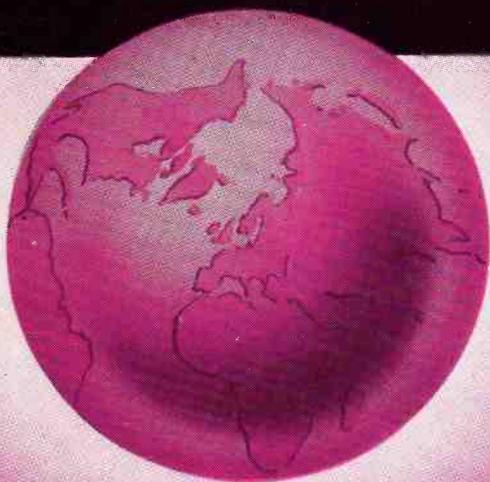


21-

# SHORTWAVE

*Magazine*



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

**VOL. VIII No. 4 JUNE 1950**

# CLYDESDALE

*Bargains in Ex-Services Radio and Electronic Equipment*

## INFRA-RED IMAGE CONVERTER TUBE

Sniperscope      Snooperscope

The famous war-time "Cat's-eye" tube used in "Tabby" for night-snooping and observation.

Provides a Silver Caesium Oxide Screen for the conversion of infra-red rays to visible rays, using an infra-red source. Data provided.

Dimensions overall : dia. 2" x 1 1/2". Screen dia : 1 3/8".

Clydesdale's Price only **12/6** each      Post paid

## Ex-Royal Navy SOUND-POWERED TELEPHONE

NO batteries required, gives long service without attention. Complete with warning indicator lamp and generator, giving a high-pitched note, which can be heard through any noise. Where a number of units are used the lamp would indicate which one is being called. Dim. : 7 1/2" x 9" x 7 1/2", overall, for wall-mounting. Designed for ships' use, but suitable for the Home, Office and Factory.

Clydesdale's Price only **27/6** each      Carriage paid

## STILL AVAILABLE

- Wireless Set No. 48 ... £14/10/-
- T1154 Transmitter Unit 4 range ... £10/10/-
- T1154 Transmitter Unit 3 range ... £7/18/6
- R1155 Receiver Unit, ... £12/12/-
- Bridge Megger 100 megohms at 1,000v ... £35.
- Wee Megger 20 megohms at 250v ... £5/19/6
- A.C. Power Unit type 3 ... £3/19/6
- Crystal Multiplier type M1-19468 ... £1/19/6
- BC-456 "Command" Modulator Unit ... 19/6
- Battery Amplifier A.1368, ... 11/6
- Reflector Aerial (MX-137/A) 5/6.

As previously advertised, prices include carriage.

## Brand New SHADED POLE MOTORS

Rugged and highly efficient motors, giving an amazing performance at an economical price. Will stand heavy overloads, and for intermittent ratings are capable of giving up to twice the rated power. Carefully tested for balance, and individually put through a Silent Room test, these motors are ideal for Gramophone Motors, Wire and Tape Recorders, Fans, Motion displays, Switch Movements, Timing Mechanisms, and many other applications.

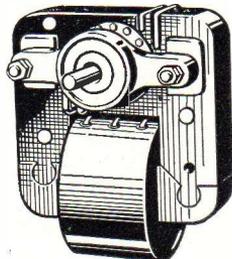
### SPECIFICATION

200-220/230-250 volts, 50 cycles. Under 30° Rise. Continuous rating.

Type	SR2	SR1
Stack Thickness	0.675"	0.875"
Watts (Light)	17	21
R.P.M. (Light)	2,750	2,750
Starting Torque (in./oz.)	1.7	2.3
Full Load Torque (in./oz.)	2.0	3.0
Full Load R.P.M.	2,000	2,000
Weight	17 lb.	2.31 lb.

Shaft Dia. : 0.1875" Steel Centreless Ground.  
Bearings : Graphite Bronze Oilless type, Self Aligning.  
Rigid Diecast Bearing Brackets. Vacuum Impregnated Layer Wound Coil.

Clydesdale's Price only      Model SR2 **25/-**      Post paid  
Model SR1 **32/-**



## Brand New, in maker's carton. Ex. U.S.A.S.C. CRYSTAL MULTIPLIER, Type MI-19468.

A frequency Multiplier to cover 2-20 mcs. with 807 and spare (2 valves) 0/10 ma. grid current meter, variable condenser, calibrated micrometer control, etc., external power supply required (no Xtals supplied). In metal case 13" x 10" x 6", with Instruction Books.

Clydesdale's Price only **39/6** each      Carriage paid

## VIEWMASTER TELEVISION

Circuit and Data State whether London (A) or Sutton Coldfield (B).  
All Components available.

### READY JUNE

Complete Illustrated List No. 7 of Ex-Services Bargains. PLUS

List of Radio and Television Components by foremost manufacturers, fully illustrated, also containing useful valve, coil, and other data. Send 6d. to cover distribution cost. Please print name and address.

## POWER UNIT 247

For 230v, A.C. 50 cycles. Output 600v at 200 ma. smoothed D.C. 6.3v, A.C. 3A.

Complete power pack, with 5U4G rectifier, etc., built on metal tray 10 1/2" x 9" x 1 1/8" with grey finish metal cover 11" x 9 1/4" x 7 1/2", 2 chromium handles, red indicator and inspection door, giving access to rect. and pilot bulb.

Clydesdale's Price only **59/6** each      Carriage paid  
with transit box

Order direct from :

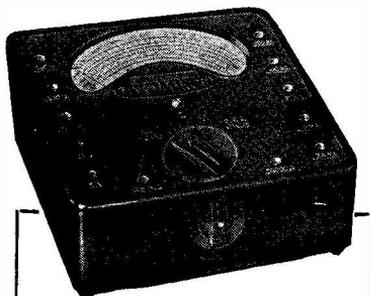
**CLYDESDALE SUPPLY CO LTD** • 2 BRIDGE STREET GLASGOW - C.5

Phone : South 2706/9

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# 'AVO' Precision ELECTRICAL TESTING INSTRUMENTS

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



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

## The UNIVERSAL AVOMINOR

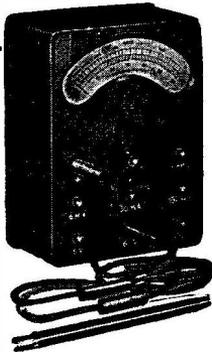
A small but highly accurate instrument for measuring A.C. and D.C. voltage, D.C. current, and also resistance. It provides 22 ranges of readings on a 3-inch scale, the required range being selected by plugging the leads supplied into appropriately marked sockets. An accurate moving-coil movement is employed, and the total resistance of the meter is 200,000 ohms. The instrument is self-contained for resistance measurements up to 20,000 ohms and, by using an external source of voltage, the resistance ranges can be extended up to 10 megohms. The ohms compensator for incorrect voltage works on all ranges. The instrument is suitable for use as an output meter when the A.C. voltage ranges are being used.

Size : 4 3/8 ins. x 3 3/8 ins. x 1 7/8 ins.  
 Nett weight : 18 ozs.  
 Price : £8 : 10 : 0  
 Complete with leads, interchangeable prods and crocodile clips, and instruction book.

## The D.C. AVOMINOR

### GUARANTEE

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



<b>CURRENT</b> 0-3 milliamps. 0-6 " 0-30 " 0-120 "	<b>VOLTAGE</b> 0-6 volts. 0-12 " 0-60 " 0-120 " 0-300 " 0-600 "	<b>RESISTANCE</b> 0-10,000 ohms 0-60,000 " 0-600,000 " 0-3 megohms
----------------------------------------------------------------	-----------------------------------------------------------------------------------	--------------------------------------------------------------------------------

A conveniently compact 2 1/2-inch moving coil precision meter for making D.C. measurements of milliamps, volts and ohms. The total resistance of the meter is 100,000 ohms, and full scale deflection of 300 v. or 600 v. is obtained for a current consumption of 3mA. or 6mA. respectively.

Size : 4 1/8 ins. x 3 1/8 ins. x 1 3/8 ins.  
 Nett weight : 12 ozs.  
 Complete as above.  
 Price : £5 : 5 : 0

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

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

# A NEW COMMUNICATIONS RECEIVER THE EDDYSTONE MODEL '750'

(A British Product)

A Double Superheterodyne  
possessing High Selectivity and  
excellent Signal-to-Noise Ratio



Four wavebands covering 32 mc/s to 480 Kc/s continuous except for a small gap around 1,600 Kc/s. Eleven valves. Separate oscillator, supplied with stabilized H.T. Independent R.F., I.F. and A.F. gain controls. Linear frequency scales, directly calibrated. Mechanical bandspread. With high reduction ratio geared tuning mechanism.

**Price £49 10 0** (Exempt from Purchase Tax)

A user writes : "The '750' Receiver is a real pleasure to handle, and the DX simply rolls in. Signals on 10, 20, 40 and 80 metres are quite exceptional, and I have never before experienced the joy of sitting down with such a 'Distance Eater'."

Full specification available from any Eddystone Registered Dealer or from the Manufacturers :

**STRATTON & CO. LTD.**

**EDDYSTONE WORKS, ALVECHURCH ROAD, BIRMINGHAM, 31**  
Telephone : Priory 2231/4      Telegrams : Stratnoid, Birmingham

## A Few "PANDA" Specials

New U.H.F. Osc. units, complete. 6" x 5" x 3", steel unit chassis with supporting feet. High quality 50mmfd. variable condenser, high frequency inductance, fil. choke, 5k.w.w. pot, Philip's concentric trimmer, CERAMIC EF50v. holder, and 4-pin English type, together with sundry resistors and condensers. BRAND NEW and ready wired. Ideal for T.V. Booster conversion. 5/9, post 9d.

VARIACS. 230v 50c. variacs, output 0-230v 1.3 amps. £5/10/-, post 1/4.

813v HOLDERS, new ceramic, 5/9 ; Jumbo lock-in, 3/6 ; 866 type lock-in, 3/6 ; int. octals, 7d.

ANT. RELAYS, by Price Bros. U.S.A. 25v d.c., D.P.D.T. 2kw. R.F. on 2" ceramic stand offs, 7" x 3" base. ONLY 12/6. D.P.D.T. 12v P.O. type, with platinum contacts (slugged), 2/-.

CHOKES. 10H. 250 M/A, 15/6. 9H. 100M/A, 5/6 ; 20H. 80M/A, 8/6. Double type. 10H. 150M/A, each section, 8/6 ; 10H. 70M/A., each section, 5/6. Adjustable core type (small), .5 to .8H. 20M/A, 2/9.

RECTIFIERS. 230v 20/30 m/a H.W. (3" x 1"). NEW, 3/6. 24v 3amp. bridge type, complete with mounting brackets, 12/6. 12v 2 amp. bridge type, complete with mounting brackets, 7/6.

RESISTANCES. Most values in half, one and two watts ; huge stocks also condensers, all types, bleeders, etc. WE CAN SAVE YOU POUNDS, let us have your lists and enquiries and we will gladly quote by return. We still have a few B.C.221's and we will quote you.

SPECIAL 5kv and 7.5kv Western Electric Vacuum capacitors for T.V.I. suppression at THE LOWEST PRICE 5/6.

**PANDA RADIO CO., 58 SCHOOL LANE, ROCHDALE**

# TRY VALLANCE'S FIRST

**EDDYSTONE LOUDSPEAKER.** A special 5" high flux unit with special baffle giving an excellent frequency response for communications purposes. 7" diameter. Chromium feet. Available in either black, brown or grey ripple finish, £2/19/6.

**A.M.C. TUNING DIAL.** Three waveband edge-lit with horizontal pointer and vertical movement. Complete with 500 pf twin-gang condenser and flywheel tuning, 20/-.

**TUNING DIAL.** Three waveband edge-lit with vertical pointer and horizontal movement. Flexible coupler and flywheel tuning fitted, 26/-.

**'BATHTUB' CONDENSERS.** 0.1 mfd 1000 vw oil-filled, 1/3 each.

**HEADPHONES.** Lanced armature. 600 ohms. Ideal for crystal sets, 5/9.

**BROWN'S type "F" High impedance,** 30/9 per pair.

**MORSE KEYS.** Practice type. All parts in brass on polished wood base, 3/3.

**CRYSTAL SET COILS.** Boxed with circuit, 2/3.

**CRYSTAL DETECTORS.** Semi-permanent type, 3/9. Cat's-whisker type (less crystal), 3/-.

Packet containing crystal and spare whisker, 9d.

**CRYSTAL DIODES.** 4/-.

**CRYSTAL SETS.** Standard with cat's-whisker. Detector MW, only 11/-.

De luxe type in cream plastic with semi-permanent detector MW, 6/-.

**ENAMELLED COPPER WIRE.** 1 lb. reels. 16, 17, 18, 19 and 20 SWG, 2/3. 21, 22 SWG, 2/6. 23, 24 SWG, 2/9. 25, 26 and 27 SWG, 3/-. 28, 29 and 30 SWG, 3/2. 32 SWG, 3/3. 33, 34, and 35 SWG, 3/7. 36 and 37 SWG, 4/-.

38 and 39 SWG, 4/3. 40 SWG, 4/6.

**DOUBLE SILK-COVERED COPPER WIRE.** 25 SWG, 2/3. 26 SWG, 2/5. 28 SWG, 2/7. 30 SWG, 2/9. 32 SWG, 3/1. 34 SWG, 3/5. 36 SWG, 3/7. (2-oz. reels.)

**DENCO POLYSTYRENE SOLUTION.** Ideal for doping coils. Low loss and damp-resisting. 1-oz. bottles, 1/3. 2-oz. bottles, 2/7.

**TUNING CONDENSERS.** Twin gang, 500 pf, less trimmers, 8/6.

**EXPANDED ALUMINIUM SPEAKER FRET.** As used by leading manufacturers. Gold or bronze. 12" x 12", 5/3. Chrome, 12" x 12", 3/9. Any other size available to order at 5/3 per sq. ft., plus post and packing. When ordering, please state whether you require the longer dimension to be horizontal or vertical.

**BAKELITE SHEET.** Ideal for panels, etc., 1/2" thick, brown, available in the following sizes: 6" x 4", 2/5. 6" x 6", 3/-.

6" x 8", 3/7. 6" x 10", 4/2. 8" x 10", 5/-.

8" x 12", 5/10. Black, 1/2" 9" x 6", 3/-.

**ALUMINIUM CHASSIS,** with reinforced corners. 18 SWG, 2 1/2" deep, 6" x 4", 5/2. 8" x 5", 7/-.

10" x 6", 9/5. 12" x 8", 10/5. 12" x 9", 11/-.

16" x 9", 12/-.

18" x 10", 13/3. 3" deep, 8" x 6", 5/6. 10" x 8", 9/8. 12" x 8", 10/8. 14" x 9", 13/6. 16" x 10", 14/3. 18" x 12", 17/3.

**Eddystone. DIE-CAST ALLOY CHASSIS.** Two sizes: 8" x 5 1/2" x 2 3/8", 9/6, and 12" x 9" x 3", 19/6.

**SPEDA PUNCHES.** This excellent chassis cutter is now available. Cuts eight sizes of holes from 1/8" to 1 1/2" in 1/4" steps. Complete with four sets of dual punches and dies, 27/-.

**MT100EA STANDARD MAINS TRANSFORMER.** 350-0-350v @ 100 ma. 0-4-5v @ 2a. 0-4-6-3v @ 4a. Completely shrouded. Mains adjustment panel fitted. Mounts three-way, end, side and drop through. Finished in black ripple, 37/3, post free.

**MAINS TRANSFORMERS.** Britran 350-0-350v 80 ma. 5v @ 3a. 6.3v @ 4a. Standard primary with screen. Fully shrouded, upright mounting, finished in grey enamel, 28/-.

**VALLANCE'S ELECTROLYTIC CONDENSERS.** 32 mfd 350 v.w., 4/-.

16 mfd 450v.w., 3/6. 8 mfd 450v.w., 3/-.

50 mfd 50v.w., 2/9. 25 mfd 25v.w., 2/3.

**IMPROVE THE APPEARANCE OF YOUR EQUIPMENT.** Put chrome handles on the panel. Small cat. 635. 3" between mounting centres, 5/6 per pair. Cat. 608. 7 1/2" between mounting centres, 9/- per pair. By Eddystone.

**FULL VISION DIAL.** By Eddystone. Black ripple finished escutcheon. White ivory scale, with scale 0-100 and four uncalibrated scales. 10-1 reduction, 18/6, post free.

**AUTOMATIC MORSE KEYS.** By Eddystone. Coarse and fine speed adjustment. Finished in black ripple, 79/-.

**DIECAST BOX.** Completely screened and sealed. Lid and four screw fixing. Ideal for crystal calibrators, etc., 6/6, post free.

**MODULATION TRANSFORMERS.** R.C.A. two 6L6's into two T240's, £1.

**AUTO TRANSFORMERS.** 100/115/150, 200/230/250v 100 watts. Three-core leads and voltage adjustment panels, 27/9.

**TAYLOR ELECTRICAL AND RADIO TEST EQUIPMENT.** Universal Taylor meters: 70A and 75A, £10/10/- and £14. Model 85A, standard, £17/10/-.

Portable, £18/10/-.

Model 90A, £15/15/-.

Model 65B. Signal Generator, £15/10/-.

Dummy aerial, 15/-.

Model 30A Cathode Ray Oscilloscope, £29/10/-.

Model 20A Circuit Analyser, £15/15/-.

Model 55A Wobbulator, £14/14/-.

Model 45A valve tester, £22.

Model 46A, £26.

Model 47 valve tester, standard, £27.

Portable, £29/10/-.

Model 120A Taylor Junior, £8/8/-.

Model 170A Electronic Testmeter, £22/10/-.

All prices plus carriage.

**WORLD RADIO HANDBOOK.** Giving information on transmission times, call signs, and programme pointers. No amateurs. 1949 issue, 6/6, plus 6d. post.

**TELEVISION. PRACTICAL WIRELESS TELEVISION.** Set of eight coils and one video choke for TRF receiver (Birmingham), 19/3.

**WIRELESS WORLD TELEVISION.** Set of 20 coils wound to specification in polystyrene and high grade paxolin for superhet receiver (Birmingham), 53/6.

**R.F. EHT UNITS.** Hazlehurst. Designed to give 5/8 kV. EHT from 250/350v H.T. and 6-3v L.T. by means of 6V6 oscillator and EY51 Rectifier. High-grade construction. Mounted in metal case 4 1/2" x 5" x 5" high, 96/-.

Tube Masks: 9" 13/3, 12" 22/6. Finished in cream.

**EF50 VALVES.** Ex-Govt., 12/- each. Boxed.

**LOCKING RINGS.** EF50, 1/3.

**PLUGS AND SOCKETS.** 10-way, chassis mounting, 3/3 plug and socket. PVE CO-AXIAL PLUGS AND SOCKETS. 1/- per set.

**LABGEAR COMPONENTS LABGEAR TANK COILS.** Single end with link. Type AL (48 m/cs with 20 pf, 28 m/cs with 55 pf condenser), 8/-.

Type BL (28 m/cs with 20 pf, 24 m/cs with 22 pf, 14 m/cs with 75 pf condensers), 10/-.

Type CL (14 m/cs with 24 pf and 7 m/cs with 95 pf condenser), 11/-.

Type ACL centre tapped with link, has the same coverage as Type AL and is 9/-.

Double ended. With swinging link Type DSL7, 26/-.

DSL/B mounting base for DSL7, with swinging socket for link, 19/3.

**LABGEAR R.F. CHOKES.** RFC. Inductance 1 mH 350 ma max. Self capacity 3 pf D.C. resistance 4 ohms, 6/9.

**LABGEAR VARIABLE CONDENSERS.** C100 16-100 pf, air gap 0.1". Overall length 5". Peak volts 4,000, 18/6. 75/75 pf split stator. Minimum capacity 10/10 pf. Air gap 0.05". Overall length 5 1/2". Peak volts 1,500, 24/-.

GOODS CAN BE SENT C.W.O. or C.O.D.

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VALLANCE & DAIVSON LTD.

Dept. S.W.M. 144 BRIGGATE, LEEDS I Tel.: 29428/9

## INEXPENSIVE TELEVISION

is the title of the latest publication which shows how a variety of ex-Government Radar Units can be converted with the minimum of effort into efficient Television Receivers. A second edition of the booklet carrying the same title, it has been extended to cover units other than the R.1355, and is well worth buying. Send only 2/9 for your copy (post paid) and a complete price list of the specified equipment. Start accumulating the equipment now, at the low summer prices and be ready for the long winter evenings.

**RECEIVERS R.1355.** Still in great demand for T.V. Construction. Complete with all valves. ONLY 55/- (carriage, etc., 7/6).

**R.F. UNITS TYPE 25.** Specified with above for London Area Station. ONLY 17/8 (postage, etc., 1/6).

**R.F. UNITS TYPE 26.** Specified for Birmingham Station now all sold, but we can supply one of the other R.F. Units with full details of modification, which has been fully tested some 70 miles from Sutton Coldfield. BRAND NEW IN CARTONS, ONLY 25/- (postage 1/6).

**THE 194 I.F. STRIP.** One of the units specified in the above book. A first class strip containing six valves VR65, and one each VR83 and VR92. Easily converted for vision or sound for both stations and supplied with the necessary instructions. Size 18" x 5" x 5". ONLY 45/- (postage, etc., 2/6).

**10-VALVE 14 METRE SUPERHET RECEIVER.** A ground control radar receiver, this will convert into a first-class Television Receiver for the fringe areas. Full details for both stations being supplied. Contains six valves SP61, two of EA50, and one each RL7 and RL16, and six I.F.T.s of 12 m/cs with 4 m/c. bandwidth. BRAND NEW IN MAKER'S CARTONS, ONLY 59/8 (carriage etc., 5/-).

**INDICATOR UNITS TYPE 6.** As specified for "Inexpensive Television." Complete with valves and VCR97 C.R. Tube. BRAND NEW IN CRATES. ONLY 90/- (carriage, etc., 7/6).

**INDICATOR UNITS TYPE 62.** Contains 16 valves SP61, two o-EB34, two of EA50, and VCR97 C.R. Tube. ONLY 75/- (carriage etc., 12/6).

**TRANSFORMERS** for "Inexpensive Television" can be supplied as follows: Time Bases and Vision Transformer, 350-0-350 v 60 m/a., 3v 2a., 6.3v 3a., ONLY 36/-. Sound Receiver Transformer, 250-0-250v., 100 m/a., 3v 3a., 6.3v 6a., ONLY 27/8. E.H.T. Transformer for VCR97 Tube, 2-0-2v., 1.1a., 2-0-2v 2a., 2,500v 5m/a., ONLY 30/- POSTAGE 1/6 per transformer, please.

**COMMUNICATIONS RECEIVER R.1155.** A special Summer offer of these famous 3-waveband R.A.F. Receivers the specification of which is too well known to repeat. When you own this set, you own the best. Complete with full details of how to adapt it for mains use, or we can supply a power pack and speaker ready to plug on and work immediately for only 26 extra, to the cost of ONLY 27/19/8 (carriage etc., 12/6). Every set fully tested before despatch.

**RECEIVER 25/73.** The receiver portion of the T.R.1196. Covers 4-3-6.7 m/cs and makes an ideal basis for an all-wave receiver. Complete with six valves: two each of EF36 and EF39, and one each EK32 and EBC33, and modification details. New condition. ONLY 25/- (postage, etc., 2/6).

**RECEIVER 18.** The receiver portion of the No. 18 Walkie-Talkie. Operates on 6-9 m/cs. Complete with four valves: 3 of VP23 and one of HL23DD. Only requires normal battery supply to operate. New condition. ONLY 17/8 (postage, etc., 2/6).

*Cash with order please, and print name and address clearly.*

*S.A.E. for lists*

**U.E.I. CORP.,** The Radio Corner, 138 Grays Inn Road, London, W.C.1.  
(Phone: TERminus 7937)

Open until 1 p.m. Saturdays, we are two mins. from High Holborn (Chancery Lane Station) and 5 mins. from King's Cross.

### YOU CAN RELY ON US FOR BRAND NEW, CLEAN, COMPETITIVE COMPONENTS. IMMEDIATE DISPATCH

#### VALVES

In addition to our large stock we again have a few of the following:—

6L6 (Metal), 10/-; 6AM6, 9/8; 6AL5, 7/8; 6C4, 6/6; 6C6gt, 6/-; ECC32, 10/-; EL32 (Mullard), 6/6; 76, 5/-.

#### VALVE CANS

Octal, three piece, aluminium, 1/6.

.25mfd 4,000v

Block paper condensers, new but surplus, 2/6 each.

#### FILAMENT TRANSFORMERS

Finished in green crackle and of very small dimensions, 210/240v to 6.3v at 1.5a, 3/8; 210/240v to 4v 3a, 12/6.

#### LIGHTWEIGHT SPEAKERS

Shallow with very small magnet. Brand new. 3", 12 6; 5", 10/8; 8", 15/-; 10", 21/-.

#### SPR COILS

Full range stocked, 3/- each.

#### POSTAGE STAMP SIZE MOULDED MICA

.0001 mfd., .0002 mfd., .0003 mfd., .0005 mfd., .001 mfd., 6d. each.

#### VIEWMASTER TELEVISOR

All parts stocked, sold separately any part except rectifier kit. Envelope containing 7 plans and booklet, 5/6, state London or Midland.

#### CERAMIC OCTAL VALVEHOLDERS

Can be used without any bolts by spring clip, 1/3 each. Amphenol types: Mazda, 6d.; int. octal, 6d.; B8A, 1/-; B7G, 1/-.

#### SELENIUM RECTIFIERS

250v at 75 m/a. New and checked at this rating, 5/6 each.

#### SPEAKER TRANSFORMERS

Goodmans, 55: 1, 4/8; midget mains pentode, 3/9; super midget for personals to match 354, DL32, 4/3.

Don't forget some postage, please.

#### RADIO SERVICING CO.

Dept. M/O, 444 Wandsworth Road, Clapham, S.W.8.

*M & C Weekly 4135*

CATALOGUE No. 7, available, 2jd. stamp  
26, 28 Tram, 77, 77A Bus, 100 yds. Wandsworth Road  
S.R. Station. Open till 6.30 p.m. 1 o'clock Wednesday

## P.C.A. RADIO

**HALLICRAFTERS BC.610 (or HT48).** Operating over 2 Mc to 18 Mc and modified for 21 and 28 Mc. Crystal and VFO on all bands. Complete with speech amplifier, antenna tuning unit, exciter units and coils for all bands, set of 36 x-tals specially made for BC610 and new valves.

**RCA TRANSMITTERS, TYPE ET.4332B.** 2 Mc to 20 Mc, 350W. C/W, 250 W. R/T, two 813's output. Crystal controlled and modified for VFO. With separate speech amplifier.

**60W. TRANSCEIVERS.** Very compact, weight 13 lbs. 829 output 2 Mc to 8 Mc or 4 Mc to 16 Mc. Phone and key. High class superhet receiver. Complete with power pack for 110/220 V.A.C. and two rotary convertors for 12v battery operation, two sets of aerials (dipole and counterpoise aerial), microphone, spare valves.

**AR-88-D's, AR-88-LF, SX28's, HRO's** with 5 or 9 coils.

All above items in excellent working condition with new valves. Working demonstration on request. Large stock of transmitting condensers, valves, crystals, and other components. Alignment and repair of communication receivers and all other amateur equipment undertaken.

#### P.C.A. RADIO

Transmitter Div.: Cambridge Grove, The Arches, Hammersmith, W.6. Tel. RIV. 3279.  
Receiver Div.: 170 Goldhawk Road, Shepherds Bush, W.12.

# H. WHITAKER G3SJ

10 YORKSHIRE STREET, BURNLEY Phone 4924

**XTALS.** The complete Xtal Kit in sealed cartons for the SCR, 536 (BC611) Walkie Talkie. 14 xtals in all with 14 coils, 7 osc. and 7 final covering the complete freq. range of the unit. There are 7 tx. freqs. and a further 7 xtals spaced 45 kc for the receiver. All are in Ft 243 holders with  $\frac{1}{2}$ " pin spacing. The complete range is as follows: 3885/4340, 4080/4535, 4280/4735, 4397/4852, 4840/5295, 5327/5782, 5437/5892 kc. The complete kit including coils, 56/-, post free. Set of 14 xtals less coils, 48/-, set of 14 coils, 8/-. Any pair of xtals, 8/-, with the exception of 5327-5 and 5295, these 7/6 each. All xtals are by leading U.S. makers.

**XTALS.** 1000 kc Biley, Valpey or Somerset, standard  $\frac{1}{2}$ " pin spacing, 20/-. 100 kc RCA, Biley, sub-standards, 17/6. Marconi, etc., 500 kc British  $\frac{3}{4}$ " pin spacing, 6/-. Western Elec. 500 kc  $\frac{1}{2}$ " Ft 243 holders, 7/6.

**FOR 144 Mc.** Any freq. 8000 kc to 8110 kc Ft 243 fitting at 15/-. A few Bendix  $\frac{3}{4}$ " pin spacing 8007-69 kc at 12/6.

**FOR 28 Mc.** Any spot freq. from 7 Mc to 7500 kc at 12/6, with the following specials. 7200, 7225, 7250, 7275, 7300, 7325, 7350, 7375, 7400, 7425, 7450, 7475, 7500 kc at 7/6 each or 72/- per doz. All  $\frac{1}{2}$ " Ft 243 holders.

**FOR 7 Mc.** 7000 to 7300 kc any spot freq. at 12/6, with the fone band specials as above.

**6 Mc Band for 144.** 6000 kc to 6083 kc any spot freq. at 12/6, Ft 243 holders.

**FOR 21 Mc.** 5250 to 5350 kc any spot freq., 12/6. Ft 243 holders.

**TOP BAND.** Double, 850 kc to 863.5 kc and 937 to 1038.5 kc, Ft 243 holders, by Western Elec. Prolific harmonic generators, Plated type, spot welded contacts, mounted in air gap at 5/- each. To Commercial users and others. A complete range available from 2 Mc to 9 Mc in either  $\frac{3}{4}$ " or  $\frac{1}{2}$ " holders. The entire range by: RCA, Biley, Valpey, Stand, etc. and all leading American manufacturers. Quantity quotations are available on request. Export enquiries welcomed.

**VALVES RX AND TX.** Another exceptionally keen 3SJ offer. All are brand new in sealed cartons and carry our full guarantee.

6J5 gt, 2/6, 24/- doz.; 813 RCA or Westinghouse, 22/6, £12 per doz. 805, 12/6; 811, 12/6, 832, 12/6, all £6 per doz. can be mixed if desired.

100th, 25/-, £13 per doz.; 866/866a, 10/6, £5/8/- per doz.; 807, 6/-, 60/- doz.; VU 508 Vac. Rec. 4v Fil. 2750v at 125 Mills, 8/-, 80/- doz.; 5R4 GY, 1625, 4/-, 36/- doz.; 6L6 G. 1622, 8/-, 80, 6C4, 6AG5, 7/6, 72/- doz.; 5Z4, 6N7, 6N7 gt, 6K8, 717a, 6/-, 60/- doz.; 6V6, met. 6F6 G. 6SK7 met. 6SK7 G, 6SK7 gt, 6J7, 6J7 gt, 6K7, 6X5, 6C5, 6C5 gt, 6AC7, 6SH7, all at 5/-, 48/- doz. 1T4, 1A5, 7Q7, 955, 9001, at 5/6. 12C8, 12SR7, 12SG7, 12K8, at 4/-, 36/- doz.

VR 150, 8/-, Sylvania Xtal diodes, 3/-, 30/- doz. VCR 97, 32/6.

**BC 221.** Brand new. Another small stock, £17/10/-.

**BC 610.** Another Three. Complete with speech amplifier all valves, and coils for 4 bands. Buyers collect, £150.

**MORSE KEYS.** U.S. Signal Corps. Flameproof, J5a, 2/6, 24/- doz. Ditto, Nr2 Mk2, 1/9, 18/- doz.

**PILOT LAMPS.** Small Bay, 6.3v, 12v or 28v. at 6/- doz.

**MODULATION TRANSFORMERS.** R.C.A. P.P. 805s to P.P. 813s, 60/-, carr. paid.

**THERMADOR.** 400 watt. Pri. 6,700 ohms ct.—Sec. 4,500, 5,000 or 5,500 ohms, 7"×6"×5". Porcelain Standoffs, and completely screened at 50/- Woden, UM1, 2, 3 or 4, immediate delivery from stock.

**PLATE TRANSFORMERS.** Thermador, Primary 210/230v 50 cy. Secondary, 2280/1725/1420/0/1420/1725/2280 at 800 Mills. Porcelain standoffs. Sec. test volts 6,000. In original sealed crates, nett weight 150 lb., £7/10/-, carr. paid.

R.C.A. 230v primary. Output 2000/1500/0/1500/2000 at 800 mills, £4/10/-.

**HALLICRAFTER.** Switched Primary 110/230v. S20.R. replacement, 30/-.

**HALLICRAFTER.** Output transformers. P.P. Primary. Separate High and Low impedance secondaries. 55CO19. 30/10,000 cy, 7/6 each.

**THERMADOR.** 680/0/680 at 225 Mills. 210/230v Prim. at 50/-.

**THERMADOR.** 350/0/350, 150 Mills. 5v 3 amp, 6.3v  $3\frac{1}{2}$  amp, 230v Primary, 30/-.

**THERMADOR.** Output trans. Primary 5,000 ohm plate to plate load. Secondary 5, 7 $\frac{1}{2}$  or 15 ohm and 500 ohm line, plus winding for 10 per cent. inverse feedback, 20/-.

R.C.A. Filament trans. 230v primary, 10v ct Twice for a pair of 805s or 813s at 25/-. Ditto Thermador, 230v primary Output 10v ct 10 amp plus 10v ct 8 amp at 30/-.

**THERMADOR.** 230v Primary. Output 2 $\frac{1}{2}$  10 amp twice for a pair of 866s. Sec. test volts 7,500. Porcelain standoffs, 30/-.

**DRIVER TRANSFORMERS.** R.C.A. P.P. 6L6s to 805s or TZ 40s, 25/-. Ditto Thermador, 500 ohm line to Split Secondary 805 grids, 1 to 2-7, 20/-.

