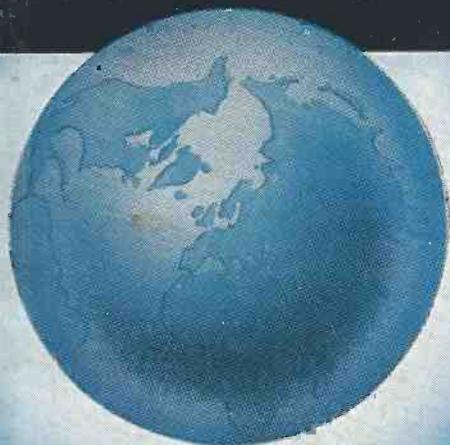


2/-

The
SHORTWAVE
Magazine



Cook

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

VOL. VI No. 9 NOVEMBER 1948

WEBB'S New 1948 Editions

Webb's Radio Globe

Whether you are a Short-Wave Listener, or an active transmitter, this globe will give added interest to your hobby, lending a touch of romance as you locate on the globe remote calls such as ZD9—Tristan da Cunha, VP8—Falkland Islands, VR6—Pitcairn. This is a new and improved edition of our famous pre-war globe. The larger diameter of 13½ in. gives considerably greater area and the compass fitted in the base allows correct orientation. New Continental boundaries and 1948 Amateur Radio prefixes are embodied.

A really handsome and useful addition to any operating shack.

Price to callers **47/6** 50/- by rail.

Webb's Radio Map

A new printing with revised amateur call signs, prefixes, coded to country and time-zone. The azimuthal projection is based on the Great Circle or shortest distance projection centred on London, and distances can be approximated in all directions by radial lines from that point to the circumference. The alphabetical list of prefixes is useful to listener and transmitter alike and the time-zone instructions are clearly indicated also on the margin. Printed in full colours on heavy white paper, size 40 in. x 30 in.

4/6 plus 6d. postage. (Also available on linen with rollers, 11/6 plus 9d. postage).

MORE VALVES

All these valves are absolutely new and in maker's original boxes.

Please do not confuse them with unboxed valves taken from broken down Government equipment. Please add 1/- for all post orders.

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4/6

U.H.F. "button base" Triode
6·3v-0·15A

9003

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U.H.F. "button base" R.F. Pentode
6·3v-0·15A

954

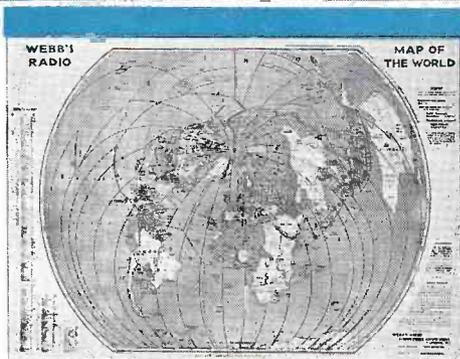
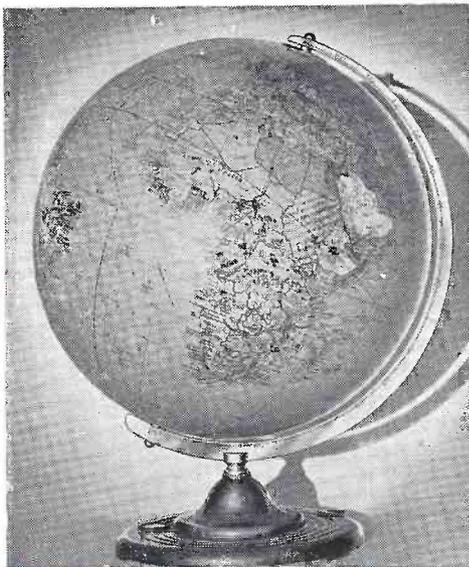
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Acorn H.F. Pentode. 6·3v-0·15A

957

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U.H.F. Acorn Triode
1·25v-0·05A



R.C.A.801—8/3

A particularly attractive offer of a well-known R.F. and A.F. Power Amplifier or class B Modulator. 7·5v-1·25A—Ceramic base, carbon anode, 20 watts plate dissipation.

R.F. RATING—600v—70 mA—60 Mc/s

AUDIO RATING—Class B for 2 tubes 45 watts output

7193 — 3/6

As 6J5GT, but with anode and grid at top of glass envelope. Used for U.H.F. low power transmission, also useful for L.F. amplifiers, grid leads kept away from heater supplies.

NEONS. Assortment of four standard type Neons, two miniature types and two 2 in. Neons, for 2/-.

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Webb's Radio * 14, 50HO ST., OXFORD ST., LONDON, W.1.

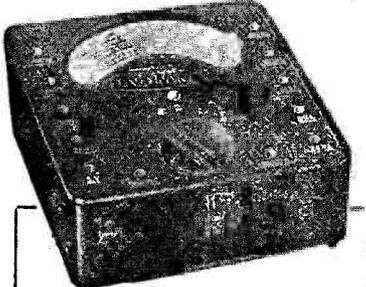
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Regd Trade Mark

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

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Size : 4½ ins. × 3½ ins. × 1½ ins.
 Nett weight : 18 ozs.
 Price : £8 : 10 : 0

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

The D.C. AVOMINOR

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

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



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Consist of a 3-stage resistance capacity coupled audio amplifier housed in a cast aluminium case with battery compartment. Includes 3 1T4 valves. Overall size approx. 14" x 8" x 4". Brand new. 22/6, post free.

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7' 6" when extended, 17" retracted. Ultra light weight and self-supporting but fitted with 3 guys for use in high wind. Brand new. 4/6 (postage 6d.)

POWER UNIT TYPE 234A

A super AC Mains power unit of modern design.

Input 200/250 v. Output 220v at 80 mA (with internal switch for reduced rating) and 6.3v at 4.5A. Exceptionally good smoothing. Includes 5Z4 rectifier. Suitable for most receivers. Incorporates 2½" meter reading AC input volts which, by means of a panel switch, also reads H.T. volts. Brand new in transit cases with input and output plugs. £4/10/- (carriage 5/-).

