4 mfd. 460 v. .. 1/3
  - 8 mfd. 460 v. .. 1/1
  - 16 mfd. 450 v. .. 2/8
  - 8 x 8 mfd. 460 v. .. 3/4
  - 8 x 16 mfd. 450 v. .. 3/4
  - 16 x 16 mfd. 450 v. .. 3/9
  - 16 x 8 x 24 mfd. 450 v. .. 4/9
  - 8 mfd. 360 v. .. 1/8
  - 16 mfd. 350 v. .. 1/11
  - 32 mfd. 360 v. .. 1/11
  - 25 x 25 mfd. 200 v. .. 3/11
  - 8 mfd. 150 v. .. 1/8
  - 25 mfd. 25 v. .. 1/-
  - 25 mfd. 50 v. .. 1/6
  - 50 mfd. 12 v. .. 1/6d.
  - 10 mfd. 25 v. .. 1/6d.

**PHILLIPS** wet electrolytics, standard type, can size 3in. high, 1 1/4in. dia., complete with locking screw for single hole fixing with bottom plate, 32 mfd. 320 v., 3/8; 14 mfd. 450 v., 2/9.  
**MIDGET TUNING CONDENSERS.** 2 gang .00035, fitted with trimmers, and complete with perspex dust cover. These condensers made by "PLESSEY" are of the type used for tuning personnel receivers. Price is 6/6, plus 8d. postage.

**4-GANG TUNING CONDENSERS.** .0005 each section—fitted trimmers—ceramic insulation. These are complete in a very useful chassis, and are fitted with a drive. Government Surplus equipment but new and perfect. Price 2/9, plus 1/3 postage. Case of six units, 17/6, carriage paid.

**2-GANG .0005 CONDENSER.** Standard size—ceramic insulation. Price 4/9, plus 9d. post.

**CHOKES. IRON CORES L.F.** (Surplus). 250 m.a. 10 henry, 9/6; 200 m.a. 6/-; 70 m.a. 4/6; 50 m.a. 3/9.  
**E.H.T. CONDENSERS** (Surplus). 1 mfd. 5,000 v., 3/9; .02 mfd. 600 v., 3/9; .02 mfd. 5,000 v., 1/6.

**PAPER CONDENSERS.** We have all types in stock up to .1 mfd., 6d. each; .25 mfd., 9d.; .5 mfd., 11d. Parcel of 36 assorted, no more than two of any value, 12/6.

**RESISTORS.** Full range in stock, 1 and 1 watt, 4d. each, 1 watt, 8d. each. Parcel of 100 assorted, all useful sizes, no more than two of any one type, 12/6.

"**ROLA**" 5in. P.M. Speaker, fitted standard O.P. trans., 11/3.  
"R. & A." 5in. P.M. Speaker, fitted standard O.P. trans., 15/3  
"ROLA" 3 1/2in. P.M. Speaker, less output transformer, 8/9.

**PLESSEY 10in. P.M.,** fitted standard output transformer, 29/6.  
**VOLUME CONTROLS**—most values in stock—good makes—with S.T. switch, 4/6; less switch, 3/6.

**TELEVISION TEST SET.** Can you be sure that your E.H.T. voltage is up to scratch. That you are not over-running your condensers or ruining your cathode ray tube? You can if you own a television test set. Absolutely essential for obtaining accurate information on E.H.T. supplies. Two ranges, 0-3,000v., 0-10,000 v., at 10,000 ohms per v. A reliable instrument of modern design in a neat black crackle case, fitted with special high voltage terminals, connecting leads, and polarity reversing switch, easily portable for service jobs. Sooner or later you will want one of these instruments—why not buy now at the special price of 85/- post paid?

**TELESCOPIC DUAL RODS**—when extended these measure 9ft., but they can be cut quite easily, and as they are 1/4in. dia. (at the thick end) they make ideal television aerials. Price 7/6 each.

**TELEVISION AERIAL.** Indoor type—designed for erecting in loft or could be fixed behind the door in a bedroom, attic, etc. Price complete with fixings and instructions, 15/-.

**WHITE PLASTIC MASK.** Of correct design for 6in. tube. Will make your finished televisor look much more professional. Price 7/6 each.

**MAGNIFIER.** Best quality, guaranteed not to discolor. Price 39/6.  
**MAINS TRANSFORMERS.** Usual 6.3 and 5 v. heaters 300-0-300 h.t. 80 m.a., 13/8; 80 m.a., 16/6; 150 m.a., 27/6; 200 m.a. 32/6.

# AMERICAN TYPES

0Z4	13/3	6B4	9/6	6L7	9/6	12SK7	8/-
1R5	7/8	6B7	10/2	6N7	10/-	12SQ7	8/6
1S4	7/6	6C8	6/6	6P7	6/6	12SR7	6/8
1S5	5/-	6C8	9/6	6SH7	6/-	14F6	9/6
1T4	6/-	6D6	6/6	6SK7	6/6	25L6GT	7/6
2A7	10/2	6F5	6/6	6SL7	13/3	25V6	10/6
5T4	6/-	6GG6	6/6	68N7	6/-	25Z6GT	7/6
5U4	7/8	6H6	3/6	68G7	6/8	80	10/-
5V4	13/6	6J6	12/6	6V6	7/6	85	8/6
6Z3	13/6	6J7	7/6	6X5	6/8	89	8/-
5Z4	7/8	6K7G	7/6	7C7	7/6	807	7/6
6A3	10/6	6K7GT	9/6	12A6	6/-	84GZ4	8/4
6AC7	6/-	6K7 MET	7/6	12K7	6/8	1299A	9/-
6AG5	6/-	6K2 MET	7/6	12K8	8/6	9001	8/-
6AG7	6/6	6L6G	10/-	12SH7	7/-	9002	8/6

Add 9d. for Post and Packing if under £3/-/6.

# W. D. SALES

3 Electron House, Windmill Hill, Ruislip Manor, Middx.

*Acclaimed*

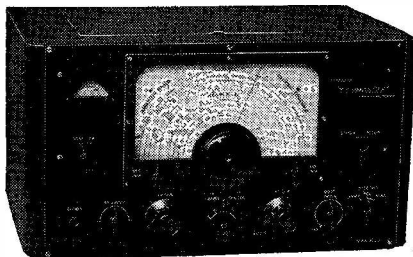
by Amateurs Everywhere  
as **THE FINEST EVER!**

The "**COMMANDER**" Double Superhet Communications Receiver

Price

**£48:10:0**

Hire Purchase  
Terms Available



Model B

Prompt  
Delivery  
Home  
and  
Export

Fitted with every worthwhile device for giving you a performance second to none. It is without doubt the finest investment the amateur can make. Complete coverage 1.7 to 31 mcs. with electrical "Ham" bandspread.

Send 2½d stamp for literature or 5/- for handbook to the makers:—

**RADIOVISION (LEICESTER) LTD., 58/60 RUTLAND ST., LEICESTER**  
EXCLUSIVE AGENCIES AVAILABLE TO "HAM" SUPPLIERS Phone: 20167

**G2AK This Month's Bargains G2AK**

**JUST THE THING TO TAKE AWAY WITH YOU ON YOUR HOLIDAYS**

Portable TX/RX in black crackle case, complete with power pack for 120/230v 50 c. operation. Three separate units very similar to the B2 RX/TX made for the same purpose. High efficiency 6L6 TX Xtal controlled 2-8 Mc/s. and 3 valve superhet receiver 2-8 megs. Max TX input approx. 30 watts. Full instructions supplied with each unit, very limited quantity available.

We are giving these away at **£8.15.0** each.  
Size overall 10½" × 8½" × 3½". Packing and Postage 5/-

**THIS MONTH'S SPECIAL FOR AR88 USERS**

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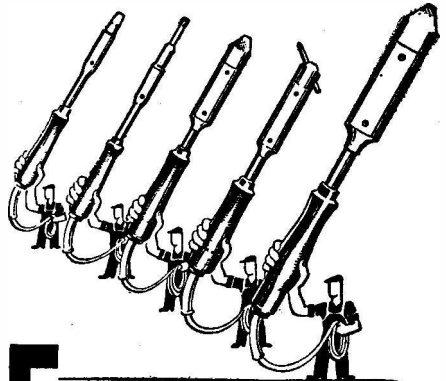
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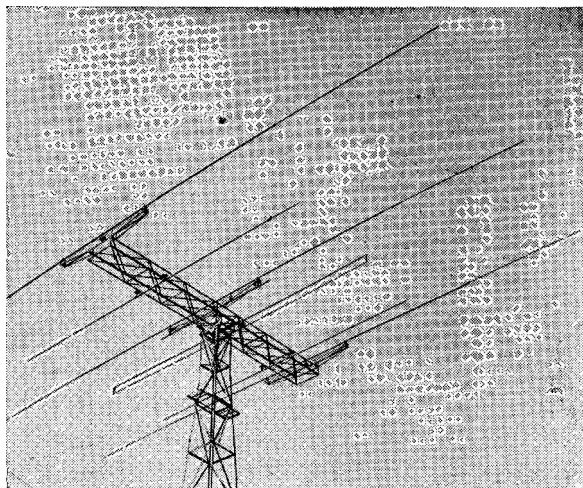
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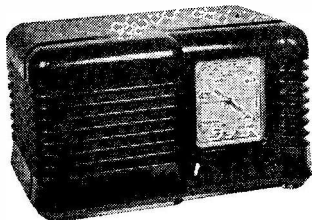
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FOR THE RADIO AMATEUR & AMATEUR RADIO

Vol. VII

JUNE 1949

No. 71

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## EDITORIAL

## Trespass

For years we have had to watch the broadcasting interests encroaching further on to what have been regarded as strictly amateur frequencies—indeed, even into bands which have been allotted to us by solemn treaty.

When these acts of trespass were committed by foreign (and presumably ignorant or hostile) agencies, we all understood the practical difficulties confronting the British authorities in getting them out of our bands—but we counted on their efforts to remedy in due course what was an obvious injustice.

Now, however, a much more serious situation has arisen. Readers will be as shocked and astonished as we were to find that our own B.B.C. has “officially appropriated” more frequencies in the 40-metre amateur band—at 7075 kc (GRS), 7120 kc (GRM) and 7150 kc (GRT). This in spite of the fact that the band 7000-7100 kc is *exclusively* amateur by the Atlantic City agreement, though it is true that in Europe the 7100-7150 kc area is to be shared with broadcasting services.

But the presence of GRS on 7075 kc is downright trespass, and action of this kind by a great broadcasting authority like the B.B.C. is the best encouragement others could have simply to appropriate still more of our frequencies. Actually, there are already 20 broadcast stations listed in the area 7000-7100 kc, but they are of considerably less importance (and power) than the services operated by the B.B.C.

We are all aware of the difficulties in which the B.B.C. has recently become involved in countering the Russian jamming offensive, which first became news on May 6th last. The counter-measure at present being employed is to provide more frequencies for the Russians to jam, which might conceivably be held to be an excuse for the appearance of GRS. But as this station is given in a B.B.C. activity list for May-July and intended for world-wide distribution, the decision to operate on 7075 kc must have been taken months ago.

Austin Foster  
6/6/50

The author discusses the practical applications of a new crystal oscillator circuit, of which he is the originator. He shows how this circuit can be adapted for operation over a wide range of frequencies and for a number of different purposes. As our contributor remarks, the progressive amateur can get away from convention by experimenting along the lines suggested here. We hope shortly to publish some practical designs based on the operation of the Butler Crystal Oscillator—Ed.

## Cathode-Coupled Crystal Oscillators

### Some New Circuits

By F. BUTLER, B.Sc., M.I.E.E. M.Brit.I.R.E.

OVER four years ago, the writer published a paper on cathode-coupled oscillators (*Wireless Engineer*, November 1944) and gave a brief description of an original quartz crystal circuit which proved to be of exceptionally high stability. A year or two later the same circuit was re-discovered, independently, by H. Goldberg and E. L. Crosby of the Radio Division, Bendix Aviation Corporation of America. These workers have since made a theoretical analysis of the criteria for the stability of the oscillator frequency and have investigated the use of the circuit at VHF. In addition, they have developed circuits giving a very high power output, and have discussed the modifications necessary to turn the oscillator into a converter or frequency changer.

The circuit in its basic form has been employed by them to produce direct crystal-controlled oscillations at 118 mc, the crystal operating at its 11th mechanical harmonic. A slight modification allows the same circuit to be used as a converter, operating well at frequencies up to 250 mc. Another modification has produced a 400-watt crystal controlled transmitter, plate modulated, using only two valves and operating at 24 mc, using the third mechanical harmonic of the crystal.

One crystal, used successively in two separate oscillators employing different types of valve, generated frequencies which differed only by one part in a million. Touching one plate of the crystal holder with the finger produced a barely perceptible change of frequency. The oscillator circuits devised to produce these exceptional results are remarkable for their simplicity and although a two-valve maintaining circuit is required, it is sufficient to use a miniature twin-triode for low power working.

#### Crystal Resonances and Harmonic Excitation

In a previous paper published in the *Short*

*Wave Magazine* for October 1948 ("Flexible Crystal-VF Oscillator") the writer discussed the distinction between the series and parallel-resonant vibration modes of a quartz plate. It is sufficient to recall that the crystal simulates a low resistance at series resonance, the frequency of which is scarcely affected by stray reactances in parallel with the crystal holder. Parallel resonance occurs at a slightly higher frequency, which is quite sensitive to the effect of variable stray capacity across the crystal holder. The quartz plate simulates a very high resistance at its parallel resonant frequency.

The foregoing remarks apply to the operation of a crystal at its fundamental frequency. There are, however, two basic methods of obtaining an output of higher frequency. The first involves running the crystal oscillator at its fundamental frequency and applying its output to a frequency multiplier stage, normally consisting of a valve amplifier of which the load impedance is a parallel LC

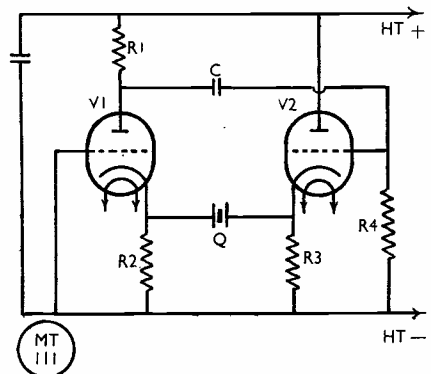


Fig. 1. Basic cathode-coupled oscillator, discussed in the text.

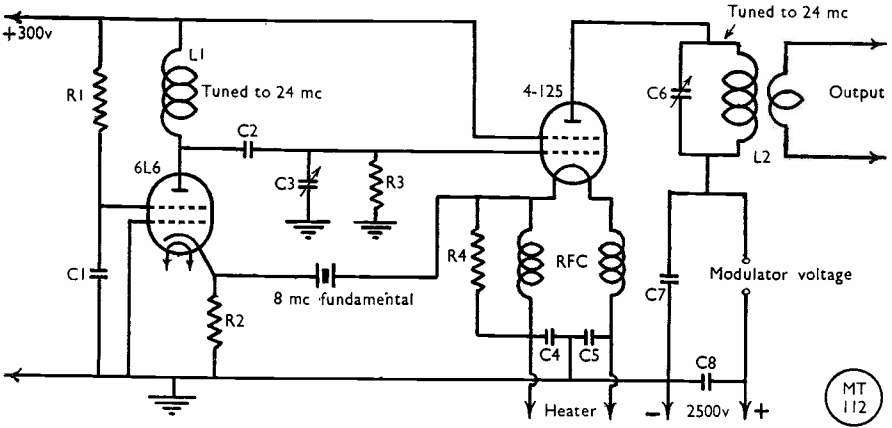


Fig. 2. Circuit for a high-power plate modulated transmitter. Values could of course be modified for operation on any of the amateur bands up to 28 mc.

Table of Values

Fig. 2. High Power Plate Modulated Transmitter

- C1, C4, C5 = .01  $\mu$ F
- C2, C7 = .001  $\mu$ F
- C3, C6 = Tuning capacities
- C8 = 4  $\mu$ F
- R1 = 10,000 ohms
- R2 = 220 ohms
- R3 = 18,000 ohms
- R4 = 68 ohms
- L1 = Tuned to output frequency three times crystal fundamental
- L2 = Tuned to output frequency
- RFC = Double-wound RF chokes

circuit tuned to some desired multiple of the fundamental frequency. The output is then an *exact* multiple of the crystal oscillator fundamental frequency.

The second method involves the mechanical vibration of the quartz plate in an overtone mode, which is *not* an exact multiple of the lowest or fundamental frequency of vibration of the bar or plate. It is not strictly correct to describe such vibrations as 'harmonics' of the fundamental frequency, though there is little danger of confusion if the modes are qualified as "mechanical" harmonics. The essential point is that the frequencies of the overtone modes (mechanical harmonics) cannot be determined accurately from a knowledge of the fundamental frequency, but they must be measured with a frequency meter. In practice, the discrepancy between the mechanical overtone and the true harmonic frequencies will seldom be more than a few parts in a thousand.

Basic Oscillator Circuit

The simplest circuit of the type under discussion is shown in Fig. 1.

In this circuit, V1 is a grounded-grid amplifier valve. Its anode load resistance is R1, and C is the coupling condenser to the grid of a cathode follower V2, of which R3 is the cathode load and R4 the grid resistor. Cathode bias for V2 is developed across R3, and Q is a quartz plate coupling the cathodes of V1 and V2.

The stage gain of a cathode follower operating into a very high cathode load impedance is  $\frac{\mu}{\mu + 1}$  where  $\mu$  is the amplification factor of the valve. Its output impedance is  $1/g_m$ , where  $g_m$  is the mutual conductance, and the output voltage is in phase with the input.

For a grounded grid amplifier, the stage gain is :

$$m = \frac{(\mu + 1) R}{R_a + R + (\mu + 1) R_e}$$

Where  $m$  = stage gain,

$\mu$  = amplification factor of valve,

$R_a$  = anode slope resistance of valve,

$R$  = anode load resistance,

$R_e$  = effective resistance in cathode circuit.

The input resistance (cathode-earth) is given:

$$\text{by : } Z_i = \frac{R_a + R}{\mu + 1}$$

For normal valves and loads,  $Z_i$  is no more than a few hundred ohms, and the grounded-grid amplifier, like the cathode follower, gives an output which is in phase with the input voltage.

The action of the circuit shown in Fig. 1 may now be described. Assume first that oscillation is possible, and suppose that there is an alternating voltage developed across the grid resistor of the cathode follower. This will produce an output, of the same phase, across R3 while the quartz plate Q, at resonance serves to apply a large fraction of this between the cathode of V2 and earth, *i.e.* across R2. An amplified voltage is developed across R1, the anode load resistance of V1. This voltage is available to supply the assumed input to V2, and it is in the same phase. Oscillation will therefore be maintained, provided only that the amplifier gain exceeds the total circuit attenuation.

It has been stated already that, at series resonance, the impedance of a quartz plate degenerates to a very low resistance. Under these conditions, almost the whole voltage developed across R3 is available to drive V1 and there is ample gain round the circuit loop to sustain oscillation. Off resonance, the quartz plate simulates a very high reactance. There is attenuation and phase shift due to this effect and oscillation is suppressed.

The simple circuit of Fig. 1 suffers from certain defects. Due to circuit wiring and valve capacitances, the gain of the grounded grid amplifier, with a resistance load, falls off seriously at high frequencies. The quartz plate may be excited in one of a number of possible modes of vibration which may differ

in frequency from the desired response. The use of a triode valve V1 limits the possible gain and a higher figure is attainable if a tetrode or pentode is employed. In practice, the optimum values for the load resistors R2 and R3 sometimes make them unsuitable for cathode bias purposes, and a different biasing arrangement is required. Lastly, the quartz plate holder capacity, shunting the crystal, can prove troublesome, and it may be necessary to counteract it. The modified circuits, to be described, take account of all these points.

### High Power Oscillator Circuit

The circuit shown in Fig. 2 is taken from the paper by Goldberg and Crosby, already mentioned. It has been used with a 6L6 driver valve and a Type 4-125 PA to deliver an RF output of 400 watts. The output stage may be plate modulated to a depth of 100 per cent, under which condition there is a small degree of undesired frequency modulation, amounting to about 10 parts in a million at full modulation. The fundamental frequency of the crystal is about 8 mc, the final output being on 24 mc, derived by selection of the third mechanical harmonic, the tuned anode circuits of both valves being set to resonate at 24 mc.

With the circuit values shown and with a plate voltage of 2500 on the final amplifier, the final crystal current is under 75 mA.

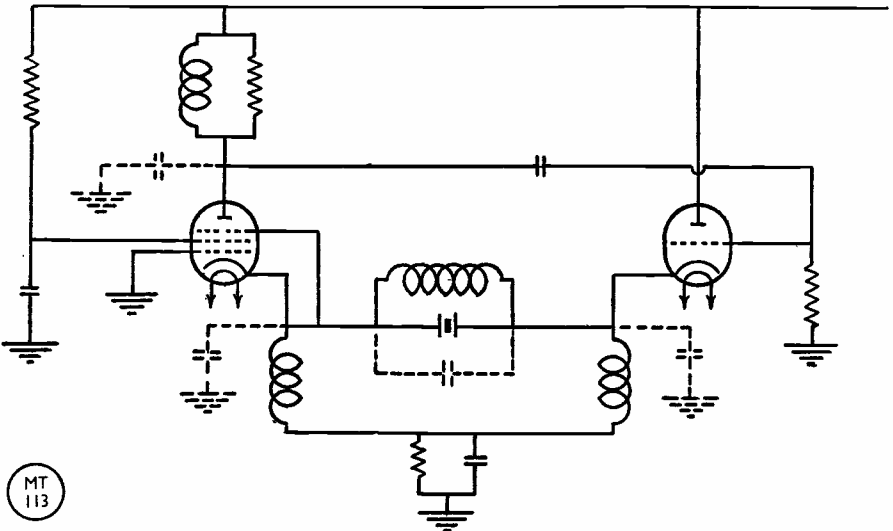


Fig. 3. This circuit for VHF working can be operated on the 11th harmonic of the crystal fundamental.



There are several differences between this circuit and the basic diagram shown in Fig. 1. In the first place, the anode load resistance R1 in Fig. 1 is replaced by a tuned anode circuit in the 6L6 amplifier valve in Fig. 2. The cathode follower stage in Fig. 2 is represented by the screen grid, control grid and cathode of the final amplifier, leaving the anode circuit available for the connection of the output tuned circuit, using electron coupling within the valve.

The use of a tuned circuit in the grounded-grid amplifier stage permits the selection of any desired crystal harmonic, whereas the broadband amplifier of Fig. 1 favours frequencies which operate the crystal plate in a mode corresponding to the greatest piezo-electric activity of the quartz.

Although the experiment has not been tried by the writer it seems likely that three or four crystals may be connected permanently in parallel and the desired fundamental or harmonic frequencies of each one of them picked out in turn by appropriate tuning of the two resonant circuits.

Obvious modifications to the circuit of Fig. 2 are required if the final amplifier is an indirectly heated valve. The heater filter circuit may be retained and the cathode lead connected to the junction of the crystal and the output valve cathode bias resistor.

**Circuit for VHF Operation**

By the use of additional circuit elements arranged so as to eliminate the effects of valve, crystal and circuit wiring capacities, Goldberg and Crosby have succeeded in producing direct crystal-controlled oscillation at a frequency of 118 mc and suggest the circuit shown in Fig. 3 in cases where still higher frequencies are required. It will be seen that the various resistors are replaced by tuned circuits consisting of inductances which are caused to resonate with the stray capacity associated with them. Dust-cored coils with screwed slugs are conveniently adjustable to the desired inductance.

In the circuit of Fig. 3 it will be noticed that a coil is shunted across the quartz plate. This inductance is selected to give parallel resonance with the holder capacity at the crystal frequency.

Frequency stability is increased by loading the amplifier tuned circuit by means of a parallel connected resistor of the lowest possible value which will still permit the maintenance of oscillation.

A good deal of experimental work will be required to get the best results from a circuit of this complexity, but there is nothing particularly difficult in the operation.

The crystal should be of a type cut specifically for harmonic operation, and normally

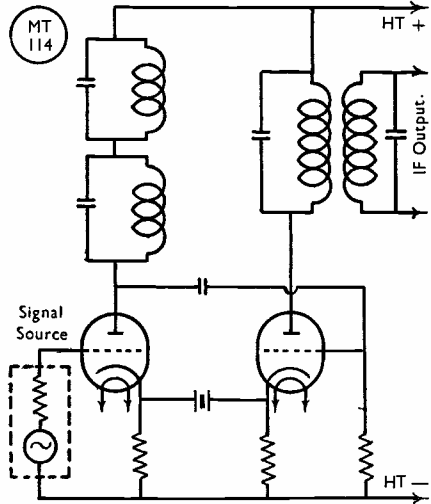


Fig. 4. A crystal-controlled converter circuit which, with a 10 mc crystal and a 7F8 twin-triode, has been operated at 270 mc.

there is no great difficulty in exciting a high harmonic mode of vibration, e.g. the 11th overtone of the fundamental frequency.

**Frequency Changer Circuit**

The oscillator circuits described can easily be modified and employed as crystal controlled superheterodyne mixers or converters. A simple example is shown in Fig. 4.

Mixing takes place, principally, in the cathode follower stage, which is simultaneously acting as the first IF amplifier, having a transformer, tuned to the intermediate frequency, in its anode circuit. Fundamental frequency or harmonic mixing may be employed, but if the signal and oscillator frequencies are widely separated, then the anode load of the grounded grid amplifier should consist of two separate parallel-tuned LC circuits arranged in series, one being resonant at the signal frequency and the other at the oscillator frequency. This gives a high value of conversion conductance and a good signal-to-noise ratio.

To ensure reliable operation of the oscillator, the signal-frequency source must be of relatively low resistance at the oscillator frequency.

A single 7F8 twin triode valve has been used with a crystal of nominal frequency 10 mc to handle signal frequencies of about 270 mc.

**Harmonic Generation**

If the circuit of Fig. 1 is modified by in-

cluding a tuned circuit in the HT line of the cathode follower valve, and making this circuit resonate at some harmonic of the crystal frequency, then a form of frequency multiplier or harmonic generator is derived, the output being available at the anode of the cathode follower valve. In this case, the output frequency is an exact, integral multiple of the crystal frequency and not an approximate multiple as in the case of *mechanical* harmonics employed in the circuits previously described.

### General Points

In the foregoing description, an attempt has been made to simplify existing accounts of the work done by the writer on cathode-

coupled oscillators, and by Goldberg and Crosby in their paper describing extensive developments of the original circuit and its derivatives.

The purpose of this work is to encourage progressive transmitting amateurs to break away from the conventional circuits which have been in use for so many years.

In one short article, it is impossible to give more than the basic principles of operation of the new equipment, with a guide to the choice of components and valve types.

Growth of interest in the high performance of series-resonant oscillators would no doubt encourage the quartz crystal manufacturers to supply sealed units calibrated at the series mode instead of at the more usual, but less stable, parallel mode.

## Three-Band Aerial System

### Flexible, Low-Impedance Fed

By P. PENNELL (G2PL)

THIS all-band low-impedance system has been evolved for use by amateurs who have only a limited amount of space for the erection of aerials, but who wish to obtain the best possible results on more than one band. It is not intended to be revolutionary, to be better than a beam, or to have an unusually low angle of radiation, but rather to radiate signals into distant places in almost all directions, on at least three bands.