**AUDIO LF CHOKES.** 150 hy, BC221 replacements, 5/-.

**L.F. SMOOTHING.** Miniature U.S.A. By Stancor Thordarson, etc. A well-assorted dozen at 12/-, post free.

**THERMADOR.** 10 hy at 225 Mills., 20/- R.C.A. Swinging 5/15 hy at 450 Mills. Weight 30 lb. carr. paid, 20/- Thordarson 8 hy 80 Mills. Max cur. 150 Mills., 6/- Parmeko 8 hy 50 Mills., 3/6.

U.S.A. JACK PLUGS, 3 circuit for BC 348, etc. A seldom seen line, 6/- doz.

**CONDENSERS.** Thermador. 20 mf 450v wkg. Metal can round. In tropicalised cartons of 5 at 10/-. Mallory 30+10+10 450v wkg. + 25 mf 25v wkg. met. can round at 2/- each. Cornell-Dubilier 25 mf 25v Bath tub or Tubular, 1/-, 10/- doz. R.C.A. 10 mf 25v met. can round at 1/6. Cornell-Dubilier 40 mf 250v wkg., 2/- Solar 20 mf 50v met. can round, 1/3, 12/- doz. R.C.A. 40 mf 25v, 1/6. I.C.C. 4 mf 600v met. can round, 2/9. Mallory met. can 2,000 mf 15v wkg., 12/- doz.

**PAPER & OIL.** Sprague 8+8+4 650v wkg.. 5"×4"×2 $\frac{1}{2}$ ", 4/-, 36/- doz.

**KELLOG.** 4+4+4+2+1 650v wkg. in detachable crackled cases with Dzus lid these are exceptionally good, 7/6 each. T.C.C., etc. 4 mf 2,000v wkg. 5×5×3, 5/-, Ditto, 4+2 mf 2,000v wkg., 9×5×3, 7/6. 10 mf 1,000v wkg. 5×4×4 $\frac{1}{2}$ , 5/-.

## Benson's Better Bargains

R1355s : Unused, £3/3/-, carr. 5/-; RF UNITS, Modified to B'ham sound and vision, airtested, 30/-, BC454/5; Coilpacks, 3/6; No. 18 Set, Battery Rx. 6/9 mcs. ARP12(3), AR8(1). 465 Kcs. IF.s, with circuit, 15/-; TRANSFORMERS : 230v input 13v CT 2a, 8/6, 425-0-425 350 ma (tapped 250v) 4v 6a, 4v 8a, tapped, 32/6, Parmeko, shrouded. 620-0-620v potted 550, 375; 250 ma. 2 x 5v 3a, New, 42/-, 300-0-300 200 ma, 6v 5a, 5v 3a, 70v 100 ma, 20v 8a, 28/6, RCA. Fully shrouded. Input 190/250v, 50c. Output 400-350-0-350-400 200 ma, 6-3v 6a, 5v 3a, 37/6, MOD. 1/1 Imp. P6K/S6K for PP807's (AB) 807 final, 20w. Potted, 12/6, VIBRATOR PACKS, DC 6v to 190v 80 ma and 6v, 22/6, YAXLEYS : 3P3W3B, 3/6, 2P11W, 2P5W2B, 2/6, 4P2W, 1/-, 3P4W Cer., 2/6, MUIRHEAD SM DRIVE, 5/-, XTALS 5-3 to 6-84, 7-55 to 7-67, 8-132 to 8-79 mcs, 5/-, 8-09, 7/6, 100 kcs, 3-pin, 15/-; CO-AX : PYE—Plugs/Sockets, 9d., pr., Double-ended skts, 1/-; "T" skts., 1/3; "T" skt/plugs, 1/-; Plugs (2) on 1 yd. co-ax, 1/6; Plugs (2) on 20 ft. 4 in co-ax (80u) 3/6, PERSPEX CRT "WINDOWS", 5 1/2 in. sq., 1/-; SLYDLOCK FUSES 5a, 1/-, 15a, 2/6; POTENTIOMETERS, Ceramic 1k 4a, 5/6, w/w, 50 ohm, 1/3, 3k, 1/9, Carbon 1m 100k, 10k, 250k, 5m, 1/3, Ohmrite 20 ohms 1 1/2a, 4/6, VITREOUS RESISTORS, 35k 35w, 30k 25w, 400 ohms 20w, 2-5k 15w, 3k 12w, 30 ohms 30w, 3k 30w, each, 1/-; METAL RECTIFIERS: FW, 48v 24a, 15/6; 12v 6a, 22/6; 12v 1 1/2a, 8/-; 48v 1a, 5/6; 70v 1/2a, 4/-; HW 240v 80 ma, 5/-; 600v 30 ma, 4/-; 240v, 30 ma, 3/6; 120v 30 ma, 3/6, CHOKES : Bulgain RF 4 pic, 1/-; U.H.F., 9d. FUSEHOLDERS

panel, 1/-; Ruby indicators, 1/3; Toggles SP, 1/3; DP, 1/3; DPDT, 2/-; SPDT (one intermittent), 2/-; Mains (chassis), plug and socket, 2-pin 5a, 1/3, VAR. CONDENSERS, Spindled, ceramic miniatures, 50 pf d'paced with SM drive, 3/6; 25 pf, 1/3; 75 pf D.E., 1/6; 75 pf Twin, 2/6; 30 pf preset, 1/-, SPINDLE COUPLERS, STD, 1/2 in., 9d, Epicyclic drives SM, 1/3, Instrument knobs, asstd. new, 5/6 doz, METERS MC 150v 3 1/2 in, 8/6; 600v 3 1/2 in., 10/2 1/2a, 7/6; 0/1a, 5/-; 0/30a, 7/6; 0/100 ma 2 in. sq., 5/6; 0/500  $\mu$  A, 5/-; 0/500 ma Thermo, 3/6; Resistors, new, 40 values, 50 assorted, 5/6, VALVES—5R4GY, 6SN7, 6SL7, ARP12, AR8, 2C26, 6AC7, 6B8M, 6K7, EF36, EBC33, 12SK7, 12SR7, 12SG7, 12AH7, 12C8, 9003, VT90 at 5/-; 6SH7, SP61, SP41, 9006, 3B24, P61, at 3/6; 6H6, EA50, EB34, 7193, CV6, at 2/6; 5U4G, 5Z4M, 6X5, 12A6, 12K8, 6J7, VU111, 884, 2X2, 6F6M, 6AG5, EF54, 5Z3, 9002, 6C4, Pen46, MU14, IT4, IS4, IR5, 6K7, 6AG7, EF50, 6Y6 717A, 721A, VR105 at 6/6; 6V6, 6L7M, 6K8M, 6F7, 807, EC52, 305, CV66, at 7/6; 6AK5, 6J6, 6L6, at 8/6; 813, at 30/-, XTAL DIODES IN22, 3/-, AERIAL INSULATORS, 3 in. ribbed, Pyrex, 1/-, STABILISERS—RCA991, 1/6; Tuneons, 1/3, CONDENSERS, block 4 mfd. 750v, 2/6; .01 1kw, 3/6 doz., .1 350v, Micamold, 6d., 2 x .1 400v, Sprague, 9d.; 4 mfd. 600v oil, 2/6, Headphones 2k, 8/6; H'phone cords, with plug, 1/6, extra long 2/6, Keys, 3/6, Carbon mics., 3/6, PLUGS/SKTS.—Big-Lec Octal, Jones, "W", types, 9d. each (State fitting), VEEDER COUNTERS, 0/999, small, 5/-.

Terms : C.W.O. CARR. PAID OVER 5/-, S.A.E. enquiries please.

**W. A. BENSON, 308 RATHBONE ROAD, LIVERPOOL, 13**

**STONECROFT  
1604**

### BARGAINS

Brand New Guaranteed Goods

**MIDGET MAINS TRANSFORMERS**, 2 1/2-3-3", Fully shrouded upright, or drop through with top shroud. Standard screened primaries, 200-250v. Secs. 250-0-250v 60 m.a., 6-3v 2a, 5v 2a, 15/6.

**STANDARD DROP THROUGH MAINS TRANS.** With Top Shroud. 200-250v screened primaries. 260-0-260v 70m.a. 6-3v 3a, 5v 2a, 12/11; 350-0-350v 100 m.a., 4v 4a, 4v 3a, 13/11; 350-0-350v 100 m.a., 6-3v 3a, 5v 2a, 16/9; 350-0-350v 150 m.a., 6-3v 4a, 5v 3a, 23/9.

**EX-GOV. VALVES.** Boxed VU111, 4/6; 6J7Met, 5/6; 6L6Met, 8/6; 5Z4Met, 5/9. Unboxed DI, EB34, 11d.; 954, 1/11; 9D2, 3/3; HL210, 2/6; SP41, 2/3; 6V6GT, 5/9.

**MAINS ENERGISED SPEAKERS** 8" Ultra with 5,000 ohm trans. Field 1,000 ohms, 16/9; Pye, 8", 2-3 ohms, Field 1,000 ohms, 14/9.

**P.M. SPEAKERS.** 5" Plessey with pentode trans., 12/6; 8" Truvox 2-3 ohms, 11/6; 10" Truvox, 2-3 ohms, 15/6.

**MISC.** 6-2v .3a M.E.S. bulbs, 5/6 doz.; Clix int. octal valve holders, 2/9 doz.; Pye co-axial plugs and sockets, 7/6 doz. prs. Smoothing chokes 60m.a. 15h. 400 ohms, 4/3.

**ELECTROLYTICS.** 8mfd 450v tubular, 1/11; 8-8mfd 450v can, 2/9; 8-16mfd can, 3/3; 16-16mfd 450v can, 3/9; 8-16-32mfd 450v small can, 4/9.

Full list of bargains, 3d. Special list for trade. C.W.O. or C.O.D. Post free over £2. Customers welcome 9 a.m. to 5.30 p.m.

**RADIO SUPPLY CO.,  
15 Queen Square, Leeds, 2.**

### SOUTHERN RADIO'S WIRELESS BARGAINS

**R.A.F. BOMBSIGHT COMPUTERS.**—Complete with motors, gyro, blowers, gears, etc., etc. Ideal for model makers and experimenters. The best component value ever offered. 55/-, plus 6/- carriage.

**SEVEN UNIT ASSEMBLY** for bombsight computer, including 27 volta motor, gearing, blowers, etc., 17/6.

**CONTACTOR TIME SWITCHES.** 10-hour movement with thermostatic control. 2 impulses per second. Complete in sound-proof case, 10/-, plus 1/4.

**TRILINE SIX VALVES SUPER-HET RECEIVERS.**—Complete with valves, etc., 22/6.

**PERISCOPES.** Ex-U.S.A. Type M.8, complete with removable telescope, 17/6.

**COMMAND RECEIVERS.** B.C.454 (49/100 metres), B.C. 455 (33/49 metres). Complete with 6 valves. Ideal for easy conversion to mains receivers or car radio, 35/-, plus 1/4. Conversion circuit to mains, etc., 1/6.

**CAMERA CONTROL UNITS.** Type 35 No. 26. Complete in wooden box, 20/-.

**LUFBERA HOLE CUTTERS.** Adjustable from 1/2 in. to 3/4 in. For use on wood, metal, plastic, etc., 5/6.

**RADIO COMPASS INDICATORS,** with Selsyn motor. 3in. dial 360 degrees, 13/6.

**ROTOTHERM.** Temperature gauges, from 200 to 500 degrees Fahrenheit. Chromium finish, 6/-.

**SECTIONAL AERIALS.** 8ft. interlocking, 3/6, base for same, 2/6.

**WESTECTORS.** Wx6 and W112 types, 7/6 per doz.

**TREBOAT MICROPHONES.** Complete with lead and plug, 3/6.

**CRYSTAL DETECTORS.** Semi-permanent type, 2/6.

**RESISTANCES.** 100 Assorted values, from 1-watt to 3-watts. All useful values, 9/- per 100.

**CONDENSERS.** 100 Assorted values. All useful sizes. Mica and tubular, 15/- per 100.

**INDICATOR UNITS.** Types BC 929A; 7 valves 2X2 (1) 6X5 (1), 6E5 (2), 6G6 (1), 6SN7 (2), 3 BPT Tube, switching motor, etc., etc. Ideal for Oscillator conversion, 44/-, plus 5/- carriage.

**DRIVE CABLES,** for B.C.453/4/5, 14ft. long with adaptors at either end, 8/6, post 1/- extra.

**RECEIVERS TYPE R1125**—Brand new complete with 2 valves, 17/6.

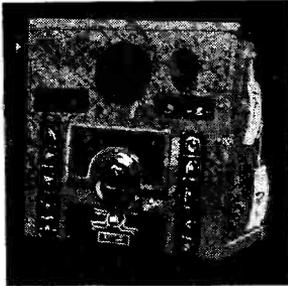
THOUSANDS OF BARGAIN LINES FOR CALLERS

**SOUTHERN RADIO SUPPLY LIMITED,  
46 LISLE STREET, LONDON, W.C.**

GERrand 6643

# RADIO EXCHANGE Co. for Bargains!

9, CAULDWELL STREET, BEDFORD.



**RECEIVER TYPE V.R.L.**

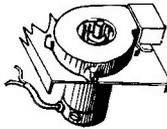
In the short time that this receiver has been upon the surplus market it has established a reputation second to none.

Sixteen star features, such as the 19-valve circuit, crystal filter, optionally-damped A.G.C. for CW, noise limiter, built-in speaker, and the amazing crystal calibrator, which provides "spot on" frequency checks, make this unit one of the finest communications receivers ever designed.

Offered at a fraction of original cost, with 19 spare valves, in SEALED MAKER'S CARTONS £29/10/- Leaflet "V" describes.

**RECEIVER TYPE 18.** A four-valve battery superhet, covering 6-9 mc/s, that is ideal for stand-by or portable uses. Complete with batteries and circuit, 27/6 each.

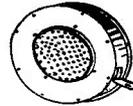
**HEADPHONES,** complete with jack-plug, and suitable for the above set, 2/9.



**MIDGET MOTORS,** measuring 1 1/2" dia x 2 1/2" long, and developing 1/135 h.p. on 27v input, these may be operated from the mains with a suitable lamp in series as a voltage dropper. The fan and bakelite housing may, of course, be removed. OUR PRICE, 9/6.

**POWER UNIT 19.** 540v at 40 mA, 275v at 110 mA from a "geny" and 275v from a vibrator; 12 or 24v input! ONLY 12/6. A few with partly stripped vibrator units, 8/6.

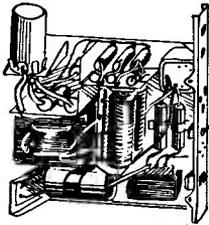
**FIELD TELEPHONES.** Of American manufacture, with hand ringing generator, bell, and PO type handset, only requiring batteries for immediate use. In canvas cases, 35/-, or in solid leather cases, 47/6.



**BRAND NEW SPEAKERS.** In attractive circular cases (9" o.d.). IN SEALED MAKER'S CARTONS 25/- each.

**BRAND NEW 1355's,** in SEALED MAKER'S CASES, these are, of course, brand new, but long storage may have caused slight corrosion of the metalwork. Complete with 11 valves, and too well known to need further description. 55/- plus 7/6 carriage, etc.

**METERS.** 0-500 µA, BRAND NEW and BOXED, 7/6. 0-8A thermocouple, 3/6. 0-3A thermocouple, 3/6.

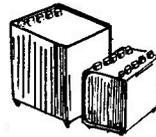


**VIBRATOR PACK TYPE 21.** A fresh supply of these units which are store soiled due to long storage by the Ministry, are offered for stripping, at "scrap" price. They contain 2 x 4 µF 350v, 2 x 75 µF 12v, 6 x 1 µF 350v, 1 x .025 µF 1,000v condensers, one vibrator transformer, five chokes, vibrator, switch, plugs, etc., and two full-wave metal rectifiers. OUR PRICE, 7/6.

**MERCURY BATTERIES.** A huge new purchase of these wonder batteries, measuring only 8 1/2" x 3 1/2" x 3", all of recent manufacture and delivering 94v HT and 1.3v LT, enables us to offer them at the ridiculous price of 5/6 each.

**MIDGET ACCUMULATORS,** measuring 4 1/2" x 1 1/2" x 1 1/2", 3 A.h. and BRAND NEW. ONLY 2/6 each, or per crate of 12 £1.

**RECEIVER TYPE 21** with nine battery-operated valves, and covering 4.2-7.5 and 18-31 mc/s, these contain BFO, crash-limiter, precision dial, etc. Complete with circuit and connecting data, and a super capacity all-dry battery, 43/6.



**MODULATION TRANSFORMERS.** A new purchase of these modulation transformers (which will function as auto transformers for mains use) enables us to offer them at 5/-. Input Transformers (for class B 211's), these may be used as multi-ratio heavy duty output transformers. Price 3/9.

All goods are sold as used unless otherwise stated

PLEASE write your name and address in Block Capitals

**RADIO EXCHANGE CO.**

9 CAULDWELL STREET, BEDFORD. Phone: 5568

## 62AK      **This Month's Bargains**      62AK

**SPECIAL METER OFFER.** 100 microamps. Scaled 0-100, 2½". Only 22/6 each.  
500 microamps. Scaled, 0-500, 2" dia. 7/6 each.  
500 microamps. Scaled 0-15-600. 6/3 each.  
Ditto, but ex-equipment. 5/- each.  
0.5 amp Thermo. 2/6 each or 5 for 10/-.  
0.5 mA, 2" dia. 5/- each.  
0-100 mA and 0-500 mA, 2½" dia. Flush mounting. 7/6 each.  
0-20v, 2" dia. 5/- each.  
20-0-20 amps, 2" dia. 5/- each.  
0-3,500v. Moving coil, 3½" dia. 25/- each.  
0-9 amps Hot Wire Ammeters (by removing external shunt full scale deflection is 4 amps). 1/6 each.  
Radiator Thermometers, 2" dia. Movements 2.5 mA. Backwards reading. Ideal for "S" meters. 1/6 each.  
Postage on single meters, 6d. Three or more post free.  
**U.H.F. RECEIVERS, TYPE R1481** (66-86 mc). Same as R1132 except for frequency range. R.F. Mixer Osc. (voltage stabilised), 3 I.F. stages, 2nd Det., B.F.O., etc., 11 valves in all. Brand new in transit case. £3/19/6, plus 7/6 carriage.  
**HIGH VOLTAGE OIL-FILLED CONDENSERS.** 4 mfd, 1,500v, 4/-; 4 mfd, 1,000v, 3/-; 4 mfd,

600v, 2/-; 2 mfd, 1,000v, 2/6; 8 mfd, 500v, 2/6 Postage 6d. each.  
**R.F. CHOKES.** Pie wound, 2.5 mH, 100 mA, Rx type, 9d. each or 7/6 per dozen; 250 mA, Tx type, 1/- each, 10/- per doz.  
Moving Coil Headphones. 4/11.  
Moving Coil Hand Microphone, with switch. 3/11.  
Above two items together, 6/-.  
Transformer for above 2/-.  
Co-ax. Cable, ¼" dia, with Pye plug each end. 13 ft 2/6.  
Twin Feeder, 80 ohm. 5d. per yard.  
Twin Ribbon Feeder (heavy), 300 ohm. 5d. per yd.  
Co-ax. Cable, ½" dia, 70 ohm. 8d. per yd.  
Postage on any above cable, 1/6, any length.  
**VIBRATOR PACKS.** 6v input. Output 150v 40 mA, complete with all smoothing. 17/6.  
Vibrator Packs. 12v input. Output 300v at 100 mA, fully smoothed. 19/6.  
**SPECIAL FOR AR88 USERS.** Matching Speakers, 2.5 ohms. Black crackle case. £3/15/-.  
AR88 Spare Crystals for D model only .455 kcs. 15/-.  
Complete kits of spare valves (14). £5.  
**POWER TRANSFORMERS.** 320/320, 130 mA, 6.3v, 5a C.T. 5v 3a. Primary 200/250 50c. Drop-through type. 22/6, plus postage 1/6.

Carriage paid on all orders over £1 except where stated. Please include small amount for orders under £1  
PLEASE PRINT YOUR NAME and ADDRESS

## CHAS. H. YOUNG, G2AK

All Callers to 110 Dale End, Birmingham CENTRAL 1635  
Mail Orders to 102 Holloway Head, Birmingham MIDLAND 3254

## SHORT WAVE (HULL) RADIO

### G5GX

**Power Packs.** 500v 200 MA 6-3, contained in grey steel case with pilot indicator ... £3/10/-  
Plus 5/- carriage

**Valves.** 807, 7/6; 65G7, 6/6; 65A7, 6/6; 6H6, 4/6; 5Z4, 6/6; 6J5, 5/6; VR, 150-30, 7/6; VR 105-30, 7/6.  
Plus 6d. postage

**Indicator Units.** Types 6A and 96, good condition ... £3/10/-  
Plus 5/- carriage

Type BC929A, makes excellent scope—brand new ... £3/-/-  
Plus 5/- carriage

**Panadaptors.** 3" CRT 1 mc sweep, 5 mc IF. To clear ... £10/-/-  
Plus 10/- carriage

**Transmitter.** Type ET4332B. Fine QRO job pair 813's in PA, modulated with 805's. To clear ... £75/-/-

**Test Meter.** G.E.C. Selectest. Little used. £7/10/-  
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To meet the demand for an inexpensive small light-weight beam for 28Mcs, capable of being very easily erected, we are now producing the Minibeam. Constructed in 1" diameter uncorrodible Manganese-aluminium alloy, the total weight is only 10 lbs. The design provides for a delta-match to the transmission line and, by means of ⅜" diameter adjustable element-ends, the array can be made to exhibit maximum forward gain (5.5db) or maximum front-to-back ratio (20db) using the parasitic element as either director or reflector, the optimum spacing of this element being set at 0.1 wavelength. At 1½ wave high, the main lobe is vertically 12°, with beam width of 60°. Price, carriage paid Great Britain, is £3/19/6.

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**RCA 931A PHOTO-ELECTRIC CELL AND MULTIPLIER.** For facsimile transmission, flying spot telecine transmission and research involving low light-levels 9-stage multiplier. Brand new and guaranteed. Only 30/-, including special 11-pin v/holder, and data sheets on this cell.

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**EX-GOVT. VALVES.** The following brand new and guaranteed valves are in stock:

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**OSMOR MIDGET "Q" COIL PACKS.** Size 3 1/2" x 2 1/2" x 1 1/2". Amazing performance. Polystyrene formers with adjustable iron cores. One-hole fixing, only five connections. Factory aligned complete with full receiver circuits, and instructions. 8/6t for 465 kc/s, 33/- only. L.M.S. also for TRF operation 3L and L.W., 30/- . We can now offer the latest "Q" pack for Silet battery operation. Complete with circuits incorporating either 1A7 or IT4 series. Valves. This pack is supplied with ready-wound frame aerial. Price 37/6.

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

**3½" Speakers, P.M.,** 8/6 each, plus 9d. postage.  
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**New IN34 Crystal Diode Cartridges,** 5/3. Post paid.

**Type R1359 Receiver Power Pack.** In grey steel cage 8" x 9" x 6½", contains two separate complete power units with outputs of 390v at 80 mA and 300v at 60 mA. Each with 6.3v 3A LT. Price £4/12/6.

**Mains Transformers.** Our own make. Input, 200/240v, output 6.3v 1.5A, 7/6. Post 9d. 6.5v x 6.5v 2A, 25/6, post 9d. 4v 8A, 25/6, post 9d. 300-0-300v 120ma, 6.3v 3.5A, 5v 2.5A, 21/6, also 350-0-350v, at same price, post 1/-. Output 6.3v 6A, 25/6, post 9d. Special 230/4 or 6v 4a, 6/9. Post paid.

**Multi-Ratio Output Trans.,** 30 watts, 25/-, post 9d.

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# RADIO CLEARANCE LTD.

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## COMMUNICATION RECEIVERS B.21B

Made by Marconi Wireless Telegraph Co., these receivers cover 1-20 Mc/s (300-15 metres) in 4 Bands, 1-2, 2-4-4, 4-4-10, 10-20 Mc/s, turret switched.  $10\frac{1}{2}$ " Roller Dial, calibrated all bands. A 9-valve super with the following line up 2-R.F. stages (KTW 61's) Mixer (X65), 3-I.F. stages (2-KTW63's, 1-X65), Det. and A.V.C. (DH63), B.F.O. (KTW63), Output KT63. Incorporates  $2\frac{1}{2}$ " meter, switched, to read H.T. volts, all valve voltages, and use as tuning meter. Intended for 230v 50 c/s operation, a 6.3v 4A Transformer is fitted, but H.T. is required. Precision jobs throughout, these receivers are supplied Brand New, complete with circuit diagram (inc. values), individual test reports, but less valves. Size  $22\frac{1}{2} \times 15 \times 14$ ". Price, £9/19/6, plus 10/- carr. and packing.

## 50 WATT MODULATORS

Ex Wireless Sets 36, these instruments are complete with Power Supplies, but mod. transformer is not included. Line up, 6C5, into 6C5's push-pull, into 807's push-pull. Both couplings by P/P Trans. Jacks provided for Key, Mike, and Line. Switching for CW, MCV, and R.T. Calibrated mod. gain control. Powered from 50 c/s mains, Transformer primaries are tapped 0-110-200/250v. Separate Bias Pack, Rectifier AU1. Main Pack has two 500-0-500v windings, Rectifiers AU1's. Both these outputs are fully smoothed, one is used for the mod., the other gives 500v 200 mA, spare, for use in Tx. 6.3 5A L.T. is also available. Paper condensers used throughout smoothing. 21" Rack mounting. Supplied with valves (8) and circuit diagram, in solid oak case, with carrying handles, £12/10/-, carr. paid.

## SUPER MAINS TRANSFORMERS

Enclosed job by "Parmeko," Primary 230v 50 c/s, sec:—  
620—550—375—0—375—550—620



Two 5v 3A windings. The wattage rating of 278 v.a., allows for simultaneous use of outputs. Size, base,  $6\frac{1}{2} \times 6\frac{1}{2}$ ", height,  $5\frac{1}{2}$ ". Weight, 24 lb. 39/6, carr. paid.

## HEAVY DUTY SMOOTHING CHOKES

Another "Parmeko" product. Rating 10 Henriens at 650 mA. Res. 50  $\Omega$ . Size, base,  $7 \times 6\frac{1}{2}$ ", height, 7". Weight 34 lb. Fully enclosed, 24/6, carr. paid.

## RECEIVER UNITS TYPE 3515

A 21-valve unit, containing 13.5 Mc/s, 3 Mc/s bandwidth strip, adaptable for T.V. Valves, 5 $\times$ VR56, 10 $\times$ VR65, 3 $\times$ VR55, 1 $\times$ VR53, 1 $\times$ VR54, 1 $\times$ VR92. New, with valves, 37/6, carr. paid.

## RADIO COMPASS MN26C

12-valve unit, containing 7-valve receiver covering the broadcast band, 150-1500 kc/s (2,000-200 metres), in three bands, with 6F6 output. Valves 5-6K7M's, 2-6J5M's, 1-6L7M, 1-6B8M, 1-6F6. Powered by self-contained 28v dynamotor. Good condition, £5/19/6, carriage paid.

## SMOOTHING CHOKES

6H, 200mA, 100  $\Omega$  ... 6/- 5H, 200 mA, 100  $\Omega$  ... 5/6

## MOVING COIL METERS

Metal cased 2" circular 0/15-600v (500 microA F.S.D.), 6/6; 0-20A, 0-40A, with shunts, 5/-; 2" square bakelite cased, 0-1 mA, 8/6; 0-5 mA, 6/-; 0-50 mA, 7/-; 0-20v, 5/-;  $2\frac{1}{2}$ " circular bakelite cased, 0-30 mA 6/6; 0-50 mA, 0-100 mA, 0-200 mA, 9/6; 0-500 micro amp., 16/6; 0-1 mA desk type, 15/-;  $2\frac{1}{2}$ " bakelite cased moving iron, 0-20v, 7/6.

## LOUDSPEAKERS, P.M.

5", less trans., 9/6; 6 $\frac{1}{2}$ ", less trans., 11/-; 10", with trans, 21/-. All brand new boxed, with all. speech coils. Post extra.

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Type 104, 12v D.C. input, outputs 250v 65mA, 6.5v 2.5A. D.C. P.M. Rotary on chassis with cover, size  $8\frac{1}{2} \times 4\frac{1}{2} \times 4\frac{1}{2}$ ", 6/11, post paid.

Type 87, input 24v. Output as Type 104, 5/11, post paid.

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

## RECEIVER TYPE 76

150-505 Kc/s in 2 bands. 3 Valves, VR53, ARTH2, VR92. Feeds out on I.F. of 560 Kc/s. Spiral S.M. dial, cal. every Kc. New in transit case, 22/6, carriage paid.

## MEDIUM-WAVE PERSONAL RECEIVERS

3-valve medium-wave dry battery operated receiver, housed in smart bakelite box, size  $7 \times 6\frac{1}{2} \times 5$ ", with plastic carrying handle. T.R.F. circuit, using 3-1.T.4 valves, with reaction. Output to pair of lightweight H.R. phones, self contained. Frame aerial in lid, provision for external aerial, S.M. dial. Powered by self-contained dry batteries, 1-W1435 and 2-U2's. Supplied brand new, with valves and batteries. Open the lid and it plays. Covers whole M.W. band. Purchase Tax paid. £3/19/6. Not ex-Govt. surplus.

## AIRCRAFT RADIO RECEIVERS TYPE CRV. 46151

6-valve receivers, covering 195 Kc/s-9050 Kc/s in 4 bands, 195-560, 560-1600 Kc/s, 1-6-4.5 Mc/s, 4.5-9-05 Mc/s, switched, R.F. mixer, 3-I.F.'s, det. and output, using 4-12SF7's, 1-12SA7, 1-12A6 (output). S.M. dial calibrated in Kc. Size  $8\frac{1}{2} \times 7 \times 16$ ". Provision for aerial or loop. Powered from 28v self-contained dynamotor. Supplied with valves and dynamotor, used, but O.K., £5/19/6, carriage paid.

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4MFD, 1,000v WKG.  $5 \times 4 \times 1\frac{1}{2}$ ", 3/-, 6MFD, 2,000v test,  $5\frac{1}{2} \times 4 \times 1\frac{1}{2}$ ", 4/-, 3MFD, 2,500v tests,  $7 \times 3\frac{1}{2} \times 2\frac{1}{2}$ ", 2/6, 2MFD, 2,500v WKG.,  $6 \times 6 \times 2\frac{1}{2}$ ", 3/6, 4MF, 2,000v WKG.,  $5 \times 4\frac{1}{2} \times 3\frac{1}{2}$ ", 4/6, 8MF, 750v WKG.,  $5 \times 4 \times 2$ ", 5/-. Postage extra please.

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**QUANTITY DISCOUNTS.** 6-12 Valves (your choice) 5 per cent. (1/- in the £); 13-24 Valves 10 per cent. (2/- in the £); 25-50 Valves 15 per cent. (3/- in the £); 51-100 Valves 20 per cent. (4/- in the £).

**TRANSMITTER/RECEIVER No. 48 MK.** Complete station in six cartons—an unrepeatable bargain. Note the price—£13/10/-, carr. paid. 115/230v 500 VA AUTO TRANSFORMERS. Made by Cowan Switchgear Co. Completely shrouded. In sealed tropical packs. Weight, 20 lbs. List price £15/10/0. Our price £2/2/6.

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**120 WATT MULTI RATIO STEP DOWN TRANSFORMERS.** First Class American make. Input 230v 50c/s. Outputs 24v @ 5 amps or 12v @ 10A or 6v @ 20A and various other voltages at corresponding currents up to 28v. New and unused but taken from equipment. A rare bargain. £1/2/6

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 Holders with retaining springs for above 2/6  
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Less valves and tube but complete with mu-metal tube screen. A super bargain for the components, of which there are literally hundreds. 17/6  
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**TOP BAND TX ("S.W. MAG." Feb.)**  
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# SHORT WAVE MAGAZINE

FOR THE RADIO AMATEUR & AMATEUR RADIO

Vol VIII

JUNE 1950

No. 83

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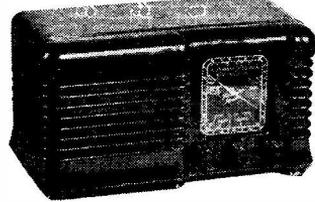
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# SHORT WAVE MAGAZINE

FOR THE RADIO AMATEUR AND AMATEUR RADIO

## E D I T O R I A L

### **Reflection**

*It is often said by those who should know better that in the amateur sense the limits have now been reached in the field of technical endeavour—meaning that technically speaking there is nothing left for the amateur to do ; that the whole territory has been surveyed and it is simply a matter of developing and exploiting it along well-established lines.*

*It is quite true that within the limits of present experience the amateur has little or no technical contribution to make to the science of radio. Commercial research and application are now far ahead of the most advanced amateur practice, whereas 20 years ago the exact reverse was the case. It would therefore seem that technically speaking the scope for the amateur is in truth very limited.*

*But consider the vast field of endeavour, well within the technical competence of the amateur, which has not yet been entered by him, and therefore still awaiting investigation in the Amateur Radio sense. There is at present a great gulf between the amateur and the professional radio engineer on such subjects as pulse working at VHF, the transmission of amateur TV and the possibility of DX communication by moon reflection. These are all subjects, potentially of absorbing interest, quite new to and entirely untouched by amateurs, and therefore as yet outside the orbit of Amateur Radio activity.*

*So we see that so far from the amateur having nothing more to do, there is in fact a great deal for him to learn. Note that these possible new outlets for our energies are all in the VHF region. There can be no question that the developments of the future will be in the direction of the higher frequencies.*

*Arthur Forsyth  
G6FO*

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# CRYSTAL CONTROLLED SEVENTY-CENTIMETRE CONVERTER

New Design for Amateur Operation on 430 mc

By S. GREEN (G3EJL)

*Here is another practical converter design for the 430 mc band, described by an operator who has already had considerable success on 70 cm. with it. Essentially, it consists of a crystal mixer with Lecher type tuned circuit, crystal controlled harmonic oscillator and IF head amplifier, giving 27-30 mc tuned IF. Construction is greatly simplified by the ingenious design principles put forward by our contributor; the result is a receiver unit capable of holding crystal controlled 70 cm. transmissions, to a design right up to the minute at the present state of the art.—Editor.*

**A**FTER the initial onslaught on 430 mc, the writer came to the conclusion that it was time for a more scientific approach to the problem of equipment for transmission and reception on the new band, if 70 cm. was ever to develop as a reliable point-to-point communication channel in the amateur sense.