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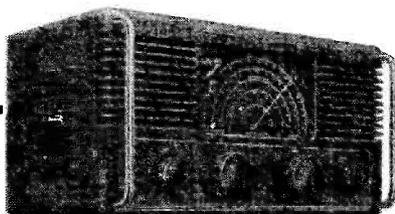
Monitors, Type 25

These are a special purpose oscilloscope which should require a minimum of modification for conversion to a general purpose instrument. AC mains operated (200/250v) 50cps; 3" non-persistent tube with very high definition. New and unused. Callers only until we obtain suitable packing cases. £6/19/6.

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The latest **EDDYSTONE** production The '670' **MARINE RECEIVER** SPECIALLY DESIGNED FOR PERSONAL CABIN USE

The Eddystone '670' receiver is primarily intended for personal use on board ship, and in view of this has been designed for operation on either AC or DC supplies of from 100 to 110 volts or 200 to 250 volts. Particular attention has been given to the performance of the receiver on the short waves as for long periods these will often be the sole medium for broadcast reception. The '670' complies with safety regulations and careful attention has been paid to the insulation throughout. The circuit is a 7 valve superheterodyne, tuning from 10 to 51.7 metres and 110 to 575 metres. A high grade internal speaker is used, which can be disconnected and headphones substituted to avoid disturbing sleeping personnel. The receiver is robustly constructed and suitable for service in the tropics. A mains filter (Cat. No. 732) is available for reducing interference from ship's electrical plant. The Eddystone special ship's aerial (Cat. No. 731) ensures high efficiency, and this together with the mains filter are valuable accessories.

The Eddystone '670' Receiver is at present available for Marine Export and Overseas Markets only.

Price : £37 10s. 0d. (ex Works)

Mains Filter : £2 10s. 0d. Aerial : £2 12s. 6d.

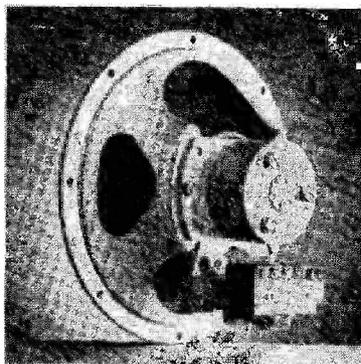
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CHASSIS DIAMETER	MODEL	VOICE COIL IMPEDANCE (OHMS)	POLE DIAMETER	FLUX DENSITY (GAUSS)	TOTAL GAP FLUX (MAXWELLS)	PEAK POWER HANDLING CAPACITY
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8"	P8M	2-3	1"	8,000	31,000	4W
8"	P8G	2-3	1"	10,000	39,000	4W

The Public are requested to order from their local Radio Dealer. Wholesalers are supplied by the sole Distributors : CYRIL FRENCH, LTD., High Street, Hampton Wick, Middlesex. Phone : KINGston 2240. Manufacturers should please communicate direct with

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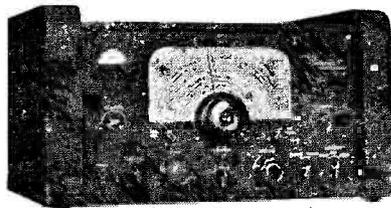
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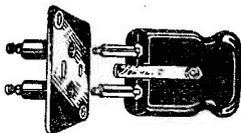
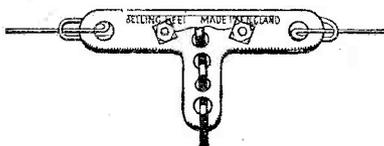
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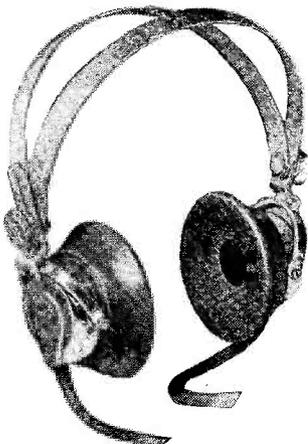
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6-valve straight receiver, with 3 R.F. stages, using plug-in coil packs, H.R.O. Type. Valves: 3 78's, 2 77's, 1 1642. Black crackle case 15" x 8" x 8". Provision for remote or local control. Dial cal. 0-100. Supplied new, complete with valves, and 6 coil packs covering: O, 187-305; P, 281-455; Q, 524-844; E, 1285-2155; G, 2960-4620; H, 3865-6265; M, 5075-7780; K, 8750-13950 kc/s. £4/10/-, carriage paid. Operated from 26v. LT.

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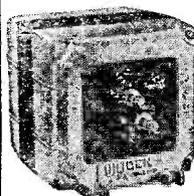
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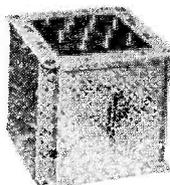
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MAINS TRANSFORMERS

D.T.M.11.	250-0-250	60 m/a
D.T.M.12.	275-0-275	120 m/a
D.T.M.13.	350-0-350	120 m/a
D.T.M.14.	425-0-425	150 m/a
D.T.M.15.	500-0-500	150 m/a
D.T.M.16.	650-0-650	230 m/a
D.T.M.17.	750-0-750	250 m/a
D.T.M.18.	1250-1000-0-1000-1250	300 m/a
D.T.M.19.	1500-0-1500	350 m/a
D.T.M.20.	2000-0-2000	250 m/a
D.T.M.21.	500-450-450-500v.	250 m/a.
	0-4v.-5v. 5a-4v. or 6-3v. 3a CT. 4v. or 6-3v. 4a CT.	
D.T.N.22.	350-0-350v.	180 m/a.
	0-4v.-5v. 4a-0-4v.-6-3v. 3a CT. 4v. or 6-3v. 4a CT.	

Also available in larger sizes



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P.T.M.13.	350-0-350	120 m/a
P.T.M.14.	425-0-425	150 m/a
P.T.M.15.	500-0-500	150 m/a

All above available in 4v or 6v filament windings. P.T.M. 16. 650-0-650 200 m/a

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TRANSFORMERS. Standard Micro-
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All new and guaranteed.

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EDDYSTONE.—"640" Communications RX £27/10/-. Ask for details of H.P. on this RX. Bug Key, 77/6; modulation meter, 175/-; medium loud-speaker, 87/6; 144 mc/s tuner unit, 17/6.