Fig. 1 shows a typical example of the aerial. It must be emphasised that flexibility is the keynote in its evolution. The length of span between the two masts is shown as 120 ft.—it may be as short as 66 ft. or as long as 140 ft. "Bending" the ends of the radiator takes care of the small span; results are not spoiled as much as might be expected, for it is the centre of an aerial which does the work.

### Feeder Line

A low impedance feeder has been chosen for several reasons; it is light (either twin 80-ohm polythene or screened twin may be used) and as the aerial will have to be lowered or raised quickly when making changes in radiator or feed point, it does not get tangled (a bad defect with 600-ohm feeders) nor does it harm the flower beds, but just coils itself gently. In order to make raising and lowering of the aerial speedy, an "endless" rope might

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The author of this article is well known as one of the world's leading DX operators. His ideas about an efficient yet simple aerial system will therefore be of great interest to all who want to get out to DX—though working it consistently calls for something more than a good aerial.—Ed.

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well be used at either end. This operation, together with changing feeder points and adjusting shorting straps, takes no longer than three or four minutes.

Fig. 2A shows an insulator with a shorting strap. Fig. 2B shows a typical feed point; the insulator in both cases is of conventional

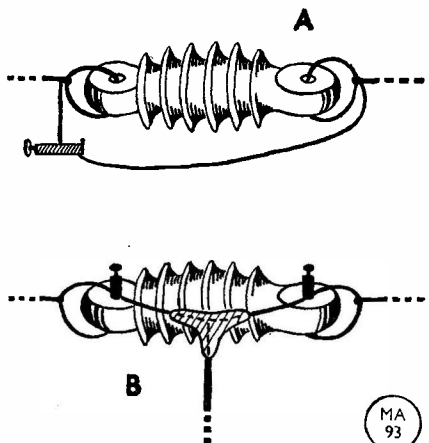


Fig. 2A. Insulator with shorting strap across terminals.  
Fig. 2B. Feed point with feeder connected.

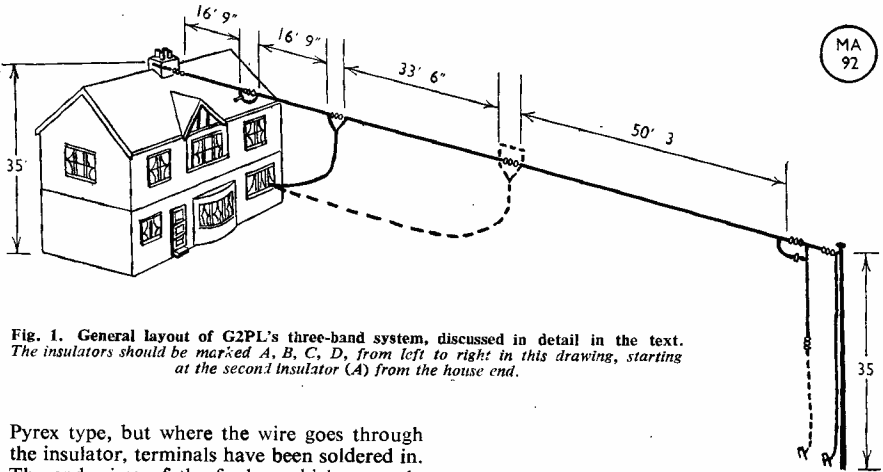


Fig. 1. General layout of G2PL's three-band system, discussed in detail in the text. The insulators should be marked A, B, C, D, from left to right in this drawing, starting at the second insulator (A) from the house end.

Pyrex type, but where the wire goes through the insulator, terminals have been soldered in. The end wires of the feeder, which are only 18 SWG, have been soldered to 14 SWG channel wire and then scrap polythene feeder has been melted and moulded around the wires. This process makes a robust and water-proof feeder termination for insertion into the terminals at the required point.

**Band Changing**

Connections for the various bands are shown in the Table. These are by no means the only possibilities. 28 mc can be included by the addition of a further insulator 8 ft. 6 in. from the house end and also by making suitable adjustment at A, B, C and D. It was felt, however, that most amateurs using Ten regularly have room for the erection of a compact beam.

It is appreciated that the various aerials enumerated in the Table are not in resonance

under all conditions of operation, but the error is small and appears to have little practical effect; current in the feeder is almost equal and normal, and certainly no high standing-wave ratio is found on the feeder.

**Results**

As an example of the results obtained when bending the ends of the aerial, where the available span is small, the author has used it with a 70 ft. span, 33 ft. 6 in. at the far end having been dropped at an angle of 80 deg. to a fence behind the pole, and 33 ft. 6 in. at the house end bent back on the radiator at an angle of 50 deg. Under these conditions, on 3.5 mc Australia, New Zealand, all

Table showing Connections for each Band

Frequency	Aerial length	Insulator "A"	Insulator "B"	Insulator "C"	Insulator "D"
3.5 mc	$\lambda/2$	Short	Short	Connect Feeder	Short
7 mc	$\lambda/2$	Short	Connect Feeder	Open	Open
	$\lambda$	Short	Connect Feeder	Short	Short
14 mc	$3\lambda/2$	Open	Connect Feeder	Short	Open

Note.—By slight rearrangement,  $2\lambda$ ,  $\lambda$  and  $\lambda/2$  can be obtained on 14 mc if the feeder is connected at A; this position has not yet been tried. These lengths will be somewhat out of resonance.

America (except W7), Palestine, Africa, Porto Rica, and many others have been contacted, and on 7 mc an exceptional contact was with the Solomon Isles (which has subsequently been confirmed as the only European QSO). The currents in the twin feeder, as might be expected under this condition, were unbalanced by about 12 per cent. This system has proved far more successful on 3.5 mc than using a loading coil to make the feeder and top

operate against ground.

Many will ask what effect is produced by the odd lengths of wire left unused in certain conditions; as far as can be observed, the radiation pattern is unaffected and no other ill effects have been noted.

If the user of this aerial tires of the variations enumerated, he can amuse himself by working out further alternative arrangements which can, of course, include the future 21 mc band.

## 50 Watts at 230 Volts

### More Power with DC Mains

By F. HOW (G3DEU) and  
F. HARROP (G3DVL)

**A**N advantage of DC is the unlimited supply of current (reckoned in milliamps) at the terminal voltage, usually 230 volts nominal, and the need for only the bare minimum of smoothing.

The writers, being on DC and with every prospect of remaining so for several years yet, decided that the use of more and more AC/DC valves like the 25A6, KT32 and so on, in parallel push-pull to obtain higher power would only lead to complications in view of the high grid-anode capacities involved; in addition, it was far from efficient, the RF

The problem of obtaining higher inputs than are usually possible with 200-230 volts DC mains has previously been discussed in these pages. This article describes a complete 50-watt transmitter suitable for operation on a 230-volt DC supply.—Ed.

output of such valves falling off rapidly above 10 mc. (Such use is not recommended by the manufacturers.)

The question of rotary converters was dismissed as their cost is prohibitive. Higher power had to be obtained efficiently and yet at a minimum cost. It is felt that this has been achieved with the transmitter to be described.

With the faithful, well-tried 807 in mind (which was dropped because of its high heater current) it was decided to use its counterpart, the 1625; these valves are obtainable at an extremely reasonable price and are identical with 807's, except that the heater rating is 12 volts at 0.45 amps. They therefore lend themselves nicely to a series arrangement with

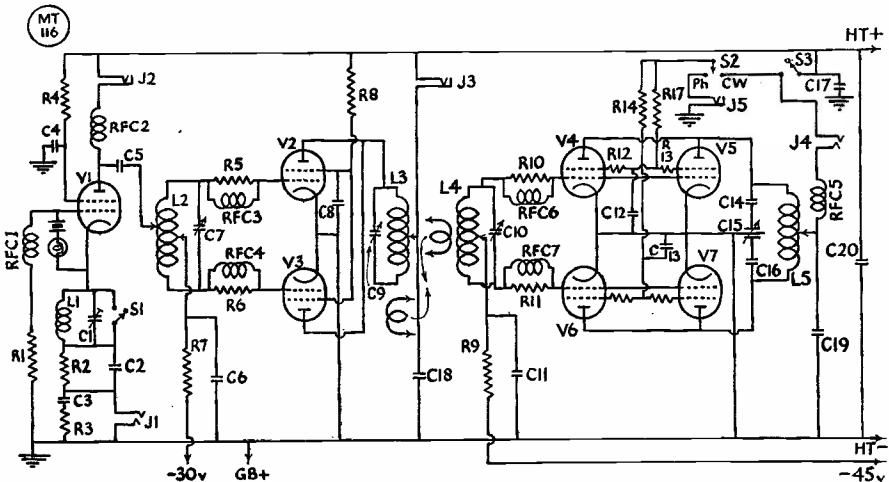
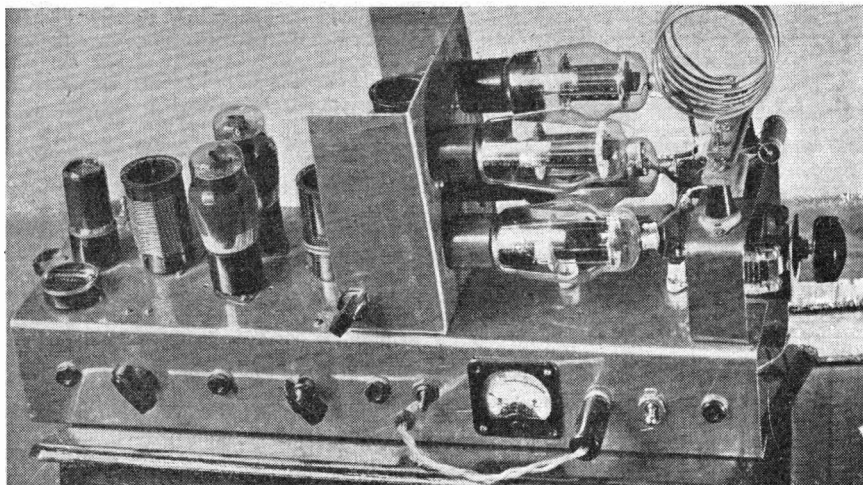


Fig. 1. Circuit of the RF section of the transmitter, as described in the text.



General view of the transmitter. From left to right, the controls are : Key jack, CO tuning C7, V1 plate jack, Buffer tuning C9, Buffer plate jack with PA grid tuning C10 just above, CW/Phone switch, PA plate jack, PA HT switch, and modulation jack.

Table of Values

Fig. 1. Circuit of the QRO DC Transmitter

- C1 = 100  $\mu$ F trimmer
- C2 = .01  $\mu$ F
- C3 = 0.1  $\mu$ F
- C4 = .01  $\mu$ F
- C5 = 300  $\mu$ F
- C6 = .002  $\mu$ F
- C7 = 60  $\mu$ F variable
- C8 = .005  $\mu$ F
- C9 = 60  $\mu$ F variable
- C10 = 60  $\mu$ F variable
- C11 = .005  $\mu$ F
- C12 = .002  $\mu$ F
- C13 = .002  $\mu$ F
- C14 = .001  $\mu$ F
- C15 = 100 + 100  $\mu$ F split stator (butterfly type)
- C16 = .001  $\mu$ F
- C17 = .002  $\mu$ F
- C18 = 0.002  $\mu$ F
- C19 = .1  $\mu$ F
- C20 = 1  $\mu$ F paper, or oil filled
- R1 = 25,000 ohms
- R2 = 50 ohms
- R3 = 250 ohms
- R4 = 11,000 ohms
- R5 = 50 ohms
- R6 = 50 ohms
- R7 = 3,900 ohms
- R8 = 1,000 ohms, 1 watt
- R9 = 4,900 ohms, 3 watt
- R10 = 50 ohms
- R11 = 50 ohms
- R12 = 50 ohms
- R13 = 50 ohms
- R14 = 100 ohms
- R15 = 50 ohms
- R16 = 50 ohms
- R17 = 100 ohms

6V6's, and it is around these valves that the circuit has been developed.

Theoretical Circuit

The circuit, shown in Fig. 1, consists of three stages—crystal oscillator, buffer-doubler, and power amplifier.

The crystal oscillator is the usual tritet with a switch to short out the cathode coil when straight crystal operation of V1 is required ; R2 is the cathode bias resistor for V1, kept to a minimum so that the valve is just protected in the case of non-oscillation, but the HT is not restricted due to too high a standing cathode voltage. C3 and R3 form a key click filter across J1, the key jack, and for short-length keying leads this combination has proved quite effective. If fairly long leads have to be used it may be necessary to add a key click filter at the key end.

The anode is parallel fed to L2 and C7 ; J2 enables the anode current of V1 to be checked. The anode tap is taken part way down L2 and some experiment was found necessary with its position before a true balance of grid drive could be obtained to V2 and V3. The grid return for these valves is from the centre tap of L2 through R7 to a bias of approximately -30 volts. R5 and R6 are grid stoppers with RFC3 and RFC4 (each consisting of six turns of 18 SWG enamelled wire) wound round them, to prevent spurious

Table I

COIL WINDING DATA	
L1 (7 mc)	8 turns 22 SWGE spaced wire diameter on $\frac{1}{2}$ -in. former.
L2 (7 mc)	26 turns of 22 SWGE spaced wire diameter, centre tapped and with one tap $3\frac{1}{2}$ turns from one end.
L3/L4 (14 mc)	10 turns of 22 SWGE spaced wire diameter and centre tapped. 2-turn link around centre.
L5 (14 mc)	10 turns 14 SWG self-supporting $2\frac{1}{2}$ in. diameter.
Note.—L2, 3 and 4 are wound on standard $1\frac{1}{2}$ -in. diameter formers.	

oscillation—it may be considered that these are unnecessary as V2 and V3 always work as a push-push doubler, but it is recommended that they be inserted. With these grid stoppers, screen stoppers were not required, and both screens are fed from a common resistor R8.

To obtain maximum transfer efficiency, link coupling is used between the buffer stage and the PA.

RFC6 and RFC7 are similar to RFC3 and RFC4, being wound round R10 and R11 respectively, the combination once again forming an effective grid stopper in each case. Grid stoppers are only provided for the pairs of valves, but screen stoppers are provided for *each* of the PA valves. The screen voltage is kept as high as possible, only sufficient resistance being inserted to isolate the screen from the anode.

The tank circuit is composed of C15 and L5, the condenser being a butterfly type removed from an IFF unit. Some difficulty was experienced at first by the tendency of this condenser to flash over, but this fault was

overcome with no apparent detriment by the insertion of C14 and C16 to remove the DC component. C19 is not essential but was found to remove the last traces of key clicks on a neighbour's straight set!

### Construction

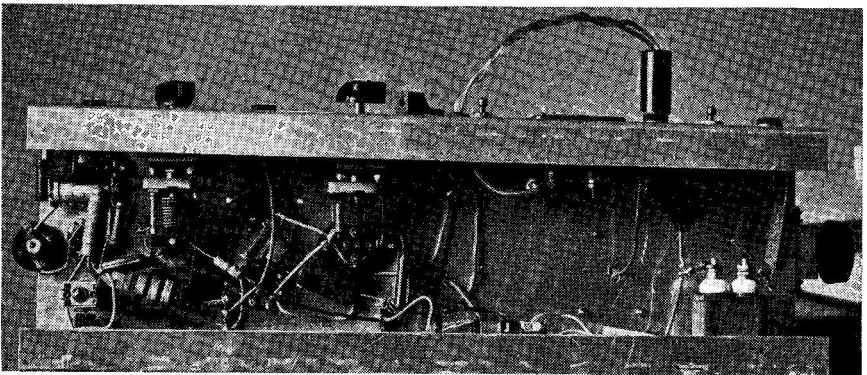
Little need be said on the construction as the photographs show the disposition of components very clearly. The unconventional layout should be followed if possible, as this allows of very short leads in the PA stage, so reducing any external anode-grid capacity introduced in the wiring. As constructed no neutralising has been found necessary.

The bias, for the buffer stage is obtained from a midget "deaf-aid" HT battery and this can be seen mounted under the chassis in the view of the underside of the transmitter. The bias battery for the PA is externally connected through a pair of leads which are shown in the same photograph leaving the chassis near the buffer bias battery. To check PA grid current an external 0-30 mA meter is inserted in series with the bias lead to this battery.

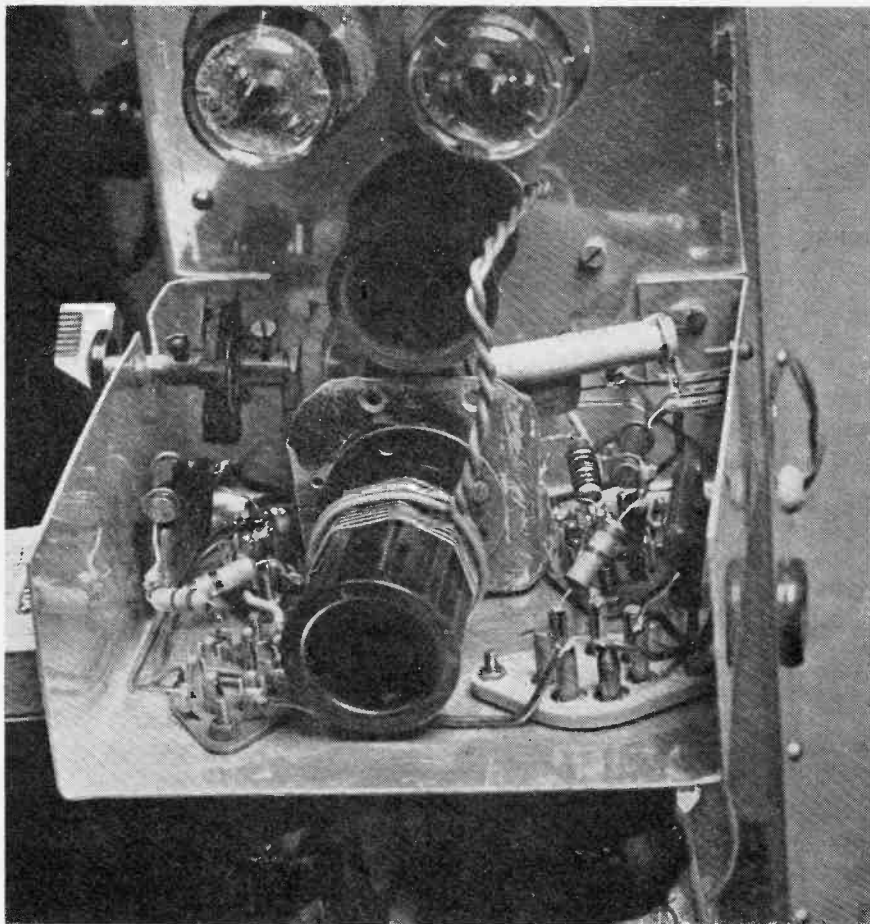
The transmitter was designed primarily for operation on 14 mc and winding data for the coils for this band are given in Table I. When time permits coils will be wound so that the transmitter can be put on the air on 28 mc.

### Operation

Setting-up procedure is quite straightforward and follows normal practice. Current readings taken on the transmitter are given in Table II and the PA will run to some 50 watts (depending on how the mains voltage varies!).



Showing the construction underneath the chassis.



Close up of the grid end of the PA stage.

### Power Supply

This may sound rather pretentious, but a certain amount of smoothing *is* essential to get rid of the final trace of hum. The circuit is given in Fig. 2; the resistor R1 (which to avoid overheating consists of two 3-amp mains dropping resistors in parallel) should be adjusted until the correct voltage is obtained across the valve heaters. In practice the station general-purpose test meter is usually kept across points "A" and "B", the voltage being set to 69 volts.

### Modulator

Once again low cost, with reasonable efficiency, was the prime consideration, since

CW is the main interest, with only occasional forays on 'phone. It was decided to try screen modulation, in spite of the many horrible things that experts say are liable to happen! This method of control is approximately 50 per cent. efficient and up to 95 per cent. depth of modulation can be obtained with negligible distortion.

The circuit used for the modulator is given in Fig. 3. This is a simple three-valve speech amplifier and is used with a moving coil microphone. The cathode bias condensers are low value to reduce bass response without reducing stage gain. It will be noted that only one wire is connected to the modulator jack—the earth return being common to both the



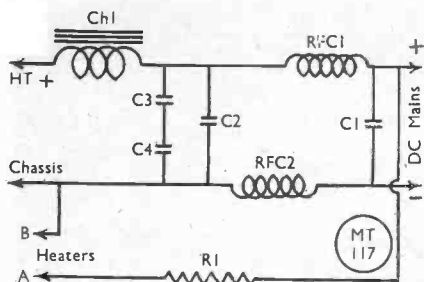


Fig. 2. Suitable power supply arrangement for DC mains operation.

#### Table of Values

Fig. 2. DC Mains Smoothing Circuit

C1, C2 = 0.1  $\mu$ F

C3, C4 = .005  $\mu$ F

R1 = Two 0.3-amp mains droppers in parallel (330 ohms for 220v DC)

RFC = Mains RF chokes

Ch = Low-resistance high current smoothing choke

transmitter and modulation chassis through the mains connection.

Because of its simplicity, constructional details are not given, this being left to individual taste. It should be pointed out, however, that the resistor marked Rx must be chosen so that in the 'phone position of S2 the PA screens

are at 100 volts. In the writers' case, this is 5,000 ohms (3 watts), but the value will vary according to the resistance of the output transformer and smoothing choke used. The amplifier will modulate the transmitter fully, with 25 watts input on 'phone.

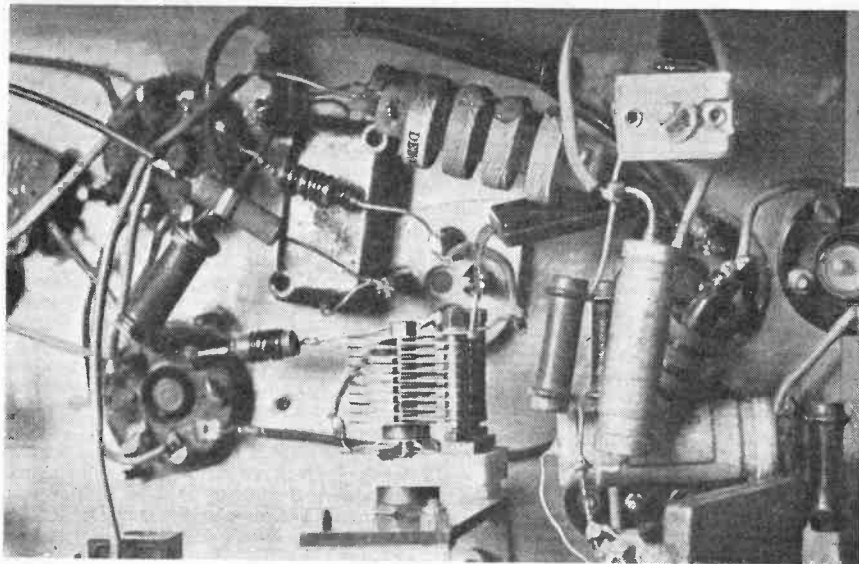
#### Results

It is realised that results depend as much upon conditions, the aerial system and on the operator as on transmitting equipment. The aerial at present in use is a half-wave dipole for 20 metres, vertically suspended due to space restrictions, and link coupled to the centre of the tank coil. On this aerial ZL and VK were worked on CW during the first week the transmitter was on the air.

The modulator has been in use for a short time only but, so far, Continental and UK contacts have yielded reports of R4/5 and S7/9 with excellent speech quality.

#### Warning!

If you are unfortunate enough to be connected to your DC supply so that the *positive side is earthy*, all metal chassis will be live—so be careful! If electrolytic condensers are used for smoothing in the modulator unit it is wise, in order to protect them, to use a three-pin plug for power connection. It is also essential to make the earth connection through a large (2-4  $\mu$ F) condenser rated at twice the working voltage.



View of the oscillator compartment

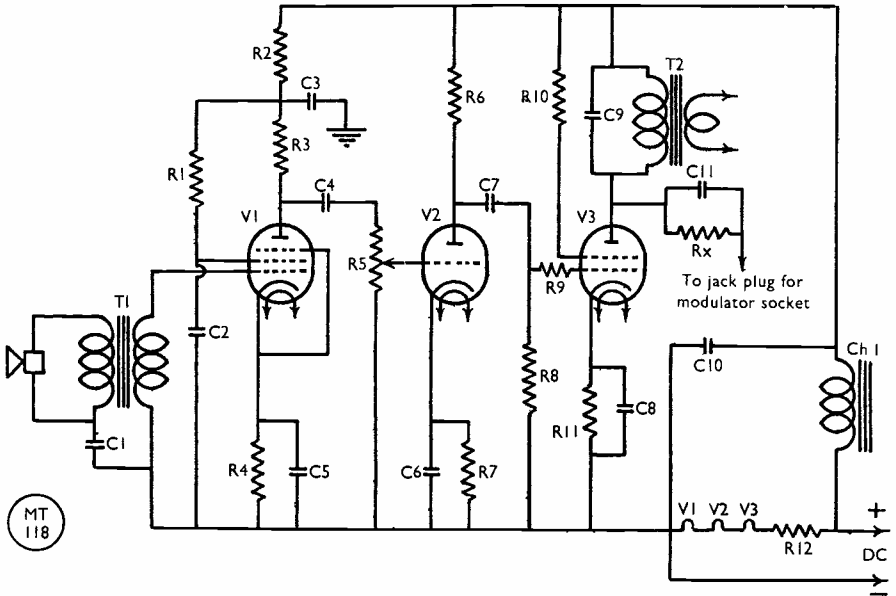


Fig. 3. Modulator for the DC mains transmitter, to give screen control of the PA stage.

Table of Values

Fig. 3. Circuit of the Modulator Unit

- C1 = 0.1  $\mu$ F
- C2 = 0.1  $\mu$ F
- C3 = 8  $\mu$ F
- C4 = .05  $\mu$ F
- C5 = 8  $\mu$ F
- C6 = .25  $\mu$ F
- C7 = 0.1  $\mu$ F
- C8 = 25  $\mu$ F (25 volt)
- C9 = .005  $\mu$ F
- C10 = 4  $\mu$ F
- C11 = .25  $\mu$ F
- R1 = 1 megohm
- R2 = 20,000 ohms
- R3 = 250,000 ohms
- R4 = 1,600 ohms
- R5 = 500,000 ohms variable
- R6 = 50,000 ohms
- R7 = 2,000 ohms
- R8 = 250,000 ohms
- R9 = 1,000 ohms
- R10 = 100 ohms
- R11 = 470 ohms (1 watt)
- R12 = 0.3-amp mains dropper
- R"x" = See text
- T1 = 100:1 mic. transformer
- T2 = 60 mA primary output transformer, ratio 60:1
- Ch = Smoothing choke.
- V1 = 6K7 or 6J7
- V2 = 6J5
- V3 = 25A6

Table II

CURRENT READINGS

Jack	Indication	mA	Remarks
J2	Anode current V1	20	
J3	Anode current V2/V3	60	
J4	Anode current PA	10 250/270 230 120	At resonance CW Off resonance CW Loaded CW Loaded Phone
PA grid current 16-18 mA			

# Broad-Band Converter for the BC-312

## Built-In Unit for Ten

By K. BUNSTON (G3AAK)

AS station receiver at G3AAK/A, the writer uses a BC-312 which, after sundry modifications, has proved to be very satisfactory. One disadvantage common to this type of receiver is that a separate convertor has to be used for 28 mc reception and for some considerable time a modified Type 26 convertor has served for this. However, it is rather bulky, requires a separate power supply of 6.3 volts for the heaters and involves running HT and RF output leads to the receiver. Some thought was therefore given to the problem of designing an *internal* convertor for 28 mc. The design discussed here is the result.

