

2/6

# *The* SHORT WAVE *Magazine*

VOL. XIV

JULY, 1956

NUMBER 5



WORLD WIDE COMMUNICATION

# H. WHITAKER **G3SJ**

Court Road, Newton Ferrers, SOUTH DEVON  
(A.R.B. APPROVED.)

Telephone:  
Newton Ferrers 320

Precision Crystals of all types in a wide variety of bases covering the complete range 50 Kc. to 18 Mc. in fundamental frequencies. All are made to extremely fine tolerances, and frequency adjustment can be given up to .005%. Plated electrodes of gold, silver or aluminium with wired in spot welded contacts are available. Quotations can be given for any type of cut or mode of oscillation including a complete range for filter circuits with zero temperature co-efficient over a sensibly wide temperature range. Our new works is equipped with up to the minute production technique methods, X-ray orientation ensuring accuracy of all cuts. Artificial aging by etching and plating by evaporation under vacuum ensure long term stability of the final calibration. Early delivery can be given of most types. Our regrind service is still available and in some cases we are prepared to quote for lowering the frequency of your existing crystals.

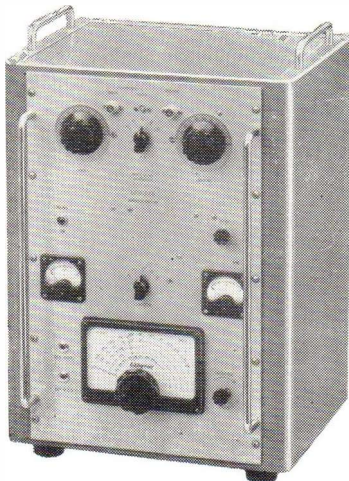
### *Special Offer :*

200 kc. DT cut, zero temperature co-efficient over the range — 30° centigrade to + 55° centigrade. Frequency adjustment .005% or better. Mode : Face shear. Silver plated electrodes, wire mounted. Basing  $\frac{1}{2}$ " pin spaced. Other bases to order, £1 each.

## WORLD-WIDE DX IS CERTAIN

with the

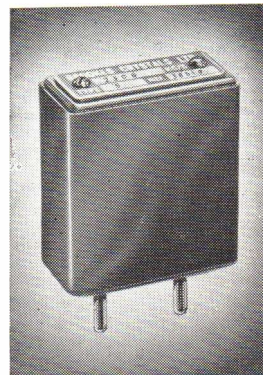
### Labgear 150 WATT TRANSMITTER MODEL LG300 Mk. II



U.K. PRICE 55 Gns. (with all valves except 813)  
Companion power unit/modulator now available. Send S.A.E.  
for leaflets SWM5035/5036

**Labgear (Cambridge) Ltd.**  
WILLOW PLACE, CAMBRIDGE, ENGLAND. Tel. 2494

## BROOKES *Crystals*



**mean  
DEPENDABLE  
frequency  
control**

Illustrated is a Type S  
Crystal unit from a range  
covering 100 kc/s to 15  
Mc/s.

- Black bakelite case.
- $1\frac{1}{2}$ " high x  $1\frac{1}{8}$ " wide x  $\frac{3}{4}$ " thick.
- Two  $\frac{1}{8}$ " dia. pins spaced  $\frac{3}{4}$ " centres.

ALL Brookess Crystals are made to exacting standards and close tolerances. They are available with a variety of bases and in a wide range of frequencies. There is a Brookess Crystal to suit your purpose—let us have your enquiry now.



### Brookess Crystals Ltd

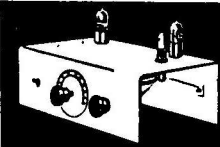
Suppliers to Ministry of Supply, Home Office, BBC, etc.  
181/183 TRAFALGAR RD., LONDON, S.E.10  
Tel. GRGreenwich 1828. Grams: Xtals Green, London.

# CALLING S.W. ENTHUSIASTS

**COURSES FOR RADIO AMATEURS EXAMS AND P.M.G. 1st & 2nd CLASS CERTIFICATES (THEORY). ALSO GENERAL COURSES FOR S.W. LISTENERS**

Take our special postal courses which have been written by experts both in these subjects and in modern methods of postal instruction. **E.M.I. INSTITUTES** are part of a world-wide electronics organisation, and many former students testify that our tuition was invaluable in ensuring their success in examinations.

**SPECIAL PRACTICAL KITS** are available as part of our Radio Courses. A typical course for beginners covers the design, construction and operation of a short wave 2 valve receiver. This equipment is supplied upon enrolment, and remains your property.



**POST THIS COUPON TODAY**

To E.M.I. INSTITUTES, Dept. 14 R, 43 Grove Park Rd., London, W.4.

Subject(s) of interest .....

Name .....

Address .....

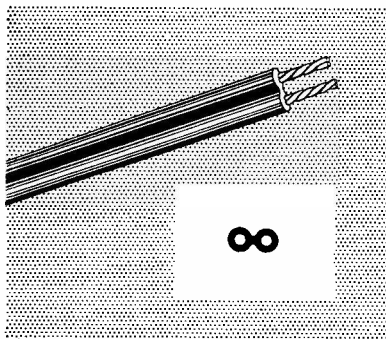
JULY .....

## E.M.I. INSTITUTES

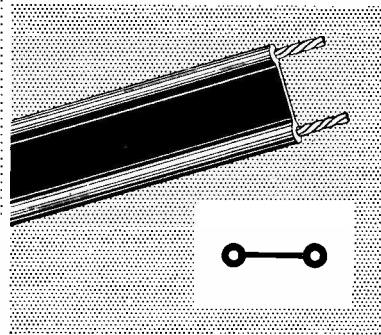
An educational organisation associated with the E.M.I. Group of Companies which include "H.I. MASTERS VOICE," MARCONIPHONE, ETC. I.C.43

# TELCON

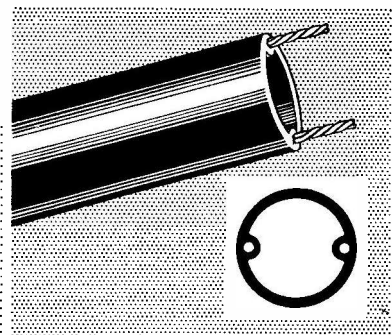
## LOW-LOSS TRANSMISSION LINES



**K.25.B** 300-ohms nominal impedance, flat ribbon-type twin; capacitance 4.6 mmf/ft; Attenuation at 50 Mc/s 1.0 db/100 ft; power rating at 100 Mc/s, 500 watts.



**K.24.B** 150-ohms nominal impedance, figure-8 section twin; capacitance 10.6 mmf/ft; Attenuation at 50 Mc/s, 2.1 db/100 ft; power rating at 100 Mc/s, 300 watts.



**K.35.B** 300-ohms tubular twin feeder with stable characteristics in varying weather conditions. Capacitance 4.0 mmf/ft; attenuation at 50 Mc/s, 0.92, db/100 ft; power rating at 100 Mc/s, 550 watts.

British Pat. No. 668,206

**THE TELEGRAPH CONSTRUCTION & MAINTENANCE CO. LTD**

Head Office: MERCURY HOUSE, THEOBALDS ROAD, LONDON, W.C.1

Tel.: HOLborn 8711

Enquiries to: TELCON WORKS, GREENWICH, S.E.10

Tel.: GREenwich 3291



## Now available for Immediate Delivery

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

# THE RADIO HANDBOOK

**14th Edition**

American, Published by "Editors and Engineers,"  
768 pages 60/- Post Free

# RADIO AMATEUR CALL BOOK

Summer 1955/56 Edition

Abridged Edition excludes only American amateur stations. Otherwise complete with latest call sign-address listings for all countries, and including much DX data. In its 33rd year of publication.

*Abridged Edition* Price 15s. Post free  
*Complete Edition* Price 31s. Post free  
(Available mid July)

# THE RADIO AMATEUR'S HANDBOOK

1956 Edition, 600 pages Price 31/6 Post free  
(Published by A.R.R.L.)

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

	<i>Post Free</i>
SINGLE SIDEBAND TECHNIQUES .....	14s. 6d.
SINGLE SIDEBAND FOR THE RADIO AMATEUR .....	14s. 6d.
HINTS AND KINKS, Vol. 5 .....	11s. 0d.
ANTENNA HANDBOOK (7th Edition) .....	19s. 0d.
ANTENNA MANUAL .....	28s. 0d.
A COURSE IN RADIO FUNDAMENTALS (New Edition) .....	10s. 6d.
HOW TO BECOME A RADIO AMATEUR (Published by ARRL) .....	5s. 0d.
LEARNING THE RADIO TELEGRAPH CODE ..	4s. 6d.
SURPLUS CONVERSION MANUAL.... Vol. 1.	21s. 0d.
Vol. 2.	21s. 0d.
MOBILE HANDBOOK (Published by CQ) .....	17s. 6d.
MODEL CONTROL BY RADIO .....	8s. 6d.
HIGH-FIDELITY TECHNIQUES .....	8s. 6d.
HIGH-FIDELITY .....	12s. 6d.
BASIC RADIO COURSE .....	19s. 0d.
PRACTICAL DISC RECORDING .....	6s. 6d.
RADIO AND TV HINTS .....	8s. 6d.
TRANSISTORS — THEORY AND PRACTICE ..	16s. 6d.
THE OSCILLOSCOPE .....	18s. 6d.
UHF ANTENNAS, CONVERTERS AND TUNERS	12s. 0d.
MOBILE MANUAL .....	22s. 0d.
OPERATING AN AMATEUR RADIO STATION (Published by ARRL) .....	2s. 8d.
BASIC AUDIO COURSE .....	22s. 6d.
SWEEP MARKER GENERATORS FOR TELEVISION RADIO .....	20s. 6d.
WORLD RADIO HANDBOOK (1956 Edition) ..	11s. 0d.
BEAM ANTENNA HANDBOOK .....	22s. 0d.
HIGH FIDELITY by G. A. BRIGGS (Published by Wharfedale Wireless) .....	12s. 6d.
WORLD RADIO VALVE HANDBOOK (1955 Edition) .....	5s. 10d.
(1956 Edition) .....	14s. 9d.

### MAGAZINES BY SUBSCRIPTION

	<i>One Year</i>		<i>One Year</i>
TELEVISION .....	48s. 0d.	POPULAR MECHANICS .....	32s. 0d.
TELEVISION ENGINEERING .....	32s. 0d.	SERVICE .....	24s. 0d.
CQ, Radio Amateur's Journal .....	44s. 0d.	ELECTRONICS. (Trade only) .....	160s. 0d.
AUDIO .....	40s. 0d.	POPULAR SCIENCE .....	45s. 0d.
RADIO AND TELEVISION NEWS .....	36s. 0d.		
QST, ARRL .....	36s. 0d.		
RADIO ELECTRONICS .....	33s. 0d.		

Subscription Service for all American Radio and Technical Periodicals.

## SHORT WAVE MAGAZINE

(PUBLICATIONS DEPARTMENT)

55 VICTORIA STREET · LONDON · S.W.1 · ABBEY 5341

*and now* **S.G. Brown**

LIGHTWEIGHT HEADPHONES FOR LADIES

Specially designed for use with dictation and recording machines.



S. G. Brown provide Headphones and associated equipment for all known purposes. Brochure 'S' sent on request.

These Headphones are extremely light in weight—only 3½ ounces. They can be worn for long periods without the slightest discomfort. They do not disarrange the hair and are designed to ensure long and reliable service.

**S.G. Brown, Ltd.**  
SHAKESPEARE STREET, WATFORD, HERTS.  
Telephone: Watford 7241.

# Faultless Reception

Depends upon Faultless Joints — Soldered with **ERSIN MULTICORE**



Safeguard the efficiency of your set with ERSIN MULTICORE, the only solder containing 5 cores of extra-active, non-corrosive Ersin Flux. Prevents oxidation, cleans surface oxides and eliminates 'dry' or H.R. joints.

Catalogue Ref. No.	Alloy Tin/Lead	S.W.G.	Approx. length per carton
C 16014	60/40	14	19 feet
C 16018	60/40	18	51 feet
C 14013	40/60	13	17 feet
C 14016	40/60	16	36 feet

**SIZE 1 CARTON 5/- each (subject).**

**BIB WIRE STRIPPER AND CUTTER**  
Strips insulation without nicking the wire and splits twin flex. Adjustable to most wire thicknesses. Nickel plated and in cartons with full instructions. 3/6 each (subject)

**MULTICORE SOLDERS LTD., HEMEL HEMPSTEAD, HERTS. (BOXMOOR 5636)**

## SAMSONS SURPLUS STORES

**36FT. AERIAL MAST.** R.A.F. Type 50 complete kit consists of 9 tubular Steel sections. Length 4ft. dia. 2in. Set of Pickets. Top Aerial attachments. Base Plate. Guys and all fittings. Supplied in canvas carrying bags. Ideal for TV masts £7.10.0 carr. 7/6.

**SPECIAL OFFER OF MINIATURE GEARED MOTORS.** Zenith 24v. 1/50 hp Shunt wound. 22 rpm at 24v. will operate on 6v. or 12v. 52/6 pp. 3/-. Glenn Martin 12-24v. approx. hp 1/60 400 rpm at 24v. Double ended spindle. 39/6 pp. 2/6. Miniature Hoover 12-24v. 9 rpm at 24v. 32/6 pp. 2/6. all Motor supplied Brand new in Makers Cartons.

**S.T.C. SELENIUM 24 VOLT 4 AMP RECTIFIERS.** 27/6 pp. 2/-. American Smoothing chokes. 13 H. 160 MA 160 OHM Res excide 10 volt 5AH glass accumulators size 7in. x 2½in. x 5in. suitable for HT unit construction and models. etc. New in Makers Cartons 8/6 pp. 2/-.

**COMMANDO ASSAULT TELEPHONE CABLE.** PVC 1000 yard drums. Ideal for telephone cable and very useful in the home and garden. 10/6 per drum pp. 2/-.

**T.C.C. BLOK CONDENSER.** 10MFD 500v. wkg. at 140 deg F. sub chassis mounting 6/- pp. 2/-. 2MFD 2500v. wkg. at 60 deg C. 8/6 pp. 2/-. 0.5 MFD 2000v. wkg. at 160 deg. F. 3/6 pp. 1/6. All condensers new and boxed.

**B.I. 4MFD 1000v. wkg. at 140 deg. F. sub chassis 4/6 pp. 1/6. B.I. 8MFD 500v. wkg. at 140 deg. F. sub chassis 5/6 pp. 1/6.**  
Just arrived Magnetic Marching Compasses Mark I 17/6 pp. 1/-.

**169/171 EDGWARE ROAD**  
**LONDON, W.2. Tel: PAD. 7851**

**125 Tottenham Court Road, W.1. Tel: EUS. 4982**  
All orders and enquiries to our Edgware Rd. branch please.  
Open All Day Saturday at the Edgware Road Branch.

## New Guaranteed Components—

**EDDYSTONE**  
Components suitable for "D.X. PILOT". Dials:— 598 Full Vision 24/6, 844 Direct Drive 3/-; 846 Bar Knob 3/6; Variable Condensers:— 586 140 μμF 12/-, 738 100 μμF 16/6, 585 100 μμF 11/6, 589 50 μμF 9/-; Coil Formers:— 847 2/6, 763 2/-, 646 1/6; 707 Coil Base 2/6; 893 or 529 Flexible Coupler 2/6, R.F. Chokes:— 737 2.5 mH 3/3, 1022 1.5 mH 3/6.

**SORAD**  
"D.X. Pilot" Switches:— 2 wafer (one ceramic, one paxolin) each 2 pole 3 way 16/-, 1 wafer, ceramic, 2 pole 3 way 11/-. Indicator Lamps:— Red, Green, Amber, Blue. Each 2/6; 6.3v .3 amp bulb for same 9d.

**POPULAR VALVES FOR AMATEURS**  
Brimar:— 5Z4 14/8, 6AM6 24/4, 6BW6 18/1, 12AU7 24/4, 5763 20/-, VR 150/30 15/-, 5B/254M (Miniature 807) 40/-; Mullard QVO-4 25/-, QVO6-20 (6146) 35/-.

**MOULDED VALVE HOLDERS**  
Octal 1/-, B7G 10d., B7G with screen 2/-, B8G 1/-, B9A 11d., B9A with screen 2/4, B9G Ceramic 2/-.

**DISC CERAMIC CAPACITORS**  
500 volt D.C. working, Hi-K:— 470 pF, .001 μF, .002 μF, .003 μF, .005 μF, each 9d.

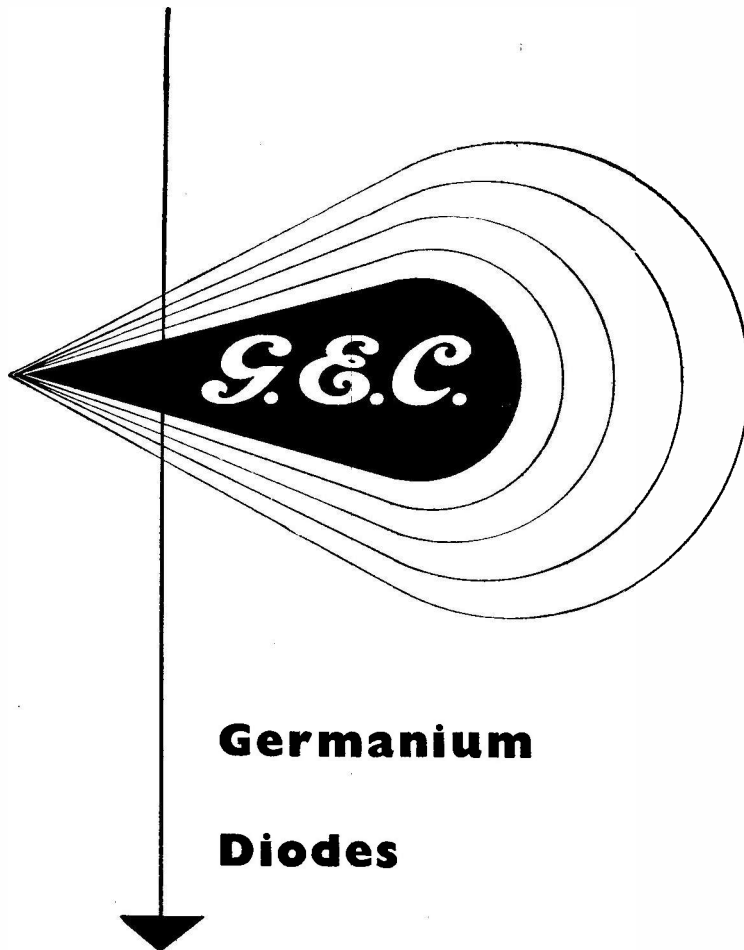
**NEGATIVE TEMPERATURE COEFFICIENT CAPACITORS**  
3 pF, 4.7 pF, 6.8 pF, 10 pF, 15 pF, 30 pF, 50 pF, 75 pF, 100 pF 1/-.

Orders over £3 post free. Minimum postage up to 10 ozs. 9d.

ANNUAL HOLIDAYS—August 13-18th inclusive

## Southern Radio & Electrical Supplies

So-Rad Works, Redlynch, Salisbury, Wilts.  
Telephone: Downton 207.



The G.E.C. range of Germanium Diodes comprises high and low back resistance types for use as F.M. and television detectors and noise limiters, V.H.F. mixers, telephony modulators and in other specialised applications. Germanium Diodes offer many advantages to the designer and they are being increasingly specified for use as clippers, clamping diodes, etc., in modern electronic equipment.

**GEX 54** (CV448) *This high grade crystal which is now generally available is of special interest to the electronics engineer. It is a high-back resistance diode with a forward current of 3 mA at + 1 V, and a reverse current of less than 100  $\mu$ A, at 50 V. It is particularly notable for its stability under wide temperature variations.*

The hermetically sealed glass capsule construction adopted by the G.E.C. is now universally recognised as the only satisfactory form. No major design change has since been found necessary, although a continuous process of refinement and detail improvement has produced the stable, reliable and efficient modern product.

**INDEX TO  
ADVERTISERS**

	PAGE
Altham Radio ... ..	279
Anglin ... ..	278
Brookes Crystals, Ltd. <i>cover ii</i>	
Brown, S. G. ... ..	227
Candler System ... ..	277
E.M.I. Institutes ... ..	225
G.E.C. ... ..	228
Henry's ... .. <i>cover iv</i>	
Home Radio ... .. <i>cover iii</i>	
K.W. Electronics ... ..	278
Labgear ... .. <i>cover ii</i>	
Lyons Radio ... ..	277
Marconi ... ..	277
Multicore ... ..	227
P.C.A. ... ..	280
Proops ... ..	230
Reed & Ford ... ..	280
Rollet, H. ... ..	280
Samsons ... ..	227
Small Advertisements	277-280
Southern Radio ... ..	279
Southern Radio & Elec. ... ..	227
S.W.M. Publications Dept.	226
T.C.M. ... ..	225
Universal Electronics <i>cover iii &amp; 279</i>	
Whitaker ... .. <i>cover ii</i>	
Young ... .. <i>cover iv</i>	

# SHORT WAVE MAGAZINE

VOL. XIV

JULY 1956

No. 155

## CONTENTS

	Page
<b>Editorial</b> ... ..	231
<b>70 Watts of Audio</b> ... ..	232
<b>Crystal Receiver with Self-Powered Transistor Amplifier,</b> <i>by J. M. Osborne, M.A. (G3HMO)</i> ... ..	237
<b>No-Mains QRP</b> ... ..	240
<b>DX Commentary, by L. H. Thomas, M.B.E. (G6QB)</b> ... ..	242
<b>Initial Amps. for Mobile Working, by J. H. Jones (G3GBH)</b> ... ..	250
<b>Calculation of Circuit Values</b> <i>by F. W. V. Buckland, A.M.Brit.I.R.E. (G3DIR)</i> ... ..	254
<b>Remote Station Control, by G. Whitby</b> ... ..	258
<b>Coil Winding Data</b> ... ..	260
<b>VHF Bands, by A. J. Devon</b> ... ..	261
<b>Methods of Construction</b> ... ..	265
<b>Letters to The Editor</b> ... ..	266
<b>Surplus Converter for Surplus Receiver, by J. S. Bennett (G3KLC)</b> ... ..	269
<b>Audio Clipper Unit, by D. M. Williams (GW3HZZ)</b> ... ..	270
<b>New QTH's</b> ... ..	272
<b>The Other Man's Station — G3KEP</b> ... ..	273
<b>The Month with The Clubs — From Reports</b> ... ..	274

*Managing Editor* : AUSTIN FORSYTH, O.B.E. (G6FO)

*Advertisement Manager* : P. H. FALKNER

*Assistant Editor* : L. H. THOMAS M.B.E. (G6QB)

*Published the Friday following the first Wednesday each month at 55 Victoria Street, London, S.W.1.*  
*Telephone : Abbey 5341/2*

*Annual Subscription : Home and Overseas 30s. post paid.*

**Copyright Reserved throughout the World.**

### AUTHORS' MSS

*Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of quarto or foolscap sheets, with diagrams shown separately. Photographs should be clearly identified on the back. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.*

# There is always a fine selection of equipment at

## The Walk-around Shop

### VIBRATOR PACKS (Mallory)

12V Input 150V 40 mA Size 5½" x 5½" x 3" Price 17/6 each.  
 12V Input 275V 80 mA Size 5½" x 5½" x 3" Price 25/- each.  
 6V Input 275V 80 mA Size 4½" x 6" x 4½" Price 35/- each.  
 With harness. Plus 2/6 p.p.  
 6V or 12V Vibrators (Mallory) standard 4-pin 7/- each p.p.

### COMMAND RECEIVERS

BC-453-B 190-500 Kc/s. Price £2 17 6 each.  
 BC-454-B 3-6 Mc/s. Price £1 5 0 each.  
 BC-455-B 6-9.1 Mc/s. Price £1 5 0 each.  
 Fully valved—Less Dynamotors (Not New). Plus 3/- p.p.

### COMMAND TRANSMITTERS

BC-458-A 5.3-7 Mc/s., BC-459-A 7-9.1 Mc/s. Price £2 each.  
 Fully valved—Less Dynamotors (Not New). Plus 3/- p.p.  
 A.R.88. Ceramic Wafered Range Switch Assembly. 8 wafers  
 mounted on chassis measuring 9" x 9" x 3¼". Spindle length 15".  
 Price 17/6 Plus 2/- p.p.

### MINIATURE I.F. STRIPS

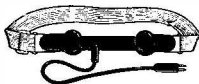


Size 10½" x 2½" x 3" frequency 9.72 Mc/s. 2 EF.92s and 1 EF.91 I.F. Amps. EB91 DET/AGC. EF.91 AGC Amp. and EF.91 Limiter. Circuit supplied. Price: (Less Valves) 8/- each p.p.

### TYPE 62A INDICATORS

Ideal for conversion to oscilloscopes, T.V. units, etc. Containing V.C.R.97, 12 VR.91 (E.F.50), 2 VR.54 (EB.34), 3 V.R.92 (EF.50), 4 CV.118 (SP.61). Slow-motion dial, 13 Pots and scores of useful components. Size: 8½" x 11½" x 18". In wooden packing case.  
 Price: £3 0 0 Carriage 7/6.

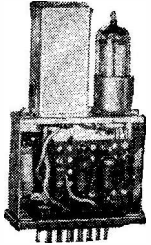
### THROAT MICROPHONES Type TS30



U.S. Manufacture. Complete with elastic strap. Lead terminating at plug PL291. New and Boxed, 2/3 post paid. Sockets available 6d. each.

### I.F. AMPLIFIER UNIT

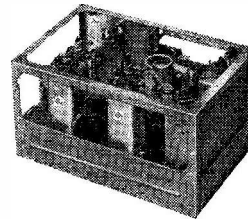
460 kc/s. with IT4. Brand new and boxed. Fully Screened in plug-in Box. Size 2½" x 1" x 4½". Price with circuit, 10/- each. Plus 1/- p.p. (as illustrated).



### MINIATURE TRANSMITTER STRIP Type 81

complete with valves CV.415 (TT15), CV309 (QV04-7), 2-6AM6, 2-EL91 and crystal. Circuit supplied Free with unit. Price £4 10 0. Post paid.

### RECEIVER UNIT Ex-1143A.



Suitable for conversion to 2 METRES or F.M. Wrotham transmissions. Valve line-up: (4) EF50; (1) EL32; (2) EF39; (1) EBC33; (1) EA50. Supplied with circuit diagrams. Fully valved. Price 35/- each. Plus 3/- p.p.

### A.P.Q.9 RADAR JAMMING UNIT

Containing 913A Photo Multiplier Cell, complete with resistance network and lightproof box. Wide band amplifier (2) 6AC7 and 6AG7, driving a pair of parallel 807s which Grid modulate a pair of 8012s in push pull. Lecher lines, these cooled by blower motor. Cathode loaded by Co-axial stubs which simultaneously guillotine tune anode and grid lines with a counter mechanism. Output is matched to aerial by a matching stub. Suitable for use in centi-metric bands. Brand new. Price £5, plus 10/- packing and carriage.

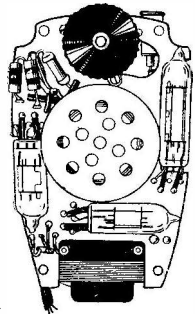
### 3 c/m WAVEGUIDE (American)

New Flexible and Rigid in lengths from 18in. to 5ft. Also hard bend, easy bend and fittings. Send for price and details.

### PAPER BLOCK CONDENSERS

8 uF 600V Wkg. ... 5/6 p.p.  
 4 uF 400V Wkg. ... 4/- p.p.

## Make a miniature POCKET RADIO



Incorporating high "Q" technique using the New Ferrite rod. Made possible by simple conversion of an ex-Govt. Hearing Aid.

Technical Details. A Germanium Diode Detector circuit followed by the existing 3-valve Amplifier, giving adequate amplification throughout the medium wave band.

This conversion can be carried out in approximately 30 minutes

SEE and HEAR this Miniature POCKET RADIO demonstrated

THE COMPLETE KIT OF PARTS includes a Type OL10 Hearing Aid (with Crystal microphone) in perfect working order with miniature earphone and moulded ear insert attached: ferrite rod, germanium diode, components, circuit diagram and full instructions. Price £2/6/- (less batteries) post paid. ALL COMPONENTS SOLD SEPARATELY.

Deaf Aid Unit with earpiece ..	£1 15 0
Plastic Ear Mould ..	2 0
Ferrite Rod ..	5 0
Conversion Components ..	4 0
Batteries 1.5 v. L.T. (Type D. 18)	8
30 v. H.T. (Type B.119) ..	4 3

NOTE: As the crystal microphone is not used in the Pocket Radio, it can, if desired, be used as a general microphone and it does not require a matching transformer.



# PROOFS

NOTE: Orders and Enquiries to Dept. 'S' Shop hours 9 a.m. to 6 p.m.—Thurs.: 9 a.m. to 1 p.m.  
 OPEN ALL DAY SATURDAY. Telephone: LANgham 0141  
**BROS. LTD., 52 TOTTENHAM COURT ROAD, LONDON, W.1.**



FOR THE EXPERIMENTER AND THE RADIO ENGINEER

# The SHORT-WAVE Magazine

## E D I T O R I A L

### **Progress**

*It being accepted that amateurs are those who indulge in some hobby or pursuit simply because they are interested in it for its own sake, it follows that their approach is individual and therefore possibly unorthodox.*

*In no instance is this truer than in the amateur approach to radio. It also happens that radio is one of those sciences to which amateurs have made a large, important and lasting contribution. Proving the facts as regards what we know as the HF communication bands, uncovering the possibilities on VHF, and showing what can be done in the field of transistory are only a few of the accomplishments which will stand any investigation when it comes to evaluating the worth of the amateur contribution.*

*Progress is always the result of enquiring minds questioning existing theories, or refusing to be content with established doctrine or practices. Had Sir Oliver Lodge refused to accept the opinions and advice of the pundits of the Royal Society of his time, it is a fair certainty that he would have forestalled Marconi in proving the practicability of communication by electro-magnetic waves. That Lodge allowed the scorn of his colleagues to discourage his own further experiments along these lines merely makes the contribution of Marconi all the greater.*

*In our own context at the present time, it is true that much amateur effort is wasted effort because the individual is re-discovering facts that are already established. But this does not matter at all because it is in itself a valuable exercise. The books cannot possibly teach everything, and much must be found out by personal experience and, above all, by experiment.*

*In the field of Amateur Radio, there cannot be too much of this process of personal investigation along unorthodox lines, for it is the very essence of progress. Amateurs in the radio field are concerned mainly with getting a result, and it may be of great importance if the practical application of their ideas is not in accordance with current theory.*

*Austin Fobler  
G6FO.*

# 70 Watts of Audio

## SPEECH AMPLIFIER / MODULATOR DESIGN FOR GOOD PERFORMANCE AND FULL OUTPUT

**T**HIS article discusses the design and construction of a 70-watt modulator or audio amplifier, intended not so much for economy as for performance. There is only a difference in load impedance between the two applications. It is important, however, that in the former the pre-amplifier should be protected against RF pick-up in the early stages.

The firm suggestion is that if you are without test instruments, do not try short cuts, either by omitting components or using parts of unknown value—unless you want to spend a lot of time chasing faults. To build a sure-fire job, use standard components and do not cut corners. Evidence of indifferently designed, or constructed, modulators can be heard every day. One has only to listen on any band, any day, at any time, to hear plenty of poor signals, proving that some amateurs cannot build them. Good ones are a little more difficult, but well worth the extra trouble as a clean, distortion-free signal is more easily readable in the presence of noise and interference.

When it comes to the design of an amplifier

the first thing to think about is the power output. This is usually settled very easily. If, for instance, we have a 150-watt transmitter, we require about 75 watts of audio. The next step is to look through a valve manual and pick a pair of valves that will give, say, 80 watts—or we can thumb through the magazines and find a design that says it will give 75 watts, and then copy it. Unless, however, you are using the stated HT voltage and a good modulation transformer giving the correct load it is a fair certainty that the thing will not give you the 75 watts you want. Output stages are very touchy about HT volts and unless you give them what they require they will not produce the expected output. They like to work into their correct load, too. So if you copy a design, copy it exactly, including the layout, unless you are prepared for trouble.