For long-distance working on any band operators have always used CW, and as 70 cm. will be no exception the writer decided to construct a converter that would receive CW and produce from it a T9x note. In order to do this some limitation on the actual frequency range to be covered has had to be accepted and the converter here described is designed to receive signals which triple from the present 144 mc band. Consequently its frequency coverage is 432 to 438 mc.

In order to take CW on this converter, the transmission itself must be crystal controlled. Most amateurs who will eventually come on the 70 cm. band are already transmitting on 2 metres using crystal controlled excitors. If they construct 70 cm. final stages which will triple from their present 2-metre frequencies, they will arrive in that part of the 70 cm. band for which this converter has been designed. Furthermore, the operation of the *Short Wave Magazine* Zone Plan will still apply; indeed, it is essential to work to that plan in order to make the most of Seventycems and avoid the necessity of cross-band working every time one wishes to establish contact on 70 cm.

More than that, with the necessarily high gain, very directive and narrow-band aerial arrays which it is hoped will be used by all operators, the portion of the 70 cm. band which needs to be searched on this converter with the aerial in any direction will be limited, so increasing the possibility of establishing a contact.

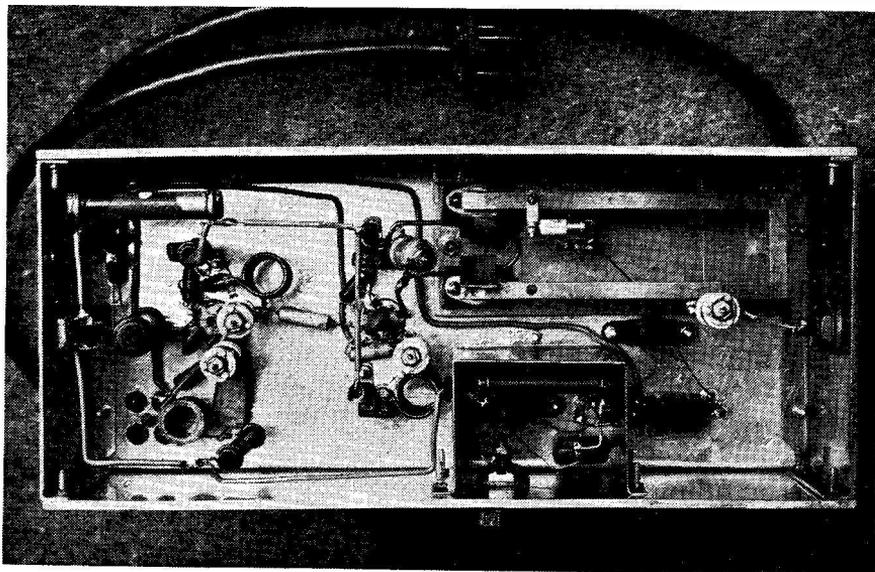
In order to obtain a T9x note from a converter, the major factors are the stability and freedom from hum of the local oscillator; if a crystal is used in the local oscillator then the resultant note leaves nothing to be desired in these two respects.

## General Design

This converter, then, was designed with a crystal oscillator section in order to obtain the necessary stability. It was found unnecessary to inject a local oscillator frequency of 408 mc into the mixer circuit in order to produce an IF of 30 mc, as efficient mixing and ample injection could be obtained if the final multiplier of the local oscillator was tuned to 204 mc. By using 6J6's, this made the design of the local oscillator and its associated multiplier stages simplicity itself. Consideration was given to various types of mixer circuits and in order that the constructor would not be burdened with having to purchase unnecessary (and by this time probably unobtainable) surplus equipment, it was decided to use a simple home-constructed Lecher line.

A crystal diode was chosen for use in the converter as it is the most efficient form of mixer at present obtainable for use on 70 cm., the noise produced by thermal agitation being very low. It is impossible with the present range of valves available in this country to envisage any appreciable gain from an RF stage; consequently the writer decided to dispense with an RF stage and rely entirely upon the high gain of a multi-element Yagi beam.

Thus we have all the essentials of a good converter for 430 mc. All that remains is the provision of a head IF amplifier as close to the mixer circuit as possible, so that no loss



Under-chassis view of the G3EJL 70 cm. converter showing general arrangement and, top right, the Lecher tuning section of which full details are given in the text.

occurs through long leads. A Mazda 6F12, or its equivalent, is used in this head amplifier. The 6F12 is an excellent RF pentode giving high gain and low noise at the intermediate frequency chosen. A band-width of some 3 to 3.5 mc with little falling off in gain was obtained. However, in order to tune from 432 to 438 mc the crystal oscillator frequency must be altered so that the IF always remains within the 3 mc band-width given by the head amplifier. The crystals adopted for this converter are the Type F.O. units obtainable from Q.C.C. These are "overtone crystals" as used in the Squier oscillator. In order to obtain an IF of 27 to 30 mc the actual crystal frequencies are 17 mc and 16.875 mc.

#### Tuning Ranges

The local oscillator and multiplier circuits tune as follows :—

(a) To tune	..	438 to 435 mc
Inject	..	204 mc (408 mc harmonic)
IF ..	..	30 to 27 mc
(b) To tune	..	435 to 432 mc
Inject	..	202.5 mc (405 mc harmonic)
IF ..	..	30 to 27 mc

The injection frequencies are obtained thus :

Stage	(a)	(b)
Oscillator ..	..	17 mc or 16.875 mc
Tripler ..	..	51 mc or 50.625 mc
1st doubler	..	102 mc or 101.25 mc
2nd doubler	..	204 mc or 202.5 mc

The tuned circuits of the oscillator and multiplier stages are broad enough to operate satisfactorily with either crystal in circuit, without any need for retuning ; this is because of the low output required from these stages.

The writer has used a high fundamental crystal frequency in order that there shall be no crystal oscillator beats in the communication receiver used as the main IF amplifier. It is obvious that the first beat from the crystal oscillator is 34 mc and consequently no interference is suffered in tuning from 27 to 30 mc, the IF of the converter.

If the Lecher line is constructed exactly to the dimensions given it will be possible to tune to the centre of the band by adjusting the small capacity at the open end. The grid coil of the head IF amplifier is placed as close as possible to the crystal diode, and the output of the mixer is tapped into the coil in order to prevent over-damping of the 6F12 grid circuit. The IF output is link-coupled to the main receiver via a coaxial cable, good bonding and screening of the amplifier and its output being essential to prevent break-through of ten-metre signals.

#### Construction

The chassis is made of 16-gauge aluminium, the finished size being 10½ in. long, 4½ in. wide and 3 in. deep. Details of the drilling of the chassis have not been given, due to the

obvious variation in components that will be used by different constructors. The layout of the oscillator section is simple and can easily be followed from the photograph, the under-chassis view suggesting also the general layout.

The most important part of the converter is the Lecher line and its associated condenser (C5). The dimensions given in the diagram should be adhered to strictly. The line is made of 1/4-in. square brass, all joints being tapped and screwed as well as soldered. The Lecher is mounted on 3/8-in. stand-off insulators at the open end, and on a piece of 1/4-in. square brass at the centre of the closed end, this mounting being tapped and soldered to the base plate so that the Lecher is solidly made, and finished as a complete unit.

The condenser C5 is formed by bending two pieces of brass sheet 1/2 in. by 1 in. of 20 gauge into L-shape and they are fixed to the open end of the Lecher. The capacity so formed by these is about 1.5 μμF and by slight bending they can be used to peak the lines at the centre of the band.

The Lecher being a complete unit in itself it can, of course, be used with any type of local oscillator, and thus overcomes the major difficulty in the construction of any

**Table of Values**

- Fig. 2. The G3EJL Seventy-Centimetre Converter**
- C1, C2, C3, C6 = 3-30 μμF concentric trimmers
  - C4 = 1-8 μμF concentric trimmer
  - C5 = See Lecher circuit construction
  - C7, C8, C9, C10 = 500 μμF mica
  - C11, C12, C13 = .001 μμF mica
  - C14, C15, C16 = 30 μμF ceramicon or silver mica
  - C17 = 5 μμF ceramicon
  - R1 = 10,000 ohms, 2-watt
  - R2 = 25,000 ohms, 1-watt
  - R3 = 100,000 ohms, 2-watt
  - R4 = 100,000 ohms, 1-watt
  - R5, R9, R11 = 10,000 ohms, 1/2-watt
  - R6, R8, R10, R13 = 50,000 ohms, 1/2-watt
  - R7 = 100,000 ohms, 1/2-watt
  - R12 = 220 ohms, 1/2-watt
  - V1, V2 = 6J6
  - V3 = Mazda 6F12, Mullard EF91, or CV138
  - V4 = IN23A crystal diode
  - Xtal = 17 mc and 16.875 mc Q.C.C.
- Type FO (see text)

70 cm. converter by providing the mixer tuned circuit.

**Adjustment**

Tuning the converter is extremely simple. Starting with the crystal oscillator rotate C1 until RF is produced. This is easily detected by any communication receiver or calibrated wavemeter. The tripler stage is then tuned, the RF being detected either by a 40 mA loop

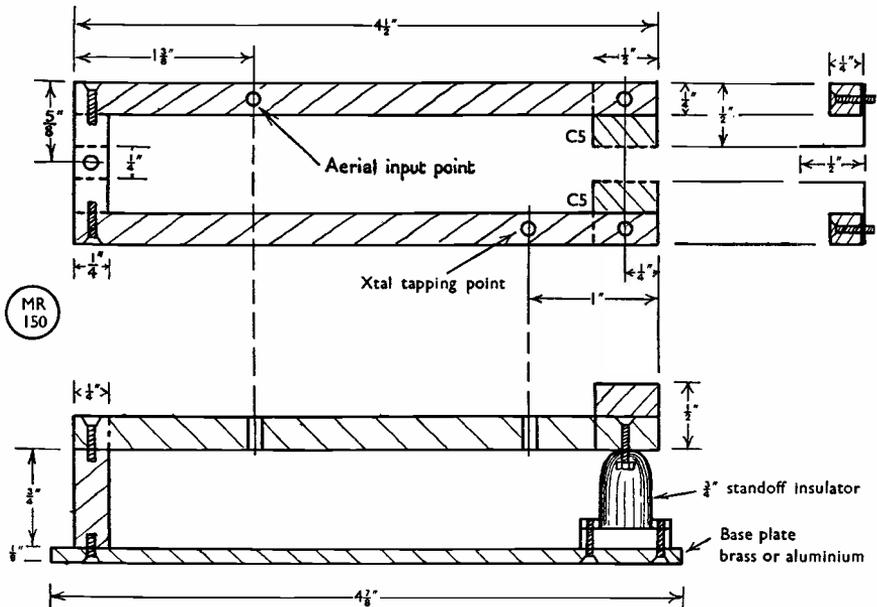


Fig. 1. Construction of the Lecher tuning circuit. These dimensions should be carefully followed—see text for discussion.

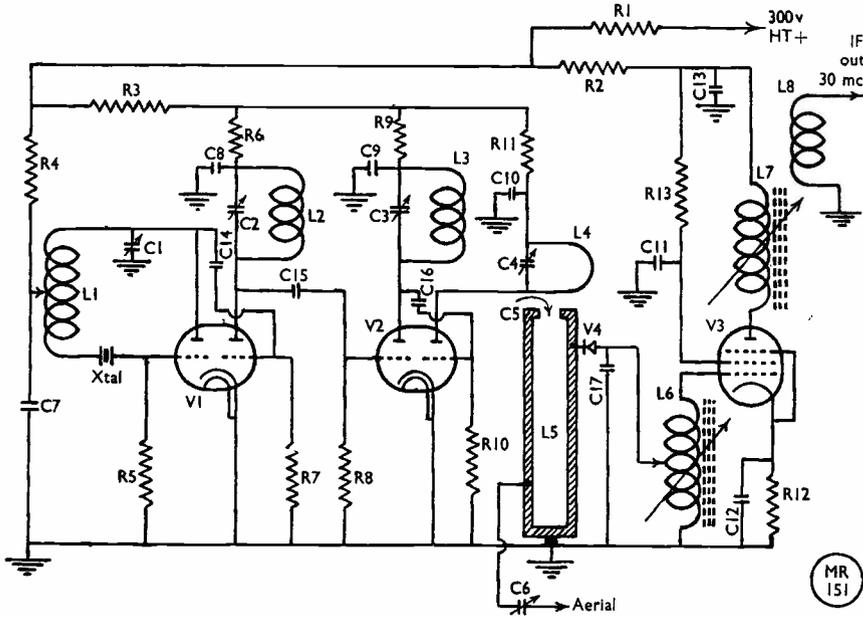


Fig. 2. Circuit complete of the 70 cm. converter designed and described by G3EJL. All values appear in the table.

lamp or wavemeter loosely coupled. The same technique is applied to the doubler stages. Injection to the mixer is inductive and the crystal current should be checked at the earthy end of the 6F12 grid coil, and the HT voltage to the whole of the local oscillator and multiplier stages reduced until a maximum current of 400 microamperes is indicated with the aerial connected to the converter. Close coupling of the 204 mc circuit is essential in order to obtain maximum second harmonic output to the mixer circuit.

With the converter connected to the main receiver, the slugs of the 6F12 grid and anode circuits are adjusted for maximum gain on 28.5 mc. It only remains for the converter to be connected to the beam and the co-operation of a local amateur enlisted to obtain a 70 cm. signal.

It is interesting to note that the writer was able to receive the third harmonic of a 2-metre transmission from a distance of 2 miles well enough to give a reading of S6 on the HRO used as the main receiver. The tuning of both mixer and doubler stages will be found to be very broad. Both local oscillator crystals should be checked and all circuits tuned for optimum on an incoming 70 cm. signal.

**General Points**

The efficiency depends largely on the crystal diode used. A quick, though not infallible, check is to measure the back-to-front ratio on an ohmmeter. The forward value should never be more than 150 ohms. The backward value varies considerably and a crystal is never used by the writer unless the back-to-front ratio exceeds 300 to 1. The actual 1N23A in use measures 90 ohms forward and 100,000 ohms backwards. Furthermore, these diodes can be easily damaged in two ways; one, by excessive crystal current, the other

**Coil Data**

- L1 25 turns 26 gauge enamelled wire, 3/8-in. diameter former, close-wound, tapped 8 turns from grid end.
- L2 7 turns 16 gauge enamelled wire, 1/4-in. diameter, slightly spaced.
- L3 4 turns 16 gauge enamelled wire, 1/4-in. diameter, spaced diameter of wire.
- L4 Hairpin loop, 1 1/2-in. long, 3/8-in. wide 16 gauge enamelled wire.
- L5 Lecher circuit (see text)
- L6 3/8-in. winding length of 26 gauge enamelled wire on 3/8-in. diameter slugged former tapped at centre. (May need slight pruning due to variations in crystals).
- L7 3/8-in. winding length of 28 gauge enamelled wire on 3/8-in. diameter slugged former.
- L8 5-turn link of 28 enamelled wire at cold end of L7.



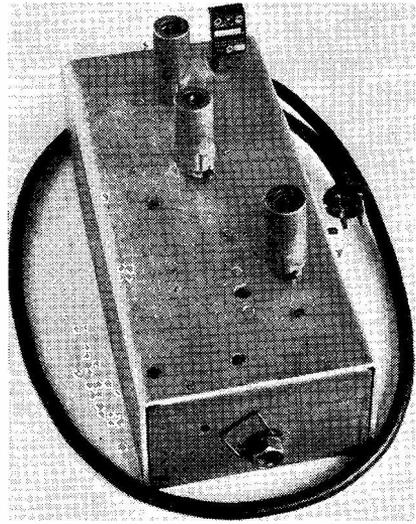
by heating whilst soldering adjacent components.

The optimum crystal diode current for best signal-to-noise ratio varies with each type of crystal. With a 1N23A or CV103 the best value was found to be 50 to 75 microamps. For a 1N21, 1N22, CV101 or CV102 somewhat higher current is required.

### Results

This converter is some 6 dB better than that used in the initial 119-mile contact with G5BY. Many CW QSO's have now been made using it and the notes received are T9x. In addition to several contacts with G5BY, six other stations have been heard: G2BMZ (102 miles) at RST-549; G3ABH (35 miles) R5, S7; G3CFR, using a two-metre beam (25 miles) RST-559; G3RI and G3CGE (local), R5, S9 plus. All these signals were crystal controlled. It has been found that with stabilised equipment 70 cm. paths are open at all times up to 35 miles between fixed stations QTH-to-QTH.

It is hoped the ideas set out in this article will bear fruit and that there will be more crystal-controlled operation on 70 cm. The writer will be pleased to help any constructor who is having difficulty in any way.



Top-deck appearance of the G3EJL converter for Seventycems—it looks, and indeed is, simple enough. This design is giving excellent results on the 430 mc band, and several models are already in operation.

## QRP WITH A PUNCH

### Nice Design for 80-160 Metre Operation

By A. G. WOOD (G5RZ)

THE impact of TVI and a series of Low Power Contests first revived the writer's interest in QRP work. For a time the station VFO unit and the QRO rig (suitably muted) were used, and not without success, but it was very apparent that the best results could scarcely be expected from equipment designed for other purposes. In consequence plans were made for the production of a special rig for the job. The final specification decided upon called for a stable VFO driving a two-band PA with more than the average efficiency. In addition, the rig had to be as small as possible with a low total power consumption (with an eye to portable work).

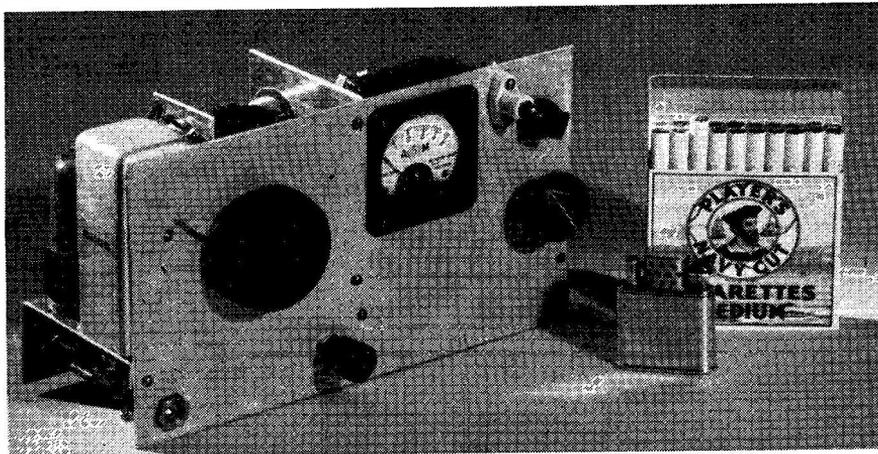
Preliminary tests were made with a VR99 (6K8 triode-hexode) as combined oscillator

*There is ample scope for ingenuity in the design of miniaturised equipment for the amateur bands. The little transmitter described here is capable of excellent results on the two LF bands and can also be used for portable work, when power supply is a factor.—Editor.*

and buffer employing ECO, Franklin and Transitron circuits, but for various reasons these were all discarded in favour finally of a 6SN7 twin-triode with one triode operating as a Colpitts oscillator. Since this valve has separate cathode leads it was feasible to make use of the cathode feed method to the second half of the valve operating as a broadly tuned buffer amplifier. The prototype was built using "breadboard technique" so that alterations could quickly be made before arriving at final values for the components.

Incidentally, one or two QSO's were achieved using this unit alone and tolerably good reports were obtained—up to 75 miles at night on the Top Band with an input of approximately 0.75 watts from a stage which was never intended to operate as a PA.

Having checked the stability and keying characteristics of the first stage, the PA unit



The packet of cigarettes compares the size of G5RZ's QRP transmitter, described in the accompanying article.

was added. For this the VT501 (TT11) was chosen as a suitable valve because of the low driving power required and the really good screening which was possible due to the top cap anode connection.

#### The Circuit

Consider now the complete circuit diagram in Fig. 1. It will be seen that the oscillator operates as a Colpitts but with the anode at earth potential, the output voltage to the next stage being taken across the cathode RF choke. Keying is achieved by breaking the cathode return to earth and the capacity across the key jack effectively prevents any possibility of hand-capacity on the key varying the frequency of oscillation. With 150 stabilised volts on the anode, the current consumption of this stage is barely 5 mA and the keying characteristic very good and clean.

The oscillator coil calls for some comment. This consists of a slug-tuned coil of "unknown inductance" taken from a piece of ex-Service equipment, the adjacent IF transformer and various small condensers being discarded, but the screening can be retained. Tuning is accomplished by connecting the tuning condenser across the lower of the two  $\cdot 001 \mu\text{F}$  capacities and adjusting for band-set by means of the slug. With this arrangement the unit was found to tune very nicely between 1750 kc and 1900 kc, and this range was considered adequate for the purpose in mind.

The  $0\cdot 1 \mu\text{F}$  condenser between anode and earth on this stage is very necessary and contributes substantially to the available output. Coupling to the grid of the second half of this valve is via a  $200 \mu\text{F}$  mica condenser. The value is not critical, but some

loss of output is suffered if this value is much reduced, whereas an increase over this capacity makes no measurable difference.

The anode coil of the buffer consists of 70 turns of 28 SWG enamelled wire pie-wound on to a  $\frac{1}{2}$ -in. diameter slug-tuned former, and is loaded to approximate resonance with  $100 \mu\text{F}$  capacity, final adjustment being made by means of the slug. With 250 volts on the anode, the optimum value for the cathode biasing resistance was sharply defined at 5,000 ohms.

The PA circuit is conventional with shunt feed, the tank coil being made to resonate in the 3.5 mc band with the midget tuning condenser and loaded to 1.7 mc by means of a  $350 \mu\text{F}$  mica condenser which is brought into operation when required by the panel-mounted wafer switch. A second wafer on the same switch is so arranged as to cut off HT to both buffer and PA stages when tuning the VFO.

It will be seen that the PA functions as such on the Top Band and as a power doubler on 3.5 mc. In practice it was found that greater output was obtainable on 3.5 mc employing this method than by doubling in the buffer stage and as this also simplified switching the former arrangement was adopted.

The anode meter mounted on the front panel is calibrated 5 mA F.S.D. and is shunted suitably to give four times this reading. Since in this particular model the HT supply is at 280 volts and there is approximately 30 volts of auto bias, it follows that the meter as scaled reads directly in watts input which is convenient for rapid inspection.

### Power Control

Some means of reducing input was required for very-QRP work and the more usual method of tapping the PA screen across a potentiometer was eventually discarded in favour of adjustable cathode bias. This consists of a limiting resistor of 1100 ohms in series with a 20,000-ohm potentiometer which is itself in parallel with a 10,000-ohm fixed resistor. This arrangement gives very smooth control from a maximum of just over 5 watts to approximately 1 watt input. There is another reason for adopting this scheme. As already stated the PA operates as a power doubler on the 3.5 mc band, and a PD is more efficient if anode volts, grid drive and grid bias are increased above normal. With this arrangement it is possible to increase the HT supply slightly (which causes the buffer amplifier to give greater output) and at the same time raise the anode voltage of the doubler. The cathode bias can then be turned down to maintain the same input with increased bias and the all-round efficiency is thereby improved.

### Aerial Coupling

Coupling the aerial to this transmitter will depend largely upon the type of aerial

employed. The writer is fortunate in having room for a 270-ft. long wire, one end of which is brought right into the operating room. The method of adjusting the aerial tapping in this case is as follows:

A small crystal diode field strength meter was loosely coupled to the aerial lead; the set was switched on and with key down the PA tank was tuned to resonance, indicated by a marked dip in plate current as registered by the meter on the set. Tap the aerial on to the tank coil a few turns up from the earthy end using a piece of insulating material to keep the hand remote from the coil, and tune the tank condenser for maximum reading on the diode meter. Note this reading and repeat the process a turn at a time up towards the "hot" end of the tank coil, retuning the tank condenser each time. A point will be found where any further increase in the number of turns (of coupling) will cause a drop in output. Work back to the turn giving the maximum output and solder on at this point. For those not possessing any means of measuring output, employ the same method but check the plate meter for minimum dip at each adjustment. This dip will become less and less as the tapping point approaches optimum and with the aerial

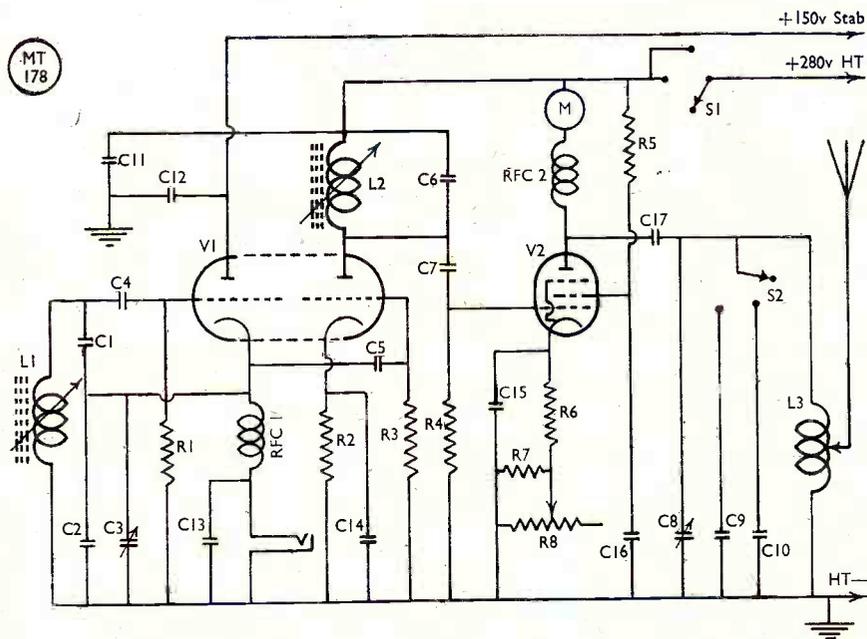
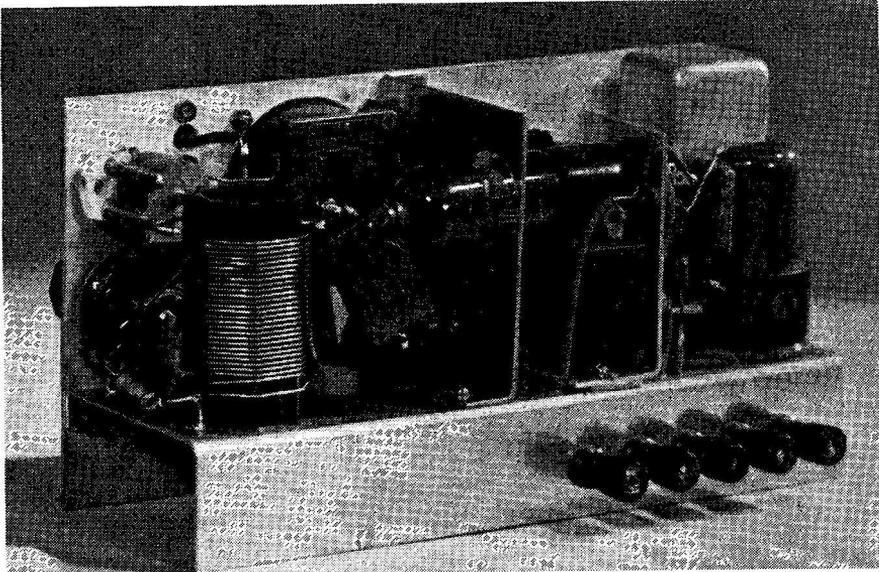


Fig. 1. The 1.7-3.5 mc QRP transmitter unit described by G5RZ, discussed in the text and illustrated in the photographs.



Rear view of the GSRZ QRP job, showing general arrangement of the parts and mounting of the valves.

correctly adjusted there will be the faintest of dips as the tank condenser is resonated.

**Construction**

Now with regard to construction and general

lay-out. The front panel is cut from the usual gauge of aluminium sheet to the size 6 in. wide by 5 in. deep and as shown carries the meter, anode tuning condenser, aerial stand-off insulator, combined on-off and band switch, cathode resistor control, VFO bandspread condenser, band-set slug adjustment and the key jack. Once the panel has been cut and all holes drilled a very attractive finish can be obtained by immersing it in an open flat pan containing boiling water and a handful of ordinary washing soda (caustic soda) for a period of two or three minutes. The panel is subsequently washed clean in cold running water and carefully dried. The chassis is cut from a sheet to the same size and along one 6-in. side is bent at right angles to form a ½-in. lip for bolting to the front panel. A second right-angled bend is made at the rear of the chassis to form a vertical section 1½ in. high to form the back panel and to provide anchorage for the five supply terminals. The horizontal section of the chassis thus measures 6 in. x 3 in. deep. Fig. 2 illustrates the layout of the main components and also shows the manner in which the PA valve is mounted horizontally, and also the position of the small dividing screen which is cut to fit the chassis and panel and through which a hole is made to fit the diameter of the valve envelope. This layout makes for very short, direct wiring, especially where RF leads are concerned.

(over)

**Table of Values**

**Fig. 1. Circuit of Midget Transmitter**

- C1, C2 = .001  $\mu$ F
- C3 = 500  $\mu$ F variable
- C4, C5 = 200  $\mu$ F silver mica
- C6 = 100  $\mu$ F silver mica
- C7 = 300  $\mu$ F silver mica
- C8 = 65  $\mu$ F midget variable
- C9 = 350  $\mu$ F mica
- C10 = 30  $\mu$ F mica
- C11, C14, C15, C16, C17 = .01  $\mu$ F
- C12 = 0.1  $\mu$ F
- C13 = .004  $\mu$ F
- R1 = 50,000 ohms
- R2 = 5,000 ohms
- R3 = 68,000 ohms
- R4 = 1 megohm
- R5 = 1,000 ohms
- R6 = 1,100 ohms
- R7 = 10,000 ohms
- R8 = 20,000 ohms potentiometer
- L1, L2 = See text
- L3 = 27 turns 22 SWG tinned copper, spaced on 1½ in. dia. Aerial tap approx. 18 turns from earth end
- J = Phone jack
- M = 0.5 mA meter shunted to read 20 mA F.S.D.
- S1, S2 = Yaxley wafer switch, two-bank
- RFC1, RFC2 = Pic-wound broadcast type
- V1 = 6SN7-GT
- V2 = VT501 (TT11)

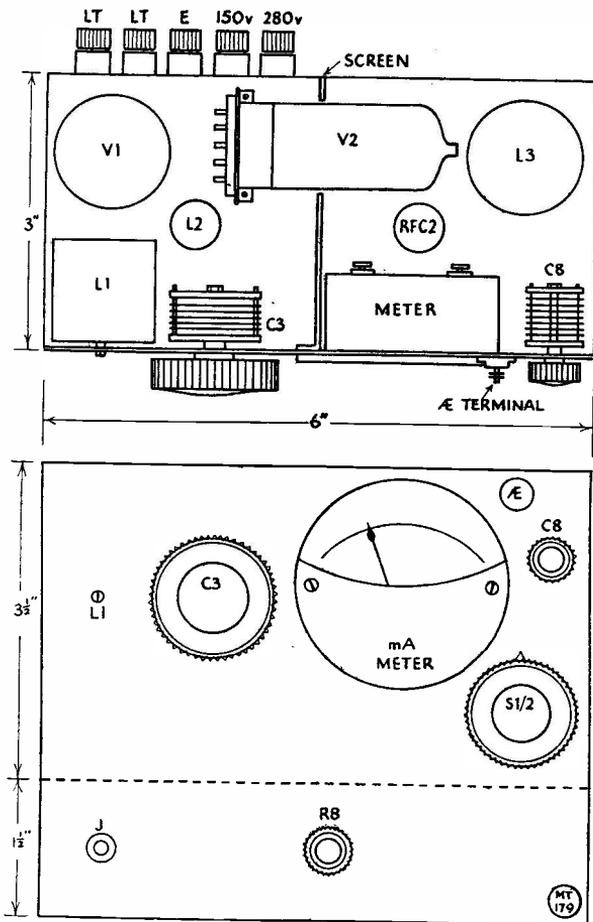


Fig. 2. Suggested chassis layout for the GSRZ QRP design, giving dimensions and essential layout details.

**Power Supply**

The power requirements of this little set are very modest and it is therefore admirably suited for operation from batteries where no mains are available. The filament supply is 6.3 volts at 0.9 amps. The oscillator takes 4.5 mA at 150 volts stabilized, but will still give results with only 105 volts, when the current drain is reduced to 2.5 mA. The buffer amplifier takes 5 mA key up and 7.5 mA key down with 280 volts HT and the PA a maximum of 22 mA, also at 280 volts at maximum cathode resistor setting. It is an easy matter to set the band switch control

to the "tune" or "off" position, when a prolonged stand-by is in operation; there is then no drain whatsoever from the HT supply.

**Results**

Tests were carried out to check the stability and freedom from drift of the oscillator. Starting from cold and with the key screwed down the frequency was found to drift towards the high-frequency end to the extent of about 60 cycles per minute for the first 15 minutes; thereafter the drift became negligible as things warmed up and after 20 minutes the frequency remained absolutely constant. It is possible that even this figure could be improved upon by a more careful choice of condensers in the oscillator stage, but in view of the relatively low operating frequencies involved it was not thought necessary to rebuild part of the set for the sake of so slight an improvement.

The equipment has now been thoroughly air-tested, especially on the Top Band, and most gratifying reports have been received all over the country. The best broad-daylight QSO has been 100 miles on 3 watts and reports of RST-579 were obtained at night at 300 miles, also on 3 watts. Reports of S8 and S9 at 100 miles range at night are commonplace and tests have shown a reduction of approximately one S-point (measured) when power has been reduced from 5 to 1 watt, which is what is to be expected.

Tests on 3.5 mc are not yet complete, but daylight QSO's of 100 miles (RST 569) and 600 miles (RST 549) have been obtained, which seem to hold out promise of good results at night on this band. T9x is frequently reported and not one T8 or poorer has been given in over 50 QSO's.

A final refinement is the fitting of a perforated zinc screen (of the meat safe variety) cut to fit the top, back and sides of the unit, and this adds appreciably to the appearance of the whole job, especially if the screen is given a bright finish with metal polish before fitting. But from a TVI point of view this is not in the least necessary

since no TVI has been experienced either on the Top Band or on 3.5 mc with a TV set operating in the same room as the transmitter.