Most convertors incorporate their own internal local oscillator; in this design, the main receiver LO performs, in addition, as convertor LO. The arrangement is shown schematically in Fig. 1. In the BC-312, the LO operates 460 kc below the signal frequency. (This is unimportant except in the case of the BC-312, where it enables the 28-30 mc band to be covered entirely on the 14-18 mc tuning range.) Thus, if the receiver RF and mixer stages are set at 14230 kc, the LO will oscillate on 13770 kc. If the output of the latter is also injected into a mixer valve, the grid of which tunes the 28 mc band, and having the anode coupled to the main receiver aerial input, signals on 28 mc can be tuned in the usual way.

As the receiver dial is swung from 14230 kc to 15230, the convertor IF and oscillator

Certain receivers in the ex-Government BC series do not cover the 28 mc band. This article describes an ingenious and successful modification to obtain reception on Ten by building in a convertor unit which operates on the harmonic range of the existing local oscillator.—Ed.

frequency will both change by one megacycle, enabling the convertor to cover from 28-30 mc. If the convertor mixer grid circuit is made broad band and if a similar broad band RF stage is added, a handy little convertor results which requires no tuning control of its own. Furthermore, no trouble will be experienced due to harmonics of the receiver LO tunable on the convertor, since these will always be 920 kc below signal frequency (twice the receiver IF).

### Construction

In the '312, space for the convertor will be found in the local oscillator compartment and the first job is to remove entirely the compartment cover, held in place by fixing screws. The convertor chassis measures 3½ in. by 1 in., with a small flange for fixing (see Fig. 2).

Having constructed the chassis, next wind the coils and mount them and the button-base holders for the 6AK5's on the chassis. The RF coil mounts above the chassis and the mixer coil below; no other screening was found necessary. Though miniature components were not available, no difficulty was experienced in fitting them all in. Nevertheless, if miniature components are on hand, their use may improve both position and lay-out. Care must be taken to see components do not project on either side of the chassis, one side of which is fixed by bolts to the side of the receiver LO tuning condenser; the other fits snugly against the compartment case when the latter is replaced.

To avoid disturbing the other tuning ranges of the '312, a lead is taken from the fixed plates

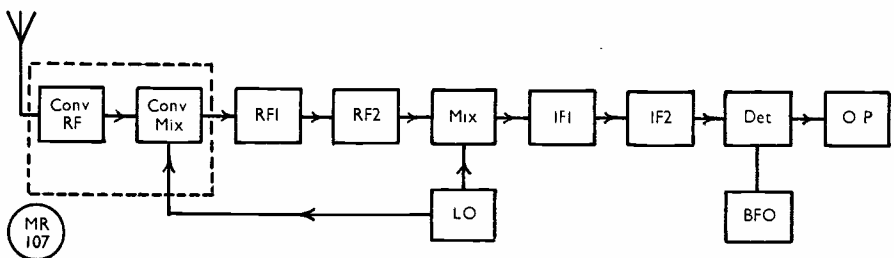


Fig. 1. Block schematic of the BC-312 as modified.

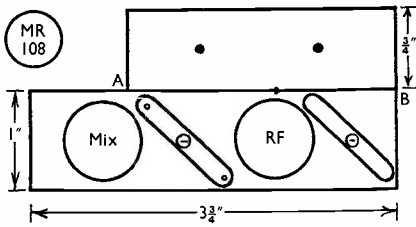


Fig. 2. Chassis detail for the converter unit ; to be bent along A-B and fixed to BC-312 oscillator condenser frame.

of C24 (the 14-18 mc osc. trimmer of the '312) through a 20  $\mu$ F condenser to the grid of the 6AK5 mixer. This should be made as short as possible, but will nevertheless cause considerable detuning of the receiver LO on this band and correction must be applied by decreasing C24 until calibration is restored. Then trim the mixer and RF stages.

With the wiring of the converter completed, obtain LT for the heaters (12.6 or 6.3 volts according to the heater connection) from some suitable point in the receiver, e.g., the dial

Table of Values

Fig. 3. Circuit of the G3AAK Incorporated Converter

- C1 = 10-20  $\mu$ F
- C2, C3, C4, C6, C7 = .001  $\mu$ F, mica
- C5 = 20  $\mu$ F
- C8 = 75  $\mu$ F
- C9 = 200  $\mu$ F
- C10 = 0.1  $\mu$ F
- R1, R3, R5 = 10,000 ohms
- R2 = 150 ohms
- R4 = 2000 ohms
- R6 = 1,000 ohms
- R7 = 20,000 ohms
- R8 See text
- L1, L3 = 10 turns 22 SWG on 3-in. dia. variable dust-core former
- L2 = 3 turns insulated wire round earthy end L3
- RFC = Eddystone VHF choke
- V1, V2 = 6AK5
- S1, S2 = 2-pole 2-way switch

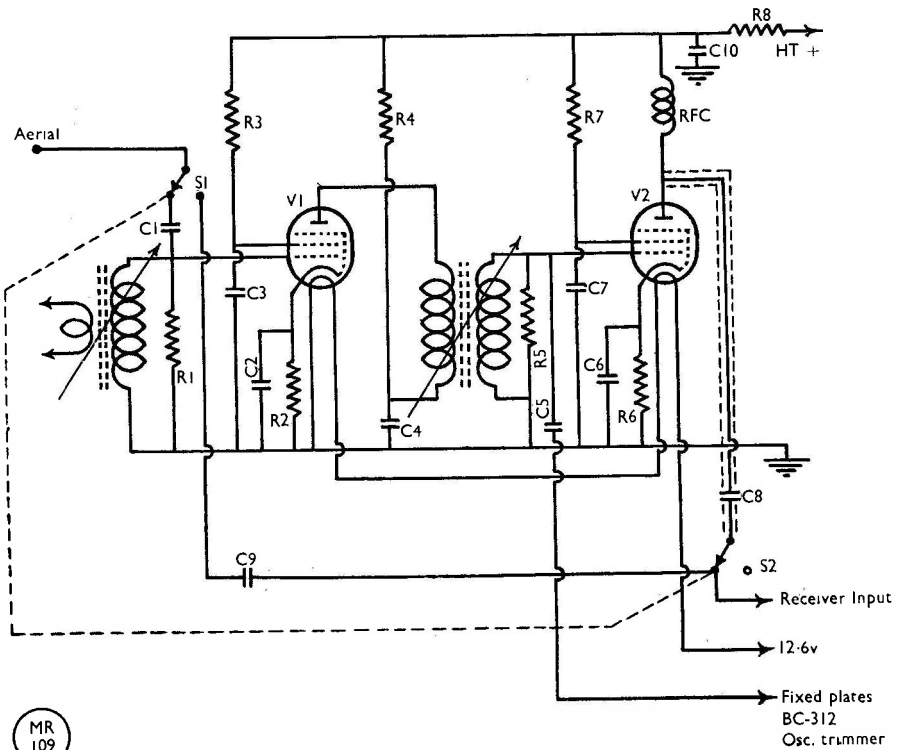


Fig. 3. Circuit of the converter designed by G3AAK to extend the tuning range of the BC-312 to the ten-metre band.

lights. About 150 volts HT is required for the convertor and the consumption is 20 mA, so this will enable the value of R8 to be calculated for the particular receiver HT supply available.

The type of aerial coupling used will depend, of course, on whether a balanced feeder or single-wire feeder is used. The coupling shown in Fig. 3 was found to be the best for the random length long-wire employed at G3AAK.

Conversion was completed in the writer's case by replacing the aerial trimmer from the BC-312 by a fixed condenser of 200  $\mu\text{F}$  and inserting in the vacant hole a 2-pole 2-way switch. The function of this is to change the aerial from convertor to main receiver and to connect or disconnect the convertor mixer output from the '312 input circuit. The '312 aerial terminal is thus retained in use for feeding either unit.

#### Trimming

With 10,000 ohm resistors across the grid coils, the gain was found to be substantially

linear over the range 28-30 mc. No tuning capacity was required, and the coils were peaked at midband by means of their dust-iron slugs.

#### Performance

This was found to be at least as good as the modified Type 26 convertor. Break-through from 14-15 mc signals is not at all serious, in spite of some strong locals operating in that region. However, a 14 mc wavetrap could, if necessary, be included in the convertor aerial circuit.

#### Conclusion

The foregoing remarks apply chiefly to the conversion of the BC-312 type of receiver, but obviously could be adapted to any receiver not already covering 28 mc. Neither is the principle restricted to Ten; any band of frequencies may be covered provided that the main receiver tunes to one-half of the desired frequency.

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## Crystal Controlled Calibrated Oscillator

### Design and Adjustment

By L. ATHERTON, Grad.I.E.E. (G3AND)

FOR many purposes it is useful to have a number of signals of accurately known frequency and good stability. For example, it may be required to calibrate a receiver, a variable frequency oscillator controlling a transmitter, or a signal generator. It is indeed a condition of the transmitting licence that if a VFO is used it shall always be checked with a crystal-controlled oscillator, and the apparatus now to be described is ideal for this purpose.

It consists of a stable crystal oscillator using cathode coupling, with the frequency very slightly adjustable by means of a pre-set variable condenser so that a frequency of 1 mc can be obtained. Following this stage is a Transatron oscillator with a natural frequency of about 100 kc. By injecting some of the 1 mc signal from the previous stage the Transatron can be made to lock with the crystal oscillator and so have the same high stability as the crystal stage.

A second Transatron with a natural fre-

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Another very useful practical article on frequency control and measurement. The author describes a unit which will produce beats of known accuracy at 10 kc separation over a wide frequency range.—Ed.

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quency of about 10 kc is locked to the 100kc-stage in the same way.

All these oscillators produce a large number of harmonics which are combined in a mixer stage and may then be injected into a receiver. With the BFO in operation a whistle will be heard every 10 kc throughout the range of the receiver, so permitting very accurate calibration to be carried out.

#### Circuit

The theoretical diagram is shown in Fig. 1. The crystal oscillator is a 6SJ7 with the screen, cathode and grid forming a cathode-coupled oscillator, the tapping point for the cathode being obtained by the condenser and resistance network C2, C3 and R3, R4. Condenser C2 is a "pre-set" ceramic or air-spaced variable which may be adjusted to give a small variation in frequency. This stage is left running at all times, output being taken from the anode via C5 to lock the following stage and via C4 to the grid of the mixer stage.

Screen and anode voltages are applied to the 100-kc stage through S1, when operation of this stage is required. The Transatron frequency is dependent on the time constant

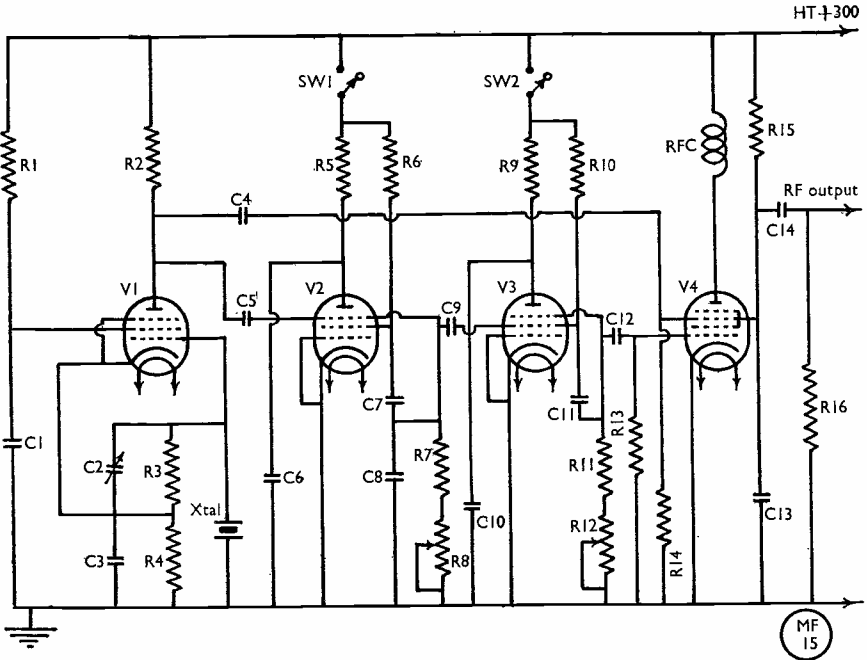


Fig. 1. Circuit of the unit designed by G3AND, all details of which are given in the text.

of C7 and R7 plus R8. In order to permit accurate adjustment R8 is variable with a screw-driver control. These components should be of good quality and all the resistances associated with the Transistrons must be generously rated to avoid undue rise of temperature, so permitting stable operation.

Output from the suppressor grid is taken via C5 and C4 to the grid of the mixer. C8 was found to improve the ease with which the Transistron locked in.

The second Transistron is similar, except that the time constant of C11 and R11 plus R12 is increased about ten times, while synchronisation is applied to the screen via C9 from the suppressor of the previous stage. C9 should be as small as possible consistent with adequate synchronisation and may well be made by twisting together two short pieces of insulated wire. Output is taken to the grid of the triode portion of the mixer valve; the anode of this stage can be left disconnected.

The anode circuit is just an RF choke, but if the receiver sensitivity is poor in the higher frequency ranges, it may be an advantage to substitute a tuned circuit resonant at the frequency at which calibration is required.

Table of Values

Fig. 1. Crystal Controlled Calibration Oscillator

C1, C13	= 0.1 $\mu$ F
C2	= 8/115 $\mu$ F ceramic or air-spaced trimmer
C3, C14	= 100 $\mu$ F mica
C4	= 10 $\mu$ F
C5	= 5 $\mu$ F
C6, C10	= 0.01 $\mu$ F
C7	= 200 $\mu$ F silver mica
C8	= 50 $\mu$ F silver mica
C9	= 2 $\mu$ F (see text)
C11	= 300 $\mu$ F silver mica
C12	= 5 $\mu$ F
R1	= 25,000 ohms
R2, R10, R15	= 56,000 ohms
R3, R13	= 500,000 ohms
R4	= 6,900 ohms
R5	= 70,000 ohms
R6	= 47,000 ohms
R7	= 10,000 ohms
R8	= 10,000 ohms potentiometer
R9	= 92,000 ohms
R11	= 100,000 ohms
R12, R26	= 20,000 ohms (R12 potentiometer)
R14	= 2 megohm
Crystal	= 1,000 kc
V1	= 6SJ7
V2, V3	= EF50
V4	= 6K8

Output to the receiver is by C14, and the resistance R16 helps to provide a constant load on V4.

### Construction

The layout employed is far from critical and no screening of the various stages was found necessary. It is probably most convenient to adopt an arrangement following the theoretical diagram. A suggested layout is shown in Fig. 2. There is no need to keep any of the leads very short and the various condensers and resistances are best mounted on a tag board.

The three pre-set controls can be arranged on the chassis close to the valves and this position is certainly best for C2, which is left set when once adjusted. Since it is possible to obtain dividing ratios other than 1 to 10 with the Transistrons, it may be thought better to mount the potentiometers R8 and R12 on the panel; the choice is purely that of the constructor. Likewise, the 10-kc stage may be dispensed with if such close calibration points are not required.

### Adjustment

It is first necessary to set up the crystal oscillator. The Transistrons should be switched off, and the output fed into a receiver tuned

to about 1 mc. The strong carrier from the crystal stage should be located and oscillation over the whole range of C2 checked. If possible one of the WWV standard transmissions on 5, 10, 15, 20, 25 or 30 mc should be located and with the receiver BFO off it should be possible to hear WWV beating with the appropriate crystal harmonic. C2 is adjusted to give as near as possible *zero* beat. The higher the WWV frequency used, the better is the accuracy obtainable, but even if zero beat is not obtained at say 30 mc an audible note will not mean that the crystal frequency is far out. (Care should be taken not to confuse the beat note with the audio modulation on the WWV signal.)

Next, remove the receiver aerial and retain the connection to the oscillator. Tune the receiver to, say, 2 mc and locate the crystal second harmonic and then the third harmonic at 3 mc. Check the range between these points for any outside carriers breaking through as confusion may arise during the next adjustment if these are not recognised.

Switch on the 100-kc stage and adjust R8 for a series of clear whistles in the receiver between 2 and 3 mc. There is no danger of mistaking an unsynchronised Transistron from one which is locked since the notes are quite distinctive; one is musical and the other just

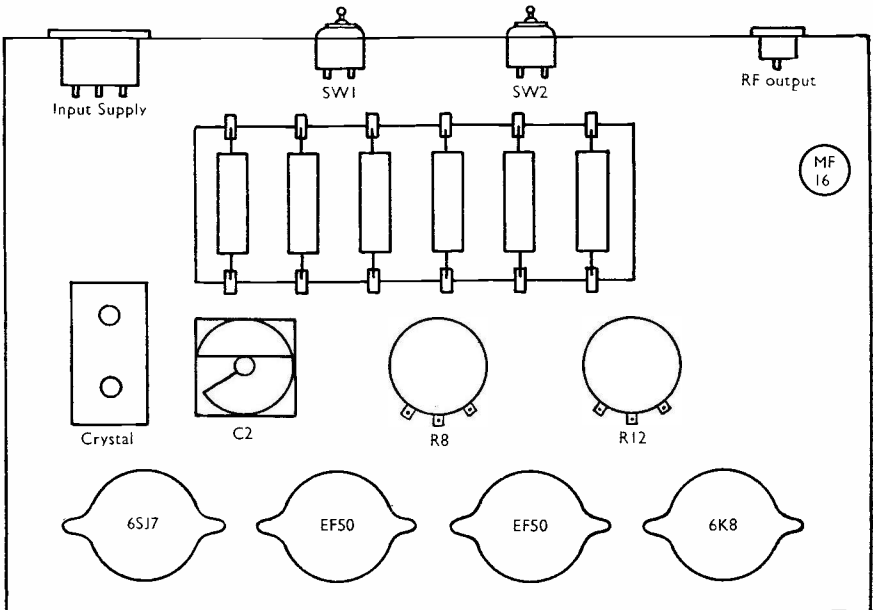


Fig. 2. Suggested layout, under chassis, for the Crystal-Controlled Calibrated Oscillator.

an unpleasant noise. The number of separate whistles between the 2- and 3-mc signals should be carefully counted and R8 adjusted until there are exactly nine. The setting of the potentiometer should be about the central point and considerable variation (about a quarter turn) should be permissible about this point before the Transatron becomes unlocked.

If the potentiometer is at or near maximum resistance, R7 should be increased, and if at the other end R7 should be decreased. This variation may arise due to the condensers and resistances being only 20 per cent tolerance.

It is best next to tune the receiver to the range 1200 to 1300 kc, as there seems little break-through from broadcast stations about these frequencies. The 1200- and 1300-kc points will be given by the 100-kc Transatron harmonics and the receiver should be tuned to one of these with the selectivity adjusted to be as high as possible and the RF gain well turned down.

Now switch on the 10-kc Transatron, leaving the 100-kc stage in operation, and adjust R8 so that there is no change in the note of the signal from the 100-kc stage as the 10-kc divider is switched on and off.

Adjust R12 for nine distinct signals between 1200 and 1300 kc and finally check the variation of R8 and R12 to be equal on either side of the finally adopted setting points.

Once set the unit should seldom if ever need readjustment, but a change of valve or some

circuit component might require resetting. The Transatrons will work with values of anode and screen resistances which depart considerably from the values given, but such changes will require experiment with R7 and R11 in order to maintain the correct dividing ratios.

#### Power Supply

The HT supply should be capable of giving 250 to 300 volts at about 50 mA, although the unit only takes about 25 mA. The regulation should be fairly good, otherwise the change in voltage as the various stages are switched on and off may upset the synchronisation. For this reason neon regulators will be found an advantage. If desired, the power supply may be incorporated with the unit.

#### XTAL XCHANGE

Insertions in this column are free, but are restricted to exchanges of crystals only—buy-or-sell notices can *not* be accepted. With the exception of 100-1000 kc bars, the fundamental frequency must be within one of the amateur communication bands or suitable for harmonic operation at VHF; 100-1000 kc bars should be of certified accuracy, and in the case of other crystals it should be stated whether calibration certificates accompany them. Notices headed "Xtal Xchange—Free Insertion" should be set out in the form shown below, and all negotiations must be conducted direct.

G2TG, 40 Netherburn Road, Sunderland, Co. Durham.

Has 3815 kc crystal in holder. Wants 7030 kc or near.

G3ESY, Devonia, Central Avenue, Hereford.

Has two ex-A.M. 7010 kc crystals, one  $\frac{1}{2}$ -in. pin spacing, one  $\frac{3}{4}$ -in. Wants crystals 7015-7045 kc,  $\frac{3}{4}$ -in. pin spacing.

G3FGT, 91 Scribers Lane, Hall Green, Birmingham, 28.

Has QCC Type P5 7056 kc, also 500 kc bar,  $\frac{3}{4}$ -in. pin spacing, no certificates. Wants frequencies in 1.7 mc band.

G3FGW, 170 Worsley Road, Winton, Eccles, Lancs.

Has Brookes 3557.1 kc crystal with certificate. Wants similar crystal 3510-3525 kc.

SWL, 76 Wendover Road, Eltham, London, S.E.9.

Has Brookes 3506.5 kc crystal, holdered, with certificate. Wants QCC type 7000-7010 kc.

SWL, 42 Cressing Road, Witham, Essex.

Has ex-BC221 1000 kc bar, octal holder. Wants frequency 3510-3590 kc,  $\frac{3}{4}$ -in. pin spacing.

#### ANYTHING FOR YOU?

Your call in this panel means that our QSL Bureau is holding card(s) for you, but we are without your postal address. Please send a large stamped addressed envelope, with name and call sign, to BCM/QSL, London, W.C.1, and the card(s) will be forwarded. And if you would like your name and address to appear in "New QTH's," and subsequently in the *Radio Amateur Call Book*, please mention that at the same time.

G2BFT, 2BKC, 2BVJ, 2CJO, 2DUS, 2HHJ, 2HIA, 2HOW, 3AA, 3AGV, 3AK, 3AMD, 3ATG, 3AYH, 3BC, 3BFN, 3BPX, 3CUP, 3CWB, 3DCM, 3DLS, 3DMF, 3DTD, 3EAE, 3ECO, 3EGA, 3ENM, 3EPA, 3EQG, 3EQO, 3EUI, 3EVM, 3FDK, 3FDS, 3FDV, 3NX, 3QH, 3WJ, 4IW, 5GP, 5RD, 6CP, 6RU, GD3GAB, GI2DTB, 3DQE, GM3CJN, 3CSO, 3DIF, GW2AXT, 2DG, 3DIZ.



# DX COMMENTARY

## CALLS HEARD, WORKED & QSL'd

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

It is our sad duty to record that the merry month of May has been far from merry, from the DX man's point of view. The first half of it, at any rate, was decidedly poor except for the odd flashes of good conditions on 28 mc, and the isolated item of interesting DX on 14. In general, the level has been well down, as the most cursory glance at last year's log shows.

Having been involved in a change of QTH, we have not been able to keep continuous observations going; and by the time our new set of rhombics was planted and growing and all the gear wired up, we awoke to the worst spell of 14 mc conditions encountered for years. This culminated in a burst of sporadic-E activity (around May 12), and since then things have been just dull. Let us hope that the end of the month shows a spectacular improvement.

### Top Band Again

Readers will remember the fine effort of G3PU (Weymouth), who worked cross-band with W4NNN, the W being on 3.5 mc and G3PU on 1.7. It is pleasing to record that the same pair have now reversed the process. On April 23, from 0515-0535, W4NNN went up from 3.5 to 1.7, on which band G3PU heard him at 349/459. Unfortunately conditions at the American end were not suitable for 'PU to try 1.7 mc as well, so he remained on 3.5. It's clearly only a matter of time before these two have a really good top-band QSO, and we shall be delighted to report it when they do.

### 3.5 mc DX

G8VB (London, W.5), who can be counted on to supply any 80-metre news that's going, has at last got up to his fifty countries on the band, adding FT4AS and CR4AA to his previous total. 'VB says he will only keep his offer of a pair of 813's open for one more month, because, as he himself has worked 50, it is obviously possible for others to do the same. So if you want a nice pair of 813's, just send your 50 cards for 3.5 mc contacts along to G8VB. . . . DX on Eighty has been fair on occasions, with bursts of S9 signals from

VO and VE, the best time being between 0400 and 0600.

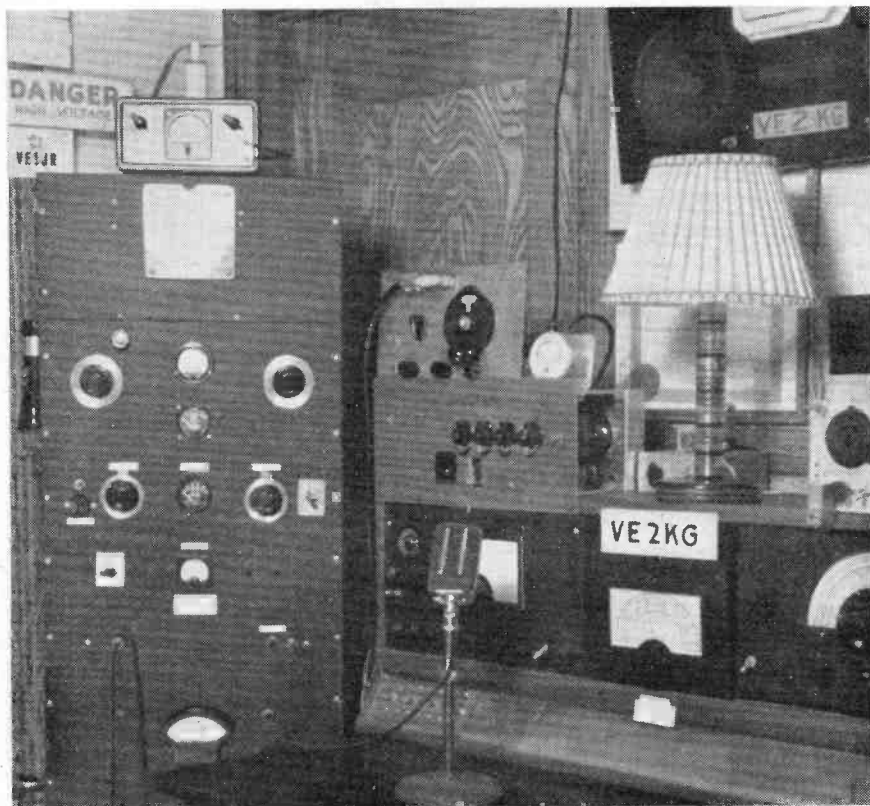
On another subject altogether, G8VB says that he does not like the behaviour of certain people around 3755 kc. This has become a channel for blind operators, and G5LK, G3UY, G2LG and GW3CYB are all crystal-controlled on this frequency. When QRO stations have jammed this channel and G8VB has asked them to give the QRP boys a break, he has met with considerable rudery. We suggest a glance over last month's Editorial.

### These Networks

This brings us to the subject of "nets" in general, on which we have received a lot of correspondence. The consensus of opinion seems to be this: "If eight or nine stations like to work on the same frequency, all well and good. It probably does save a bit of QRM round the band. But when these same gentry behave as if they have just bought the freehold rights of the said frequency, it's time they were told exactly where they alight. And if some unfortunate with one crystal happens to have been on the frequency before they started—or even if he happens to come up while they are at work—then they, and he, must put up with it. If they start telling him to get off the air, then they are outstepping their rights completely and deserve to have their party busted up by a flock of QRO stations (which has happened more than once)."