### Evolving a Design

If you like to design and build your own amplifiers the first thing, then, is to consider the output stage and the HT voltage. If you are looking for a lot of audio power Class-AB2 operation with tetrodes is undoubtedly the most economical way to obtain it, but not necessarily the easiest. Class-AB2 requires a bias supply and a reasonably well-regulated driver stage. Zero bias triode valves can be used, saving on the bias supply, but the driving difficulties are increased, as much more

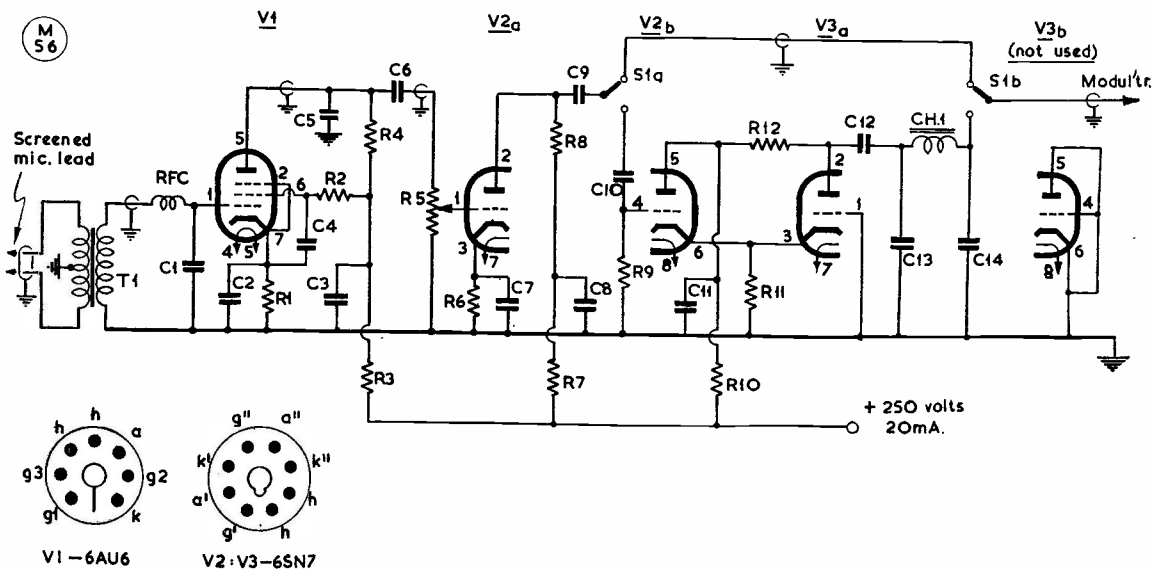


Fig. 1. Circuit of the pre-amplifier and limiter for the 70-watt modulator discussed in the article. Here the input is as for a moving-coil microphone. To use a crystal microphone, the correct load resistor, usually not less than 1 megohm, would have to be connected in place of the primary of T1, with an additional 4,700-ohm series resistor, making the input arrangement as shown on p.535 of the December 1955 issue. All other values are given in the table.

input power is required. Tetrodes are never driven to heavy grid current like a triode operated under Class-B conditions.

With a pentode or beam tetrode Class-C final RF amplifier, slightly more audio power than half the DC input is required on account of the energy absorbed by the screen. To be more practical, assume we have a pair of 807's with 150 watts DC input: To modulate them fully we shall require about 80 watts of audio. Allowing for a modulation transformer efficiency of 90%, the audio power given by the modulator should be 90 watts.

Looking through valve data sheets discloses two types capable of giving nearly this power into the primary of the modulation transformer. These are a pair of 807's or a pair of EL34's. There are other valves which are just as capable of giving this output power, but as the experiments were carried out around Brimar 807's, only the valves actually used are listed, without giving alternatives.

It is just as well, here, to point out the apparent difference between American and English ratings. It is really a difference of meaning only in that the American figures are usually for Intermittent Commercial and Amateur Service (ICAS), whereas English figures are for Continuous Commercial Service (CCS). With the latter the valves have to be reliable and have a long life—somewhere in the region of 5000 hours or longer. Assume you operate 2 hours every day for 350 days a year. (The balance of 15 days you are away on holiday!) This will give you over 7 years of operating. If the valve is so overloaded that the life is reduced to 2000 hours it will still give nearly 3 years' service. No one would grumble at this.

In other words, it is often more economical slightly to over-run a small valve for intermittent use where 100% reliability is not required than to buy the next size up. To go from an 807 to an 813, for example, is quite

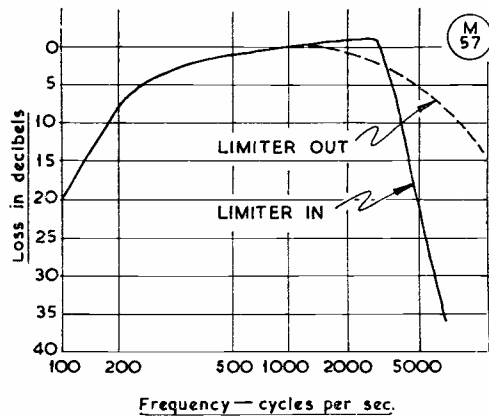


Fig. 2. Response curves of the pre-amplifier, with limiter in and out. It is controlled by the S1 switching in Fig. 1.

a big jump! Incidentally, an 807 does not take kindly to RF overloading, particularly as regards grid drive and screen voltage. If overloaded in either way you will find the grid current decreases and the screen current increases until the valve destroys itself or the fuses blow. On the other hand, at audio frequencies, the 807 seems capable of taking quite a beating. The R.C.A. lists a pair of 807's with 750v. plate and 300v. screen as capable of giving 120 watts output. The Brimar data on the 807 gives the maximum output as 80 watts with 600 and 300 volts respectively. There is usually no guarantee of valve life when operated under ICAS conditions. The writer has obtained 120 watts from a pair of 807's with 850 volts HT and a well regulated 300v. on the screens without any breakdown or apparent damage to the valves.

The snag with AB2 output stages is the variation of anode current with speech level. The variation is at least 50 to 200 mA in anode current—that is, an increase of 4 times from quiescent to driven conditions, and a similar change in screen current. The difficulty is to hold the HT supply voltage constant. In passing, it should be mentioned that it is this variation in current that rules out automatic cathode bias. The maximum from a pair of 807's with cathode bias is about 35 watts audio with 600 and 300 volts on plate and screen. With the same plate and screen voltages but using fixed bias the valves are capable of double this output! The drop in HT plate and screen voltage under driven conditions is usually what limits the audio output, preventing one from obtaining the "book" figure. The Brimar figure of 80 watts for

**Table of Values**

Fig. 1. Pre-Amplifier and Clipper for 70-watt Modulator

C1 = 50 $\mu$ F	R7 = 22,000 ohms
C2, C7 = 100 $\mu$ F, 25v.	R8 = 100,000 ohms
C3, C8,	R9 = 1 megohm
C11 = 8 $\mu$ F, 450v.	R10 = 47,000 ohms
C4 = .03 $\mu$ F, 400v.	R11 = 1,500 ohms
C5 = 100 $\mu$ F	R12 = 56,000 ohms
C6 = .001 $\mu$ F, 400v.	RFC = Small RF choke
C9, C10 = 500 $\mu$ F	T1 = As required for
C12 = .01 $\mu$ F, 400v.	m/c microphone
C13, C14 = 330 $\mu$ F	1:56, or Woden
R1 = 1,000 ohms	MT101
R2 = 560,000 ohms	Chl = 5 Henry
R3 = 33,000 ohms	S1A,
R4 = 220,000 ohms	S1B = DPDT toggle
R5 = 0.5 megohm gain control	V1 = 6AU6
R6 = 3,600 ohms	V2, V3 = 6SN7

600 and 300 volts on plate and screen with fixed bias is difficult to achieve with ordinary, reasonable sized, power units. With HT of 600v. under quiescent conditions, the plate voltage drops to about 550v. and the screen down to about 275v. (even with swinging choke input) when driven. With these actual voltages there is just about 50 watts available on the secondary. Do not misunderstand this statement. The valve manufacturers are not wrong. They are quoting what the valve is capable of doing if you treat it properly and give it the correct voltages *under all conditions*. That is to say, it must have its full 600v. when driven.

Hence, the easiest way to get this power output (80 watts) is to raise the HT voltage slightly so that it is still 600v. when the amplifier is on load. It means, of course, that in the quiescent state it will be up to about 650 or 700 volts. The screens must be held at 300 volts by means of two 150-volt stabilisers in series. The extra HT will not harm the valves.

**Power Pack**

Then there is the question of the rectifier. Few amateurs seem to use the dry-plate Westinghouse type of rectifier in high power circuits, so there is only the choice of the

ordinary high vacuum type or the mercury vapour type. The latter are much the more suitable where Class AB2 output stages are involved, with their varying current, as the HT voltage is kept more nearly constant. They do not always, as some amateurs think, create RF interference ("hash") in the receiver if they are properly operated — even if un-screened. At least, that is the writer's experience over the years, with four 83's in a bridge circuit. On the other hand, they can be tricky if the plate AC voltage is applied before they have reached operating temperature and they will not, under any conditions, withstand overloading.

To review the position: A pair of 807's with 700 volts on the plates and 300 volts on the screen will give us about 80 watts. The currents

**Table of Values**

Fig. 3. Driver-Output Stages of 70-watt Modulator

C1 = 50 $\mu$ F, 50v.	R8 = 22,000 ohms, 2 w
C2, C5 = 100 $\mu$ F	R9, R10 = 22,000 ohms
C6 = .01 $\mu$ F	R13, R14 = 10,000 ohms, 1-w
C3 = 100 $\mu$ F	R15, R16 = 47 ohms, 1-w.
C4 = 16 $\mu$ F, 350v.	Rv = 0.5 megohm gain control
R1, R2 = 2,200 ohms	T1 = Woden UM2 matching transformer
R3 = 2.2 megohms	
R4 = 560,000 ohms	
R5, R11, R12 = 470,000 ohms	
R6, R7 = 100,000 ohms, 1-w.	

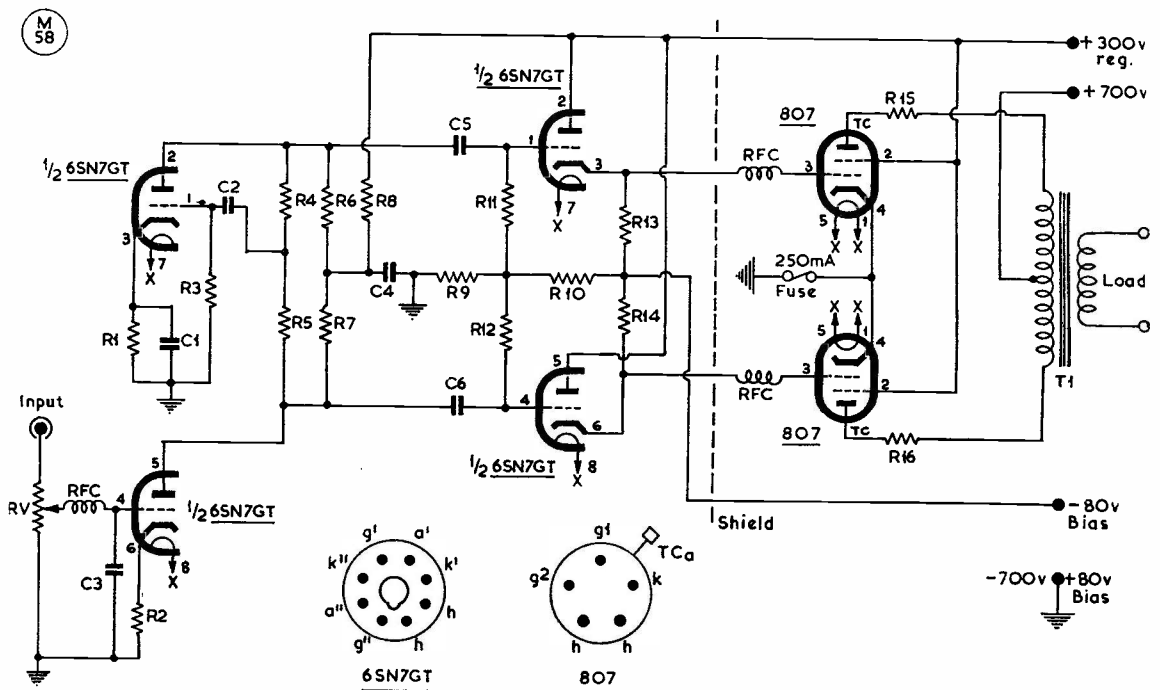


Fig. 3. Circuit of the modulator and driver section, discussed in detail in the text. With this arrangement, the full 70 watts of audio can be obtained from the 807's; by using a 6SN7 twin-triode, the driver transformer is eliminated. A suitable power pack for the speech amplifier/modulator complete is shown in Fig. 4.

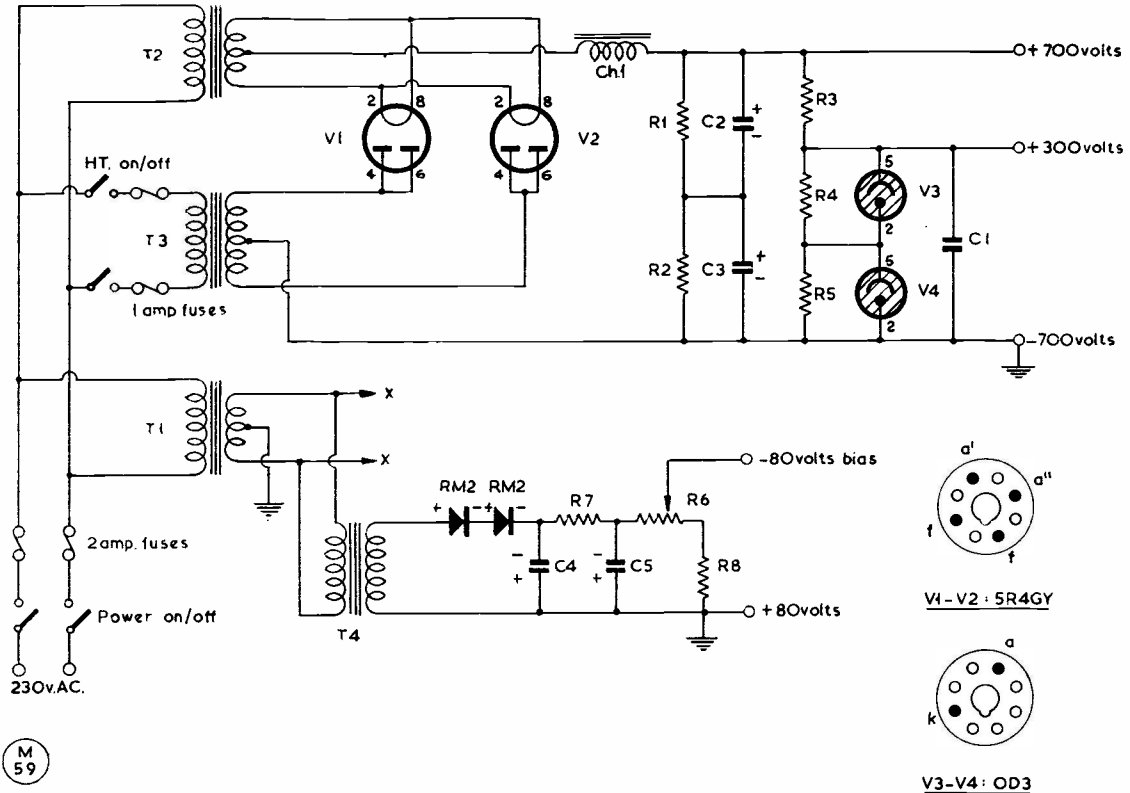


Fig. 4. Provided the main HT transformer T3 is properly rated, this power pack will run the 70-watt modulator comfortably. The stabilised supply is essential for the screens of the 807's; the necessary fixed bias is obtained by connecting a heater transformer T4 back-to-back with the main LT transformer T1.

will reach about 200 and 20 mA for plates and screens respectively on speech peaks. The anode-to-anode load should be about 6500 ohms and the grid driver stage capable of supplying about 35 volts peak to each grid with respect to earth. A fixed bias of about 30 volts on the grids is required and there is no way of avoiding it if you want this amount of power from a pair of 807's. (If you live in a district where the supply voltage tends to drop at night it is preferable to over bias slightly, otherwise the standing anode current will be too high when the mains voltage is low.)

**Driving the Amplifier**

There are two ways of driving the output stage—either by the usual driver transformer or by push-pull cathode-coupled triodes. The latter, with triode drivers, is probably the cheapest and easiest to feed with HT. The circuit is given in Fig. 3. It is the recommended Brimar arrangement. There is nothing special about it, except that it is sure-fire and works without any difficulty. One thing

**Table of Values**

Fig. 4. Power Supply for the Speech Amplifier-Modulator

C1 = .01 μF, 400v.	T2 = 230/5v. 4a., or Woden PTF-14
C2, C3, C4, C5 = 40 μF, 450v.	T3 = 230/750-0-750v. 250 mA or Woden PTM-17
R1, R2, R3 = 10,000-ohm 20w., w/w	T4 = 230/6.3v. (see text)
R4, R5 = 1 megohm, 1-w. w/w	Ch1 = 5-25 Henry swinging choke, or Woden PCS-12
R6 = 1,000-ohm var., w/w	RM2 = Brimar RM2 metal rectifiers in series
R7 = 5,000-ohm 20w., w/w	V1, V2 = Brimar 5R4GY
R8 = 1,000-ohm 5w., w/w	V3, V4 = Brimar OD3 stabilisers (VR 150/30)
T1 = 230/6.3v. 3a. heater xfmr or Woden PTF-15	

to watch is that the plates of the first 6SN7GT are well decoupled by a large RC filter, R8, C4. Whatever you do, do not make C4 less than 16 μF. If you do there is the possibility that the whole circuit will oscillate at about 2 cycles per second. This oscillation disappears when the amplifier is driven and takes 5 to 10 seconds to build up after the speech has gone off. It can be detected by putting an 0-100 mA meter in the cathode of one of the 807's, and will be shown by a slight waver

or oscillation of the meter pointer. The 807 is prone to parasitic oscillation, but if 47-ohm resistors are connected to the plate caps and a VHF choke of about 24 turns of 22 SWG enamel wire, wound over a 1 watt resistor, is put in each grid, you will not have much trouble. No negative feedback is used because:

- (a) NFB is tricky and can be a source of considerable trouble.
- (b) A straight flat frequency response is not required; actually the response is more than adequate.

### Building the Modulator

Regarding layout and construction: The diagram Fig. 3 shows a shield between the 807's and the earlier parts of the circuit. It is advisable to put a thin piece of aluminium right across the chassis so that the output stages are completely "blind" to the rest of the circuit. If the pre-amplifier (Fig. 1) is on the same deck or chassis not only is it preferable to have the screen—it is absolutely essential. The very small capacity formed between the 807 anodes and odd parts of the earlier stages is quite sufficient to cause self-oscillation. At audio frequencies one can take considerable liberties with wiring, except for high impedance circuits—usually grid circuits. These should not come near AC circuits carrying the heater current. The easiest and safest way for sure operation is to lay out the valve sequences in line as they are drawn in the diagrams. It may be a bit uneconomical as regards space, but it does prevent circuits doubling back on themselves and so avoids unwanted couplings between input and output sections.

### Operating Data and Results

On the amplifier as built the main HT was 680 volts no-signal, which dropped to 630 when driven. The first 6SN7GT (in Fig. 3) draws 3.5 mA and the second 10 mA. These values increase slightly with drive. An input of 4 volts RMS is required fully to load the 807's, which gave 69 watts at 7% distortion on test. The response is flat from 200 to 15,000 c.p.s. when working into a resistive load. When working into a Class-C RF stage the response may be modified on account of possible stray capacities, particularly if the RF stage is shunt fed. To preserve good modulation characteristics the RF stage should present a correct load to the modulator and the PA screen should not be by-passed by too large a condenser otherwise the modulating voltage disappears from the screen at the higher audio frequencies

and the percentage of modulation becomes low. When modulated, the plate current of the final should be perfectly steady. If not, try adjusting the loading and increasing the grid drive. *No final stage modulates correctly without adequate drive.* Another frequent cause of jumping plate current is the clamp circuit which is so popular these days. This valve may have sufficient bias to be cut off when the final is not modulated. On speech peaks the screen voltage rises to double its normal value and gives the clamp valve a chance to conduct, thus cutting the upward or positive modulation peaks.

The response of the amplifier has purposely been made good as it is preceded by a limiter to clip speech peaks—see curves Fig. 2. The flat response is necessary in order to preserve the output waveform of the clipper, V2b, V3a in Fig. 1, otherwise the phase shift (due to poor response) in the modulator can, and will, put peaks back on to the waveform. (The limiter itself will be described in detail in a subsequent article.)

The power unit may appear quite elaborate, and, in fact, it is — but unfortunately it is necessarily so in order to obtain a genuine 70 watts of audio. In the writer's case the two filament transformers are "surplus" 230/6.3v. items, one being rewound to give 5v. The main HT transformer is an ex-R.A.F. "surplus" component picked up at bargain price.

Hard rectifiers are used for the HT to avoid delayed switching and the associated thermal devices and relays. As previously stated, there is no way of avoiding the bias. With the 50-volt drop in the 10,000-ohm cathode resistors R13, R14 for the second 6SN7 valve, a negative supply of 80 volts is required; this has to be from a low-resistance source on account of the 10 mA taken by the second 6SN7. The easiest way to obtain this voltage is to connect a 6.3 volt heater transformer (T4 in Fig. 4) the "wrong way round," with the 6.3 side connected to the 6.3 winding of the transformer supplying the 807 heaters. Using a couple of RM2 metal rectifiers ensures that the bias supply comes up almost instantaneously when the heaters are switched on. Some form of protection against failure of the bias must be provided. This is done simply enough by a 250 mA cartridge fuse in the cathode circuits of the 807 valves, as shown in Fig. 3.

In the course of the writer's professional work many amplifiers have been built exactly as described here; measured for power output all have given the same figures, behaved well and played no mean tricks. Switch on and you're in business!

# Crystal Receiver with Self-Powered Transistor Amplifier

USING BC STATION CARRIER, RECTIFIED, TO PROVIDE HT

J. M. OSBORNE, M.A. (G3HMO)

Though this article describes what is no more than a simple BC receiver, the results it gives and the way in which it works will be fascinating reading to those interested in circuit design and the applications of transistors. For here we see another example of the versatility of the transistor and its extraordinary power-conversion capability—Editor.

THE normal A3 transmission from a broadcast station consists of a steady carrier and side bands containing the audio. With a conventional crystal set the audio energy ultimately powers the headphones, the steady carrier providing no information, for being steady, no audio results.

If the local station is strong enough this steady carrier can be rectified to provide enough DC to power a transistor audio amplifier. Some time ago *Electronics* (April, 1955) published such a crystal transistor set for working phones at increased strength on the local station and an English version,\* using an OC71 or OC70, is shown in Fig. 1. This DC power is of the same nature as the AVC

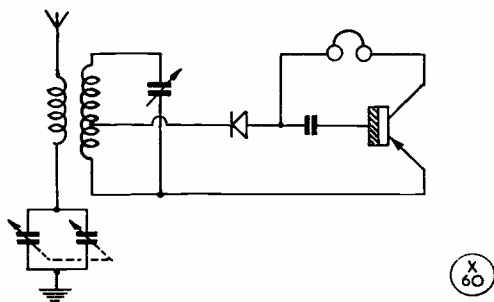


Fig. 1. This is the circuit appearing in "Junction Transistors for the Home Constructor" by Mullard Ltd., from which G3HMO evolved the design shown in Fig. 6. The arrangement above is essentially a local station receiver with a transistor amplifier powered by the DC component of the carrier tuned in.

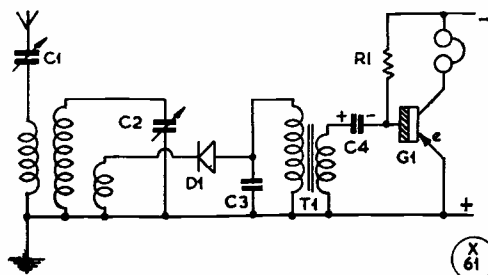


Fig. 2. An improvement on Fig. 1, giving better selectivity and more audio output. Power for the transistor is derived from a separate tuned circuit, of the type of Fig. 3.

voltage in a normal valve receiver and varies with field strength and aerial layout. The success of the system depends entirely on the strength of the local broadcast carrier and the effectiveness of the aerial in picking it up.

Now, the requirements of such a receiving arrangement are twofold: It must be designed to provide the maximum DC power for the transistor, and also selective enough to avoid interference from any other strong BC stations. As is so often the case, these requirements are conflicting and a compromise has to be reached. In the receiver to be described these two functions are separated, with important advantages. The coupling to the aerial for DC power can be as tight as is needed for optimum HT input to the transistor, while the receiver tuned circuit can be made as selective as is consistent with reasonable audio output. The novel feature of the arrangement described here is that the receiver can be tuned to a station different from that which is providing the HT. It is thus possible to receive many Continentals at good headphone strength, because they are tuned by a selective circuit with low output and then amplified by a transistor audio stage. The power for this amplifier is provided by the local BBC station and the receiver thus remains a true crystal set with no batteries.

In the writer's case, it has been found possible to obtain *loudspeaker* results on several stations. It is difficult to give an exact idea of the audio output, but it is loud enough to follow all programmes without strain or effort while sitting in the same room as the speaker. It is not strong enough to talk down a loud conversation which would, in fact, reduce the intelligibility of the programme.

## The Circuitry

To describe the circuit we will take the two parts separately. First the receiver proper is

\*"TRANSISTORS FOR THE HOME CONSTRUCTOR," Pamphlet issued by Mullard Ltd., Century House, London, W.C.1.

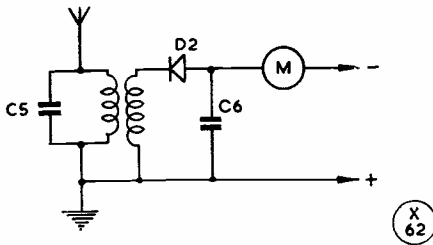


Fig. 3. If a circuit like this is tuned to a local BC station, appreciable DC power can be obtained from a germanium diode; this can be used to run a transistor. Experiments have shown that a good aerial is necessary to get the best results.

shown in Fig. 2. The aerial winding is a Teletron crystal set coil and is designed to give good coupling into the crystal diode; it is slug-tuned and wound with Litz wire. For selectivity the aerial coupling has to be loosened a little and this can be done with a 100  $\mu\text{F}$  trimmer in series. The primary of a midget step down transformer (actually designed for inter-stage coupling in transistor deaf aids) forms the load for the germanium diode and provides the input to a conventional grounded emitter transistor amplifier. The transistor is biased by a resistance R1, which should be adjusted for best results in each case and then left.

The power supply (Fig. 3) is provided by another crystal set, but here power transfer, not selectivity, is the watchword. The maximum RF power is collected in the tank circuit, which is tightly coupled into the rectifier circuit. This consists of a germanium diode with a 10  $\mu\text{F}$  smoothing condenser. An 0.1 mA

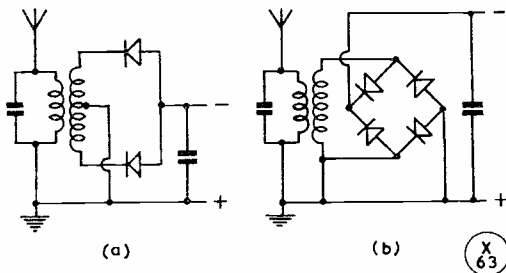


Fig. 4. Broadcast power tuned circuits for the experimenter — these are two full-wave versions of Fig. 3 and are discussed in the text.

meter is almost essential for checking that the power is on, and in setting up. A dummy load of 5,000 ohms is also helpful in making the initial adjustments. A 10  $\mu\text{F}$  capacity is needed to by-pass any audio component in the power supply. As far as RF is concerned, a condenser of .001  $\mu\text{F}$  would have been adequate.

It has been suggested that full-wave rectification would provide more output. Results have been disappointing, though under some conditions increases of 10% have been observed. This is probably a matter of matching, which is very important, although not very critical. In other words, there is very little aerial power available and so it is important to get most of it where it is wanted. On the other hand, a 10% improvement is neither here nor there, as it makes no audible difference to the output.

To return to the subject of full-wave rectification: It would seem to the writer that there is a limited amount of energy circulating in the tank circuit and one cannot draw it off faster than it is being replenished by the aerial. The rectifier is a load or damping on the tuned circuit, and whether it happens to be full-wave or half is not going to make a startling differ-

### Table of Values

For Circuits Figs. 3 to 6 inclusive

C1 = 100 $\mu\text{F}$ Air Trimmer	R3 = 50,000 ohms (see text)
C2 = 500 $\mu\text{F}$ Tuning Condenser	D1, D2 = Germanium diode, GEX-34, etc.
C3 = 0.005 $\mu\text{F}$ Cascap	T1, T2 = Transistor Deaf Aid Transformer, Bellere type FM-4.5-41
C4, C6, C7, C8 = 10 $\mu\text{F}$ Electrolytic 25v. working	G1, G2 = Junction Transistor: Mullard OC70, OC71; Brimar TJ1, TJ2, TJ3
C5 = Fixed padder for tuning local station	M = Meter, 0.1 mA.
R1 = 100,000 ohms (see text)	
R2 = 20,000 ohms	

ence. Certainly, the idea of collecting twice as much by collecting every half-cycle is quite false. However, for those who would like to try, two arrangements are shown in Fig. 4. The second is a bridge circuit which effectively doubles the rectifier loss, as in the conducting state two rectifiers are in series. The first circuit might therefore be a little better, but it does require a centre tap on the secondary.

Fig. 5 shows the complete circuit of the experimental receiver. The two parts are quite separate and can be tackled independently. The power unit should come first. Although tuning coils designed for crystal sets can be used for this section, much tighter coupling is needed for best results. The writer found that a good coil for his particular aerial system consisted of a 40-turn coupling coil of Litz wire on a  $\frac{1}{2}$ -inch slugged former overwound with a 50-turn tuning coil of the same wire. The tuning coil is directly connected to the aerial and earth and is resonated by a fixed condenser and adjustment of the slug. Normally only one station need be tuned in on this circuit



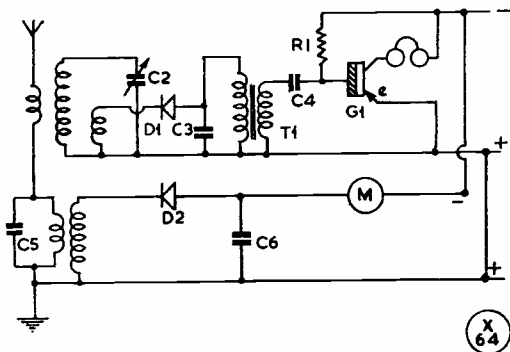


Fig. 5. By combining the circuits of Fig. 2 and Fig. 3 it is possible to have a multi-station receiver with its transistor amplifier working on radiated power. In this arrangement the power supply unit can be left set on the BC station giving the greatest DC output, the receiver itself being tuned round to any station that can be heard.

—the BC station giving the greatest rectified output.

**Aerial Considerations**

It must be emphasised that the success of the receiver depends on having a high field strength available and an aerial/earth system which can collect the power. The aerial should be high and long, with a good earth. In this connection the reader is reminded of the directional effect of the aerial, even on the medium wave BC band; aeriels of comparable length and height can give very different results according to direction. This is a matter for individual experiment on site, and is worth spending time on to get maximum pick-up. It is also a most interesting and instructive exercise!

The initial current obtainable from the local "power station" — in the writer's case, the Third Programme transmitter at Daventry, 20

miles away—was at first 0.1 mA into a 5,000 ohm load, for which the aerial was 60 feet long and 35 feet high. By improved coupling 0.4 mA was obtained. A new aerial at right angles to the first, 120 feet long and 25-30 feet high, gave 1 mA into the same load, representing an overall improvement in power of 100 times (20 dB). This output is more than is needed to operate the transistor, and when the Light Programme is off the air, London Regional (330m.), 40 miles away, can provide 0.2 mA with appropriate adjustment of the tuning.

Taking relatively large power from the aerial into a rectifier can have disadvantages. If there is insufficient filtering in the power unit, speech from the local station can break through. Another phenomenon noticed is cross-modulation of a nearby BC receiver. A clearly audible background of Home Service was present when the set was tuned to the medium-wave Light Programme. This disappeared when the power for the receiver (shown in Fig. 5) was switched off by detuning. Second harmonic of the power-providing station is also very pronounced. For best results it is essential to have completely separate aerial/earth systems, one for power and the other for tuning the desired signals. Even so, using Third Programme power, a strong Third Programme signal (whose fundamental is 464m.) comes up on 232m. between Luxembourg (208m.) and the Light (247m.).

**Receiver Design**

The power may be accounted for roughly in this way. The Class-A audio amplifier cannot have an efficiency of greater than 50%. So it is clear that the audio output cannot be greater, in any circumstances, than half the

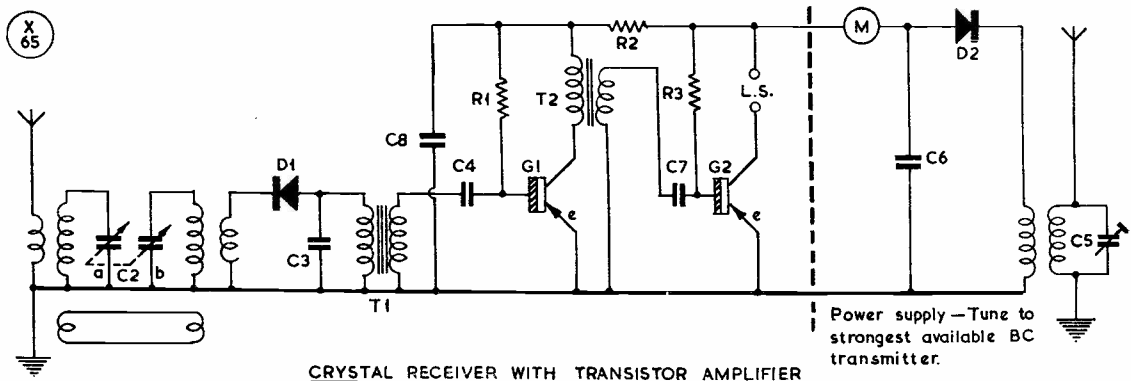


Fig. 6. A "de luxe" version of the crystal-transistor receiver, self-powered from any strong BC carrier, incorporating a number of refinements derived by experimenting with the original idea. By using band-pass tuning on the receiving side, (C2A, C2B being a two-section 500 μF condenser) much better selectivity is achieved, and the two-stage transistor amplifier should give enough output for a small speaker. Good outside aeriels will be found necessary in most locations, though this is a matter for experiment and will depend upon what is expected in the way of "DX".

total power available. There is not a great deal to be gained, theoretically, by using this set, transistor amplified, on the strongest local station except for the good selectivity. But with sufficient power gain in the audio stage every signal could theoretically be brought up to the level of the local, which is where the advantage lies. This implies that if one uses more than one stage of audio amplification, one should arrange that the earlier stage (or stages) draws a negligible fraction of the available power. In practice, it has been found worth while using two stages of amplification where 3 or 4 mW can be made available from the "power supply" station. With less power, the set with one audio stage is more satisfactory and can still give good headphone reception of Continental as well as British broadcast stations.