One small point of interest concerns the power supply. This was a rectifier unit built originally for supplying receivers and/or ancillary apparatus and contained a somewhat high resistance smoothing choke. To obtain results when using slightly higher HT supply this choke was temporarily short-circuited.

Strangely enough there was no apparent deterioration in the purity of the radiated signal and reports continued to be T9, so that from then on the choke was permanently discarded !

In conclusion the writer can claim to have had great satisfaction both from the building and operating of this miniature rig and plans are already on foot for providing speech equipment to go with it !

## TACKLING TVI AT THE OUTPUT END

### Experiences on Twenty

By M. E. TAPSON (G6IF)

**A**BOUT this time of year, when the 28 mc band is closing for the summer season (though many may dispute that it ever does close), more of the DX fraternity will be turning their attention to 14 mc—and this brings up the old problem of TVI, which may be due partly to 3rd harmonic radiation, and partly to badly designed aerial couplers and radiating systems.

Since DX conditions are usually good between the hours of 2030 and 2230, it was decided at the writer's station that some cure for TVI had to be found.

As a result of the efforts discussed here, it is now possible to work on the 14 mc band using 100 watts of fully modulated telephony with absolutely no ill-effect on a TV receiver (sound or vision) located only 100 yds. away, with the television dipole looking towards the transmitting aerial.

#### Equipment Involved

The final at G6IF employs a pair of PT15's, plate-screen modulated, run at 100 watts input, and the first consideration was the use of 3rd harmonic traps in each anode lead (see circuit arrangement). No originality can be claimed for these traps, as they are a well-known "first approach" to the whole business of harmonic suppression.

Next, it was necessary to eliminate any possibility of strong vertical radiation from the aerial feeder system, since this is one of the worst causes of TVI. Various aerial systems

*As TV spreads, so do individual experiences in combating it increase ; the notes below suggest an approach for those who may be looking for a quick cure where a neighbour's TV receiver is involved, though it should be noted that much depends upon such factors as relative field strength and, in some cases, the design of the offending TV receiver.—Editor.*

were tried, but with little success ; finally, it was decided to use a folded dipole, constructed entirely of 300-ohm ribbon. With this, it is possible if care is taken to get a perfect match between the feeder line and the centre of the half-wave.

The folded dipole "top" itself was cut to resonate at 14.2 mc exactly—not by formula, but by experiment and the assistance of a BC-221 frequency meter. The general result is suggested by Fig. 1, the method being to couple the aerial feeder quite loosely to the PA tank, and then trimming equally each side of centre on the dipole until maximum plate current is drawn at the required frequency (in this case, 14.2 mc). The degree of coupling must be maintained constant during this operation, and the aerial raised and lowered each time an adjustment is made to its length, so that it is resonated at its height

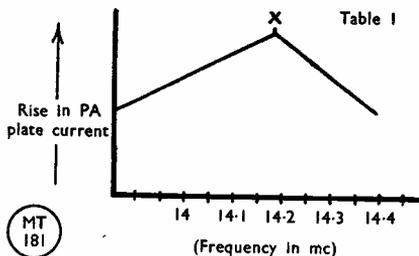


Fig. 1. Showing effect of resonating the aerial by the method discussed in the text.

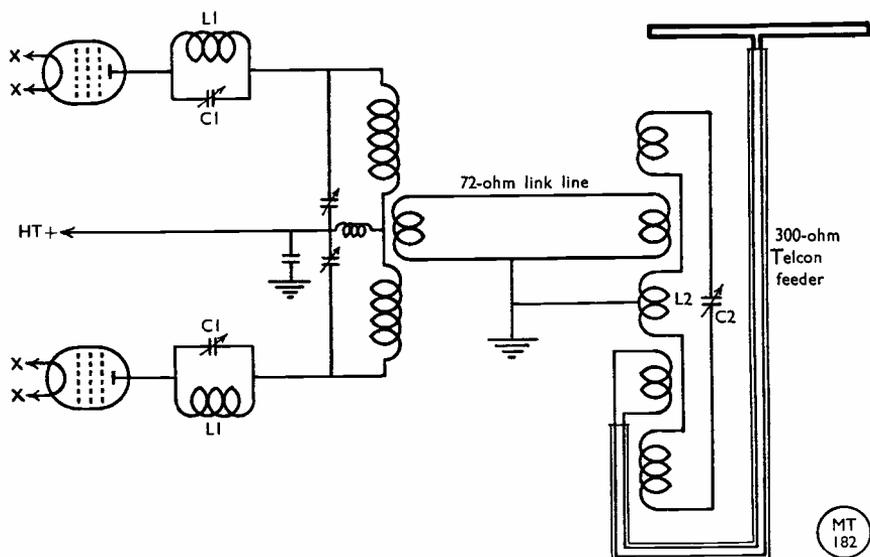


Fig. 2. Circuit arrangement of the aerial coupling network. The links on L2 are spaced equidistant from the earth tap. L1, 8 turns No. 16 SWG,  $\frac{3}{4}$  in. i.d., 1 in. long; L2, 10 turns overall,  $\frac{1}{4}$  in. dia. copper tube,  $2\frac{1}{2}$  in. i.d.; C1, 3-30  $\mu$ F trimmers; C2, 50  $\mu$ F, spaced for voltage. These values are for 14 mc operation.

of normal operation. This height was made  $\frac{1}{2}$ -wave at 14.2 mc. All this will ensure that an exact match is obtained for the centre impedance of 300 ohms, and the ribbon feeder will operate as an RF pipe and not as a radiating element.

#### Operation

The aerial and feeders are finally coupled to the transmitter through the network shown in Fig. 2. Two-turn links are used throughout and the PA is itself link-coupled to the driver stage. Some suggested values for 14 mc operation are given in Fig. 2.

#### Testing for TVI

The next step was to seek the co-operation of the GPO, and with the ready assistance of two of their engineers, the official test set, tuned to the TV channel, was placed alongside the transmitter. With its pick-up wire off, the test set was adjusted to an arbitrary zero on its meter; the Tx was then switched on and tuned up for 100 watts input on 14.2 mc; the test set meter showed a considerable deflection. The 3rd harmonic traps in the PA stage were then adjusted until this deflection was reduced to a minimum—actually the test meter zero, so that there was no indication of 3rd harmonic radiation with the transmitter on or off.

Then the GPO test set was taken out into

the road, directly in line with the aerial, and 4-ft. of pick-up wire attached. Some deflection was obtained, and the test set was then walked down the road. At a distance of 15 yards, there was a 15 dB loss in field strength of the harmonic radiation and a few yards further on, the meter reading was again zero.

As the nearest TV aerial is about 100 yards away, no interference whatever is noticeable on this receiver, and the tests outlined suggest that the writer could tolerate a TV receiver as close as 20 yards without interfering with it.

#### Results — On the Air

Having thus beaten the local menace, it was surprising to find what excellent DX results were obtainable with what is really no more than a single dipole, accurately matched and fed. The low-angle radiation characteristic appears to be excellent—one VK remarked that he thought that at least a 3-element beam must be behind the S9 signal he reported, and a W5 even went so far as to say that G6IF was the loudest DX signal he had "ever recorded" (the writer is not boasting; this is what he said!).

However, apart from all this, the really gratifying feature of the whole undertaking is that one is free to come on the air at any time without that uncomfortable feeling at the back of one's mind that a neighbour is about to complain.

## SELF-CONTAINED VFO UNIT

### Driving the Four-Band QRO Transmitter

By G. P. ANDERSON (G2QY)

AS already stated in the article in the May issue, provision is made in the Four-Band QRO Transmitter for working on four spot frequencies from crystals incorporated in the transmitter and selected by a switch. But of course during recent years increasing use has been made of variable frequency oscillators for the control of amateur transmitters; under present-day operating conditions, VFO control on some bands is almost imperative. Numerous such oscillators have been described in the past, using various types of circuits; that to be discussed here is specially designed to work with the Four-Band QRO Transmitter, but it is suitable as a driver unit into the crystal oscillator stage of any transmitter using 3.5 or 7 mc crystals.

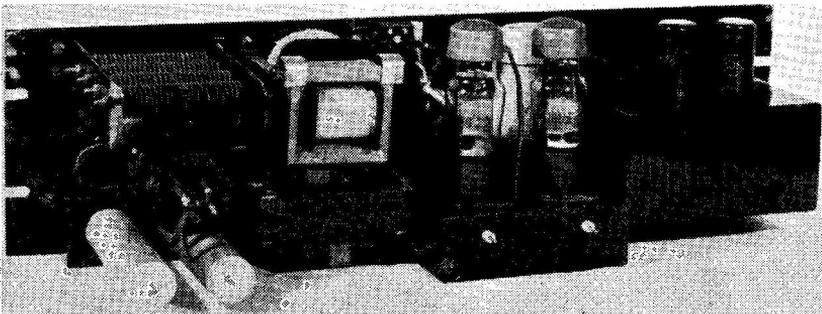
Basically the oscillator consists of the well-known Franklin circuit, arranged to oscillate very weakly, and operating with very low power. This is followed by two untuned amplifier stages, and then by a frequency doubler, providing an output on 3.5 mc using the values suggested. Precautions have been taken to minimise variation in frequency due to heating, the oscillator being assembled

*Though this drive oscillator was actually designed for the Transmitter described in detail by the author in our issue for May, it can be used for the same purpose with any similar type of amateur band transmitter. Output is available on two bands for operation through doublers, and the unit is self-contained for power.—Editor*

inside a screening box with the valves outside, and the amplifiers mounted on a separate sub-chassis. The model shown in the photograph is arranged for rack mounting and is completely self-contained, with its own power supply, on a standard 5½-in. panel.

#### Circuit

The Franklin oscillator uses a pair of metal 6J5 valves, in a straightforward circuit. The coupling condensers C4 and C5 should be only sufficiently large to provide oscillation over the range desired; the value of 6.8  $\mu\text{F}$  shown appears to be satisfactory. The VFO was required to drive the Four-Band Transmitter on the higher frequency amateur bands, and consequently the frequency range of the oscillator was limited in order to spread out the tuning; using the condensers and coil shown, the tuning range is 1750 to 1840 kc, the harmonics of which fully cover the 7, 14 and (future 21 ?) mc bands, and up to 29.5 mc on Ten. As will be seen, the frequency range selected is a compromise; if full coverage was required from 28 to 30 mc, the tuning on 7, 14 and 21 mc would become unduly critical. The output is at high impedance through a small condenser, and for convenience is brought out to a terminal. The heater circuits are decoupled by the .001  $\mu\text{F}$



Rear view of the VFO section of G2QY's transmitter, with the oscillator unit itself at the right, and the amplifier-doubler chassis at centre. All details are given in the text.

condensers C9, C10, which are connected midway between the two valholders. The earth connection to the centre tap of the heater circuit is also made in this unit by means of two 56-ohm  $\frac{1}{2}$ -watt resistors.

The 6J5 valves were used in place of the more usual double-triode (6SN7) type so that advantage could be taken of the metal envelopes in order to achieve screening combined with efficient heat dispersal.

### Amplifier

The amplifier unit consists of a small RF pentode, SP61, with resistance anode load, capacity-coupled to a larger pentode, EL32, which has an inductive anode load. This in turn is capacity-coupled to another EL32, the anode circuit of which is tuned to 3.5 mc. Cathode resistor bias is provided on all stages, and provision is made to obtain output from the plate of each EL32 at 1.75 and 3.5 mc respectively, at high impedance. The level of the 1.75 mc signal is of the order of 5 volts, and 15 volts are available at the 3.5 mc terminal, which is more than sufficient to drive the SP61 frequency doubling stage in the main transmitter. The 3.5 mc output from the VFO is connected to a position on the "Crystal/VFO" selector switch (see *Short Wave Magazine*, p. 178, May), and although the connecting lead is about 2 ft. long, no trouble has been encountered.

The condenser tuning the anode of the 1.7 to 3.5 mc FD is controlled from the front panel; in operation no adjustment is required over quite a wide frequency range, but it does provide an effective means of controlling the output level.

### Power Supply

The power supply required is 6.3 volts at 1.7 amp, and about 180 volts at 50 mA. Any suitable supply may be used, the one shown having metal rectifiers in a bridge circuit. The smoothing as specified is adequate, a pure DC note being obtained even after multiplication to 60 mc. The HT feed to the oscillator is stabilised by means of a S130 stabiliser; a VR150 would be equally satisfactory.

### Keying

Keying may be carried out in the cathode of the first amplifier valve V3, permitting "break-in" operation. No chirp is apparent even at 60 mc, the combination of voltage stabilisation and light oscillator loading being effective in producing a signal of stable frequency.

### Construction

The construction of the unit is based on the

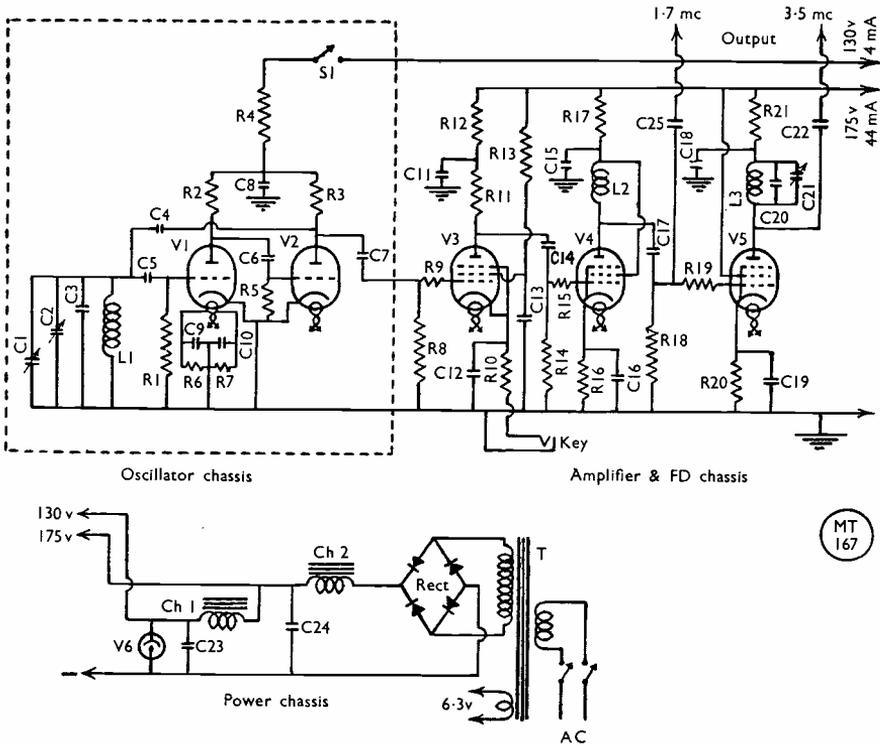
### Table of Values

The G2QY VFO Unit	
C1	= 70 $\mu$ F, variable
C2	= 30 $\mu$ F, trimmer
C3	= 470 $\mu$ F mica + 70 $\mu$ F ceramic
C4, C5	= 6.8 $\mu$ F
C6	= 22 $\mu$ F
C7	= 33 $\mu$ F
C8, C11, C13	= .01 $\mu$ F
C15, C18	= .001 $\mu$ F
C9, C10, C12, C16, C19	= .001 $\mu$ F
C14, C17, C22, C25	= 47 $\mu$ F
C20	= 122 $\mu$ F
C21	= 50 $\mu$ F variable
C23	= 16 $\mu$ F 250v
C24	= 8 $\mu$ F 250v
R1	= 100,000 ohms $\frac{1}{2}$ -watt
R2, R3	= 22,000 ohms 1-watt
R4, R12	= 10,000 ohms 1-watt
R5	= 22,000 ohms $\frac{1}{2}$ -watt
R6, R7	= 56 ohms $\frac{1}{2}$ -watt
R8, R14	= 220,000 ohms $\frac{1}{2}$ -watt
R9, R15, R19	= 4,700 ohms $\frac{1}{2}$ -watt
R10	= 330 ohms $\frac{1}{2}$ -watt
R11	= 47,000 ohms 1-watt
R13	= 100,000 ohms 1-watt
R16, R20	= 470 ohms $\frac{1}{2}$ -watt
R17, R21	= 4,700 ohms 1-watt
R18	= 220,000 ohms $\frac{1}{2}$ -watt
V1, V2	= 6J5
V3	= SP61
V4, V5	= EL32
V6	= S130 or VR150
L1	= 25 turns 22 Enam. wire, 1 in. dia. (13.9 $\mu$ H)
L2	= 2.5 mH RF choke.
L3	= 28 turns 22 Enam. wire, 1 $\frac{1}{2}$ in. dia. (15 $\mu$ H)
Ch 1	= 20 H, 10 mA
Ch 2	= 20 H, 60 mA
T	= Mains/320v 50 mA and 6.3v 2 A
Rect	= Bridge rectifier to suit

use of sub-chassis, the oscillator stage being assembled in a copper box, and the amplifier on a small chassis. In the original model it was convenient to mount the power supply components directly on the panel, although a further chassis could have been used.

As may be seen from the photographs, the oscillator components are all assembled inside the screening box, with the exception of the valves, which are mounted on a small metal bracket, so that each valve is outside the box. This, together with the use of adequately rated components, avoids trouble from heat inside the oscillator compartment. All wiring should be firmly tied down, to avoid changes in frequency which could be caused by vibration. The coil, after winding, should be painted with polystyrene solution to secure the windings in place; alternatively, several coats of shellac could be applied. The dimensions of the box shown in the illustration are 5 in.  $\times$  2  $\frac{1}{2}$  in.  $\times$  3 in. high.

The amplifier unit is assembled on a three-sided chassis. No particular care is required in screening this unit, although normal precautions should be observed in wiring. It will be seen that the rotor of C21 is at high



Circuit of the VFO unit described by G2QY.

potential to earth and consequently the condenser must be insulated from the chassis ; a small fibre block was cut and the condenser was mounted on it in the model shown.

No particular reference need be made to the construction of the power supply, any convenient layout being followed.

The assembly of the units on the panel may be seen from the photograph. Any good slow-motion drive will be suitable for the control of the oscillator tuning ; the frequency doubler tuning does not require any gearing, direct drive being entirely satisfactory.

**Operation**

After the application of power to the unit, check should be made by means of a suitable receiver to ascertain that the oscillator is functioning. After allowing a period of about 15 minutes for warming up, the tuning condenser C1 should be set fully meshed, and the frequency of the oscillator adjusted to 1750 kc by means of the trimmer condenser C2. Next tune in on the receiver the harmonic at 3500 kc and vary C21, to confirm that it

will tune the plate circuit of the frequency doubler stage to that frequency. It should do so with about half capacity. If it does not, turns should be added to or removed from L3 in order to achieve this result.

It may be found that during the first few periods of operation the oscillator will drift slightly ; this should not be serious, even at 28 mc, but it is undesirable, and it will be found advantageous to "age" the components in the oscillator by running it continuously for a period prior to putting it into operation. If the valves are removed from the amplifier stages, the power consumption of the unit will be very low, and the oscillator may be left running continuously for say 24 hours, after which time it should be found to be perfectly stable, and ready for use within a few minutes of switching on from the cold condition.

The unit described has been in operation for more than two years at the writer's station, mainly on the 28 mc band (and previously on 58 mc) and its stability has been commented upon very favourably.

# AUTOMATIC FREQUENCY CONTROL

## AFC Circuits at VHF

By R. E. B. HICKMAN

ONE of the obstacles to the full exploitation of that portion of the radio spectrum above 30 mc is the difficulty of providing effective automatic frequency control (AFC) at these frequencies. At an operative frequency of say, 100 mc, serious detuning may be caused by an oscillator drift of only 0.01 per cent. The difficulties of controlling oscillator drift to such fine limits become obvious when one realises that the major portion of the tuned circuit may be inside the oscillator valve itself.

This drift falls into two general classes: The first, due to the oscillator valve and its socket, is characterised by a short time frequency drift as the valve and socket warm up; the second, due to the other oscillator circuit components, has a longer time drift as the chassis reaches its operating temperature. Both these effects tend to lower the oscillator frequency.

The use of miniature valves in VHF oscillator circuits greatly assists stability as due to the poor heat-conduction properties of the glass base used in this type of valve, little heat is lost to the chassis. Substitution of a mica-filled rubber valve holder for the normal phenolic holder will give reduced drift. Further improvement may be achieved by means of a condenser of suitable value, having a negative temperature

*This article discusses a principle not yet well understood in amateur circles, though it has a number of useful practical applications. The figures quoted by our contributor will interest those concerned with the design of stable oscillators at the higher frequencies.—Editor.*

coefficient, connected, at the valve socket, across the tank circuit of the oscillator. In a circuit using a converter such as type 6BE6 it is convenient to connect the compensating capacity between the screen grid and one side of the heater. This effectively brings the condenser between the cathode tap of the coil and earth and permits the use of a larger more convenient value. By this means the frequency drift may be reduced to approximately half that before compensation.

Electronic AFC using a separate reactance valve has been used effectively at frequencies below 100 mc. (See Terman.) Above this frequency, however, inter-electrode capacitance and transit time effects limit the use of such a device.

This article describes a new AFC valve which combines the functions of local oscillator and reactance device in a single unit, and functions by controlling the transit time of the electrons. (See Kurshan.)

## Transit Time Frequency Control

Electrons reflected back from the RF signal grid of a converter valve to the oscillator section interact with the electrodes and space charge. When the signal grid bias is varying, these electrons have variable transit times and give rise to a "pulling" of the oscillator frequency. These effects are normally largely overcome by careful electrode design in converter valves intended for high frequency working but the action may be turned to

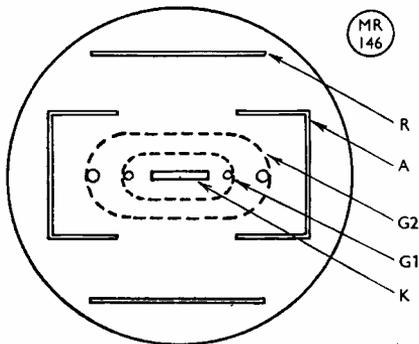


Fig. 1. Electrode arrangement of a transit-time controlled oscillator valve.

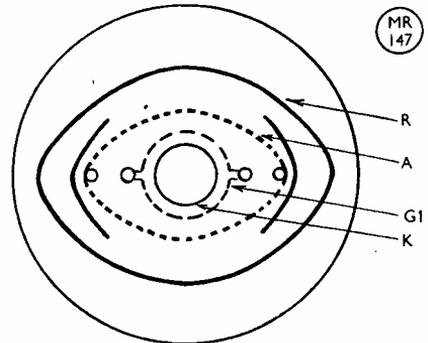


Fig. 2. The special AFC valve, as designed by the author.

**Table of Values**

**Fig. 3** Suitable AFC (Automatic Frequency Control) Oscillator Circuit.

- C1 = .01  $\mu$ F
- C2, C3, C6 = .0005  $\mu$ F
- C4 = 27  $\mu$  $\mu$ F
- C5 = 5  $\mu$  $\mu$ F
- R1 = 10 megohms
- R2 = 1,800 ohms
- R3 = 30,000 ohms
- R4 = 50,000 ohms

(Oscillatory circuit as for frequency required)

advantage in a valve with an electrode system such as is shown in Fig. 1.

Electrons from the cathode K pass through the control grid G1, are accelerated by grid G2 and reach the anode A after reflection from the reflector R. Some of the electrons go directly to the anode and contribute only to the transconductance of the valve. Other electrons pass the anode and are reflected back to it from the reflector R. The transit time of these electrons and hence the trans-susceptance of the valve varies with the reflector potential, producing a variable oscillator frequency.

**Use of Commercial Types**

A receiving tetrode may be used as the controlled oscillator by making the plate the reflector and using the screen grid as the anode. A receiving pentode can also be used with its suppressor grid either at ground or plate potential.

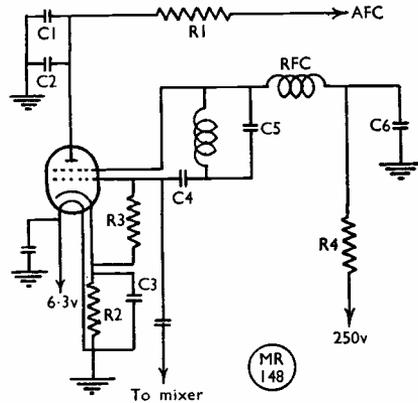
Of a number of miniature valves tested, the 9001 gave the greatest control sensitivity, but it was difficult to sustain oscillation. Type 6AK5 performed readily at a slightly lower control sensitivity. It was found that approximately 50 volts on G2 gave a reasonable compromise between sensitivity and oscillation amplitude, while at least 1 or 2 volts negative on the reflector were needed to prevent current to the reflector.

The 6AU6 and 6AG5 required higher values (90 to 100 volts) of reflector potential to overcome their greater spacing between screen and plate, and oscillation was very weak.

**Design and Performance of Special AFC Valve**

One of the strongest oscillators was found to be the 6BE6 converter valve with its RF signal grid used as a reflector. It produced large frequency shifts, but a reflector bias of at least 20 volts negative was needed, due probably to wide spacing between screen and plate. A special valve was therefore built using 6BE6 parts with the RF signal grid replaced by a reflector designed to work at zero potential. A cross-section of such a valve is shown in Fig. 2.

Tests conducted in a commercial FM receiver showed that the warming up drift of the



**Fig. 3.** An AFC oscillator circuit, giving exceptionally high stability at VHF; normal types of low-capacity valves can be used in this circuit with good results, though the drift figures given in the article were as obtained when using the special valve of Fig. 2.

oscillator, *i.e.*, the difference in the frequency existing 30 seconds after switching the set on, until a steady state was reached at 120 mc was 230 kc in the first nine minutes. Using the special AFC valve constructed as above, in the same receiver, the drift was reduced to 28 kc in three minutes at the same frequency.

The circuit used was as shown in Fig. 3. It comprises a permeability tuned Colpitts oscillator. Cathode bias is provided so that the AFC voltage may be centred at ground potential.

By applying AM to the reflector electrode, the AFC valve can be used to generate a frequency modulated signal directly. It has the advantages of high sensitivity and high impedance.

**References**

- F. E. Terman—*Radio Engineers Handbook*, page 654.
- J. Kurshan—*RCA Review*, December, 1948.

**A NEW 807**

The 807 is probably the most popular, widely used and best-known valve in the amateur catalogue, and is freely available at a very reasonable price. So look out for the new Sylvania 807W, described as a "ruggedized cousin" of the 807; it is smaller, has a tubular glass envelope, is claimed to be free of parasitics (though that must depend largely on the way in which it is operated) and is fitted with the standard 807 5-pin base. We are not at all sure what "ruggedized" is supposed to mean in this context, unless it is that the 807W will stand heavier overloads for longer periods.

# TOP BAND Tx

## Describing A

### VFO/CO-PA for 1.7 mc

By N. P. SPOONER (G2NS)

COMPLETE saturation of the amateur bands is indeed a very long way off. But it must be obvious to many operators that although congestion is quite heavy at times on certain frequencies other bands remain relatively unoccupied. To relieve such congestion and to make fuller use of the elbow-room already available does not necessitate mass-emigration to the VHF's. These may well be left to those amateurs mainly interested in them, and as a future retreat should TVI eventually expel us in disgrace from the lower frequencies. The effect of harmonics in connection with the proposed new 21 mc band may later give some pointers in this respect.

In the meantime there is another avenue and

*Apart altogether from the present favourable tendencies for DX on our lowest-frequency band, every station should be equipped with a small 1.7 mc transmitter, even if only to work the locals. For many obvious reasons, a Top Band Tx is most conveniently built as a separate unit. Here is a good practical design.—Editor.*

for the discomfited newcomer who has borne the spivvery, heat and burden of Ten and Twenty, the crush on 7 mc or the intricacies of Eighty, the present article may suggest to him what perhaps are pastures new. Attention is in fact drawn to the wide open spaces of 1.7 mc where "never is heard a con-trary word," except that emanating from the tiring pursuit of fish. Here will be found a frequency area where the QRP CW-only man with a simple keying filter is presented with wide horizons, and can accomplish much if he looks after his aerial efficiency.

Here on the Top Band during the daytime will normally be heard a few Service transmissions, ship-shore traffic, an odd beacon, many faint carriers, unintelligible "fish fone," and regular weather reports broadcast to shipping. Unlike other bands, however, darkness brings to this little-visited region not an excited floating population but merely a

Table of Values

Fig. 1. VFO driver circuit.

- C1 = 500  $\mu$ F
- C2 = 100  $\mu$ F
- C3 = 20  $\mu$ F
- C4 = 100  $\mu$ F silver mica
- C5 = .01  $\mu$ F mica
- C6 = 200  $\mu$ F silver mica
- R1 = 100,000 ohms
- R2 = 33,000 ohms
- R3 = 20,000 ohms
- L1 = 45 turns 18 SWG bare, spaced one turn, on 2-in. ceramic former; cathode tap 10 turns from earthy end
- V1 = 6L6, 6V6
- S1 = SPDT switch

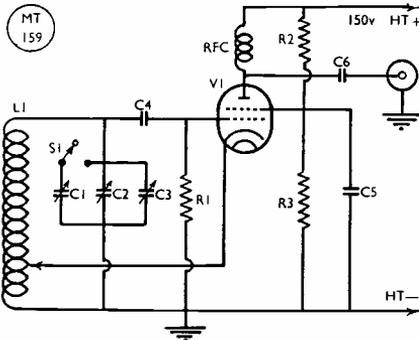


Fig. 1. The VFO driver circuit suggested by G2NS. Functions of S1 and C1-C3 are explained in the text.

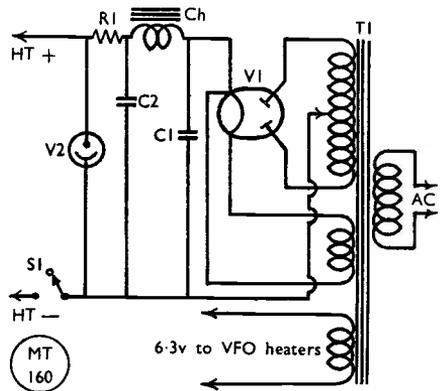


Fig. 2. Stabilised power supply for the VFO, V2 being the neon stabiliser.

Table of Values

Fig. 2. Stabilised power supply for VFO driver.

- C1, C2 = 16  $\mu$ F, 600v wkng.
- R1 = 10,000 ohms, 50 watt
- Ch = 10-henry 120 mA choke
- T1 = Transformer 350-0-350v, 100 mA, 5v and 6.3v
- S1 = VFO on-off, HT
- V1 = 80 or 83
- V2 = Cossor S130 voltage stabiliser

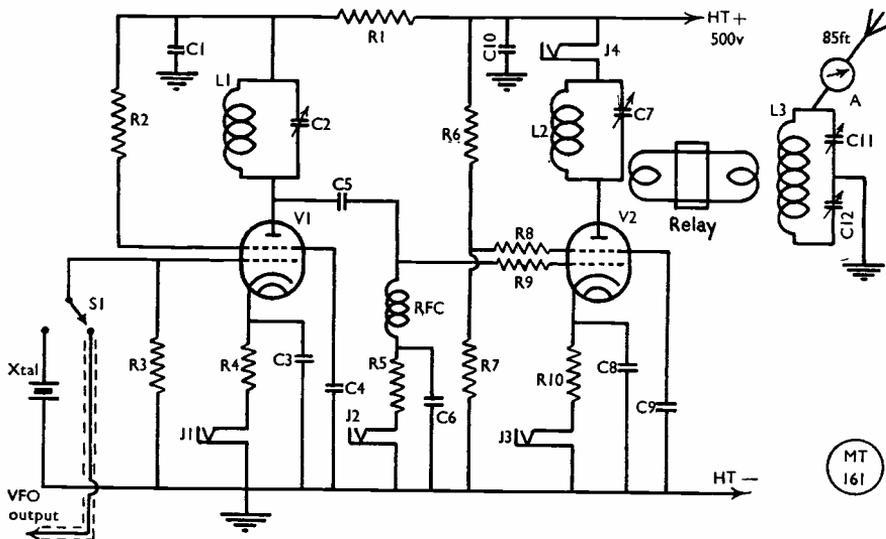


Fig. 3. Circuit complete of the VFO/CO-PA transmitter for the Top Band, discussed in the article.

few placid visitors and an increase in the strength of the static, the carriers and the nautical expressions.

**Suitable Gear**

The construction of a conventional 6L6-807 transmitter for 1.7 mc is simple enough and most of the needed components are in the junk-box or what-have-you category. The power input is limited to 10 watts (a limitation which might well be exercised on other bands by operators themselves in order to lessen the general QRM). Although on 1.7 mc quite 75 per cent. of success lies with the aerial itself, this does not necessitate the erection of a "special array" and very satisfactory results are usually obtainable with the HF system already in operation at the average stations, plus a good earth or counterpoise and perhaps some type of matching coupler.

**Driver Stage**

The variable driver suggested here is mentioned in a little greater detail because it has so outgrown itself since starting life along the lines of G6QB's "VFO Drive Unit" described in the June, 1946, issue of the *Short Wave Magazine*. Use of the oscillator was required on all bands and the present ECO version allows a fundamental of 1.7 or 3.5 mc at will. The three variable condensers C1, C2, C3 (Fig. 1) are employed in the following roles : C1 sets the band for 1.7 mc but is switched out

**Table of Values**

Fig. 3. VFO/COPA for 1.7 mc.