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RAYMART.—Tx variable condensers —15 in. air-gap, 100 pF, 55/-; 50 pF, 45/-; 50 x 50 pF, 55/-; 100 x 100 pF, 65/-; 100 pF, .08 in. air-gap, 45/-; 80 x 80 pF, .07 in. air-gap, 25/-; Neutralising condensers, .19 in., air-gap: 5 pF, 5/-; 10 pF, 6/3; 13 pF, 7/6.

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THIS MONTH'S BARGAINS

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Another G6HP Product. Clapp Bandswitching V.F.O.—Driver. Voltage regulated. Low impedance—or capacity coupled output.

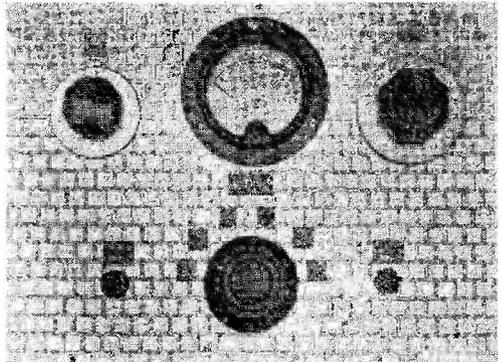
Eddystone Slow Motion Bandspread Tuning Two Models. 807 Output. This is a complete 75 watt maximum 6-valve transmitter or driver unit for a QRO Final. Full output on 6 bands from 1.8 to 28 (including 21 Mcs). Silver-plated copper tube P.A. Coils. Power supplies required. Price £25.

6V6 Output. A smaller 5-valve edition to drive your present crystal oscillator stage. Output on 1.8, 3.5 and 7 Mcs., £16. Deduct £1 if meter not required.

Both use your Rx HT and heater supplies. The 807 requires also bias and HT up to 750v. Small physical size permits this V.F.O. Driver to rest alongside your Rx on the operating desk and connect via co-axial cable to the Tx. Panel size 11" x 8", overall depth 7". Also available: QRO P.A. Unit. Bandswitched. Using a pair of 813's on a similar size chassis for 14-21-28 Mcs. Co-ax fed. Complete with 2 new 813 valves. Less meters. Power supplies required. Price £25.

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Special. Brand New Boxed Guaranteed Westinghouse 813's at £3/10/- each.

Eddystone 640 Receivers. H.P. facilities should be available before this appears in print. See our September advert. in this Magazine. May we send you details of the very easy H.P. Terms?

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We are now able to offer a wide range of Raymat high quality short-wave components of which the following is a representative selection:—
Coils. Plug-in type wound on RD4 low loss dielectric formers. Both 4- and 6-pin types being interchangeable with competitive makes.

Coverage with '00016 Mid. Variable Condenser.	a.	d.
Type CA 4 pin 11-25 metres	4	0
Type CB 4 pin 20-45 metres	4	0
Type CC 4 pin 44-100 metres	4	6
Type CD 4 pin 80-180 metres	4	9
Type CA6 6 pin 11-25 metres	4	3
Type CB6 6 pin 20-45 metres	4	3
Type CC6 6 pin 44-100 metres	4	9
Type CD6 6 pin 80-180 metres	4	9
Type CE6 6 pin 110-250 metres	5	6

Condensers. All Microvariables are of the all-brass construction type, using ball-bearing spindle and ceramic insulation. Single hole fixing and double ended for ganging purposes.

Type VG 15X -023 in. gap	2.5/15 pF ..	3	9
Type VG 40X -023 in. gap	2.75/40 pF ..	4	0
Type VG 100X -023 in. gap	3.8/100 pF ..	5	8
Type VG 40X -023 in. gap	8/160 pF ..	6	8
Type VG 250X -023 in. gap	7.3/250 pF ..	7	9

Insulators. Aerial insulators type AG. 3 1/2 in. ribbed pyrex glass	1	1
Stand-off insulators type SX. 3 1/2 in. high (ex-terminals)	2	0
Stand-off insulators type SM. 1 1/2 in. high (ex-terminals)	0	9
Stand-off insulators type SN. 1 in. high (ex-terminals)	0	6
Stand-off insulators type ST. 1 in. high (ex-terminals)	0	6
Knobs and Dials. Large skinned bakelite knob, with 4 in. graduated metal dial, 0/100 deg. Type TXD	6	6
As above, but with 2 1/2 in. dia. Type TXJ	3	11
Pointer Knobs, 2 1/2 in. long. Type LPK	1	3
Miscellaneous		

Two-piece Ceramic Feed-through bush. 4BA hole .. 0 3 1/2

Two-piece Ceramic Feed-through bush. 2BA hole ..	0	5
Feeder spreader. Ceramic, 6 in. wide	0	7
Transposition Block in raymex ceramic	0	6
Aerial "T" piece insulator, ceramic	1	3

SURPLUS SHORT-WAVE COMPONENTS. (All condenser spindles 1/2 in. diam.)

2-Gang Variable Condensers:		
120 pF per section. Ceramic insulation. 1 1/2 in. spindle.		
Size 3 1/2 in. x 2 1/2 in. x 1 1/2 in.	5	0
20 pF per section. Ceramic insulation. 1 1/2 in. spindle.		
Size 3 1/2 in. x 1 1/2 in. x 1 1/2 in.	2	6
15 pF per section. Ceramic insulation. 1 1/2 in. spindle.		
Size 2 1/2 in. x 1 1/2 in. x 1 1/2 in. (Spaced plates) ..	2	6
2-Gang Variable Condensers:		
160 pF per section opposed static plates. Ceramic insulation throughout. 1 in. spindle. Size 1 1/2 in. square x 3 in. long	2	6
60 pF per section. As above. Size 1 1/2 in. sq. x 2 in. long	2	6
75 pF per section. Ceramic insulation throughout. 1 in. spindle. Size 1 1/2 in. x 1 1/2 in. x 2 1/2 in.	2	6
18 pF per section. Ceramic insulation throughout. 1 in. spindle. Size 1 1/2 in. x 1 1/2 in. x 1 1/2 in. ..	1	6
6 pF per section, otherwise as above	1	6
Single Variable Condensers:		
7 1/2 pF Ceramic insulation. 1/2 in. spindle with ends. Size 1 1/2 in. x 1 1/2 in. x 2 1/2 in.	1	6
25 pF Ceramic insulation. 1/2 in. spindle. Size 1 1/2 in. x 1 1/2 in. x 1 1/2 in.	1	3
9 pF Ceramic insulation. 1/2 in. spindle. Size 1 1/2 in. x 1 in. x 1 in. Double spaced plates	0	9
25 pF Differential, Ceramic insulation. 1 in. spindle. Size 1 1/2 in. x 2 in. x 1 in.	0	9
Miscellaneous.		
Wright & Weare type 3-pole 4-way ceramic switch, 1 1/2 in. spindle	5	0
5 pF, 10 pF, or 15 pF Ceramic air-spaced presets ..	0	9