To do justice to the power available at the writer's site, a *de luxe* version of the set has been built (see Fig. 6). For reasons already given independent aerial/earth systems are used for power and signal. Better filtering has been incorporated. Two stages of audio are used, the first stage being allocated about 10% of the power. Band-pass tuning is used to get the maximum selectivity on the RF side. The set is obviously a straightforward development of Fig. 5, and this more complex circuit should not be attempted until the power facilities from local stations have been investigated and the simpler circuit of Fig. 5 proved satisfactory. With the more advanced set good loud-speaker results have been obtained on several Continental stations. A large and efficient speaker on a baffle should be used, as a small speaker does little better than a headset.

With two audio stages overloading occurs on

local stations and the loudspeaker can be driven more effectively with one stage. The layout and building of these sets is not critical in any way and the only points which need watching are the electrolytics and the bias resistors. The electrolytics should have low leakage, as obviously one cannot afford to waste the major part of one's power in this way. The bias resistors should be adjusted to suit the transistors and the values given are only a guide to the magnitudes involved. The best values usually lie between 20,000 and 200,000 ohms.

### Some Further Ideas

One does not pretend that, in its present form, this receiver is more than a toy, even though it can be left running continuously and is switched on and off by the BC carrier! It has its difficulties and its limitations. On the other hand, the manner in which it works on radiated power opens up some interesting possibilities.

For instance, could one use a battery storage system to make more power available? Sealed low-voltage secondary cells are on the market. Could one power a transistor transmitter in this way? Perhaps G3CSZ/TTX would look into this! Have we here the basis of a new, simpler and more effective local-calling device, consuming only radiated power? (See SHORT WAVE MAGAZINE, December, 1954.)

Though it has been suggested that it is immoral to use the BBC's Light Programme carrier to listen to Luxembourg (!), it cannot be illegal, since one is only drawing off the energy which cannot be prevented from reaching one's aerial—nor is it possible, in any case, to get more than the BBC is putting down at one's location.

---

## No-Mains QRP

### TWO-STAGE BATTERY TRANSMITTER

IT would appear that many stations still use batteries for power supply—either for stand-by gear or simply because they are without mains. The small transmitter described here is, therefore, offered for those who are interested in these situations. Though the details as given are for 40 metres—a good band for QRP now that the LF end is being cleared—the general idea is applicable to 80 and 160 metres as well.

The transmitter follows conventional design

and no snags should be met in construction and operation. The circuit consists of a crystal oscillator driving a Cossor 230XP in the PA. This valve is a "super" output triode, still available, and has been driven to 12 watts with 200 volts on the plate—although this, of course, is *not* advisable for any length of time!

In the model a permanent meter was included with suitable shunts and resistors, switched, for measuring the HT and LT voltage and PA grid and anode currents. But this is not necessary providing jacks are included in the respective leads and a suitable meter is available having ranges of 5 and 50 mA.

As both sides of the condensers are at HT potential, it is important to make sure that

**Table of Values**

**Battery QRP Transmitter**

- C1 = 100  $\mu\mu\text{F}$
- C2 = .001  $\mu\text{F}$
- C3 = 50  $\mu\mu\text{F}$
- C4 = Neutralising capacity
- C5 = 100  $\mu\mu\text{F}$
- C6 = .01  $\mu\text{F}$
- R1 = 20,000 ohms
- RFC = RF choke

X = Alternative key positions

**Coil Data — 7 mc Band**

L1 = 14 turns 24 SWG enam. spaced over  $\frac{1}{2}$ -in. on 1 $\frac{1}{2}$ -in. diam. former

L2 = 20 turns as above, spaced to tune with C5, and 2-turn link

they are well insulated from the panel. All supply leads are taken to a terminal strip at the rear of the chassis.

**Adjustment**

To set up the transmitter, the meter should first of all be inserted in the grid lead of the PA with HT applied to the CO only; when the crystal is oscillating a reading will be obtained—it might be 1.5-2.0 mA. Next, the PA should be neutralised, and the method is as follows: With the PA coil in rotate the PA tuning condenser. On passing through resonance a kick will be observed on the grid milliammeter. The neutralising condenser is then adjusted until *no movement* is observed when passing through resonance. It may be necessary to retune the CO slightly for maximum grid current during this operation.

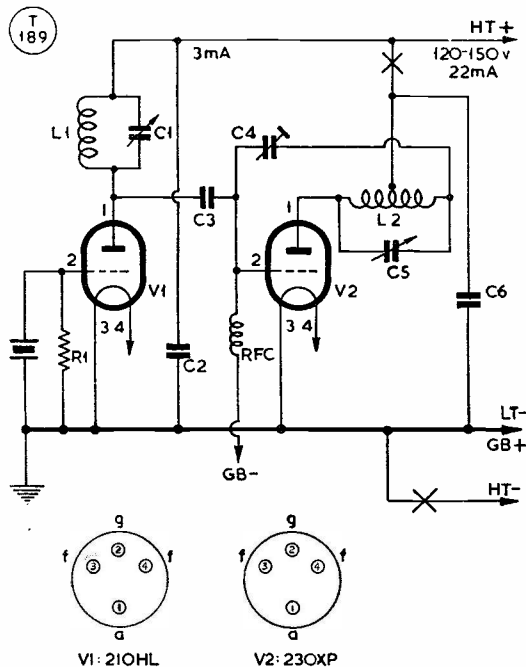
When the PA has been neutralised it should be biased to twice cut-off value, and the HT applied. This biasing back should be done carefully, starting from a value which is too high for any reading to be obtained on the PA meter. The correct setting depends, of course, on the actual HT voltage used. With the meter in the PA HT lead, the PA should then be tuned for minimum current—which will be 3.5 mA, from approximately 40-50 mA when off resonance.

**Operation**

It will be observed that keying is by breaking the HT negative lead; with a condenser filter across the contacts, no trouble should be experienced with key-thump or chirp. Alternatively, the PA HT lead can be keyed.

This transmitter has been tried on the 7 mc band only; as regards results obtained, some excellent contacts were made with European stations using a maximum input of 5 watts, although mainly the input was in the region of 2-3 watts. The aerial was a 40-metre dipole, link coupled to the tank.

Though designed round what are nowadays regarded as "obsolescent" or "replacement" valve types for old battery receivers still doing



Battery operated CO-PA transmitter for the 40-metre band. The neutralising capacity C4 could be a midget 3-plate variable and keying can be in either of the points marked X. With an active 7 mc crystal, it might be possible to get QRP RF output on 20 metres. A separate tuned circuit should be used for the aerial, link coupled to L2.

duty in country districts, this transmitter circuit has merit in that it is simple and yet will give good results.

For those who are experimentally minded, and like the idea of a very small and really portable no-mains transmitter, there is the possibility of using the new 1.4v. battery miniatures, with a small HT/LT block such as the Ever Ready "Batrymax." Indeed, there is great scope for the design of portable equipment of all sorts using the high-efficiency battery valves of modern type, for which Ever Ready battery units have been specially produced.

**DX ZONE MAP**

Readers interested in DX will be glad to know that they can still obtain our wall-mounting *Zone Map*. This is 35 ins. by 21 ins., in five colours, drawn to a great circle projection centred on the U.K., with time, distance and degree scales, and all chief place names marked. It also gives the 40 Zones into which the world is divided for amateur DX purposes, with a listing of the main prefixes under each Zone. The map is sent out well packed and rolled on a cardboard postal tube, and the cost is 3s. 9d. post free from stock, of the Publications Dept., Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

# DX COMMENTARY

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

WE have to report another rather discouraging month, due to the seasonal conditions rather than the overall level. In recent years, during the trough of the sunspot cycle, conditions have been so poor that one has almost forgotten the normal behaviour of the bands. Even at the peak of the cycle there is usually a notable falling-off of DX conditions during the height of the summer, and this is what we are now suffering from (without the compensation of summer weather). The first half of June showed us typical summer conditions in typical November weather!

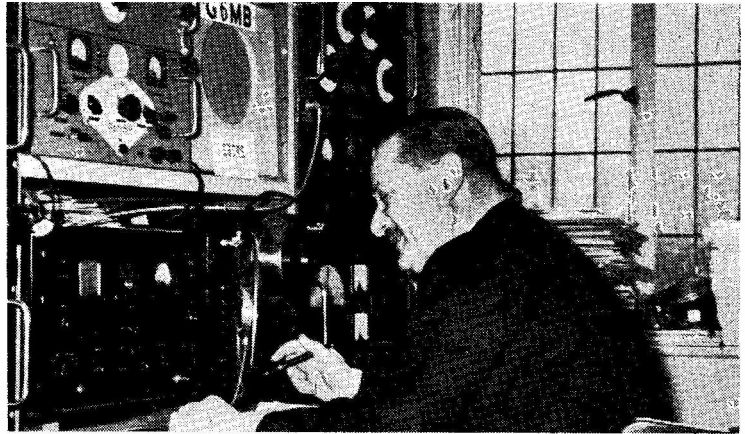
Our prediction is that next autumn and winter will produce DX conditions better than anything experienced during the last twelve months, and most probably equal to anything remembered by any of us. Meanwhile we must make the best of a dull patch.

A fairly high MUF is somewhat masked by variable conditions and by inactivity on *Ten*, but the DX is certainly there nearly all the time, though weak. Incidentally, there is no shortage of world-wide DX for stations in or near the Tropics—it's only in the Northern Hemisphere that this bad patch is holding things up. That, again, fits in with the normal pattern.

Reports are not quite so numerous this month, chiefly because of the uninteresting state of the bands, and partly because of holidays and other summer activities.

## Ten Metres

The DX on *Ten* is somewhat scarce, especially to the casual operator who can only check the band when time allows. Even



G6MB

## CALLS HEARD, WORKED and QSL'd

those who stick to it through all their spare moments haven't extracted much.

G3HCU (Chiddingfold) collected CR7CO, VK6RU and VK6KW one morning (0850-0935), and another session at a similar time fetched in OQ5AJ and ZS6ZA—all on phone.

G2CDI (Stokenchurch) found four new ones during a period of short skip—F, HB, LA and EA—but didn't notice any worthwhile openings.

GM2DBX (Methilhill) says "I'm happy to have a QSO with anyone I can hear—what a comedown!" G3GGS (Preston) reports little activity, but two new Europeans for the ladder.

G3GWO (Chelmsford) managed to wrinkle out OQ0BH in Ruanda for an interesting one; others worked on *Ten* phone were VQ3 and 5, MP4KAC, CX, OD, ZD6RM and ZS3B.

## Fifteen Metres

Apart from the mid-week lull, *Fifteen* has shown us some very nice DX. Daylight periods have often been dull, but by late afternoon the band wakes up and all sorts of things are liable to happen together.

New ones at G2CDI were SV0WE (Rhodes), TG9AZ, HH7YL, VP5RR, CT3AA, PJ2AN and VS4BO in Sarawak, as well as OZ, UA4, UB5 and UC2 (the latter on CW). A QSO with GC6FQ was believed to be the first GC/G phone contact on the band. Others raised on phone included KL7, VP4, 5, 6, 7 and 9, CO, VK (long path, 2230 GMT), ZD8SC, SV0WE (Crete), JA's, KR6 (1710), FM7 and PZ. Certainly not a bad month for CDI.

G3HCU has completed a new 4-element beam for 21 mc and has it on a 25-ft. mast for trial. At that height it compares very well with the old one at 45 ft. New ones for G3HCU were ZM6AS (0805), ET2FM, ZD8SC, FB8BZ, SV6FP (Crete), VS4BO and BV1US (0836), among others. Also worked were quite a few interesting stations not new for the band, including VK1GU at 2210 GMT, with 5's and 9's both ways. (Last month G3HCU was inadvertently credited with his All-Time scores instead of 1956 figures; this has now been put right, and the raised eyebrows may be lowered again!).

G3ICH (Leighton Buzzard) has unfortunately had a spell in

**21-28mc MARATHON, 1956**

Station	21 mc	28 mc	Total
G2CDI (Phone)	134	74	140
G3HCU (Phone)	107	41	113
VQ4RF	74	80	113
G3KHE (Phone)	71	19	75
G5BZ	65	38	78
MP4BBW (Phone)	60	57	80
GM2DBX (Phone)	59	19	63
G2DC	57	33	69
ZB1HKO	39	19	42
G3GGS	30	33	52
G3GZJ	17	6	20
G3JVJ	16	2	16
G3JWZ	10	4	14

hospital and so has not been active, but he just writes to comment on the late openings on Fifteen, with Central and South Americans roaring in around 0100-0200 GMT.

GM2DBX raised VP8BT and ZD8SC for new ones, apart from which he has not noticed much except the very late openings just mentioned.

G3GGS collected VP9G for an all-time new one, as well as OD, OZ, UA, UB5 and VP5 for the ladder. G3KHE (Birmingham) winkled out BV1US on the morning of June 13, both ways round, with the better signal *via* the long path. Other new ones, all on phone, were ZK1BS (21176 kc, looking for G's at 0830 on Sundays), VS1, 2 and 4. UA, VR3, VQ5, TI, and an XE on CW. Other points: VS4BO is a good signal from Kuching, and is anxious for contacts with Coventry stations, in particular; VS2DB says he is trying to raise some 21 mc activity from VS5; VQ5DES runs 20 watts from his car and is looking for QSO's with Redditch.

G3GWO succeeded with ZD2JHP on phone and JA1CJ and IACB on CW; KR6QV was heard at 1700 but not worked.

**Late Flash:** XE4A and YV0AA were both heard on CW around June 18, and W6ITH was due on

San Maarten as PJ2MC. We shall be interested to hear how U.K. stations fared in the contests to work them.

**Curtain Raised ?**

Slight pause to inform the uninformed that the Russian stations, in all USSR districts, are now working all and sundry with great gusto. Many of them follow a CW QSO with a request for a phone contact, and most of them use the RSM scale (Modulation 1 to 5). Nothing as exotic as UA0 or UL7 or UM8 has yet been reported on 21 mc phone, but we shouldn't be surprised to see them turn up any time.

The keen country-chasing types are rejoicing in the fact that up to eighteen "new" prefixes are now available to them which have been *taboo* for some years. On the other hand, those who worked all the eighteen before the Russian closing-down order could hardly worry less.

**DX on Twenty**

There is not a great deal to report about *Twenty*, which has been performing just about normally, but with what still seems:

to be a great excess of short skip. (To greybeards like us it always seems like the pre-war *Forty* . . . and our distant memories of Twenty label it as a DX band on which one was seldom bothered by Europeans. Is it a case of rose-coloured spectacles, or does the fact that everyone uses so much more power nowadays explain it?)

Early morning is still the best time for an uninterrupted DX session, with Oceania, the Pacific, West Coast U.S.A., and sometimes Asia all liable to come through. Later in the day the Europeans take over, together with East Coast W's, but another good session can usually be organised in the late afternoon. It it's South and Central Americans you want, stay up late. This has been the pattern of the band from time immemorial—it is only the short-skip nuisance, with Europeans scratching one another, that seems to have shown such a change for the worse.

G3GGS raised some all-time new ones with 9S4AX, HZ1HZ and UA9FB, all on CW. But during sessions at 2200-2300 GMT he missed such interesting possi-



In the troubled Island of Cyprus, ZC4GT is a club station at R.A.F. Ayios Nicolaos, with ZC4BV in this photograph. Other members with their own calls are ZC4AA, ZC4AL and ZC4RK. Since the end of March, when ZC4GT first came on the air, they have had about 400 contacts under the club call. Cards should be sent to Box 216, Famagusta, and all stations worked will be QSL'd.

bilities as FE8AE, HH3DL, 3W8AA, ZS7C, HI8FR, FG7XB, CP3CA and BV1US (all CW, too).

G8PL (London, N.W.3) works the band in the early mornings, using his little indoor aerial, and has raised W's, VE's and an occasional VK. He has also been more successful with the South Americans, such as OA4AV, YV5HI and 5BJ, CX6CM, HC1FG, PZ1BS and the usual LU's and PY's.

CE0AD has been heard on CW, a very good signal around 14010 kc, 0500 GMT. But current information is that he is not interested in QSL'ing. Other interesting ones for the 'chasers are M1B, SV6FP (Crête) and BV1US, all on phone between 14100 and 14200 kc. VR1B has been around on 14080 kc, and has also been heard on Fifteen phone and CW; by the time you read this he will probably be active from Nauru as VK9TW, collecting his dollar-QSL's with the new "\$600 receiver" with which he has just been presented by a well-known American firm. Unfortunately, Danny is credited (*Christchurch Times*, 24 Feb. '56) with the opinion: "I think my countrymen stink, with a capital S"! That means us! See "Letters to the Editor" for further comment on

this rather disagreeable topic.

**Forty and Eighty**

These two bands are now really neglected by the DX types, and who are we to blame them? Only a few brief notes remind us of their existence this summer.

GM2DBX worked and received a QSL from his first British Maritime Mobile, having had a QSO with GM3HLQ/MM (in the Clyde!) He also raised GW3GRO/P, using four watts and 2500 ft. up in the Welsh mountains. Both of these on *Eighty*.

G3JHH (Hounslow) heard UA3BC on *Eighty* during the evening of June 13; the UA worked DL's and OK's and at least one G station.

Your commentator himself has had a few listening sessions on *Forty* (usually around midnight), and has been surprised at the number of the rarer Central and South American countries coming through—but they have always been swamped by W's and operating conditions have not been good in any case.

**Top Band Topics**

Even the Top Band is getting into its summer doldrums, but a certain number of the keen types continue to push their way

**FIVE BAND DX TABLE  
(POST-WAR)**

Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries	Station	Points	3.5 mc	7 mc	14 mc	21 mc	28 mc	Countries
DL7AA	735	102	161	220	140	112	225	G3INR	265	43	51	101	50	20	114
W8KIA	657	61	145	258	84	109	258	GM3EFS	209	25	39	97	27	21	107
G5BZ	643	64	115	236	135	93	241	MP4BBW (Phone)	184	1	5	49	72	57	95
G3FXB	587	67	124	190	143	63	201	G3GWO	182	6	40	88	18	30	110
W6AM	494	30	58	264	85	57	264	G2DHV	175	19	25	112	7	12	113
G3FPQ	456	52	64	145	124	71	169	G3IUW	162	30	34	36	48	14	81
W1VG	450	25	113	170	88	54	178	G3JLB	162	31	28	49	32	22	74
G2YS	428	61	79	146	87	55	162	ZB1HKO	153	18	25	51	39	20	61
K2BZT	397	64	66	171	72	24	?	G3JWZ	140	41	44	41	10	4	69
GM2DBX (Phone)	384	33	31	158	81	81	171	G3HSM	137	14	43	46	26	8	64
G8KU	364	23	52	161	53	75	170	G3GZJ	114	18	28	36	26	6	53
G3ABG	364	45	83	157	49	30	165	G3JVJ	107	10	53	26	16	2	65
W6AM (Phone)	326	13	32	221	39	21	221	G3HEV	47	8	19	16	3	1	28
JA1CR	280	15	49	151	55	10	152	MP4BCA	36	1	1	5	13	16	16
G6VC	273	27	33	129	54	30	136	G3JSN	33	13	9	7	3	1	21

**TOP BAND COUNTIES  
LADDER**

(Starting Jan. 1, 1952)

Station	Confirmed	Worked
G2NJ	97	97
G5JM	97	97
GM3EFS	96	96
G3JEQ	94	94
G6VC	94	94
G2AYG	88	89
G3HEK	86	89
G3GGS	86	88
G3JHH	85	85
G3BRL	83	83
G3KEP	79	81
G3DO	74	74
G3XA	71	83
G3JZ	71	76
G3HZM	70	71
G3FNV	69	74
G2FTK	66	83
G2CZU	66	67
G3KOG	65	69
G8KU	63	65
G3DVQ	62	63
G3KKZ	60	64
G3JNX	60	61
G3EJF	57	64
G8CO	56	67
GM3JZK	54	55
G3KLP	48	52
G2HDR	45	54
G3ICH	38	53
G3JSN	26	30
G3KMQ	24	54
G3JZP	20	42
G3JME	16	25

through the static and keep things moving. Real DX work (meaning, at this time of year, long-haul GDX) is pretty difficult unless one has sessions at midnight and later. Even then the band seems slack.

Owing to a receiver breakdown, G2CZU (Bath) missed a contact with Nairn, which would have been a new one, but he raised GM3GZA on Lewis. On phone he has now worked 41 counties, of which 34 have QSL'd—he is still chasing that phone WABC. He also worked OK2KBA for his first OK, and ninth country on the band.



The very fine station of IIFA in Pavia, Lombardy, features an array of modern commercial equipment. All bands are worked and IIFA has been a well-known callsign for many years.

G3GGS found it a quiet month, but put his score up to 88 worked, 86 confirmed.

The hon. sec. of the Aldershot Club tells us that one of their members, G3AID, will be working from St. Mary's, Scilly Isles, between August 6 and August 31, operating Top Band between 2200 and 2300 BST most nights if there is sufficient activity to warrant it. During the day he will also be on Twenty.

G2NJ (Peterborough) asks if no one will undertake a trip to Alderney this summer? Such an expedition would produce a lot of activity, especially from 'NJ himself, who has been standing at 97/97 and waiting for someone to put Alderney on the map for a very long time. He would also like another Top Band Daylight DX Test, on a Sunday afternoon. This we will organise as soon as the holiday season is over—probably for early September.

#### The Overseas News

The hon. sec. of MARTS (Malaya) would be glad to know

the present addresses of any former VS1, 2, 4, 5, 6 and 7 amateurs, as it is intended to compile a list for publication in an early issue of *The Malayan Radio Amateur*. Will anyone in this category please drop a card by airmail to VS2DB, P.O. Box 777, Kuala Lumpur, Malaya.

K2BZT (Summit, N.J.) was the first U.S.A. station to qualify for our WBC award; he now claims his FBA and makes his first entry in the Five-Band Table. He sent in the latter figures "to show what a 150-watt station could do," and says that the high-powered boys over there have dominated the bands so much during the past years of poor conditions that one tends to forget that *most* W's don't use more power than *most* G's. K2BZT himself gets plenty of fun with 150 watts to a centre-fed 3.5 mc Zepp, with a 3-element 14 mc beam to help along. (Incidentally, we should tell him that "most" G's are found to be using 150 watts or less simply because that's the maximum we are allowed over here!).

G8PL forwards some interesting notes from ZB2R, who has a 150-watt CW rig and will be on phone next month. He is on Twenty most evenings, and sometimes makes it an all-night session; Forty is "deader than dead," but he does sometimes work *Eighty* with about 20 watts. There's too much QRM and QRN on One-Sixty, so he is not active at all on that band.

MP4BBW (Bahrein) found a few good spots during the last month or so, with nice openings on Fifteen, and even Ten sometimes in really good shape. New ones on Fifteen were VP5FH, ZD8SC, TG9AD, TI2RC and HK4CO, all of whom came back to CQ's. A WAC in just under two hours was obtained with TI2RC, VK4HR, HK4CO, OE2HW, 4X4FF and ET3AH (June 7, 0200-0400). Heard but not worked on Fifteen were BV, HC, HP, VP1, VK1, UB5, UQ2, EAØ and VK9, to mention a few.

MP4BCA is a brand-new station on Bahrein, at present sharing 'BBW's rig until his own arrives.

He shakes us by talking of TVI troubles — in *Bahrain!* (The USAAF in Arabia run a TV programme on Band III.) Noise level is also very troublesome out there, largely of the man-made variety, and no one seems to bother about suppressors. (Perhaps the TV will, indirectly, do the MP4's a good turn!).

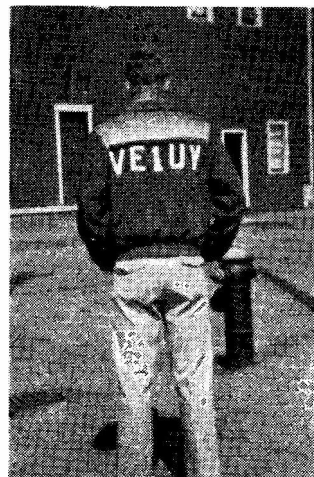
CN8AF (Casablanca) also makes FBA, and tells us that he runs a home-built band-switched transmitter on all bands from Ten to Eighty—50 watts to an 807. An HRO mates up with a home-made crystal converter for Ten and Fifteen. CN8AF is a member of the Old Timers Club and is FT4AD and FA3XA.

DL7AA (Berlin), still top of the

Five-Band ladder, reports that 3W8AA is OK (Rudi knows him well); that he will be on Forty at week-ends, and on Eighty this winter; also that the WAE "substitute country list" is withdrawn from June 1, but applications with substitute cards will be accepted until May 31, 1957. G6BS is the first WAE II holder on Phone; only twelve WAE I certificates are issued as yet, but 80 WAE II and 400 WAE III.

#### Certificates and Awards

We are very pleased to announce another *Magazine DX Award*—probably still the toughest nut to crack out of all the hundreds of certificates available from scores of countries. MDXA No. 4 goes to Glenn Thayer, W8KIA, of



Seen on the water-front at St. John's, New Brunswick, and photographed by G3JEG, radio officer of the m.v. "British Baron." He says that VE1UY is visible at quite a distance!

### SHORT WAVE MAGAZINE DX CERTIFICATES

#### WNACA (Worked North American Call Areas)

Twenty-two cards to be submitted, for contacts with stations in ten U.S. Districts (W1-9); nine Canadian (VE1-8 with one 8 in Yukon, one in North-West Territories); Alaska (KL7), Newfoundland (VO) and Labrador (VO). Contacts may have been on any bands, phone or CW. Operators in W, VE, VO or KL7 are not eligible for this Award. (98 WNACA Certificates issued to June, 1956).

#### FBA (Four Band Award)

Cards to be submitted with confirmation of contacts with 20 different countries, each country to have been worked on four different bands. Any bands will qualify e.g. 160-80-40-20, or 80-40-20-10, or 160-40-20-15 — and so on. Entrant's own country may count as one of the 20 countries. (60 FBA Certificates issued to June, 1956).

#### WFE (Worked Far East)

Eighteen cards to be submitted, for 18 different countries selected from among the following: C (China), C3 (Formosa), C9 (Manchuria), CR9 (Macao), CR10 (Timor), DRU (Philippines), FI (French Indo-China), HL (Korea), HS (Siam), JA/JKA (Japan), KR6 (Ryukyu Is.), PK1-2-3 (Java), PK4 (Sumatra), PK5 (Dutch Borneo), PK6 (Moluccas), UAO (USSR in Zone 19), VS1 (Singapore), VS2 (Malaya), VS4 (British North Borneo), VS5 (Brunei), VS5 (Sarawak), VS6 (Hong Kong) and XZ (Burma). All or any bands count. (22 WFE Certificates issued to June, 1956).

#### WABC (Worked All British Counties)\*

Sixty cards required, from sixty counties of the British Isles, all to have been worked on the 160-metre band since January 1, 1952. Counties to be as shown in any standard atlas, not "administrative counties" such as the three Ridings of Yorkshire, East and West Sussex, County of Bristol, and so on. Isle of Wight counts as Hampshire — not separately. Isle of Man does score separately, as do all the Channel Islands. Scilly Isles also count separately. For London, the L.C.C. area scores as one County. (129 WABC Certificates issued to June, 1956).

#### WBC (Worked British Counties)\*

Open only to claimants outside the United Kingdom and Eire. Cards required from 50 different counties of the British Isles, worked on any band 3.5 to 28 mc inclusive, phone or CW. Stickers will be issued to claimants showing proof of contact with 60, 70, 80 or 90 counties. The definition of U.K. counties is the same as for the WABC Certificate above. (Award instituted December 1955. 26 WBC Certificates issued to June, 1956).

#### MDXA (Magazine DX Award)

To qualify for this Award it is necessary to have worked 3 continents, 15 countries on 160 metres; 5 continents, 40 countries on 80 metres; 6 continents, 80 countries on 40 metres; 6 continents, 180 countries on 20 metres; and 6 continents, 90 countries on 10 metres. (Four Awards issued).

This involves a total of 405 QSL cards, which should not be sent. A list of all qualifying contacts should be given in the first instance when claiming the Award, after which certain selected cards will be requested for scrutiny.

\*A full List of U.K. Counties appeared on p.20 of the March, 1956 issue of SHORT WAVE MAGAZINE.

Claims, enclosing return postage, for all the above-mentioned certificates should be addressed "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1.

Defiance, Ohio. (The first three are held by G2PL, G8KP and W2QHH). Glenn put in a total score (all confirmed) of 16 countries on 160, 49 on Eighty, 100 on Forty, 253 on Twenty and 90 on Ten, thereby qualifying handsomely for his MDXA. It's still that qualification of 15 countries on One-Sixty that weeds them out! Congratulations, W8KIA, and also on making second place in the Five-Band Table this month.

And, in response to many requests, we reprint here full details of all our Awards, with the conditions attaching to them.

#### DX Strays

A small but unusual DX-pedition will be in operation on July 14/15, when G13KYP/P will be on the air from the Copelands—a group of three small islands off Donaghadee on the Co. Down coast. Operators will be G13HXV, G15UR and G13GSB, and five watts of CW will be going out on 80, 40 and 20. (At the same time G12HML will be on 144.138 mc with 20 watts of CW.) Contacts and reports will be appreciated—1700 GMT on July 14 until 1700 GMT on July 15.

It seems that VK1's are not necessarily exotic DX any longer, as we gather that VK2 calls have been re-shuffled and a number of VK1's are now in the former



second district. More of this when we get full details. (See later.)

YVØAA was on the air from Aves Island around mid-June . . . XE4A (Socorro Island) was also on from June 10, besieged by thousands of W's . . . A group of ON4's will have been on from Luxembourg, signing ON4QX/Lux, by the time this reaches you. If you missed them, you will be glad to know that DL1CR, DL3AO, DL9CI and DJ1BP will be going to Luxembourg for a week on either August 5 or August 12. They will be active, CW only, on all bands from Ten to Eighty—no call-sign yet announced.

VS2DQ passes on the following via G3HCU: VS4BO active (QSL via VS2DQ, Box 600, Penang) . . . VU5MR is an ex-VS1 and was due to be on from Nicobar Island, on Fifteen, from June 15 . . . Active on Fifteen phone are ZK1BS, K M 6 A X, KJ6BN, KM6CA and KX6ZB . . . VR3D, on Christmas Island, Pacific, is on Ten; ZC3AC, from the other Christmas Island (Indian Ocean) will show up some time in July.

"Rare" Russians now known to be operating are UG6AL, UN1AA, UP2KBA, UJ8AF and UR2AK . . . QSL's for 3W8AA can go via OK1FF . . . ACØAA is said to be in Unamchi, Mongolia . . . FB8BR is not likely to return to the Comoro Islands owing to licence difficulties . . . FB8BI is on the island of Juan de Nova in the Mozambique Channel . . . ZD9AE has been worked by W's, but we know nothing of his status or authenticity . . .

"SV1SM" on CW is said to be a Maritime Mobile in the Caribbean . . . YK1AC, still a rare one for many, is active on 14100 kc phone . . . YK1AK also said to be active.

### Pirates

Normally we prefer to ignore the activities of pirates, those Teddy Boys of Amateur Radio, but we have had several rather disturbing letters on the subject this month. DL2XS (who has also been G3ATH, XZ2HP, VS7PH and ZB2A) was working on Eighty when he was called by "M5CUK," giving his QTH as Nil and his name as Wak. This specimen went



The Frobisher Bay group, in the Far North-West of Canada, run a communal amateur station under call signs VE8OG, VE8SD, VE8SM and VE8YT, the operator behind which may be any of the chaps you see here.

QRT after suitable remarks, but started up again on the same frequency as G3ADH, which he changed, while sending, to FA8LP and later to OK1TN.

Then we are also notified by the Liverpool Club of considerable pirate activity up there, and are asked to warn readers of the following: "G2AVG," also uses the calls 3FOI, 3EOG, 3WAG and 3KES; "G2HLA," also calls himself 3KCP; "G3DKD" uses 3FRZ and 3FKD; and the calls G3ATX, 3BWB, 3JNA and 3KET are being used by unlicensed stations in the Liverpool area. Some of these work all bands—not always in the bands, and are liable to cause TVI and get law-abiding amateurs into all kinds of trouble. The matter is in the hands of the G.P.O. and we wish

the authorities every success in getting rid of these pests. Pirates of this type usually show themselves up very quickly by their ignorance of procedure and how to behave on the bands, and also, very often, by poor signals and flabby operating. Don't have anything to do with them—except, perhaps, to tell them what you think of them.

### Miscellany

G5RV showed up during June as VP6RV on Fifteen phone and CW, and we have it from G6UT that we may expect to hear more of 'RV from there from time to time; after a "residential qualification" in Caracas, where he is living, he hopes to obtain the call YV5RV.