- C1, C3, C4 = .01  $\mu$ F
- C2, C7 = 125  $\mu$ F
- C5 = 100  $\mu$ F
- C6, C8, C9, C10 = 0.1  $\mu$ F
- C11, C12 = 500  $\mu$ F
- R1 = 50,000 ohms
- R2 = 25,000 ohms
- R3, R5 = 10,000 ohms
- R4, R10 = 250 ohms, 5 watt
- R6 = 3,500 ohms
- R7 = 20,000 ohms
- R8, R9 = 50 ohms, carbon
- S1 = Xtal—VFO switch
- Xtal = 1.7 (3.5 or 7 mc)
- J1, J3 = Key or CO cathode current. PA cathode current
- J2 = PA grid current
- J4 = PA plate current
- V1 = 6L6, 6V6
- V2 = 807
- A = Hot-wire or Thermo-couple
- L1 = 1.7 mc, 45 turns 18 SWG enam., close wound on 1 1/2-in. former
- L2 = 1.7 mc, 30 turns 18 SWG enam., close wound on 3-in. former
- L3 = 1.7 mc, 24 turns 14 SWG enam., close wound on 4-in. former
- Link = 5 turns

of circuit on 3.5 mc ; C2 spreads the band on 1.7 and becomes the bandsetter on 3.5 mc ; C3 is locked at zero and left untouched on 1.7, but on 3.5 mc it becomes the band-spreader. Although intended mainly for use on the Top Band the two stages of the transmitter actually allow CO/PA working on 1.7, 3.5 and 7 mc, besides VFO/BA/PA on 1.7 and 3.5 mc and

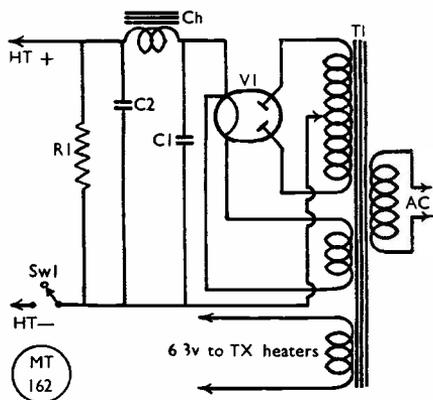


Fig. 4. Power pack for the Top Band transmitter.

#### Table of Values

Fig. 4. Power Supply for 1.7 mc Transmitter.

- C1, C2 = 8  $\mu$ F, 1,000v wkng.  
 R1 = 25,000 ohms, 25-watt  
 Ch = 32-henry 150 mA choke  
 T1 = 500-0-500v, 100 mA, 5v and 6.3v  
 S1 = Tx on-off, HT  
 VI = 83

VFO/FD/PA on 3.5 and 7 mc. When variable frequency is used in the LF portion of the 3.5 or 7 mc bands the buffer or FD/PA and the aerial tuning may all be adjusted and left at the centre frequencies of the required wave-range, no retuning being required except for heterodyning incoming signals with the oscillator 20  $\mu$ F spreader C3 itself. On 1.7 mc, however, a band-width of nearly 300 kc (1715 to 2000) has to be covered and exactly 100 deg. of the C2 100  $\mu$ F spreader dial happen to accomplish this once the edge of the band has been hit by the 500  $\mu$ F setter C1. For reasonable steps, therefore, no retuning is required but should the chase lead one right across the band then both stages and the aerial condensers as well will require readjusting for resonance.

The easiest way to do this is to heterodyne the incoming signal with HT on the oscillator only, and when commencing to call, quickly to retune the other circuits for maximum output on a small loop-lamp fixed near the aerial coupling coil. This not only saves metering after the initial tuning up but also provides a constant visual assurance that RF is actually "going up the spout."

The VFO described has been collecting consistent T9 reports. But of far greater importance than the generation of RF power is the method by which it is launched on its journey.

#### Aerial Arrangement

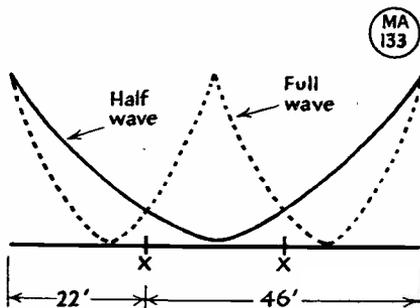
Descriptions of aerials best suited for Top

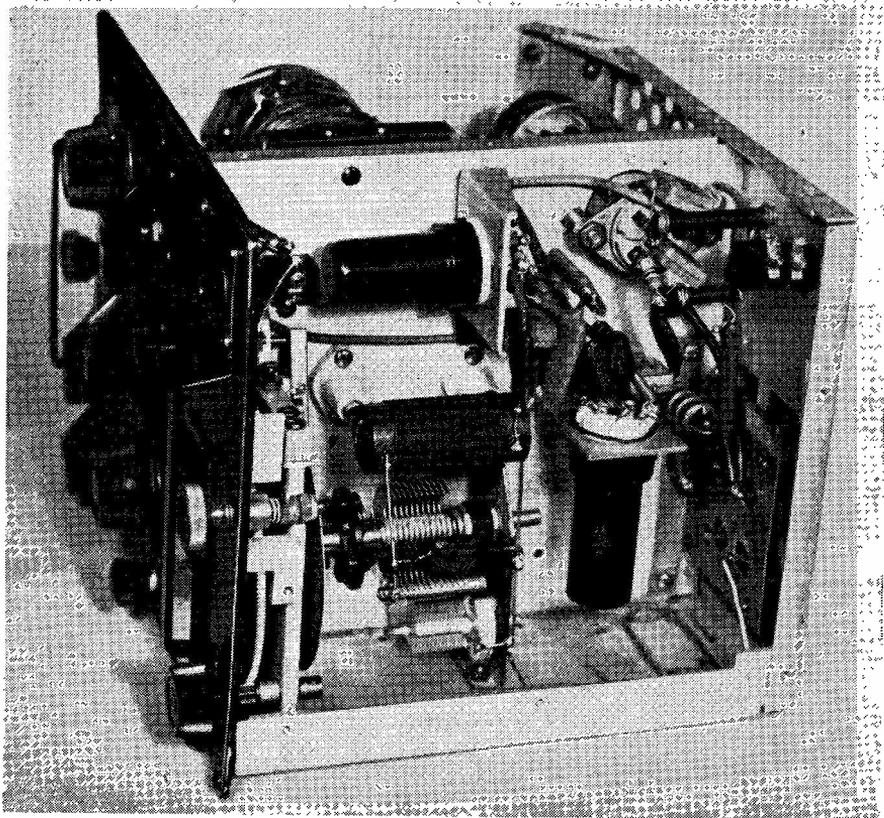
Band working have appeared in the pages of this *Magazine* at various times. Aerial change-over by means of a relay is, of course, optional but it can be accepted that faint 1.7 mc signals make better copy when taken off a good outdoor aerial, such as that used for transmitting, than from a piece of flex draped round the picture rail. The coupler in use is of the Collins type described by G6FO in his two articles "Aerials Worth Trying," February, 1939, and "Multi-Band Aerial System," August, 1946, in the *Short Wave Magazine*. In the writer's case the combined length of the top and the strapped feeders of the 14/28 mc Zepp, used end-on for 1.7 and 3.5 mc working, happened to total 85 ft. and instead of an earth that proved to be poor and of high resistance a so-called "counterpoise" of 60 ft. of wire was run down the garden.

To conclude it is suggested that greater use be made of the huge slice of territory in the Top Band region, not only to encourage the few regulars who are already there ploughing rather lonely furrows, but because the more we spread ourselves the happier we shall be!

#### CORRECTION AND APOLOGY

This is more a case of the Ha! Ha! Department than Error Crep' In, and no doubt a great many readers did think "Ha! ha! they've done it again". Did you notice that drawing captioned Fig. 1 on p. 189 of the May issue—if not, you should have done! The dotted curve is quite wrong, and the drawing should have appeared as given here. Note that this in no way affects the argument—the points X are still there, and in the same places on the wire—though the words "decreasing to a lower value at the ends" in line 18 of the left-hand column of text should be deleted. Sorry about this one; it was a case of the wrong block being put down and slipping through undetected. However, we have been putting earth on our head and drinking ink as a penance.





## MORE IDEAS ON THE CAY-47155C

### Top Band Conversion

By J. CRERAR (G3BYV)

AFTER reading G2CZ's conversion of the CAY-47155C tuning unit (*Short Wave Magazine*, February, 1950) and having two of them available, it was decided to put them to a similar use. The circuit follows normal practice and the stability proved to be very good. When checked against WWV for four hours the oscillator drifted a maximum of 70 cycles starting from cold, most of this taking place in the first 10 minutes.

The circuit finally used consists of a series tuned Colpitts (Clapp) using either a 6J5 or a 6V6 strapped as a triode. This is followed

by an untuned buffer using a 6V6, and is capacity coupled to the cathode of the oscillator. An 807 is used in the PA, and there is plenty of drive for an input of 10 watts.

### Modification Details

The MO section is completely stripped of all components (more for the junk box) with the exception of the slow motion dial and the socket strip at the rear. A 1½-in. hole is cut in the compartment screen and the 807 socket sub-mounted, preventing any tendency for the 807 to "spill over." The other holders are mounted on 2 in. by 2 in. dural brackets, one of these being the original "MO step" switch bracket.

The coil, consisting of 60 turns of 22 gauge close wound on a 1-in. polystyrene former, is rigidly supported by a pair of 1-in. stand off insulators.

The tuning section, comprising a .00014  $\mu$ F variable condenser with a midget .0001  $\mu$ F

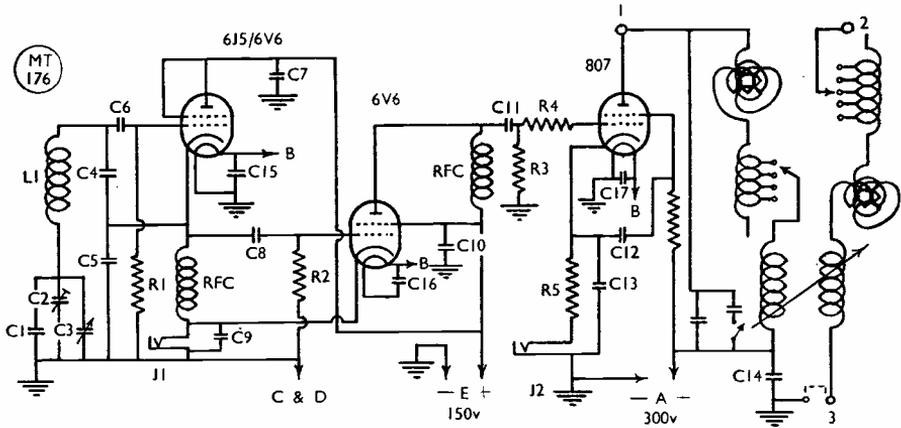


Fig. 1. From the CAY-47155C, G3BYV produced this circuit arrangement, the result being a useful Top Band transmitter.

air trimmer (slot adjusted with locking collar) and a .0001  $\mu$ F silver mica in parallel with it, is mounted on a 3 1/2 in. by 2 in. steel bracket.

The photograph shows the relative positioning of the important components.

The only additional component on the PA side is C14 and this is soldered directly from the cold end of the coupling coil to earth. The wire from socket F to the coil is removed and the HT fed through a rubber grommet from socket A.

A short length of braid from the wire leading to stud 1 to the valve cap completes the PA section.

Table of Values

Fig. 1. Circuit of the CAY-47155C as modified

- C1, C6, C8, C11 = .0001  $\mu$ F, silver mica
- C2 = .0001  $\mu$ F, air variable
- C3 = 140  $\mu$ F, variable
- C4, C5 = .001  $\mu$ F, silver mica
- C7, C9, C10, C12, C13 = .01  $\mu$ F, mica
- C14 = .001  $\mu$ F, mica
- C15, C16, C17 = .001  $\mu$ F, mica
- R1 = 100,000 ohms
- R2 = 47,000 ohms
- R3 = 15,000 ohms
- R4 = 47 ohms
- R5 = 230 ohms
- R6 = 20,000 ohms
- RFC = 2.5 mh
- L1 = See text

Keying

J1 is fitted on the front panel in place of the MO step switch and J2 is mounted above the socket strip at the rear. The transmitter may be keyed either at J1 or J2, depending on whether break-in working is required or not.

Both the oscillator and the buffer brackets are wired as far as possible before fixing into the unit, keeping long leads down to a minimum. All earth connections for each stage are taken to a common earth tag and these are then joined together by a 12-gauge busbar. Two 0 BA 1/4-in. bolts are soldered to studs 2 and 3 and the lower bolt, fixing stud 3, is

reversed so that a shorting link may be connected when required.

Finally a 1/4-in. hole is drilled at the rear to

REAR SOCKET CONNECTIONS

- A = 300 volts
- B = 6.3 volts, 3 amps
- C = Chassis
- D = Chassis
- E = 150 volts, stabilised
- F = Not used

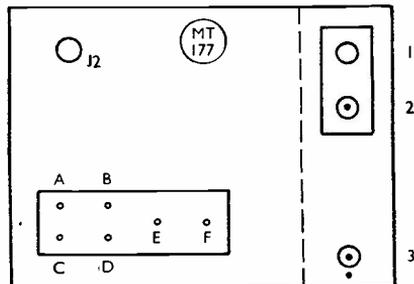


Fig. 2. Rear view of the CAY-47155C chassis, showing socket connections.

enable C2 to be adjusted when the dural cover is replaced.

The tuning range spreads the 160-metre band over the whole dial, with a spare 5 kc either side of the band edges. Greater stability still would result if the coil were made larger (the former used would only take 60 turns) and less series capacity used.

The modified unit will also double to

80 metres and can be operated as a driver for the QRO rig.

A power pack, modulator, and control unit has now been completed with the same size panel as the RF section and is mounted below it. The two chassis are held together by two pieces of chromed angle strip and thus make a complete "rack and panel transmitter" for the Top Band.

## BAND EDGE MARKER

### With Visual Indication

By H. M. HUMPHREYS (G13EVU)

MOST readers will probably agree that in these days of congested bands a VFO is essential if a reasonable number of contacts are to be made. While the self-excited oscillator has the advantage that it can be adjusted either to the frequency of the call being heard, or to a clear spot on the band if a CQ is contemplated, it also has the great drawback that it is all too easy to stray outside the band—an offence which the GPO is understood to view with grave displeasure!

The fact that the terms of the amateur licence require an approved frequency meter to be kept *and used* at a station where variable frequency control is employed does not entirely solve the problem, for several reasons. Despite good intentions, dials *can* be read incorrectly, especially where graduations are small and close together; graphs or calibration charts *can* easily be misread; oscillators *can* go off calibration quite unexpectedly; and last, but far from least, is the frailty of human nature, which usually turns out to be at its weakest when there is a possibility of bagging some rare DX. There is great temptation to swing the VFO to within a few hundred cycles of zero-beat with that unusual call sign, and to hang on expectantly with the hope of beating all opposition to a snappy reply immediately the CQ ends. In such circumstances, accurate frequency measurement is usually postponed until a contact is firmly established, on the assumption that the automatic check against the other station's signals is sufficient assurance of being in the band. While this assumption may prove reliable in most cases, there is ever present the danger of being lured outside the band by a station in one of those countries in which frequency measurement seems to be a very approximate matter, or by a member of the

ever-increasing pirate crew who presumably have no hesitation in adding the minor offence of operating outside the recognised amateur bands to their major crime of being on the air at all.

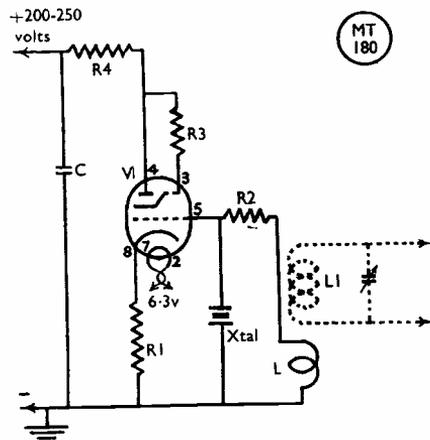
### Suitable Unit

To obviate all these risks, it would appear eminently desirable to have a marker which would give an unmistakable indication of the band edge. As far as the CW enthusiast is concerned, he is unlikely to run out of any of the communications bands except at the

#### Table of Values

##### Band Edge Marker

- C = .01  $\mu$ F, mica
- R1 = 2,500 ohms,  $\frac{1}{2}$ -watt
- R2 = 15,000 ohms,  $\frac{1}{4}$ -watt
- R3 = 1 megohm
- R4 = 47,000 ohms
- L = 2.5 turn link
- L1 = VFO tuning or buffer tank
- V = Y63 Electron Indicator Tube
- Xtal = 3500 kc crystal



Circuit of the magic-eye indicator unit, giving automatic band edge warning if the VFO is brought into resonance with the crystal.

low-frequency end, and the fortunate harmonic relationships which exist make it a simple matter to design and construct a thoroughly efficient indicator which can be arranged to serve for all bands.

Apart from a valve mounting and a couple of resistors, the only components needed are an Electron Eye Indicator Tube and a crystal, the frequency of which should be exactly 3500 kc. Both these items are readily and inexpensively obtainable from surplus sources. The circuit diagram is given at Fig. 1, and although it is fairly well self-explanatory, a few hints on adjustment and operation may help to get it working at maximum efficiency. A 3.5 mc crystal is used at G13EVU, because the VFO in use operates in that band, doublers being included in the exciter to give outputs at 7, 14 and 28 mc as well as on the fundamental. There is, however, no reason why a 7 or even a 14 mc crystal should not be substituted at will, and no doubt many variants will suggest themselves to the experimenter. The principle of the circuit is straightforward. The crystal, which is not in continuous oscillation, has no frequency

controlling effect, its sole purpose being to cause the eye of the indicator tube to close when the link is coupled to a tuned circuit oscillating at the same frequency as its own fundamental. The degree of coupling is fairly critical—not exceptionally so, but the link should be adjusted so that the eye is almost fully closed at resonance. If the coupling is too loose, the opening of the eye may be found to vary slightly at points well off resonance as the VFO tuning control is rotated. This effect will, however, disappear completely as the coupling is increased to the optimum, and in any event is not likely to be confused with the indication of resonance, which is sharp and unmistakable. It is immaterial whether the indicator is coupled to the frequency controlling inductance of the VFO or to the anode coil of a tuned buffer stage, as it has a negligible damping effect. The HT and LT demands of the tube are so small that they can almost invariably be supplied by the VFO or exciter power pack.

The electron tube should be mounted with the eye through a hole in the panel as close to the VFO tuning dial as possible, and gives a clear visual warning of approaching danger as the operator nears the band edge.

While the greatest service can be obtained from this circuit by using it as a band edge indicator as recommended, it can also be used with any crystal which the reader may possess to give a spot check on the calibration of a VFO.

#### XTAL XCHANGE

Here are the current offers—for the few simple rules respecting insertions in this space, please see p. 188 of the May *Magazine*.

**G3AIZ**, 157 Wanstead Park Road, Ilford, Essex.

Has OCC Type P5 crystal 7064 kc, also Brookes Type C7BT 7089 and 7139 kc, all certificated. Wants frequencies about 1800, 1850 and 1900 kc.

**G3ATL/A**, The Limes, Station Road, Hugglescote, Leicester.

Has Standard Radio 7029 kc crystal, in holder, 3-in. pin spacing. Wants 100-1000 kc bar, holdered.

**G3FDU**, Honeycroft, London Road, Alderley Edge, Cheshire.

Has OCC Type P5 3506 kc crystal, certificated; also 3528 and 7035 kc crystals, mounted. Wants similar crystal in range 6016-6026 or 8022-8036 kc.

**G3FWX**, 11 Primrose Croft, Hall Green, Birmingham, 28.

Has OCC Type P5 3601 kc crystal, mounted, with certificate. Wants similar crystal 7017-7100 kc.

**G3HAT**, 100 Beaufort Avenue, Norbreck, Blackpool, Lancs.

Has 100 kc bar. Wants any type crystal about 1750 or 1790 kc.

**G3SB**, 16 The Parks, Minehead, Somerset.

Has crystals 1795, 1970, 7113 and 7169 kc, unmounted. Wants frequencies 7005-7025 kc.

#### NEW QTH's

Readers who may be concerned at what they feel is undue delay in the appearance of their call sign and address in our "New QTH" feature need not fear we have lost the slip or are otherwise disinterested. At the present time, due to the very large number of new call signs and changes of address that we are receiving, it can take from six weeks to two months, *i.e.* two issues, before a new QTH actually appears. This is because of demands on space, apart from the fact that new call signs are published in the order in which we receive them. But about every third month we take some extra space to clear off the backlog—but even at that we seldom have fewer than 40 new QTH's awaiting publication.

#### QSO COINCIDENCE

ZB1IH, Malta, was working VE3ZW recently and asked the VE if he happened to know a great friend of ZB1IH's in the R.C.N.; to which the reply from VE3ZW was, "I am John Doull, so you must be Geoff Turner!"

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# FIRST CLASS OPERATORS' CLUB

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President :  
GERALD MARCUSE, G2NM

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

Asst. Hon. Secretary :  
J. E. CATT, G5FS

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The annual dinner of the First Class Operators' Club will be held in London on the evening of Saturday, November 25 next. Members who intend to be present will assist by giving early notice; more detailed information will appear in the Club circular letters, but in the meantime—enter that date.

It is hoped that a new membership list will be issued before the autumn—with a present total of some 280 members, the current list is out of date, though additions, amendments and changes of address are duly notified to all concerned in the circular letters. Members are asked particularly to inform the Honorary Secretary of changes of address, if possible in advance.

## Club Activity

The monthly C/L's now carry as a feature "Members' News", giving much information about individual activity. From the May issue of the *Short Wave Magazine* it is evident that the Club is represented in practically all branches of Amateur Radio achievement. To pick out a few instances, an FOC member heads the "Dozen DX" Contest; in the Four-Band DX table, the first three places are taken by members; four others are in the first eight callsigns in the Top Band list, and an FOC member also takes second place in Post-War Zones Worked.

In the QRP field, the "monthly bun" goes to G6ZN of the FOC, and the new pair of G's mentioned as having been worked by ZL1HM on Eighty are also Club members.

## FOC DX Contest ?

It has been suggested by one of our overseas members that the Club should hold a DX contest of its own during the coming season. Will those who would care to take part let us know (especially overseas members), so that if the idea has sufficient backing, arrangements can be made. Details will be discussed in the C/L's.

The first married couple within our ranks, both holding a licence in their own right, are G3EYO and G3CTE—and G3EYO is already having her call pirated! On this subject of piracy, a G2 member actually heard his own call on the air with a GM prefix.

## Circular Letters

Will those members who do not receive a C/L by the end of each month please be good enough to notify G5FS, so that in their own interests an investigation can be made as to the cause of any delay. The C/L's are now posted regularly at the beginning of every month, and G5FS hopes that he has at last devised a system whereby full and prompt circulation can be assured.

## Election Notice

In accordance with the Rules of the Club, the following new members are declared elected to the active membership list of the F.O.C. :

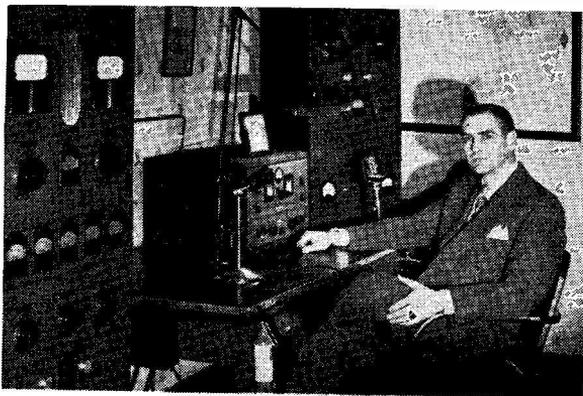
L. F. Crosby, G3FGT (Birmingham 25); Mrs. Duesbury, G3EYO (Sunderland); B. M. Selby, G4LV (South Killingholme); J. Banner, GW3ZV (Rhigos); S. T. Hudson, ZL4FO (Dunedin); A. Lindgren, SM5IQ (Sundbyberg); O. W. Reid, ZS6DO (Germiston); P. R. Solder, G5FA (London) and F. Dearlove, G2QO (Hull).

All communications respecting the First Class Operators' Club should be addressed direct to Capt. A. M. H. Fergus, G2ZC, 89 West Street, Farnham, Surrey. (Tel: Farnham Surrey 6067).

## CARDS IN THE BOX

We are holding cards for the stations listed below—please claim by forwarding a large stamped addressed envelope, with name and callsign, to BCM/QSL, London, W.C.1, which is a full and sufficient address for our QSL Bureau. If you would like your name and callsign to appear in our "New QTH" feature, and subsequently in the *Radio Amateur Call Book*, please mention that at the same time.

G2FWI, 2KV, 2LR, 2VB, 3CAQ, 3DEH, 3DEZ, 3DWN, 3EDH, 3EXV, 3EYH, 3FSG, 3FSY, 3GBD, 3GBI, 4JZ, 4PV, 5GU, 5QD, 6YF, 8BS, GW3CPU, 3DNN.



# DX COMMENTARY

CALLS HEARD, WORKED & QSL'd

**J**UST to show that it is not the accepted custom to begin this Commentary by moralizing, we propose to plunge boldly into the subject of DX without further ado. Suffice it to say, in passing, that last month's homily resulted in a considerable volume of comment, mostly of a sympathetic nature.

With the exception of Ten, which has been decidedly scratchy, all bands have been bringing in the good stuff and have been well occupied. Ten, as one would expect at this stage of the sunspot cycle, has relapsed into summer conditions almost by the middle of spring; from time to time little bursts of Far East activity make a pleasing diversion, and on many occasions the South Africans roar in, but on the whole the activity is very restricted, and there is practically nothing at all for the CW man. So we will refer briefly to 28 mc when we come to the proper place, but first will deal with the Old Reliable.

## DX on 14 mc.

No shortage of activity here, judging by the mail. Peak periods continue to be the breakfast hour, 1730-2000 and, sometimes, the hour around midnight. One phenomenon remarked upon by several chasers is the way in which the VE8's seem to crowd around the band at *midday*—a most unusual time for them. It is pretty safe to say that one simply cannot listen between 1100 and 1300 without coming across one or two of them. G3ID (Dawlish) reports VE8AS at 1115; other contacts were FF8JC, KV4AA, VQ4BJ, YV4AX, KL7VV—

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

mostly in the early evenings. Heard, but not worked, were HZ1CK, VS7KR, CR5AC and KG6FAA.

G3FGT (Birmingham) has worked U18KAA, CE3DZ, KL7YJ, VQ4WLH, YI3DYN, FF8JC and plenty more on 14 mc CW, and he has been active on three other bands as well. G3FZW (Lichfield) remarks that OX3BR gives his QTH as Peary Land, but presumably this only counts as Greenland; it's the northernmost part and of interest for that, if no other reason.

G6BB (London, S.W.2) offers AC4KK, giving QTH as Lhasa, name "Fred," on 14045 at 0853. The time seems a little peculiar, and we don't know, *via* the grapevine, of an AC4KK, but let us hope he is the real thing. Others for 'BB on Twenty were CR7AD, EQ3FM, VK6GA and lesser fry. G3FPQ (Bordon, Hants) built an 832 PA for the band and collected 53 countries in four weeks. Some of his best were VS7SV, TF5TP, EA9BB, PJ5TR, ZS3BA, KV4AO, CX4CZ and the doubtful M1B.

From G3BDQ (St. Leonards) comes a list including KR6CA, VP8AO, VP4CO, KG6HG, FN8AD and EA8LP—all new ones—plus several old pals. 'BDQ adds that VE2IQ is in the Arctic at a remote Eskimo settlement (Fort Chimoin) and is looking for G contacts. G3FXB (Hove) has teed up his G8PO aerial

and has collected some new ones thereby, again including this doubtful M1B. (Our own private buzz is that the real M1B uses 'phone only, and that this chap giving his QTH as "Snt Marino" is a Suspicious Character).

The little surprise that makes life interesting is the theme of the letter from G8OJ (Manchester). After repeated fruitless calls to PK1RI and PK1HX, he eventually called one of them and *the other* came back! As 'OJ sagely remarks, if every DX rarity came back to us every time we should soon lose interest in the business—hence the lack of any desire for 1 kW and a Rhombic. Others from G8OJ were FKS8AD, SVØWM, CE2BC, VE8RX, YI3DYN and EA8LP.

G13EDN writes from R.N.A.S., St. Merryn, to say that he worked VK1RD on 'phone from GI2HML, his brother's station; QSL via VK3ASD, R.A.A.F. Station, Laverton, Victoria—but boats visit Macquarie Island only about once in six months. This particular contact was on 'phone, but we have heard VK1RD twice on CW. G2GM (Torquay) now uses 150 watts on 14 mc only and is finding DX good. He raised W7KJQ in Nevada for his WAS, although he is short of four cards. 'GM says he finds the Far East the most difficult to work, with local Europeans busy pouncing and drowning the DX with their terrific signals.

G6BS (Cambridge) seems to specialise in "K" stations; his "KH6 beam" has given him no fewer than twenty different Hawaiian QSO's and most of his other DX consisted of KG6, KZ5, KX6, KL7 and the like. If anyone else has even *heard* twenty KH6's during the past month or so we shall be surprised.

From G3ATU (Sunderland) comes quite a nice list of good ones, including VP3FJ, VP7NM, EA9BB, CR4AE and HC8GRC. The latter, of course, was strictly a short-time station and has long since been non-existent. The lucky ones who worked him were by no means numerous, and he made only rare appearances on CW. 'ATU had to spend quite a lot of time studying tactics before he found the right time to raise HC8GRC without having to penetrate the wall of W's, 40 kc thick. Other nice ones heard by 'ATU were VK1RD (1800), VK1YM (1830), VK1AJT (1600), VK9JC (1500), ZS7C (1900) and FB8AX (1000). Regarding last month's query on VP7NM, he says this station is genuine; it is operated by a GPO type who has been in VP7 for only a year.

G3ABG (Cannock) makes some nice offerings, such as the said VP7NM, FF8JC, EA8CL, UM8KAA, UAØKFD, VP3FJ, VP8AO (South Shetlands) and many others. He also tells us that VE3CHL is the call of G6HL, temporarily over there. G2BJY (West

Bromwich) has heard ZK1AZ calling CQ DX (0800-0830) but has had no luck. Best DX for 'BJY was VE6, 7 and 8 plus KH6PM and VQ4WLH.

A long list of 14 mc 'Phone DX comes

## FOUR BAND DX

Station	Countries Worked					Power
	28 mc	14 mc	7 mc	3.5 mc	Total	
G2BJY	104	95	24	4	138	25
G3DO	103	161	37	23	191	150
G3ATU	100	183	70	26	190	150
G2WW	100	168	46	21	178	150
W2QHH	98	183	62	70	189	35
G2VD	98	161	60	29	168	150
G6CB	94	42	6	1	112	20/150
G3BOC	72	34	25	17	83	15/60
G3FNJ	71	114	45	24	135	150
G8KU	70	132	45	9	148	50/120
G5FA	68	130	95	19	146	35/150
G8IP	66	115	42	13	132	3/150
G3AKU	58	137	66	31	153	100
G8PW	58	100	60	15	115	25/100
G6BB	52	111	60	25	127	10/85
G3FGT	47	90	37	32	112	60/100
G6QX	45	104	29	16	117	30/150
ZB1AR	43	99	45	31	112	150
G2YS	34	113	32	23	127	150
G2FYT	31	120	31	5	128	150
G8VG	26	108	55	24	?	60/75
G3FXB	21	59	47	21	77	25
GW3CBY	19	48	29	21	66	15/30
G6TC	18	88	43	11	97	20/75
G3EIZ	15	39	23	36	54	25
G5WC	12	120	50	1	122	45
G3ACC	6	105	13	21	114	150
G6BS	4	182	112	28	191	150
G2DHV	4	83	21	19	88	25/60
G3ABG	3	117	51	22	118	45/50
GM3EST	2	97	23	20	101	150
G6AT	1	89	46	20	94	100

from G3CIZ (Wakefield) and includes ZD1SS, SV5UN, ZP2AE, VP3MCB, VP5MU, VP9II, TI2KW and 2OE, TG9AI, as well as VQ2, 3 and 4, CR6, PK4, KZ5, KP4, XE and heaps of others. In short it seems that 'Phone has paid off better than CW does for many people.

### Some Rarities

It isn't by any means everyone who has worked ZK2AA yet! And yet there he was, calling CQ DX and not getting a single reply, on two recent occasions. Admittedly he was pretty weak, but our own particular AR88 is no better than anyone else's; so get

weaving, someone. And now we have a long report from David Mitchell (ZL1MP) about the proceedings at VR1C. This station is run under the auspices of the U.S. Loran Station Nr. 84, and is on Bikati Island, part of the Makin Atoll at the northernmost end of the Gilbert Islands. There are three stations in Transmitting Unit 84, one of which is operated by KX6BA in the Marshall Islands. The third is at Kwadack Island, near Kwajalein, but has no amateur population (as yet).

VR1C has been operated by KX6BA (who is also W6PZ) and another operator, "Dave," who apparently has no amateur call. He uses 100 watts to a dipole but expects to have some beams up soon (after which he will go on to 'phone, so hurry up, you key-bashers). Best time for Europeans on 14 mc is apparently between 1700 and 1800 GMT. Cards will be QSL'd, and should be addressed to Loran Unit Nr. 84, Navy 824, c/oFPO, San Francisco.

This station is very isolated, and the operators would appreciate copies of English radio magazines, so if you want to make sure of a contact and a QSL you know just how to go about it.

While on the subject of rarities there is no harm in mentioning that there will be an FP8 on the air one of these fine days, but we are not yet allowed to release the whole story. We will warn you in good time!

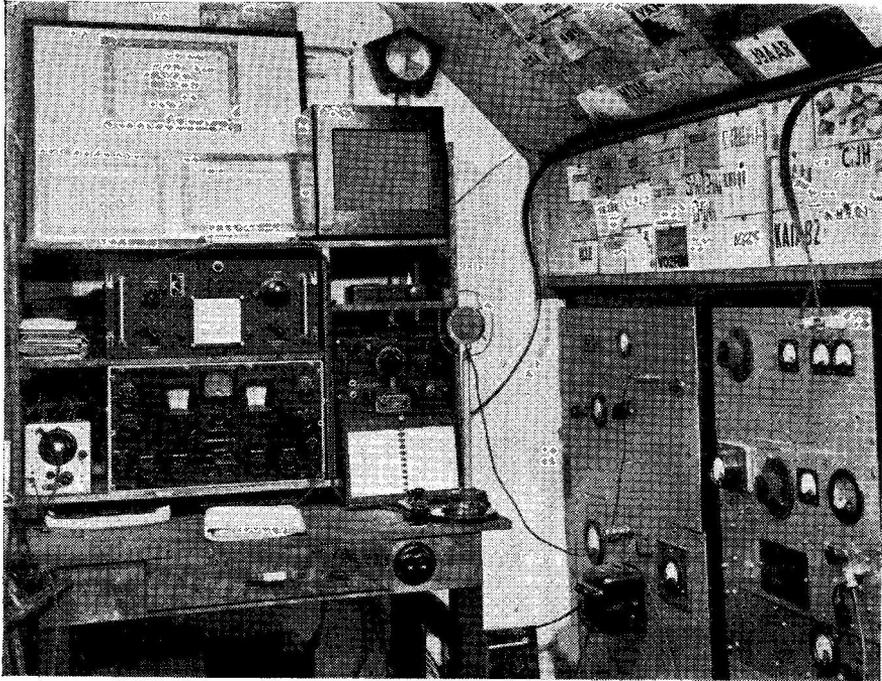
Still on the subject of 14 mc DX, G3CDC (Sherwood) would like any information on the subject of CS3WS, heard calling CQ round about 0800. 'CDC also heard AC4KB, but as he was 579x, gave his QTH as "Pikifx" and said the weather was "gode," he didn't get unduly steamed up about him. Others from G3CDC were EA9BB (1840), UAØFR in Sakhaline (2000), ZK1BC, Rarotonga (0900) and KX6BA (1910). But most of all we thank him for "Pikifx", for which we can think of several uses!