With all of which we heartily agree. And, becoming mistily sentimental, we reflect that in the "good old days" no one ever thought he had a frequency all to himself—even if VFO's were relatively unknown. We even remember grinding crystals to get clear of G5., and then landing on G6., and having to get out the carborundum again.

So let us say, with all the emphasis we can command, that if "nets" are going to introduce a new and nasty spirit into our hobby, for Pete's sake scrap them, and quickly. One last point: Is it our fancy, or do nets encourage people to stay on and keep nattering for ever, when they would otherwise have said



This is the outfit at VE2KG, Longueuil, Quebec, who runs 300 watts on Ten to a pair of 814's modulated by a pair of 807's in AB2. Receivers are BC-453 with the Q5'er modification, a home-built superhet, an R.1155 converted, and a British Q-Max unit, of which VE2KG speaks very highly, for 2-6-10 metre reception. Aerials are a 4-element beam (28 mc), centre-fed doublet (50 mc) and a 4-element vertical beam (144 mc). VE2KG is WAC on 28 mc phone

their piece and shut down? If they do, then they are not helping in the slightest to reduce QRM.

### Zone 23 Shows Up Again

In spite of the bad conditions, some patient searching around 14 mc has given quite a number of people their 40th Zone. C8FP has shown up from time to time, and has been worked by G2FSR (Chingford) and G2VD (Watford). 'FSR says he is T7 and can be heard around the band most evenings; 'VD quotes him as T7, on 14100 kc at 1800 GMT.

G2FSR put up a rotary folded dipole, which brought him in seventeen new countries. These included FO8AC, EA8MC, VP2AA, VP2KS, VP8AK, FF8GP, ZD8B, ZS7B and,

of course, C8FP. (We'll have to tear all our rhombics down and put up a rotary dipole now.) 'FSR also tells us that VK4SI/VR1 is looking for G's on 14350 kc at 0800 GMT. "AC4AA" was heard, but on phone at S8/9, obviously from Somewhere in Europe. We entirely agree with G2FSR's closing remarks: "The most difficult part of DX is *hearing* the stuff, and knowing when and where to look for it."

G5FA (London, N.11) added two new ones on 14 mc, with HZ1A and UP2AA, but he has not spent much time on the band. See "28 mc" for his main activities.

G3ATU (Sunderland) collected KS4AI (0630) for a new one, and also worked MP4BAD and the highly doubtful PX1AC.

## FOUR BAND DX

Station	Countries Worked					Power	Station	Countries Worked					Power
	28 mc	14 mc	7 mc	3-5 mc	Total			28 mc	14 mc	7 mc	3-5 mc	Total	
G6HL	131	145	80	29	173	150	G8IH	30	171	57	14	178	7/150
G6QB	115	159	67	32	182	150	G6BB	28	89	34	18	107	10/70
G3DO	96	146	37	19	176	150	G5GK	26	116	88	11	183	150
G2BJY	85	61	24	4	112	25	G3CBN	25	105	44	13	116	50/150
G6CB	81	21	5	1	89	20/130 Ph.	G2YS	25	102	23	21	113	100/150
G3ATU	79	155	60	26	163	150	G8VG	24	101	51	19	117	60/75
G2VD	77	158	42	26	163	150	G3AKU	21	129	45	29	137	30/70
[G2WW	76	155	31	21	165	60/150	G8LO	14	110	29	10	111	140
G8QX	67	101	18	12	124	150 Phone	G3EIZ	14	28	23	32	44	25
G4CP	64	178	45	3	178	150	GW3ECH	13	37	9	10	46	25
G8IP	62	110	34	13	127	3/150	G5WC	12	113	50	1	114	45
GC2CNC	61	134	55	14	163	10/50	G3BDQ	9	107	26	18	109	25/150
G8VB	59	119	44	50	140	120	G2HKU	7	81	32	1	89	4/25
G5FA	46	117	82	17	133	35/150	ON4JW	4	190	68	24	191	35/75
G8KU	42	116	23	1	126	120	G6BS	4	150	93	28	164	150
G3FNJ	42	92	26	19	107	150	G2DHV	4	71	20	18	74	25/60
G2VJ	41	66	12	4	85	25/150 Ph.	G3FGT	4	28	15	13	40	25
G6XL	35	105	41	15	127	35/100	G4QK	3	83	26	19	87	150
ZBIAR	35	72	37	29	87	25	GW3CBY	3	33	19	11	43	15/30
G2HIF	34	42	9	6	66	150 Phone	G3DOG	2	62	24	3	91	25/150
G2AVP	32	151	55	28	158	25,120	G8PG	1	28	28	11	40	1½/14

The second passed on the news that Bahrein Island is now coming under MP4, so delete VU7 from now on. There *is* a VU7 in Nepal, anyway.

## DX on 28 mc

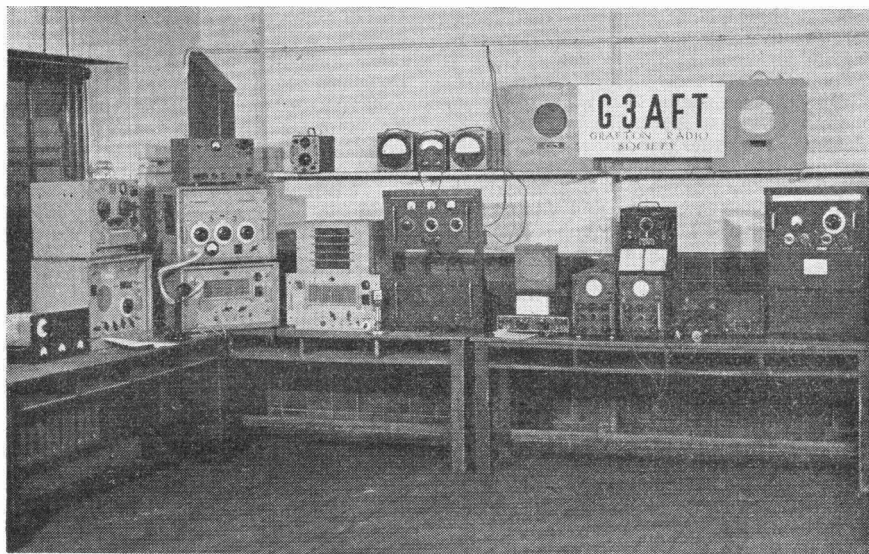
This queer band has been doing its stuff in patches all through the month, mostly on phone, as usual. During the sporadic-E activity many of the Four-Band hunters put up their 28 mc totals a lot by working Europeans who otherwise are very difficult to get hold of.

G3ATU (Sunderland) collected OZ, HB and DL4, but he also kept up the DX end by working, on phone, several KG6's, KR6's, ZP5BL (1730), VS1AX (1630) and VU2JP, who is interesting as being one of the few VU's in Southern India.

G5FA (London, N.11) added no fewer than

18 new ones and says his biggest thrill was a good QSO with TA3GVU; now he *knows* he has worked Turkey, after having collected long strings of TA pirates throughout the years! New DX for 'FA included CR4AC, CX1FB and PK4KS.

To G8KP (Wakefield) we owe a small apology for not crediting him, last month, with a phone contact with KL7KK. We couldn't have noticed that this was 28 mc, because, as such, it was a very unusual QSO. 'KP would like to know whether many others have worked or even *heard* Alaska on 10-metre phone. New ones, also in phone, were PK4DA, ZP5BL, CP5FA, DU1AK, HL1BO, VU7AF and ZDISW. Another interesting point is that G8KP worked ZL at 2330 GMT—long way round—so the band hasn't died on us yet, by a long way.



The fine array of equipment at G3AFT, the Grafton Radio Society.

**The 7 mc Band**

Except that G2BP (Chatham), with 10 watts, reports a contact with an aircraft signing MXRKL on the Berlin Air Lift, it seems that Forty must be in a bad way, because the only other references to the band concern the "Crazy Gang," to whom we alluded last month. Not having had the privilege of hearing these gentlemen operate, we have to base our opinion on letters received, and so far it isn't a very good one. G5FA says he heard them saying that they don't talk radio in case someone should steal their ideas and publish them (or, more probably, in case someone should take note of what they say and make allusion to *that*!). G8KP says "Never heard such piffle and rubbish—and this is the type of thing that the public remembers, when it hears it." Too true; we have heard many things over the air lately that might be in order on the telephone system, but are definitely unsuitable for "broadcasting." We get the impression that some of these phone operators—particularly those in nets—forget that their remarks are reaching anyone other than the person they are talking to.

On the other hand, it is fair to add that we have had a reasoned statement from an SWL writing from Lewes, Sussex, who says that some hundreds of listeners—some blind,

**ZONES WORKED LISTING  
POST WAR**

Station	Z.	C.	Station	Z.	C.
Phone and CW			Phone and CW		
ON4JW	40	191	G2YS	35	113
G6QB	40	182	G2BJY	35	112
G2FSR	40	179	ZB1AR	35	87
G4CP	40	178			
G8IH	40	178	G5WC	34	114
G3DO	40	176	G8PL	34	109
G2WW	40	165	G3BNE	34	92
G3ATU	40	164			
G2VD	40	163	G2FYT	33	100
G2AVP	40	158			
ZC1CL	40	136	G3ACC	31	102
G8IP	40	127	G4QK	31	87
VS2CH	39	153	Phone only		
G3AKU	39	137	G2ZB	39	160
G2AO	39	120			
G5MR	39	118	G2XK	38	126
G6PJ	39	87	G3DO	37	142
G8VB	38	140	G8QX	35	124
G5FA	38	133	G2ALN	35	120
G8KU	38	126			
			G6CB	32	89
G6FB	37	102	G2VJ	31	85
GC2CNC	36	163			
G3FNJ	36	107			
GM3CSM	36	107			
G6BB	36	107			

some in hospitals or sanatoria, and some permanently incapacitated—look forward eagerly to these so-called “Crazy Gang” transmissions; in fact, a private subscription scheme has been started to buy a receiver for one such listener to enable him to hear them! The SWL who writes thus also argues that the operators responsible do not break any of the rules of amateur procedure or behaviour.

While one has every sympathy with such a point of view, the fact remains that amateur licences are not granted for performances of this kind on the amateur bands; it is the function and prerogative of the BBC to provide entertainment for the general listener, and if the facts are as stated, it is clearly a matter for Post Office investigation. The vast majority of amateurs well know that this is the kind of thing, however innocent or well-intentioned, which brings Amateur Radio into disrepute, and lays all amateurs open to the charge of abusing their privileges.

#### News from Overseas

GM3ANO (aboard H.M.S. *Jamaica*) was hurriedly switched from the West Indies to Hong Kong (*via* Panama), so he has been in some very interesting DX parts on the way there. He was given permission to operate in the amateur bands, but this was withdrawn. He is hoping, however, that he will be able to resume in due course.

MD1A (ex-MO1A, ex-MD1A) tells us that the change-over to “MO” as a prefix was purely the result of a clerical error. MO1 was intended for commercial stations only, so he is now MD1A once again.

ZD3D (QTH in list) has opened up in Gambia, and runs 100 watts on 14080 kc. He will be looking for G's every third day between 1500 and 1930, and every third night from 2100 to 0600. (Sounds as if he works on a three-watch basis!) He says they are best between 1630 and 2200, and he would sooner have a good natter with a G than face the queue of short, sharp W QSO's.

Ex-VS2BO (QTH in list) is now VS1CS. His home call is G2ALJ.

ZL1MP (Tauranga) has changed his QTH (new one in list) and has bought eight acres of land for a combined citrus-fruit and rhombic farm. He is putting up a double Vee-beam with reflectors, aimed at G, and should have things ready by the end of the summer. David mentions that he has met G6YS in Auckland, and GW5OD is on the way out. His new location is on flat land, 150 ft. high, and overlooking the Pacific Ocean. From all this we deduce that we should be hearing quite a signal from ZL1MP next season.

OX3RG reports (*via* G2YK) that he has moved from Cape Adelaer to Prince Christian.

Lots of QSL's are outstanding, he knows, but he asks people to be patient, as he is out of stock until the new batch arrives from Denmark.

ZB1AR (Malta) didn't think much of last month for DX, but in his first year out there, with 25 watts of CW, he has worked 87 countries in 35 Zones; also 35 States, WAC and WBE. This month he reports hearing HB9EJ/VS on 7 mc, and working XOY4F on 28 mc. Also he says he has a card from W4BRB, who claims to have worked 24 Zones and 60 Countries on 3.5 mc—using a kilowatt!

A long and interesting letter from WØUOX (Redwood Falls, Minn.) covers all subjects under the sun, from Russian QSL's to ZD8B! Of the former, he says that he gets a good percentage back, and only lacks five out of the eighteen possibles. HZ1HZ he describes as a “good boy,” who sent his QSL direct by Air Mail. New ones recently worked out there have been ZS7B and ZS9D. The former was on 14090, T8. They, too, have heard of VK4SI/VR1, who would appear to be genuine. They also have the news that VQ2HC will be operating from ZD6, on 14030 and 28060 kc. WØUOX would dearly like a contact with ZD8B, but says he thinks he is mad at all W's—and not surprising, in view of the behaviour of the California Kilowatt gang every time ZD8B shows his nose on the band! 'UOX, by the way, has worked 172 countries, with 145 confirmed.

On the overseas theme, G3ERB (Whitby, Wirral) reports that he is going to W6 on a business trip and will be in San Francisco during the period August-December; he hopes to arrange schedules while there with stations in Birkenhead and Liverpool, and also promises us some G calls heard lists. If time permits, G3ERB would be prepared to forward reception reports to specific G stations who may be interested.

#### Miscellany

G3DOG (London, W.3) remarks that W7HTB, an old friend of his, badly wants to know the whereabouts of the former VS4GE. Can anyone help, please?

G3FNJ (London, N.W.6) relates one of those queer stories that live on all up from time to time. On May 9, 1948, he worked a station signing I6AO, who proved to be in Italian Somaliland, and, as such, was very welcome. It was I6AO's first QSO and, of course, a new country for 'FNJ, who was then operating SV1RX in Athens.

Then, this year, on May 8, 'FNJ winkled out a station signing MS4A. This proved to be the same chap, and it was his *first* QSO with



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**RADIO VALUES**  
*ever offered!*

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**UNREPEATABLE OFFER.**

Brand new electrolytic cans. T.C.C. 8x8x8 mfd, 400v working with high ripple section for rectifier. Four for 10/6. Buy four for the value of one. Size 4 1/8" by 1 1/8".

**ELECTROLYTIC CANS.**

Brand new.  
 16x8 mfd, 450v working 2/6 ea.  
 16 " " " 2/- ea.  
 32 " 350v " 1/6 ea.  
 500 " 15v " \*2/6 ea.  
 1000 " 15v " \*2/6 ea.

\*U.S.A. manufacture

**GREAT BARGAIN.** T.C.C.

Micropack Electrolytic cans. 25 mfd, 25v working. Three for 3/-.

**FAMOUS CARBON THROAT MICROPHONES**

with lead and two-pin midgeet plug. Type TS30, complete with neckband and instruction sheet. Brand new in box. 1/- each.

**OIL-FILLED CONDENSERS**

for T.V. .1 mfd, 4/6000v, 3/- ea. 2 mfd, 6000v, 6/- ea. .01 mfd, 2500v, 1/- ea.

Offer of the new "PYRANOL" condensers, brand new U.S.A., all with heavily insulated contacts. 4 mfd, 2000v, 6/- ea. 3 mfd, 2000v, 5/- ea. 4 mfd, 600v, 2/6 ea. 2 mfd, 600v, 2/- ea. .5 mfd, 500v, 1/6 ea. .5 plus .5 mfd, 500v, 1/6 ea. .05 mfd, 1000v, 1/- ea.

**FAMOUS ROTHERMEL CRYSTAL MICROPHONE,**

torpedo shaped with chromium grille. Listed at £18/18/-, we are able to offer at the astounding price of £3/8/6. Full details if required. Few only left.

**METEOROLOGICAL BALLOON,**

expands to 5 1/2' in diameter when inflated. Brand new in tins. Make splendid aerial balloons in conjunction with our 200' Flexible aerial, or excellent beach balls. Three for 10/6.

**VARIABLE CONDENSERS.**

Twin gang .0002, 2/6. Three gang .0003, 3/3. Twin gang .000025, 4/-. Twin gang .000019, 4/-.

**AERIAL COPPER WIRE.** 200'

on reels. Very flexible braided type. Brand new, ex U.S.A. 2/9 per reel.

**BOX ASSORTED SPARES**

for American A.B.K. set. Contains dynamo brushes, springs. Pye sockets, fuses, etc., etc. Brand new. 1/3 per box.

**PILOT'S COCKPIT LAMP HOLDER AND SHADE.**

Finished in black bakelite with bayonet lamp receptacle. Excellent for workshop lamps, etc. Brand new. Three for 2/6.

**AMERICAN HEADSET ADAPTOR,**

from high to low impedance or reverse. Brand new. Three for 2/6.

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Nine strand, .012 tinned copper, rubber covered semi-flat cab type type. List price 11d. per yard. Our price 12 yards for 3/6.

**RUBBER SQUARES**, size  $5'' \times 5''$ ,  $\frac{3}{8}''$  thick. Sorbo type. Very useful for mounting, door silencing, etc., etc. Six for 2/-.

#### FAST AND SLOW MOTION TUNING DIAL, 4" diameter.

Dial marked 0-100 engraved black on white with transparent pointer and vernier reduction 200 to 1 ratio. Complete with spindle. Brand new in cartons with wooden former. Worth 25/-, only 4/- each !!

#### MICROPHONE TRANSFORMER,

manufactured by R.C.A. Beautiful midget job, brand new. Size  $1\frac{1}{4}'' \times 1'' \times 1''$ . 2/6 each.

#### MICROPHONE HANDSET

with G.P.O. type carbon insert. Press to talk switch in handle. The whole contained in black bakelite moulded case. Brand new. Amazing value, only 2/6 ea.

#### HEADPHONES

made by S. G. Brown. 4000 ohms per pair. Brand new. 5/- pair. Headphones moving coil with handset included 47 ohms each part, 6/- set.

#### MAINS TRANSFORMER

for E.H.T. Made by R.C.A. 115v input. Output 250-0-250v at 150 mA, 5v 3A and 6.3v 4A. A pair in series with voltage doubler circuit will give 2000v and L.T. supply. Amazing bargain at this price. Pair pair, 30/- !!

**CORK MATS.**  $5\frac{1}{2}''$  diameter,  $\frac{1}{4}''$  thick. Twelve for 4/-.

**R.F. UNIT TYPE 24.** Easily converted to same frequency range as Type 25. No need to describe this three-valve unit which from us is Brand New in original carton. Save money and only pay 12/6 each.

#### AIRCRAFT COMPASS.

Floating in alcohol type for head mounting. Also contains excellent mirror on ball and socket joint. This part makes an excellent car mirror and is made to precision standards. The whole contained in nice wooden hinged box. 200 only now left. Great seller. Smash reduction. 9/- each !!

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Fractional h.p. Approx. 35 watts consumption from standard 230v A.C. mains. Complete with  $\frac{1}{2}''$  shaft by J" long and flex ready to plug in. Hundreds of uses, and already thousands sold. Approx. 5,000 r.p.m. and can be altered by use of 40-watt resistors to vary speed, in series. Rock-bottom price offered for remaining 2,000. NOW 12/6 each.

#### SOCKET AND JACK PLUG.

Two way. Brand new in carton. 1/6 each. Tele-Mic Cords,  $5\frac{1}{2}''$  long. Brand new. Six for 1/6.

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for Push Pull 6L6 Class A, 10 watts. Speaker matching 3 and 15 ohms. A "best seller." 12/6 each.

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Brand new. 1/- Press on, press off, Microphone switch, 1/-.

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**VIBRATOR PACK**, 6v, made by Masteradio. Output 200v at 60 mA. Fully smoothed and filtered (2,000 mfd). Non-synchronous vibrator, uses OZ4 rectifier. In handsome grey metal case, 9"×5"×6". 20/- only. Brand new.

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**NUTS AND BOLTS, U.S.A.** Nearly equivalent of 6 BA size. Brand new. No. 1, nickel-plated brass, ⅞" long, No. 2, oxidised brass, ⅞" long. Per gross complete, nuts and bolts, 2/6 either type. Very useful and high-grade spares.

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**LOUD SPEAKERS.** 3½" P.M., less transformer, 8/6. 5" P.M. Plessey with Tx, 10/6. 8" P.M. Truvox Monobolt, less Tx, 10/6. The above are all brand new and boxed. THESE ARE THE LOWEST PRICES EVER OFFERED.

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**FITTER'S 4" SQUARE.** Best steel precision make. In wooden box, new condition. 2/6 each.

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A new purchase of these spares enables us to offer you a rare bargain. The wooden case in which the goods are packed will make an excellent tool cabinet or large speaker baffle cabinet, and is beautifully finished in green, with American snap-on locking device with wooden section separators internally. Inside, the contents are packed in parcels and containers, and among other articles you will receive the following : Filament Transformers, Electrolytic condensers, Pyranol condensers, mica and paper condensers of all values. A large assortment of resistors from 100 watts to ½ watt, indicator lamps and bulbs, thermometers, chokes, switches including two- and three-bank with silver contacts, toggle and heavy duty on off switches, keying relays, coils, motor spares, insulators, springs, silver contacts, potentiometers, valve holders, modulation, input and output transformers, etc., etc. These spares were for high-class transmitting and receiver work, and are quite worth £20 per lot. We offer this astounding parcel of all Brand New Components for 70/- per case.

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his newly-acquired licence from the British authorities !

### Where the RF Goes

Referring to the queries from G3ETI last month, G4QK (Croydon) says that the answer to getting out on 14 mc is an RF ammeter. He puts half an amp. into the end of a two-wave aerial, end-fed from the shack. Incidentally 'QK says G3ETI is lucky to have some RF "up there"; he himself has to look down on the RF, as the trees at the bottom of the garden are only ten feet high.

### Russian Reports

Still from G4QK—he says the Russian QSL's have been coming through in fine form now, and the slanging-match can best be confined to their *notes* in future. On the other hand we have G6BS (Great Shelford) saying that he recently had a batch of 146 Russian cards—most of them no use at all. (We had about 25 this very morning, all of them reports on 14 mc transmissions which were generally getting to VK, ZL or W at the time.)

So G6BS asks if anyone would like a hundred or so on the basis of 25 for a 4  $\mu$ F condenser, 50 for a 6L6, 75 for a 7 mc crystal, 100 for a bug key, and so on. There certainly is a huge influx these days, and they are mostly useless (we write our frequent memos. to the Editor on ours, so he eventually fills his W.P.B. with them !).

### The Old Times

Last month there was a mention of a three-way with G2LZ, U1AAO and Z4AM in July 1926. Mr. H. R. Lodge (Wickford, Essex) has forwarded the actual QSL card from Z4AM confirming this contact. The interesting thing is that it shows it to have been on the 33-metre band—not 45, as we suspected. Certain British amateurs were licensed for "32 metres" for quite a few years, if you didn't know. Mr. Lodge says he has all G2LZ's QSL's, some of them much older. This one, from Z4AM, says that he was using 180 watts to an 85-ft. vertical aerial and a 45-ft. counterpoise; the valve was a "50-watt tube" in a Hartley circuit.

### Shorts

G3FGT (Birmingham) makes the Four-Band Table after being on the air for a month. Since then he has worked 40 countries and all W districts, plus KH6, OX, CX, PZ and JA. All this on a long wire just 9 ft. off the ground. And this not by any means with peak conditions to help him—nice work.

G6CB (Wimbledon) reports calling CQ on a dead band, when back came his old friend CE3BA, asking him to shift as he was QRM-

ing IIGX, with whom the CE was in contact ! This on 28 mc.

GC2AWT (Jersey) asks how many others got caught up in the Russian DX Contest? He stuck it for three hours and worked all USSR districts except two, plus a ship in the Arctic. UA ØKFD, queried last month, is, he says, in Providence Bay.

G2HKU (Sheerness) is another one to add to the Four Band Table. On 28 mc, with only 15 watts and a folded dipole 15 ft. high, he has raised FE8AB, VS9AL, PK5HL, CT3AB and lots of the usual stuff. Good ones on 14 mc were our old friend VE3BWW (ex-G6WY), MD7WE, HZ1KP and 1HZ, TF3ZM, MP4BAD and VQ5JTW.

### "G" Notes

G2HKU, along with others, reports that T7 and T8 notes from G's are now as common as those from UA, F, EA and so on. It's these imperfect VFO's that do it, and there is no doubt that our notes have fallen back several years. However, it's nearly always the man with a nice fist and T9x who gets through, even if he's a bit weaker than some of the rough customers, so maybe they will learn one day.

Speaking of super-DX, such as G2PL's 200 confirmed, 'HKU says he would be interested to know just how much time is spent on the air by the people at the top of the ladder. Just to find out whether time *is* the deciding factor in DX work ! We should say that quality has more to do with it than quantity. You can spend forty hours a week on the air and never work a new country, just by calling CQ all the time and never really scratching around. On the other end there *are* people who are rarely heard except when they are working a new one; they just sit, listen, and pounce ! Finding the new one the first time he shows his nose on the band is the easiest way of working him, but it certainly requires some patience.

G6AT (Hampton Hill) has reverted to the aerial system he used in 1927—optional full wave or two half-waves in phase. He has started working South America at last, as a result of this. Other 14 mc DX has include VS7AD, VK6KU, VS6BC, OX3WC, TF3ZM VS9AL, VS7CL and VP6SJ. 'AT adds that he runs weekly skeds on 3.5 mc with two G's, and that last time he was deliberately and badly QRM'd by someone swishing a VFO about. He wonders whether this is a sequel to his remarks about DX on 3.5 mc, which he thinks we misrepresented somewhat. (If we did we much regret it.)

G3ALI (home QTH Wembley Park) is on the M/V *British Baron*, and sends a list of 7 mc Calls Heard from three points in the Mediterranean. He says some of the G's put

very fine 7 mc signals into the Central Med. area, and singles out for mention G2CJY, G3BMY and G8PX.

King of the Four Band Table this month (which is in 28 mc order of precedence) is G6HL (Shepperton). This will be his last appearance for some time, as he sailed for VE3 on the *Empress of Canada* on May 17. We wish him good luck and good radio during his two or three years with the VE's.

#### "Confirmed" or Not ?

Discussion continues to rage on whether the totals of countries worked, which we quote in our various tables, should be merely "claimed" or "confirmed" totals. On the whole, opinion is not in favour of confirmations—somewhat

naturally, because all the totals would come down substantially !

G3AKU (St. Ives) puts the view of the majority when he says, "Whatever totals are put up, whether they are worked or confirmed, they all depend on the honesty of the sender." Too true ; it's perfectly easy for anyone to write to us with a total of 200 worked, and it's equally easy to write in and say you have 180 confirmed. But we don't cater for any of the queer freaks of the type who would be so crazy as to send in inflated totals for personal glorification. There aren't many of them, and they *very* soon get found out, for the volume of our mail is such that there tends to be an automatic cross-check on such matters as inflated DX claims.

#### Just One More Pirate

Latest victim of piracy is G3EQM (London, S.E.6), who has been receiving cards for transmissions that did not emanate from him. He has never worked on 7 mc and is at present QRT. So anyone working "G3EQM" between January 31 and July 15 worked a pirate and not the genuine article.