ZL4AW (Otatara) very much wants to get in touch with AC4RF

—to see if he can collect that all-important card for his final WAZ qualification! ZL4AW worked Bob in 1949, just before he was captured by the Chinese; if anyone can put them in contact, ZL4AW would be very grateful.

The Army Wireless Reserve Amateur Radio Society was allotted the special call GB3AWR for the latter half of June, when it operated a station near Chester on all bands from One-Sixty to Ten. In addition, individual members roamed over North Wales and Westmorland, using their own calls on the Top Band and making a few rare counties available. Unfortunately, this information was received several days too late for the June issue, but we hope their efforts were duly noted and appreciated.

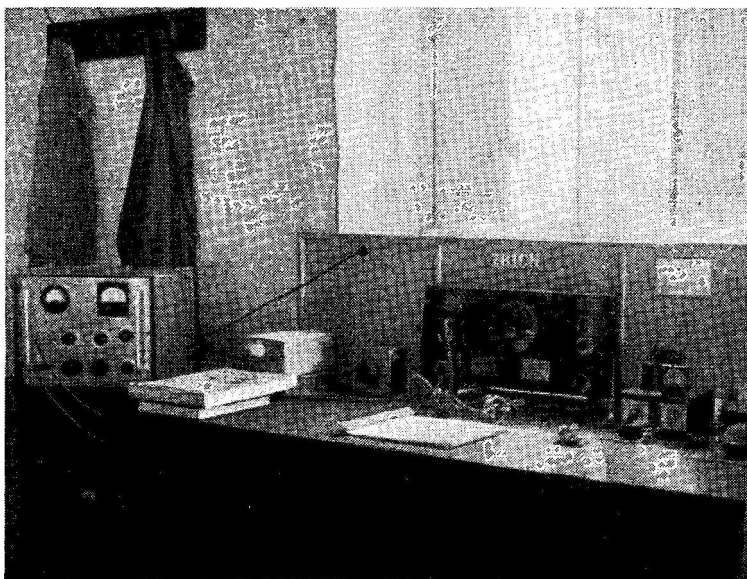
A few DX notes from SWL V. Kelly (Bettws-y-Coed): AC4NCB was heard on Twenty (1840), but labelled "probably phoney"; UQ2AN active most mornings around 0630; SVØWE often heard on Twenty phone, 0730; JZØPS heard working several G stations (this one, we think, is genuine); and (general comment) so much phone DX migrating to Fifteen and Ten that it leaves Twenty sounding like an inter-European band.

### More DX Strays

W6OYD worked AC3SQ on phone, short path . . . ZD9AE, it now appears, is the replacement party for ZD9AD; '9AE will be there for one year (on Gough Island) and runs 100 watts to a rhombic aimed on South Africa . . . ZS7H is on CW (14053 kc) and ZS7C on Twenty phone . . .

WINWO has received QSL's from UAØAA, ØKFD, UL7KAA and UA1KAC—all very nice except for the fact that he didn't work them! Some new racket seems to be developing . . . VK9TW (Nauru) will be on CW on 14075 kc, and on phone on 14130 and 21315 kc, but if requested on the latter frequency to operate CW he will do so . . .

CR10AA may often be heard around 14080 kc with a T7 signal (1200 to 1500 GMT); believed to be OK . . . MP4QAL about to be QRT but MP4QAP will soon be



The neat and efficient station of ZB1CH, Rabat, Malta, G.C.

on to keep the flag flying . . . YJ1AA still active around 14090 kc, 1130 GMT . . . FU8AA on 21 mc, week-ends, and FU8AC on phone, 14 and 7 mc.

From Antarctica there is activity at KC4USA (Little America) and KC4USV (McMurdo Sound). Towards the end of the year we may expect KC4USB (Marie Byrd Land) and KC4USN at the geographical South Pole. No mail will be forthcoming until the ships return in 1957.

### VK Call Changes

We understand that w.e.f. June 1st amateur calls in the Australian capital territory of Canberra, about 40 in all, were changed from VK2 to VK1. The VK1's in the outpost areas, e.g. the Antarctic, become VKØ, this to take effect by the end of the year. Simultaneously, the VK5's in the Northern Territory of Australia will become VK8.

### Another Island

A brand-new one was put on the map by GM5WW/P, when he operated from the lonely, uninhabited island of St. Kilda (get out those atlases!) from June 11 to June 14, with a QRP rig on Eighty only. Paul did not have

much time for amateur contacts, as he was there on strictly official business and could only be on as opportunity offered. However, he tried the 80-metre band in the early mornings, going off the air before 0700. He heard very few amateur signals (some GI's and GM's only), but did work G3FAS (High Wycombe) on sked for his one amateur QSO. This is the first time an amateur signal has been radiated from St. Kilda. Before the 1914 War, there used to be a radio station there, and in his exploration G5WW found its site, also what was apparently the armature of the generator used for power—a solitary and somewhat unexpected relic!

### Late Flash

In spite of all that we have said in the foregoing paragraphs about murky conditions, it is very pleasing to be able to record that they showed a tremendous improvement over the week-end of June 16/17. June 16 will long be remembered for the worst June weather on record (especially by holiday-makers), but with the appalling weather came a rapid change in radio conditions, until by the afternoon of the 17th the Fifteen and Ten-metre bands

were really wide open. By the time we know whether this was a flash-in-the-pan or a real build-up to better conditions, we shall have gone to press, so further comment must wait until next month.

### Country List

Our last complete list of Countries by Prefixes was published on p.282 of the July 1952 issue. The bulk of that list still stands as correct, but we feel that there have been sufficient alterations and additions to warrant the

publication of a complete and up-to-date list this season. This is at present being worked on, and will appear as soon as we are satisfied that agreement has been reached between the various parties concerned with the issue of certificates, diplomas and so forth. We hear rumours of a few new prefixes to be issued and some old ones to be changed, but it is hoped that our new list will be complete and ready in time for the opening of the DX season this coming autumn

That concludes this month's

offering, for which contributions have been rather slender. We hope to see all the regulars back in circulation next month, together with as many newcomers as possible. The deadline will be **first post on Friday, July 13.** (For overseas readers' benefit, the one after that will be *August 17*). Send your news and views, reports, grouses and general outpourings to "DX Commentary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Until then, Good Hunting, 73, and—may you hear all you work!

### CORRECTION

In the note on p.161 of the May issue, it should have been stated that R. W. Addie, G8LT, had been appointed assistant commercial manager of the Radio and Television Division of *Philips Electrical, Ltd.*

### CHANGES OF ADDRESS

When notifying a change of address, with a QTH for publication, it helps considerably if we are also told whether the reader concerned is a direct subscriber; this is to ensure his card being changed in the circulation index. If the month of expiry can also be quoted, that helps, too.

### CHRISTMAS ISLAND

It is reported that in connection with the forthcoming British hydrogen bomb tests, 300 Signals personnel are already installed on Christmas Island, from which "certain observations" are to be made on the tests. This is resulting in some amateur activity, in the meantime. Christmas Island, just north of the Equator and about 158°W., is a British possession.

### QSL BUREAU for GREECE

We are asked to announce that the QSL Bureau address for Greece is now Box 564, Athens.



On May 30, the Radio Industries Club held its 25th anniversary luncheon, at which 600 members were present, with the toast of the Club and the Radio Industry proposed by Alderman Sir Cuthbert Ackroyd, Lord Mayor of London. The response for the guests was by the Marchese Guilio Marconi (at left in this photograph) son of the great pioneer who proved the practicability of radio communication. The toast of the guests was proposed by Mr. H. de A. Donisthorpe (right) of the General Electric Co., Ltd., who knew Senator Marconi personally and fitted certain equipment in the yacht "Elettra," which in the early days was used by Marconi for much of his experimental work. His son, the present Marchese, came over from Rome specially to attend the celebrations. It will be remembered that Mr. Donisthorpe himself is one of the amateurs of the pre-1914 era, when he held the call DKX.

# Initial Amps. for Mobile Working

## LIMITATIONS OF THE CAR ELECTRICAL INSTALLATION

J. H. JONES (G3GBH)

*It is widely supposed that the dynamo can put back all the amps. taken from the car battery by the /M equipment. Our contributor, who is professionally concerned with auto-electrical installations, shows that in the modern car the battery and its charging dynamo are already being operated near their limits. This means that before any further load is imposed upon the system, certain precautions need to be taken and adjustments made if expensive failures are to be avoided.—Editor.*

**I**F the reader hopes for detailed instructions for building "the last word in mobile rigs" or how to make a "super centre loaded whip aerial with 20dB gain over a dipole," then let him turn to other pages, for here he wastes his time. But if a word or two about the source of power to run his mobile rig is of interest, then may he read on and, one hopes, derive some benefit.

The source of power supply for most of the mobile equipment seen by the writer is that poor old maid of all work—the car battery.

Over the last twenty years or so two important things have happened which react unfavourably on the car battery. First, the load placed upon it has increased enormously. A little over twenty years ago this consisted of a starter motor, one tail and two side lights, head lights, a single low-current horn and a light-duty screen wiper.

The modern car now has a starter, two side and three tail lights, two head lights (the power of which has increased from 24w. to 36w. or over for each light), a 48w. pass or long range driving light, a 48w. fog light, twin wind-tone horns, twin heavy-duty screen wipers, electric fan for interior heater and windscreen dimister. Add to this list the possibility of car radio, electric screen washer, electric free-wheel control, electric cigarette light, with other gadgets, and it can be shown that the battery's lot is not a happy one.

But that is not all. The car manufacturers now demand an even smaller and lighter battery; the battery makers can only comply

with a battery having a lower amp/hour capacity.

On this scene comes the /M amateur with still further demands. Small wonder that, "unless precautions are taken," the car battery may very soon refuse to start the engine at all.

To understand the whys and wherefores of these precautions a little of how the car electrical system functions needs to be understood.

### Basic Facts

The modern car dynamo is a plain shunt machine (Fig. 1). If terminal F is joined to terminal D and a battery placed across the junction D and earth (dynamo carcass) the battery would receive a charging current from the dynamo when the armature was rotated in the correct direction and at the right speed.

Because the field coils are fed from the armature brushes the current flowing in it will rise as the speed of the machine increases. As the field current rises so will the output of the dynamo go up, because the armature revolves in a denser magnetic field.

If the speed goes too high a point will be reached where the output of the dynamo is so great as to cause overheating, failure of insulation, melting of solder at the armature commutator and then complete breakdown of the machine—all quite quickly.

In the motor vehicle one cannot, for obvious reasons, have constant dynamo speed; therefore, it has become common practice to control the voltage supplied to the field windings and thus to keep the field current and consequently the dynamo output to safe limits.

To achieve this a resistor of suitable value is placed between terminal D and terminal F of the dynamo, which at rest is shorted out by a pair of contacts (C). These contacts are held closed by a spring (S), the tension of which is capable of adjustment.

A solenoid (VS), energised from the output terminals of the dynamo, is so arranged as to cause a relay armature to open points (C) as soon as the output voltage of the dynamo attains a preset figure (approximately 8 volts for 6 volt equipment and 16 volts for a 12 volt system). This places the resistor in series with the field circuit and brings down the field current, and as a result, the output voltage of the dynamo. This drop in output voltage causes the solenoid to release the relay holding the contacts open. The contacts close, shorting out the resistor, and the output voltage again builds up to the preset voltage, when the cycle is repeated. This sequence is very rapid and continuous so long as the speed of the dynamo

is such that the output voltage available is at or above the preset voltage of the regulator relay. Adjustment of the relay preset voltage is carried out by means of varying the tension of spring (S).

A second relay, again energised from the dynamo terminals, connects the battery to the machine when 12 volts appear at the dynamo terminals; when the dynamo volts drop below that figure, the battery is disconnected. This is to prevent the battery discharging *via* the dynamo windings.

Several other refinements appear in the modern auto-electric system, such as series windings on the voltage regulator solenoid to assist opening the points (C) if the current passing to the battery is too heavy due to dead flat batteries, or excessive load being placed on the system; spring (S) may be a bi-metal leaf which reacts to temperature changes and assists in opening the points if the rise in temperature is likely to be dangerous to the system. These variations can be ignored for the purpose of this article, as they do not affect the main argument.

The result of this control system is constant voltage at the dynamo output at all engine speeds greater than that speed required to produce the preset voltage.

Taking a 12-volt system as example, this is how things are arranged: The dynamo voltage is fixed at 16 volts. Therefore, the potential difference between the battery and the dynamo will be greatest when the battery is fully discharged.

A battery right up and on charge will have a terminal voltage of around 15 volts; with the one volt potential difference between it and the dynamo only a very small charging current can flow.

A fully discharged battery, however, will have a terminal voltage of as low as 9 or 10 volts; the potential difference between it and the dynamo will be around 8 volts and a much larger charging current will flow. Thirty amps would not be an unusual charging rate under these conditions. A proportionate charge rate will exist between these two extremes.

### The Dynamo

The dynamo fitted to the modern car has been designed round certain exacting requirements. It must supply a heavy charge rate for short periods when the battery is very flat. It must give a medium charge rate for long periods, *e.g.*, when head lights are in use. It must operate at high and continually varying speeds. It must be mechanically robust and

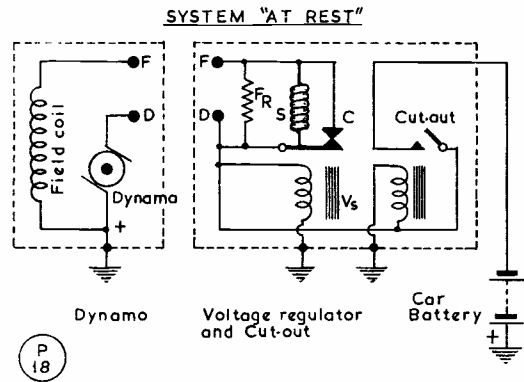


Fig. 1. Simplified circuit of the constant voltage control system in a modern auto-electric installation. Under normal running conditions, the contacts C are working rapidly all the time; when they are opened by the pull of the solenoid, the resistor Fr is put in series with the dynamo field coil and its output is reduced.

be efficient amid oil, road dirt and water.

But it must also be as small and as light as possible and available at a price to be economical to the car manufacturer.

It is *not* designed to operate continually at high charging rates, because under normal conditions the terminal voltage of a flat battery rises quickly when charging commences, with the rate of rise tapering off as the state of charge in the battery increases.

### Load Factors

If then we add load in the form of a transmitter and receiver to the system the dynamo will automatically adjust itself to that extra load *as far as it is safely capable of so doing*.

The final state of charge in the battery after a lengthy period of radio operating will depend on how heavy the load is and how often it comes on. Loads of 5 to 10 amperes used intermittently can nearly always be handled by the system. On the other hand, loads of 10 to 15 amps call for a certain amount of intelligent use if flat batteries are to be avoided.

Equipments involving big rotary converters and large numbers of valves may draw considerably more than 15 amps and require special measures, to be detailed later.

If, having installed your mobile gear, you find that the car battery is always flat, do not blame dynamo or battery before carrying out certain tests.

### Maintenance

Carefully measure the total load imposed by the additional gear. (It may be far in excess of what you thought!) If nothing untoward

is found next check the dynamo drive belt. Over half the cars taken to garages and electrical service workshops with complaints of low state of charge in the battery turn out to be due to dynamo drive belts that are slipping or are worn out. With the engine switched off try to turn the dynamo pulley. If you can turn the pulley whilst the belt does not move then the dynamo is not getting its necessary amount of drive when a load is placed upon it.

Examine the dynamo pulley. If the pulley is worn bright in the Vee the belt drives in, then the pulley and/or the belt is badly worn and needs replacing.

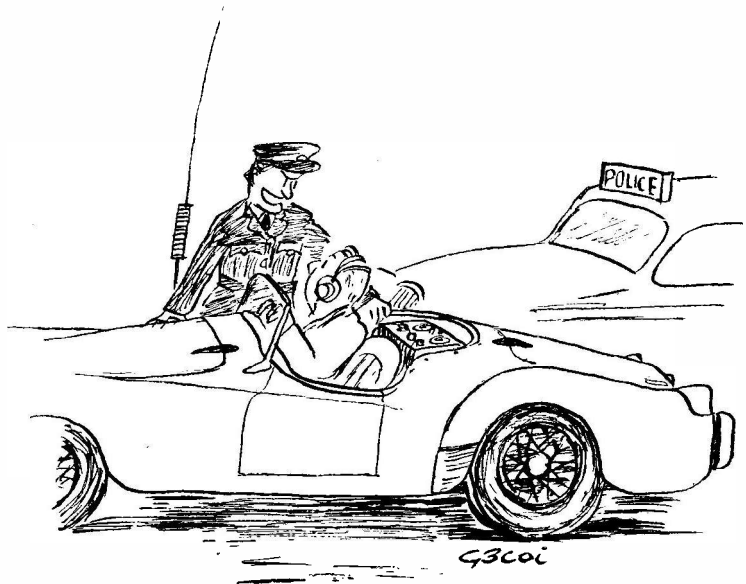
If examination shows that the belt is not riding in the bottom of the pulley, tighten the belt until turning the dynamo pulley results in turning the engine—or the resistance of the engine stops you turning at all.

Do *not* be tempted to alter the regulator voltage adjustment in an endeavour to obtain more output! You may get that output, but it will be at the expense of a new dynamo or battery. If you doubt the present setting of the regulator, take the car to a reliable electrical service workshop and ask them to check the regulator voltage for you. At the same time tell them you have added to the load on the system and would like them to set the regulator voltage at the highest value permitted by the makers.

The reason for this being necessary is that new cars are turned out with a setting to give average charge rates, though in practice cars are used under varying conditions requiring varying regulator settings.

For instance, local running with many stops and starts requires the maximum charge rate permitted because a very small mileage is being done with frequent use of the self-starter; a traveller, on the other hand, may do 100-200 miles of fast driving a day with very few stops, so that his battery would be overcharged if the regulator were set at maximum.

Let us see what tampering with the regulator setting can do. If you increase the voltage at the dynamo terminals you also increase the potential difference between the dynamo and



*“ . . . And if we don't slow down a little, Sir, we may find our suffix changed to stroke A . . . ”*

the battery, and of course increase the charge rate. But that increase in charge rate is on at all times and not just when your mobile gear is switched on. As stated earlier, the dynamo is not designed to give a *continuous* high charge rate and will in time be severely damaged. The battery electrically can accept very high charge rates, but will break down mechanically for the following reason: When a heavy charge is passed through a battery for an extended period, the internal temperature of the battery rises; this causes the lead grids, which are the foundation of the plates, to expand. In this expansion the active paste of the plates is loosened and falls to the bottom of the battery case. The battery loses its capacity and becomes useless.

Another result of prolonged high charging of a battery is the breaking up of water in the electrolyte into gases, which are driven out via the filler caps. This results in lowering of the acid level and unless constant topping up is carried out the plates so exposed get dry, hard and useless. Sulphate forms on the surface of the plates and again the battery is scrap.

### The Safe Limit

If your mobile gear takes 15 amps or over, or if your car is fitted with a small dynamo and battery and the system cannot keep the

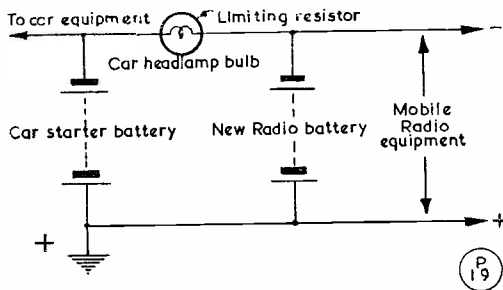


Fig. 2. The obvious way to provide extra amps for a mobile installation is to carry an additional battery. This should not, however, simply be paralleled with the existing electrics, otherwise the dynamo will be over-worked. A series resistor, consisting of a 3-amp. lamp bulb, will prevent this and the auxiliary battery will be kept on trickle charge.

battery reasonably charged, then two suggestions are offered.

Your auto-electrical service depot can fit a larger battery and a dynamo with a higher wattage rating. They will be pleased to advise you—but the expense may well be considerable.

The second suggestion is to obtain another car battery fully charged. Connect this in parallel with the car's own battery, but with a limiting resistor in one of the connecting conductors, and take your mobile supply from this second battery (See Fig. 2). The limiting resistor could well be an ordinary head-lamp bulb (a 12v. 36w. bulb passes 3 amps.). Thus, the car battery is trickle charging the radio battery; full radio load does not appear across the car battery, and the car electrical system will function normally. Of course, one does not get anything for nothing and the radio battery will need removing for a separate charge from time to time.

It is recommended that the radio battery be disconnected from the car battery (remove the bulb mentioned above) when parked for long periods, and each night, otherwise the car battery may be considerably discharged due to the current supplied to the radio battery, and therefore unable to turn the starter when required to do so.

### In Conclusion

Batteries should be kept clean and topped up regularly with distilled water. When checking for state of charge the only reliable instrument is the hydrometer. A fully charged battery should show a reading around 12.80 to 13.00 SG, but different makers have different SG readings, and reference to their data should be made.

Batteries should never be stored in a discharged condition. If not in use, give a full

charge at low charge rate every six or eight weeks whilst in store, checking at frequent intervals with the hydrometer. A neglected, unused battery can be ruined in a few weeks. A working battery well maintained will give good service for years.

### GW2BG, MAYOR of ABERGAVENNY

On May 23, the new Mayor of Abergavenny, in Monmouthshire, was installed with all the ancient ritual attending on that office. He is Councillor G. R. Silverthorne, GW2BG, who was first licensed in 1923 at Abertillery, Mon. Until about three years ago, he will be remembered as a very active phone station on the 160-metre band, with a particularly potent signal. His early transmissions were made on 440 metres (until 1926 a permitted amateur channel) and later on 180 metres, long before the bands as we know them today had been allocated. During the last war, GW2BG was in charge of radio interception and anti-espionage work in the South Wales area. He is in business in Abergavenny as a radio and television dealer.

### OBITUARY

It is with deep regret that we record the death, on June 9, of Roy McGregor Sutherland, G5RO, at the age of 59, after a long illness in hospital. "Suthy" was well known all over the country, both for his own cheerful personality on the air and for his sterling work for the Hastings Amateur Radio Club. He was, indeed, responsible for the formation of the Club before the war, when the call G6HH was allocated. Roy Sutherland was first licensed as 2AYN in June, 1933, and became G5RO in July, 1935; thereafter, he was a real enthusiast on all bands.

He was the personification of a genuine amateur in the sense that he loved his hobby, and would extend unlimited help to any fellow-enthusiast. On field days, at Club exhibitions, or any other event for which there was work to be done, he would shoulder most of it and build or lend most of the gear. He will be very sadly missed in Hastings and St. Leonards.

He leaves a widow and two daughters, to whom we offer our sincere sympathy in their great loss.

\* \* \*

We also very much regret to have to report the death, on May 14 at the age of 45, after a long illness, of William Kenneth Whiteoak, G2WU, of Colne, Lancashire. He had been licensed for nearly 30 years, since schooldays, and though recently inactive on the air, always maintained the keenest interest in radio.

He was connected with the textile and aviation engineering industries and will be much missed by a wide circle of friends. He leaves a widow and young son, who will also have the sympathy of all who knew him as G2WU.

# Calculation of Circuit Values

USING SIMPLE TEST  
APPARATUS

F. W. V. BUCKLAND, A.M.Brit.I.R.E.  
(G3DIR)

*Our contributor discusses an easy way in which required circuit values can be arrived at, taking as an example a circuit of his own described in a recent issue. Details of a useful and interesting item of simple bench test equipment are also given.—Editor.*

ON many occasions it has been found that, in wishing to reproduce a circuit as it is described, the components to hand are not exactly the value stated in the diagram, but are sufficiently close to justify their use, or at least to justify not having to buy them specially. Results cannot be exactly the same as were obtained in the original circuit, and frequently, where very close tolerance values are necessary, the results can be most disappointing. In this article the writer seeks to show, more especially to those with limited apparatus and experience, how to use simple test gear to ensure that a replica of the original—in results if not in actual value—can be obtained. Alternatively, it is shown how a circuit can be modified to suit a particular need.

After the appearance of an article by the author in a recent issue of SHORT WAVE MAGAZINE<sup>(1)</sup> several letters were received asking for values of the coil and condenser used in the variable frequency circuit, in order to cover a given frequency range. The writer has replied to all of these to the best of his ability, and as the circuit described in that article was not on the frequency range, nor using the particular valve which appeared in the final design, the various stages of designing, constructing and testing the final oscillator are described here. This is being done not so much to “sell” the circuit, as to show how simple apparatus, and ABAC’s, can be used in order to obtain similar results with different values. It is hoped that this may be of some interest to those who come across a similar problem in some other context.

The Low-C Colpitt’s oscillator had been selected as the circuit to use for the frequency controlling part of the oscillator, and now came the choosing of the valve, frequency range, and so forth. A 6BE6 was the choice—the circuit was required for a mixer—and the range to be covered was from 2 to 3 mc, as near as possible.

## Apparatus Used

Two pieces of equipment were needed to meet these requirements, and a few ABAC’s, as well as the station receiver. ABAC’s are available in most of the popular radio handbooks, and a comprehensive book containing nothing but these useful aids is available for a few shillings from one of the well-known technical publishing houses. (Those used were in a handbook.) The usual home-made test meter was one piece of equipment, and this one has a meter with a 1 mA movement, giving readings in mA, volts, and ohms—a most unpretentious piece of apparatus which surely must be found in the shack of all experimenters. But the second unit may not be found so frequently, though with so much “surplus” equipment about it is a very useful instrument. It is a simple means of measuring capacity; the circuit diagram is given in Fig. 1, in case it is thought worth while making one up. Perhaps a little explanation on its use and capabilities might not be out of place.

It consists of a grid-dip oscillator, operating in this particular case on about 7 mc—but it can use any frequency at all, preferably somewhat lower than this. In the diagram it will be seen that no values are given for the tuned circuit, for as just mentioned, it is immaterial to the working of the instrument, within reason. As the frequency is adjustable, it was set on 7010 kc (using a crystal) for one measurement when constructing the circuit to be described, but this is merely incidental as regards the unit itself. To construct this capacity measuring set, a condenser with an SLC (straight-line capacity) characteristic, *i.e.*, having semi-circular plates, was “adjusted” until its swing was exactly 100  $\mu\mu\text{F}$ , and as a scale with 100 divisions is fitted, each division reads 1  $\mu\mu\text{F}$ , and can be read off directly. It thus became a calibrated condenser, and is used across a coil so positioned that it absorbs power from the oscillatory circuit when it is at resonance, causing the grid current to drop and thus make the meter an indicator of resonance. With no capacity across the measuring terminals, the calibrated condenser is set at zero (maximum capacity) and after the unknown capacity has

(1) “The Low-C Colpitts Oscillator,” SHORT WAVE MAGAZINE, February, 1956.



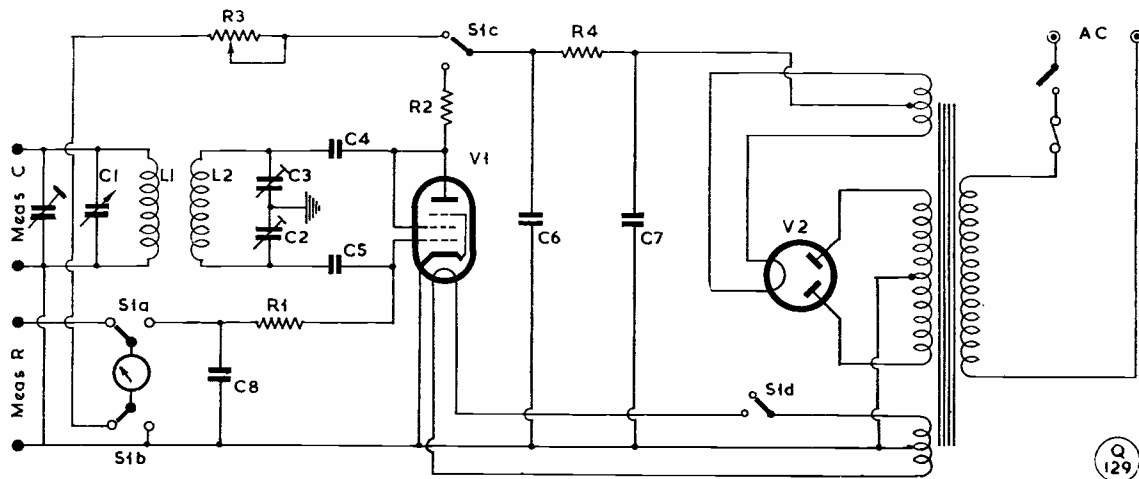


Fig. 1. Circuit of the capacity measuring unit used in developing the oscillator shown in Fig. 3. C1 is a calibrated condenser with a 100  $\mu\mu\text{F}$  swing, the method of doing the calibration being explained in Appendix 2. The instrument will also measure resistance and the switching is shown as in this position.

**Table of Values**

Fig. 1. Circuit of the Capacity Measuring unit.

C1 = 100 $\mu\mu\text{F}$ swing, calibrated	able (for meter adjustment)
C2, C3 = As required	R4 = 5,000 ohms, 1-w., smoothing
C4, C5 = 50 $\mu\mu\text{F}$ , mica	S1 = 4-position, double-pole
C6, C7 = 4 $\mu\mu\text{F}$ , smoothing	V1 = Any small triode, or triode connected pentode
C8 = 0.1 $\mu\mu\text{F}$	V2 = Rectifier
Cp = Preset trimmer	
R1 = 10,000 ohms, 1-w.	
R2 = 15,000 ohms, 1-w.	
R3 = 500,000 ohms vari-	

been connected to the terminals, capacity is removed from the calibrated condenser until resonance is restored. The amount of capacity indicated on the scale as being removed from the calibrated condenser is equal to that added by the unknown condenser, all strays being included in the original calibration of the zero point. Thus, the value of the unknown can be read off.

The device only measures directly up to 100  $\mu\mu\text{F}$  (the maximum of the calibrated condenser) but it is almost as simple to measure higher values. Simply take a condenser of value less than 100  $\mu\mu\text{F}$ —say, 50  $\mu\mu\text{F}$ . Measure it, and then add the unknown value which is larger than 100  $\mu\mu\text{F}$  in series with this 50  $\mu\mu\text{F}$ , and check the combination. The resultant will be less than 50  $\mu\mu\text{F}$ , and to calculate the value of the unknown, merely divide the product of the two readings by their difference. The result gives the value of the unknown in  $\mu\mu\text{F}$ . (See Appendix I.)

For the instrument itself, it is not easy to calibrate a condenser without having some sort of standard available. But though tedious, it is not impossible. (See Appendix II.)

**APPENDIX I**

To prove the formula for finding an unknown value of capacity when in series with a known value, and when the total series capacity is known.

Given C as the total series capacity, C1 as one condenser and C2 as the other :

$$C = \frac{C1C2}{C1 + C2}$$

Assuming C1 is 50  $\mu\mu\text{F}$  and C2 is 200  $\mu\mu\text{F}$ , then

$$C = \frac{50 \times 200}{50 + 200} \mu\mu\text{F}$$

$$= \frac{10,000}{250} \mu\mu\text{F}$$

$$= 40 \mu\mu\text{F}$$

Assuming C1 is 50  $\mu\mu\text{F}$  and C is measured as 40  $\mu\mu\text{F}$ , then

$$C = \frac{C1C2}{C1 + C2}$$

$$\frac{CC1 + CC2}{CC1} = \frac{C1C2}{C1C2 - CC2}$$

$$\frac{CC1}{C2} = C1 - C$$

$$C2 = \frac{CC1}{C1 - C}$$

Substituting,

$$C2 = \frac{40 \times 50}{50 - 40} \mu\mu\text{F}$$

$$= \frac{2,000}{10} \mu\mu\text{F}$$

$$= 200 \mu\mu\text{F}$$

### Measuring Inductance

One can also measure inductance on the instrument, aided by ABAC's. First set the oscillator of the measuring unit to a known frequency. In this case 7010 kc was used, but any frequency will do, it being necessary only to know what it is. Next, ensure that the calibrated condenser indicates resonance when set at zero. Having set it there, leave it. Connect a small variable condenser across the unknown inductance, put this tuned circuit across the measuring terminals, and adjust the capacity of this small variable until a dip is found on the meter. It is important that the calibrated condenser is not touched when doing this, the idea being to resonate the unknown coil to the known frequency. Carefully, taking care not to disturb the setting of the small variable, disconnect it from the coil, and measure it in the usual way. Knowing the value of the condenser to tune to the known frequency, it is easy to find the inductance of the coil from the ABAC.

In the diagram, Fig. 1, it will be seen that advantage was taken of the available high voltage to fit a switch whereby very high resistances could be measured. This is useful, as the test meter does not indicate high value resistances without the addition of an external high voltage supply, and here is one right to hand.

### The Example

Now to the design of the circuit, originally under consideration. The tuning condenser to be used was an SLF (straight-line frequency) type, with a minimum of  $9 \mu\mu\text{F}$  and a maximum of  $120 \mu\mu\text{F}$  — both measured on the aforementioned instrument. This gave a swing of  $111 \mu\mu\text{F}$ , and by inspection of the ABAC it was determined that a coil of  $31 \mu\text{H}$  would tune over a range of 2 to 3 mc with a capacity which could be swung from 90 to  $200 \mu\mu\text{F}$ , *i.e.*, a range of  $110 \mu\mu\text{F}$ . This was just inside the range of the condenser to be used, and so a coil of  $31 \mu\text{H}$  was constructed, again using details obtained from the ABAC. It was measured, required slight adjustment, and then finally found to be just  $31 \mu\text{H}$ , as required.