Just as we had written about G4QK (Harpden) and his "magnificent" tree, he wrote to say that someone had called and cut it down; so now he will have to move again. Before its demise he contacted UAØKSB and ØSJ, ZE2KF and OX3BR, and heard KR6CF and YN1LB.

### DX News on Ten

Very little 28 mc activity is reported, but during the good patches the band has been known to get very lively. G2BJY records that on one particular day all continents were coming in, and he heard ZL, VK, ZS, W, VE, PY, LU, CE, VU, AP, VP2, KZ5, PJ, VP8, KP4, YV, OA and CX! Of course there is no doubt that after the brilliant behaviour of Ten over the last four years, we have all become thoroughly spoilt and expect too much. There's not much wrong with that little list for

TOP BAND LISTING Starting August 1, 1949		
Station	Counties	Countries
G6AB	61	16
G2YS	60	16
G4LX	60	14
GM2HIK	58	13
G2AJU	57	13
G3GDW	56	8
G6ZN	55	10
G3AGQ	52	10
G3AKU	52	9
G3FZW	52	8
G6VC	52	7
G6HD	51	11
G5XF	50	8
G2AOL	49	10
GW3CBY	49	10
GM3FBA	47	6
G3BOC	45	7
G3EJF	43	7
G3BTP	42	11
G2CZU	42	7
G3FGT	41	8
G3NT	41	8
G2BON	40	9
G3GGN	38	11
G8NF	38	10
G3ATU	37	8
G3BEX	37	7
G2ABT	36	6
G3ABG	34	10
G3ALE/A	28	4
G6OM	21	5
ZB1AR	12	4



G2ZF, Bramhall, Cheshire, is active mainly on 14 and 28 mc, CW and phone. The Tx consists of ECO-TU5 into a 3-stage exciter driving an 813 in the PA. The receiver is an HQ120X and the aerials a folded dipole on Twenty with a two-element beam for Ten. The score as at the beginning of February was 147C and WAS on 28 mc phone.

a band that is actually being neglected because conditions are bad.

G3AWP (Bournemouth) managed to raise HC8GRC at 2200 by calling him on 28640 kc, since the HC was tuning from 28500 up. He tells us that G2AKQ worked him as HC9GRC, when he was on the boat on the way out from Ecuador. It seems that during the short stay on the Galapagos the station made 1116 contacts! G3FXB has got up a three-element beam which, although low and badly screened, is rolling in the DX that he couldn't work on his Zepp. But 'FXB complains bitterly of the lack of CW activity, which is definitely unfair to those who haven't yet been issued with their 'phone tickets.

G6BB also has a new beam up in the air, but had to be content with VS6 and LU during the month. G3FGT has been using 'phone on the band and has snagged ZE2JP VQ4RF, PK1CR and 4X4CZ during brief openings.

#### 7 and 3.5 mc News

Activity on these bands has also been at a low level this month, since they have been

pretty slow after an encouraging burst of DX conditions. G6BB raised PY2DY to give him his WAC on 7 mc, after 22 years on the band. A week later he raised PY2AC with his first call, and also found HP1LO. G4RZ (Harrow) sticks to the band through thick and thin; he says that signals have become much weaker, but there is still DX about every morning. To prove it he quotes contacts with ZL (three of them), plus UR, SP and KP4 for new ones. All this with 25 watts and a single crystal on 7036—and all between 0600 and 0630.

G6BS has pushed his 40-metre score up to 112 countries with I1YAT/Trieste, 4X4DF, MB9BJ, AP5B, and ZE2JN. G3FGT has favoured the 3.5 mc band, on which he has raised KP4KD, ZB1AB/P, VO1W, LX1DU and sundry VE's and W's.

G3FPQ, whose QRP feats on the same band were reported some little while ago, continues to wield his *three watts*, with which he has worked VE1BV, FA8BG and 3V8AB. He lost a TA3 through the much-hated "ferrying" technique, by which the TA3 was passed from G to G until 'FPQ gave up in despair.

(over)



might eventually be relieved of part of the band.

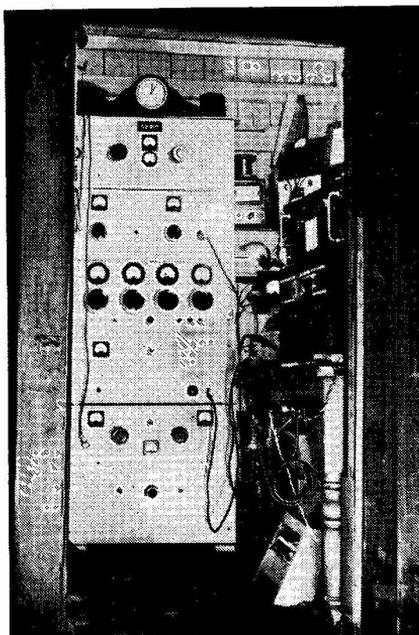
G4LX, currently scoring 60 counties, tells us that this will be his final claim, as he will not be on the band much more until November. He set 60 counties as his target, which has now been well and truly hit. And he returns to VHF for the summer season.

G6AB reports that he has his card from HZ1KE confirming the first G/HZ contact on the Top Band, and very nice too. 'AB continues to head the table with his score of 61 counties and 16 countries. G6VC (Northfleet) has added a few more counties in spite of being involved in a QRP Contest on 3.5 mc. G2CZU (Bath) wonders whether he might be the only amateur in the country (or in the world) who is also the trainer of a rugby team? For that reason he has more time on the air in the summer than in the winter. 'CZU is preparing to build a new shack and to erect a 40-ft. steel mast—he is already 540 ft. up. In answer to his final query, we are, so far, only talking about "WAEC" as a Top Band activity, and there is, as yet, no such thing as a certificate, though that is in hand.

G3AKU (St. Ives, Hunts) has changed his tactics to the extent of spending nearly all his time on the Top Band. As a result, he has worked 52 counties and 9 countries in a total of 52 days. It was easy at first, because several people were only too eager for Hunts—but the tempo is a bit slower now. He pleads for activity in Shropshire and Hereford—just as a few people did a month or so ago for Hunts! 'AKU asks whether portables can count for "WAEC"—in view of field day activity this summer. We really don't see why not, provided the location is authenticated and QSL'd. Finally, he remarks how strange it is to find people on the band who have been operating for years and can still only handle a shaky 10 w.p.m.

G2YS, who was probably the first to achieve WAEC (he claimed it on April 20, just too late for last issue) was delighted to make the acquaintance of G3CRJ and G3CUC in Westmorland. Lots of others also pass a vote of thanks to these worthies for putting their county on the air so effectively. 'YS brings up another point, though, when he says that all "Iron Curtain" countries should be excluded from scores on this band, since none of them are licensed for the band and it is almost impossible to check their authenticity. During the *Magazine* Club Contest last winter a very phoney "UB5BK" showed up; now there are sundry UA's and HA's and others, who may or may not be OK.

G3EPR (Tankerton) is one of those who are mystified at the way more than 40 counties are produced out of the hat. This has already



G2BID, Middleton, Lanc., in a small space 7 ft. by 5 ft. by 6 ft., runs a rack-panel job with a pair of push-pull 807's in the PA, driven by a four-stage exciter unit, with a push-pull 6L6 modulator. The Rx is an AR88D, the aerial an end-fed 85-footer, and main activity is on 160, 80 and 10 metres, with a separate CO-PA for the Top Band. All the transmitting equipment is from designs published in the *Short Wave Magazine*.

been explained, so we won't dwell on it. G3BAP (Lancaster) tells us that ex-GC2BMU is already active as G2BMU from Westmorland, although as yet he can only use a few feet of wire across the room as an aerial.

GM3FBA (Dumbarton) has continually been finding surprises on the band, such as G3AGA 'way down in Falmouth suddenly springing up on 'phone in the middle of the Lancs group. 'FBA has been scrutinizing the more consistent signals on the band and is convinced that the length of wire strung up has much to do with it. He, of course, hears very few signals from less than 200 miles' distance; so all those he does hear have to be pretty good ones.

#### News From Overseas

VE2KS (Montreal) puts in a plea for an Empire Contest, but strictly on an inter-Continental basis. He adds that VE2AGF is ex-G2CIN and is a director of the Montreal Amateur Radio Club. 'KS himself has been



"... Just idling a pair of 813's here, OM. . . ."

on the air since 1921 and says, "treat it as a hobby and it's still wonderful . . . but how many hours have certain people wasted on acquiring hundreds of new countries?"

VS7NX (Colombo), via G2ZC, says that there are many pirates with VS7 calls, including VS7AB, 7AX, 7JG and VS7EL, who states that he is in the Cocos Islands. No such call has ever been issued. VS7NX is the one and only holder of the DXCC in Ceylon; he started transmitting in 1928, is 46 years old and still going strong.

AP5B (Lahore) sheds a little light on why some G operators don't get all the QSL cards they would like, by telling more than one story of bad behaviour which so enraged him that he certainly would not dream of sending a card! He is still active on 7 mc with 25 watts to a B2, but has given up 3.5 mc until the winter, when he hopes to be back there again. His power on the DX bands is only 8/20 watts, but he has 40 countries on 7 mc and 95 on 14 mc to his credit (to say nothing of 60 on 28 mc).

Mal Geddes, formerly G2SO and now firmly settled in Southern Rhodesia, is expecting a ZE3 call at any moment. He hopes to work lots of G's, and on the night of April 18, on 14 mc CW, he heard G3APB, 3BRQ, 3CBU, 3CSP, 3DCU, 3EET, 3EGQ, 4MU, 5BZ, 6OY, 8LS, 8RQ, GM3AHQ and GM3EST—so it looks fairly propitious. Likewise Bill King (ex-G3ECU) notifies us of his arrival in Iraq, complete with gear, and he, too, says the G's come through well on 14 mc CW.

WØUOX (Redwood Falls, Minn.) is one of the lucky ones who have already worked VR1C. He has also collected EA9BB and VP5BF, and he landed ZD8B just before he left for G-land.

An interesting letter from ZL3NE of Christchurch discloses that 80-metre G's are audible out there during the period 2000 to

2100 BST, and that conditions from the ZL3 point of view should improve during the next few weeks as the Antipodean winter advances. ZL3NE lists a number of European prefixes, all received up to May 12 last, and mentions G3FQ and G3RZ as having been called by him on the evening (our time) of May 5. He says that he will be on 3501 kc regularly till about 2200 BST, able to QSY anywhere up to 3600 kc if necessary, also that ZL1CI and ZL4IE are others similarly interested. What kills it for us, of course, is the high level of noise and European QRM, but contacts of this kind are well worth the effort.

VS1BQ (Singapore) is now on Twenty again with a modified B2, VFO driven, but is somewhat handicapped by lack of a decent receiver; he and VS1CO operate from adjoining rooms, so the mutual-QRM problem has taken a bit of sorting out! However, things "work out fairly well," as VS1BQ puts it.

More on the difficult DX theme, HZ1KE says that G/HZ working on the Top Band is now over for this season, as daily storms and a very high level of QRN make listening impossible. For the information of all interested, Ken authenticates the following as the only four G's with whom he had full and proper 1.7 mc contacts: G6AB, G6BQ, GD3UB and GM2HIK—though several cards have arrived at HZ1KE from other G's who thought (or hoped) they had worked him too! Ken says he will be on the Top Band again next season and expects to be in Saudi Arabia till some time in 1952.

And from the Free State of Trieste, we have a line from ex-DL2CU who is now signing MF2AD and looking for G contacts on the 3.5, 7 and 14 mc bands.

#### Miscellaneous Gen.

GM3EST (Motherwell) seems to have got the idea that all the fellows who work lots of super-DX have very deep pockets, possibly in addition to ideal locations and heaps of shiny modern equipment. 'Taint so, 'EST, not by a long way. Some of the top-scorers have very modest gear, a far-from-perfect QTH and as shallow a pocket as one could lament upon. We know personally that *three* in the "over-200" class use a pair of 807's and completely home-brewed gear with the exception of an ex-Govt. surplus receiver obtained at a very modest price. The most important things, we are convinced, are the *operating ability* and the *aerial*. And the latter doesn't imply a superlative location but merely an intelligently-strung-up piece of wire which makes the best use of all the local circumstances.

G8AR (Sunderland) sends us a local press cutting reporting him as working DL4NH, airborne at 12,000 ft. over Iceland . . . G3COL (London, N.W.11) had a CQ replied to by a VR6QL, who dodged the question of QTH and finally faded away when asked for it . . . G3DCU (also N.W.11) tells us that ZS8MK is ex-G6MK and ZS5MK, and his QTH when in ZS8 is Dr. R. L. Markham, Qachas Nek, Bechuanaland. He was found for some time on 14115 kc between 1730 and 1830, but we believe he is now out of ZS8 again.

G8IX (Stoke-on-Trent) sends us a Japanese SWL Report—from a member of the JARL and BSWL. This card expresses the hope that Japanese nationals will be allowed on the air in the near future.

### More QRP

G2FXA (Stockton-on-Tees) has been trying very low powers. Having been on the air with an exciter unit only, he dispensed with its power supply and used a 100-volt HT battery. With this, on 7 mc, he found that about eight out of ten stations came back; so he went down to 30 volts of HT and still got around. And he adds that although he has some nice receivers and converters, he still sticks mostly to his favourite 1-V-2. GM6IZ (Aberdeen) brings in a funny one which we have met personally on one or two occasions. With his 150 watts he had been calling his head off for a long time, and finally worked a W4 who gave him 599 plus. When told of all the abortive calls he suggested that signals were so strong that people suspected them of coming from a local phoney! So GM6IZ gave his 866's a week's leave, reduced to 18 watts and promptly worked Calif., Ariz., Ore., Mont., Idaho, Alberta, and the rest (to say nothing of VO6, ZE2 and UAØ) and ended up with a W6 who said: "I can honestly say that you are the strongest signal coming in from Europe." There's a moral here all right!

G3ACC (London, S.E.22) is yet another who has gone QRP, but, in this case, because of TVI. Meg now has a TVI-proofed 25-watt and also uses 10 watts (QRO) on the Top Band, but she bemoans an apparent lack of stations up there. The new Tx consists of a 6V6 and an 807—nothing more.

G3COJ (Hull) wants to see the UAØ position clarified, since there is no means of telling which are in Zone 18 and which in Zone 19. The short answer probably is that it doesn't much matter which zone they are in until the card arrives, so the best plan is to try to work them all. Frankly, we just don't know who is in which, except that 'KFD is in Zone 19 all right. G2BBI (Westcliff) requests light on the VØ/VE matter, and asks



" . . . Yes, of COURSE I use a double superhet and a push-pull PA. . . . "

whether VO's worked before the "merger" still count as a separate country. It has been ruled, quite recently, that they don't, so we all lose one country from our scores. 'BBI heard VT1RF (Kuwait) make his first QSO on ten-metre 'phone, but couldn't raise him. Since then he has heard that VT1RF limits himself to three contacts a day, because he has no cards and three letters a day is all he can manage.

G3CJV (London, N.13) wishes one could indicate, when calling, whether one wants a chatty QSO or just a rubber-stamp affair. He suggests some signal for the purpose, but we are always chary of trying to introduce such things, because for the next three years one will have to waste so much time explaining to every single contact what they mean! We have seen another suggestion, recently, for ruling out the CQ call altogether and calling one's own prefix, so that anyone hearing "G G G de G6ABC" would know at once that it was a G calling. At the same time the use of the prefix would indicate that it was a general call. This, too, might be a very good thing, but unless it was internationally introduced it would merely waste an awful lot of time.

GC2CNC (Jersey) makes the frightening suggestion that we should start a column giving the calls of all stations who have been heard committing acts of "Spivvery." Times, frequencies and details to be given, and general remarks on the transmissions. Not in a thousand years, 'CNC—we are not the type to stick the old neck out quite so far, apart from the fact that what is called spivvery is very often a matter of opinion. But the further suggestion of publishing a "Code of Good

Conduct" is more likely to meet with general approval and is well worth considering. Then those who didn't come up to the standard could possibly be educated in a painless manner; the other would be far from painless, and might actually lead to innocent parties being pilloried.

#### Pirates

G3EAZ (Exeter) says his call is being pirated by someone using 'phone on the Top Band; he himself has been off the air since October last and has never used 'phone.

G3EVP (Harrogate) has had cards confirm-

ing QSO's on the 3.5 mc band, on which he has not yet worked. He is going on it shortly and hopes to have a QSO with himself, if the other chap persists in sticking to the call.

And that brings this month's offering to a close. Nothing now remains but to extend the usual wishes of Good Hunting and Good Conduct, and to remind you that the closing date for next month's outpourings is **June 13, first post**. For overseas mail it will be July 12 for the August issue. Address it all to DX Commentary, *Short Wave Magazine*, 53 Victoria Street, London, S.W.1. 73 and BCNU.

## Portrait Gallery

### G2VV

**J**AMES N. ROE of G2VV is one of our younger Old Timers, in terms of "radio age", having taken the air in January 1929. Prior to that, however, he had served a three-year apprenticeship with an artificial aerial licence and the call 2BUW. Jim's was the first amateur station to be licensed in Farnham, Surrey, and his early interests were QRP work, rag-chewing and DX, all of which have persisted right up to date.

In 1934, he held WAC and WBE certificates achieved without exceeding 9 watts from batteries; he still holds a portable licence and takes pleasure in wielding QRP! But at present G2VV is undergoing an extensive QRO rebuild, and is only active on 3.5 mc CW.

In addition to being M.I.R.E. and F.R.S.A., Jim belongs to the FOC and BOTC, and was for five years the Hon. Sec. of the Thames Valley Radio Society. He also holds an unusual distinction in the form of the pre-war DJDC (German) Olympic Games Radio Contest Certificate.

Radio is a full-time interest with G2VV; before 1940 he was in turn with E.M.I., Ferranti, Baird Television and Gambrell Radio Communications. During the war he was a production engineer with Rediffusion Ltd., and a member of the R.O.C. Since the war he has been working as a free-lance



engineer and journalist, and is engaged on the design and servicing of domestic, communications and amateur equipment, together with the preparation of technical service manuals.

The fact that Jim remains an active enthusiast on the amateur bands goes to prove that professional radio men can still enjoy Amateur Radio as a hobby. The present QTH of G2VV is Hampton-on-Thames, Middlesex.

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

# KEYING TECHNIQUE

## Click Suppression and a General Discussion

By I. E. HILL (G6HL)

EACH passing year seems to produce increased activity on the various amateur bands to the extent that it is now most unusual to receive one signal without a background of several others. 'Tis bad enough if the signals in the background are clean, but one or two indifferent ones and a few key clicks can strain the patience of the most saintly. Particularly is such interference annoying when one considers that it is almost entirely unnecessary and could be avoided. In this country, at any rate, there is no shortage of good equipment and an adequate supply of literature on radio theory and practice. Nevertheless, we still have bad notes, signals with unstable frequency control or no control at all, and shocking key clicks, particularly on the lower frequency bands where there is least excuse.

In the past, key click elimination has been practised only to the point where BC1 is avoided and radiated clicks do not trouble neighbouring amateurs listening off the transmitter frequency. To-day, it is necessary to go even further and completely remove clicks from the radiated signal.

### Cause of Key Clicks

Keyclicks, or apparent key clicks, are of three kinds, and can be classified as :

- (a) Clicks caused by the spark at the key and radiated as an RF pulse of short duration and no particular frequency.
- (b) Clicks caused by the start and/or stop of a CW signal.
- (c) Apparent clicks associated with keying which are actually short bursts of parasitic oscillation.

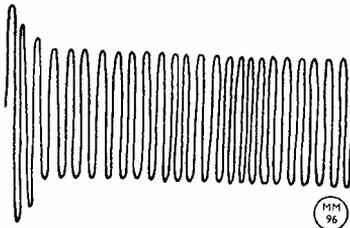


Fig. 1. Waveform to be expected of keyed CW signal with no key click correction.

*This is an essentially practical article on a most important subject and will be of interest to every operator of a CW transmitter. The author also suggests a method of clickless keying which while involving no new principle, is a system not often used in amateur working.—*  
*Editor.*

By always keying a circuit carrying a minimum of current and including a small fixed condenser at the key contacts, together with RF chokes in the key leads, the click caused by sparking is not difficult to avoid. This type of click is normally only heard quite locally to the source.

At the instant before the key is depressed, plate supply is at a maximum voltage, and with the average amateur installation this is at least 10 per cent. above the loaded condition. As the key is depressed RF drive is suddenly applied and the radiated signal builds rapidly to a peak as illustrated in Fig. 1. This sudden change from no signal to a maximum peak will produce a click in the receiver on the fundamental and nearby frequencies. Similarly, when the key is released, the signal will fall rapidly to zero and another click will result.

In the old days of LS5B drivers and DET1's or T250's in the final, parasitics were almost unknown and in any case were easily avoided. To-day, sensitive tetrodes or pentodes are the general rule for both exciter and final stages. The sensitive valve is more prone to parasitic oscillation, particularly of the HF type. Careful design and the liberal use of carbon resistor "stoppers" in grid and screen feeds will do much to prevent parasitics. If preventative measures are not taken, it is likely that the action of keying will jerk the transmitter into producing parasitic oscillations, each of short duration. As these parasitics are often present only during the process of keying, absence of this trouble when the key is depressed does not give the transmitter a clean sheet; 807's are particularly prone to such effects.

(over)

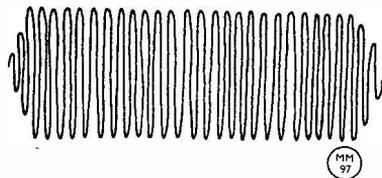


Fig. 2. Waveform of ideal CW signal, showing effect of click elimination. The build-up is slow, with constant amplitude of the "made" signal, followed by a slow fall-away.

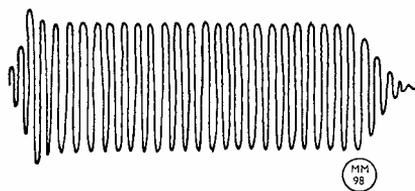


Fig. 3. Waveform of acceptable amateur CW signal, with adjusted key click correction. Slight peaking must be expected at "make" unless the power pack regulation is perfect. It is difficult to obtain exactly similar build-up and fall-away, and it is preferable to have the former faster than the latter, as suggested in this sketch.

### Cure

It was explained earlier that the click is caused by the sudden application of RF drive and/or plate supply, and the rapid build-up of the RF output. If this process can be slowed down and the oscillation made to build up gradually to its peak and similarly to fall slowly to zero, then the clicks will be avoided. There is then less likelihood of shock excitation into parasitic oscillation, and if suitable precautions are taken that trouble will also be avoided.

If the slowing-up process is overdone, the keyed signal will become "woolly" and difficult to copy. A happy medium is the sort of waveform illustrated in Fig. 2—with a further comment in Fig. 3.

### How to Do It

At "make" it is necessary to slow down the speed of build-up to the steady peak value. An inductance objects to any change of passing current and insertion of a suitable value in the plate feed of the keyed valve will have the desired effect. Increase of the inductance will increase the time taken to build up to normal and a minimum value should therefore be selected which will remove the click on "make."

So far so good ; use of a suitable LF choke will remove the click on "make," but when the key is broken the current in the keyed stage will fall to a minimum or zero. The choke is still in circuit and it will object strongly to the further change in passing current, and will demonstrate its objection by a spark at the key.

Sparking contacts—the cure is obviously a condenser which will be put across the key contacts. The spark occurring when the key is broken is now taken care of by the condenser which will be charged by the voltage previously producing a spark at the key contacts. The click on break is thus removed.

But next time the key is depressed a click is heard in the receiver, this time caused by the condenser discharging. It is now necessary to show up the discharge rate of the condenser. This can be done by the use of a series resistor of a few hundred ohms.

The final keying filter is the conventional circuit of Fig. 4. The size of the choke Ch. will determine the build-up on "make" and the condenser the fall on "break". The resistor must be adjusted to slow down the discharge rate of the condenser. Correct adjustment of the three keyed variables will give clickless keying of the keyed stages for one given value of current and operating conditions.

### Primary Keying

Primary keying using a heavy relay will give a slow build-up at "make." The power supply has to charge up the filter condensers ; the bigger the condensers and the bigger the filter choke, the slower the build-up. Similarly, on "break" the condensers will discharge slowly and again the bigger the condensers the slower the fall. Unfortunately, the power supply filter is limited to a relatively small size if the keying is to be readable ; it is therefore almost impossible to obtain a PDC signal. High speed keying is possible only if the filter size is reduced and a T7 or T8 signal is acceptable.

### Bias Keying

A condenser takes time to charge up ; for a given applied voltage the bigger the condenser the longer it will take. Similarly, if the

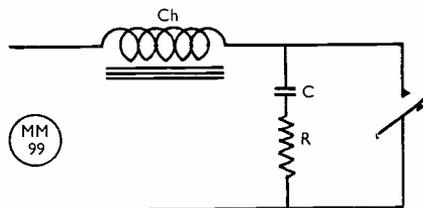


Fig. 4. The conventional keying filter, some points regarding which are discussed in the text.

condenser is shorted by a resistor the time taken for the condenser to discharge will vary with the size of the resistor. The bigger the resistor the greater the time taken to discharge.

A condenser-resistor combination can be employed to avoid key clicks when using one of the various forms of bias keying. Unfortunately, however, the grid is the sensitive part of a valve and the slightest click produced in the grid circuit is amplified in the output. Bias keying can be used satisfactorily, but it is touchy and not easy to adjust. It is difficult to isolate completely the key from the RF circuits under control.

### Valve Keying

The use of a valve specifically for keying purposes has much to commend it. The key

and associated circuits can be completely isolated from the keyed RF stage and are at low potential. The waveform of the RF in the keyed stage can be determined by the values of condenser and resistor in the bias keying of the keyer valve. By the provision of suitable selector switches a rapid change of condenser and resistor value can be made and thus the waveform of the keyed stage can be changed over a wide range of loading. Constructional details of a suitable valve keyer follow later.

### Where to Key

Various handbooks and radio manuals detail keying methods and how they may be applied in a transmitter. To outline them all would be outside the scope of this article; it must suffice therefore to specify the author's preference.

Undoubtedly the cathode circuit is the best place to insert the key and will minimise clicks before introduction of the keying filter. With cathode or centre tap keying raising the key breaks the plate circuit and at the same time puts a high negative potential on the grid, thus reducing plate current rapidly. On "making" the key, the high negative bias is removed from the grid and the plate circuit is completed.

In a transmitter which has fixed loading on the keyed stage the choke-condenser-resistor network, properly adjusted, will be satisfactory. But most amateur transmitters are used on several bands and inevitably the keyed stage loading varies somewhat. In this case, a valve keyer with its ease of adjustment is much to be preferred.

The location of the keyed stage in the transmitter is important.

First, it should be emphasised that keying of the oscillator is outdated practice and bad. If BK is an essential requirement two oscillators should be run, one fixed, one variable and fed to a mixer valve which can be keyed. The oscillators must be well screened and frequencies selected so that they add to the required output frequency but with neither giving low order harmonics in the amateur bands, e.g. a crystal oscillator on 2000 kc can feed the grid and a VFO on 1500 kc can feed the suppressor of a pentode mixer, the output of which is tuned to 3.5 mc. An untuned buffer should be used between the VFO and the mixer.

If BK is not a requirement—and except for traffic handling it is difficult to see its necessity in amateur communication—then the keyed stage should be moved as near to the PA as possible. The objectives are to reduce the likelihood of setting off parasitic oscillation in the post-key stages and also to isolate the

keyed stage from the oscillator. Except for low-power work it is not good practice to key the PA owing to the difficulty in adjusting the keying filter and the higher voltages involved. In the case of the valve keyer the loss of power in the keyer valve is undesirable and for large plate current in the PA the keyer becomes unwieldy.

### Suggestions

1. Do listen to your signal on a receiver with aerial off, RF gain turned down, AVC off, BFO off. If manipulating the key produces only a rushing sound in the receiver and there is no sign of click or thump on "make" and "break", and if you can find no other funny noises associated with keying—replace halo headress and continue operating! In the more likely case of detecting clicks, make a resolution to remedy them and get started *now*.

2. Do put a .0005  $\mu$ F mica condenser (or larger in some cases) across the key at the contacts and insert HF chokes in the key leads at the key end. Screen the lot and take the key leads away in screened cable, earthed at the transmitter end.

3. Do locate the keyed stage as near the PA as electrically possible—not necessarily physically.

4. Do put parasitic stoppers in all stages; 25- to 50-ohm carbon resistors inserted in grid and screen leads at the valve holder and before the by-pass condensers.

5. Do use a well filtered and well regulated power supply. A condenser input filter gives a higher voltage output, it's true, but a choke input filter gives better regulation.

6. Do stabilise plate and screen supply of the oscillator and screen supply of the next stage. VR tubes will do the trick.

7. Do avoid paralld feed and use series feed, thus avoiding RF chokes in the transmitter. RF chokes are prone to help LF parasitic oscillations.

8. Do report key clicks or absence thereof when making contacts.

### Practical Valve Keyer

The circuit at Fig. 5 is almost self explanatory and values can be varied somewhat to suit junk box parts available. The keyer has been built into a TU5B case and provision made for the use of up to four keyer valves in parallel. Any type of low impedance triodes can be used—45, 6B4, 2A3 and so on. Allow 50 mA per valve and expect a voltage drop across the keyer of 50 to 100 volts. In the writer's transmitter an 807 which operates on 3.5 or 7 mc is

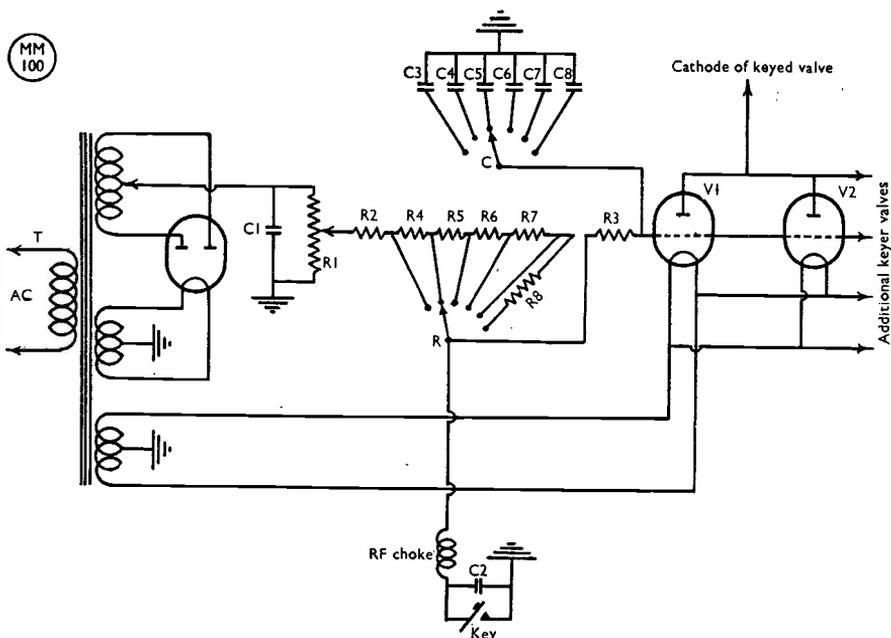


Fig. 5. The valve keyer suggested by G6HL; the current capacity can be increased by paralleling further valves with V1, V2. Values are given below and the method of operation is covered in the discussion.

keyed and one 6B4 is adequate in the keyer. The 807 plate current varies from 25 mA when used as a doubler to feed other driver stages to 50 mA when used to drive the PA. The 807 cathode connects to the plate of the 6B4 and is by-passed for RF at the 807 holder.

As the TU5B case was large enough an additional LT rectifier was incorporated to give relay supply for aerial and control switching. The unit becomes a combined keyer and send/receive box.

The variable resistor across the bias supply is useful as its adjustment to give a lower value of bias voltage will precisely control the keyed stage input. This enables one to obtain a convenient signal in the receiver for oscillator setting when working on the higher frequencies and the oscillator harmonic is weak or inaudible. After setting the oscillator frequency the bias resistor must, of course, be restored to maximum or the keying will be woolly and a spacer radiated.

Adjustment of the R and C switches for keying characteristic is quite simple. To reduce click on "make" increase R; to reduce click on "break" increase C. The correct adjustment is obtained when there is just a trace of click on make and the click has just disappeared on break but there is no tail. It

#### Table of Values

Fig. 5. Keyer Valve Circuit Arrangement

C1	= 2 $\mu$ F
C2	= .0005 $\mu$ F
C3	= .0001 $\mu$ F
C4	= .002 $\mu$ F
C5	= .003 $\mu$ F
C6	= .005 $\mu$ F
C7	= .008 $\mu$ F
C8	= .01 $\mu$ F
R1	= 50,000 ohms, 5-watt variable
R2	= 50,000 ohms
R3, R6, R7, R8	= 500,000 ohms
R4	= 100,000 ohms
R5	= 250,000 ohms
V1, V2	= Any low-impedance triode (2A3, 6B4, 45)
T	= 250-0-250v, with suitable LT's

will be found that the adjustments of R and C interlock; after setting R to optimum for "make" an increase in C will necessitate a slight readjustment of R, but a balance between the two can easily be found.

Finally, it is perhaps opportune to say "Check your transmission carefully and get a few opinions from nearby operators if you are in doubt. If it does not measure up to K9 it is time to do some hard thinking and make a few quite simple modifications to the transmitter."