And that brings us to the end of this month's news. The deadline for next month will be first post on June 15, so please have everything in by then—claims, letters, moans and lists of new stations in Zone 23. Address them all to DX Commentary, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. And, until then, Good Hunting, and May You Hear All You Work !

#### DX QTH'S

<b>CP5FB</b>	via R.C.B., Casilla 15, Cochabamba, Bolivia.
<b>EA8MC</b>	Manuel Celanmor, 23 Sol-y-Ortega Street, La Laguna, Tenerife, Canary Islands.
<b>EK1DO</b>	B.P.O. Box 39, Tangier.
<b>HC1KW</b>	U.S. Military Attache, c/o U.S. Embassy, Quito.
<b>JA2CH</b>	APO 925, c/o PM, San Francisco, Calif.
<b>KR6AM</b>	APO 331, c/o PM, San Francisco.
<b>MS4A</b>	Fabrizio Caramelli, Alula, Italian Somaliland.
<b>VP2AJ</b>	APO 855, c/o PM, Miami, Fla., U.S.A.
<b>VP6CE</b>	Hillcrest, Navy Gardens, Christchurch, Barbados.
<b>VQ3KIF</b>	Box 599, Dar-es-Salaam, Tanganyika
<b>VQ4ZFW</b>	J. F. Waldegrave, P.O. Box 25, Kilindini, Kenya.
<b>VS1CS</b>	Lt.-Col. H. F. Trewby, R.E.M.E., 335 Thomson Road, Singapore, Malaya.
<b>VS7RF</b>	R. A. Farquharson, Agra Estate, Lindula, Ceylon.
<b>VU2DU</b>	Army HQ Signals Regt., New Delhi.
<b>W3ORD/C3</b>	P.O. Box 10, Navy 3930, c/o FPO, San Francisco.
<b>ZD1SW</b>	Box 99, Freetown, Sierra Leone.
<b>ZD3D</b>	R. G. Smith, c/o International Aeradio, Ltd., Fajara Rest Camp, Bathurst, Gambia.
<b>ZL1MP</b>	David Mitchell (ex-G2II, <i>GW6AA</i> ), Ohauti Settlement, near Tauranga, Bay of Plenty, North Island, N.Z.
<b>ZF5BL</b>	College International, Box 241, Asuncion, Paraguay.
<b>ZF9FA</b>	Box 716, Asuncion, Paraguay.
<b>ZS4F</b>	Box 124, Harrismith, Orange Free State, S. Africa.



"... Yes, the HT is on ..."

# Valves for the Buffer Stage

## Some Further Data

IN our issue for August, 1948, the *Short Wave Magazine* published an interesting and extremely useful article by J. B. Roscoe, M.A. (G4QK), on the choice of valves for the buffer stage.

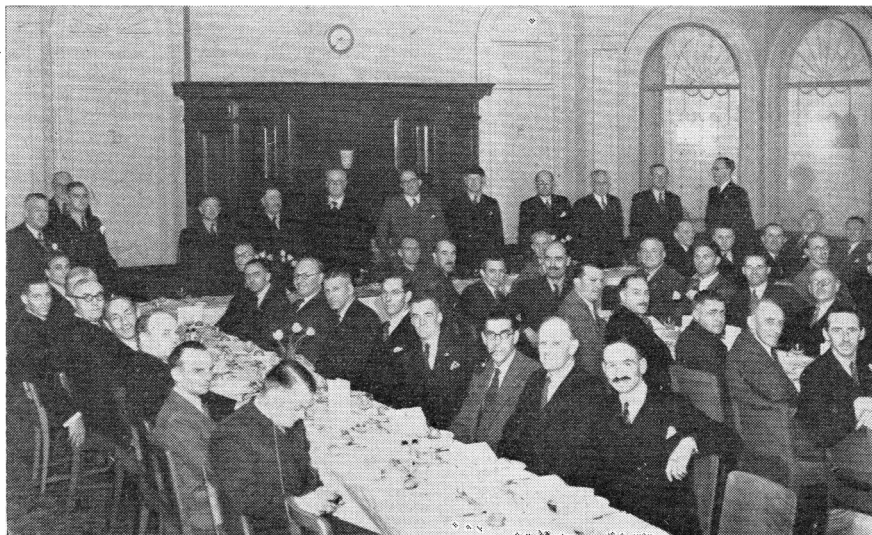
He showed that the types frequently em-

ployed for BA operation are wrongly chosen, without due regard to what the buffer stage itself is expected to do. A gain factor was worked out in respect of each type of valve normally obtainable and which could be used in this service, the data being shown in the form of a table in order of gain factor.

G4QK has now prepared a new list of valves arranged in the same order, which appears herewith. Useful newcomers include the 6F32 and the 61SPT, and though the list is rather long, as G4QK remarks, this only serves to emphasise the position of the 6L6G, 6V6G and 6F6G—right down at the bottom!

GAIN FACTORS OF VALVES USED IN BUFFER RF STAGES

Type	Gm mA/V	Cg-a $\mu$ F	Gain Factor	Wa min	Type	Gm mA/V	Cg-a $\mu$ F	Gain Factor	Wa min
6F32	3.0	.0005	6000	1.0	7B7	1.7	.005	340	2.1
7W7	5.8	.0025	2320	3.0	6AB7	5.0	.015	333	3.75
EF42	9.5	.005	1900	2.5	6K7	1.65	.005	330	2.75
6F13	9.0	.005	1800	2.0	6K7G7	1.65	.005	330	2.75
SP61	8.5	.005	1700	3.0	6S37	1.65	.005	330	2.5
6F12	7.5	.0045	1667	2.5	6S37GT	1.65	.005	330	2.5
6SH7	4.9	.003	1630	3.0	KTZ63	1.23	.0038	323.	.25
8D3	7.5	.005	1500	2.5	7AD7	9.5	.03	317	8.2
6AU6	5.2	.0035	1486	3.0	7L7	3.1	.01	310	1.1
7V7	5.8	.004	1450	3.0	KTW63	1.5	.005	300	1.9
HP6	7.5	.0054	1389	2.5	6J7	1.225	.005	245	.75
6SG7	4.0	.003	1333	3.0	6J7GT	1.225	.005	245	.75
6BH6	4.6	.0035	1314	1.8	6K7G	1.65	.007	236	2.75
6BA6	4.4	.0035	1257	3.0	6U7G	1.6	.007	229	2.05
Z77	7.5	.006	1250	2.5	6R6	1.49	.007	213	1.75
6SH7GT	4.9	.004	1180	3.0	6AG5	5.0	.025	200	2.0
KTW61	2.9	.0025	1160	2.5	7C7	1.3	.007	186	.5
W143	2.2	.002	1100	1.5	6AG7	11.0	.06	183	9.0
EF22	2.2	.002	1100	1.5	6AK7	11.0	.06	183	9.0
6BJ6	3.8	.0035	1086	3.0	8D4	1.8	.01	180	.75
6AM6	7.5	.007	1071	2.5	6W7	1.23	.007	176	.1
6SD7	3.6	.0035	1029	1.5	6AS6	3.5	.02	175	.6
7T7	4.9	.005	980	2.7	6J7G	1.225	.007	175	.75
EF91	7.65	.008	956	2.5	6AK5	5.1	.03	170	1.4
63SPT	6.5	.007	929	2.5	6AN5	8.0	.05	160	4.2
EF50	6.5	.007	929	3.0	61SPT	11.0	.08	137	16
6SV7	3.4	.004	850	1.8	6AJ5	2.75	.02	137	.5
7AG7	4.2	.005	840	1.5	EF36	1.8	.02	90	.75
EF39	12.2	.003	733	1.5	EF37	1.8	.02	90	.75
6SE7	3.4	.005	680	1.5	EF55	12.0	.15	80	10
VR116	4.0	.006	667	3.0	KT8	6.0	.12	50	25
7AH7	3.3	.005	660	1.7	807	6.0	.2	30	30
6F15	2.3	.0035	657	1.75	6AK6	2.3	.12	19	3.5
7G7	4.5	.007	643	1.5	6L6	6.1	.4	15	21
9D6	2.5	.004	625	2.5	7A5	6.1	.44	14.	5.0
EF92	2.5	.004	625	2.0	6V6	4.1	.3	13.7	8.0
6AC7	9.0	.015	600	3.02	6F6	2.5	.5	12.5	12.5
6AJ7	9.0	.015	600	3.0	6BC6	6.0	.5	12	20
6F11	2.2	.004	550	1.0	6AQ5	4.1	.35	11.7	8.0
W148	3.8	.007	543	2.3	6YGG	7.1	.7	10	12.5
6F14	10.6	.02	530	3.9	7C5	4.1	.4	10	12
7H7	3.5	.007	500	2.5	6AR6	5.4	.55	9.8	19
6BD6	2.0	.004	500	3.0	6AS5	5.6	.6	9.3	5.4
W81	2.8	.006	467	2.0	TT11	3.5	.4	8.7	7.5
6SS7	1.85	.004	462	2.25	EL91	2.6	.3	8.7	4.0
W77	2.5	.006	417	1.6	6LGG	6.0	.9	6.7	21
6SK7	2.0	.005	400	3.0	KT32	10.5	1.6	6.6	10
6SK7GT	2.0	.005	400	3.0	EL32	2.85	.5	5.7	7.5
7A7	2.0	.005	400	2.15	KT66	6.3	1.1	5.7	21.5
EF54	7.7	.02	385	3.0	6VGG	4.1	.7	5.5	8.0
6AH6	11.0	.03	367	3.0	6VGGT	4.1	.7	5.5	8.0
6F33	3.55	.01	355	1.15	6FGG	2.5	.5	5	12.5
6S7	1.75	.005	350	2.1	7B5	2.3	1.6	1.4	6.75



Some of the assembled company at the Old Timers' Dinner—unfortunately, it was not possible to get everybody present into this view.

## THE OLD TIMERS' DINNER

*London, May 20, 1949*

On the evening of Friday, May 20, a company of some 78 amateurs gathered in one of the spacious upstairs dinner rooms at the Horse Shoe Hotel, London, W.C.1. The occasion was the Old Timers' Dinner, run jointly by the *Short Wave Magazine* for the British Old Timers' Club, and the Rado Society of Great Britain.

Eligibility for attendance at the Dinner was membership of the B.O.T.C. or the holding of a full transmitting permit issued not later than December, 1928, with a current licence.

The chair on this memorable and, indeed, unique occasion was taken by Gerald Marcuse, G2NM—the Grand Old Man of Amateur Radio—supported by T. A. St. Johnston, G6UT (deputising for the President of the Radio Society of Great Britain, who was unable to remain for the dinner) and by Austin Forsyth, G6FO, Editor of the *Short Wave Magazine*. After the toast of The King and a tribute to the Silent Keys who have gone

before, the toast of the evening, "Amateur Radio," was proposed by C. Harris, VE6HM, the only overseas OT present; he had undertaken this responsibility at the shortest notice, and discharged it with great *aplomb*.

The response by the chairman was the hit of the evening—Gerry had brought with him "the archives," from which he was able to quote many remarkable facts and anecdotes, and some statements signed by official hands which at this distance of time are almost unbelievable. In particular, the terms of the complaint from the Japanese Government that signals from G2NM had been received within the boundaries of Nippon will long be remembered.

With G6CL acting as toastmaster, in the course of the evening a great many amusing (and very interesting) informal toasts were also called: Those who were licensed before 1914 (10 got up); those who had served in the 1914-18 war, to which 23 responded; those



The Old Timers' Dinner, held in London on May 20 last. At the top table, left to right : G6UT, G6CL, G2NM (Chairman), G6FO and VE6HM. The OT's present totalled 78.

who had operated on 1,000 metres—11 were present; those who had worked on 440 metres (42 responded); those who had served in the 1939-45 war, of which there were 53 present—and so on.

The dinner seating was broken up as early as possible in order to give everyone an opportunity of chatting to old friends and, in numerous instances, meeting for the first time friends made over the air many years ago but until that evening known only as call signs.

In response to a suggestion by the organisers, a number of those attending brought along some remarkable mementoes of the early days of Amateur Radio. These were separately displayed and included photographs and QSL cards of great historic interest and of immense value for the archives. This fine collection of equipment and personality photographs is of particular importance in this respect, and it is greatly to be hoped that it will be carefully preserved.

One would not care to be too specific on the point, but the age range of those present was probably not younger than 38 to over 60 years. The collective list of call signs included G2, G5 and G6, and one or two re-licensed G4's. It was a great pleasure to see so many not-very-

young amateurs still as keen as ever they were and, in most cases, still very active, collectively on all bands from 1.7 to 144 mc.

Not only had the gathering made much of the history of Amateur Radio in this country, but it also represented a good deal of the talent—and certainly it represented everything that is within the meaning of that all-embracing term "The Ham Spirit."

Finally, it is particularly gratifying to be able to record that more than half those present were members of the British Old Timers' Club, and in a sense the gathering was the first meeting of the B.O.T.C. The Club exists only to bring on record all British amateurs who, having been possessors of a full transmitting permit not less than 20 years ago, are still holders of a current licence (though not necessarily issued by the same authority or under the same call sign). That is the sole qualification, and membership costs nothing.

As the years roll on, more and more British amateurs, all over the world, will achieve 20-year status. It is hoped that they will make themselves known to us, join the British Old Timers' Club, and attend our gatherings.

**EDITORIAL NOTE:** Prints of the nine photographs taken at the Dinner can be obtained from F. Wise, 5 Victoria Street, London, S.W.1.

# Comparing Receiver Performance

## Practical Application of the Noise Generator

By W. J. CRAWLEY (G2IQ)

**A**MATEUR Radio would not be the same without its controversies. Most of us at some time or other have encountered some particularly useful circuit or piece of apparatus for the first time, have been delighted with the results using it, and thenceforth have been staunch advocates of its use. This is especially true of the VHF fraternity, who take their experimenting seriously. One such controversy among 144 mc workers is the *pro* and *con* of triode or pentode RF stages in the receiver; the adherents of each type discuss its merits with the vigour one used to find among "high-fidelity" enthusiasts years ago.

It will be agreed that the only way finally to test either type of RF stage is by suitable measuring apparatus. No one will deny that the ear is a fickle meter at best, and whilst it is possible to obtain some useful comparisons over long periods of listening, conditions on 144 mc are so variable and change so rapidly that absolute aural measurement is impossible. The difficulty is in finding some simple means of comparing the merits of each type of RF stage. It is a simple matter to compare the gain but we do not want to determine the gain so much as the gain over noise, or signal-to-noise ratio. Fortunately, there is now available a simple means of comparing the signal-to-noise ratio, or Noise Factor, of receivers in the piece of equipment known as the Noise Generator.

### The Noise Generator

The question of the sensitivity of VHF receivers has received much attention in recent years. Whilst the sensitivity of a receiver covering the lower frequencies can be defined solely in terms of the signal input required to produce an arbitrary output power, on the higher frequencies this does not tell the whole story, for thermal agitation noise in the input circuits plays a most important part. Therefore at VHF the overall gain of the receiver is of less importance than the noise threshold. For example, it is a comparatively simple matter to design a receiver at VHF to comply with the requirements of so many milliwatts output for so many microvolts input; the necessary gain could easily be achieved in the

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This article will be of great value to all in any way interested in amateur receiver design, particularly in the VHF field. The author shows how the noise factor—until recently hardly considered as a figure of merit in the specification—can be measured and comparisons made between different circuit arrangements.—Ed.

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IF amplifier or in the audio amplifier. But the receiver might be very insensitive to weak signals owing to the noise having been disregarded. Therefore the old method of defining the sensitivity of a receiver by its overall gain has been supplanted by a new method which in addition defines the *noise threshold*. Actually the two values of gain must be considered. There is the minimum gain required to amplify the receiver noise so that the output is perceptible above room noise; there is the arbitrary gain required to provide sufficient signal output.

### Noise Factor

The term Noise Factor is a figure of merit that compares the actual noise threshold of a receiver with that of a hypothetical perfect receiver of the same band-width. In other words, it is possible by measuring the Noise Factor of two receivers to compare their actual signal-to-noise ratio. The lower the Noise Factor the better is the receiver.

The measurement is a simple matter by means of a Noise Generator. This instrument, the essential circuiting of which is shown in Fig. 1, provides noise of adjustable power having a uniform frequency range over the receiver passband, and presenting the specified source impedance for which the receiver was designed. Whilst absolute measurements of Noise Factor require very careful design of the generator, in the amateur field fairly accurate readings may be obtained with quite simple apparatus, providing that certain points are observed; in any case, if there is a discrepancy in the absolute reading, the use of the generator for relative readings is not impaired.

#### Characteristics of A.1468 or CV172

Filament voltage	6 volts.
Average filament current	1 amp.
Max. filament voltage	7 volts.
Saturated anode current	30 mA.
Anode voltage	100/150 volts.

The requirements are that the noise diode has a high impedance in relation to the receiver input resistance and that the connections to the receiver be kept short. The coupling condenser must have zero impedance to the noise frequencies and the RF filter must present a high impedance to the diode at the

noise frequencies. The diode used by the writer is type CV172 made by Osram and now known as A1468. The short lead requirements are satisfied by making the generator in the form of a probe with the diode, RF filter and output components enclosed in a small aluminium box with coaxial output plug. The HT and LT supply is on a separate chassis.

#### Method of Measurement

When measuring the Noise Factor it is preferable that all the receiver noise sources be included. Usually, the signal-to-noise ratio is determined in the first stage of the receiver unless this stage has very low gain—hence, the output noise may be measured at any point beyond the first IF stage. For comparative measurements it is convenient and easy to measure the audio output. By controlling the current through the diode filament by means of a rheostat, the DC current through the diode is a direct reading of the noise power developed across the load resistor.

Two methods of determining the Noise Factor may be used. In the first the noise generator is connected to the receiver input terminals with the output from the generator at zero. The actual receiver output noise is then observed. An attenuator giving 3 dB attenuation in the receiver output is then inserted prior to the detector and the generator turned up until the original output noise is obtained. The diode current then indicates the added noise, which is equal to the original noise.

The second and simpler method of measuring the Noise Factor of the receiver is to turn up the receiver gain until a reading is obtained on the output meter, then to turn up the generator until the noise output of the receiver is doubled. The added noise is then equal to the receiver noise. The Noise Factor is calculated from the equation

$$NF = \frac{eI_{dc}R}{2kT}$$

where  $k$  is Boltzman's constant,  $T$  is temperature of the resistance (usually taken to be room temperature, degrees Kelvin 300 deg.) For comparing results this may be simplified into  $NF = 20 IR$ , or expressed in decibels:  $NF = 10 \log_{10} 20 IR$ .

For comparison purposes only it is not necessary to use the equation at all. The receiver which requires the least diode current to double its noise output is the better. Nothing could be simpler and we can be assured that this is a really accurate means of assessing the value of an RF stage.

#### Some Practical Comparisons

Some indication of the results observed by the writer with various receivers may be of

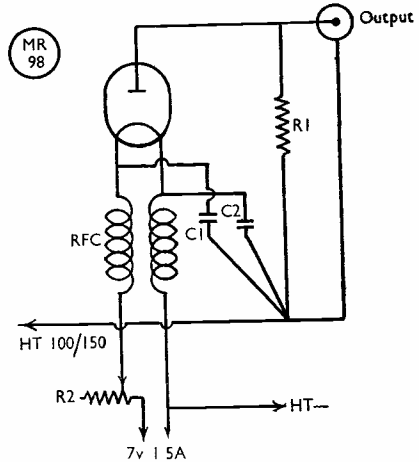


Fig. 1. Circuit of G2I0's Noise Generator.  $C_1$ ,  $C_2$  are .001  $\mu F$ ;  $R_1$ , 72 ohms, 1-watt carbon;  $R_2$ , 6-ohm rheostat; RFC consists of 20 in. of 22 SWG enamelled close wound on a  $\frac{1}{2}$ -in. former.

interest. Again it is stressed that the figures quoted are not claimed to be absolute readings, but may be taken as useful *figures of comparison*.

The Noise Generator was first used on several commercial communication receivers well known in amateur circles and measurements were taken at 28 mc where possible, but if the receiver did not go up to this frequency, 14 mc was used. The two best receivers tested showed figures of around 11 dB at 28 mc; this could be improved slightly by switching-in the crystal filter and thus narrowing the IF pass band. A very popular ex-Service receiver showed a Noise Factor of about 20 dB at 14 mc, whilst another with two RF stages had a similar figure at 28 mc. A home-made 30 mc converter working into a very selective IF/AF amplifier (*Short Wave Magazine*, August, 1947) gave a noise figure of around 6 dB only, and a similar set-up at G3MY was as low as 4 dB. The Noise Generator during these tests proved its worth for peaking up a receiver "on the nose." It is particularly useful to have at hand an instrument from which one can tell at a glance the value of any adjustment made to the receiver.

#### Results at 144 mc

After having quoted these rather high noise figures of lower frequency receivers, it may come as a surprise to some to see the results obtained at 145 mc. It should be pointed out, however, that the receivers used at 145 mc have



had every care and attention to keeping up their signal-to-noise ratio ; they are individual receivers, the particular pet of the constructor, and it is unlikely that such results could be repeated if an attempt were made to mass-produce them.

Several converters have been compared, all of them using a BC-454 at 7 mc as the IF/AF amplifier, with the BFO disconnected. The best results were obtained with a 3-valve converter recently described in the *Magazine*, using a 6J6 push-pull RF stage, a 6J6 push-push mixer and a 6J6 oscillator. By careful adjustment of the input circuit and by reducing the capacity across the grid coil to negligible proportions, a reading of 4 dB only has been achieved with this receiver. The nearest approach to this figure was from a converter using a CV66 (EC54) GGT RF stage into a 6AK5 mixer, giving a reading of 7 dB. The very best result that the writer has had with a pentode RF stage is from the 6AK5 which, with very careful adjustment, was reduced to 8 dB. A 6AK5 mixer with no RF stage had a Noise Factor way up in the 20 dB region ! When connected as a triode, however, the figure was lower. It is therefore recommended that when no RF stage is to be used the mixer be a triode and the gain be made up in the IF stages. When an RF stage of low noise figure is to be employed, the mixer may be either triode or pentode, as sufficient gain should be obtained in the RF

stage to over-ride mixer noise.

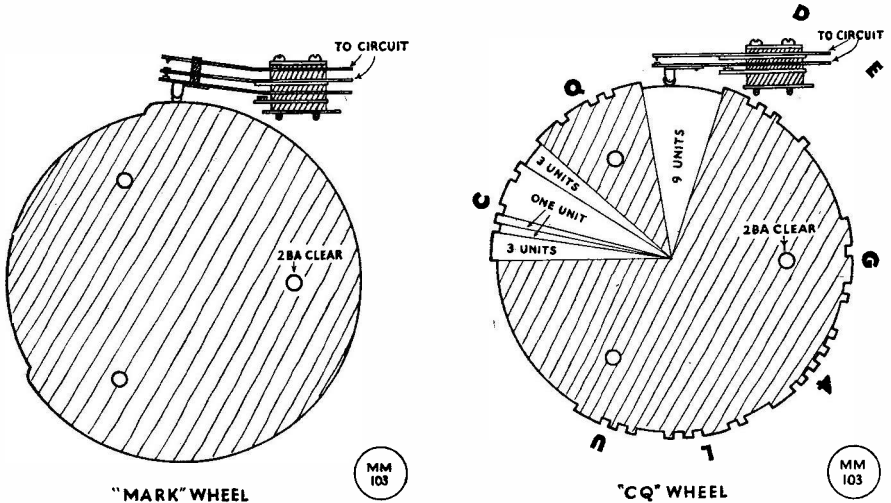
The Noise Generator is recommended to those who interest themselves in receivers as a means of easy comparison between types. No originality is claimed for the foregoing and those who wish to know more of the subject are referred to three excellent articles in *Wireless World* for December, 1946, and January, February, 1947.

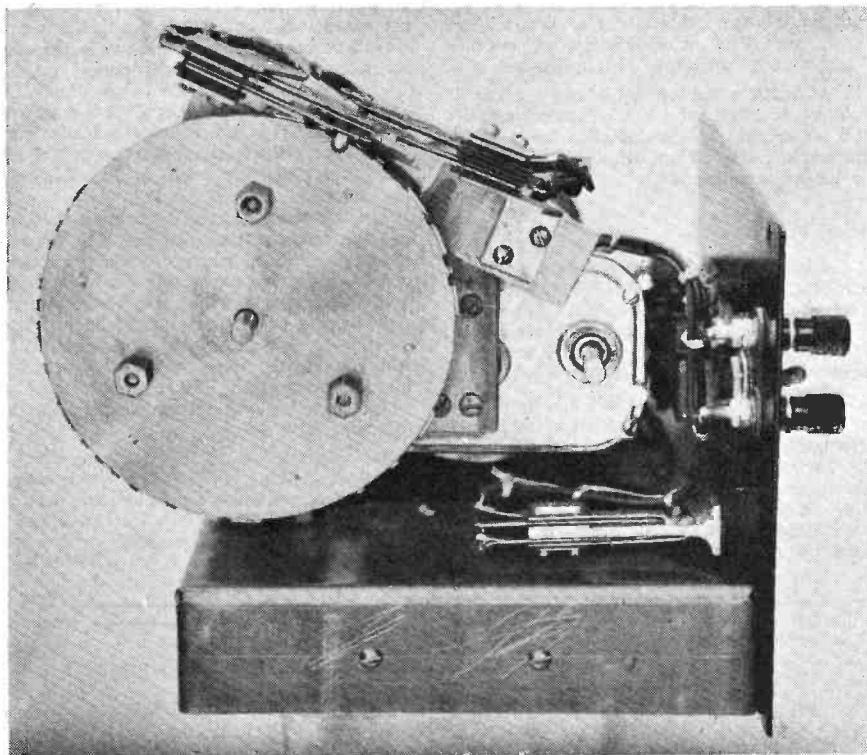
The A.1468 valve is probably the most suitable for the job, but any type with a pure tungsten filament may be used. It should be recognised that the frequency at which valve types can be employed is restricted by internal lead lengths, inter-electrode capacities and transit time. At the lower frequencies an old R valve has been successfully pressed into service.

CAN YOU EARTH IT ?

The recent spell of thundery weather is a reminder that at all amateur stations proper arrangements should be made to earth down the aerial system quickly and *safely*. And this does *not* mean fishing for the live feeder with a crocodile clip on a length of bare wire ! Any aerial which is longer than about half-wave on Eighty can pile up a paralysing charge very quickly, and shorter aerials will give a nasty kick. Since we are well into the static season, now is the time to fit a hefty earthing switch which will keep the aerial safe.

Fig. 1. Drawing details for the mechanism of the automatic key.



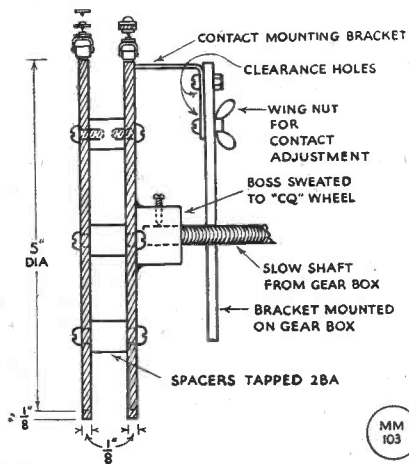


Side view of G4LU's automatic CQ key with the "Mark" wheel removed

## Auto CQ Sender

### Home-Built Mechanical Key

*Designed by G4LU*



The CQ call is a repetition signal and can therefore be sent on an automatic key. For years, the design of such keys has intrigued amateurs and the earliest types (which sent "Test de . . ." and not "CQ") nearly always involved some cunning work with a gramophone turntable; you just wound it up and let it play as long as the spring lasted. Here is an up-to-date version of the automatic key, not too difficult for those who can take a little care with the mechanical details.—Ed

**W**hen conditions are poor or activity is low on the VHF bands, the emission of a number of CQ calls is usually required before one obtains a "bite"—and especially if a directive aerial system is used much time may be spent before a QSO results. There is no doubt that it is factors of this kind, with

perhaps only two contacts at a session, which explain why VHF working is not so popular amongst some operators as it might be.