But there would be a further  $81 \mu\mu\text{F}$  or so to be included in the tuned circuit as well as the variable already chosen, and as the circuit was to be a Low-C Colpitts type, this capacity would have to be made up by the three condensers C1, C2, and C3, indicated in Fig. 2. It would also have to include any strays in the wiring, for which  $10 \mu\mu\text{F}$  was allowed. As will

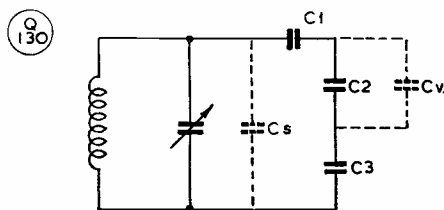


Fig. 2. Showing the capacity network in the Low-C Colpitts circuit, and the additional capacities to be taken into account when working to close tolerances.  $C_v$  is the capacity of the valve, and  $C_s$  the stray capacity.

be seen in the diagram, the input capacity of the valve ( $C_v$  in Fig. 2) would be across a very large condenser, and so could be ignored. The total to be added would therefore be about  $71 \mu\mu\text{F}$  and this being so, the grid condenser must be larger than this value, and was made  $100 \mu\mu\text{F}$ . (It actually measured  $102 \mu\mu\text{F}$ .) With the  $100 \mu\mu\text{F}$  in this position, the total of  $71 \mu\mu\text{F}$  could be made up with two  $480 \mu\mu\text{F}$  condensers in positions C2 and C3. The values were checked, and although both were nominally  $500 \mu\mu\text{F}$ , they actually measured 490 and  $485 \mu\mu\text{F}$  respectively. There is no doubt that using ABAC's is certainly not such hard work as calculation using inverted reciprocals, as would be required when dealing with condensers in series.

In addition to this, the makers state that the 6BE6 should not have more than 100 volts on the screen grid, *i.e.*, the oscillator anode, the grid resistance to be 22,000 ohms, and that the grid current, for efficient mixing, should be 500 microamps. These requirements further influenced the design, as will be seen later. From ABAC's, the necessary dropping resistor and its wattage were found, to apply 100 volts to the screen grid from a 250-volt supply.

Using the  $31 \mu\text{H}$  coil, the  $9$ - $120 \mu\mu\text{F}$  tuning condenser, and fixed condensers as determined above, the circuit was wired up and power applied. The voltage on the screen grid was 100 volts, and the resistor did not run hot. All well so far. Checking the frequency coverage on the station receiver indicated that it was from 1.9 mc to 2.95 mc—not a bad result on the original requirement of 2-3 mc. One turn was removed from the coil; the frequency range moved, and was now 2.1 mc to 3.05 mc. For the moment, it was left as it was, and the grid current checked. The test meter showed a reading of 100 microamps when connected between the grid resistor and earth. This would have to be increased, and to do this meant lifting the cathode tap to a position up the tuned circuit nearer the grid. In the circuit used, this

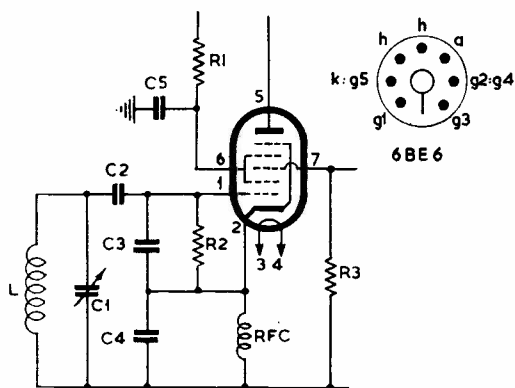


Fig. 3. The oscillator circuit as finally evolved, by the methods discussed in the text.

**Table of Values**

Fig. 3. Oscillator circuit as finally evolved

C1 = SLF, 9-120 $\mu\mu\text{F}$	R2 = 22,000 ohms, $\frac{1}{4}$ -w.
C2 = 100 $\mu\mu\text{F}$	R3 = 22,000 ohms
C3 = .001 $\mu\text{F}$	RFC = 2.5 mH
C4 = 330 $\mu\mu\text{F}$	L = 31 $\mu\text{H}$
C5 = .01 $\mu\text{F}$	V1 = 6BE6
R1 = 22,000 ohms, 1-w.	

**APPENDIX II**

**CALIBRATING THE CONDENSER**

(C1 in Fig 1)

Having constructed the capacity measuring instrument, the condenser C1 used for measuring can be calibrated quite accurately and readily by the following method:

Take two pieces of brass or other non-ferrous metal exactly  $1\frac{1}{2}$  inches square. When these two plates are fitted exactly square and parallel they make a two-plate condenser; the capacitance of such a condenser is extremely close to 1  $\mu\mu\text{F}$  if the plates are

accurately spaced half an inch apart. ( $C = \frac{A}{d} \times 0.2244 - \mu\mu\text{F}$ ,

where A is the area of one plate and d is the spacing, measured in inches.) Making the spacing between the plates one-tenth of an inch increases the capacity to 5  $\mu\mu\text{F}$ . Here, then is the "standard" by which the condenser C1 can be calibrated.

First, connect an additional known 100  $\mu\mu\text{F}$  (or larger) variable condenser across the measuring terminals of the unit, and set it at minimum capacity. This remains connected to the terminals throughout the calibrating operation, and can be called the *compensating condenser*. Then, with C1 (Fig. 1) set at maximum capacity, adjust the pre-set condenser so that the meter shows a dip. The dial reading of C1 will be zero, and should be marked accordingly. Now connect the 5  $\mu\mu\text{F}$  "standard" across the measuring terminals (in addition to the compensating condenser), and adjust C1 until the dip again occurs. Carefully mark the indicated position of C1 on the dial; this is the 5  $\mu\mu\text{F}$  point. Remove the "standard," restore the dip using the compensating

condenser this time, taking care not to move C1. Again connect the "standard," and again adjust C1 to the dip. A second point is now indicated on the dial of C1, and should be carefully marked 10  $\mu\mu\text{F}$ . Remove the "standard," restore the dip using the compensating condenser, replace the "standard" and find the dip using C1. The third point, to be marked 15  $\mu\mu\text{F}$ , has been calibrated. Continue until the full condenser has been calibrated, after which the compensating condenser can be removed, having served its purpose. The 1  $\mu\mu\text{F}$  points can be inserted by interpolation between the 5  $\mu\mu\text{F}$  points already found, but this is very tedious, and liable to errors. It is thought, however, that the 5  $\mu\mu\text{F}$  calibrated points would be sufficient to make the unit of considerable use to the experimenter who has no other means of calibration available.

indicated a change in the values of C2 and C3, in Fig. 2, but they still had to total 71  $\mu\mu\text{F}$  or so, when in series.

Referring once again to the ABAC, it was found that amongst other values, a capacity of .001  $\mu\text{F}$  in series with 330  $\mu\mu\text{F}$  would give the same total series capacity, and of course, if the one with the lower impedance was fitted nearer the grid, the net effect would be to tap the cathode higher up the tuned circuit as required. The condensers were found, measured and fitted. The frequency range was now found to be 2.05 mc to 3.1 mc, and the grid current was almost 400 microamps. This was considered to be satisfactory. The coil was given a slightly increased inductance by fitting an iron-dust core, and the range of tuning was moved so that the full swing of the condenser covered from slightly below 2 mc to just above 3 mc. This was perfectly acceptable, as the tuning condenser, like most condensers, ceases to be linear at the extreme ends of its range.

Thus, only using the simple test gear described, a circuit has been adapted from a previously published design, using the valve required, and taking into consideration the maker's recommendations as regards the working conditions of the valve. It should not be difficult for anyone to do the same, using the same line of reasoning, provided that they have access to simple test gear of the type described.

**THE CALL BOOK**

There has been an unusually heavy run on the Spring issue of the *Radio Amateur Call Book*, and we are now out of stock of the full edition. The abridged edition can still be supplied (at the time of writing) at 15s. post free. The next (Summer) issue of the *Call Book* is now in proof, and will be announced as soon as it is available.

# Station Remote Control

## RELAY ARRANGEMENT AND CIRCUITRY

G. WHITBY

**E**ASY switching from "send" to "receive" is of great importance, and a control unit permitting single switch change-over offers brisk, efficient operation which is particularly appreciated during contest sessions and long night watches, when any extra movement is not only a waste of time but also an added fatigue.

Nowadays most amateurs have a variety of relays removed from ex-Service equipment; those specified for this control unit are, in any case, readily obtainable in the surplus market, because the arrangement of their springsets—the combination of fixed and travelling contacts on the relays—is quite standard.

Minor modifications may be necessary to both receiver and transmitter control circuits if they have not already been carried out for station change-over purposes. Where this has been done, it only remains to replace any manual switching with the relay springsets in order to effect the required operations.

### Operation

The primary purpose of the control unit as sketched here is to change the aerial from receiver to transmitter, to ensure that the transmitter is out of action when the station is receiving, and, when radiation is taking place, that the HT supply is removed from the first RF stage of the receiver. It is not sufficient merely to change the aerial from receiver to transmitter, leaving the former working, because the first stage may be damaged by the proximity of the radiated RF.

It should also be possible to bring the station to a stand-by condition, with both receiver and transmitter ready to function, on a second control switch.

Finally, indicator lamps showing whether the station is on stand-by, or is receiving or transmitting, are an asset, and a mains lamp (it might well be a 15-watt neon) should indicate when the equipment is powered.

### The Circuit

It will be seen from the diagram that five relays are employed, only one of which—the

aerial change-over Relay C—has a complex springset.

The circuit is shown in the "receive" condition, and it will be noted that only Relays A and B are working when the transmitter is not in use.

Switching S1 from "Off" to "Standby" illuminates indicator lamp S and energises Relay A, which closes to apply mains to the station power units and the mains indicator lamp—already mentioned—which is wired on the equipment side of the springset.

Bringing the station to stand-by applies LT to all filaments, but, until Relay B is closed, HT is held off both receiver and transmitter. Moving switch S1 to the "Operate" position will close this relay and bring the "Send/Receive" switch S2 into circuit by applying the relay operating potential to it.

In the "Receive" position shown, no relays are operated by S2 and the only change is that the receiver is powered, lamp S extinguished and lamp G illuminated. The receiver will, therefore, be working normally, whilst the transmitter is out of action.

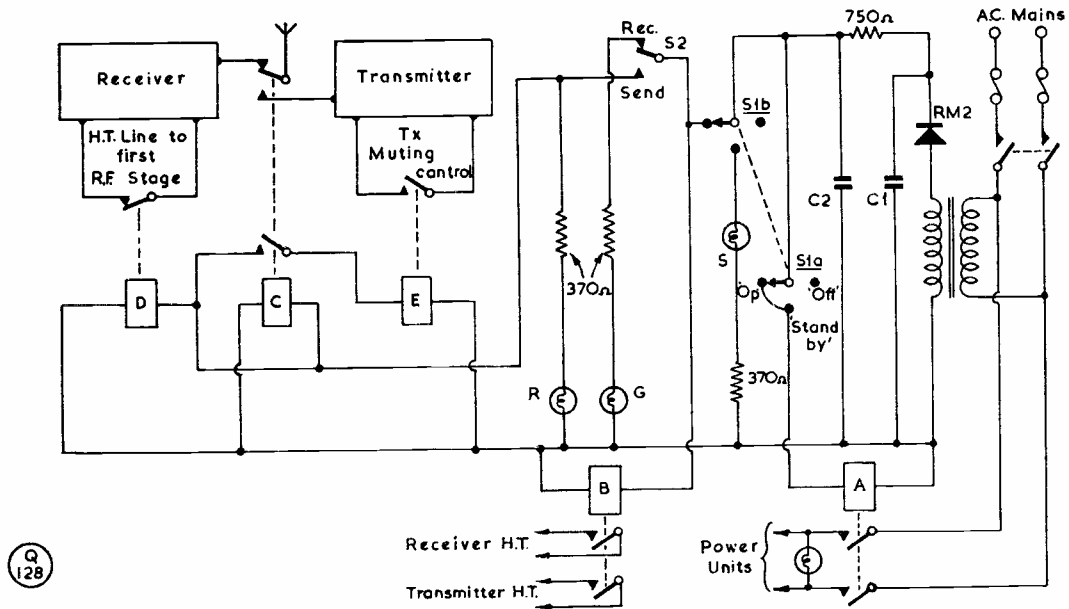
When S2 is depressed to "Send," Relays C, D and E operate, Relay D opening the HT line to the receiver RF stage and Relay C closing to change the aerial from the receiver input to the transmitter output, whilst the second springset on this relay closes to apply operating voltage to Relay E, thus ensuring that the transmitter is not radiating before the aerial is changed over—a minor consideration which prevents sparking and burnt relay contacts. Lamp R is also illuminated in place of G, to indicate the transmission condition.

### Components

Although any relay may be used which functions on the voltage provided by the power unit, it is recommended that the P.O. Type 3000 relays, with 2000-ohm windings, be employed. These relays draw an operating current of about 10 mA, and so will function satisfactorily on a potential of 25 volts.

Relays with a lower winding resistance will function on this voltage, but the current will probably be greater; windings with a resistance of more than 2000 ohms will demand a higher operating potential, which can be obtained by reducing the value of R1. Relays with differing coil resistances can be mixed successfully on the same potential by inserting resistors in series with the winding; the exact value must be found experimentally.

The springsets on Relays B, D and C need only light contacts, but the springsets on Relay



Q  
129

Circuit for the remote control system described in the text. When S1A-S1B is set as shown, the whole change-over operation is controlled by S2. Lamps S, G, R, are coloured, indicating the operating condition, and are brought into circuit on "stand-by," "receive," "transmit." When S1A-S1B goes to "off," relay A is released, and all power to the station is cut.

A must be well-insulated, with heavy contacts : the aerial relay C should have heavy contacts on the aerial change-over springset, which should be well insulated and set apart from the second springset.

Switch S2 is preferably a Kellogg-type key, but if this is not available a single-pole, single-way toggle-switch will suffice. The rotary switch S1 should be of the twin-pole, three-way Yaxley type, mounted alongside S2 on the control panel.

**Relay Power Unit**

Half-wave rectification is quite adequate, the transformer providing 100 volts at 100 milliamps and being reduced to the operating potential by the smoothing resistor R1. The rectifier is a Brimar RM2, and C1 and C2 are 4 μF 200 volt, such as Micropack CE32G.

The indicator bulbs are 6.5 volt 0.05 amp, and are placed in series with 370-ohm voltage dropping resistors. The total current on "Stand by" is 60 mA, 70 mA on "Receive" and 100 mA on "Send," much of this consumption being due to the indicator lamps, which were deliberately introduced to prevent an undue voltage rise across Relays A and B when the unit was supplying current for these relays alone.

Higher winding resistances may require proportionally higher operating voltages, but relays

are seldom critical and will withstand wide variations without appreciably affecting their performance.

**Distribution of Components**

Although the components are shown grouped in the circuit, it will be appreciated that they are best mounted in their related equipment. Relay D should be mounted within the receiver, whilst Relays A, B, C and E could be placed inside the transmitter cabinet. Relay C should be mounted where the transmitter output joins the aerial feeder. Relays A and B can be adjacent to the power units, and if the receiver has its own power supply then extensions must be run from the relays.

The control cabinet can be any size or shape to fit in with the station design and need house only the "Send-Receive" key switch, the rotary selector switch S1 and the indicator lamps—the relay power unit preferably being mounted on the equipment rack, or, alternatively, fitted inside the control cabinet. However, when the mains unit is separate from the control unit, only five connecting leads are necessary between this unit and the rest of the circuit, none of them carrying mains voltage. Actual layout and disposition of the relays will depend, of course, on the equipment it is desired to control and its arrangement, both physically and electrically.

# COIL WINDING DATA

## CHARTS FOR QUICK REFERENCE

THE curves herewith enable coils to be selected for four bands 3.5 to 28 mc with the minimum of calculation. They are virtually self-explanatory. In Fig. 1 the data refer to coils having a length equal to the diameter, and in Fig. 2 the length is  $1\frac{1}{2}$  times the diameter.

There are several points to be borne in mind when using the charts for design purposes. In the first place, the gauge has very little effect on the inductance when the coil is space wound—but the inductance increases considerably with close-wound coils as the gauge decreases. In using these particular charts, the gauge is only important in so far as the coil may be required either for receiving or transmitting purposes. In the former case, light wire can be used—anything from 28 gauge upwards.

For transmitting, on the other hand, gauge is very important in regard to RF current-carrying capacity, and, in a 150-watt transmitter, 14 or 16g. would have to be used. This would make it impossible to get, say, the number of turns required for a 3.7 mc tank on to a  $\frac{1}{2}$ -in. diam. former  $\frac{3}{4}$ -in. long! For a well-formed transmitting coil to give a reasonable Q-factor at this frequency, the right shape to choose would be 2 in. diameter by 2 in. long, requiring (with the capacity given) about 18 turns of wire. This could be 20g. for a low-power transmitter, but should be 16g. at least for a 150-watt tank. As 16g. enamelled winds 15 turns per inch, not only is the winding easily accommodated in the 2-in. length, but the turns would have to be spaced out evenly to take up that length. Such a coil could

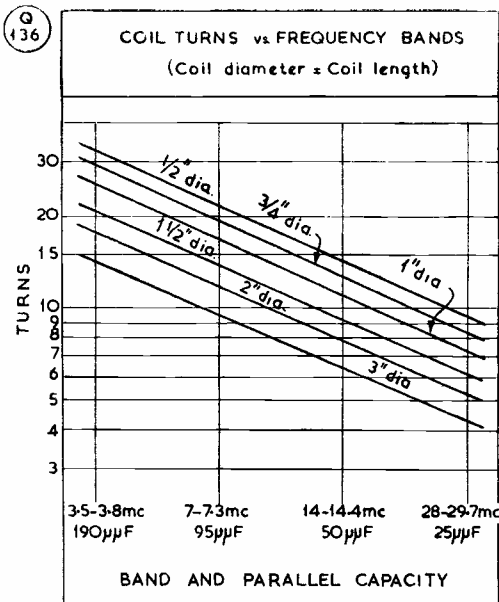


Fig. 1.

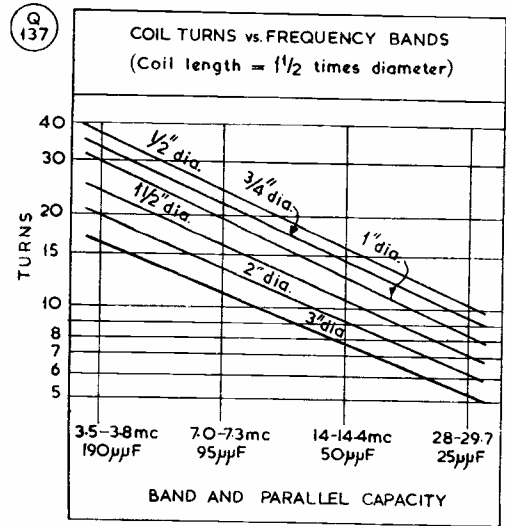


Fig. 2.

either be on a suitable former or wound up on insulating strips by the method suggested on pp.434-435 of the October 1955 issue of SHORT WAVE MAGAZINE.

Conversely, it would be foolish to use a coil of such dimensions for a receiver, and even more so to make the wire gauge smaller simply because the coil was for a receiver! On the other hand, at the HF end of the range, coils for both receiving and transmitting purposes in the 10-metre band can be made of wire heavy enough in gauge for them to be air-spaced and self-supporting, while still keeping the physical size small.

Having chosen the coil size and wire gauge, the winding must be formed to the given diameter and spaced out evenly to the required length if the correct inductance value is to be obtained.

Radical departures from the parallel capacities given for the coils will, of course, alter the figures, and the turns will have to be adjusted in proportion. The capacities selected will tune the band with coils of the dimensions shown.

The sole purpose of these charts is to give the quick answer for making up coils, bearing in mind the necessity for discriminating between receiver and transmitter applications and allowing for capacity variations.

### CHANGE of NAME

We are informed that, with effect from April 27, RCA Photophone, Ltd., became RCA Great Britain Limited. An associate company of the Radio Corporation of America, the address of RCA Great Britain Limited is Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex. (Phone: Sunbury-on-Thames 3101/3107). Information on all RCA products can be obtained from them.

*Can you Shut Down with One Switch ?*

IN spite of the rather low level of correspondence, suggesting that nothing much has been happening on VHF for the last couple of months, the fact is that in gathering in the loose ends your A.J.D. has been struck by how much—due to enforced absence for a few weeks—he has missed.

Since our March Contest—the season's curtain-raiser, reported in the May issue—the VHF bands have been behaving in a most unusual fashion. The pattern of conditions has in no way followed the weather—there has been GDX working when the signs have been all against it, while when the "glass has been high, with a warm day followed by a cool evening," the expected DX conditions have not always materialised.

At the same time, it is also true to say that activity generally has been disappointing from the point of view of those who show up on two metres most evenings and every week-end. It is very difficult to put a finger on this activity factor. It is certain that far more people listen than transmit, unless there is a contest on or something out of the usual to work. The result is that those wanting ordinary, easy contacts at the semi-local distances (up to 60 miles or so), are either ignored when they call CQ—though by those listening their QRK is carefully evaluated and compared with previous occasions—or they themselves feel doubtful about answering or calling a station known to be on the look-out for DX. The nett result is that nothing much happens, in the sense that contacts which would please both ends just do not take place.

This phenomenon, peculiar to the two-metre band, can be noted during any listening session. You hear G2X working a long-haul contact on schedule with his particular buddy G4Z. You can just about get both ends of the QSO, which you follow with interest. From where you sit it is a distance of 50-60 miles or so either way, though for them it is a 100-mile *plus* path. There is a good deal of rather casual chat about "usual R5, S9 with an occasional fade to S7" (you are just about making S4 on G4Z),

# VHF BANDS

A. J. DEVON

---

Conditions and Activity—

Recent EDX Openings—

The July Contest—

Individual Station Reports—

The Tabular Matter to Date—

---

and you feel that after *that* any call to either of them would be banal! In any case, it is clear from the tenor of the conversation that both want to be away doing something else—digging the garden or catching up on the TV—so you forbear to call either, feeling that in any case neither of them is likely to tune across your frequency.

All this comes about by reason of the fact that VHF operators are essentially specialists. They are happy to work anybody when there is a contest on or the band is wide open. But under run-of-the-mill conditions, the tendency is for pairs, or groups, of stations to hang together and work mainly one another. On the other hand, in some cases this only seems so because nobody else will *call* them! What we want on two metres is many more operators who come on prepared to work not only GDX, or their schedule contacts, but anyone else, at any distance, who cares to give them a call. This would make for much more activity, and would be a

great encouragement to those more recently-joined brethren who at the moment feel that when they have once worked an established semi-local for "a new contact," any further attempt to QSO is not of any particular interest to him.

The foregoing is, of course, a generalisation, and by no means applies to all regular two-metre stations; some schedule-keepers not only announce at the end of their QSO that they are "looking over the band," but actually do so. G2HCG goes even further than this: He has a panoramic receiver, and when he is in QSO any local can attract his attention by "flashing the carrier" (switching it on and off a few times), thus producing an unmistakable blip on the receiver. (Anyone who has seen a radar trace will know exactly what happens.) Since the base-line is a frequency scale, G2HCG also knows who it is.

## Some EDX Results

From various sources, we have it that the nearer Europeans have quite frequently been workable from the south-eastern part of the country—likewise, there have been many good contacts amongst the DL's, F's, ON's and PA's. The G calls most often "mentioned in Continental circles" are G2HCG, G5KW and G6NB. The former still keeps up his daily lunch-time schedule with PE1PL (signal level has been very variable), while it seems the Bill of G6NB can work F's and PA's whenever the spirit moves him.

It would be tedious to attempt to fill all the gaps over the last two months—in any event, we are without some of the details—and it is sufficient to say that though activity has been low, there was nearly always somebody on to catch whatever openings did occur. Between them, G3GPT, G3JWQ, G3KHA, G5KW, G5MA and G5YV do not miss much.

Coming down to the immediate past, there was a particularly interesting EDX opening over the week-end June 23-24, when conditions were good to Scandinavia. On the Sunday morning, G5YV found himself embroiled in a contest taking place across the North Sea—he had the satisfaction

## TWO METRES

## ALL-TIME COUNTIES WORKED LIST

Starting Figure, 14  
From Fixed QTH Only

Worked	Station
75	G5YV
70	G6NB, G6XM
68	G3BW
66	G3IUD (302)
65	G3CCH
64	G5BD (435)
63	EI2W (258), G3GHO
62	G3BLP (630)
60	G2OI (402), G3DMU
59	G2FJR (427), G3EHY, G4SA
58	G8OU
57	G8SB
56	G3WW (770), G5DS (654)
55	G2HDZ, G2HIF, G3IOO, G5BM, GW5MQ
53	G2AJ (519), G2HDZ (416), G3FAN, G4CI
52	G2NH, G6RH, G6XX, GW2ADZ
50	G3ABA, G3GSE (518)
49	G3HAZ (358), G5MA
48	G6TA (487)
47	G5ML, G5WP
46	G4HT (476), G5BY, G6YU (205)
45	G2XC, G5JU
44	G3BJQ, G3BK, G3FIH, G8DA
43	G2AHP (500), G3BA, G3COJ, G3HWJ, G4RO, G5DF
42	G2DVD (291), G2HOP, G3BNC G3DLU*, GM3EGW (146)
41	G2FQP, G3DO, G3HBW, G3WS (255), G6CI (184)
40	G2DDD, G3CGQ, G8KL
39	G2IQ, G3GBO (434), G3VM, G8IL (325)
38	G2FCL (234), G3APY, G3IER, G8VN (190)
37	G2FNW, G2FZU (180), G3DLU, G3DVK (175)
36	G2DCI (155), G3CXD, G3IIT, G6CB (312), G8IP
35	G3FZL, G3FYY (235), G3HCU (224), G5MR (312)
34	G2CZS (243), G3AEP, G3BKQ, G8IC
33	G3HHY (125), GC3EBK
32	G2CIW (100),* G3HII, G8QY, G8VR
31	G3HXO, G5RP

of working about six Scandinavians *before lunch*, including SM7BE and SM7BR (who will be remembered as having been active and effective Swedish two-metre men for many years), which must have given them a considerable lift. It also shows, yet again, what can be done by keeping open on the band and watching for opportunities. (There may well have been other G's who were in on this particular opening, but at the moment of writing we have not got full details.)

About the middle of June, conditions were good on several evenings for working between the London area and Lancashire—indeed, the two-metre stations in

Worked	Station
30	G3CKQ (122), G3FRY, G3GOP (208), G3GVF (129), G3IRA, G5NF, GM3DIQ, GW8UH
29	G3AGS, G3AKU, G3FIJ (194) G3KHA (115)
28	G3ITF, G3JWQ (135), G8DL, GM3BDA
27	G3CVO (231), G3DAH, G3ISA (160), G6GR, G3GQB, GW3GWA
26	G3CFR (125), G3SM (211), G4LX, G4MR (189)
25	G3JMA, G3JXN (220), G5SK, G6PJ
24	G3FD, G3FXG, G3FXR
23	G3CWW (260), G3HSD, G3JHM (131), G3YH, G4JJ/A, G5PY
22	G2DRA, G3AGR (135), G3ASG (150), G3BPM, G3HIL, G5AM, G8NM
21	G2AOL (110), G3DVQ, G3IWI, G6XY
20	G2BRR, G3EYV, G3IOE, GC2FZC
19	G3FEX (118), G3GCX, G5LQ (176)
18	G2AHY, G3DBP, G3JGY, GC2CNC
17	G3EGG
16	G3FRE
15	G3IWA
14	G2DHV, G3CYY

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

\* New QTH

Lancs are maintaining a very creditable level of activity. On the evening of June 23, when they were strong in the south-east, the DL's were also being heard and called from the London area. That this opening was pretty widespread is shown by the fact that West Country stations and the Channel Islands (GC3EBK) were getting into the Home Counties at the same time.

During the month, there have been some good long-haul QSO's. For instance, G5MA from his new QTH in Surrey has had several contacts with G3BW up in Cumberland, and G5YV has worked GM2FHH in Aberdeen. It appears that the Scots have had, after a long and barren interval, another sample of good conditions, and there is a fair level of GM activity. It is some time since we have heard anything of the GM's in the southern part of the country; there are several G's, putting out potent signals and with good receivers, who are searching anxiously for GM's, and it is to be hoped that things will open up sufficiently for that lift over the Pennines and the Cheviots which alone can make a 400-mile G/GM contact possible.

## All-European Contest

It seems that if conditions are anything like reasonable for EDX working, we shall have good Continental support for this. The first section is over the week-end July 14/15, and the second section (which is, in effect, an entirely separate affair, unless you want to enter for both) takes place during the following week-end, July 21/22.

Rules in full appeared on pp.148-149 of the May issue of SHORT WAVE MAGAZINE. The suggestion is that you get ready *now* with ruled log sheets; a map marked with 30-mile circles with your own QTH as centre would also be helpful, but is not actually necessary till after the Contest is over, when it comes to the "office work." This has been made as simple as possible, and is a good deal easier than it looks—it is only a matter of getting the system of scoring clear. Your A.J.D. hopes very much that this is quite



clear to everybody, taking it as a good omen that we have not had a single query on these rules from anybody, at home or from the Continent.

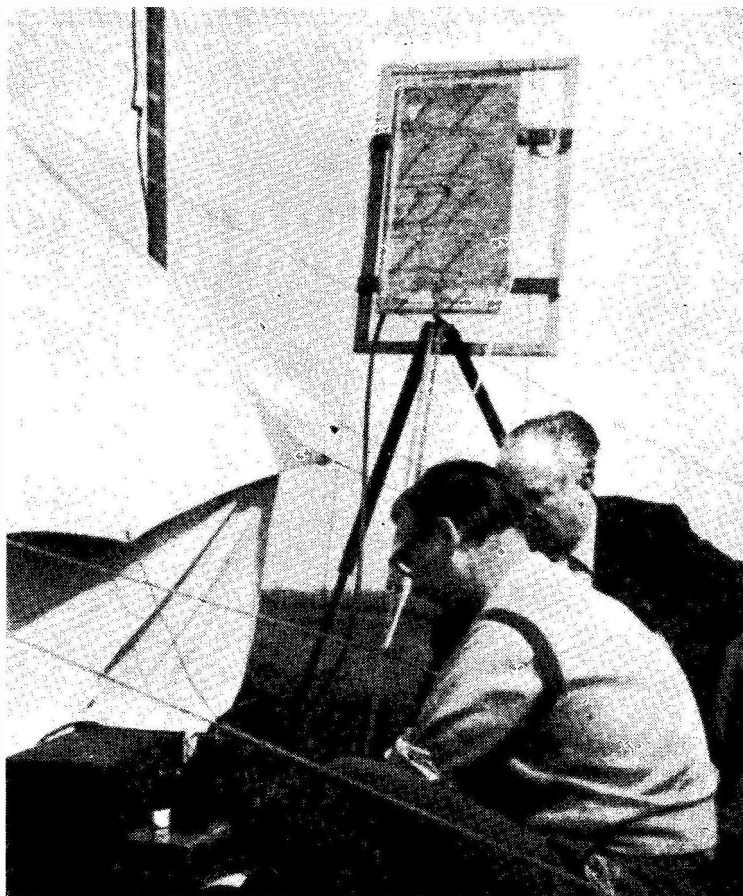
Whatever you are doing, spare one week-end for this Contest; it should be interesting and we have done everything possible to ensure its success. The only factor over which we have no control is the obvious one, and even if conditions are not good, there should be a high level of U.K. activity.

And, having taken part, *do send in an entry*. There are few things more discouraging to operators who are taking it seriously (as well as to the organisers) than to hear the lofty line, "I'm only on to give the others a point and don't think I'll put in a score"! Of course, you don't *have* to come on, nor must you enter the Contest if you do—but if you are keen on VHF and want to see more activity on the band, you will help a lot by doing both those things, and so making it a good party for everybody.

**TWO METRES**  
**COUNTIES WORKED SINCE**  
**SEPTEMBER 1, 1955**  
 Starting Figure, 14  
 From Home QTH only

Worked	Station
43	G3GPT
32	G3IOO, G3JZG
31	G3WW, G5DS
29	G3WS, G5BM
28	G3IRA, G3JWQ
26	G2DVD, G3FIH
24	G3DLU
23	G3KHA, G4JJ/A, G8VN
21	G3CKQ, G3DO, G3JXN
20	G3BJQ, G3HWJ
18	G3IEX
17	G3IER, G3ITF
16	G3BW

*This Annual Counties Worked Table opened on September 1st, 1955 and will run for the 12 months to August 31st, 1956. All operators who work 14 or more Counties on Two Metres are eligible for entry in the Table. The first list sent should give stations worked for the counties claimed; thereafter, additional claims need show only counties worked as they accrue. QSL cards are not required for entry in this Table.*



The 1250 mc radiating system actually used by G3CGQ for his tests with G3FUL, on its camera tripod mounting. The 25 cm effort, on the highly successful outcome of which G3CGQ and G3FUL are to be congratulated, was run "in parallel" with the two-metre field day on May 6. In the photograph we see G2RU (right) with G3JZW on the 1250 mc gear while G3CGQ (who built the equipment and inspired this GDY effort on 25 centimetres) took the picture. The actual distance covered on May 6 was about 16 miles, with G3FUL operating under portable-mobile conditions.