# VHF BANDS

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

**Great DX Break on Two—  
Continentials Worked May 8-12—  
Seventycem Equipment and Results—  
VHF News, Views and Comments**

FOR the last eighteen months November 1948 has been quoted as "Those were the days" on two metres. Newcomers to the band have been encouraged by the old timers with amazing tales of the DX worked during those foggy November evenings. Our first two-metre contest for G's only was almost wrecked by the unexpected opening to the Continent. For eighteen months the VHF enthusiasts have waited for a repeat, and at last their patience has been rewarded. True, some parts of the country enjoyed better things than others—one must commiserate with G5BY down in Devon when he says, "Conditions do not seem to have been at all good on 145 mc. Howling N.E. gale been blowing here ever since May 9"—though the Northern, Midland and Eastern stations found the band almost like Forty, with F, ON and PA signals coming in literally by the dozen.

Your conductor was preoccupied with 70 cm. tests during this good spell and so can give little first-hand information, but the reports which have poured in draw a clear picture of all the amazing things that happened in the middle of May.

In Northern Ireland G12FHN (Bangor) heard G3BLP (Selsdon) on phone on the evening of Saturday, May 13. G3BW (Whitehaven), nursing a dislocated shoulder, also found May 13 the best when he heard and worked G6XM at S8 phone and G3BLP at similar strength, also hearing G5MA/P from Sussex. G3CYY (Newcastle) found May 12 the superior date and worked ON and PA as well as southern G's; on the next evening he heard much but could not work the DX. G4LX (Newcastle) also knocked off ON and PA and got as far south as G5MA/P. G8SB

(Horwich) worked many southern G's and was called by G2XC several times in vain! G2OI (Eccles) heard a number of ON and PA signals.

In the Midlands, G5SK (Coventry) could hardly believe his ears when on May 12 he switched on and heard the PA's coming in mostly at S9. G3ABA (Coventry) was also on to hear and work the DX during what he calls "this marvellous opening." G4RK (Coventry) also got in QSO's with PAØEO and PAØBP. G8KL (Wolverhampton) was amazed at the lack of fading on the ON and PA stations, and managed to work two. G3CXD (Newcastle, Staffs) worked the Continentals but could not hear any northern DX, although he noted southern stations working stations in that direction.

It was in East Anglia that the Continental working reached its peak. G2XS put S9 phone into PA. G3WW (March) worked three Belgian and five Dutch stations. G2CPL (Lowestoft) worked one French, seven Dutch and four Belgians. G2WJ (Dunmow) managed eight PA's and two ON's, all on phone and mostly at S9, while G2CIW (Romford) in addition to working three PA's and one ON, heard *twelve* other PA's and two more ON's; he comments that on May 13 the Sutton Coldfield TV at over 100 miles was 5 dB stronger than Alexandra Palace at less than 20 miles!

In the south-west G3EHY (Banwell) heard only weak signals from Holland, but managed to work PAØMU. G8IL (Salisbury) received PAØBP, but worked only F3LQ on May 14. At G2XC, listening was for a short period only and but one weak PA was logged. Some good signals were heard from the north, however. The same sort of story comes from all stations in this district; the area of good conditions simply did not extend as far west and south. In the neighbourhood of South London also it appears that, although the Continental DX could be heard, it was almost impossible to work it. At one time G3BLP could hear the Oswestry stations calling and working PA when there was no sound of the signals in Surrey.

(over)

## Late Flash !

### NEW SEVENTYCEM RECORD

At 2245 BST on the evening of May 30, G2XC of Portsmouth and G5BY of Bolt Tail, South Devon, established two-way contact on 70 cm. over a path of 132 miles, the QSO being comfortably held for half-an-hour with signals up to RST-579. This is a new QTH-to-QTH record for the band, and the congratulations of all readers will go to two of our leading VHF workers on their success.—*Editor.*



This survey of what happened on May 12 to 14 could go on a lot further, but what has been said should be enough to show that there was an excellent opening from the North to the South-East, including Belgium and Holland, but that conditions from Southern England to the Continent (and from South-West England to anywhere) were not so good. The absence of fading remarked by many stations is believed to indicate that the propagation was by ducting and doubtless if there had been adequate 70 cm. activity in the regions affected some good DX would have been possible on that band, too. It was unfortunate that the part of the country where such activity is highest was not covered by the duct.

#### Report from The Netherlands

In a very interesting letter PAØLU discusses results during the period May 8-12, when conditions were exceptionally good on Two for the PA's as well. On May 12, PAØLU himself heard no less than fifteen G's, with G2CPL (Lowestoft) as the strongest signal and in QSO in turn with all the PA's on the 144 mc band at the time—well done, G2CPL! It was all very interesting and reciprocal, because many PA's who had never previously worked a G had their first DX contacts on May 12, so that VHF interest and activity in Holland has been greatly stimulated in consequence. The first G to break through to Northern Holland during this particular period of good conditions was G3DIV/A (Eastbourne) who worked PAØAJA of Rotterdam on May 10; two days previously, on the 8th, PAØPN is reported as having worked F, G and ON.

It also looks as if PAØWL (Hoozeand) has, with G3AHT (Oswestry), made a new European DX record for Two, as the distance is roughly 412 miles; this will be finally checked when we have had time to make the pin-point calculations, as some other northern G stations—notably G2MA (Rotherham), G6LI (Grimsby), G2ADR (Acomb) and G8SJ (Halifax)—were also in on the PA DX and between them worked a number of Dutch stations.

**Special Note:** During the periods July 1, 1900-2359 BST, and July 2, 0500-1700 BST, the PA's will be running a Two-Metre Contest with scoring rules as for the last *Magazine* VHF Contest—see p. 611, October 1949 issue—except that there will be no code numbers, and for "miles" in the *Magazine* Rule (6) read kilometres. All G logs should be sent to us for onward transmission to the PA organiser responsible for this contest, which we hope will be well supported by G's (for whom also it will of course be a contest).

PAØLU demonstrated his version of the G3MY 70 cm. converter at the PA VHF

conference on May 14, when another interesting piece of gear in operation was a 70-cm. straight PA using a Philips QQE-06/40 giving 30 watts of RF output, all tuning inductances being Lecher lines. (We are checking up on the Mullard equivalent to this valve.)

Incidentally, PAØZQ will probably be the first Dutch member of our VHF Century Club, as he now has the necessary 100 QSL cards.

It is particularly gratifying to your conductor to be able to discuss these interesting PA results, and we are most grateful to PAØLU (who writes excellent English) for keeping us up to date with news from Holland.

#### Propagation Note

An interesting article by Booker and Gordon in *Proc.I.R.E.* for April 1950 describes some experiments made in the Caribbean Sea area on VHF propagation. One conclusion reached from these tests is that signals on centimetric and metric wavelengths are received beyond the horizon as a result of scattering from turbulences in the atmosphere at points of high field strength above the horizon. This is of course quite a different phenomenon from ducting and is particularly interesting to your conductor, who has for long contended that ducting would not supply the answer to the amount of 2-metre DX experienced in this country over land paths. The article concerned suggests that much of the fading on metre-wave broadcasting, such as TV, is due to this scattering.

#### The Zone Plan

The Zone Plan has been coming under fire from the misinformed and uninstructed, so that a note on its operation may not be amiss here. It has been contended that as a result of the *Magazine* VHF Band Plan it is now difficult to find the DX. This is strange, as when the scheme was first propounded, one of the criticisms was that it would make DX working too easy. The present difficulty regarding operating frequencies is surely entirely due to those stations who are not working within their Zone area. There are some notable examples of this and almost without exception these stations are causing severe QRM to their own locals on DX signals. Correspondence we have received this month shows an overwhelming condemnation of the spirit displayed by these operators—who are of course free to do as they please, even if they do hash up the band for everyone else.

At the same time it must be placed on record that some of the severest critics of the Zone Plan are nevertheless operating on the correct zone frequency and showing thereby a fine example of the spirit of Amateur Radio. Though they do not agree that a plan is

## TWO METRE ACTIVITY BY ZONES AND COUNTIES

## Zone A (144 to 144.2 mc)

Ayr : GM3DDE, GM3DIQ  
 Fife : GM3EGW  
 Lanark : GM2DI, GM3BDA, GM3EHI, GM5VG

## ZONE C (144.2 to 144.4 mc)

Cumberland : G3BW  
 Durham : G2FO, G3EHZ, G8BI  
 Northumberland : G3CYY, G4LX  
 Lancashire : G2DCI, G2OI, G3A00, G3BY, G3CHY, G3CSC, G3DA, G3ELT, G5TH, G5VN, G8SB  
 Yorkshire : G2ADR, G2IQ, G2MA, G3CC, G3DMK, G5QU, G6YO, G8GL

## ZONE D (145.8 to 146 mc)

Co. Down : GI2FHN, GI3GQB

## ZONE E (144.4 to 144.65 mc)

Cheshire : G3AMP, G3AYT, G3GMX, G5CP, G6TL  
 Derbyshire : G5RW  
 Leicestershire : G2FNV, G3ENS  
 Staffordshire : G3CXD, G3EEZ, G8KL  
 Warwickshire : G3ABA, G4RK, G5JU, G5SK, G6CI, G6SN, G8QY

## ZONE F (145.65 to 145.8 mc)

Glamorgan : GW2DUR, GW3EJM, GW8SU  
 Monmouth : G4GR  
 Montgomery : GW2ADZ  
 Shropshire : G3AHT, G4LU

## ZONE G (144.65 to 144.85 mc)

Bedfordshire : G3CGQ  
 Buckinghamshire : G3AHB, G3GBO, G6CJ, G6JK, G6NB, G8HK, G8QC  
 Cambridgeshire : G2AIQ, G2CNT, G2FJD, G2XV, G3BK, G3CJY, G3WW, G4MW, G5IG, G5JO, G8SY

Hertfordshire : G3FD, G4RO, G6LL  
 Huntingdonshire : G2FQP, G3AVO/P  
 Norfolk : G2XS, G3CFK, G3VM, G5UD  
 Northamptonshire : G2HCG  
 Suffolk : G2CPL

## ZONE H (145.25 to 145.5 mc)

Berkshire : G5HN, G8LG  
 Dorset : G3ABH, G5UF  
 Gloucestershire : G2AOK/A, G3MA, G5BM  
 Hampshire : G2DSW, G2XC, G3BHS, G3BNC, G3CGE, G3DEP, G3EJL, G3ESS, G3FAN, G3RI, G6XM, G8LY  
 Oxfordshire : G5TP, G6KB  
 Wiltshire : G2BUJ, G4AP, G8IL

## ZONE I (145.5 to 145.65 mc)

Cornwall : G3EDN/A  
 Devon : G2BMZ, G3AUS, G5BY, G5QA, G6WT  
 Somerset : G3CMT, G3EHY, G3FMO, G4RX

## ZONE J (144.85 to 145.25 mc)

Essex : G2CIW, G2WJ  
 Kent : G2AJ, G2AOL, G2BYF, G2KF, G2UJ, G3AFV, G3BOB, G3CAZ, G3FOD, G5MR, G6VC, G6VX  
 London : G2HDY, G3BUN, G3CNF, G3CZY, G3FXG, G4AU, G4DC, G5PY, G6OT, G6WU, G6YP, G8KZ, G8VR  
 Middlesex : G2AHP, G2DD, G2FMF, G3AZJ, G3EEI, G3FYR, G3GMZ, G3GSE, G3SM, G4HT, G4KD, G5LQ, G6UH, G8IP  
 Surrey : G2ANT, G2DRH, G2MR, G2MV, G2NH, G2YL, G3AIU, G3BLP, G4CI, G5AS, G5LK, G5MA, G5WP, G6CB, G6LK, G6LX, G8SM  
 Sussex : G2JU, G3BEX, G3DIV/A, G3EBW

Note : *The frequencies given above are those recommended by the Two-Metre Zone Plan but some stations are not conforming.*

necessary or desirable, they are *not* making things difficult for the great majority who wanted some such plan.

There is no need to mention here the calls of stations operating on other than correct zone frequencies as they are known to all two-metre operators.

Since this Plan was only brought into being after the fullest consideration and with the active support of practically all experienced VHF operators, we would appeal here to all concerned to comply with the scheme. That there is some congestion in the London Zone we well know, but it is felt that without the Plan things would have been much worse, for not only would all the London signals be within 200 kc of 145.1 mc, but most of the rest of the country as well. The Plan has opened up practically the whole area of the

band, and that alone has been worth while. It is also thought that some stations are using broadband receivers and that undoubtedly makes the position more difficult for them.

At the moment, your conductor sees no point in separate CW and phone sections of the band, as most stations operate both and there is a fairly usual habit of changing to phone during a QSO after receiving a good CW report.

## Station News

Starting in the south-east there are several reports from Kent. G2AOL (Otford) is a newcomer to Two. His Rx is a 6AK5 RF into 6J6 osc/mixer feeding into a CR100 on 25 mc ; he has a G2IQ converter under construction. The Tx has an 832 running at 30 watts, and the beam is a very wide-spaced 4-ele. type fed

from 300-ohm line. G2BYF is active in Sheerness; G3AFV (Sittingbourne) has a "City Slicker" in operation; G3CAZ (Gillingham) is hoping to replace his 4-ele.

TWO METRES ALL TIME COUNTIES WORKED LIST Starting Figure, 14 From Fixed QTH only	
Worked	Station
45	G3BLP
43	G2OI
40	G2AJ (225), G5MA, G5WP
39	G3ABA (141)
38	G2IQ, G2NH (212), G3EHY (136)
36	G5BY, G6XM
35	G4HT (203), G6NB, GW2ADZ
34	G2XC (225), G4DC (188)
33	G3CGQ
32	G5BM, G8WV
31	G2XS (136), G4LU, G3CXD
30	G4AU (123), G6LK, G8SM (172)
29	G2CPL (143)
28	G2CIW (185), G2HDY, G3VM, G3WW, G6VC
27	G3DAH, G5JU, G8IP (176)
26	G2ADR, G8QC (126)
25	G6UH (184), G6WT
24	G3FXG (100), G8KL
23	G2NM, G3BOB, G3EJL, G8IL, G8QY
22	G2FNW, G4RK, G8SB
20	G3BW, G3FD, G3GBO (122), G8KZ
19	G3BHS, G3GSE (116), G5SK
18	G3BK, G6CB, G6CI, GM3OL
17	G3FIJ
16	G5PY
15	G2ANT, G3CWW, G8VR
14	G3CAZ, GM3BDA

*NOTE: Figures in brackets after call are number of different stations worked, starting figure, 100.*

Yagi with a W3GV 12-ele. array; he would like information from anyone who has tried one successfully. G3FOD (Rochester) is using a 6AK5-6J6 converter after failing to tame a G2IQ type; his Tx is the SCR522, and he has worked PAØ. G5MR (Hythe) now has four countries worked; his new PA uses a 3E29 at 70 watts.

G3DIV/A (Eastbourne) has been keeping Sussex well on the map. He worked ON4YV on April 30 and finds he can raise him most nights. PAØPN was raised on May 9; 20 watts to an 832 and a 4-ele. Yagi put the signals out from G3DIV/A, but a 4-over-4 is promised shortly. G5MA/P on Linch Down also provided a much-needed Sussex contact for a number of operators. His QSO with G4LX he claims as a record for a portable station on two metres in this country. He was using the G6VX exciter unit as described in the *Short Wave Magazine* for July 1948, with only 12 watts input to the 6C4's.

Hampshire continues to be a centre of activity on VHF. G3BHS (Eastleigh) puts in a plea for more CW working, or at least of signing on CW after phone QSO's. Phone "overs" are far too often dismissed as a formality and become completely unreadable to someone hearing the signal at S3 or so. G3BHS gives the information that G3EDN/A is now on Two at St. Merryn, Cornwall, with 60 watts to an 829B. G6XM (Farnborough) has 150 watts but did not hear the Continentals during the recent good spell. Much good DX was worked to the north, however.

G5QA (Exeter) is still active and maintaining regular schedules with G4RX and the Torquay stations; a new beam is ready to go up. G4RX (Bridgwater) has his "City Slicker" up and working; he reports G3FUM (Weston-super-Mare) as being on in the near future. G3EHY (Banwell) says his signals were QRM'd by a PA while working G3WW during the good spell! He is running a lunch-time schedule with G3CHY (Ashton) at 1300 GMT and so far this 160-mile path has been 100 per cent. reliable; G3EHY worked G3BW on May 15.

GW2DUR (Swansea) is using 10 watts to an 832 tripler and a 3-ele. beam. The Rx is a super-regen with single acorn triode quench detector and two audio stages; CW can be received, but we would hate to use this in an area of high activity! His location is excellent for VHF work, being on the top of a 400-ft. cliff overlooking the Bristol Channel. Some aerial and polarisation tests have been carried out during recent months. G5BM (Cheltenham) raised PAØMU and is at work on a complete 2-metre double superhet from a BC-453B. He hopes to be portable in Breconshire during the summer.

G8QC (Chalfont St. Peter) managed F3LQ and two PA's and heard many more. G8WV (Bletchley) writes from Canada where he will be for a month or two. His arrival at his hotel synchronised with the holding of the local radio club's annual dinner in the same building; he collected a 6AQ5 in the draw! G8WV considers 2-metre technique in VE to be quite a bit behind the standard in this country.

G2AHP (Perivale) suggests the need for the establishment of a reliable and regular station on both the 144 and 420 mc bands to enable receivers to be checked. (This need has certainly been felt on 70 cm. by many, but with limited range on that band many such transmitters would be needed if all are to be served.) G3GSE (Kingsbury) uses a modified SCR-522 with 18.9 watts and an RF26 into an 1155 for reception; the beam is a 4-over-4 fed with 300-ohm ribbon. He has worked 100 stations in just under five months, which is very good going. G8IP (Hampton) has been testing a 4-over-4 against a single-tier Yagi of the same dimensions, and although there is little difference on local signals the weaker DX shows up to advantage on the stack. He found the evening of May 9 most exasperating as he heard PAØPN over a long period but failed to raise him.

G3AHB (Slough), at present on 145.35 mc, would like to change crystals to put him in his correct Zone; an 8050 kc rock would be suitable. His Rx is 6J6 mixer/osc with EC91 GG RF stage and has a noise factor of 4. A 4-ele. Yagi will shortly be replaced by four stacked folded dipoles, with reflectors. G3GBO (Denham) was another who heard the Continental DX but failed to work it.

G8VR (Abbey Wood) uses a single 6J6 as converter into an S.640. He hopes to move into Zone J very soon. He was lucky with the PA's and worked three of them. G6CB (Wimbledon) draws attention to the congestion in Zone J and the lack of occupancy outside it. (However, G3BW tells us he has moved out of the Zone C spectrum due to the terrific QRM there! So perhaps the occupancy is spread a little more than some think. The only really sparsely occupied section is above 145.6 mc.) G8SM (East Molesey) has 80 watts on the Tx now, and anticipates more soon. He supports the Zone Plan. G4HT suggests a new table, namely, "Total Counties Worked Each Month," totalling up the figures at the end of the year.

G3CGQ (Luton) worked 17 stations over 80 miles during the good week-end, the best being G4LX and the Dutch stations. He reports hearing the well-known hissing phenomenon on the afternoon of May 14. His beam is two 4-ele. Yagis spaced one wavelength (electrically) and fed in phase from the

### THE MONTH ON SEVENTYCEMS

#### Two-way Contacts

G3EJL/G5BY	119 miles	2 QSO's
G3ABH/G5BY	90 miles	3 QSO's
G2XC/G6LK	32 miles	8 QSO's
G3ABH/G3EJL	30 miles	
G2XC/G3EJL	17 miles	
G3EJL/G3RI	2 miles	

#### Signals Heard

At G2XC: G3BHS (18), G3DEP (11)  
 At G3EJL: G3BHS, G3CGE, G3DEP (18), G6LK (42)  
 At G6LK: G3DEP (41), G5TP (36)

#### Stations Active

G2ANT Godalming	*G3FUL Luton
*G2CNT Cambridge	G3RI Southampton
G2XC Portsmouth	*G4CG Wimbledon
*G2XV Cambridge	G5BY Bolt Tail
G3ABH Poole	*G5PY Clapham Park
G3BHS Eastleigh	*G5DT Park Lane
G3CGE Southampton	*G5KH S.W. London
G3DEP Ryde	G5TP Stoke Row
G3EJL Southampton	G6LK Cranleigh

\*SEO. Others are crystal-controlled.

bottom element with 54 in. of coax using a balun section. With this array the northern DX was steady over a long period, whereas on the single Yagi (10 ft. lower) there was much QSB.

#### East Anglia

G2CPL (Lowestoft) has increased his beam height to 60 ft. and fitted a better feeder. A new converter is also in use with 6J6 RF stage, followed by push-pull EF91 RF and the same again as mixer and EC53 osc. G5UD (Kings Lynn) is running a 624C Rx and has been enjoying the DX. G3BK (March) has an 8-ele. stack in the air and results have been good; he hears little from the north, however. G3WW (March) has a 5-over-5 in action and finds it 1 to 1½ S-points better than his previous single 5-ele. beam; he was there to work the DX on May 12 to 14. G3WW complains of Cambridgeshire stations working off their Zone frequency and so causing needless QRM.

G2CIW (Romford), in spite of some success with the PA's, was disappointed with his results to the north. G3WS (Gidea Park) is

moving to Chulmleigh in Zone I (Devon) and says the new location looks good from a VHF point of view.

### Midlands

G3CXD (Newcastle, Staffs) has been running a weekly schedule with G5RW, but had been finding things very dull until the May 13 week-end when he worked his share of the Continentals. G8KL (Wolverhampton) has given G4HT his much-needed QSO, to the latter's delight. G5SK (Coventry) remarks that one has to be a regular user of two metres to take advantage of the short bursts of good conditions. GW2ADZ (Llanymynech) says although not yet a believer in one-way paths some recent results have made him keep an open mind on the subject. He is now using a lower frequency (*see* table herewith) and in some directions this shows an improvement, whilst in others it is not so good as the old frequency.

### North

G3GMX (Timperley) has a 522 Tx and a R28/ARC5 with a CV53 and also a 6J6 job for Rx. G2OI (Eccles) continues to work the DX and sends some comments on the "Best Twenty" contest. Unfortunately, space will not allow a discussion on that this month. G3CSC (Prescot) has 18 watts to a 522 Tx, and a 4-ele. beam in the roof; a new converter using the cascode circuit is under construction. G8SB (Horwich) has found the path to G3EHY open every day, but due to the fixed position of his City Slicker he was unable to take part in the PA and ON excitement.

G3COJ (Hull) is within sight of being active again. His 2-metre Tx will run 150 watts to a pair of 4E27's and the Rx will be a cascode arrangement. G2ADR (Acomb) lost his beam and mast in the winter gales; hence his period of inactivity. A new beam is now up and is a 20 reflector square corner fed with 400-ohm open line. A 6J6 converter takes care of the Rx side; he is using four IF's; first is 28 to 30 mc tunable; then 7.4 mc; third at 465 kc with crystal filter available; and finally at 85 kc for good selectivity. G2ADR asks us to encourage the Zone Plan.

Going still further north, G2FO writes a little indignantly, as a result of our remarks last month suggesting that the North was inactive. He gives most definite assurance that G2ADR, G2FO, G3DMK, G3EHZ, G5QU and G8BI operate 365 days a year! G4LX (Newcastle) complains of certain well-known stations who do not QSL in spite of being members of the VHF CC. Your conductor will see what he can do about it, but no miracles are promised. G3CYY (Newcastle) got back on Two in time for the DX. He has

6J6 Rx and 522 Tx; a new Tx and beam are planned.

G3BW (Whitehaven) is another to assure us he has been active and he now has his 5-ele. beam on top of a 42-ft. tower. He is operating just inside the Scottish Zone to avoid the Lancashire QRM.

GM3DIQ (Saltcoats) and G3DDE (Largs) continue busy on the air. They were using 4-ele. c.s. beams and not doing too well with them. Since GM3DDE has put up an 8-ele. stack signals have improved markedly. The Rx at Saltcoats is a 522 with a 6AK5 mixer and RF. GI2FHN (Bangor) is now in Co. Down, and suggests that GI stations use Zone A. This seems all right to your conductor, but might need review if activity in Northern Ireland should increase. Both he and G13CQB (Ballywalter) are operating most evenings at 2100 BST.

News received via G2FPC is that DL4DD is there on 144.58 mc using 180 watts to two 24G's; his aerial is eight half-waves in phase, and a new 30-element beam is under construction.

### Seventycems

Although no new records have been put up during the past month it has been a period of consolidation and increasing activity. Interest is keen all over the country, but it is mainly in the Southern Counties that action is apparent. Here crystal control is used by all stations. In the south-west corner of Surrey, G2ANT and G6LK are both fully operative on 70 cm. The former is in a poor location, with hills on most sides. G6LK has worked G2XC over a 32-mile path, which includes much high ground rising at one point to 700 ft. Signals vary somewhat and reports have ranged from S3 to S7 on CW, but it is believed the path is always open and a series of tests to prove this will be undertaken shortly. G6LK has also been receiving G3DEP at strengths up to S8 over a rather longer path, and G5TP at S3.

At G2XC your conductor has also worked G3EJL on several occasions, and this 17-mile path has provided S7 phone signals both ways. G3DEP on the other side of Portsdown Hill, and 10 miles away, is an S9 signal, while G3BHS at 18 miles is S5 phone. None of these paths is optical.

From Southampton, G3EJL has continued his good work with further contacts with G5BY (Bolt Tail) and G3ABH (Poole), while he can work his local G3RI, two miles away, with no aerial connected at either end. This is, of course, "through" the built-up area of Southampton; G3DEP has been worked cross-band and G6LK heard.

The G3ABH/G5BY path has produced further contacts, but is not 100 per cent.

reliable, signals varying between zero and S9. Tests between G5BY and G6LK, and G2XC and G3ABH have not yet produced any signals.

As a generalisation, results so far on 70 cm. suggest that for normal ground-range working it is necessary for S9 signals to obtain on 2 metres before there is much chance of a 70-cm. contact over the same path. This does not apply, however, to tropospheric propagation, due to ducting and other similar manifestations. On that point G5BY mentions that on May 14 G3ABH was if anything stronger on 430 than on 145 mc, while on May 16, when 2-metre conditions were good, G3ABH was inaudible on 70 cm., an entirely opposite effect. Obviously there is much to be learnt.

#### Notes on 70 cm. Equipment

Most of the southern stations are using 832A triplers in the Tx and converters based on the G3EJL design which appears in this issue of *Short Wave Magazine*. At G2XC, the mixer Lecher circuit is as suggested by G3EJL, but the oscillator is of the tunable SEO type similar to that of G5BY described last month and using a 9002 operating in the 142 mc region. Third harmonic injection gives a 10 mc IF; injection is controlled by varying the HT voltage on the 9002, and G3EJL suggests that a similar arrangement may with advantage be tried with his CC oscillator.

Injection in the G2XC converter is obtained by a very small capacity (about  $2\ \mu\mu\text{F}$ ) at the point where G3EJL feeds in the inner line of his coaxial cable. The aerial (in spite of much criticism from other workers) is fed with

300-ohm ribbon and is coupled inductively at the earthy end of the lecher lines. This arrangement was devised after some experimenting during which it was found that it is easy to shift the resonant frequency of the lines unintentionally if modifications are made indiscriminately. Using the SEO it is a simple matter to check the line frequency by swinging the oscillator tuning and watching the mixer diode current. This should peak noticeably when the SEO is tuned to about 145 mc if maximum signals are required on 435 mc. In the final arrangement at G2XC it is possible to get over 2 mA of current at 435 mc, falling to less than 5 microamperes 30 mc off tune. Oscillator stability is remarkably good and the notes of received signals are pure DC. An appreciable amount of break-through at IF was experienced at first but was cured by connecting a  $\frac{1}{4}$ -wave line of ribbon across the aerial input and shorting and earthing the other end of it. This provides a short circuit to earth for all signals coming down the feeder in an unorthodox manner or on the wrong frequency!

One point regarding the measurement of diode current appears to be worth mentioning. The figure obtained is affected by the resistance of the meter employed, and if a meter of high resistance (more than 100 ohms or so) is used the actual current when the meter is removed will be higher than when the meter was in circuit. This should be remembered when comparing results with others.

It is not customary for the results and activities at G2XC to be discussed at length in this column, but it is thought that with the prevailing interest in the band and the large number who hope to be on Seventycems in the near future, the various points mentioned may be of interest and possible use to others.

Those making the G3EJL converter exactly as it is described in the article in this issue can be assured that its performance is really first class. For any to whom the cost of two quartz crystals and 6J6's is prohibitive, assurance can be given that excellent and worth-while results can be achieved with an SEO. In the interests of both stability and bandspread use a small inductance and plenty of capacity.

Other points worth making are, first, that most 70-cm. stations are radiating appreciable energy on two metres. This is due to the high power driving stages used and to the comparative ease with which a 2-metre circuit radiates. In the interests of avoiding false reception reports it would seem advisable to reduce this radiation. Secondly, during the present very experimental stage of 70-cm. work it is almost essential that contacts be made by first establishing a QSO on a lower frequency. Indiscriminate listening and calling

TWO METRES BEST TWENTY April 1950		
Station	Total Miles	Best Contact "Call" "Miles"
G3EHY	3150	G2XS 175
G2OI	3030	G6VX 175
GW2ADZ	2884	G5MR 216
G2CPL	2720	GW2ADZ 205
G4HT	2440	G2OI 167
G8QC	1649	G3AHT 138
G3CGQ	1500	G3EHY 120
G2FNW	925	G6VX 100

*For this table send details of date, mileage and call signs of best 20 contacts made during previous calendar month. No station to be counted more than once per day (0600 to 0600 GMT).*

on 430 mc is not likely to produce results. Schedules may work but it is thought success will come quicker the other way. In any case, setting up the converter for maximum results needs much co-operation and it is advised that whenever possible two stations should become active on the band in a locality. A lone station hearing nothing is unable to know whether this is due to a poor location or poor receiver, but once a signal is heard, however weakly, then adjustments can be made with a view to improving things. Thirdly, most stations, including G2XC, are using multi-element Yagis with very sharp horizontal polar diagrams. At G2XC, moving the beam 20 deg. off G3EJL drops signals from S7 to near inaudibility. This is much too sharp for convenience and it looks as if aerial arrays with broader characteristics must be used if signals are not to be missed through mis-alignment of beams.

#### Some 70 cm. Reports

Other 70 cm. news comes from Cambridge where G2CNT and G2XV are active with SEO transmitters, but promise to be CC before long. They are active daily with 5 to 15 watts and have several aerials in use, including 10-ele. Yagis and corner reflectors and stacked arrays. They call in the London direction every evening at 2100 BST for five minutes on MCW and phone, and then listen for five minutes. Periods of calling and listening alternate until 2230 when they listen for G3FUL in Luton for five minutes, after which a call is made in that direction. Co-operation from anyone between Cambridge and London would be welcomed. On evenings when 2 metres is good it is proposed to operate portable from the Gog-Magog Hills, a slight though noticeable eminence in the otherwise flat country round Cambridge! London is

also called on Sundays at 1000, 1100 and 1200.

G2CIW (Romford) is at work on a converter; G6XM (Farnborough) hopes to be on 70 cm. in about a month; G3COJ (Hull) is thinking of starting up with 8012 triplers and asks for information on using them; G3CSC (Prescot) also has some 8012's in mind and an ASB8 for Rx; G3AHB (Slough) has four half-waves in pairs side-by-side with a wire-mesh reflector. The Rx is an ASB8 and it is hoped to have either an 832A or push-pull 8012 tripler stage going soon in the Tx.

#### In Conclusion

Our sincere thanks to all those who put in such interesting reports on the past month's activities on both Two and Seventycems; it has been very nearly a record mail. If your own achievements seem to have received but scant mention you can be assured that cuts have had to be made on all the stories, otherwise "VHF Bands" would have filled the *Magazine* this month! It is probable that the Editor will have had to make some further cuts on his own account, and it may not be possible to get in the long lists of calls worked and heard which so many of you sent; if that is so, please do not let it discourage you from sending in further lists. They are an invaluable source of information for the "Activity by Counties" table, and will also appear as Calls Heard lists whenever possible.

Next month's news, and here's hoping it will be as good as the present one's, should reach us addressed E. J. Williams, G2XC, *Short Wave Magazine*, 53 Victoria Street, London, S.W.1, by June 15 at latest.

#### BACK IN HISTORY

In case anyone still imagines that Amateur Radio is without its roots in the early history of this century, here are some interesting facts: Before the 1914-18 War, some 40 years ago, the following radio clubs were in active existence—Birmingham Wireless Association, London Wireless Club, Coventry Wireless Club, Bristol Wireless Association, Derby Wireless Club, Liverpool District Wireless Association, Liscard Wireless Telegraphy Club, Cheshire Radiographic Scientific Society and the Liverpool Amateur Wireless Association. Remember, all this was 40 years ago, and many of the members of these organisations are long since dead and gone—we dare say that even the names of some of the clubs had been forgotten until this moment. To the Liverpool and Cheshire groups must go the distinction of being first in the world to adopt the words "Amateur" and "Radio" respectively in their titles.

#### SOME TWO-METRE FREQUENCIES

G2ADR	144-39	G5BM	145-35
G2XC	145-29	G5MR	145-152
G3AHB	145-35	G5QA	145-62
G3BW	144-168	G8VR	145-35
G3COJ	144-2	G12FHN	144-18
G3CYY	144-345	GM3DDE	145-8
G3EDN/A	145-026	GM3DIQ	144-136
G3FOD	145-0	GW2ADZ	144-208
G4RX	145-8		

*The above figures are those quoted by the stations concerned and have not been measured over the air.*

# Here and There

## Turn Up for the Book

We are informed from the States that at the present value of the pound sterling, most items of ex-U.S. Army/Air Force surplus advertised in the *Magazine* are much cheaper over here than in America, where the good stuff is getting very short, anyway. So we can expect a lot of this gear to be drained off for dollars. As originally it was all bought by the British Government for dollars, it seems to be the case of the biter bit, or the elephant never forgets, or something.