Q.C.C. TYPE P5 QUARTZ CRYSTAL UNIT

This unit uses the well-known Q.C.C. Power type crystal, which is undoubtedly the most rugged and active crystal cut available for amateur use. The crystal is mounted in our type U dust-proof holder, with standard 1/2 in. pin spacing, as illustrated above.

The P5 unit has a temperature coefficient of 20 cycles per megacycle per degree Centigrade temperature change. Used with a 6V or 6L6 type beam tetrode, it will give up to 5 watts r.f. output on the fundamental frequency and approximately 3 watts on the second harmonic in the Tritet circuit.

Available with fundamental frequencies in the 1-7, 3-5 and 7 Mc. bands for fundamental operation or frequency multiplying to any higher frequency band.

An official certificate of calibration is sent with each P5 unit, giving the frequency under stated operating conditions to an accuracy of 0.025%.

PRICES: Ground to your specified frequency in the above bands £1/17/6

Or ground to a frequency not specified by you but taken from our stock £1/12/6

Please note that all the leading dealers in amateur equipment now carry stocks of the P5 crystal unit.

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MIDGET Airspaced Trimmer Condensers, 30pF, 2/2.

EDDYSTONE Neutralising Condenser, 3/6.

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GRAMPIAN 9" P.M. Speakers, 2 ohm 15 ohm, 40/-.

MODULATION Transformers—Woden UMI, 30 watt audio, 54/-.

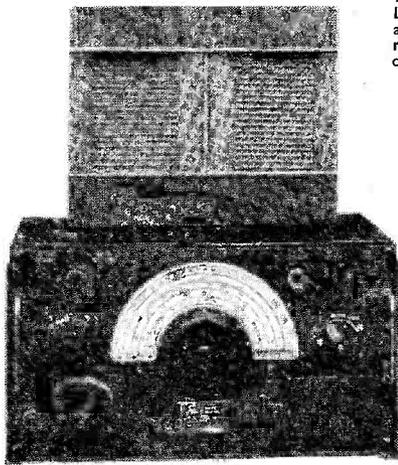
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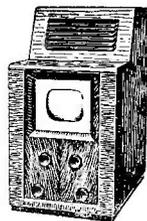


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We invite you to call on Saturdays before 5 p.m. during Television transmitting time, to see this excellent little receiver working. If you can't call, send without delay for the constructional data. Price 7/6. All components are again available ex stock at present but we advise you to order early.



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 12-volt vibrator unit, non-synchronous. Output 200 volts, 50 milliamperes. Incorporating two smoothing chokes, 20 x 20 mfd/450 volts Sprague electrolytic condenser, volume control, input and output transformers, 0Z4 rectifier and 6X5 output valve. Suitable for conversion to mobile amplifier applicable to charabancs, buses, cars, etc., or can be used as GP intercommunication amplifier.
BARGAIN 25/-

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6X5, 6Q6, 6L5, 6K6, 6R7, 6SN7, 6SL7, 6SA7, 6B8, 25L6, 71A, OC3, OD3, 6AG5, 6J6	6/-
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6C5	4/-
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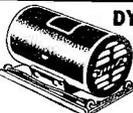
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 Carbon insert (GPO type). Press button contact. Aluminium case. Gift - 2/6
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 New 32 mfd. - 350 V.D.C.W. **2/6**

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 From High to Low impedance or alter to reverse **2/-**

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UHF RX WESTON R28/ARC5. 100/150 Mc. 10 valve. Manual or auto tuning. Calibrated dial in Mc. Provision for 4 preset Xtal controlled channels. Brand new in sealed cartons but less xtals. No manuals are available but should not present any difficulty. Carriage paid, £6.

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Input 230/110v 50cy. Both the above are an exceptionally fine job complete with 2 866 rectifiers and constructed of finest procurable parts, Kenyon, Utah, etc. The units are foolproof, have 3 circuit breakers, with push button stop, start. Provision also for remote control from your desk. Weight of the above, 250 lb net.

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RX SCR593C 4-channel push button. 7 button base valves, complete in original crates with all fittings and spare set of valves, £7/10/-.

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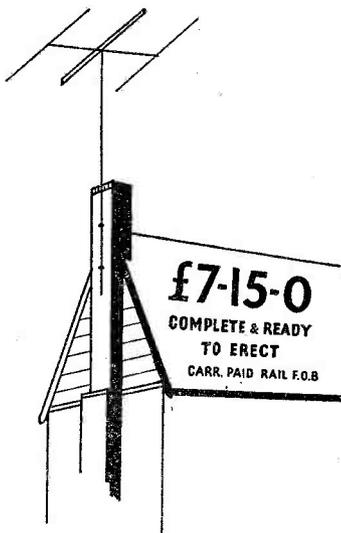
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TYPICAL CHARACTERISTICS