To overcome the manual-labour aspect of grinding out CQ's, the writer constructed the unit described in this article, and "key-thumper's cramp" from lengthy CQ calls is no longer experienced.

**Design Points**

The basis of the unit is the dynamotor and gear-box from a BC-966A IFF transmitter-receiver, but similar components from other IFF equipments would be equally suitable. The essential parts of the mechanical arrangement are shown in the main drawing, Fig. 1.

Two suitably shaped wheels are mounted on the slow shaft of the gear-box and are arranged to operate contacts associated with the keying circuit of the transmitter. One wheel, designated the "CQ Wheel," sends "CQ de call sign" and the other wheel, termed the "Mark Wheel" sends a "Steady mark de call sign." The latter facility is of

use when a distant receiver requires a signal for alignment purposes. The two wheels are so mounted that the mark period on the "Mark" wheel overlaps the CQ on the "CQ" wheel and the "de Call Sign" is common to both sides. The wheels can be made from brass or paxolin and the contact assemblies are the ones originally used in the BC-996A equipment.

The secret of success is accurate marking out and accurate cutting of the "CQ Wheel," although the final touches to the projections can be made by connecting the unit to an audio oscillator and listening to the signal. A swivelling adjustment should be provided on the contact associated with the "CQ" wheel so that the necessary amount of contact bias can be applied. The shaping of the CQ-wheel is carried out in accordance with the following table :-

Dot . . . . .	One unit
Dash . . . . .	Three units
Spacing between elements of a letter . . . . .	One unit
Spacing between letters . . . . .	Three units
Spacing between words or groups of characters . . . . .	Nine units

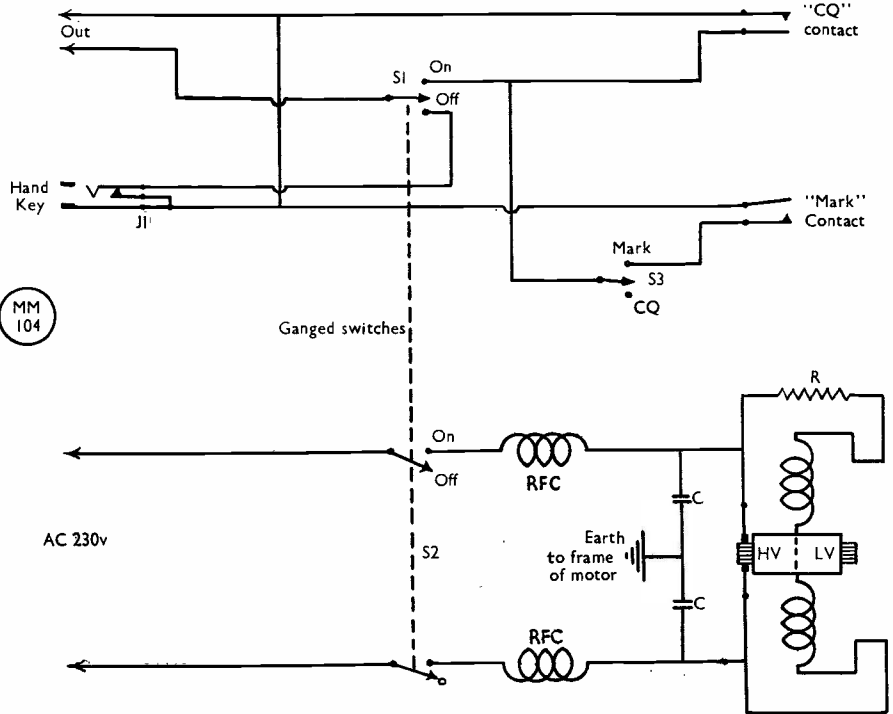
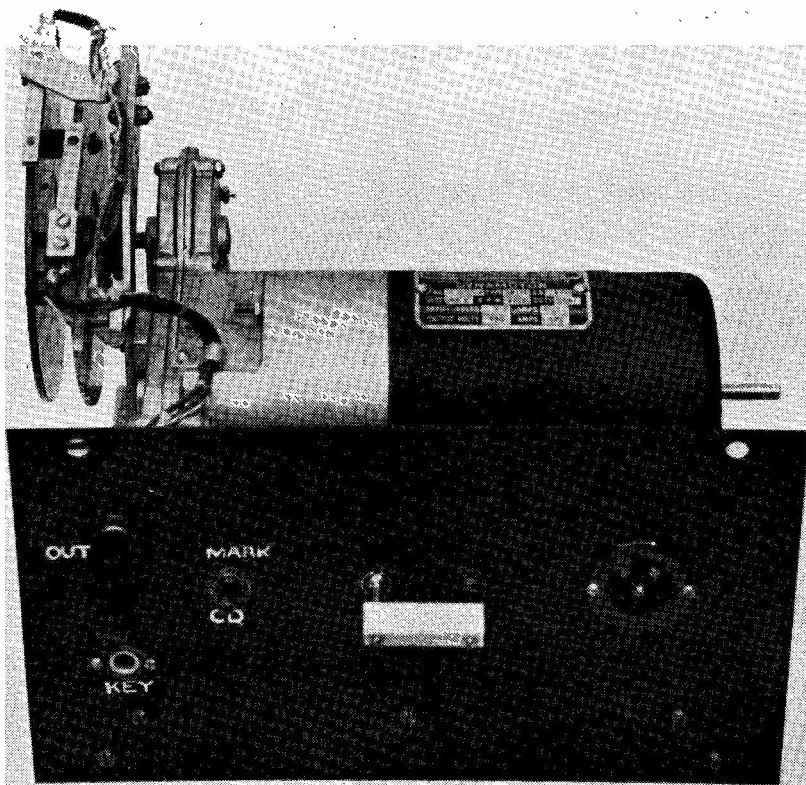


Fig. 2. Circuit connections, which can of course be varied to individual requirements. C, 0.5/0.5 μF, 600v; RFC RF chokes; R, 1,000 ohms 80 watts; S1, S2, S3, QMB switches; J, close circuit jack.

MM 104



Front view of the auto sender as constructed by G4LU. The ganged switches are for drive motor and change-over control

To facilitate the marking out it is suggested that the characters be first drafted on squared paper and the total number of units counted up. The circumferential length per unit can then be calculated and the wheel marked out accordingly.

#### Connections

The electrical arrangement of the contacts is shown in Fig. 2. S1, which is ganged with S2, the motor supply switch, changes the transmitter keying circuit from the hand key to the auto-sender. S3 changes over the circuit from the "Mark" and "CQ" signals respectively. Slight modifications to the

dynamotor are necessary to get it working effectively from an AC supply. The field winding is connected across the low-voltage armature, but this should be disconnected by the removal of the low-voltage brushes. The field is connected in series with a resistance directly across the supply line, the value of the resistance being chosen as a compromise between maximum torque, suitable speed and heating of the field winding.

Some suppression of the motor circuit was necessary to prevent interference with receivers. The chokes are of a transmitting type and the condenser is a dual "bath-tub" block. To reduce mechanical noise the motor can be supported on small "Silentbloc" mountings

# VHF BANDS

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

*Operating Procedure—  
Band Plan Comment—  
Improved Conditions—  
Seventy-Centimetre Activity*

THIS month we are beginning with a grumble section for which no apologies are made !

Continuing the discourse on the peculiarities of 2-metre working, started last time, it is becoming very evident that an amazingly large number of DX calls are being missed. From all parts of the country letters come in telling us in no uncertain way what inefficient (or words to that effect !) receivers there are in all other DX locations. The complaints of the Londoners of the number of Lancashire and Yorkshire stations they have called in vain is only equalled by the grumbles of those same Lancastrians and Yorkists regarding the failure of the London fellows to reply to their calls. Do one-way conditions really occur? Or does QSB always set in at the wrong moment?

Or is it bad handling of the receiver? One hates to make this last suggestion, but it would seem to be at least part of the answer. To give an example: Some evenings not long since, we hung on to an S4 signal from a DX station for 5 minutes (!) while he called CQ. We called him for just under two minutes, and on changing over—there he was already calling CQ again. A rapid look round the band found two other local stations still calling him! Now we contend that the band could not have been searched for weak signals in the time allowed between those two CQ calls; the probable reason why none of the calling stations was heard was that the operating technique at the DX station was at fault, and *not* the receiver. This is not a solitary instance, and others have reported similar instances. So we would suggest to everyone that careful searching is of paramount importance.

While writing in this somewhat critical vein, we would quote G3DAH (Herne Bay), who has

noticed that CQ calls are unnecessarily long; that CW is generally much too slow, so that QSB gets the signals before the QSO is half over; and that poor notes and drift still get T9 reports. We endorse G3DAH's first and third complaint, but think his second one may be open to argument. The sending speed should be adapted to conditions and, of course, the operator at the other end. When QSB is fairly slow, a fast speed is undoubtedly the best, but sometimes rapid and even fluttery QSB is encountered and then fast CW, however well sent, becomes unreadable. Sending double is only justified if the operator at the other end can't read Morse, or if QRM is bad. When QSB is slow, double sending halves the copy obtained during the readable periods and does little to help when the signal is in the noise, while with very rapid QSB slow sending is a better answer. G3DAH also raises the point that operators in QSO usually finish each transmission with c/s—AR-2-K. This is the same ending used when they call CQ and he suggests that to prevent confusion the figure 2 should only be included when the call was a CQ. It is an interesting point that we still use the wavelength figure in signing on two metres, as we did on ten and five. On those two bands there was good reason for

## TWO METRES COUNTIES WORKED LIST Starting Figure, 14 From Fixed QTH only

Worked	Station
29	G3BLP (107)
26	G2ADZ, G5MA
25	G2AJ (101), G2AXG, G5BM, G6NB (101)
23	G2CIW, G2IQ, G2MR (110), G2NH (122), G3APY, G4LU
22	G5MI (108)
20	G2NM, G5NF
19	G5RP
18	G3COJ, G5BY, G6PG
17	G2XC, G3EHY
16	G8SM
15	G2FLC, G3DAH, G8QX
14	G2OI, G3DMU, G6LK

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

doing so as they were in close harmonic relationship with other more populated bands and, particularly in the early days, there were more harmonics than fundamentals and the wavelength figure was necessary to check that it really was a 10 or 5 metre transmission. Now it seems to have become just a tradition—far be it from us to decry it.

### The Two-Metre Frequency Plan

A number of comments on G3CYY's "Plan for Easier Searching" (*Short Wave Magazine*, May 1949, p. 205) have been received, but many more must come in before we can say that we have any guarantee that the majority of VHF operators are in agreement, and what is more, will comply with the plan. We had the chance of discussing it at the Oxford VHF meeting and, of all the opinions heard, only one has been *contra*. However, the apathy of the many who have not expressed an opinion could well ruin the scheme. We have no intention of trying to be dictatorial about this, and any such plan will only be launched if we are assured that it is the wish of the vast majority of VHF operators.

Most important and widespread criticism of the scheme as it stands is the insufficient allocation to the London area. G3CYY, himself located in Newcastle, could not know what a large number of two-metre stations there are in London. (Truth to tell, we can hardly believe it ourselves. But perhaps it is that Rx of ours!); 200 kc is considered inadequate for nearly 100 stations! So we have drawn up another allocation for your consideration and at the same time tried to keep the general idea of G3CYY's excellent and carefully thought out scheme in mind. This would give the London area (J) 400 kc and at the same time we would suggest that stations on the border of any area might be allowed to use frequencies allocated to the next zone if they feel it would be advantageous. For example, the West Sussex stations in and around Chichester would more sensibly be in Zone H and so might the South-West Surrey stations in the Farnham area, while some of the Middlesex stations on its northern edge could use Zone G without over-populating it. Common sense must be the deciding factor in such cases.

Several correspondents have pointed out that the Continentals use the LF section of the band and that our South-Eastern zones ought, therefore, to coincide. It is thought, however, that it might well be advisable to keep the crowded London zone free of Continentals, so we have refrained from shifting Zone J to the extreme LF end, as has been suggested. With the foreign DX using the same frequencies as Zones A, B and C, there should be little chance of QRM.

## TWO METRE ACTIVITY BY COUNTIES *The North*

<b>Cumberland</b>	G3ACY, G3BW
<b>Lancashire</b>	G2OI, G3BY, G3CWJ, G3DA, G3ZM, G5CP, G6LC
<b>Leicester</b>	G3BKO
<b>Lincs.</b>	G5BD
<b>Norfolk</b>	G2XS, G3VM, G5UD
<b>Northants.</b>	G3BBA, G3DUP
<b>Notts.</b>	G3APY
<b>Salop.</b>	G2ADZ, G4LU
<b>Staffs.</b>	G3EEZ, G8KL
<b>Warwick.</b>	G2ATK, G2AVO, G3ABA, G3DJQ, G5JU, G5LJ, G5ML, G8MZ, G8QK, G8QY
<b>Yorks.</b>	G2IQ, G2MA, G2TK, G3ALD, G3ALY, G3CC, G3CUI, G5GX, G6OS, G6YO
<b>Scotland</b>	GM2DI, GM3BDA, GM3EDQ, GM3OL, GM5VG, GM6LS, GM6SR
<b>Northern Ireland</b>	GI2HML
<b>North Wales</b>	GW3ELM, GW5UO
<i>Southern Counties Next Month</i>	

The crystal problem may be worrying some, but the *Magazine* "Xtal Xchange" section is available to all who may care to use it. Alternatively, a special crystal exchange arrangement can be organised through "VHF Bands" if it is required. In addition, one of the crystal manufacturers, not unknown to the VHF fraternity, has offered to help out if the scheme is adopted.

If you think this plan is good, or bad, please let us know this month, and better still, find out from all your local VHF operators whether they will co-operate or not. Let us have their calls and opinions. Then we shall know what the wishes of the majority are and can act accordingly. And if you have not already done so, read up the scheme again in last month's issue of the *Magazine*.

### Station News

G2NH (New Malden) has maintained a daily schedule with G2CPL (Lowestoft) with

only one miss during the month, while an early afternoon series with G3EHY (Banwell) has been made 100 per cent. The latter is busy with a new 5-ele. c.s. beam which is to go up to 40 feet, but his 6-ele. at 16 feet does remarkably well. He remarks that on May 11, at midday, with weather very hot, sun shining and haze over sea and hills, G2NH was S9 on 'phone. In just six weeks, G3EHY has had over 180 contacts, most of them DX. Also active in the West is G4GR (Newport, Mon.) on 145-656 mc with a 6-ele. beam and 25 watts.

G5BM (Cheltenham), who found conditions fairly good during the past few weeks, heard or worked GDY on 22 out of the 28 days he was active. GM3OL (Dumfries) was raised 17 times during the period, and heard faintly on other occasions. G5BM claims the first G/GW contact, as he worked GW5SA on January 6. Any prior claims? G3YH (Bristol) has been hearing G2NH almost nightly.

G4LU (Oswestry) found April 12 to be an outstandingly good night for working London. G3BLP (Selsdon, Surrey) is a regular signal with him and has been heard at well over S9. He cannot, however, hear GM3OL and wants a few "block-busters" dropped on the nearby hills. G4LU says G3ATZ (Chester) should be active soon. G2ADZ (Oswestry) has been endeavouring to work G2XC, and although signals have been heard at both ends, on several occasions, contact has not been made. He suggests a Two-Metre Contest. (This is a point on which we should like opinions.) The greatest thrill of the month for G2ADZ was working GM3OL on May 10, and hearing another GM3 on May 9. The latter was trying to get into the G5BM/GM3OL QSO and not doing it, while G2ADZ was trying to get the GM3 and not achieving that. The occasional colossal disparity of reports, in and out, is another point on which G2ADZ comments.

G2OI (Manchester), who gives April 17, 19 and May 9 as peak days with him, would like to see the country divided into equal zones, to be used instead of counties as the yardstick for station performance. As he says, a station in the Midlands has 25 counties within a 100-mile radius, while in Manchester the 100-mile circle gives only 9 counties, with many of them void of 2-metre activity. We should be very glad to be able to devise a scheme fair for all, but even with zones, half the circle for coastal stations is over the sea; the problem is further complicated by the hilltop QTH's of some people, giving them a good start whatever county they are in. It was for that reason we started the "Two-Metre DX Working" Table on a mileage basis, and when the next spell of conditions for the Continent comes along we think the advantage will lie with the Northern stations.

Another centre of activity in Lancashire is Nelson, where G3CWX (145.8) and G3ZM (145.26) are on. The former is using a modified ZB2 into a 640 for Rx, and 20 watts to 832 in on the Tx. The converter at G3ZM is EF54-EF54-EC52 into RME69; Tx again has an 832 final. Both stations use 3-element beams. G2AUA, G3CZP (Preston), G2IN (Southport) and G6MI (Blackpool) are also reported active. G6LC (Warrington) has worked GM3OL; he is using two RF stages in his converter and an EAC91 mixer-oscillator. Like others, he also is finding some of these mysterious one-way paths.

In Yorkshire, G3DSA (York), in company with G2BLS, looks for GDY around 2000 nightly, and has heard G6VX. The G3DSA converter is CV66 RF, diode mixer, EF50 osc. into a 640, with an SCR22 as Tx. Other news from the district is that the Hull group is active again and now includes G2FZX, G3ALD, G3ALY, G3CC, G3CUJ and G6OS, while G5GX has moved to Leven, about 15 miles north of Hull. G3COJ worked GM2OL on April 17 as well as G4LX and G8AO.

G3BKQ (Leicester), after a period of some weeks with one watt input, has now an 829 PA running and has been working some of the DX. His Rx is a modified P38, using an IF of 30 mc into an AR88; a 5-ele. beam completes the line up.

In Coventry, G3ABA has a new CC converter with 6J6 RF and 6J6 mixer. We know it works well as he has heard G2XC! G8QK is active in Kenilworth with a SCR522 Tx and 6-ele. beam. G3ABA says we got him wrong, and that all those Coventry stations we listed two months ago were not active but just preparing! Our apologies to both G3ABA and G8KL, whom we misled.

An aerial height of 6 feet is probably the chief reason why G3VM (Norwich) is not yet

### Frequency Areas on Two Metres

#### REVISED ALLOCATION

Zones A and B	144.0 to 144.2	mc
Zone C	144.2 to 144.4	mc
Zone D	145.8 to 146.0	mc
Zone E	144.4 to 144.6	mc
Zone F	145.65 to 145.8	mc
Zone G	144.6 to 144.8	mc
Zone H	145.2 to 145.5	mc
Zone I	145.5 to 145.65	mc
Zone J	144.8 to 145.2	mc

For descriptions of Zones see *Short Wave Magazine*, May, 1949, pp. 205-6. For new proposals see this month's "VHF Bands."



The group at the Oxford VHF meeting on April 23 last, at the Roebuck Hotel. This was another highly successful Fiveband Club occasion, organised by G5RP (left, first row standing) our representative for that area.

working the DX, although he has raised G3CFK in Great Yarmouth. The aerial in question is a 5-ele. beam and is scheduled to go up on a 35-foot tower in the very near future. G3VM is there 1930 to 2200 daily at NGR 63/182101. His Rx is 1132A and Tx SCR522.

G2CIW (Brentwood) has a new converter, running 9003 CO, 9003 quadrupler, 9003 quadrupler into 6J6 mixer, with 6J6 cathode coupled RF stage. G3WS (Gidea Park) has two EF91 RF stages, and a 6J6 mixer-osc. with output on 10.5 mc into an HRO. G5MI (Wimbledon) was operating from Ipswich with his JA call early in May and had some interesting contacts, using only 4 watts. G6WT (Torquay) in addition to his 24-ele. beam, has a 4-ele. rotary and is building a Sterba barrage array—so should be able to work the stuff!

We have a query from a reader in Letchworth asking for information on A.M. Oscillator Type 12A. If anyone can help we should be pleased to pass on the information. The Tx at G3DAH (Herne Bay) is 6J6, tripling and doubling to 48 mc from a 8 mc crystal, 6J6 P/P buffer amplifier at 48 mc, and 832 tripler driving an 829B in the final. The beam, up at 45 feet, is of the 4-ele. w.s. type. A crystal convertor does service on the Rx side. G3DAH has had a number of over-200-mile

contacts, but cannot raise G3EHY whom he hears quite well.

G3EJL (Southampton) receives a number of London stations but so far calls them in vain. He is using 24 watts to 832 PA on 144.72 mc, and a 3-ele. beam 20 feet up. His neighbour G3RI has a new Rx with two 6AK5 stages for RF and another as mixer and finds his meter readings four to five S points higher than before.

#### Seventy Centimetres

Activity on the 420-460 mc band appears to be on the increase and some very good results have been achieved. On the South Coast G3EJL (Southampton) and G3LV (Southsea)

#### Two Metre DX Working

Worked	Station
Over 350 miles	G2IQ, G5BY
300 to 350 miles	G2ADZ, G2BMZ, G2MA, G3DMU, G4LU, G6WT
250 to 300 miles	G2XC, G6OS, G8DM
200 to 250 miles	G2AJ, G2CIW, G2OI, G3DAH, G3DEP, G5BM, G5MQ, G5RP, G5TZ, G6DH, G6PG, G6ZQ, GM3OL



## 70 Cm. ACTIVITY LIST

## Birmingham

G3EMY, G3LNL, G5JU, G8JI

## Luton

G3CGQ

## London

G2FKZ, G2WS, G3BDV, G3BOB, G3CU,  
G3DSV, G3FZL, G5PY, G6HD

## Portsmouth

G3LV

## Southampton

G3EJL

## Southwick, Sussex

G3BEX

have made contact over an 18-mile path. Initial tests were one way only, Southampton to Portsmouth, and when the first signal from G3EJL was heard by G3LV on April 26, the 4-ele. beam was being held out of the bedroom window at the Southampton end, height being about 15 feet and it was firing straight into a tree. Although signal strength at the Portsmouth end was only S2, the extremely low noise level made it 100 per cent. readable. On subsequent evenings the aerial was raised to 20 feet at G3EJL and the signal increased to S3. Widely varying weather conditions, including rain and hail, made no noticeable difference. On May 2, an 8-element beam was put up at G3EJL, and this with the 16-ele. beam which was used by G3LV throughout

the tests made a two-way contact possible at R5, S6. This has since been repeated nightly.

The 70 cm. receivers at both stations are IN21 mixer with 955 oscillator, with IF at 30 mc fed into an HRO. Coax aerial change-over relays are employed. These receivers are so stable that CW can be read. G3LV is at sea level and in a built-up area. His beam is up at 48 feet, and the Tx is 10 watts to an 832 tripler. G3EJL is at 100 feet a.s.l. but looks straight into three lots of hills much higher than his aerial.

We feel the very creditable performance outlined above is a fine testimony both to the operators concerned and to the use of stable equipment. The fact that the Rx is of the narrow-band type is proof of the stability of its RF section. The beam at G3LV is very sharp, signals being lost at 10 degrees off the line-of-shoot. G3EJL has obtained a /A permit and hopes to increase the distance by operating his equipment from another QTH. He is also intending to arrange schedules with G5BY at Bolt Tail. Throughout these tests horizontal polarisation has been used.

In the East London area, G3DSV (Highams Park) and G3BDV (Walthamstow) are active, but so far a two-way contact has eluded them. G3BDV has a push-pull SEO using 6J6 and 8 watts input into a 4-ele. c.s. beam; the Rx is a super-regen. At G3DSV the equipment has also a SEO for Tx, with an RL18 and 5 watts input, while the Rx is an R.1359. They would be glad to discuss 70 cm problems

## TWO-METRE ACTIVITY REPORT

## G3BLP, Selsdon, Surrey.

WORKED: G2ADZ, 2IQ, 2OI, 2XV, 3ABA, 3BKQ, 3DAH, 3DJQ, 3EEZ, 4LU, 4MW, 5BD, 5IG, 6WT.

HEARD: G2AVR, 3AUS, 8PX.

## G2FLC, Cheveley, Cambs.

WORKED: G2XS, 3COJ, 4IG, 5BD, 5UD.

HEARD: G2KG, 3BLP, 3BWS 5MA.

## G6WT, Torquay, Devon.

WORKED: G2ADZ, 2BMZ, 2NH, 3AUS, 3AVF, 3BLP, 3DAH (208), 3DEP, 3EJL, 3LV, 3RI, 5BM, 5MA, 5PB, 5QA, 6DT, 6NB, 8JB.

HEARD: G3EHY.

## G2XC, Portsmouth, Hants.

WORKED: G2BMZ, 2FMF, 3DAH, 5TP.

HEARD: G2ADZ, 2CIW, 2IQ, 2KG, 2OI, 2WJ, 3BKQ, 3CGQ, 3EHY, 6WT.

## G3COJ, Hull, Yorks.

WORKED: G2AOK/A, 2CIW, 2FLC, 2XS, 3BLP, 3CGQ, 3DA, 3DAH, 3DSA, 4DC, 4LX, 5MA, 6DH, 6OH, 6VX, 6YP, 8AO, 8WV, GM3OL.

HEARD: G2MR, 2NH, 2WS, 2XV, 3AEX, 3DEP, 6NB.

## G3BKQ, Leicester.

WORKED: G2ADZ, 2ATK, 3APY, 3BLP, 3DJQ, 3EEZ, 5BM, 5MA, 5WP, 5XA, 8QY.

## G2OI, Eccles, Lancs.

WORKED: G2ADZ, 3DA, 3EEZ, 3EHY, 5BM, 5CP, 5MB, 6LC, 8SJ, GM3OL, GW3ELM, 5UO.

HEARD: G3BKQ.

## G2ADZ, Oswestry, Salop.

WORKED: G2ATK, 2NH (165), 2OI, 2WJ (160), 3BKQ (120), 3BLP (165), 3BMY, 3DAH (210), 3DEP (180), 3EEZ, 3EHY (120), 4DC (160), 4LU, 5BM, 5JU, 5MA, 6LC, 6NB (160), 6WT (160), 6YP (165), 6ZQ, 8QY, 8SM (168), GM3OL (150).

HEARD: G2MR, 2XC, 3BY, 3DA, 5BD, 6SB, 6VX, 8KL, GM3EDQ. (Bracket figures are distances).

## G4LU, Pant, Salop.

WORKED: G2AOK/A, 2ATK, 2CIW, 3ABA, 3BLP, 4AU, 4DC, 5MI, 6FK, 6NB, 6YP, 8KZ, 8SM.

HEARD: G3AUA, 3BKQ.

## G6NB, Chertsey, Surrey.

WORKED: G2ADZ, 2IQ, 2WJ, 3ABA, 3AUS, 3BKQ, 3DAH, 3EHY, 4AP, 4LU, 5BD, 5BM, 5JU, 6WT.

## G3EHY, Banwell, Somerset.

WORKED: G2ADZ, 2IQ, 2MR, 2NH, 2OI, 3BLP, 3BY, 3FP, 3YH, 4AP, 4CI, 4GR, 5BM, 5MA, 5TP, 5WP, 5YK, 6NB, 6SB, 6VX, 6ZQ, 8SM, 8WV, GW5SA.