All being well, some preliminary notes on both sections of the Contest will appear in the August issue, but we do not anticipate being able to get out the full results before September at the earliest.

#### Station Reports and Results

For the three days, May 20-22, G3XC/P worked from various sites in Brecknock, Radnor and Montgomery — thereby making himself a most attractive proposition to those wanting these counties. At any rate, from Brecon he worked 14 stations, from Radnor 18 and from Montgomery only two (it was by then Tuesday). As G3XC remarks in

his report, "Providing there are stations of interest on the air, the activity is not as low as it might seem; I have heard since that there were more stations calling me than I worked."

Several of the old hands write to say they have returned to the VHF fold. Brian G6CI (Kenilworth), who has held his licence since the early days, reports that after two years off VHF, he is "bashing away again on Two." G2FVD has got himself organised at his new QTH in Kenton, and likewise reports back after two years' absence. Yet another in much the same category is G2HOP, who has moved to Stamford, Lincs., and suggests a series

of 3-hour *monthly* contests to buck up activity; "something simple on the first Monday of each month and no prizes," is how he puts it. Well, it's an idea, certainly, and we can think about this again when the July events have been played off.

G3DLU, who used to be down in the West Country, is now in Sheffield with a good QTH, 700 ft. up and clear to the east and south-east; he is on 144.32 mc and fully operational. G3IER (Cheltenham) is shocked to hear "well-known two-metre operators chasing DX on 21 mc"! GM3FSD is settled in Jedburgh (Roxburghshire), perched 400 ft. a.s.l. but with higher ground all round, and is on 144.05/435.45 mc. G3H11 (Liverpool) keeps steadily at it and finds that most of his contacts are made outside TV hours—his own gear is TVI-proof (including the converter).

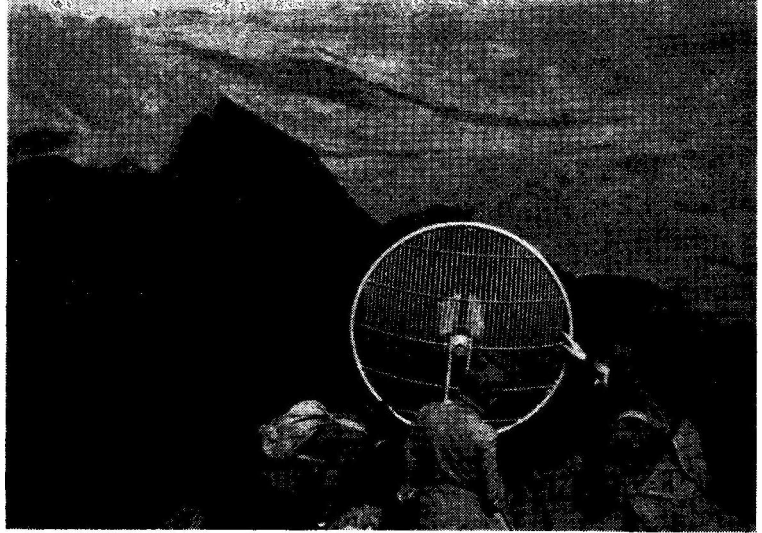
G3KHA (Bristol) is VHF-only, is on both bands, and has now had a year at it, with quite good scores standing for the Tables; but he says his QSL account is heavily debit, with only about half the cards wanted for VHFCC. G3GFD (Bradford) reports himself as a newcomer, and is making progress with 20w. into a 5-le flat-top and cascode converter.

G3GPT (nr. Preston), whose

**SEVENTY CENTIMETRES**  
ALL-TIME COUNTIES WORKED  
Starting Figure, 4

Worked	Station
26	GW2ADZ
25	G2XV
23	G3BKQ
18	G3IOO
16	G6NF
15	G4RO, G5YV
12	G2HDZ
10	G2OI, G3HBW
7	G2DDD, G2HDY, G3IRW
6	G3FAN, G3JMA, G3WW
5	G3FUL, G3IRA, G3IUD
4	G3JGY

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



Not another attempt on a UHF record, but the BBC's portable micro-wave linking station on the summit of Snowdon for a series of telecasts from North Wales, when it was essential to get a good signal into the main TV network. The party is on the edge of a sheer 1,000 ft. drop.

very fine two-metre transmitter was featured in the June issue as a constructional article, also keeps a schedule with PE1PL, and on May 16 noticed a most unusual effect, when neither he nor PE1PL could heterodyne each other's signals, though they were arriving as MCW notes. This was most probably due to a high degree of scatter, akin to sporadic-E, and suggests that, at the same time, conditions might have been particularly good for real DX. Unfortunately, these phenomena are almost always "fleeting opportunities," and are lost unless they happen to occur when there is plenty of activity.

G3HHY (Bristol) reports regular Thursday evening (2215 clock time, 145.8 mc) activity on the part of G3FIH, G3FKO, G3KHA. G3KPT and himself and invites co-operation. G5MR (Hythe) confirms that HB1RD will be on (from Mt. Chasseral) for the July Contest, and will probably be at the LF end, though in fact they have crystals all through the band; having worked most of Europe from Mt. Chasseral. HB1RD will be concentrating on the U.K. during the Contest.

**The Tabular Matter**

All the tables have been brought up-to-date with our latest available

information, some 30 movements being recorded since the last appearance.. But there are undoubtedly many more claims, and new entries, yet to be put in. These we would like to have for our next.

VHFCC elections since May are as follows: A. D. Hawksworth, VK6DW, Bruce Rock, West Australia, No. 201; G. Martin, G3IER, Cheltenham, No. 202; H. Maycock, G3JWQ, Ripley, Derbs., No. 203; F. Voges, DL9LT, Espelkamp-Mittwald, No. 204; A. Wittmer, HB9RD, Zurich, No. 205; J. E. Tindle, G3JXN, London, N.6, No. 206; and J. Woudenberg, PAØIKS, Nijmegen, No. 207.

**And Finally—**

Your A.J.D. would like to thank most sincerely those who have kept up their reports in spite of a negative appearance, apologise to many of them who have not been mentioned here (though any claims made have been taken in), and emphasise that, being back in the business again, he would be very glad to have your report for August issue by **July 18** certain, addressed: A. J. Devon, "VHF Bands," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. And *do* come on for the Contest!

## METHODS OF CONSTRUCTION

### SOME IDEAS FOR EQUIPMENT ASSEMBLY

AS some amateur constructors have already found, there is no need to be tied to the familiar rack-panel, table top or open chassis methods of assembly and layout for home-built transmitter equipment.

The emphasis is on the transmitting side rather than receivers, because in the great majority of cases the receiver is a purchased item and in any case needs to be positioned for operating convenience. Usually, it takes up relatively little space and, with proper control and change-over methods, can be placed quite a distance from the transmitter, modulator and power pack sections of the station layout.

Where space is a factor and the gear must be housed in such a way as to take up as little room as possible but yet be accessible for adjustment and maintenance, consider the methods of assembly suggested here, applicable to low- or medium-powered amateur stations.

#### Hang It on the Wall—

A piece of board three feet long and a foot wide will easily accommodate four shelves 12 ins. square held to it by small metal brackets, spaced so that there is a full 9-inch clearance between each shelf.

The board is then hung (not fixed) in a convenient position on the wall, where there is a wooden upright or cross-piece behind the plaster. A strong hook is let into the wall at this point, registering with a hole centred near the top of the board carrying the shelves. The board is, of course, hung up on the hook with the shelves projecting outwards. The various items of what might be called the "static" transmitting equipment are then assembled on aluminium chassis in the usual way—with or without panels as may be preferred—these chassis being made, say, 11-ins. square to avoid overlap when on the shelves, which are used to accommodate them. Inter-connection between the units is by plug-socket on cable forms made up to carry the necessary circuits.

If desired, a dust cover made of hardboard (with an adequate number of ventilation holes) can be fitted, and painted some colour to harmonise with the room.

The result is a neat, space-saving layout, easily got at but out of the way, which in effect takes up no room at all because it is hung on the wall. The only points to watch are finding the right place to put in the hook (so that the plaster is not torn down) and avoiding too much weight on the shelves. If heavy power packs are involved, it would probably be necessary to box them away at floor level, running the HT supply in rubber-covered high tension cable.

#### —Or Put It on the Mantel-Piece!

If it can be cleared of the oddments with which it is usually littered, the mantel-piece is also worth con-

sidering as a "basis on which to build." Should it be flat and of reasonable width and length, say 5 to 6 ins. wide and 3 to 3½ ft. long, the thing is easy. One simply makes up chassis of the right width to sit on the mantel-piece without overlap, the gear then being built up on these chassis in convenient units.

The tidiness factor comes in by cutting a piece of hardboard of the correct length and depth to box in the gear, with wooden side-pieces at each end, resting on the mantel-piece, to hold the hardboard panel upright. (With a long mantel-piece, a centre support might also be required.) This cover or panel simply rests on the mantel-piece and, again, can be painted to harmonise with the general colour scheme.

To get at the gear, it is only a matter of lifting off the hardboard cover. In a bachelor establishment, of course, it might not be necessary to go to any serious lengths to camouflage the gear!

#### Shelving with Fitted Panels

For the accommodation of a more ambitious layout—let us say, a full-power station, fully modulated, with recording and play-back amplifiers and all the paraphernalia that goes with remotely controlled rotary beams—a different approach is necessary if floor space is a factor.

The idea is to fix strong, wide shelves to a convenient wall, in a corner of the room with the shelves at right angles, and then to fit hardboard panels (vertically to the edges of the shelves) hinged to open either like cupboard doors or as flaps.

If the shelf fitting is done by fixing wooden uprights to the wall (with "Rawlplug" or "Philplug" fastening) and the shelves themselves held in position by large metal brackets, a very strong framework results, on which heavy power packs can be carried.

The gear is assembled, as before, on open chassis. The hardboard panels can very easily be cut to carry meters and switches, connected by "loose" leads, having enough slack to allow the panel to swing open on its hinges. In a layout along these lines, the panel sizes will have to be planned a bit to avoid having to deal with unwieldy sections.

In a particular instance where this general form of station layout has been adopted, four shelves 14 ins. wide by 4 ft. 3 ins. long, with another set of four of the same width 3 ft. 3 ins. long butted up to them, are fitted in the corner of the room, the vertical separation between the shelves being 18 ins. This gives a total available shelf area for the accommodation of gear of no less than 35 square feet; in addition to this, there is another 24 sq. ft. of hardboard panelling, available for meters, switches and the direct mounting (on the inside) of light chassis. All this with only a 14-in. width of a corner of the room being taken up! The shelves are positioned at a comfortable level for standing at, the gear is safe, reasonably dust-proof, with the minimum of what, to the feminine eye, are "unsightly wires and bits of thing," and any unit of the assembly is immediately accessible by swinging back the appropriate panel.

#### Conclusion

The ideas outlined here can, of course, be varied in many ways. The whole point is to suggest that

neither table room nor floor area need be taken up by the most ambitious transmitter equipment if there is some empty wall space available.

It is also worth adding that hardboard can be used for a great variety of purposes in amateur station construction—even to building an operating table or

console. It can be obtained from any builder or home-decorator's supply stores. It is cheap, easy to work, takes paint well, and is available in large sheets, with one surface smooth-finished and the other rough for "insides," for cutting to required size.

A.J.D.



Letters published are those which seem to us to be of general interest, but should not be read as necessarily being in accordance with our own views on the subject. We welcome readers' comments.

### ETHICS OF AMATEUR RADIO

SIR,—In the discussion on p.144 of the May issue, the YL's argument is based on a false assumption, viz., that British licences are granted for experimental purposes. Theoretically, they may once have been, but they are certainly not now. I think there is too much laying down of the law in Amateur Radio—the CW men say phone operators are not true amateurs, phone men say CW is out of date, and home constructors look down on stations equipped with commercial gear.

After all, Amateur Radio is only a hobby, not a life-or-death affair, and it is big enough for everyone, no matter what their interests may be. If a man is able to buy all his equipment, why on earth shouldn't he? It would have a greater investment value than the equivalent cash spent on home-constructed gear, for one thing, and for another he would be helping to support an important sector of the radio industry.

We never hear any suggestion that stations in the South Pacific operated by U.S. personnel using Service AR88 receivers and BC-610 transmitters should be banned because they are not strictly amateur—on the contrary, everyone seems only too anxious to work them. And when W6ITH appeared as FS7RT with Collins commercial gear, nobody said he oughtn't to be on the amateur bands—they were all too busy busting their waistcoat buttons trying to raise him!

H. Tec, G8UA, 406 Higher Brunshaw, Burnley, Lancs.

SIR,—I am writing on the topic: To pay or not to pay for rare QSL's. During a period of 8½ months last year I held the calls VS4CT, VS5CT and ZC5CT; I sent out over 1,500 QSL cards. This was 100% QSL'ing, and I adopted what I considered to be a reasonable system in view of the exorbitant postage rates from Borneo. This was to QSL direct to those who tried to assist with postage, even though IRC's were not accepted by Borneo post offices—but they had been sent me in good faith. All other cards were cleared in bulk to the appropriate QSL bureaux (again a heavy postal charge). Sometimes it happened that after I had sent my cards to the bureaux, duplicate QSL's would arrive with IRC's, and in these cases I felt bound to send a further card direct.

Any help I had with my very high postage bill was most welcome, but it was never stipulated that only those who paid the postage got the card. I disagree most strongly with the idea of QSL's being sent for payment only. Some amateurs are well able to pay for whatever they want, but for the majority this is out of the question. There is nothing to stop anyone sending a donation to assist a DX-pedition, but it is, or should be, unthinkable that his rare DX QSL card should be dependent on it. To send QSL's in bulk by sea mail from the DX end is certainly not prohibitive.

Had I asked a dollar per QSL, and got it, for all the 1,500 cards I sent, I should have made quite a profit. But that seems to me

right against everything that Amateur Radio is and for which it stands.

P. H. J. Green, G3DCT (VS4CT, VS5CT, ZC5CT), 65 Balcombe Street, London, N.W.1.

SIR,—I think the dollar-a-QSL idea a very bad thing for Amateur Radio. If a chap cannot really afford to make one of these expeditions, then he should not start out.

I would never pay for a QSL; in fact, I do not agree with the prevailing American tactic of sending a clip of IRC's for a return card by airmail.

W. E. Waring, G3GGS, 43 Towngate, Leyland, Preston, Lancs.

SIR,—Regarding the question of paying for QSL's: This is obviously a controversial matter. My view is that while I am quite prepared to pay postage plus something towards printing costs (for a card I really want), one dollar I regard as quite unreasonable—but then I am not a DX hunter! I think the effect on Amateur Radio of paying for rare DX cards would be bad. Besides introducing a measure of commercialism into a hobby which has always been singularly free of it, the result in the end might be that one would have to pay for every QSL (or is that being too pessimistic!)

As it affects the rare DX station, \$2000 is not a bad return for a few days of Amateur Radio which, presumably, a man only undertakes because he enjoys it, anyway!

C. N. Chapman, G2HDR, Yeovil, Stoke Hill, Stoke Bishop, Bristol, 9.

And this is what the June issue of the *Northern Californian DX'er* has to say about what it calls the "Yasme Affair," round which, as they put it, this regrettable controversy centres:

*"The DX'er wants to make it crystal clear that the Northern California DX Club is not in any manner whatsoever entering into this conflict. We feel that it is strictly up to the individual whether he donates to DX-peditions. The general feeling seems to be that in those cases where financial support is essential to a DX-pedition, this fact should be made clear well in advance of departure.*

*It is well known that DX-peditions are costly affairs; it is further known that contributions, unsolicited and strictly voluntary, do not provide funds in worthwhile amounts. FS7RT and TI9MHB together did not receive enough to buy the whale oil for their lamps.*

*There are some who stick firmly to what they term "principle" or "amateur standing." But the inescapable fact is that Amateur Radio, just like everything else, costs money. Every move you make costs money: The power you consume, the gear you purchase, the call book you use and the cards you send. These things are provided by legitimate commercial enterprises. The American Radio Relay League itself is a million-dollar corporation, and by its existence (entirely at amateur expense) a large group of people have a means of livelihood.*

*Does all this have any effect on anyone's amateur standing? There wouldn't be any amateur standing without it!"*

Since the cat is now out of the bag and Danny Weil, of the yacht *Yasme*, signing various exotic Pacific calls, is named as the focus of all this comment, here are our own findings, as a result of a good deal of correspondence and information received:

The individual in question is a Christchurch (Bournemouth) watchmaker, and apparently was quite unable to get any local support for his venture. Various firms

approached by him in the world of yachting and small-ship supply were equally unenthusiastic. He left England feeling that his own people had given him a raw deal. Before setting out from this country he did not hold a G call-sign nor had he qualified in any way for an amateur licence—his practical knowledge of Amateur Radio was virtually nil. This is an important point to note.

On arrival in the Caribbean (in itself a feat for single-handed sailing) he was, in effect, taken up by certain American interests who saw in his venture some publicity value, both on the Amateur Radio side and in regard to supplies for his vessel. Since leaving the Caribbean and getting into the Pacific, he has been well supported by American commercial concerns. From his own point of view, he also found that many of the American amateurs he worked were quite prepared to fall in with the "dollar-a-QSL" idea.

He cannot be blamed for this because, remember, he is not and never has been a radio amateur in the accepted sense. He is an adventurer using Amateur Radio as one of the aids to get him round the world. He has, in fact, been misled (mainly by amateurs, at that) through not realising that the dollar-a-QSL basis of operating was certain to be widely construed as a racket, and would expose him to a good deal of odium.

According to our information, he has been so well supplied with dollars as to be able to make remittances home, and when temporarily short of money at any of his ports of call, finds he can earn what he needs by putting in a few days' work at his trade.

Whatever one's opinions may be as to the ethics of the "Yasme Affair" as it affects Amateur Radio—and something of this sort was in any event bound to happen sooner or later—what should never be forgotten is that single-handed sailing in a small craft over thousands of miles of empty ocean is in itself a great feat. It has often been attempted by solitary enthusiasts but seldom brought to a successful conclusion. *Yasme* has a long way to go before she completes her round-

world voyage. So far, in the hands of Danny Weil, she has done extremely well.—*Editor.*

### CW PROCEDURE SIGNALS ON TELEPHONY

SIR,—*I must agree with VQ4RF's comments in the May issue of SHORT WAVE MAGAZINE. Many of the abbreviations to which G2NS appears to take exception have become so internationally recognised as to be enormously helpful in conveying one's meaning to overseas operators whose language one may be unable to speak.*

*I shudder to think how difficult it would be to explain QRM or QSB or QSY in Portuguese to a Brazilian, in Spanish to a Peruvian, or in German to a Swiss. I myself have no hesitation in using these generally-accepted CW procedure signals on phone, and I cannot see why anyone should object to them.*

E. M. Wagner, G3BID, 5 Ferncroft Avenue, London, N.W.3.

### SINGLE-CHANNEL PROCEDURE

SIR,—*As a professional operator of 1919 vintage, I deplore the attitude of many stations in utilising two channels as much as 10 kc apart for QSO's on a congested band. Surely any experienced operator can read two, or even three, beat notes without difficulty; the probability of an exact zero beat is very remote. In my experience there is, in 95 cases out of 100, a separation of at least 500 cycles between stations calling; this is ample. In fact, 250 cycles should be more than enough for CW with any respectable receiver.*

*It rather points to inexperience in handling AVC. How many operators know that to pick out DX comfortably it is necessary to use maximum AVC with minimum audio gain? In this manner, loud signals are reduced to somewhere near the level of the weaker DX station; slight adjustment of the BFO will bring the note to that "peak" which is present in most receivers (and headsets); this reduces the necessary channel*

width to something less than 1,000 cycles.

A lot of time is wasted through stations not indicating how they are tuning—though, of course, it is usually understood that they are listening on or near their own frequency. On the phone bands, it is vitally necessary to zero accurately if everyone is to get a look in.

A VFO is now the only answer on the amateur bands, unless the CC-only operator is satisfied to work merely what comes up 1 kc or so either side of his fundamental—but if this happens to coincide with a wanted DX station, he becomes nothing more than a nuisance.

Our available frequencies are diminishing almost yearly, and we must make the best use of what we have. So let us hear no more about the DX operators who "refuse to answer less than 10 kc off their fundamental." I might add that (if I am DX to anybody) a call to me more than 2 kc off my frequency is flogging a dead horse.

H. Grist, GD3FBS, 48 Victoria Road, Douglas, Isle of Man.

The views of readers on the points made by GD3FBS would be interesting.—Editor.

#### THE CALL-SIGN SEQUENCE

SIR,—I read with interest your note on p.201 of the June issue, and was reminded of how I got my own call in September 1937. I was 17 years of age at the time and call-signs in the G8 group

were being issued; actually, they were practically all out and several of my friends, including G8KL and G8RF, had just beaten me to it in getting their full tickets. However, on applying for my licence, I requested the G.P.O. to grant me, if possible, a call-sign from the earlier G2 or G6 group. Imagine my surprise and delight when, on opening my licence on the morning it arrived, I found I had been given G6TC.

I believe that I am the third holder of this call; originally I think it belonged to a GI, and after that to a G in Lancashire, before being issued to me.

The only disconcerting thing (if you can call it that) is the number of people who refer to me as "old timer" when in QSO. Come to think of it, however, perhaps I am!

T. Rowley, G6TC, 136 Black Halve Lane, Wednesford, Wolverhampton, Staffs.

#### SAFETY IN MOBILE OPERATION

SIR,—In view of the increasing interest in mobile operation, one feels most strongly that emphasis should be laid on the safety angle. The problems involved are quite complex, and may be out of the province of many amateurs. A glaring example came to my notice a few days ago. It was of a beautiful mobile rig which, with its attendant power supplies, had been fitted in such a manner that the car, a new one, lifted its front wheels slightly off the ground

every time the accelerator was touched, this resulting, of course, in uncertain steering. From every aspect other than safety, this car with its installation was a certain "mobile concours d'elegance" winner. From the safety point of view, it was a death-trap. Luckily, the danger was demonstrated to the owner's entire conviction; the gear was immediately dismantled and a major rebuild undertaken.

A very few errors of this nature would soon lead to a spectacular crash, and the outcome could well be a loss of our JM privileges. After all, how is a magistrate or a coroner to differentiate between inattention to the wheel and unexpected under-steer of a particularly vicious nature?

Being connected with the service technical section of a large motor manufacturing group, I would be glad to give professional advice and assistance (gratis) to any amateur who, being inexperienced in fitting mobile equipment and not clear on the importance of proper weight distribution, cares to get in touch with me.

E. P. Essery, A.M.I.M.I., G3KFE, 174 Guildford Street, Lozells, Birmingham, 19.

We drew attention to this important factor of safety and careful driving, when operating /M, on p.25 of the March issue of SHORT WAVE MAGAZINE. G3KFE emphasises another point from his own experience, and his suggestion will no doubt be welcomed by many readers who are embarking on mobile working.—Editor.

#### ISLE OF WIGHT BBC TV STATION ON FULL POWER

The BBC announces that with the installation of the permanent aerial system on the new 500-ft. mast at its Rowridge, Isle of Wight, television transmitting station now nearing completion, the station started radiating with increased power on June 11, using Channel 3 (Vision 56.75 mc, Sound 53.25 mc) with vertical polarisation.

Rowridge was brought into operation in November, 1954, with a temporary aerial system on a 200-ft. tower in order that BBC TV could be made available to viewers in the south of England at the earliest possible moment. The permanent aerial system on the 500-ft. mast now brought into service increases the effective radiated power of the station by more than three times, and is expected to extend the coverage as far as Seaton in the west, Lewes in

the east, and inland to include Wells, Trowbridge, Marlborough, Reading and Guildford, linking up with the service areas of the BBC's Wenvoe and Crystal Palace stations.

#### NEW MULLARD FILMSTRIPS

The first of these, entitled *An Introduction to Electronics*, describes the structure of the atom, ionization, conductors, insulators, semi-conductors, thermionic emission, photo-electric emission and secondary emission.

The second new filmstrip is called *Electronic Devices: 1. Electron Tubes*. It deals with space charges, diode, triode and multi-grid valves, gas-filled valves, thyratrons, cathode ray tubes, the electromagnetic frequency spectrum, X-ray tubes, photocells and cold cathode tubes.

The third, *Electronic Devices: 2. Semiconductor Devices*, illustrates the operation of the transistor.

# Surplus Converter for Surplus Receiver

THE RF-24 UNIT WITH  
AN R.1155

J. S. BENNETT (G3KLC)

*The theme here is extending coverage at the HF end and improving performance of "surplus" receivers by the use of an RF-24 as converter-preamplifier. Though the R.1155 is taken as the working example, the general idea is applicable to any other type of receiver which either does not tune much above 16 mc or is insensitive on the HF bands.—Editor.*

THIS article is written with particular reference to the R.1155, but applies equally to any surplus receiver. Most people who use such receivers do so for one reason—economy, and battle with the disadvantages as best they can. Some of these disadvantages, notably lack of the 21 and 28 mc ranges and low sensitivity on 20 metres, can be overcome by adopting the converter and preamplifier arrangement described in these notes. This costs less than 20s. and takes under one hour to put into operation.

The basis of the idea is the RF24 unit, which is still being advertised in new condition at "give-away" prices. It is a broad-band converter designed to plug into various IF strips at a frequency of 7.5 mc. (This has to be changed to 8.0 mc.) Valves used are the SP61 in three stages — RF, mixer and oscillator. (These valves are in ample supply at very reasonable prices.) At the frequencies we are concerned with they are efficient and have only the disadvantage of heavy heater current.

The RF24 has switched tuning centred on five frequencies between 20 and 30 mc. These are:

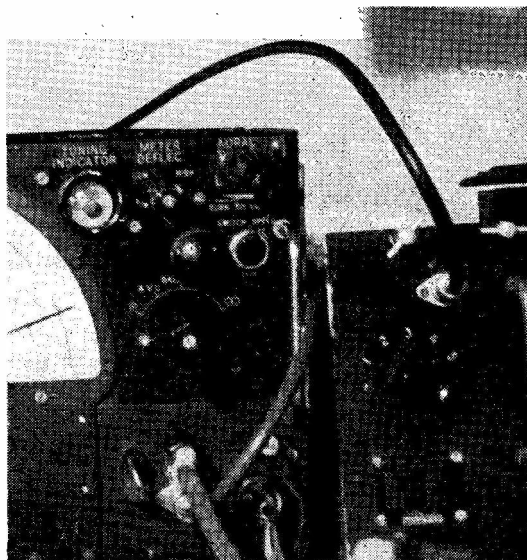
Switch position	No. 1...	22.0 mc
"	" No. 2...	22.9 mc
"	" No. 3...	25.3 mc
"	" No. 4...	27.3 mc
"	" No. 5...	29.7 mc

Experiments were first made by fitting ganged tuning condensers in place of the switch and using variable tuning. It was soon found that easier control was obtained by using the RF24 for *band setting* only and then tuning on the main receiver. When it was decided to

try using the RF24 with the original switching, very good results were obtained.

## Construction

The actual constructional work is very simple. At the rear of the RF24 is a six-pin "Jones plug" and two locating spindles. These spindles are easily removed by pulling out two small split pins. The hole resulting on the left-hand side (looking from the rear) is then drilled slightly larger to take co-ax cable. The other hole is large enough for power supply leads. The inner of the co-ax is connected to pin No. 6 of the Jones plug and the braiding to chassis. (This pin is easily identified by the length of co-ax from the mixer section which is connected to it.) The neutral side of the heater supply is connected to chassis



RF-24 Unit in use with an R.1155.

and the live to pin No. 1. HT+ goes to pin No. 2 and HT- either to chassis direct or via a 5,000-ohm resistor. (See under "Power Supply.")

The trimmers associated with the switch positions are marked on the outer case. The trimmer marked No. 1 in the oscillator section is shorted across. Those marked No. 1 in the RF and mixer sections are shunted with 100  $\mu\mu\text{F}$  silver mica condensers. This completes the constructional work.

## Power Supply

The heater supply required is 6.3 volts at 1.8 amps. and 150 to 300 volts HT. In the

Service the equipment was run at 300 volts, but it has been found that there is only slight loss of sensitivity but much improved noise level by using 150 to 200 volts. HT - is not taken directly to chassis in the R.1155, but *via* a resistor network. As the converter is connected to the main receiver by the co-axial cable outer a resistor of about 5,000 ohms must be put in series with the HT - lead if the same power supply is used.

### Setting Up

The IF of the RF24 is adjusted to 8 mc by unscrewing the iron-dust core of the mixer anode coil. It can be done on "noise" with the R.1155 set at 8.0 mc.

Connect the co-ax to the aerial socket on the main receiver. To prevent break-through and make a more efficient job it is better to fit a screened plug and socket. When set up, the converter will cover five amateur ranges 14, 21, 27 mc (American band) and 28-29 mc and 29-30 mc.

Switch the converter to Range 5 and the main receiver to cover 7.5-8.5 mc. With a local oscillator or harmonic beat from a VFO at 29.5 mc and the main receiver at 8.0 mc, tune the RF24 oscillator trimmer until the signal is heard, then peak it with the trimmers in the mixer and RF sections; use the tuning indicator on the R.1155 for maximum response. The oscillator will be found to tune very sharply. It will also be found that by tuning the R.1155 the range 29-30 mc will fall almost exactly between 7.5 and 8.5 mc on the

main dial.

The operation is repeated with the RF24 on Range 4 and a local signal of 28.5 mc. Range 3 is tuned to 27 mc and Range 2 to 21 mc; the 21 mc band falls between 7.6 and 8.1 mc on the main receiver.

On Range 1 the main receiver is tuned to 14 mc and the trimmers in RF and mixer sections adjusted for maximum response.

### The Pre-Amplifier

It was originally intended to make the converter cover the 14 mc band as well, but this was found to be impracticable because of break-through. So by shorting the oscillator trimmer the oscillator is put out of action on this band and by adding the condensers already mentioned across the mixer and RF trimmers on Range 1 the 14 mc band is covered, and a sensitive pre-amplifier results. The increase in gain on 14 mc is phenomenal! Lack of bandsread is still a problem, but on the writer's R.1155 this has been overcome by adding mechanical bandsread.

It will be found that the original bandwidth of the RF24 is quite adequate to cover the bands as described and break-through is no problem. The trimmers have plenty to spare to cover the bands without further padders.

This converter has been used for many a QSO on the 21 and 28 mc bands and will be found remarkably efficient. In fact, it is all that is needed to help anyone who is restricted to the R.1155 as a receiver to get going on 10 metres.

## Audio Clipper Unit

TO LEVEL RECEIVER  
OUTPUT

D. M. WILLIAMS (GW3HZZ)

**M**OST operators, especially those addicted to using headphones, have at some time or other been temporarily deafened due to the appearance on the frequency of a sudden high-powered signal—their own, a near neighbour's or a commercial station.

A method exists, however, whereby the audio output can be limited or clipped, and it is worthy of inclusion in every communication receiver. In audio clipping the output can be set to a predetermined level, from a readily accessible control, such that any signal, either CW or phone, is reduced to a comfortable level.

This audio clipping unit consists of two triodes and with associated bits and pieces can be constructed either on its own small chassis or inside the receiver—running off the receiver's own power supply in most cases. The requirements are about 230 volts at 5 mA and 6.3 volts at 0.3 amps if a double triode such as a 12AU7 is used, as shown in the circuit.

In the writer's case the unit has been built into an HRO immediately behind the RF control, the extra knob being brought out on the side of the chassis; the only other modification is that headphone output is *via* a transformer off a 6J5 output valve. In either case the clipper input lead is taken off either the detector valve anode, or the normal front panel headphone socket, the output lead being connected to the grid of the output valve or direct to the headphones; the setting control can, with advantage, be interchanged with the existing



audio gain control and space found for the second knob on the front or side of the case.

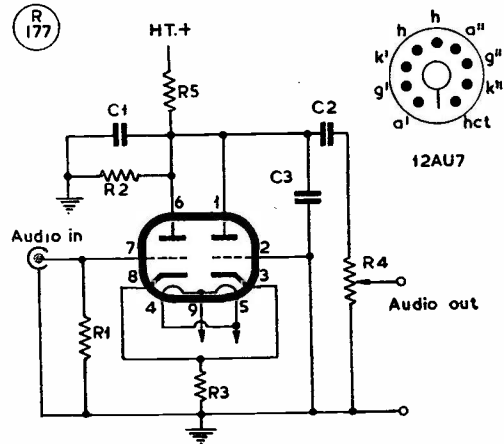
### Action of the Circuit

The circuit should be considered as an infinite impedance detector followed by a biased diode. This type of detector is known for its high signal-handling abilities combined with low distortion—also, it does not load the previous circuits.

When an audio signal is put on the detector grid a positive voltage appears across the cathode resistor, its actual value being determined by the action of the receiver audio control and the voltage on the diode plate; this audio voltage is impressed on the diode which will conduct as long as the diode plate is positive with respect to the cathode. But when the applied signal is big enough to make the cathode *positive* with respect to the plate, that portion of the signal is cut off—in fact, the signal is clipped. The large value by-pass condenser, following the diode, effectively reduces the harmonics produced in the clipping process.