Type	Base	V _n (V)	V _a (V)	V _{g2} (V)	V _{g1} (V)	I _a (mA)	g _m (mA/V)	*μ	r _a (KΩ)	R _a (KΩ)	P _{out} (W)
EY91 H.W. Rectifier	B7G 6-3	250 (max)	—	—	—	75 (max)	—	—	—	—	—
			—	—	—	10	6.5	75	1000	—	—
EF50 R.F. Pen.	B9G 6-3	250	250	250	-2	10	7.7	80	500	—	—
			250	250	-1.7	10	12	28	55	—	—
EF54 R.F. Pen.	B9G 6-3	250	250	250	-4.5	40	9.5	—	440	—	—
EF55 R.F. Pen.	B9G 6-3	250	250	250	-2	10	7.65	70	1000	—	—
EF42 R.F. Pen.	B8A 6-3	250	250	250	-2	10	3.2	11	90	9	2.5
EF91 R.F. Pen.	B7G 6-3	250	250	250	-11	26	2.6	12	130	16	1.4
EL42 Output Pen.	B8A 6-3	225	225	250	-13	16	6.5	60	9.2	—	—
			250	250	—	-2.6	10	—	—	—	—
EL91 Output Pen.	B7G 6-3	250	—	—	—	10	8.5	100	12	—	—
EC52 V.H.F. Triode	B9G 6-3	250	—	—	-1.5	10	—	—	—	—	—
EC91 Grounded Grid Triode	B7G 6-3	250	—	—	—	—	8.5	5.3	38	7.1	—
ECC91 Double Triode	B7G 6-3	100	—	—	-0.9	—	—	—	—	—	—

*For Pentodes μ_{g1-g2} is quoted.

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SHORT WAVE MAGAZINE

FOR THE RADIO AMATEUR & AMATEUR RADIO

Vol. VI NOVEMBER 1948 No. 64

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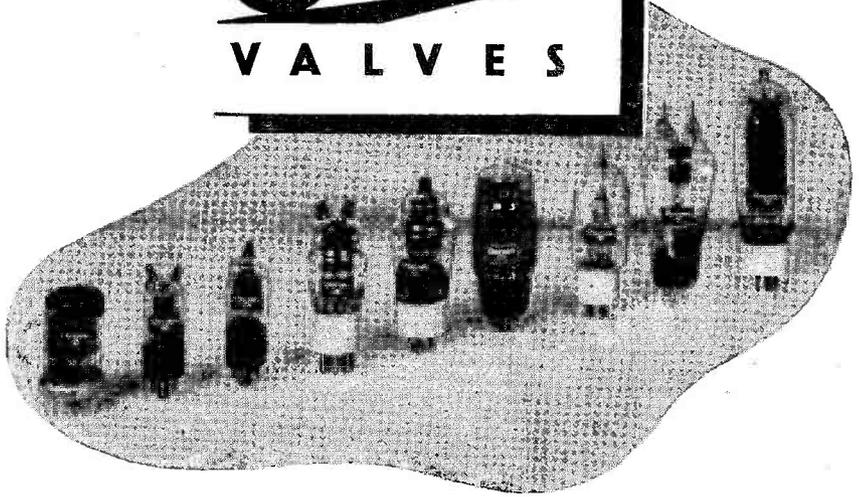
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VALVES

EDITORIAL

Shop-Window

In pre-war days, when the licence regulations on procedure were a little stricter and the "personal touch" was not regarded as such an important factor in a 'phone QSO, one hardly ever heard an exchange of handles; nor was it the custom to put one's female belongings up to the microphone to speak their coy piece; and the conversation was hardly ever allowed to stray from a discussion strictly on technicalities.

In a word, the other man was a callsign, and unless you happened to know him personally you never addressed him by anything but his callsign, nor did you talk about anything else but radio.

It is true that we must have progress, and progress means change. But few experienced operators will be found who will agree that the inanities now being banded about the 'phone bands are a change for the better. The handle business leads to such extraordinary utterances as "The-handle-here-is-John-Jay Janeweray-O Oboe-Haitch Honolulu-N Norway." We know of an amateur who is described by a wide circle of derisive BCL's as "Jay-Janeweray"—it comes out unfailingly in every QSO he makes.

'Phone operation is also being made ridiculous by the extraordinary jargon affected by those using (quite incorrectly) CW abbreviations instead of plain English. If this jargon sounds fatuous and childish to other amateurs who have been on the bands for years, what sort of impression must it make on the untutored BCL who happens to be listening?

As amateurs we need for our own sakes to build up and maintain as much public goodwill as we can mobilise. In other words, BCL's must feel (rightly or wrongly) that amateurs are doing something useful on the air; that they are the sort of people to be encouraged; and that they really do know something about radio.

It is as well to remember that amateur 'phone working is that by which Amateur Radio as an activity will always be judged by the uninitiated.

Austin Fordy G6FO.

Transmitter for Two

Five-Stage Unit on Single Chassis

By W. R. JOSS (G2AJ)

(Here is another practical 145 mc design, incorporating the latest techniques, which is already giving excellent results on the air. Crystals of three different frequency ranges can be used, ample drive is available for an 829B as a straight RF amplifier on two metres, and the transmitter is easy to build. It can be confidently recommended to all who wish to provide themselves with something "permanent" for the 145 mc band.—Ed.)

THE transmitter to be described is capable of being operated to an input of 100 watts at frequencies of 144 mc and upwards but should a lower input be required the 829B final can be replaced by an 832A running at 20-30 watts. The basis of the circuit was suggested by a recent American design using a push-pull crystal oscillator and incorporating tank circuits to a design by WICTW.

From Fig. 1, it will be seen that a single ended oscillator followed by a buffer amplifier is employed; this arrangement permits the use of 4, 5.3, or 8 mc crystals with the anode circuit of the oscillator always tuned to 16 mc. The incorporation of the buffer amplifier ensures plenty of drive for the first tripler stage, which consists of a pair of 6L6G's in push-pull. These in turn drive an 815, which in this circuit triples to 144 mc, and could if necessary be used as a low power final. This is not recommended, however, and a separate stage running as a straight amplifier at the output frequency is definitely superior; especially on the band under consideration.

The final circuit shown in Fig. 1, has proved itself to be very satisfactory and has the following points to commend it:

- (a) The entire transmitter is built on one standard chassis.
- (b) Alternative choice of crystals of 4, 5.3 or 8 mc.
- (c) Plenty of drive is available, and therefore capacity coupling is possible in all driver stages; the use of a non-resonant grid circuit in the final stage greatly improves stability. (In some layouts this may obviate the need for neutralisation).
- (d) Simplicity of tuning.—Only four controls on the front panel.
- (e) The use of receiving-type valves, which most amateurs will already possess, in the early stages avoids the heavy expenditure involved in acquiring specialised valves.