## Amateur Television

The current (June) issue of our *Short Wave Listener and Television Review* carries the first of what is to be a series of regular reports on the activities, technical and otherwise, of the British Amateur Television Club. The B.A.T.C. is worthy of the support of everyone with an experimental interest in amateur TV transmission, which is itself one of the newer branches of the art of Amateur Radio. The Club hopes soon to obtain official permission for the operation of TV transmitters on part of one of the amateur VHF bands. In the meantime, successful closed-circuit work is being done. The Honorary Secretary of the B.A.T.C. is M. W. S. Barlow, G3CVO, Cheyne Cottage, Dukes Wood Drive, Gerrards Cross, Bucks., who is also responsible for *CQ-TV*.

The same issue of our companion journal publishes Part I of an extremely interesting article on BC-348 modifications, details on the adaptation of an RF-26/R.1355 combination for sound-vision reception from Sutton Coldfield, and Part II of the new series on "Television for Beginners."

Copies of the June issue of *Short Wave Listener and Television Review* are obtainable from us (Circulation Manager, Short Wave Magazine, Ltd., 53 Victoria Street, London, S.W.1) at 1s. 4d. post free, or 16s. for a year of twelve issues.

## Thought for the Morrow

It is reported that one of the more important matters discussed at the recent Acheson-Bevin-Schumann meetings was an intensification of the radio propaganda war against our erstwhile allies on the other side of the Curtain. It seems that Britain and America can, between them, mobilise some 70 trans-

mitters for the purpose, the idea being that the more frequencies we on our side can use simultaneously, the more difficult it will be for the Stalinistobaskets to apply effective jamming. (We had all this during the last war, when the major preoccupation of the Bomber Command signals staff was to eliminate by jamming the communications and control system of the Luftwaffe night defence organisation.)

For us as amateurs; the result of these decisions by the Big Three may well be the appearance of a new flock of high power stations on our bands in the 6-23 mc region, adding to the large areas already occupied by *force majeure*.

## The Call Book

Now available is the Spring 1950 issue of the *Radio Amateur Call Book*, once again a remarkable compilation giving the callsign, name and address of every known amateur in the world—with the melancholy exception of those blessed by the rule of Soviet Russia. The *Call Book* is compiled in two main sections, America and The Rest; the latter or "foreign" section is set out alphabetically by country-prefix and callsign, the zone area for each country also being given, together with the address of its QSL Bureau. The price of the Spring issue of some 350 pages is 16s. 9d. post free. It might also be mentioned here that we are now sole forwarding agents for the G section of the *Radio Amateur Call Book*, this being compiled and kept up-to-date from QTH lists supplied by us to the American publishers.

## Top Band Crisis

On the night of April 29-30 last, amateurs were officially asked to keep off 1.7 mc for the period 2359-0100 in order to give the lost trawler *Milford Viscount* (ex-Milford Haven) the best possible chance of making herself heard. It was subsequently reported that an SWL living near Porthcawl, S. Wales received what may have been her last transmissions. During this same period GD5CZ (who is himself a ship-owner) heard with many other listeners an SOS from the *Mary Heeley* (ex-Douglas); GD5CZ was instrumental in getting help to the ship, and those listening were able to follow the proceedings through Seaforth Radio, the GPO coast station in control.

## 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

- |         |                                                                                      |         |                                                                                                 |
|---------|--------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------|
| E12A    | S. C. MacNamee, 4 The Square, Navan, Co. Meath, Eire.                                | G2FRI   | T. J. Swain, 34 Howgate Road, East Sheen, London, S.W.14.                                       |
| G2ALO/A | R. P. Munn, Whiteneat, Sandgate Lane, Storrington, Sussex.                           | G2FTY   | G. E. Duffin, 94 Birchfield Road, Redditch, Worcs.                                              |
| G2BOF   | F. J. Harris, 143 Collingwood Road, Sutton, Surrey.                                  | G2FZI   | F. Hill, Cheriton, St. Mary's Road, Mortimer Common, Berks. (Tel.: Mortimer 80).                |
| G2CDN/A | R. J. Toby, 18 Holloway Arcade, Nags Head, London, N.7. (Tel.: North 1358).          | G2LA    | S. E. Smith, 12 Ellers Drive, Bessacarr, Doncaster, Yorkshire.                                  |
| G2FOW   | L. Gostelow, 21 Cannon Street, Lincoln, Lincs.                                       | G2SX    | J. D. Ordish, 23 St. Georges Road, Petts Wood, Kent.                                            |
| G2HCG   | B. Sykes, Rosslyn, Debdale Road, Northampton.                                        | G2XW    | A. W. Wells, 20 Cricketfield Grove, London Road, Leigh-on-Sea, Essex.                           |
| G2HGA   | C. A. Shutt, 85 Boughton Green Road, Northampton.                                    | G2ZD    | T. C. Whimster, Home Place, Whatlington, Sussex.                                                |
| G3BCZ   | R. P. Stevens, 65 Drayton Road, Northampton.                                         | G3ADG   | H. Swift, 31 Mary Street, King Cross, Halifax, Yorkshire.                                       |
| G3BJY   | N. Cantrill, 4 Nelson Street, Swadlincote, nr. Burton-on-Trent, Staffs.              | G3AEN   | A. G. Witham, 82 Redcliffe Gardens, Earl's Court, London, S.W.10.                               |
| G3BSR   | M. W. Pearce, 58 Hollam Road, Milton, Portsmouth, Hants.                             | G3ALW   | F. G. Baker, 6 Sunningdale Crescent, Kinson, Bournemouth, Hants.                                |
| G3EKJ   | H. F. Mattacks, 307 Compton Bldgs., Goswell Road, London, E.C.1.                     | G3BHD   | R. H. Whitley, 75 Westgate, Peterborough, Northants.                                            |
| G3EKZ/A | D. E. Blacklock, B.Sc., Radio Society, Doveleys School, Rocester, Uttoxeter, Staffs. | G3BR    | S. T. Hall, 57 New Street Hill, Bromley, Kent.                                                  |
| G3EMO   | H. Ward, 12 Ashbourne Crescent, Roby, nr. Liverpool.                                 | G3BSC   | B. G. Dodd, 5 Smitham Bottom Lane, Purley, Surrey.                                              |
| GM3EMV  | J. McGreevy, 240 Braidcraft Road, Pollok, Glasgow, S.W.3.                            | G3BWR   | N. B. Greenall, 16 Shaw Lane, Prescot, Lancs.                                                   |
| G3EPK   | R. L. S. Harrison, 12 Westfield Road, Bengeo, Hertford.                              | G3CFC   | A. Wood, Marton Grove House, Grove Hill, Middlesbrough, Yorkshire.                              |
| G3EXK   | S. Bindley, Main Road, New Duston, Northampton.                                      | G3CPK   | I. G. Gibbs, The Cottage, Horne Park Farm, Newchapel, Lingfield, Surrey.                        |
| G3EZT   | C. A. Turner, 28 Cambridge Street, Wolverton, Bucks.                                 | G3CYR   | J. Williams, 11 Adelaide Terrace, Waterloo, Liverpool, 22.                                      |
| G3FAD   | L. Glasscock, 25 Bridge Street, Downham Market, Norfolk.                             | GM3DHD  | G. W. D. Brown, 19 Laverock Bank Road, Trinity, Granton, 5, Edinburgh.                          |
| G3FWZ   | D. Vaughan, 25 London Road, Camberley, Surrey. (Tel.: Camberley 1268).               | G3EFP   | J. C. Pennell, Jr., 30 Grange Gardens, Pinner, Middlesex.                                       |
| G3FYJ   | R. J. Smith, White Tor Road, Starkholmes, Matlock, Derbyshire.                       | G3EKM   | A. W. Tonkyn, 19 Treyew Road, Truro, Cornwall.                                                  |
| G3FZD   | S. Walker, 3 Bakehouse Yard, Knutsford, Cheshire.                                    | G3FHI/A | W. A. W. Lauder, B.Sc.(Eng.), Home-lands Secondary Technical School, Plainmoor, Torquay, Devon. |
| G3GCG   | R. C. Murden, 4 Holmesdale Road, Bexleyheath, Kent.                                  | G3FNT   | P. Dean, 31 Park Lane, Whitefield, Lancs.                                                       |
| G3GCU   | W. Houseman, Riversdale, Snowdon Street, Barton, Northwich, Cheshire.                | G3FPW   | S. V. Cleaver, 40 Dark Lane, Hollywood, nr. Birmingham, Worcs.                                  |
| GM3GJB  | W. A. McFarlan, 2 Comley Place, Falkirk, Stirlingshire.                              | G3GGJ   | A. H. G. Watson, 60 Thornton Road, Cambridge.                                                   |
| G3GLS   | H. Silvester, 37 Gothic Road, Twickenham, Middlesex.                                 | G3SI    | E. L. Wright, Brooklyns, Thaxted, Essex. (Tel.: 229).                                           |
| G3GMK   | K. W. May, 111 Dale Valley Road, Shirley, Southampton.                               | G4AO    | E. G. King, Acacia House, Fosse Road, Farndon, nr. Newark, Notts.                               |
| GM3GNB  | K. G. Reid, Brainley, Torphins, Aberdeenshire.                                       | G4BX    | J. W. Heffernon, 36 Oakwood Avenue, Boreham Wood, Elstree, Herts.                               |
| G3GNC   | N. S. Potter, 47 Derby Road, Fallowfield, Manchester, 14. (Tel.: Rusholme 5539).     | G4QK    | J. B. Roscoe, 6 Birch Way, Harpenden, Herts.                                                    |
| G3GNR   | R. E. Short, 112 Southwick Street, Southwick, Sussex.                                | G6DH    | D. Heightman, 25 Lancaster Gardens West, Clacton-on-Sea, Essex. (Tel.: Clacton-on-Sea 770).     |
| G3GOX   | Miss A. B. Walford, The Old Rectory, Farway, Colyton, Devon.                         | G6JD    | J. B. Duncan, 1 Ashland Avenue, Wigan, Lancs.                                                   |
| G3HAA   | J. L. Morgan, 81 Breckfield Road South, Liverpool, 6. (Tel.: Anfield 4248).          | G6UA    | G. Bloomfield, 31 St. Martins Close, St. Martins Road, Norwich, Norfolk.                        |
| G6TJ    | A. Cooper, 31 Madresfield Road, Malvern, Worcs.                                      |         |                                                                                                 |

## CHANGE OF ADDRESS

- |       |                                                  |
|-------|--------------------------------------------------|
| E13Z  | P. Conway, 12 Castle Street, Athlone, Eire.      |
| G2ACD | A. C. Dunn, 412 Newbegin, Hornsea, E. Yorkshire. |
| G2AON | W. A. Allwright, 333 Seaside Eastbourne, Sussex. |

## CORRECTION

- |       |                                                        |
|-------|--------------------------------------------------------|
| G3AQ  | C. E. Sutton, 178 North Street, Coventry, Warks.       |
| G3FTQ | A. Frost, 18 Beechwood Avenue, Thornton Heath, Surrey. |
| G3GKA | G. Mather, 23 Haydon Road, Ashington, Northumberland.  |



## The other man's station G6LR

ABOVE is a view of the station designed and operated by L. P. Elmer at 608 Nelson House, Dolphin Square, Westminster, S.W.1, who suffers from the extreme disadvantage of being located in a large block of flats which, through lack of space, restricts his activities to the 28 and 145 mc bands.

G6LR is one of the real Old Timers, having been first licensed in 1911, with the call-sign EXD, and later operating on 400 and 1,000 metres with an input of 40 watts. After the 1914-18 war, he joined the Marconi Wireless Co. as a ship's radio officer, and did not re-apply for an amateur transmitting licence until 1932.

The 28 mc transmitter is xtal or VFO controlled and uses either NBFM or amplitude modulation. The final is a 100TH running at 150 watts. The receiver, mounted in the rack to save space, is a Hallicrafter SX28, with an improved noise limiter to cope with the severe interference from car ignition and other neighbouring noises.

With a telescopic dipole, which can be

erected quickly outside the window (60 ft. above the ground) many DX contacts have been made, especially with California. Owing to the mass of steel in the building, it is practically impossible to work any stations between the North-Easterly and South-Easterly directions.

On the 145 mc band, a BC-625A transmitter is used. The aerial is a simple folded dipole which leans against the window, inside, facing due West. Nevertheless, 'phone contacts have been obtained with stations in Southampton, Portsmouth, Torquay and the Isle of Wight when conditions have been right. The receiver is a Hallicrafter S27 modified to cover up to 147 mc, and is preceded by a wide-band RF amplifier using a neutralised 6J6.

A xtal microphone is employed with both transmitters, and modulation depth can be checked on incoming and outgoing signals by means of the E.M.I. oscilloscope; the BC-221 also provides a very useful and accurate check on all frequencies.

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*Always mention the Short Wave Magazine when writing to Advertisers—It Helps You, Helps Them and Helps Us*

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# The Month with the Clubs

FROM REPORTS RECEIVED

It seems that the swing from winter to summer programmes is more or less complete, and most Clubs are now thinking in terms of Field Days, D-F Contests and visits to places of interest, rather than of lectures, demonstrations and film shows.

Many of the flourishing Clubs are, however, able to command good attendances at many indoor meetings right through the summer season, and this would seem to indicate that a high standard has been set for the meetings, and also that enthusiasm has been kept up by good organisation. To our way of thinking it is a great pity if any Club activity shows a serious dropping off during the middle of the year; the loss of continuity is bound to be reflected in the attendances during the next winter season.

This month 42 Clubs report to us; a very fine total. Next month's deadline will be first post on June 13; address your reports to "Club Secretary", *Short Wave Magazine*, 53 Victoria Street, London, S.W.1. And in order to assist us with the compilation of accurate records, would all secretaries please be good enough to add a note showing the membership total as at the date of sending in the report. These figures are not necessarily for publication; but if anyone likes the idea, we can run a sort of Club Ladder (not in the competitive sense) showing new members gained each month.

**British Amateur Television Club.**—This Club recently gave a demonstration, in collaboration with the Sheffield & District Short Wave Society, of amateur TV equipment. The whole meeting was televised, from the reading of the minutes to a Junk Sale, the audience viewing the proceedings on a 15-in. tube. Some 250 people were present, and were most impressed. It is hoped to repeat the demonstration in London in the near future. See panel for Secretary's name and address.

**Coventry Amateur Radio Society.**—The April meeting featured an introductory talk to the R.A.E., which many local members were taking.

There should be some new calls in the locality before long. May meetings comprised a discussion on NFD and a complete trial Field Day, results of which were to be "scrutinised" carefully in preparation for NFD.

**Radio Society of Harrow.**—Attendance at recent meetings has nearly doubled, and numbers are growing every week. Morse classes are now held at every meeting. Forthcoming events are: June 14, G2TA, on Building a Receiver; June 29, Dr. Rogers on Quality Reproduction; June 8 and 22, Club Tx on the air. Several Field Days are being arranged for the summer.

**Hemsworth & District Radio & Television Society.**—This Club, a newcomer to our columns, meets alternate Mondays at 7.30 p.m., in the Co-operative Reading Room, Hemsworth. Morse classes are held from 7 to 7.30, and everyone who is interested in short-wave transmission, reception or television (including beginners) will be welcome.

**Midland Amateur Radio Society.**—The "MARS Receiver", designed and built by Messrs. A. Rhodes and G. Brown, was described and demonstrated at the last meeting. Its performance is said to be amazing, and many members are now busy making receivers to the same specification. Meetings are on the third Tuesday of each month, 6.45 p.m., at the Imperial Hotel, Birmingham.

**Montrose Radio Club.**—An interesting lecture on television was recently received with great enthusiasm by members. The club is still busy building, and is holding listening contests among its SWL members. NFD preparations are also well under way.

**Penteradiant Hobbies Club, Stafford.**—This Club, with headquarters at 59 Crooked Bridge Road, Stafford, now includes a radio section. Although this is in an embryo stage, it has a nucleus of keen members, and workshop facilities are available. Anyone in the Stafford district who is interested will be made welcome at the above address any Wednesday evening after 7.30 p.m., or by the Hon. Sec. (see panel for his QTH).

**Plumstead, Woolwich & Abbey Wood Group.**—We have received *The Bull Sheet*, the local Newsletter of this Group, which meets in the Club Room of the Bull Tavern, Vincent Road, on alternate Wednesdays at 8 p.m. Other S.E. area meetings are also held in Lewisham (at The Anchor, Lewisham Road). Prospective members are asked to contact G3E1W (see panel for address).

**Poole & District Amateur Radio Club.**—This Club, now five months old, is going ahead



Barnsley & District Amateur Radio Club annual dinner was held on January 14 last, with an attendance of about 100 members and friends. The president, GZBH, took the chair and one of the highlights of a very successful evening was the presentation to G5IV, who has been connected with the Club for over 20 years

nicely, and recently heard a talk by G5GG on an Audio Filter, described as the greatest improvement he had made to his receiver for years. Meetings are on the first and third Mondays of the month, in a Club Room with comfortable seats for 50—new members to fill some of them will be welcomed. The Club Tx will be on the air shortly on 14, 28 and 144 mc, with a prospect of Top Band work later.

**South Shields Amateur Radio Club.**—Meetings are held every Friday, 8 p.m., at Trinity House, Laygate, South Shields, and consist of Film Shows, lectures and discussions. There are some 25 members, 10 of whom have licences. The Club has its own "shack", occupied by its Tx G3DDI. Prospective members and casual visitors will always be welcome.

**Stourbridge & District Amateur Radio Society.**—At the May meeting, the Hon. Sec. was able to report that the Club had received much publicity and interest at the Halesowen Hobbies Exhibition. Mr. W.

H. Rigg, Principal of Lydiate Ash Laboratories, Bromsgrove, gave an interesting talk on Tricks with Electronic Circuits. Meetings are held on the first Tuesday and third Friday of each month.

**Sunderland Radio Society.**—At the recent A.G.M., the retiring Chairman reported a successful year, which included a number of lectures of outstanding interest. It is proposed to move the Club premises to the Y.M.C.A. at Toward Road, where a Club Room will be available on Thursday evenings; members will also have the right to avail themselves of any of the other Y.M.C.A. amenities on any evening. The Club Tx and R. will be stored there, and there are facilities for the erection of aerials.

**Sutton & Cheam Radio Society.**—At the recent A.G.M. the retiring Secretary was elected a Vice-President, and two joint Secretaries were elected for the coming year. Meetings are held on the first and third Tuesdays at Sutton Adult School, Benhill Avenue; on

June 6, there is to be a demonstration of 420-mc equipment, by G2FKZ.

**Warrington & District Radio Society.**—Recent talks have been on Pre-War Gear (by G8TR) and Hum-Free Sound Amplifiers (by G8LZ). Forthcoming subjects are Valves (G8TA), Radio Simply Explained (G3EZX) and Communication on 3 cm. (G3LZ). Meetings are on the first and third Mondays, 7.30 p.m. at the Sea Cadet HQ. New members always welcome.

**West Middlesex Amateur Radio Club.**—The new Officers and Committee were elected at the A.G.M.; ordinary meetings will be on the second and fourth Wednesdays, 7.30 p.m., at the Labour Hall, Uxbridge Road, Southall, Middx. The June programme includes a lecture on Propagation (Mr. A. W. Watkins) on the 14th, and also informal talks by Messrs. Blomfield, Bostock and Gott.

**Bournemouth Radio & Television Society.**—Arrangements for field day working are com-

plete and two stations will be in operation this year. A series of local visits has also been arranged, including one to an up-to-date telephone exchange. Times and details are obtainable from the Secretary.

**Grafton Radio Society.**—The recent TVI Lecture by the G.P.O. was a great success, with an attentive audience of 77. Meetings continue every Monday, Wednesday and Friday evening.

**Hounslow & District Amateur Radio Society.**—The Hon. Sec. gave a talk on Oscillators at the first of the May meetings. June 7 is Members' Night, when apparatus built by them will be displayed and demonstrated. The Quarterly Meeting will be on June 21, and the transmitting section meets every Sunday morning at Heston.

**Lewes & District Model Engineering Club (Radio Section).**—At the A.G.M. in March the Lewes Amateur Radio Club joined up with the Model Engineers and the above new title is the result. The programme for the next three months has been drafted with special reference to items of interest to both Clubs. Radio Section meetings are still held every Friday evening, 7.30 p.m., in the Club Room at Southover Grange.

**Edinburgh (Lothians) Radio Society.**—Fortnightly meetings are still held in the Chamber of Commerce Rooms, 25 Charlotte Square—7.30 p.m., every Thursday. June meetings are on the 8th and 22nd. Activity continues at a high level, including preparation for field day working. New members will be welcomed at any meeting.

**Mansfield District Radio Society.**—Officers and committee were elected at the A.G.M. in May, and field day arrangements have been completed. A Club Room is now available every Tuesday evening; Morse classes have begun, and technical lectures and a members' library are being organised. Weekly Club

Nights are on Tuesdays, 6.30 p.m., in the Westfield Folk House. Secretary's QTH in panel.

**Neath, Port Talbot & District Amateur Radio Club.**—Main activity at present is the preparation for portable operation, in which the Club hopes to improve on last year's performance. At the next meeting GW3XY will talk on Radio in Retrospect. Meetings are on alternate Wednesday evenings at the Royal Dock Hotel, Briton Ferry; visitors to the locality will always be welcomed on these occasions.

**South Manchester Radio Club.**—The last class in this year's R.A.E. course was held recently; these classes will now be discontinued until the autumn. During May the Chairman gave a talk on the principles of D-F, in preparation for a forthcoming contest. Some 35 members are scheduled to take the field during this event. Other May activities included a talk on Television by a B.B.C. engineer; Ship-Shore Working, by an ex-Merchant Navy operator; and a Special General Meeting. A Hamfest has also been arranged for October 7—more of this later! Next meetings: June 9 and June 23.

**Brighton & District Radio Club.**—During the summer months the meetings will consist of talks and ragchews on alternate Tuesdays. More time for "ragchewing" has been found desirable, since members find little spare time after talks or demonstrations. The Club Tx, G3EVE, will be used more frequently. The June programme includes a further talk on aeriels and a lecture on TVI-locating.

**Cambridge & District Amateur Radio Club.**—Next two meetings are on June 23 and July 21; at the June meeting G2PU will talk on Amateur Aeriels for Long-Distance Communication, reviewing their design in the light of ionospheric conditions, angle of radiation and the sunspot cycle. Both meetings will be at The Jolly Waterman at 8 p.m.

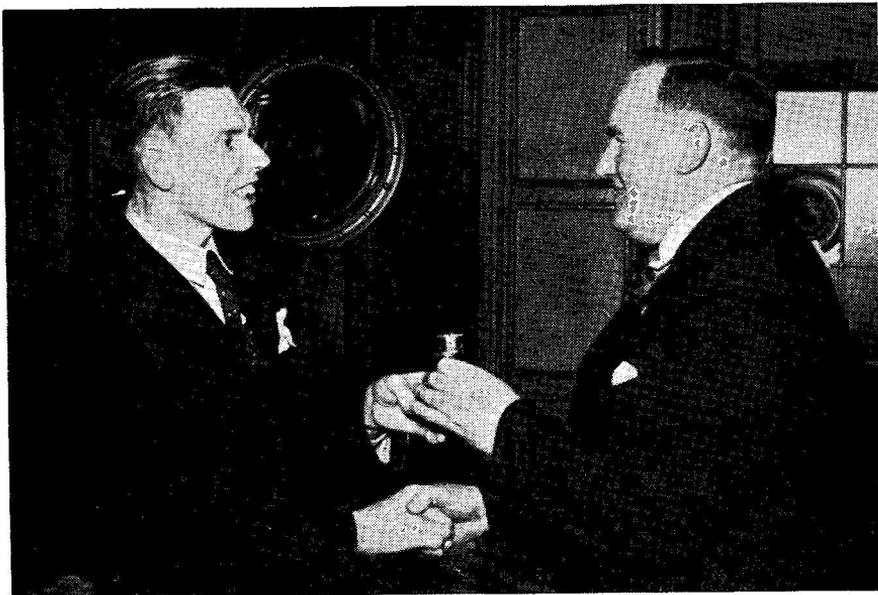
**Chester & District Amateur Radio Society.**—At the recent A.G.M., G2YS was re-elected as President and a new Secretary was appointed. See panel for his QTH. G3GIZ, the Club Tx, has been very active in preparation for field day participation. New call-signs among the members are hoped for, as many sat for the R.A.E. on May 10. G2CUR (ex-VQ4CUR and VQ1CUR) is a new member of the Club. Lectures, demonstrations and practical work continue at all meetings, and outdoor activities are being arranged for the summer.

**Clifton Amateur Radio Society.**—The first D-F Contest of the season was held on May 7, and was won by Messrs. Wooller and Meyers; the event was well attended. A Junk Sale is scheduled for the next meeting. The Club Tx, G3GHN, is being completely rebuilt on account of TVI, but it is hoped that it will be back on the air shortly.

**Derby & District Amateur Radio Society.**—June events include a Portable D-F Contest on the 25th, during which G3ERD/P will be operated on the Top Band from a hidden location. This is an open event and all interested enthusiasts are asked to contact the Hon. Sec. if they would like to "have a go." Members will visit the Derbyshire Royal Infirmary by way of concluding the series "Electronics in Science and Medicine."

**Eccles & District Radio Society.**—Weekly meetings continue to be well attended, Morse and general discussions occupying most of the time. Miniature oscilloscope building is all the rage, a dozen members having built one each! A visit to Telephone House, Manchester, proved to be an interesting event, and it is hoped, shortly, to visit the B.B.C. at Moorside Edge. The Technical College is being asked to form a class for R.A.E. next winter. Meetings are held every Monday at the Mill Brow Cafe, Worsley—7.30 p.m.

**Gravesend Amateur Radio Society.**—This Club ran a



At Thanet Amateur Radio Society's dinner on February 4, G3CED (right), winner of their transmitting contest, was presented with a silver trophy.

stand at a local exhibition during April, and several pieces of apparatus were on show, including Transmitter and Receiver in operation. A constructional competition was held in connection with this exhibition. In May the Club ran a QRP Contest—maximum input one watt. This was won by G6BQ and G6VC. Meetings continue every Wednesday, 7.30 p.m., in the Clubroom, 30 Darnley Road, Gravesend.

**Kingston & District Amateur Radio Society.**—Recent lectures included one by G3DHZ on Field Day Operation. Arrangements have been made for a Club Shack and Workshop, and now a Tx licence is being applied for. Meetings have been well attended and new members enrolled. June meetings are at 7.45 p.m., on the 7th and 21st, both at Penrhyn House.

**Kirkcaldy Amateur Radio Society.**—The officers and committee were elected at the A.G.M. in May, and the Club now has its own call,

GM3GOL. Meetings are held on the first Tuesday and third Wednesday of the month, 7.30 p.m., at the Club Rooms, 285 Links Street, Kirkcaldy.

**Lincoln Short Wave Club.**—Talks on field day activity have occupied recent meetings, but the subject for debate on June 21 is "The Crystal is Superior to the VFO"—which should stir up some discussion! It is hoped to arrange a visit to the Telephone Exchange and to GKZ in the near future.

**Reading Radio Society.**—Recent meetings have included a talk by Dr. Lemon on Lightning (including a demonstration with models and 100-kV discharges) and another on Frequency Standards and Frequency Measurement (by Ekco, Ltd.). Dates for June are: Main Society, 8th and 24th; Instructional Section, 13th.

**Royston & District Radio Club.**—This Club has been in existence for three years, and although its membership is

small, this is compensated for by enthusiasm. Meetings are held every Tuesday at 7.30 p.m., and the Club Tx, G3GIT, is active on 7, 3.5 and 1.7 mc. Headquarters are at the Community Association, Old Post Office, Royston, Herts.

**Salisbury & District Short Wave Club.**—Recent meetings have been devoted to preparation for the Club Stand at the Salisbury & District Model Engineering Society's Exhibition, at the Guildhall, on June 17. It is hoped to operate stations on 3.5, 7, 14 and 144 mc, with the calls G3FKF/A and G2FIX/P. A display of equipment belonging to members will also be a feature of the Stand.

**Sheffield Amateur Radio**—Attendances at the technical meetings have shown an improvement which it is hoped, will continue. The next lecture is by G3FQJ on the Theory of UHF Operation; this will be on June 14..

(over)

**Southend & District Radio Society.**—More than 100 people attended the recent Hamfest, at which the cups for various contests held during the year were awarded. Projected activities for the summer include week-end camps with portable gear, D-F Field Days, and visits to several places of importance in the radio sphere.

**Surrey Radio Contact Club (Croydon).**—Meetings continue on the second Tuesday of the month, 7.30 p.m., at the Blacksmiths Arms, South End, Croydon. At the A.G.M. the officers and committee were elected—note QTH of new Secretary, in panel. At the May meeting, G3CU spoke

on Modern Methods of Processing Quartz Crystals; the June meeting will feature an inquest on the Club's field day participation.

**Thames Valley Amateur Radio Transmitters' Society.**—The May meeting was well attended, and members heard a talk by G2QS on Instrument Measurements, including practical uses of the various types of Bridges. Two stations will be in operation for the field day event—one at Broadmoor and one at Chobham. Visitors will be specially welcome.

**West Kent Radio Society.**—Fortnightly meetings continue at Culverden House,

Culverden Park Road, Tunbridge Wells, the next being on June 7 and 21 at 7.30 p.m. Recent talks were on NBFM and the Amateur (G8KG) and on 144 mc Development (G2UJ).

**Wirral Amateur Radio Society.**—Talks on Television have recently been given by G2AMV and G3AKW. G3ERB, recently back from the U.S.A., gave members a summary of his experiences and impressions over there. Forthcoming events are the field day inquest and a talk by G2AMV on Practical VFO Design. June meetings are on the 7th and 21st, both 7.30 p.m., at the Y.M.C.A., Whetstone Lane, Birkenhead.

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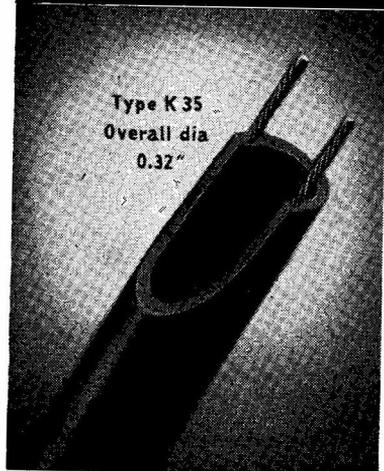
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H.S.3.	Input 200/250v. Output 350/0/350v. 80 m/a 8-3v 3 amps. 5v 2 amps .. 17/8
H.S.2X.	Input 200/250v. Output 250/0/250v. 100 m/a 8-3v 3 amps. 5v 2 amps .. 19/8
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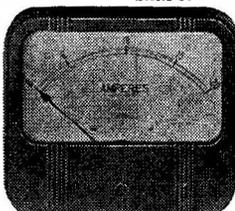
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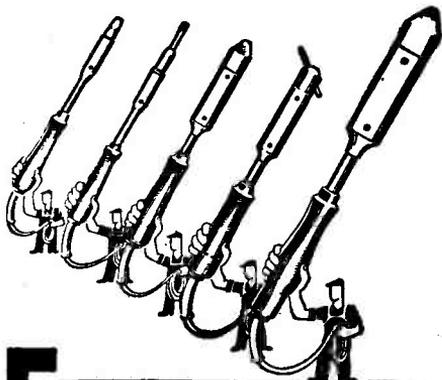


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**SMALL ADVERTISEMENTS**

READERS'—continued.

**RADIOCRAFT DX2**, 7 coils: 4 EF50's, phones, *Short Wave Magazine* post war to March, 1951 (1951), £6.—Devaney, "B" Mess, Cavalry Barracks, York.

**WANTED** urgently, complete set of nine coils for **WHRO** Senior, or any single coil.—St. Martins, Locks Heath Park Road, Locks Heath, Southampton.

**EDDYSTONE 358**, excellent condition, 9 valves, 150 kc to 31 mc, power pack, £12.—Knowles, 44 Salisbury Avenue, North Shields.

**AR88LF**, good condition and alignment nearest offer £25.—Box No. 760.

**A.M.** Avometer Type D, guaranteed, £7/10/-. APNS 13, 450 mc Tx and Rx, complete valves, £7.—Box No. 759.

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**BC348N**, external P/P, FB. CR100/4, ex. cond.; SX17 overhauled, re-valved. Must sell. Best offers.—Gilbert, Homeview, St. Erth, Hayle, Cornwall.

**FOR SALE.** AR88LF as new, S-meter and additional 6v RCA P/P complete, manual, £40.—BRS.18450, 184 Kingsway, Gatley, Cheshire.

**AR88**, good condition, spare valves, Q-Max S-meter, new. Offers?—L. Neesom, High Street, Wooler, Northumberland.

**FOR SALE.** Eddystone S640, good condition, £21. Hallcrafters S20R, good condition, £16. Both carriage free.—79 Hall Drive, Chilwell, Notts.

**DYE** Communication Rx: RF, 2 IF, 6V6 output, built-in M/E speaker, 230 AC, AF and RF gains, excellent condition, nearest £15. KT66 (6), and KT8 (2), all new, £3 the lot. Ediswan inter-office communicating equipment, master unit with 4 extensions, all 6½-in. speakers, two-way speech and buzzer call, 230 AC. Highest offer secures.—Box No. 761.

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**EDDYSTONE** S640 with Eddystone speaker, excellent condition, £24.—Everest, 44 Salcombe Drive, Chadwell Heath, Romford, Essex.

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**EDDYSTONE 640** latest model perfect condition, £20 or offers? 118 Robertson Road, Eastville, Bristol.

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**EXCHANGE BC221** brand new, R107, 1155, all perfect order. Wanted, precision camera.—6 The Byeway, Bexhill-on-Sea.

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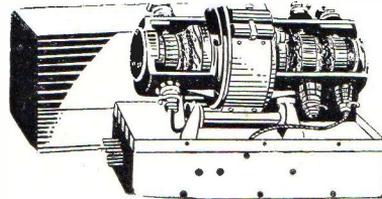
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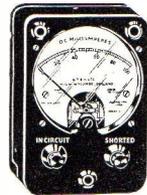


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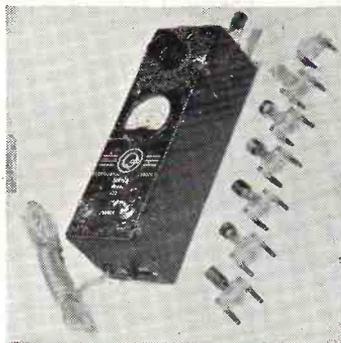
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