### Operation

The unit is brought into use by setting the RF gain slightly higher than normal, then advancing the audio control resistor R4 until a comfortable output is heard in the headphones or speaker; a loud signal is tuned in on the receiver dial and the clipper control is adjusted until the signal is brought down to a reasonable level. Then, by slightly varying the unit audio gain and the clipper controls a point can be reached whereby normal signals are un-



Circuit of the audio limiter suggested by GW3HZZ, using a 12AU7. C1 is 8  $\mu$ F; C2, 500  $\mu$ F; C3, .002  $\mu$ F; R1, 1 megohm; R2, 22,000 ohms; R3, 10,000 ohms; R4, 1 megohm, control; R5, 47,000 ohms. The action of the circuit and its setting up are discussed in the text.

affected but all very loud signals reduced to a safe level.

In the writer's case, the RF control (on the HRO) is usually set at  $8\frac{1}{2}$ , the audio gain control to 6, and the clipper control to 3; once set, the two latter knobs need not be varied except when changing bands.

If instability is present, usually shown by wooliness in the audio system, especially when the clipper control is used, suspect the condensers. Once in use, the writer feels sure that much more comfortable listening will be the result, whether on 160 metres or any other band.

### NEW BBC TELEVISION TUNING SIGNAL

The BBC introduced a new television tuning signal on June 16. The new tuning signal retains all the essential features of the old one but the presentation and general appearance have been improved. The purpose of the tuning signal is to assist viewers in making any necessary minor adjustments to their sets immediately before the start of the programme.

### BRITISH STANDARD ON THE USE OF ELECTRONIC VALVES

A new publication, Part 3 of British Standard Code of Practice CP.1005, *The Use of Electronic Valves*, covers requirements for photo-cells, transmitting valves and cold-cathode gas-filled valves. The new part should be read in conjunction with the recommendations for all electronic valves contained in Part 1 of the Code of Practice; this was published in 1954 together with Part 2.

Part 3 gives information, additional to that in Part 1, on the more usual problems in the use of

electronic valves, such as ratings, mountings and temperature. Specific aspects of the subject, of which the following are examples, are also dealt with: Modulation-frequency response and relative spectral-response for photo-cells; means of ventilation and cooling for transmitting valves; and ionization and de-ionization in cold-cathode gas-filled valves. Reference is also made to the possibility of danger arising from X-radiation from valves operating at high voltages.

Copies of the Standard can be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1, price 3s. each.

### POSTAGE — PLEASE NOTE

Due to the heavy (and increasing) postage charges now prevailing, readers are asked to note that all correspondence to which a reply is expected *must* be accompanied by a stamped envelope. Overseas readers can meet this by enclosing the appropriate IRC, air mail or surface mail.

# NEW QTH's

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

**EI5BD**, A. J. Hopkins, 35 Main Street, Bray, Co. Wicklow.

**EI6BD**, B. Harkin, 67 Main Street, Letterkenny, Co. Donegal.

**G3GNR/A**, R. E. Short, 25 Russell Avenue, Sprowston, Norwich, Norfolk.

**G3JBF**, L. P. Brown, La Myrtle, High Street, Markyate, St. Albans, Herts.

**GM3JSX**, J. A. J. Dalrymple, 1 Gill Place, Dornock, nr. Annan, Dumfries-shire.

**G3KDZ**, C. Ferns, 47 Cornwall Street, Ashwood, Longton, Stoke-on-Trent, Staffs.

**GW3KLU**, E. Eaton, Kelsterton Hall, Flint, Flintshire.

**G3KTL**, M. K. Dunn, 417 Wilmslow Road, Withington, Manchester. 20. (Tel.: *Rusholme 4750*).

**G3KTR**, H. D. J. Roek, 583 Harrow Road, Wembley, Middlesex.

**GM3KWN**, W. C. Nicoll, 32 Durham Square, Portobello, Midlothian.

**G3KXB**, D. E. Pantony, Herts Farm, Linton Road, Loose, nr. Maidstone, Kent.

**G3KXP**, G. H. Tillet, 42 Park Lane, Hornchurch, Essex.

## CHANGE OF ADDRESS

**G2AIM**, C. E. Clarke, Flat 3, Rockstone House, 77 Paines Lane, Pinner, Middlesex (Tel.: *Pinner 1171*).

**G2APF**, J. Frampton, 33 Christine Avenue, Rushwick, Worcester.

**G2CBS**, L. G. Thompson, 55 Roecliffe Road, Woodhouse Eaves, Leicester.

**G2FMP**, T. Elkes, 10 Chesterton Road, Eton Road Estate, Burton-on-Trent, Staffs.

**G2FUU**, T. Knight, Homefield, Upper Nazeing, Watham Abbey, Essex. (Tel.: *Nazeing 2274*).

**G2HOP**, J. H. Parrish, Uffington, nr. Stamford, Lincs.

**G2OS**, J. W. Ostens, 27 Seaford View, Tynemouth, Northumberland.

**G3ADH**, A. G. Sutton, 15 South View, Austerfield, Bawtry, Yorkshire.

**GW3ARB**, W. F. Brittle (*ex-G3ARB*), 27 Mayals Avenue, Swansea, Glam.

**G3BHQ**, K. Robinson, 9 Victoria Street (North), Old Whittington, Chesterfield, Derbyshire.

**G3BLO**, F. G. Sargent, 75 Hele Gardens, St. Maurice, Plympton, nr. Plymouth, Devon.

**G3BSO**, C. L. Turville, 18 Tredington Road, Glenfield Frith Estate, Leicester.

**G3CO**, J. B. Kay, Dene Bank, Ash Road, Hartley, Dartford, Kent.

**G3COV**, G. B. Woffinden, 5 Peckmill, St. Bees, Cumberland.

**G3CYS**, J. B. Walker, 170 Edlington Lane, Warmsworth, Doncaster, Yorkshire.

**G3DLH**, P. Evans, 25 Stanley Drive, Bramcote, Notts.

**G3ECX**, A. P. Newport, 24 Winn Road, Lee, London, S.E.12.

**G3EDJ**, J. W. Swan, 80 Woodfield Road, Harrogate, Yorkshire.

**G3EHA**, G. F. Hendriksen, Bradford Hotel, 60 Holyhead Road, Coventry, Warks.

**G3EIT**, E. A. Read, 13 Eastry Road, Erith, Kent.

**GM3FHS**, Hawick Radio Society, c/o 13 Wilton Crescent, Hawick, Roxburghshire.

**GW3FPH**, J. W. Hayes, 4 St. Mary's Drive, Northop Hall, Mold, Flintshire.

**G3FWW**, S. W. Watts, 8 Killarney Avenue, Burnham-on-Sea, Somerset.

**GW3FWY**, G. Tashara, 16 Vivian Park Drive, Aberavon, Port Talbot, Glam.

**G3GTW**, D. Kirk, 337 Doncaster Road, Rotherham, Yorkshire.

**G3HCL**, S/Ldr. D. E. C. Lockyer, BEM, The Old Vicarage, Hordle, Lymington, Hants.

**G3HFA**, R. Cairns, 107 Dewalden Place, Pegswood, Morpeth, Northumberland.

**G3HHT**, F/Sgt. J. A. Bassford, 8 Franks Close, R.A.F. Station, Henlow, Beds.

**GW3HOJ**, A. R. Holbrook, 80 Mynydd Garnllwyd, Morriston, Swansea, Glam.

**G3HRJ**, J. T. Gorge, Mayfield House, Blissford, nr. Fordingbridge, Hants. (Tel.: *FOR. 3383*).

**G3HWO**, B. Taylor, 57 Mongeham Road, Deal, Kent.

**G3IQF**, Sgt. R. A. Fowler, 11 Edgcombe Avenue, Newquay, Cornwall.

**G3IXE**, R. J. West, The Cottage, Duncan's Yard, Westerham, Kent.

**G3JKF**, K. V. Franklin, 33 Cornton Road, Ealing, London, W.5. (Tel.: *PER. 1033*).

**G3JTK**, G. T. Allen, 83 Huntsmoor Road, Tadley, nr. Basingstoke, Hants.

**G3JTP**, F/Lt. E. Oldham, DFC, 2 Brooklands, Edgerton Road, Preston, Lancs.

**G3JWJ**, J. W. Jackson, 206 St. John's Grove, Hull, Yorkshire.

**G3JYT**, F. Jeanmonod, 188 Kennington Lane, London, S.E.11. (Tel.: *RELIANCE 3925*).

**G3KDA**, M. G. Rimmer, 38 Grafton Lane, Bidford-on-Avon, nr. Alcester, Warks.

**G3KFG**, Sgt. H. Taylor, 4 Rock Cottages, Aldington, nr. Ashford, Kent.

**G3KLI**, F. C. Beadle, Mellstock, The Drive, Longfield, Kent.

**G3ZY**, J. R. Tweedy, Bridge Close, Bridge Street, Rothbury, Morpeth, Northumberland. (Tel. *Rothbury 45*).

**G5HB**, H. Biltcliffe, 101 Thorpe Road, Melton Mowbray, Leics.

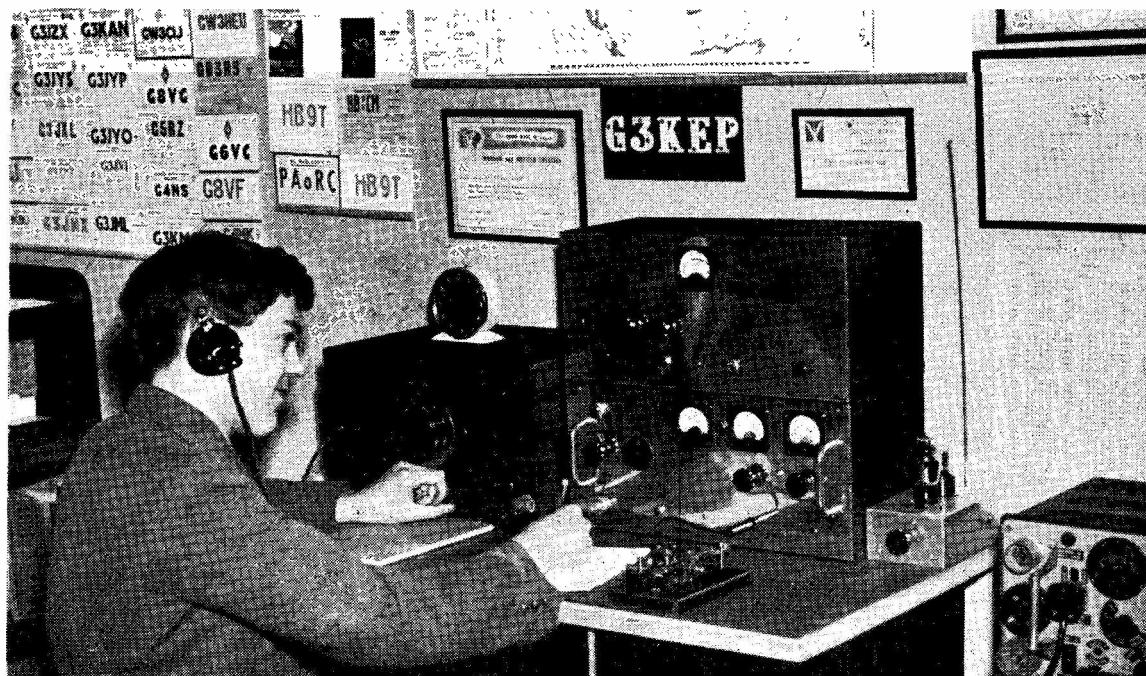
**G5IG**, C. H. Babbs, 47 Partridge Avenue, Baguley, Manchester, 23.

**GM6IB**, H. N. Miles, 24 Battlefield Gardens, Langside, Glasgow, S.2.

**G8LT**, R. W. Addie, Sunhaven, Church Road, Ham Common, Surrey. (Tel.: *KINGSTON 0669*).

## The Other Man's Station

# G3KEP



**T**HIS time our picture is of G3KEP, owned and operated by young David Pratt, of 27 Woodlands Grove, Cottingley, Bingley, Yorkshire—who is lucky enough to be but 17 years old. He has been licensed since January, 1955, and operation is almost exclusively on 160 metres, although transmission on Eighty is possible by doubling in the PA; on Top Band G3KEP has had more than 2,500 QSO's since starting up.

On the left in the photograph is the station receiver, a very much modified R.1224A; a mains power supply unit giving the necessary DC outputs for HT and LT has been built into the back of receiver cabinet, and the original valves are used because of their very low noise level.

The transmitter valve sequence is 6AC7 Clapp VFO into a 6AG7 untuned buffer driving a TT11 as PA, running the full 10w. on CW and phone. Keying is in PA plate and screen, the key itself being a home-constructed bug. The modulation side starts with an Acos crystal microphone into an EF50-EF50-6N7 speech amplifier driving a pair of 6L6's in Class-AB1, as described by G2AJ in the March 1949 issue of *SHORT WAVE MAGAZINE*—David was just 10 years old when this was published! On the right of the transmitter is the CC frequency marker, consisting of a 6J5 100 kc crystal oscillator and a 6SN7 10 kc multivibrator; this unit takes its HT/LT from the transmitter. The receiver, transmitter and modulator each have their own power supplies in their own cabinets.

On the immediate right is an ex-Army 19 Set in

the (inevitable!) process of modification. The 19 assembly consists of a 5-valve superhet receiver and a transmitter with an 807 in the PA, running up to 25w. CW and 10 watts on phone. As so far modified by G3KEP, anode modulation is used instead of the original grid control. With this rig, David hopes to go /P and /M on 160 metres—fortunate fellow!

The aerial at G3KEP is 260 ft. long and 25-30 ft. high, the coverage being NE-SW, and coupling to the PA is by means of a pi-section network.

All the QSL cards visible are for contacts on 160 metres; David has already gained his *SHORT WAVE MAGAZINE* WABC Award and hopes in the near future to be able to claim a second WABC for phone only. His Top Band counties score as at May 12 was 79C confirmed and 81 worked. No American contact has yet been achieved, but it is hoped that conditions during the next Trans-Atlantic season may be good enough to make that possible.

And to it all we can add that, still at Bradford Grammar School, David is honorary secretary of the school radio club, no less than five members of which took the last R.A.E. Bradford entered for the Tenth MCC in November, the station being G3KEP/A with David on the key. Readers will agree that with his very neat layout and the results already achieved, he has made a most promising start. With all the advantages of youth, he can look forward to many years of Amateur Radio activity—and we would hazard the prophecy that he is going to be outstandingly successful.

# THE MONTH WITH THE CLUBS

By "Club Secretary"

(Dead-line for August Issue : JULY 13)

**I**N previous summers we have commented on the fact that some Clubs manage to hold their members together with the help of outdoor events—DF contests, private field-day battles with other clubs, mobile outings, and the like—while others quietly fold up for three months or so.

Clubs with permanent headquarters of their own need never fear a summer slump, because constructional work should hold quite a few members' interest during the summer months. It is those who have to meet in a café or institute of some sort, which either closes down or turns them out, who suffer a long period of doldrums.

May we suggest that even if members cannot all get together in the same place each week, it is most important to maintain contact with each other, either by radio on a network, or by organising summer outings of some kind. Visits to members' stations used to be the stand-by in pre-war days, and although not everyone can cope with a visitation of several assorted fellow-members, there are usually some who will welcome a visit of limited proportions.

With the increasing popularity of portables and mobiles, it should be possible to organise small-scale rallies at least once a month during the summer. Keep the pot boiling—that is the main thing!

## ACTIVITY REPORTS

**Aldershot** have recently re-formed themselves, and hold fortnightly meetings at The Cannon, Aldershot. The main interests have been rag-chews, and demonstrations of mobile and static equipment; the future programme includes two-metre and low-power field day activities, film shows, visits and lectures.

**Clifton** had two interesting talks during May, when M. Paveley, VQ4CW (ex-G3GWD) gave details of Amateur Radio in Kenya, and G. Alderman, G3BNE, spoke on the Decca navigational aids. On July 13, G3MZ will talk on Tape Recording; on the 15th there is the third DF Contest, and on the 29th a Transmitting Field Day. The Club meets every Friday at 225 New Cross Road, London, S.E.14.

**East Kent** get together every Tuesday in the basement of the Technical College, Long Post Street, Canterbury, where benches and cupboards are still being built. One DF set has been tried out and found satisfactory; it is hoped to get at least two more going in the near future. Raffles and lectures are also held, with a Theory course by the Hon. Sec.

**Hull** meet on July 10 to hear the G5RV Transmitter (recorded tape lecture) and on the 31st for two films by the Mullard organisation. Two visits are also arranged—to Earles Cement Works to see

the electronic control of the various processes. A recent lecture by Mr. Barry, of the Marconi Co., included a practical demonstration of closed-circuit TV. Meetings are at the Royal Oak ("Tony's") on the second and last Tuesday each month.

**South Shields** meet monthly, in the Trinity House Social Centre, Laygate Lane. These meetings are on the last Wednesday in the month, but facilities are available to use the Club instrument room, with the Club Tx, G3DDI, almost any weekday evening. They will again be taking part in the Annual Flower Show this year, from August 24-26. Special call-signs will be in use, including GB3SFS, and activities will be spread over all bands from 80 to 10 metres. Contacts will be welcomed, and reception reports will be QSL'd with a special card.

**Spenn Valley** visited the R.N. W/T station at New Waltham on May 13, and then spent an afternoon at the Grimsby depot of the Marconi Marine Co., followed by a visit to the docks and the 1956 m.v. *Prince Philip*. The Marconi Co. rounded off proceedings with a magnificent tea. On July 11 they hold the final meeting of the season.

**Bailleul** (Arborfield Camp) provides first-class Amateur Radio facilities for REME Telecons tradesmen passing through. The Club has its own Tx, G3IHH, and a fully-equipped workshop. Membership fluctuates with comings and goings on National Service, but rarely falls below 30. The Club would like to contact ex-members, especially those now overseas—see panel for Secretary's QTH.

**Cray Valley** will meet on July 24, when G3JRA will give a talk on Adventures with the Minimitter. This will be at the Station Hotel, Sidcup, at 8 p.m.

**Crystal Palace** have announced the rules for their Ann Cup and Trophy, the transmitting and



G2KU (right) and G3GKF doing the operating for the Purley group's entry on the field day in June.

receiving contests for which are to run during TV hours on two amateur bands. The event will take place in October and will last nine days. Next meeting is on July 21, Windermere House, Westow Street, S.E.19, and will be a "Mobile Evening," with demonstrations of gear.

**Grafton** held their annual field day on June 9/10 on Hampstead Heath, with two stations covering four bands. We gather it was the usual highly successful event. They will be closing for the summer recess on July 20, re-opening on September 7.

**Liverpool**, in their excellent News Sheet, intended to advise members to get their Morse speed up to 16 w.p.m. before taking the GPO Test. Owing to a misprint this figure appeared as 10 w.p.m. The Club were surprised to find that their News Sheet, intended for private circulation, even found its way as far as the GPO, who pointed out the error! They will be running a demonstration station at a big Liverpool fête in aid of Spastics, on August 6; they hope to be on all bands. Meanwhile, they seem to be suffering from a surfeit of "pirates" up there, and the list of phoney calls they supply is too long for us to quote. Beware of anyone giving QTH as Liverpool unless you can authenticate him.

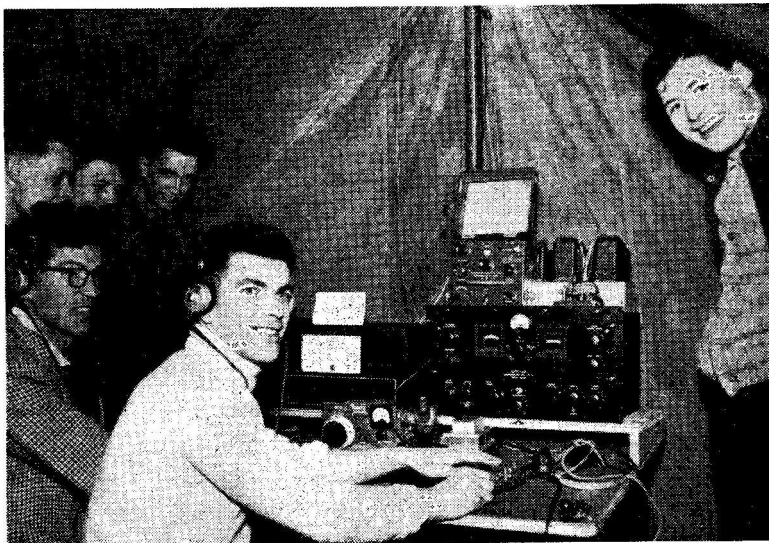
**Portsmouth** recently ran an outing for members and their families, in the form of a coach trip round the Isle of Wight, with visits to the GPO station at Niton and the BBC TV station at Rowridge. New members will be welcomed at the Club Rooms, British Legion Club, Queen's Crescent, Southsea.

**Purley** will again be taking part in the annual Summer Fair in the Rotary Field, Purley, on July 21. There will be an exhibition of members' equipment and an operational station. The call-sign is not yet fixed.

**Slade** will be meeting on July 6 to hear G3JZF on An Introduction to Amateur Television. It is hoped that there will also be a demonstration by G3KBA/T. On July 20 there will be a lecture by Mr. J. A. Thomas on the Universal Avometer.

**South Manchester** notify the following programme: July 13, lecture by G6DN (subject to be announced); July 27 will be an Open Night; on August 10 they will hear a recorded lecture by G8TL on Mobile Operation; and on August 24 there will be a Junk Sale.

Reports for this feature are welcomed from all active Clubs and Societies. For the August issue, they should reach us by **July 13**, addressed "Club Secretary," *Short Wave Magazine*, 55 Victoria Street, London, S.W.1. Closing date for September will be *August 17*.



G2BUJ/P was operated by Swindon Radio Club for the June field day. Identified in this photograph are G3KEU on the key, G3AYL (left, in headset, logging) and G3IRA in the far corner of the tent.

**Stockport** recently staged a very successful exhibition in conjunction with a local TV dealer, and much interest was shown in their display. On July 18 they will hear a talk by G3JLX, and on August 1 there will be a DF lecture. There is no meeting fixed for August 15.

**Wirral** continue to meet on the first and third Wednesdays at the YMCA, Whetstone Lane, Birkenhead. Next meeting after publication is on July 18, when there will be a Junk Sale. At the previous meeting G2AMV gave a talk and demonstration on his home-built panadaptor.

(over)

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE :

ALDERSHOT : J. St. C. T. Ruddock, G8TS, 44 Hazell Road, Farnham, Surrey.  
 BAILLEUL : T. Holbert. Bailleul Radio Society, Bailleul Camp, Arborfield, Berks.  
 CLIFTON : C. H. Bullivant, G3DIC, 25 St. Fillans Road, London, S.E.6.  
 CRAY VALLEY : S. W. Coursey, G3JJC, 49 Dulverton Road, S.E.9.  
 CRYSTAL PALACE : G. M. C. Stone, G3FZL, 10 Liphook Crescent, London, S.E.23.  
 EAST KENT : D. Williams, Llandogo, Bridge, near Canterbury.  
 GRAFTON : A. W. H. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middx.  
 HULL : M. P. Sqaunce, G3HTB, 118 Wolfreton Lane, Willerby, Hull.  
 LIVERPOOL : A. D. H. Looney, 81 Alstonfield Road, Knotty Ash, Liverpool 14.  
 PORTSMOUTH : L. Rooms. G8BU, 51 Locksway Road, Milton, Portsmouth.  
 PURLEY : E. R. Honeywood, G3GKF, 105 Whytecliffe Road, Purley.  
 RUISLIP : (114 Sqdn. A.T.C.) A. Morris, No. 4 Main Unit, West Ruislip, Middx.  
 SLADE : C. N. Smart, 110 Woolmore Road, Birmingham 23.  
 SOUTH MANCHESTER : M. Barnsley, G3HZM, 17 Score Street, Bradford, Manchester 11.  
 SOUTH SHIELDS : W. Dennell, G3ATA, 12 South Frederick Street, South Shields.  
 SPEN VALLEY : N. Pride, 100 Raikes Lane, Birstall, Leeds.  
 STOCKPORT : G. R. Phillips, G3FYE, 7 Germans Buildings, Buxton Road, Stockport.  
 WIRRAL : L. I. Powell. 549 Woodchurch Road, Prenton, Birkenhead.

At **Ruislip**, 114 Squadron of the A.T.C. has formed an Amateur Radio Club, based on No. 4 Maintenance Unit, West Ruislip; they will be on the air in the 40- and 80-metre bands. CW and phone, on Sunday mornings between 10.30 and 12.30, and on Tuesday and Thursday evenings during 19.30-21.30, using call-signs G3LAF and G4GB/A. Reports and contacts will be welcomed—see panel.

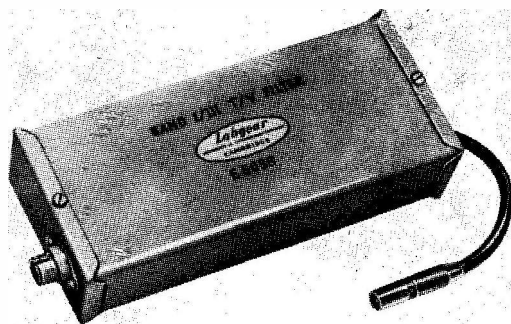
### FREQUENCY-MODULATED SHF RADIO SYSTEM PROVIDES 600 TELEPHONE CIRCUITS

The Swiss Posts and Telegraphs Department has recently placed an order with Standard Telephone et Radio S.A., Zurich, for SHF radio equipment, to link Berne with Geneva, providing 600 telephone circuits over a single radio channel, with facilities for future extensions. This will considerably augment the existing telephone network and cater for subsequent growth. The equipment will be designed and manufactured in England by Standard Telephones and Cables, Limited (associated with Standard Telephone et Radio S.A., Zurich), to the requirements of the Swiss Posts and Telegraphs Department, and will comprise terminals at Berne and Geneva with a repeater station at Chasseral.

The transmission path lies over mountainous country, and the section Chasseral-Geneva is some 70 miles long, a considerable distance to cover in one hop. This will be accomplished, however, with the Standard SHF System incorporating the newly-developed Standard 5-watt travelling-wave amplifier. The equipment to be provided will comprise a system equipped initially with one working and one spare RF channel for 600 telephone circuits, *i.e.*, ten supergroups. Normal expansion will enable this to be

extended to six RF channels in the band 3800-4200 mc, and if necessary additional channels can be added in the band 3600-3800 mc. These additional RF channels can be used for further telephone circuits or for television links. The frequency division channelling equipment used will provide facilities for "through-group" and "through-supergroup" working with other systems, *e.g.*, a standard coaxial or radio system.

At the terminal stations, the equipment for each radio frequency channel will consist of transmitter and receiver cubicles, the transmitter being equipped with a travelling-wave amplifier which will deliver an output of 5 watts to the aerial system. In the case of the repeater station, two one-way 5-watt repeaters will be required, each consisting of one cubicle mounting the transmitter and receiver.



Labgear E.5038 composite Band I/III filter. It plugs in series with the aerial lead to the TV receiver and allows only Band I and Band III signals to pass, interference arriving at all other frequencies being effectively suppressed.

### NEW MULLARD OSCILLOSCOPE

The Mullard L.140 is a new laboratory oscilloscope for the observation and accurate measurement of pulse waveforms. It has an especially linear triggered time-base with a large range of sweep durations, and a wide-band Y-amplifier. Signal delay is included so that the full wavefront of a random pulse can be displayed. The instrument is provided with stabilised power supplies, a cathode follower input probe, and a Mullard cathode ray tube with post-deflection acceleration.

**Time Base and X-Deflection.** A new circuit has been developed which ensures time-base linearity, especially at the start of the sweep. This feature, together with the signal delay circuit, makes possible the accurate investigation of the complete leading edges of pulses.

Time-base sweep durations are from 1 microsecond to 150 milliseconds, and a sweep expansion circuit continuously variable from 1 to 5 diameters can be used to expand the trace horizontally about the tube centre. When used in conjunction with the X-shift controls, this allows minute examination of any part of the trace.

Triggering can be either internal (by the displayed waveform) or external (from a separate source of trigger voltage). With internal triggering, a sensitivity control allows sweep initiation at Y-input levels corresponding to trace deflections down to 3 mm. Trigger sensitivity is independent of Y-amplifier gain. Time measurement can be made with a maximum error of 3 per cent. for time intervals from 1.5 microseconds to 150 milliseconds.

**Y-Amplifier.** Nine sensitivity settings ranging from 3mV/cm to 30V/cm are provided. The amplifier is directly coupled on the lower gain settings (100mV/cm and over), and has a rise time of .07 microseconds. On the high-gain settings a-c coupling is employed, and the rise time is 0.08 microseconds. Pulse amplitude can be measured to better than 3 per cent. (low gain 0.3-300V) or 4 per cent. (high gain, 10mV-1V).

The cathode follower probe has a high input impedance and gives an output which is linear to within 0.25 per cent. for signal voltages from -150V to +150V. A backing-off voltage is provided, variable from -50V to +50V relative to earth.

Be well paid for doing the work you like  
And see the world into the bargain

## Become a Radio Officer in the Merchant Navy

As a Radio Officer pay begins at £28.10.0 a month "all found," for seagoing officers, and rises to £77 a month. You achieve officer status directly you are qualified. Holders of current P.M.G. certificates are eligible for immediate employment. You get generous annual leave besides shore leave in off-duty time in foreign ports.

This is a really worthwhile job. It can take you all over the world and provides opportunities to acquire electronic technical qualifications which open up highly paid posts ashore later on.

Write for full particulars to Mr. F. E. Ash, Dept. E.54, Superintendent of Training, The Marconi International Marine Communication Co. Ltd., Marconi House, London, W.C.2.

### SMALL ADVERTISEMENTS

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

### TRADE

**G3CGD QSL's.**—Fixed and mobile samples on request. Printing enquiries welcomed.—30 St. Luke's Road, Cheltenham.

**WANTED:** Meters, output power; Oscillographs; Oscillator, beat frequency; AVO types; Line Testers TMS No. 1 and TDMS; Wireless Sets 62.—Gilfillan, 7 High Street, Worthing. (Tel.: Worthing 8791).

**SHACK CLEARANCE:** Receivers S20R, £14; SCR-100, £12; 100 assorted resistors, 5/6; 100 assorted condensers, 6/-; new .01  $\mu$ F 750vw. TCC small metal tubular, 2d. each; new TCC 500  $\mu$ F silver mica, 1000-volt test, 2d. each. Meters, chassis, Woden transformers; hundreds of new valves: VR150/30 at 5/6; 805 at 25/-; 813 at 35/-. Bargain parcels, 10/-. Postage extra; s.a.e. for full list of bargains. Callers welcome. Lots of free gear.—John Morris, G3ABG, 24 Walhouse Street, Cannock, Staffs.

**TELEVISION INTERFERENCE:** Receiver Filters —High-pass E.5037, 30/-; Low-pass E.5031, 30/-; Composite Band I/III, 49/6; Transmitter Filter E.5034, 80 dB, 1 kW., £6.—Labgear (Cambridge), Ltd., Willow Place, Cambridge.

**This is Candler calling**

- ALL ENTHUSIASTS
- wishing to learn or to
- improve their speed and
- accuracy in Morse Code.
- The Candler System of *home study* and practice embodies exclusive methods for quickly
- learning to read and send Morse Code. The Practice Equipment costs only a *few shillings*.

Thirty minutes of guided practice a day, the Candler way, is more beneficial than hours spent in hit and miss methods. This System is recognised throughout the World as the most efficient, simple and scientific method of Morse Code Training.

These are three Courses available :

**(1) THE SPECIAL SHORT COURSE**

For G.P.O. Morse Code test for securing Amateur Transmitting Licence, and for S.W.L's.

**(2) THE JUNIOR COURSE**

A Complete Course for the Beginner.

**(3) THE ADVANCED COURSE**

For all who desire to increase their accuracy and speeds up to 20 or more w.p.m.

For Terms and Full Details, write for the "BOOK OF FACTS" which is sent post free, without any obligation.



## CANDLER SYSTEM CO.

(Dept. 55 S.W.) 55b ABINGDON ROAD, LONDON, W.8.

Candler System Company, Denver, Colorado, U.S.A.

## LYONS RADIO LIMITED

3, Goldhawk Rd., Shepherds Bush, London, W.12

Dept. MS.

Telephone: SHEPHERDS BUSH 1729

**FERROMAGNETIC AERIALS and RODS.** Enable an indoor aerial to be made of comparable efficiency to that of an outdoor type. Ideal for portables. Rods only 6in. long x 5/16in. dia., with full winding data. PRICE 6/-. post 6d. Ready wound by Teletron Co. for medium wave band. PRICE 8/9, or Dual wave 12/9, post 6d.

**TELEPHONE SETS TYPE F.** Utilize P/O type hand set with twin call bells, buzzer, and hand generator for calling. Operate from 2-1.5v. cells. (Exact size to fit type "S," 3/9 each if required.) Supplied in metal case approx. 11 x 9 x 8in. In good condition and working order. PRICE, per pair, £7/10/-, carriage 5/-.

**LORENZ HIGH FREQUENCY SPEAKERS.** These P.M. electro-dynamic speakers are specially designed to reproduce those higher frequencies in the sound spectrum from 1.6 to 20 Kc/s. Connected across your existing speaker is sufficient to bring reproduction to life and for it to acquire a realism and sparkle previously unobtainable. Essential for the high quality reproduction of modern L.P. recordings, F.M. and T.V. transmissions. Can be used with any standard speaker and loaded up to 25 watts. Size approx. 2in. diameter x 2 1/2in. deep. Full connection details with each speaker. PRICE 39/6, post paid.