(f) The 815 and 829B are still available on the surplus market while the British equivalents (Mullard types QQVO4-20 and QQVO7-40) should always be obtainable.

(g) By using an 832A in the final, the entire transmitter can be run off one power supply. This provides a fairly compact rig for portable work.

Layout and Construction

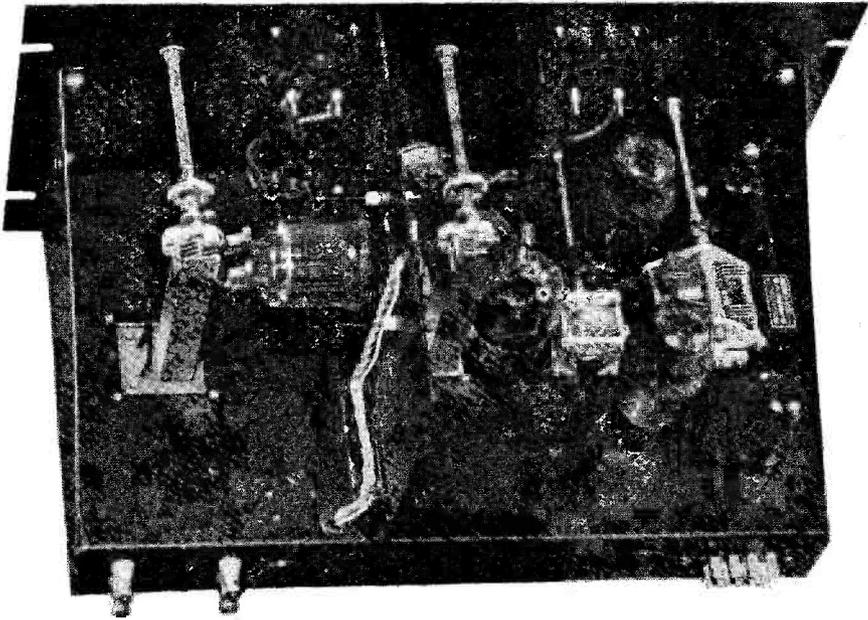
The transmitter is designed for rack-mounting and is built on a standard 17-in. \times 10-in. \times 2-in. chassis with an 8 $\frac{1}{2}$ -in. panel. It is strongly advised that the layout be followed as closely as possible; it is the result of much experiment. Fig. 2, illustrates the major chassis drilling and also the details of the screen which carries the 829B valveholder.

The 815 plate circuit is in the exact centre of the chassis and is mounted by means of a small square of $\frac{1}{4}$ -in. polystyrene. The 829B tank is mounted in a similar manner but in this case a larger piece of $\frac{1}{4}$ -in. polystyrene is used so as to permit the aerial coupling link to be placed alongside the final tank. Great care should be taken to mount all components securely in the 144 mc stages, as the slightest vibration causes the most unbelievable troubles.

A piece of an old steel panel was cut up to make the screen and this is fixed on half-inch brass angle.

If a bending press is available, then a half-inch right angle flange could with advantage be put on the screen.

The rear of the chassis carries a 6-pin Jones plug for power input, while alongside is the keying jack. At the opposite end of the chassis there are four polystyrene feed-through insulators and one high voltage type socket. The latter carries the HT for the 829B. The aerial entry is on one pair of feed-throughs and is passed out to the receiver on the other pair. A



The 145 mc transmitter complete. The RF output stage is on the left and the construction of the tank and aerial coupling inductances can be followed quite clearly. A similar inductance is used in the tank of the final driver stage, which operates as a tripler to 145 mc.

double-pole change-over relay is mounted under the chassis for send/receive purposes, but this particular unit has yet to be tested at frequencies as high as 144 mc.

A large tag board is fixed under the rear part of the chassis and this carries all the larger resistances and condensers associated with the 815 and 829B stages. The coils for the first three stages are all mounted below the chassis, while only the split-stator condensers C8 and C12 are mounted above. As the tuning of the crystal oscillator is somewhat "flat" (and as frequency changing is not generally visualised) it was decided to make the oscillator tank condenser pre-set, and to place it beneath the chassis; this condenser is 75 $\mu\mu\text{F}$, air-spaced, with screw-driver adjustment. Particular care should be taken with the arrangement of components associated with the buffer stage, as self oscillation can occur if anode and grid circuits interact.

Inductances

All coil data are given in Table 1, and should present no difficulty. A word, however, concerning the 144 mc tank inductances: These were designed to

carry the Mullard 15 $\mu\mu\text{F}$ double-spaced condensers. Each inductance is made up of $\frac{1}{8}$ -in. copper strip, $\frac{3}{4}$ -in. wide and 11-in. long (see Fig. 3), folded into a "U" shape as shown. The condensers are bolted on to one arm of the "U" with 6BA bolts (the condensers are tapped for this purpose) and a connection from the moving vanes is sweated to the same arm. One of the lugs on the fixed vanes is then likewise sweated to the opposite arm of the "U," thus making a very rigid unit. Incidentally, it is a very sound proposition to have these inductances silver plated, or to use the process recommended by G6VX in the July issue of the *Magazine*.

The Circuit

A video beam power pentode—the 6AG7—is employed in a tuned-plate oscillator circuit with excellent results. A similar circuit is described by one American handbook as a "Pierce Amplifier-Multiplier-Oscillator." This title is probably correct as nearly all the basic crystal oscillator circuits were either used or else developed independently by G. W. Pierce, although he has not always been so credited. In any case it is *not* the Pierce

circuit as it is most commonly known. The crystal itself oscillates in a Colpitts circuit with electron coupling to the output circuit on the desired harmonic. The oscillator gives a good output, is easy on the crystal and has no adjustment other

than the output tank. In cases where a 6AG7 is not available a 6V6 may be tried without affecting the overall performance of the transmitter. From a comparative point of view the 6AG7 is better in that :