HEARD: G3BKQ, G3FD, G4LU, G5JU.

The above reports refer, in general, to the month ending May 12, 1949.

with anyone by schedule on the Top Band.

G6HD (Beckenham) has a corner reflector arranged for horizontal polarisation and with it up at 50 feet finds signals much stronger. He continues to work G2FKZ, G2WS and G3CU. A newcomer to the band is G3BOB (Hayes, Kent), who is using, temporarily, a single 6J6 oscillator into a half-wave dipole with a corner reflector tied to the house gutter. The Rx is super-regen. Others active in the London area are shown in the Activity List. Regular operating times for the South London area are: Sundays 1130 to 1230; and Wednesdays 2000 to 2200.

G3FZL hopes to be on the band by the time this appears in print; he will have a CC Tx using 8012 GG PD with trough lines and 25 watts. His aerial will be a 12-ele. horizontally polarised beam, stacked vertically with wire-net reflector. The QTH is about  $\frac{1}{2}$  mile from G3CU.

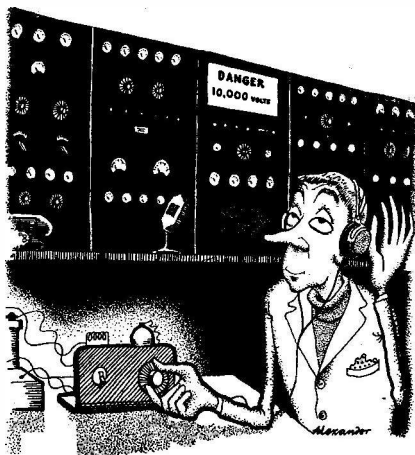
G3DJQ (Birmingham) is working to be on 420 mc soon. He has a Type 33 Rx and asks if anyone can supply modification details, especially for the concentric line input and mixer circuits. Information is also required by G6TG (Scarborough), who wants to triple from 145 mc with a pair of VR135's. He says they make good oscillators at 430 mc but so far he has failed to make them get there by tripling.

#### Correction Note

In the article on "VHF Mixer Circuits" in the last issue, points marked A'A should have been shown in Fig. 3 where the aerial is tapped on to the input circuit; and in Fig. 8, RFC2 ought to have been marked RFC1, and RFC3 shown as RFC2. We shall be very interested to hear from readers who may use this article as a basis for the design of new VHF converters.

#### Quick Summaries

The dead-line for this issue was a bit tight, so that several reports came in too late for detailed treatment. G13FKO (Belfast) summarises the VHF activity in Northern Ireland by saying that as yet only G12HML is fully equipped for Two, with modified SCR-522 units and a 6-ele. beam. Several other GI stations are taking an interest in the band, and when G13FKO gets his own Rx going he hopes to be regularly active. . . G5QA (Exeter) is now in regular QSO on Two with G2BMZ, G3AUS, G3AVF and G5BY, all to the South West; he hopes to live long enough to work Portsmouth and London, and is another who supports the Two-Metre Band Plan. . . G3CRO (Camberley, Surrey) remarks, quite rightly, that we may be surprised to get a "bind" about QRM on 420 mc; it seems that G3CRO and others are experimenting with telechrics around 465 mc, and would be grateful if the chaps busy working DX on 70 cm would keep



“... If I could hear him I could work him ...”

to the LF end of the band, as the telechric's relays are being triggered off by their signals! Well, we never—but it is good to hear of so much real VHF experiment going on, and hope that G3CRO will let us know more. . . The GPO has authorised MCW on 420 mc (though we are not altogether sure whether this is a Good Thing) and G3EKP (Darwen, Lancs.) is one of those who has been licensed for it. . . G3CUJ (Hull), on 145.2 mc, is surprised at the consistency of signals in the E-W direction, he having heard G3DA (Speke, Liverpool) on nine consecutive nights; this accords with the experience of some of the southerners. G3CUJ would like us to quote frequencies whenever possible, as it helps to catch up on the counties. . . GM5VG (Glasgow) found April 27 a good day, when G3ACY (Carlisle) was heard working GM3OL; there is a good deal of successful inter-GM working over useful distances, and over (or through) considerable obstacles—the path GM3OL-GM3BDA goes over ground rising to 2,300 ft., and that between GM3OL and GM5VG to 1,500 ft. . . G8KL reports himself and four locals active in Wolverhampton, and G3EEZ has succeeded in working G3BLP for an excellent GDY contact, while G2NH has been heard at G8KL. . . G5ML (Coventry) is there on 145 mc xtal CW most days 1630-1800 BST, looking for contacts and asking for reports. He is one of the OT's whom we welcome to Two.

One final point, which really may not require much emphasis: It is that VHF men

everywhere should be particularly careful to QSL all listener reports as promptly as possible. The VHF bands are hard going for our SWL's, who are entitled to all the help and encouragement we can give them. So even if you are well in on the GDX and you get a report from within your "normal service area," the SWL concerned may be a beginner on the VHF's and your card might be just what he needs to make him feel *he* is getting somewhere.

**In Conclusion**

May we remind you of the Fiveband Club

meeting in Nottingham on July 9. Several have already indicated their intention of being there and we are anticipating a gathering equally as successful as those already held in London and Oxford. A new list of operating frequencies in the 2-metre band will be circulated to Club members shortly.

Latest date for next month's reports is June 16—and do not forget to send in your call for next month's Southern Counties Activity List. The address, as you know, is E. J. Williams, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. CU on July 6—and in the meantime, Search the Band!

## Type 17 on Two

### Easy Modification of a Surplus Unit

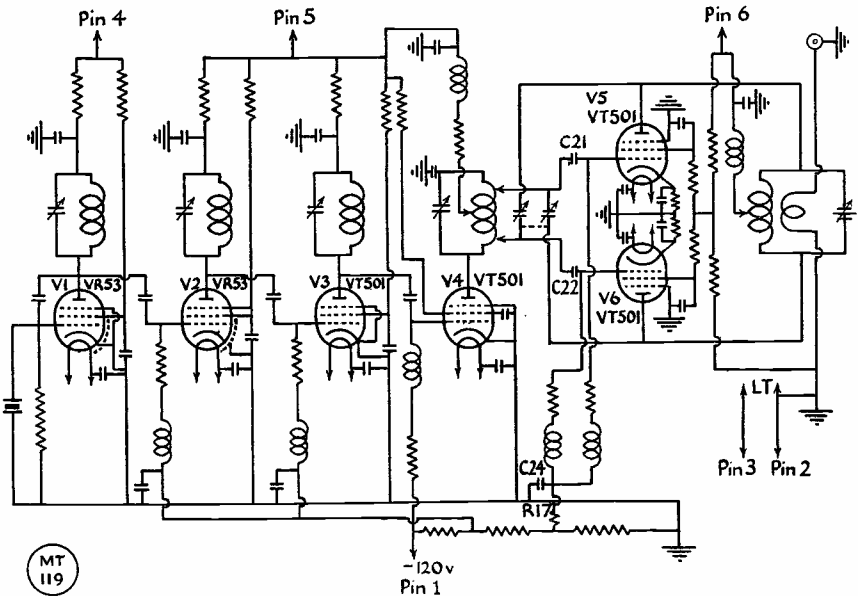
By H. E. SMITH (G6UH)

The transmitter unit of the TR.1143 equipment, more usually termed Transmitter Type 17, can easily be converted for operation

on the 145 mc band, either as a driver unit, or as a self-contained low-power transmitter.

Being designed originally for operation up to 125 mc the modification consists, in the main, of removing turns from the coils. The original circuit line of the Type 17 is as follows: V1, xtal oscillator; V2, trebler; V3, trebler; V4, doubler; V5 and V6, push-pull output. With modification it becomes: V1, xtal oscillator; V2, quadrupler; V3, trebler; V4, doubler; V5 and V6, push-pull output.

The LT side is wired for operation from a



Basic circuit, unmodified, of the Transmitter Unit Type 17, with connections to Jones plug indicated. Switching and metering connections have intentionally been omitted.

12-volt supply, but the conversion to 6-volt working is very simple as the wiring is distinctively colour coded. The connections requiring attention will be evident on examination of the equipment.

#### Modification for Two

For complete modification proceed as follows: V1 circuit remains unaltered, as the crystal used for 144-146 mc is one which was employed for the original purpose, *i.e.*, 6000 kc to approximately 6080.5 kc; V2, remove three turns from L2; V3, remove one turn and open out remainder of turns to occupy approximately  $1\frac{1}{4}$  in.

If the unit is to be used as a driver, the modification to V4 entails alteration to coil size only, as follows: Remove the present coil (located under chassis) and fit a 3-turn coil  $\frac{1}{2}$  in. diameter and spaced to occupy  $1\frac{1}{2}$  in. Reconnect grid coupling condensers C21 and C22 to a point approximately  $\frac{1}{2}$ -turn from each end; this circuit will then tune through 145 mc.

#### As 145 mc Tx

If, however, the unit is to be used as a complete transmitter, more drive will be required from the V4 doubler stage, and the procedure is then: Remove V4 entirely and fit a Mullard QQVO4-7 in its place. Remove rotor from TC4; stator should be left *in situ* as it provides a support for the neutralising

condenser plates. Using the coil supports on underside of chassis, fit a 6-turn coil  $\frac{1}{2}$  in. diameter and spaced to occupy  $1\frac{1}{4}$  in. Take out the  $8\mu\mu\text{F}$  condenser from "cold" end of coil support and fit  $25\mu\mu\text{F}$  air-spaced trimmer. (The side of the chassis should be drilled to accommodate this condenser.) This circuit now becomes "series tuned" and will provide approximately three times the amount of drive than is possible with the original connection. Coupling condensers C21 and C22 should be connected to a point one full turn from each end.

#### The PA Stage

Remove  $\frac{1}{2}$ -turn from each end of the coil in the PA stage, V5, V6, leaving three full turns. Finally, the junction of R17 and C24 should be broken, and a lead brought out from C24 to a separate bias point. This will allow the final pair to be run in Class-C instead of AB as designed, with consequent increase in RF output.

As a complete transmitter, the Type 17 will deliver approximately 6 watts RF output with a 350-volt HT supply or, as in the writer's case, it makes an excellent driver unit for an 832 or 829.

The circuit shown is a simplified one, and does *not* include the metering or crystal switching circuits in the original. The RF diode rectifier is also omitted, as this is only used in conjunction with the metering circuits.

#### TOP BAND IDENTIFICATION

May we remind all 1.7 mc operators, whether on CW or phone, that it would be a great help to SWL's if they would announce their county location as frequently as possible during transmission? This is not so much for the purpose of QSL'ing, but rather of helping on those listeners who are endeavouring to score in "1.7 mc Counties Heard" in our *Short Wave Listener*. It is worth mentioning that the four leaders of that Table have each logged over 50 G counties on the Top Band.

#### "EF50 TEN-METRE CONVERTER"

Though the 10-metre band may be dormant (or will it?) during the next two or three months, many operators will wish to make sure that they possess efficient equipment for 28 mc when it is again wide open. An article in the June issue of our *Short Wave Listener* describes in detail the design, construction and operation of just such a converter. It will work with any existing receiver tuning to 10 mc and may be expected to give results much better than are possible on a set designed for general coverage.

#### WORD OF WARNING!

Once again, we would advise amateurs to be extremely careful about giving stories on Amateur Radio or station interviews to hack reporters from the lay Press—particularly those papers specialising in gaudy splash stories. With the best of intentions on both sides, the result as it finally appears in print will bring a blush to the cheek of any self-respecting amateur. The reason is that very few papers are in the least degree interested in Amateur Radio as a scientific hobby, and so tend to treat it as sensation story, very often wildly exaggerated. Contrary to the general belief, this does nothing to "advertise" Amateur Radio, but tends rather to make amateurs look ridiculous in the eyes of the great untutored public. And that does nobody any good.

#### QRT

We are asked to announce that the firm of Grand Arcade Radio is now closed down, though G8OG remains fully active as an amateur from his home address in Leeds.

## 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.

- |         |  |                   |   |
|---------|--|-------------------|---|
| G2ACI   | G. H. Mackereth, 13 Braddyll Terrace, Ulverston, Lancs.                                      | G3FFY             | M. H. Stedman, Further Hobbs Flat, Tandridge Lane, Lingfield, Surrey.                       |
| G2AZT   | J. W. Dean, Marlborough House, 31 Conduit Street, Gloucester.                                | GM3FGL            | G. T. Lyell, 19 Castlelaw Crescent, Bilston, Roslin, Midlothian, Scotland.                  |
| G2BHZ   | E. F. Gadsden, Amcotts, Old Town, Bexhill-on-Sea, Sussex. (Tel.: Bexhill 1158.)              | G3FGW             | M. O. Denny, 170 Worsley Road, Winton, Eccles, Lancs.                                       |
| G2BTJ   | D. W. Robinson, 70 Penny Lane, Liverpool, 15. (Tel.: Sefton Park 2743.)                      | GM3FHB            | J. Barnes (ex-V56AD), 27 Craigs Road, Corstorphine, Edinburgh, 12, Scotland.                |
| G2CMQ   | C. Clark, 40 Goldsmith Walk, Lincoln.  | G3FHH             | J. H. Park, 111 Burnside Avenue, Skipton-in-Craven, Yorks.                                  |
| G2DJM   | E. V. Chilton, The Willows, Ickbore Road, Mundford, Thetford, Norfolk.                       | G3FHI             | W. A. W. Launder, B.Sc.(Eng.), 15 Cambridge Road, St. Marychurch, Torquay, Devon.           |
| G3AJB   | H. H. Mills, 55 Helredale Road, Whitby, Yorks.   | G3FHI/A           | Exeter Secondary Technical School Radio Club, Belmont Park, Exeter, Devon.                  |
| GM3BHY  | R. H. Low, The Angus Hotel, Blairgowrie, Perthshire, Scotland.                               | G3FIH             | L. A. Lear, 41 Bath New Road, Radstock, Near Bath, Somerset.                                |
| G3BRR   | W. J. Leader, 340 Blurton Road, Longton, Stoke-on-Trent, Staffs.                             | G3FIJ             | F. R. Howe, 65 Kendall Road, Colchester, Essex.   |
| G3CCP   | Amateur Radio Club, Military College of Science, Shrivenham, Swindon, Wilts.                 | G3SB/A            | T. Bryant, Redcleave, Holdstone Down, Combe Martin, Devon.                                  |
| G3CSY   | K. Hill, 48 Bousfield Street, Walton, Liverpool, 4.  | G4BY/A            | Simon Langton Grammar School Radio Society, Whitefriars, Canterbury, Kent.                  |
| G3CSY/A | K. Hill, Ashleigh, Woolton Park, Woolton Hill Road, Liverpool.                               | G4RX              | P. E. Taylor, No. 1 The Hill Bungalows, Ashcott, Bridgwater, Somerset.                      |
| G3DEQ   | N. Woodnutt, 78 Southampton Road, Fareham, Hants.  | G6XY              | R. H. Webb, 26 Waverley Road, Kenilworth, Warks.  |
| G3DID   | Amateur Radio Club, H.M.S. Ganges, Shotley, Near Ipswich, Suffolk.                           | G8LC              | B. E. Rogers, 20 Priory Avenue, Harlow, Essex.  |
| G3DOG   | R. F. C. Crowther, 10 Oxford Court, London, W.3. (Tel.: ACOrn 4944.)                         |                   |   |
| GW3DXT  | Swansea Amateur Radio Society, Vivian's Road Social Centre, Sketty Cross, Swansea, S. Wales. |                   |   |
| G3ECV   | H. G. Hunt, 9 Salerno Road, Aldermoor, Southampton.  |                   |   |
| GM3EHC  | F. A. McHarg, 29 Union Street, Montrose, Angus, Scotland.                                    |                   |   |
| G3EHJ   | J. Hullock, 33 Sheaf Street, Daventry, Northants.  |                   |   |
| G3EHW   | A. S. Watkins, 142 Queenborough Road, Sheerness, Kent.                                       |                   |   |
| G3EJD   | D. G. Duff, 50 Sutton Way, South Shields, Co. Durham.  |                   |   |
| G3ELO   | P. L. Tinto, 21 Westcroft Street, Droitwich, Worcs.  |                   |   |
| G3EMY   | R. Moreton, 23 Thackeray Road, Kings Norton, Birmingham, 30.                                 |                   |   |
| G3EQH   | R. A. Sharp, 32 Belvedere Road, Darlington, Co. Durham.                                      |                   |   |
| G3EQQ   | C. W. Dickinson, Marleen, Cheadle Road, Tean, Near Stoke-on-Trent, Staffs.                   |                   |   |
| G3ESK   | L. A. Potter, Knaresboro, Altrincham Road, Baguley, Altrincham, Cheshire, Hereford.          |                   |   |
| G3ESY   | P. W. F. Jones, Devonia, Central Avenue, Hereford.   |                   |   |
| G3ESY/A | P. W. F. Jones, c/o 5 Orchard Gardens, Putson, Hereford.                                     |                   |   |
| G3ETG   | E. Hughf, 43 Torrens Road, Sunderland, Co. Durham.   |                   |   |
| GM3EUM  | J. A. R. Finlay, Benvrackie, Cowdenbeath, Fife, Scotland.                                    |                   |   |
| G3EXD   | E. Bovis, 30 Kingsmead, New Barnet, Herts.   |                   |   |
| G3FEH   | J. V. Stone, 63 Bordesley Road, Morden, Surrey.  |                   |   |
| G3FEO   | A. Taylor, 67 Sylvia Avenue, Knowle, Bristol, 4.   |                   |   |
| G3FEP   | C. Williams, The Vicarage, Wootton, Bedford.   |                   |   |
| GM3FEU  | G. W. Robertson, Edenbank, New Road, Forfar, Angus, Scotland.                                |                   |   |
| G3FFA   | Barnet and District Radio Club, Hopedene, The Avenue, Barnet, Herts. (Tel.: Barnet 6806.)    |                   |   |
| G3FFB   | T. M. Adams, 43 Grainger Street, Darlington, Co. Durham.                                     |                   |   |
|         |  | CHANGE OF ADDRESS |   |
|         |  | EI8T              | M. P. MacCarthy, Columb Barracks, Mullingar, Co. Westmeath, Eire.                           |
|         |  | GM2BMJ            | T. D. Jardine, 5 Burnscarth Road, Locharbriggs, Dumfries, Scotland.                         |
|         |  | G2CFC             | R. G. Frisby, The Barn, Glen Road, Oadby, Near Leicester. (Tel.: Oadby 682.)                |
|         |  | G2YZ              | A. K. Wall, 9 Hill Crescent, Bexley, Kent.  |
|         |  | G3ABU             | E. J. Hayman, 113 Barton Road, Torquay, Devon.  |
|         |  | G3AYZ             | J. F. Turner, 4 Hazeleigh Gardens, Woodford Bridge, Essex.                                  |
|         |  | G3BUB             | A. Hubbard, 61 Broomleaf Road, Farnham, Surrey.   |
|         |  | G3CPG             | L. Damon, 62 Orford Way, Malvern Link, Worcs.   |
|         |  | GW3DDS            | F. Bergelin, 53 (W) Div. Sigs. Regt., Maindy Barracks, Whitechurch Road, Cardiff, S. Wales. |
|         |  | GM3ECI            | D. W. McKay, 10 Sydney Crescent, Auchterarder, Perthshire, Scotland.                        |
|         |  | G3EFE             | A. R. Bryant (ex-JAAP), 12 Greenway Park, Westbury-on-Trym, Bristol, 9.                     |
|         |  | GC3FXQ            | W. S. Godwin, Corfe Mullen, Les Gelles, St. Peters Valley, Jersey, Channel Islands.         |
|         |  | G3SB              | T. Bryant, 16 The Parks, Minehead, Somerset.  |
|         |  | G4OO              | D. Hoult, 78 Lavender Hill, London, S.W.11.   |
|         |  | G8DM              | L. G. Stoodley, 9 Medlar Road, Shrivenham, Swindon, Wilts.                                  |
|         |  | CORRECTION        |   |
|         |  | G2BSU             | W. G. R. Wilby, 18a Redland Grove, Redland, Bristol, 6.                                     |
|         |  | G3DGR             | B. Goodger, The Barlow Bungalow, Gobowen Road, Oswestry, Salop.                             |
|         |  | G5AO              | W/O A. E. Lambourne, R.A.F. Station, Watton, Thetford, Norfolk.                             |

# Here and There

## Amateur TV Transmission

G3CVO—M. Barlow, Cheyne Cottage, Dukes Wood Drive, Gerrards Cross, Bucks.—writes to say that he would be glad to hear from other amateurs interested in TV transmission. G3CVO is running a regular Saturday evening schedule with PAØZX, of the Groningen TV group, at 2200 BST on 3780 kc.

## "The New Wonder"

Fifty years ago, the Cornish local paper *West Briton* printed a paragraph under this heading, announcing a lecture by a Mr. William Lynd in the Concert Hall, Truro, on "Marconi's great discovery of wireless telegraphy." The lecture was to include a "practical demonstration . . . sending telegrams across the room without wires, and also through the walls of the building." One might wonder if Mr. Lynd's experiments were successful and whether any of his audience who may be alive to-day remember that demonstration of long ago. G3EKM, Truro, sent us the cutting from the *West Briton*.

## G3's and 3-plus-Three's

In the first paragraph of the F.O.C. column, on p.198 of our last issue, there appeared a Misleading Statement. This can be corrected by reading "G3-plus-Three" for G3—as, indeed, is implied by the context. It was certainly not the intention to suggest that the only DXCC certificates yet awarded to G3's had gone to the two operators named, who are G3-plus-Three's. For those who may wonder what all the fuss is about, G3 calls were in issue before the war, whereas the G3-plus-Three series (meaning three letters after the figure and not two) is a post-war creation. We have put a little earth on our head over this one, in the hope that thus the honour of the First Class Operators Club and of those G3's who may long since have gained their DXCC certificates will be satisfied.

## Direct Subscribers

For 20s. you can get the *Short Wave Magazine* for a year of twelve issues, sent to you by post on publication day, the first Wednesday of each month. New subscriptions can be entered to start with the July issue, due out on the 6th of that month. Order on the Circulation Manager, Short Wave Magazine, Ltd., 49 Victoria Street, London, S.W.1.

## G6QB—Organist

Few of those who read his "DX Commentary" every month would know that our Assistant Editor is also an accomplished organist who appears professionally as Howard Thomas. Anyone listening to the Light Programme at 1045 a.m. on May 25 would have heard him modulating about 200 of the BBC's kilowatts in the course of his first broadcast engagement. As G6QB says, 100 kilowatts of audio make a nice change from 100 watts of RF!

On this theme, we might add that G2XC of "VHF Bands" is also an organist, who plays regularly at a Portsmouth church.

## Photographs, Please!

We are always glad to see photographs of amateur stations or equipment. Any that are used are paid for at good rates and can be returned if specially wanted—the block making process involves no damage to the face. Photographs can be any size, print or negative, but *must* be clear and sharp.

## Councillor W. Krohn, G6KJ

During the recent local government elections, G6KJ stood as one of seven candidates for five seats on the Buckingham Borough Council. He was returned fourth, and takes his seat for a three-year term. To those who know him, G6KJ's election is of particular interest because it says so much for the ability and courage of an Old Timer, still fully active, who has been blind practically from birth.

## DX on 1.7 mc

With the announcement in the May issue of *QST* that limited amateur operation on the hitherto closed 1.7 mc band is again permitted in the States, we may expect to see Trans-Atlantic working on the Top Band next season. In the pre-war era, the period February-March was found to be best for two-way contact with W on 1.7 mc.

## Change-of-Address Notices

Direct subscribers holding call signs who change their addresses should of course not only notify us as soon as possible, but also send in the change on a separate slip if they want it to appear in "New QTH's." Since this feature is also open to readers who may not be direct subscribers, any change-of-address notice they may send should be headed "For New QTH's only."

# The other man's station G3ATL

D. I. Wiggins, Dunster Lea, Rochdale, Lancs, was first licensed in the early part of 1946, and was then serving at sea as a radio officer; in the autumn of 1947, he also obtained a permit as ZL2AFP, operating shipborne under this call, which is still current.

G3ATL has been rebuilt no less than three times already, and the photograph above shows the present layout. On the bottom shelf of the cupboard is the 600v. 300 mA power pack for speech amplifier and modulator; next comes the relay supply unit and PA pack, delivering 800v. at 350 mA; above is the speech amplifier-modulator, running 6SJ7-6CS's-P/P 6CS's-P/P 807's in Class AB1.

The remainder of the transmitting equipment is built into a number of TU5B cases, and includes a frequency meter with 100 kc crystal, a VFO feeding into two 6V6 untuned buffers, a double-section exciter giving output on all bands 3.5-28 mc, the PA unit with a pair of 807's and the aerial tuning section—all separately accommodated. The transmitter runs an input of 140-150 watts on all bands except 1.7 mc.

On the receiving side, G3ATL/ZL2AFP has a Hallicrafters SM40 and an S40A of the same make. Aerials in use are an end fed 67-ft. Zepp; a 33-footer, also end fed; and a 3-ele. c.s. rotary beam, Selsyn-motor driven and controlled from the operating position.

In the course of his travels, G3ATL has had some very interesting experiences. As ZL2AFP, he worked W's from Wellington Harbour on 80-metre phone; and when



within 500 miles of Pitcairn Island raised VR6AB and was introduced (by radio) to Mr. Arthur Christian, a direct descendant of the Mr. Christian of the *Bounty*. Another contact on 80-metre phone was with G8VB, when over 2,000 miles from Land's End.

G3ATL has recently been elected a member of the F.O.C. and, having swallowed the anchor and joined a firm in the Midlands, will be keeping his hand in on G3ATL/A, running 20-40 watts and with all the equipment housed in a couple of TU5B cases.

# THE MONTH WITH THE CLUBS

## FROM REPORTS

Again we report a flourishing month, with 38 Clubs sending in details of their activities. The accent is, of course, on outdoor work for the coming summer season, but by far the majority of the established Clubs continue to meet regularly for the purposes of instruction and constructional work.

Next month's Club Reports should be in by first post on June 15. Address them, please, to Club Secretary, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. And please bear in mind, as usual, that we are always glad of good photographs of Club activities to illustrate this feature.

And so to our 38 reporting Clubs. . . .

### TOP BAND CLUB CONTEST—1949

The Fourth Annual *Short Wave Magazine* 1·7 mc Club Transmitting Contest will take place during the period November 12-20, next. Rules and entry forms will be circulated to all Clubs in good time.

**Ashton-under-Lyne Amateur Radio Society.**—This Club, although described as being "of moderate means," being in industrial Lancashire, continues to flourish, and has now acquired a B21 receiver to add to the collection at G3BND, Astral House. Morse instruction facilities are available—pupils are wanted! G3BND is on the air every Thursday night on the 3·5 mc band.

**Barnsley & District Amateur Radio Club.**—The lecture at the last meeting was on the Cathode Ray Oscilloscope, and a model built from surplus gear was demonstrated. On June 10 there will be an Exchange and Mart, followed by a general discussion.

**Berwick Radio Society.**—This Club was formally constituted in March, with Capt. Steven, GM5BA, as President. Some excellent talks have been given at the monthly meetings by Old Timers, and the Society has a live membership. Others will be welcomed.

**Bournemouth & District Amateur Radio Club.**—In the past few months several interesting talks have been given to the membership by G3ABH,

G3SP and G4IX. NFD is the chief source of activity at the moment; Morse classes have been started, and Club Nights are now on Fridays at 8 p.m. at the Club Headquarters, St. Clements Road, Upper Parkstone.