**TRANSMITTER/RECEIVERS TYPE 58.** Canadian<sup>4</sup> Walki-Talkies. Frequency range 6-9 Mc/s, continuously variable. Range approx. five miles. Front panel contains all controls, including 2in. diameter meter for checking operating voltages and current drain. Microphone, headphones, three aerials (rod, wire, and telescopic types) are all included. Valves: 2-1299A's, 1-1R5, 3-1S5's, 2-1T4's. Weight of set less batteries approx. 12 lbs. Soiled externally but good internal condition. PRICE £5/19/6 or, less valves, 59/6, carriage 4/6.

**AMERICAN I.F.F. UNITS.** Contain 2-relays, three sets of cam operated contacts, ten ceramic type I.O. valveholders, sprague and mica condensers, resistors, carbon pile voltage regulator, etc., etc., and ten valves (6-6SH7's, 2-6H6's, 2-7193's.) Also a rotary converter rated for 18v. D.C. input and 480v. D.C. output. Operate quite well from 6v. and 12v. with a correspondingly lower output voltage. One end of the converter is fitted with a fan and the other end with a gear box, both of which can easily be taken off if required. The gear box reduces speed of rotation to two driving shafts which rotate at approx. 4 and 16 r.p.m. for 12v. input and at half this speed for 6v. input. In good condition. PRICE ONLY 30/-, carriage 5/-.

**G4GZ'S BARGAINS**

**VALVES**: 688G, 6G6G, 12SC7M, EF36, EF50, EL32, TT11, 4/-, 1A3, 1L4, 1LN5, 6AG5, 6F8G, 6J5GT, 15D2, EF39, V5110A 4/6, 3D6, 6C4, 6C5M, 6J5M, 6J6, 6K7G, 6Z4, W77, 5/-, OZ4A, 6AM6, EF50 (SYL), EF91, Z77, 6/-, 1A5, 1G6, 3A4, 5Y4, 6AK5, 6F6M, 6N7M, 6SK7M, 6SN7GT, EBC33, 6/6, 155, 1T4, 2A3, 354, 6BE6, 6BS7, 6BW6, 6CH6, 6L7M, 6SA7M, 6SJ7M, 6SL7GT, 6SQ7M, 6V6GT, 6X4, 6X5GT, 6Y7, 12A6M, 12C8M, 807(USA), VR105/30, VR150/30, X66, 7/6, 1C2, 1R5, 3V4, 5U4G, 5Z4G, 6AQ5, 6AT6, 6AU6, 6BA6, 6Q7GT, 7B7, 7C5, 7C6, 7Y4, 12AT6, 12AU7, 12BE6, 12K7GT, 12Q7GT, 12SQ7M, 35Z4GT, 50L6GT, DK92, EF37A, EZ40, EZ80, UY41, 8/6, 12AU6, 12AT7, 12J7GT, 80, 9/-, 3Q5GT, 6K8M, 6Y6M, 757, 12K8GT, 35L6GT, DAF96, DF96, DK96, DL96, ECC83, ECH35, EF80, EM80, PL82, PY82, 9/6, 6AG7M, EABC80, PY80, 10/-, 5R4GY, 10F1, 20L1, 83, 572, EAF42, EBC41, EBF80, ECC82, ECH42, ECH81, ECL80, EF41, EL41, EL84, PY81, UAF42, UBC41, UCH42, UL41, 10/6, 6F13, EY51, PCC84, PL81, PL83, 11/6, 12AH8, 866A, ECC84, ECF82, EF86, PCF80, PCF82, PCL83, R19, 12/6, U25, 13/6, 808, HK24G, 25/-, 805, 832, 30/-, 813, 60/-, **MOULDED V/HLDERS**. B9A, B7G, B8A. Int. Octal 9d. each. B7G, B9A, with screens 1/6 set. B9A PAX. 6d. each.

**MIDGET MAINS TRANS.** (Same size as STD.O/P) 230/250v. input. 175v. 25 m/a 6.3v. 0.6A O/P, 10/6. Ditto but 220v 20 m/a, 10/6 (Post 1/3).

**M.C. METERS.** 2in. sq. fl. mtg. 0-50 m/a, 0-150 m/a 0-500 m/a (RF. T/C) 7/6 each. 0-300v. 9/6, 50-0-50 amps, 10/6. 2in. Rd. Fl. 0-50 m/a 0-25v. 6/6 each. 2in. Rd. Fl. plug-in. type 0-500 Microamps (scaled 0-10v.) 17/6 each. 0-350 m/a (RF. T/C) 7/6. 2½in. Rd. Plug-in Flush 0-250 microamps 22/6. 3½in. Rd. Fl. (2½in. dial) 0-500 m/a, 0-200 m/a, 0-30 m/a, 0-15v. A/C (MI. CAL at 50 cps.), 12/6 each.

**LAST FEW !!** Power units type 247 input 230v 50 cps O/P 580v 200 m/a DC 6.3v 3 amps AC smoothed by 2. 4 mfd. 1Kv. Block condensers and heavy duty shrouded choke. Fitted 5U4G, in smart grey stoved case with chrome handles. Size Bin. X 9in. X 11in. WT. 30lbs. Brand New, 49/6 each, carr. paid. Post/Packing under 10/- (9d.), 20/- (1/3), 40/- (2/-), FREE OVER 40/-. We regret we cannot accept overseas orders.

**JOHN ANGLIN**

385 CLETHORPE ROAD, GRIMSBY, LINCS

Telephone 56315

**G5KW****G8KW****KW ELECTRONICS for**

the world-famous v.f.o. unit by **GELOSO** Output 80, 40, 20, 15 and 10 metres to drive single 807 (model 4/101) or two 807's (model 4/102). Calibrated dial 8¼" x 5". Uses valves type 6J5GT, 6AU6, 6V6G (6L6G).

Price, less valves, £7.12.6. P & p. 1/3 extra.

\* \* \*

**KW ELECTRONICS for**

"Hamobiles" Mk. I & Mk. II, 2-metre Transceivers and Kits.

\* \* \*

**KW ELECTRONICS for**

v.h.f. "Business Radio" equipment.

We are in production with a complete range v.h.f. Mobile & Fixed Station equipment to G.P.O. specification.

\* \* \*

All enquiries to:—

**K. W. ELECTRONICS LIMITED**

136 Birchwood Road, Wilmington,

Dartford, Kent.

**G8KW****G5KW**

SMALL ADVERTISEMENTS, TRADE—continued

**QSL CARDS AND LOG BOOKS. G.P.O. APPROVED. CHEAPEST, BEST. PROMPT DELIVERY. SAMPLES.—ATKINSON BROS., PRINTERS, ELLAND, YORKS.**

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

**QSL's and LOGS** by Minerva. The best there are.—Samples from Minerva Press, 46 Queen's Road, Brentwood, Essex.

**SITUATIONS VACANT**

**RADIO ENGINEER REQUIRED FOR THE ASSEMBLY AND TESTING OF ELECTRONIC INSTRUMENTS. SOUTH LONDON DISTRICT.—BOX No. 1690, SHORT WAVE MAGAZINE, LTD., 55 Victoria Street, London, S.W.1.**

**READERS' ADVERTISEMENTS**

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

**REQUIRED URGENTLY:** 20-40 mc coils for R Transmitter Type 36.—Smith, Trevithal, Paul, Penzance, Cornwall.

**WANTED:** Eddystone or similar Communications Receiver; ex-Govt. not objected to; must be reasonable price.—Perry, 55 Woodview, Grays, Essex.

**JERSEY HOLIDAY:** Stay at "The Lincoln," 3 J Saviours Road; near sea/town centre. Ham shack; photo dark-room; s.a.e., please, brochure.

**WANTED:** Set of Columbia Morse Instruction Records; also Instruction Booklet. State price.—4003308, Sgt. Rowden, 51 AMQ., R.A.F., Felixtowe, Suffolk.

**G.E.C. Miniature Crystal Calibrator, 100 kc fundamental, modulated or CW harmonics, usable to over 40 mc. Accuracy ± 01%. As new, £4.—15 Lymington Avenue, Leigh-on-Sea, Essex.**

**WANTED:** 50-80w. Tx, VFO, 7-28 mc switched, CW or Phone.—Box No. 1688, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**FOR SALE:** Eddystone 750 Rx, new condition; G S-meter and L/S, several spare valves; £50 (o.n.o.).—G3INC, 72 Torrington Road, Ruislip Manor, Middx.

**URGENTLY REQUIRED:** Sept. and Nov. 1948, Feb. 1949 copies of *Short Wave Magazine*.—L. Loveland, 39 Beech Avenue, Beeston, Notts.

**ROCA AR88D, £38 (no offers).—G2FSR, 2 Parkhill Road, Chingford, E.4. (Tel.: SIL. 2451).**

**NEW Unboxed 829 B, 832 (2), 2AP1 (3), 6L6GA (4), American 807 (2); also pair slightly used 35T's; £5, or individually. — Jolliffe, 7 Parkrise, Leatherhead, Surrey.**

**5v. S/W SET;** vari-volt power pack; ¼-h.p. DC motor and rectifiers 230v.; junk box of valves, switches, etc.; £15 (worth three times).—Melville, Briar Bank, Capel, Surrey.

**3-ELEMENT 10-metre beam;** commercial job; brand-new, with pitch prop motor; £10 complete. Type 145 VFO, with 807 and stabilisers, £2 10s.—G3EMD, 99 Shenstone Valley Road, Quinton, Birmingham, 32.



## SMALL ADVERTISEMENTS, READERS—continued

**FOR SALE:** Collins TCS 12 Receiver (1.5-12 mc) in v.g. condition, £6 (plus carriage). Valves, unused (each): 811 (3), 10/-; 6AG7 (3), 6L6G (6), 6K8 (4), 4/-.—Box No. 1689, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**MORECAMBE HOLIDAY:** Overlooking Bay and Lake District mountains. Ham shack.—Write brochure: G3AEP, Ferncliffe Guest House, Drewton Avenue, Sandylands, Morecambe.

**ZC1** Mk. 2 with aerial base, mike, key, leads, phones, control unit and manual, £9 10s.; Radio City 314 valve-tester, mint, with manual, £6; Universal Avominor, recently overhauled by makers, £4 15s. All perfect working order. Carriage paid.—Horrocks, G2FLP, Biddulph Road, Congleton, Cheshire.

**WANTED:** DST-100; must be in perfect working order.—Box No. 1691, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**URGENTLY REQUIRED: MOBILE Tx, Rx, POWER SUPPLIES, 12-VOLT; ANY BAND; INDIVIDUAL ITEMS, OR COMPLETE.—G3AOS, 5 PROSPECTS DRIVE, HALE BARN, CHESHIRE.**

**LATE G3HBK:** All equipment to be sold, including B4/40, BC348, 1155, power units, etc.; s.a.e. for list.—H. W. Cross, G3HCY, 5 Chippenham Close, Eastcote, Middx.

**WANTED:** Medium-sized power Phone/CW Tx 160 to 20 metres, with power supplies. Applicant at sea, but all replies answered soonest.—Write full description, price, Box No. 1692, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**SALE:** Hallicrafter Sky Champion Communications Receiver, 0.5-44 mc; immaculate condition and performance. Offers?—York, Waldrons Farm, Sidmouth Road, Farringdon, Exeter, Devon.

**SALE:** BC-342N, unmodified. G.E.C. (U.S.A.) CG 46117, unit of RAX-1, 7-27 mc; or exchange for Comms. Rx, 60 kc-30 mc (CR-100 considered).—Kirkup, 42 Beckett Lane, Langley Green, Crawley, Sussex.

**LAKESHORE INDUSTRIES** Miniature Table-top SSB Transmitter, 20 x 9 x 7½ inches, 50 watts, £45; AR88LF S-meter, manual, perfect, £48; SCR522 Transmitter, complete, 67/-; Receiver, complete, 55/-; 19 Set Mobile Pack, 24/-; Mobile Pack No. 4, 26/6. Carriage extra.—27 York Road, Selsdon, Surrey.

**FOR SALE:** BC-312 and P/Pack, £10; BC-221AH and Stab P/Pack, £15; BC-455 converted 20m. bandspread with P/Pack, £3 10s.; BC-454 (new), £2; two 1154's (one converted), £2; new 813 and RCA Heater Trans., £1 10s.; 829B (new), 15/6; Mod. Trans. for 813's, husky job, £2; S-meter (new), 15/-.—G. J. Dobson, G3HTU, 33, Thompson Avenue, Ormskirk, Lancs.

**TRANSMITTER** 53, 15/-; Receiver 78, 25/- (both 2.4-13 mc); 522 Transmitter, 18/6; Receiver, 6/- (less valves); TU Top Band transmitter, 17/6; 144 transmitter, TT15 PA, £2 5s.; Test Set BG3, 12/6; 12v./230v. AC rotary, £3; 28v./230v. dynamotor, 10/6; 12v./255v. dynamotor, 15/-; 6/12v. dynamotor and filter 12/6; 6v./230v. Vibrator Pack, 27/6; 9in. mains Vent-Axia, £2 5s. Several mains transformers, various meters, 5/-; 6AG7, ECH35, 6/6; 832, 446B, VCR139A, 12/6; 829B, 35/-. Odd valves to clear; list; carriage extra.—GW3EJR, 32 Hillfield Place, Aberporth, Cardigan.

**WANTED URGENTLY****Exceptional Prices Paid For****BC221****FREQUENCY METERS**

or CASES

Kindly advise price required.  
NO REASONABLE FIGURE REFUSED  
As we DO require these urgently.

**UNIVERSAL ELECTRONICS**

22, Lisle Street, Leicester Square, London, W.C.2.

**WANTED****VERY HIGH PRICES PAID FOR THE FOLLOWING:—**

APN3	BC342	I-152
ARCI	BC611	TS13
ARC3	BC713A	TS35
ARN7	BC714A	TS45
ART13	BC721	TS148
BC221	BC788C	TS174
BC312	CPN2	TS175

Also Modulation Transformers Thermador No. CS2160 and Scanner (antenna) RC94 or parts.

**ALTHAM RADIO CO.****JERSEY HOUSE - JERSEY STREET  
MANCHESTER 4**

Telephone: Central 7834/5/6

Largest stocks in Europe of Government surplus material.

**Southern Radio's Wireless Bargains**

**TRANSRECEIVERS.** Type "38" (Walkie-Talkie). Complete with 5-valves. In Metal Carrying Case. Ready for use. Less external attachments ..... per set 30/-

**ATTACHMENTS** for use with "38" TRANSRECEIVER: HEADPHONES, 15/6; THROAT MICROPHONE with Lead and Plug, 4/6; JUNCTION BOX, 2/6; AERIAL, 2/6; SPECIAL OFFER of used "38" TRANSRECEIVERS less Valves but complete with ALL COMPONENTS. Excellent for SPARES ..... per set 11/6 P & P 2/-

**TRANSRECEIVERS.** Type "18" Mark III. TWO UNITS (Receiver and Sender) contained in Metal Case. Complete with six valves, microammeter, etc. LESS EXTERNAL ATTACHMENTS ..... £4/10/-

**RECEIVERS.** Type "109" 8-valve S.W. Receiver with VIBRATOR PACK for 6-volts. Built-in Speaker; METAL CASE ..... £5

**BOMBSIGHT COMPUTERS.** Ex R.A.F. BRAND NEW. A wealth of components. GYRO MOTORS; REV COUNTERS; GEAR WHEELS, etc. Ideal for Model Makers, Experimenters, etc. .... £3

**LUFBRA HOLE CUTTERS.** Adjustable ¼" to 3¼". For Metal, wood, plastic, etc. .... 7/-

**RESISTANCES.** 100 ASSORTED USEFUL VALUES. Wire Ended ..... per 100 12/6

**CONDENSERS.** 100 ASSORTED. Mica Metal Tubular, etc. .... per 100 15/-

**PLASTIC CASES.** 14" x 10½". Transparent. Ideal for Maps, Display, etc. .... 5/6

**STAR IDENTIFIERS.** Type I A-N covers both hemispheres. In case ..... 5/6

**CONTACTOR TIME SWITCHES.** In sound-proof case. Clockwork movement; two impulses per sec. Thermostatic control 11/6. REMOTE CONTACTORS for use with above 7/6

**MORSE TAPPERS.** Standard, 3/6. Midget .... 2/9

**MORSE PRACTICE SET** with buzzer on base ..... 6/9

Complete with battery ..... 9/6

**METERS AND AIRCRAFT INSTRUMENTS.** Only need adjustment or with broken cases. TWELVE INSTRUMENTS including 3 brand new Aircraft Instruments 35/- for 12

**CRYSTAL MONITORS.** Type 2. New in transit case. Less valves ..... 8/-

Postage or Carriage extra. Full List of Radio Books 2½d.

**SOUTHERN RADIO SUPPLY LTD.**  
11, LITTLE NEWPORT STREET, LONDON, W.C.2.  
GERrard 6653

SMALL ADVERTISEMENTS, READERS—*continued*

**S**ALE: Eddystone S.640; one owner; no extras; good order. Offers nearest £16.—Hadwick, 11 Crawshaw Avenue, Sheffield, 8.

**F**OR SALE: Canadian Marconi-type 52 Tx/Rx; frequency 1.5-16 mc; fully valved; 813 PA and main power pack; buyer collects; £20.—Wilson, 18 Holdenby Drive, Park End, Middlesbrough.

**Q**-MAX B4/40, all-band, Phone/CW, 40-watt table-top transmitter, complete; in perfect working order and very good condition; £27 10s. (o.n.o.).—Box No. 1693, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**100 PER CENT.**! mostly brand-new: 829 (2), 30/-; 832 (2), 15E (1), 15/-; 3FP7 (1), ECL80 (4), EF80 (5), 9/6; RL18 (2), 6J6 (4), VR105/30 (2), 6/-; 6C4 (2), 6AG5 (4), 4/9; PT15 (2), EF50 (6), with ceramic base, 2/9. Pye 45 mc strip, 30/-; 14in. television cabinet with mask, 15/-. Post extra.—V. A. Cedar, 9 North Drive, London, S.W.16.

**Q**UICK SALE: Ex-G3DT transmitting and receiving equipment; power packs, speakers, components, etc.—Rozel, Harrietsham, Kent. (Tel.: Harrietsham 281).

**E**DDYSTONE S.640 Receiver, good condition, £10; EHRO and 9 coils, £13; 50 microamp. meter, £1. Also dozens of valves, etc.—St. Martins, Locksheath Park Road, Locksheath, Southampton.

**H**RO, Rack Mounted; 6 coils, 500 kc-30 mc; power supply; speaker; £23 (o.n.o.). Wilcox Gay VFO, £3 (o.n.o.); prefer buyer collect. BC-624A; TZ40 (2); MCRI Rx, complete; R103, Mk II; power pack; speaker; £6 (o.n.o.). R1224 (needs attention), £1. BC-453B, converted to MW; 6 valves; 30/-. Ali Chassis (2), 10/- each (14" x 8" x 2"), front panels and side plates. Two field telephones (less batteries), 10/- each.—G3HWU, 200 Quarumby Road, Huddersfield.

**S**ALE: Large Cabinet containing hundreds of components, £25 (prefer buyer arrange transport). R109 (mains), £5; 832, 15/-; 6v. charger transformer rectifier, 25/-; mod. preamp, £1. Voigtlander camera, £7 10s.; processing accessories, tank, 25/-. Vibrator P/Unit, £2; 6in. 1 mA meter, £3; R1155 D/F meters, 15/-; 100 kc Xtal, £1; 80m. driver, suitable QRP, phone (requires p/unit and tank circuit), £3. *Short Wave Magazine*, Oct. 1950 to Dec. 1955, £3. *Radio Constructor*, Vol. 8 (bound), Vol. 9 (unbound), £1. *R.S.G.B. Bulletin*, Sept. 1950 to Aug. 1954, 30/-. Jason FM Rx, needs aligning, £2 10s. (carriage extra).—Box No. 1694, Short Wave Magazine, 55 Victoria Street, London, S.W.1.

**C**OMPACT 12in. x 7in. x 11in. Top Band Tx; VFO/BA/PA; plate and screen modulation; TT11 Pi-Section output; exhibition Tx; £10.—Box No. 1695, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**25-WATT** Tx (Radiocraft design), complete with aerial tuner and 25-watt modulator; has worked over 80 countries, FB; compact job; £12 the lot for quick sale.—Box No. 1696, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**13-CHANNEL** 14in. Television; perfect condition. Never had the back off; 12 months old; all Mullard valves and CRT. Would exchange for FB Rx, preferably AR88, or sell for £45.—Box No. 1697, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**ZC1**/Mk. II Transmitter-Receiver; has been modified for AC mains, but will supply 12v.; power pack and handbook; new Rx dial fitted, but needs mod. to modulation completing. First-class condition, with spare valves, phones, etc.; £9.—Box No. 1698, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**V**ALVES: 300 valves, including 35T, GU50, 808, 807, 6K8, 6S6, 6C4, ECL80; all types American metal valves; too many types to list. State wants and prices offered (s.a.e., please).—Box No. 1699, Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1.

**R.C.A.** AR88 with Manual, etc.; also R.C.A. Tone Keyer, two U.S.A. Transceivers; £3 10s. each. All brand-new.—17 Kent Road, Atherton, Manchester.

**Reliable Surplus Valves.** 12H6, 1/-; EB34, 9004, 1/9; 2C26, EC31, 2/6; 6SK7GT, KTZ63, 3/9; EB91, KTZ41, D77, 4/3; 6J7, 4/9; 6Q7GT, 6/9; 80, 7/6; KT33C, 8/-.

**The following in Maker's Cartons.** VU111, 2/3; 6H6, 2/9; 954, 3/-; 6SK7, 3/9; 6SH7, 6K6GT, 4/9; 6C6, 5/9; 866A, 9/6. Ex-equipment types: EB34, 1/3; VR65A, 2/-.

**VCR97 Cathode Ray Tubes.**—with socket. Full picture 35/-, slight restriction (outside mask area) 25/-, cut off, suitable for scope, 12/6. Carriage 2/6 per tube.

**Heavy Duty Twin Screened Cable.** 9d. a yard.

**Midget Ceramic Condensers.** 1, 2, 3, 4, 7, 7.5, 10, 15, 22, 27, 33, 39, 47, 56, 75, 100, 150, 220, 270, 330, 390, 470, 680, 1000, 1500, 2000, 3000 pf, 8d. each 7/6 doz. 5000, 10,000 pf. 10d. each 9/6 doz.

**Electrolytic Condensers.** 20  $\mu$ F, 50V, 1/3; 50  $\mu$ F 12V, 1/9; 50  $\mu$ F, 50V, 2/-; 8  $\mu$ F, 450V, 2/3; 16 + 32  $\mu$ F, 350V, 4/3; 32 + 32  $\mu$ F, 350V, 5/3.

**Potentiometers.** Carbon, 5K, 500K, 1/3 each, wirewound 3K, 3 watt, 1/9 each.

Please allow for postage on orders less than £1.

2a, BURNLEY ROAD

**REED & FORD**

AINSDALE SOUTHPORT

**Wanted**

**BC312      BC342**

Receivers. We will pay

**£25**

each for sets in good condition.

**P.C.A. RADIO**

Beavor Lane, Hammersmith, W.6.

RIVerside 8006

**BRASS, COPPER, BRONZE,**

**ALUMINIUM, LIGHT ALLOYS**

IN ROD, BAR, SHEET, TUBE, STRIP, WIRE

---

**3000 STANDARD STOCK SIZES**

**H. ROLLET & CO., LTD.**

6, CHESHAM PLACE, LONDON, S.W.1.

SLOane 3463

**Works: 36 ROSEBERY AVENUE, LONDON, E.C.1.**

Branches at LIVERPOOL, MANCHESTER, BIRMINGHAM, LEEDS

"No Quantity too Small"

# HOME RADIO OF MITCHAM



FOR THE

## NEW

## EDDYSTONE

## “888”

A magnificent communications receiver which has been designed completely for the radio amateur and serious short wave listener. The amateur demands bandspread — and then more bandspread — and in the “888” he certainly gets it. There are six scales each taking up the whole of an amateur band. Variable selectivity and a specially designed audio filter, built-in crystal calibrator, R.F., I.F., and audio gain controls and a host of exciting features. May we send you full specification? A demonstration receiver is available at our showrooms. Deliveries will commence during July.

PRICE **£110** (H.P. terms available)

### HOME RADIO

187, LONDON ROAD, MITCHAM, SURREY. Mitcham 3282

## Quality Electronic Equipment All Guaranteed in Perfect Condition

### RECEIVERS in stock

EDDYSTONE 640 1.2—30 Mc/s. As new.	£22 10 0
740, 550 kc/s—32 Mc/s. ....	£30
750, 550 kc/s—32 Mc/s. ....	£48
680 .....	£65
680x .....	£85
RCA AR77E 550 kc/s—32 Mc/s. ....	£35
AR88D and type L.F. from .....	£50
HAMMARLUND HQ129X .....	£85
Super pro., complete with power supply	£38
<b>HALLICRAFTERS</b>	
S38 a.c./d.c. 550 kc/s-32 Mc/s .....	£20
SC24 550 kc/s-32 Mc/s .....	£35
S20R .....	£28
SX28 550 kc/s-42 Mc/s .....	£45
SX71 550 kc/s-32 Mc/s .....	£85
<b>RADIOVISION</b>	
Commander Double .....	£40
Superhet .....	£40
HAMBANDER receiver 1.2—30 Mc/s. ....	£17 10
RME 69 550 kc/s—32 Mc/s. As new .....	£30
ZENITH Transoceanic batt.-mains receivers	£23
NATIONAL NC 173, 550 kc/s-30 Mc/s. NEW, with matching speaker .....	£100
HAMMARLUND HQ 129, as NEW .....	£75

### MANUALS

for the following receivers :

AR88LD-D, AR77E, R107, Hallicrafters SX24, SX28, S20R, S20, B2 Transmitter/Receiver, HQ120, HRO, Junior and Senior £1.7.6 each.  
Set of main dial, bandspread and name plate for AR88D, £1.10, set of three.

### TEST EQUIPMENT

#### FERRANTI A.C./D.C. TEST METERS

Pocket size complete in case and tested. Ohms, Volts, Milliamps. A snip, £4.17.6 plus 1/6 postage.  
AVO voltage range extenders for AVO model 40. Up to 4800V. New in box, 5/6 post paid.

#### TAYLOR TYPE 82

A.c./d.c. Universal test meters. Complete in wood box. 6in. scale, 5000V. Resistance/Meg. 1mA—1A 1,000 ohms per volt. £7.15.0 each.  
AVO nine-pin couplers ... 7/6 ea.  
1-222A Signal Generator 110V a.c. 8-15 Mc/s., 150-230 Mc/s. £12.10.0 each plus carriage 10/-.  
AVO model 7 ... .. £15  
AVO model 40 ... .. £12 10  
AVO wide range signal generator ... £23  
AVO electronic test meter ... .. £30

### AUDIO EQUIPMENT

LEAK TL/10 ... .. £28.7  
LEAK “Point-one” and TL/12... .. £28.7  
ROGERS RD junior with control unit ... £26  
Speakers : Goodmans, Wharfedale, Vitavox.  
BK PARTNERS reflex corner speaker, complete with Axiom 60 and 101, polished cabinet ... .. £25  
We wish to buy good, second-hand Audio equipment . . . part exchanges arranged.

**WANTED URGENTLY !!!**

**Exceptional Prices Paid for**

## BC221

## FREQUENCY METERS

or CASES

kindly advise price required

**NO REASONABLE FIGURE REFUSED** as we DO require these urgently

Also required :

**RECEIVERS.** ASB8, ASB4, ASB6, etc. Hallicrafters SX28, S27, S27C, S27CA, R.C.A., AR88, R1359, R1294 and any VHF equipment. APR4 and Units TN16, TN17, etc., etc.

**U.S.A. MICROWAVE** equipment including all TS prefix equipment, i.e.: TS12, TS13, TS47, TS174, TS175 and Manuals for any equipment.

# UNIVERSAL ELECTRONICS

22/27 LISLE STREET · LEICESTER SQUARE · LONDON · W.C.2

Write, Call or Telephone GERrard 4447

# HENRY'S RADIO Ltd

5 Harrow Road, Paddington, W.2

PADddington 1008/9 and 0401

OPEN MONDAY to SAT. 9-6. THURS. 1 o'clock.

Send Stamps for NEW 1956 28-Page Catalogue



### QUARTZ CRYSTALS

Type FT243 fundamental Frequencies. 2 pin.  $\frac{3}{16}$  in. spacing.  
**120 TYPES.** 5675 Kc/s. to 8650 (in steps of 25 Kc/s.).  
**80 TYPES.** 5706 Kc/s. to 8340 Kc/s. (in steps of 33.333 Kc/s.).  
 ALL BRAND NEW **10/-** each.

Special price for complete sets of 80 or 120

Above are suitable for re-grinding.

**TYPE FT241A** 54th harmonic Crystals. 2 pin.  $\frac{3}{16}$  in. spacing.

**80 TYPES AVAILABLE** 20 Mc/s.—27.9 M/Mc/s (In Steps of 100 Kc/s. COMPLETE SETS AVAILABLE. ALL BRAND NEW **7/6** each.

**FT241A** 200 kc/s. 10/- each. Crystal Holders for both Types 1/3 each.

### MINIATURE TRANSMITTING STRIP 'TYPE 81'

Size  $7\frac{1}{2}$  in. x 6 in. x  $\frac{3}{16}$  in. Complete with Valves Type CV415, CV309, 2-6AM6, 2-7D9 and Quartz Crystal, 4,860 kc/s. Fully wired with circuit. **£4/10/-** complete.

### U.S.A. TEST METER

25 ranges. 1,000  $\Omega$  p. volt, A.C. and D.C. Readings 10-6,000 volt. Milli-amps 1 mA-600 mA. Ohms 0-5 megs. Decibels — 10 to +70 DB. Complete with internal batteries, leads and instruction book. **£6/19/6.**

### TRANSISTORS

Offered at less than half-price

This **JUNCTION TRANSISTOR TYPE P.N.P.** is designed for A.F. Application up to 800 Kc/s, and is suitable for use in Radio Control, Signal Tracers, Local Station Receivers, Oscillators, Transistor Voltmeters and Local Experimental work, etc. **10/-** (Complete with Technical Data and Circuits)

### ELECTRICAL DATA :

Maximum collector voltage	— 5 volts
Peak collector voltage	— 5 volts
Maximum collector current	— 10 m/a
Maximum emitter current	— 10 m/a
Maximum power dissipation	— 25 mw.

### T/R 1196 RECEIVER

Complete with 6 valves: 2 EF36, 2 EF39, 1 EK32, 1 EBC23, 465 I.F.T., ideal for conversion. In absolute new condition. **27/6**, p.p. 2/6, with circuit.

### TR 1196 TRANSMITTER

Transmitter section comprising EL32, EF50, VT501, Relay, etc., **12/6**, p.p. 2/6.

**COMPLETE TRANSMITTER RECEIVER** with 24v. power-pack in original transit case. **57/6**, p.p. 5/-.

### 62A INDICATOR UNIT

Containing VCR97 with Mu-Metal Screen. 21 Valves: 12-EF50, 4-SP61, 3-EA50, 2-EB34. Plus Pots., Switches, H.V. Cond., Resistors, Muirhead S/M Dial. Double Deck Chassis and Crystal. **BRAND NEW ORIGINAL CASES, 67/6.** Carr. 7/6.

### CATHODE RAY TUBES

**VCR138A with SCREEN** £1 15 0

**VCR139A.** 2 $\frac{1}{2}$  in. C/R Tube. Brand new in original cartons (carr. free)..... £1 15 0

**VCR97.** Guaranteed full T/V picture (carr. 2/-) .. £2 0 0

**VCR517C.** Guaranteed full T/V picture ..... £1 15 0

**MU-METAL SCREENS** for VCR97 or 517. P.P. 1/6..... 10 0

6 in. **ENLARGER** for VCR97 or 517. P.P. 1/6... 17 6

**VCR97.** Slight cut-off. Carr. 2/- ..... 15 0

**3BP1.** Brand new ..... £1 10 0

We have over 50,000 British and American Valves available at very low prices — Send for Lists.

**G2AK**

**QUALITY and SERVICE**

**G2AK**

## THE LAST WORD

Built for the connoisseur who must have the best

### THE NEW EDDYSTONE "888"



### AMATEUR BAND COVERAGE ONLY

Range 1. 28-30mc	Range 4. 7-7.3mc
Range 2. 21-21.5mc	Range 5. 3.5-4mc
Range 3. 14-14.35mc	Range 6. 1.8-2mc

Double Super Het. circuit with I.F.'s. on 1620 and 85 Kc.

Built in 100 Kc Calibrator.

A Super Audio Filter.

AVAILABLE IN STRICT ROTATION. PRICE £110. H.P. Terms available on approved accounts.

Write for details and the new illustrated Technical Brochure.

**CHAS. H. YOUNG Ltd**

MAIL ORDERS TO :—Dept. "S"

102 Holloway Head, Birmingham

ALL CALLERS TO :— 110 Dale End, Birmingham

MIDLAND 3254

CENTRAL 1635

Printed by The Courier Printing Co. Ltd., Tunbridge Wells, for the Proprietors and Publishers, The Short Wave Magazine, Ltd., 55 Victoria Street, London, S.W.1. The Short Wave Magazine is obtainable abroad through the following: Continental Publishers & Distributors, Ltd., William Dawson & Son, Ltd.; AUSTRALIA AND NEW ZEALAND—Gordon & Gotch, Ltd.; AMERICA—International News Company, 131 Varick Street, NEW YORK. Registered for transmission to Canada by Magazine Post. July, 1956.