(a) It will work well with crystals

Table of Values

Fig. 1. The 145 mc Transmitter

- C1 = .002 μ F mica
- C2 = 75 μ F airspaced trimmer, pre-set
- C3 = 15 μ F mica
- C4, C5, C9, C10 = 50 μ F mica
- C5, C7, C11, C16, C17 = .001 μ F mica
- C8 = 60 μ F per section, variable
- C12 = 30 μ F per section, variable (butterfly type)
- C13, C14, C21 = 100 μ F mica
- C15 = .003 μ F mica
- C18 = Mullard 15 μ F double-spaced trimmer, one vane removed
- C19 = Mullard 15 μ F double-spaced trimmer
- C20 = .001 μ F silver mica
- C22, C23, C24 = 500 μ F mica
- N.C. See Text
- R1 = 20,000 ohms 2 watt
- R2 = 30,000 ohms 2 watt
- R3 = 10,000 ohms 3 watt
- R4 = 68,000 ohms 1 watt
- R5 = 250 ohms 1 watt
- R6 = 56,000 ohms $\frac{1}{2}$ watt

- R7, R8, R9, R10 = 100,000 ohms $\frac{1}{2}$ watt
- R11 = 800 ohms 10 watt
- R12 = 4,700 ohms .1 watt
- R13 = 100,000 ohms 2 watt
- R14 = 10,000 ohms 10 watt
- *R15 = 1,250 ohms 10 watt
- *R16 = 800 ohms 10 watt
- *R17 = 20,000 ohms 5 watt
- *R18 = 750 ohms 5 watt

*These values are dependent on the power supplies used and in some cases R15, R16, and R18 can be omitted.

- S1 = Double Pole, Double Throw, toggle type
- S2 = Single Pole on/off toggle type
- MA1 = 0-250 mA
- MA2 = 0-20 or 25 mA
- RFC1 = 2-5 mH RF choke
- RFC2 = (See Text)
- V1 = 6AG7 or 6V6
- V2 = 6V6
- V3, V4 = 6L6G
- V5 = 815 or Mullard QVO4-20
- V6 = 829B or Mullard QVO7-40

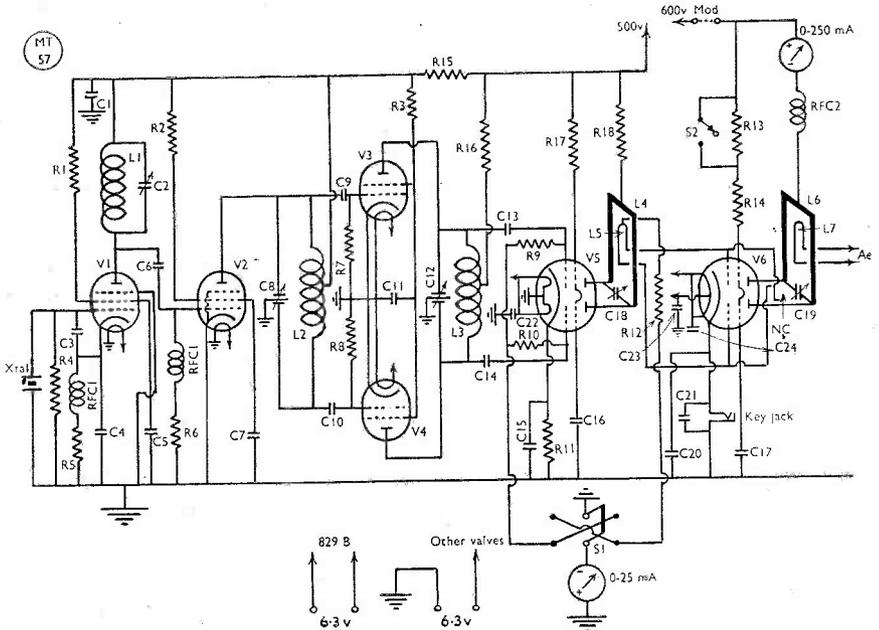
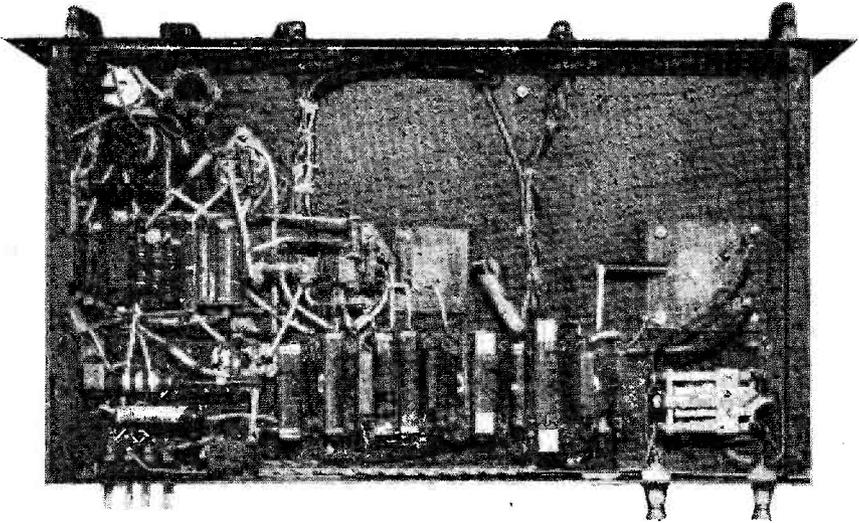


Fig. 1. The circuit of G2AJ's 145 mc transmitter ; strip inductances are used on grid and plate sides of the output stage



Underneath the 145 mc transmitter. The heavier resistors and their associated by-pass condensers are mounted on a tag board.

having a rather poor activity, (b) the crystal current is somewhat lower, and (c) the harmonic output is slightly greater.

The oscillator is capacity-coupled into the grid of the buffer amplifier and this stage requires little description. It is a straightforward circuit, the only point worth commenting on being the necessity for a centre-tapped coil and split-stator condenser in the anode in order to obtain the 180 deg. phase difference at the 6L6G grids necessary for push-pull operation. It was actually found that the tap of the coil had to be moved in order to find the exact electrical centre and so obtain equal grid currents in the 6L6G's. Approximately 3 mA of grid current were measured in each, under drive conditions.