**Brentwood & District Amateur Radio Society.**—Meetings are now being held fortnightly at the Drill Hall, Ongar Road, Brentwood; next after publication is June 10 at 7.30 p.m. and thereafter on alternate Fridays. Membership stands at 22; lectures and portable plans are in hand, and it is hoped to have a club station going before long.

**Brighton & District Radio Club.**—This Club has now moved to new headquarters at the Eagle Inn, Gloucester Road, Brighton, where old and new members will be made welcome at the meetings—every Tuesday at 7.30. Recent discussions and talks have been on HF amplifiers, individual SWL's receivers, and the theory of the oscilloscope. The Club transmitter, G3EVE, will be on the air again soon.

**Clifton Amateur Radio Society (S.E. London).**—This Club

held its first Field Day of the season on May 1, when the weather was kind and a good day was enjoyed by a field of 16 members. The Contest was won by Messrs. Wallace and Bruce, with Messrs. Theobald (Senior and Junior) as runners-up.

**Exeter & District Radio Society.**—This Club has just moved into new premises at 9 Palace Gate, Exeter, and meetings are now held every Thursday evening at 7.30. New members will be welcomed at any meeting.

**Gillingham Telecommunication Society.**—This Club was formed in April by a number of local amateurs, and meets on the third Tuesday of the month, 7.30, at the Medway Technical College, Gardiner Street. At the May meeting the subject of TVI was discussed. Prospective members will be welcomed by the Hon. Sec., whose QTH appears in the panel.

**Grafton Radio Society.**—Grafton is participating "unofficially" in NFD, and gear is under construction for the purpose. The Top Banders are getting into their stride with a regular sked on Mondays, 2200, with G3ALE/A, the President. Plans for a high-powered rig as a permanent memorial to the late Mr. Harry West, G3AFC, are being examined by the committee.

**Gravesend Amateur Radio Society.**—This Club has now received its licence, with its own initials for the call (G3GRS). Recent talks have been on Aerials (G6BQ), VHF (G3EJK) and Noise Limiters (Mr. Hatch). A number of members visited the Grays Club in April. Lectures arranged for June are on "My Station" (G8LZ) and Television (G3EJK); Conversion of ex-Service Gear (Mr. Hatch); and VHF (G6VC). NFD arrangements are almost complete.



**Radio Society of Harrow.**—A television receiver using surplus gear was demonstrated to a large gathering of members; other recent events have been a demonstration of an oscilloscope and a talk on Time Bases. Morse and technical classes are arranged for the future, and visitors will be heartily welcomed at the Clubroom.

**Hounslow & District Radio Society.**—At the April meeting members brought along their own apparatus for exhibition and demonstration; several oscilloscopes were among the exhibits. An RF EHT generator caused great interest. On May 4 the Secretary and Mr. K. H. Trott gave interesting television demonstrations with their own home-made sets.

**Isle of Man Amateur Radio Society.**—The AGM was held in May, and the 1949 officials elected. The new headquarters are at the Nook Pavilion, Quarter Bridge, and a Club station is being built there. Free and easy meetings of a social order take place at the "Shack" on Tuesday evenings and are usually well attended, and a number of members are studying with a view to obtaining their own licences later.

**Lothians Radio Society.**—The closing meeting of the season will be held at the Chamber of Commerce Rooms on June 30, and will be devoted to business matters. A successful season has been spent, with an increase in membership of 50 per cent. Activity will be resumed in September.

**Merseyside Radio Society.**—From the *Merseyside Amateur Radio Review* we learn that the first Amateur Radio Exhibition in that part of the country was a very successful affair. Forthcoming events are a discussion on NFD (May 14), a talk on Multi-Element Arrays (May 28) and NFD itself (June 11-12).

**Midland Amateur Radio Society.**—Many MARS members spent an enjoyable evening at the CARS Annual Dinner, and a good crowd visited the Coventry O.R.M. MARS met in Birmingham on



A Grafton committee meeting, with A. W. H. Wennell, their chairman elucidating a point. On his immediate right is W. H. C. Jennings, G2AHB, the Honorary Secretary, on whose unflagging energy and enthusiasm Grafton's outstanding success has been very largely built.

May 17. Note the QTH of the new Secretary—in panel.

**Oxford & District Amateur Radio Society.**—Preparations for NFD, a lecture on Stabilised Power Supplies, and a visit to Droithwich have comprised the recent programme of this Club. Activity on 2 metres is on the increase, and, at the other end of the spectrum, the Sunday morning ragchew on the Top Band is assuming frightening proportions!

**Prestwick Airport Radio Club.**—This Club, newly formed, meets every Monday at 7.30 p.m. Permanent accommodation has been obtained, and it is hoped that a Club station will be built in the near future. All visitors will be heartily welcomed. See panel for Secretary's address.

**Reading Radio Society.**—Recent meetings have included talks on Negative Feedback (Mr. Keating), on NFD (G5DF) and on the Panoramic Adaptor (Dr. Lemon). An instructional section has now been started, and this will meet during the summer on the second Saturday of each month, the main Club meeting being on the second Thursday.

**Romford & District Amateur Radio Society.**—D/F and NFD occupy most of the Club's time for the next few weeks. The YMCA are forming a Junior Section and have approached the Secretary for some initiation into the art of radio. Amateur Radio is already the most popular branch among the youngsters! A new Top-Band aerial has been erected for the Club Transmitter, G4KF/P, and it is hoped to pull in some DX on that band.

#### SLOUGH, BUCKS, DISTRICT

It is hoped to organise a Radio Society in the neighbourhood of Slough, Bucks. A meeting is to be held at the Slough Public Library, William Street, on June 30 at 7 p.m., with that end in view. All who are interested are cordially invited to attend. The Acting Secretary is F. J. T. Tuckfield, Cynon House, 13 Quaves Road, Slough.

**Salisbury & District Short Wave Club.**—At the recent AGM G8IL was re-elected President with Mr. C. A. Harley as Hon. Sec. Work proceeds on the Club station (G3FKF) and an S.640 re-

ceiver is now a part thereof. The Club participates in a combined exhibition of hobbies, arts, crafts and sports in September, at the Guildhall, Salisbury. Further details will be given later. Meetings are now on Monday evenings, but the Clubroom and workshop are available at any time.

#### **Solihull Amateur Radio Society.**

—Recent meetings took the form of a Quiz Night and a lecture by G2ACV on The Club Transmitter. Members reported good progress with the D/F receivers for the contest, which was held on May 8 and attended by 20 members. The transmitter was so well hidden that only one pair of members found it!

#### **Southend & District Radio Society.**

—Over 60 people attended the Annual Hamfest, including representatives from the Chelmsford Society and two Swedish amateurs. At the meeting at the end of April the Club's 7-mc transmitter was on the air, and plans were made for forthcoming D/F Contests.

#### **South Manchester Radio Club.**

—A one-day Amateur Radio Exhibition is planned by this Club, the date probably being in September. It is being held simply for friends and relations of Club members, to give them an insight into the Club's activities; a 'phone station will be on the air, and also examples of several members' work. For the immediate future, visits to places of interest are being planned, but no dates are yet fixed.

#### **Southport Radio Society.**

—The Club call-sign, G3FJG, has been received, and the station is already on the air, having made numerous contacts. The transmitter is operated on Monday and Wednesday evenings, when the Club premises are always open. Morse classes and a session for beginners are being started soon.

#### **Spenn Valley Radio and Television Society.**

—Membership has recently increased by 50

per cent., although this remains a small Club. Meetings are held fortnightly at Cleckheaton Temperance Hall, and recent gatherings have included a Brains Trust, and lectures on Aerial Couplings, Amplifier Design, Noise Limiters and Two Metres. A trip has also been made to the BBC short-wave station at Skelton, near Penrith.

#### **Steyning & District Radio Club.**

—Welcome to this newcomer to our columns. A series of lectures is now in progress for the benefit of beginners; meetings are held every Monday at 8.30 p.m. at the Scout Hut, Steyning. All are welcome, and intending members should contact the Hon. Sec. (see panel for address).

#### **Stoke-on-Trent Radio Society.**

—The new headquarters is at The Cottage, Oakhill, Stoke, and regular attendance is increasing. Lectures in May covered Audio Amplifier Technique (G3DML), Theory of

#### **NAMES AND ADDRESSES OF CLUB SECRETARIES**

**ASHTON-UNDER-LYNE :** N. H. Brown, B.Sc., A.R.I.C., G3DRS, 13 Corporation Road, Audenshaw, Manchester.

**BARNSELEY :** J. A. Ward, G4JJ, 44 Northgate, Barnsley.

**BERWICK :** W. B. Baker, G3AFL, 4 Devon Terrace, Berwick-on-Tweed.

**BOURNEMOUTH :** A. E. Harvey, Hillview, Curliu Road, Oakdale, Poole.

**BRENTWOOD :** J. F. Moseley, G2CIW, 45 Geoffrey Avenue, Harold Park, Brentwood, Essex.

**BRIGHTON :** L. Hobden, 17 Hartington Road, Brighton.

**CLIFTON (S.E. LONDON) :** W. A. Martin, 21 Brixton Hill, London, S.W.2.

**EXETER :** E. G. Wheatcroft, 44 Lethbridge Road, St. Loyes, Exeter.

**GILLINGHAM :** R. A. Lucas, G2BJW, 97 Milton Road, Gillingham, Kent.

**GRAFTON :** W. H. C. Jennings, G2AHB, Grafton LCC School, Eburne Road, London, N.7.

**GRAVESEND :** R. E. Appleton, 23 Laurel Avenue, Gravesend, Kent.

**HARROW :** S. C. J. Phillips, 131 Belmont Road, Harrow Weald.

**HOUNSLOW :** A. H. Pottle, B.Sc., 11 Abinger Gardens, Isleworth, Middx.

**ISLE OF MAN :** H. Grist, Broadway House, Broadway, Douglas, I.O.M.

**LOTHIANS :** I. Mackenzie, 41 Easter Drylaw Drive, Edinburgh, 4.

**MERSEYSIDE :** C. M. Johnstone, 6 Flawn Road, West Derby, Liverpool.

**MIDLAND :** A. W. Rhodes, 135 Woolmore Road, Birmingham, 23.

**OXFORD :** R. H. Clifton, G3CGU, 86 Victoria Road, Summertown, Oxford.

**PRESTWICK :** J. Simpson, GM4QV, 10 Falkirk Road, Bonnybridge, Stirlingshire.

**READING :** F. Hill, G2FZI, 997 Oxford Road, Reading.

**ROMFORD :** D. L. K. Coppendale, G3BNI, 9 Morden Road, Chadwell Heath, Essex.

**SALISBURY :** C. A. Harley, 85 Fisherton Street, Salisbury.

**SOLIHULL :** G. Haring, 121 Bradbury Road, Olton, Birmingham.

**SOUTHEND :** J. H. Barrance, M.B.E., G3BUJ, 49 Swanage Road, Southend-on-Sea.

**SOUTH MANCHESTER :** M. I. Wilks, 57 Long'ey Lane, Northenden, Manchester.

**SOUTHPORT :** F. H. P. Cawson, G2ART, 113 Waterloo Road, Southport.

**STOKE-ON-TRENT :** K. H. Parkes, G3EHM, 159 Belgrave Road, Longton, Staffs.

**SPEN VALLEY :** N. Pride, 100 Raikes Lane, Birstall, nr. Leeds.

**STEWING :** C. J. Thomas, 45 Shooting Field, Steyning, Sussex.

**STOURBRIDGE :** W. A. Higgins, G8GF, 35 John Street, Brierley Hill, Staffs.

**SUNDERLAND :** C. A. Chester, 38 Westfield Grove, High Barnes, Sunderland.

**SUTTON AWD CHEAM :** L. Seaton, 8 Croft Road, Sutton, Surrey.

**THAMES VALLEY :** Major A. Eden, 31 Chatsworth Crescent, Hounslow.

**WEST KENT :** G. D. Brewer, G4IJ, 80 London Road, Southborough, Kent.

**WEST SOMERSET :** T. C. Bryant, G3SB, 16 The Parks, Minehead.

**WIRRAL :** R. A. Browning, 24 Norbury Avenue, Bebington, Cheshire.

**WYMONDHAM :** Morley Radio Club, Wymondham Teachers' Training College for Men, Morley St. Botolph, Wymondham, Norfolk.

**YEovil :** D. L. McLean, 9 Cedars Grove, Yeovil, Som.



For the Derby & District Amateur Radio Society dinner on February 9, G5YY (centre, top table) took the chair, with G2CVV, Derby's honorary secretary, on his immediate left.

Line Transmission (Mr. E. Fair) and a practical demonstration of a home-built wire recorder (Mr. A. Hackney). Work on the Club transmitter has started, and television gear is also being built by several members.

**Stourbridge & District Amateur Radio Society.**—At the April meeting G5BJ and Mr. Rhodes gave a talk on FM Fundamentals and the application of F/M to Amateur Radio. Many members are now said to be avowed converts to FM. Normal meetings are on the first Tuesday, but on Saturday, June 18, a meeting at 7.30 p.m. will be addressed by G2MI.

**Sunderland Radio Society.**—The AGM was held in April, and a highly successful year of activity was reviewed. Among the newly elected officers were G3CTE (Chairman), G3BLV (Vice-chairman) and Mr. C. A. Chester (Hon. Sec.). The new Treasurer, Miss Judy Bolton, was heartily congratulated on acquiring the call-sign G3EYO and the Club feels that a YL-Treasurer-Transmitter confers great distinction upon them!

**Sutton & Cheam Radio Society.**—Recent meetings have included the AGM (April 19), an NFD Rehearsal (May 15) and Part 5 of the Mullard Valve lecture (May 17). A lending library is being

organised, and the Club has been invited to take part in a Hobbies Exhibition run by the local Rotary Club in October.

**West Kent Radio Society.**—An interesting lecture was recently given on Mechanical Construction in Radio, by the Secretary, Mr. D. Brewer. The Cup Final was viewed at Club Headquarters on three television receivers specially installed for the purpose. Final preparations for NFD are now in progress.

**West Somerset Radio Society.**—A very successful Field Day was held in April, with G3SB/A operating from a point roughly 1,000 ft. above the Bristol Channel. The Club also took part in the Minehead Arts Guild Festival; G3SB/A was again in operation, and a great attraction was a demonstration of television, with Alexandra Palace being received (at 170 miles) on home-made equipment.

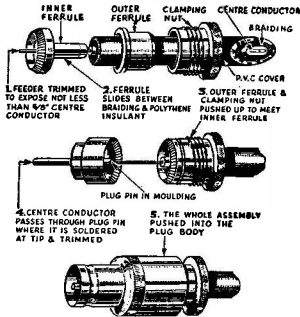
**Wirral Amateur Radio Society.**—A talk was given recently by G8BM on Wavemeters, and a successful visit was arranged to the Port Radar Station at Gladstone Dock, Liverpool. June meetings will be on the 8th and 22nd, both 7.30, at the YMCA, Whetstone Lane, Birkenhead.

**Morley Radio Club, Wymondham.**—Many members spent the Easter holidays preparing their home QTH's for the end of the course (August 13). G3ABG is organised at his home QTH with an 813 PA, and G3FDA has his shack ready in Leeds for the Great Day. Members returned to the College on May 5, and G3ABG/A is again active from there.

**Yeovil Amateur Radio Club.**—Regular Wednesday meetings have continued weekly throughout the winter. The Club station is very active, and a VFO has recently been added. 'Phone is now being used for the first time. Local members are building TV gear in readiness for the opening of the Birmingham station, although one already gets excellent results from Alexandra Palace. The Club is open to anyone interested in Amateur Radio, and visitors are always welcome.

**Thames Valley Amateur Radio Transmitters' Society.**—At the monthly meeting in May a large gathering heard a lecture by Mr. C. W. Cobb (Interference Dept., G.P.O.), which covered all aspects, both technical and "diplomatic," of BCI and TVI. The meeting was opened for questions after the lecture, and they were still going strong when "Time" was called.

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B5M844 145 Mc 8-element high-gain two-bay stacked array ... £8/15/-

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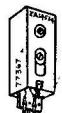

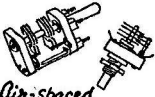
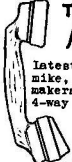
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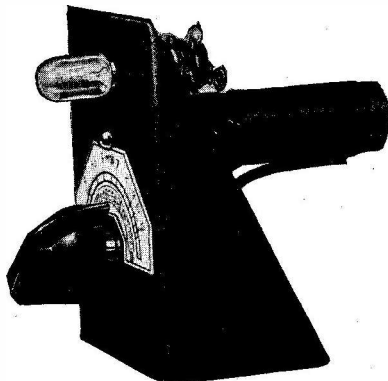
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4a, 0-4-5v 3a, 35/- (unshrouded); filament transfer, 6-3v 2a, 7/- each.

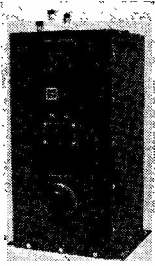
**TRANSFORMERS.** Output. 30 watt multi-ratio, 23/9. Ratios 20, 28, 32, 35, 40, 46, 54, 70, 80 and 140 to 1, all C.T. Pri. cur., 80 m/a. Each half, with shields and feet. 5 watt 6 ratio, 7/6. Both by Porthminster. Standard midget Pow/Pen, 4/6.

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**ELECTRONIC ENGINEERING TELEVISOR.** Booklet, 2/6, post 2/9. Scanco Deflection Assembly, 25/-; Focus coils, 29/6. EHT transfer, 4kV, 63/-; 5kV, 75/-; Coil formers, 10d. each. Complete set of resistances, 35/6. -1mfd con., 6,000v, 11/6. Mains transf., 2x350v 240m/a, 6-3v at 6a, 4v at 8a, 4v at 3a, 2v at 2a, 6-3v at 2a, £3/15/-. T41 valves, 12/10. Pen 46, 18/3. Pen 45, 12/10. Chassis, etc., available.

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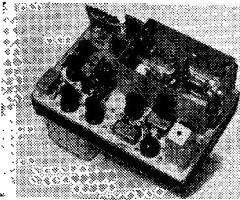
## Aerial Coupling Unit

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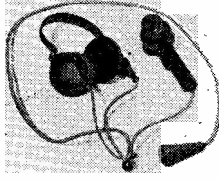
by General Electric. Input 24v DC, output 1,000v DC, 350 mA. Complete with starter switch, fuses, suppressors and base. Size 10" x 10" x 6". 45/- each. Carr. paid



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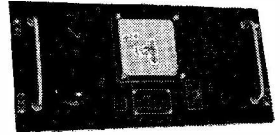
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1 1/2" long.  
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4 to 40pF. 1 to 6 way. 1 1/8" between plate centres. 3/8" high. trimming screws. 3/8" between fixing screws.

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Scanco Television Scanning Coils	1	5	6
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Colvern wire wound potentiometers, 3 watt type, 2K, 2.5K, 5K, 10K, 50K		5	6
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1/2 and 1 watt, 20%		4	
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H.S.63.	Input 200/250v. Output 250/0/250v. 60 m/a 6-3v 3 amps, 5v 2 amps	15/6
H.S.40.	Windings as above. 4v 4 amps, 4v 2 amps	15/6
H.S.2.	Input 200/250v. Output 250/0/250v. 80 m/a	17/6
H.S.30.	Input 200/250v. Output 300/0/300v. 80 m/a	17/6
H.S.2.	Input 200/250v. Output 350/0/350v. 80 m/a	17/6
H.S.2.	Input 200/250v. Output 250/0/250v. 100 m/a	18/6
H.S.30X.	Input 200/250v. Output 300/0/300v. 100 m/a	18/6
H.S.3X.	Input 200/250v. Output 350/0/350v. 100 m/a	19/6

Fully Shrouded—

F.S.2.	Input 200/250v. Output 250/0/250v. 80 m/a	19/6
F.S.30.	Input 200/250v. Output 300/0/300v. 80 m/a	19/6
F.S.2.	Input 200/250v. Output 350/0/350v. 80 m/a	19/6
F.S.2X.	Input 200/250v. Output 250/0/250v. 100 m/a	21/6
F.S.30X.	Input 200/250v. Output 300/0/300v. 100 m/a	21/6
F.S.3X.	Input 200/250v. Output 350/0/350v. 100 m/a	21/6

All above have 6-3-4-0v at 4 amps, 6-4-0v at 2 amps.

F.S.43.	Input 200/250v. Output 425/0/425v. 200 m/a 6-3v 4 amps C.T. 6-3v 4 amps C.T. 5v 3 amps	42/6
F.S.25.	Input 200/250v. Output 350/0/350v. 250 m/a 6-3v 6 amps. 4v 8 amps. 0-2-6-3v 2 amps. 4v 3 amps	98/6
F.S.50.	Input 200/250v. Output 450/0/450v. 250 m/a 6-3v 2 amps C.T. 6-3v 4 amps C.T. 5v 3 amps	77/6

Framed, Flying Leads—

F.30X.	Input 200/250v. Output 300/0/300v. 80 m/a 6-3v 7 amps, 5v 2 amps	26/6
E.H.T.1.	1,000v 5 m/a, 2-0-2v 2 amps, 4v 1-1 amps	32/6
E.H.T.2.	2,000v 5 m/a, 2-0-2v 2 amps, 4v 1-1 amps	35/0
E.H.T.25.	2,500v 5 m/a, 2-0-2v 2 amps, 4v 1-1 amps	36/6
E.H.T.3.	3,000v 5 m/a, 2-0-2v 2 amps, 4v 1-1 amps	39/6

The above have inputs of 200/250v.

F.4.	Filament Transformer. Input 200/250v. 4v 2 amps. 7/6	
F.6.	Filament Transformer. Input 200/250v. 6-3v 2 amps. 7/6	
F.12.	Filament Transformer. Input 200/250v. 12-6v. tapped at 6-3v 3 amps	15/6
F.24.	Filament Transformer. Input 200/250v. 24v tapped at 12v 3 amps	21/6

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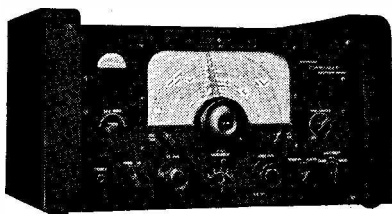
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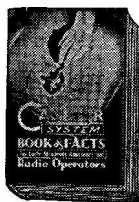
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FOR Sale.—Eddystone 504 Receiver, home or marine use, £30.—Mrs. B. White, 167 The Drive, Ilford, Essex.

SALE RSGB Bulletins July, 1941-October, 1947, 25/- 11 Wireless World, 5/-. Traders, March, 1943-May, 1946, 12/6. Rotary converter LT. 3v 4a, HT 310v 85 mA, 5/-. Philips mike and trans, 7/6. 75 ft. heavy coax, 12/6; screened twin, 3d. a yd. Valves: VU111, VU113, 6/-; 6J5, X66, MHLDe, 4/-; VR65, 2/6.—A. J. Slater, 72 Underdown Road, Southwick, Sussex.

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SUPER Skyrider SX17, 540 kc to 62 mc in six switched bands, xtal filter, noise limiter, S-meter, perfect condition, £35. Offers? Type 145 oscillator and 392 power pack, complete all valves, £9.—12 Westborough Road, Westcliff-on-Sea, Essex.

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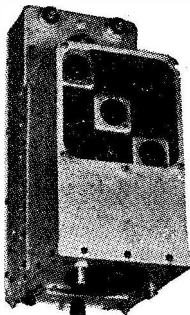
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W.E. 703A doorknob triode, 10/-, All brand new.—  
E. Noakes, 36 Greenfield Road, Little Sutton, Cheshire.

**AMK111** as new, complete phones, key, vibrator,  
spares. Sell nearest £10.—Pratt, G3EAC, 21  
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**F**OR Exchange 22 set, 80/40, VFO, xtal, CW, phone. Type A Mark I suitcase set 80/40, xtal, CW. Both complete and FB. Offers? G3COI, 59 Darlington St., Wolverhampton.

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**HRO** Junior for sale, P/Pack, nine coils, 50 kc to 30 mc, in coil container. Everything in 3-foot rack. Excellent condition, £25 or near offer.—Murray, Rockfort, Milngavie, Glasgow.

**H**AM, married, urgently requires unfurnished accommodation S.E. London. Can anyone help, please? G3DCA (Ex D2CA), 139 Charlton Church Lane, London, S.E.7.

**AR88'S** wanted, or 88D or F. Reasonable cash for good condition Rx's.—G8QV, 72, Hartington Road, S.W.8. Batt. 4761.

**UHF** signal generator Type 804 by General Radio, 2.5-330mc, 230v AC, good condition £30, Booklet. UHF receiver P58 300-600 mc, EC53 RF stage, xtal mixer, 45 mc IF, 230v AC mains, £12, as new. Panoramic adaptor BC1032B, good condition, tested OK, 230v AC, £8, circuit. Wavemeter 1191, built-in 230v AC supply, £8, as new. Wavemeter Class D, xtal accuracy, 0.0015 per cent. mod. 230v AC, with transformer, £7 as new. Absorption wavemeter (Furzehill) 0.8-17 mc, 30/-, CR100, as new, £25. Carriage extra.—Box No. 541.

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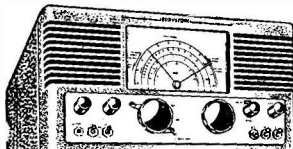
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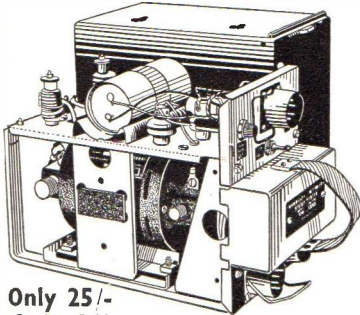
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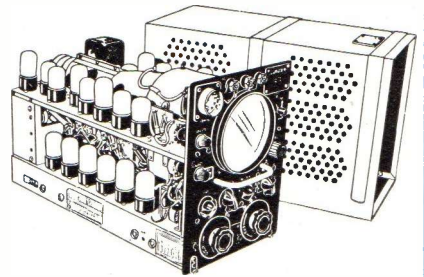
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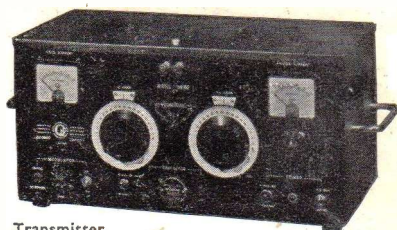
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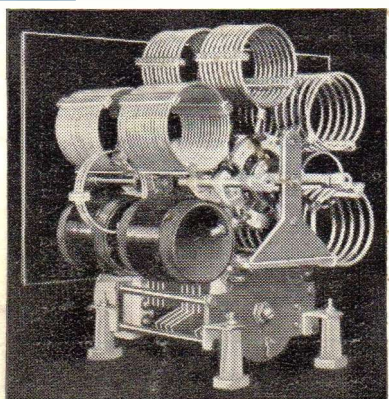
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**£12 : 12 : 0**

## Utility Slow Motion Dial



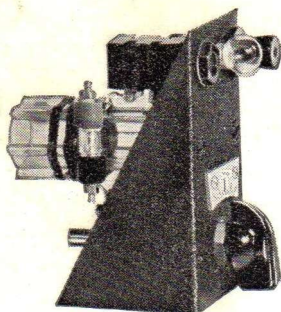
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**29/6**

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