Being driven fairly hard, the 6L6G's produce excellent output on 48 mc, and give more than adequate drive for the 815. The anode circuit of the 6L6's consists of 8 turns of 16 SWG wire on a $\frac{1}{2}$ -in. diameter former which is tuned by means of one of the $30 \times 30 \mu\mu\text{F}$ "butterfly" type condensers so readily acquired on the surplus market, and which have good vane spacing. Both glass and metal 6L6's were tried and the glass version is strongly recommended, as the operating conditions are such that the dissipation is high and it was found that the glass valves ran considerably cooler.

Capacity coupling is again used between the tripler stages and provision is made for

checking the grid current of the 815. This is done with the aid of a DPDT switch mounted on the centre of the front panel, which puts the grid meter (on the left of the panel) in circuit with either the 815 or 829B. The 815 tank circuit has already been discussed and it need only be said that it was found necessary to remove one fixed plate from the $15 \mu\mu\text{F}$ condenser owing to the fact that the self-capacity of the 815 is higher than that of the 829B. The anode connections are made with pieces of $\frac{1}{4}$ -in. copper braid sweated to the ends of the "U" shaped tank.

The PA Design

We now come to the final amplifier itself. The grid circuit was fabricated from $\frac{1}{8}$ -in. diameter silver-plated copper tube, bent as shown in Fig. 3, with the "U" shaped portion the same width as the plate

Table I.

COIL DATA

L1	9 turns No. 20 wire, 1-in. long on $1\frac{1}{8}$ -in. dia. former.
L2	7 turns No. 14 wire, 1-in. long on $1\frac{1}{8}$ -in. dia., self supported, with centre tap.
L3	8 turns No. 16 wire, on $\frac{1}{2}$ in. dia. former, $\frac{3}{8}$ in. long, centre tapped.
L4 and L6	144 mc inductance (See text).
L5	$\frac{1}{8}$ -in. dia. copper tube, silver plated (See Fig. 3).
L7	Approximate size of L5, but made of No. 12 gauge enamel wire.

circuit to which it is coupled. This coupling was found to be the most critical adjustment of the whole transmitter, considerable patience being necessary. Fig. 3 gives the dimensions which were found to be satisfactory in the writer's case, but these should be regarded purely as a guide, as individual circuits are likely to differ to some degree. The "U" portion was found to produce maximum grid drive when placed at a distance of $\frac{3}{8}$ -in. from the plate link, tighter coupling resulting in less drive. The overall length should be as small as possible, and yet provide adequate grid drive, and the making of several circuits in order to reach this end is advocated. The smaller the grid tank, the less likelihood there is for instability in the power amplifier.

It had been hoped that the use of this non-resonant grid circuit would eliminate

the need for neutralisation. Such, however, was not so and a very much more stable amplifier resulted when a small amount of neutralisation was added. This is achieved by the placing of two short pieces of 14 gauge wire parallel with each anode and at a distance of about $\frac{1}{8}$ -in. from the envelope. The wires are crossed over on the base of the valve and brought through the screen by means of small porcelain feed throughs. The length of wire protruding after adjustment was $1\frac{1}{8}$ -in.

The tank circuit is identical with that of the 815, only in this case no modification is necessary to the condenser. The anode connections are again made by means of copper braid sweated to the "U" and for this purpose 45/55 alloy Multicore solder was used. This alloy has a melting point somewhat higher than the normal 60/40

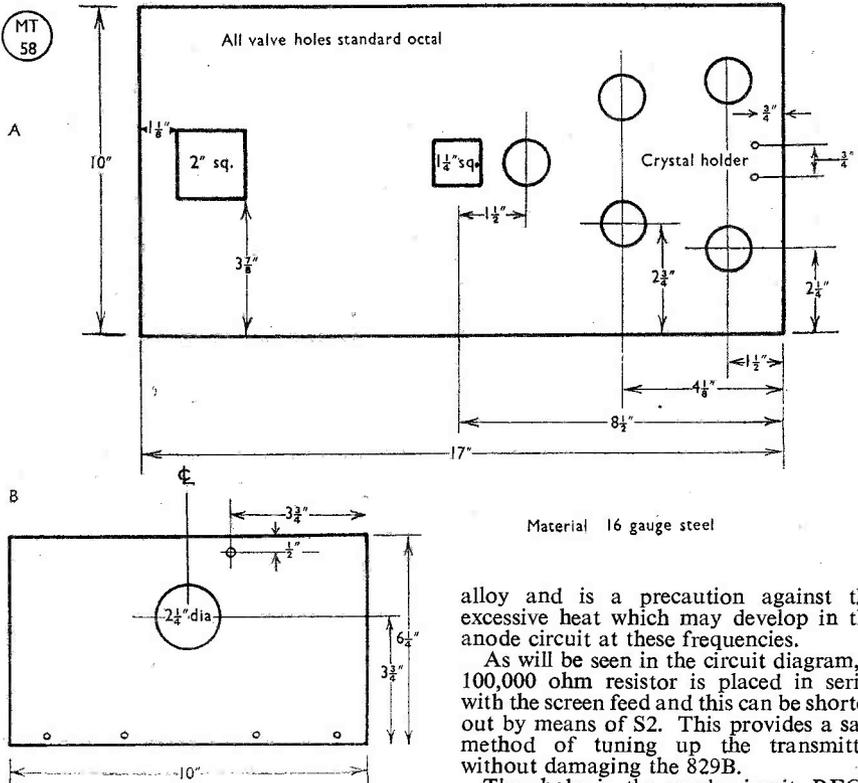


Fig. 2. Chassis detail for construction of the 145 mc transmitter.

alloy and is a precaution against the excessive heat which may develop in the anode circuit at these frequencies.

As will be seen in the circuit diagram, a 100,000 ohm resistor is placed in series with the screen feed and this can be shorted out by means of S2. This provides a safe method of tuning up the transmitter without damaging the 829B.

The choke in the anode circuit, RFC2, is 40 turns of No. 22 gauge enamel wire, close-wound on a piece of 1/2-in. polystyrene rod.

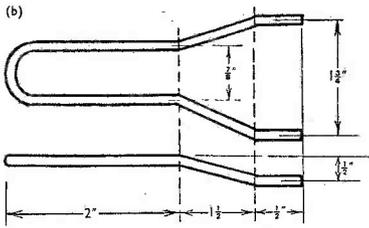
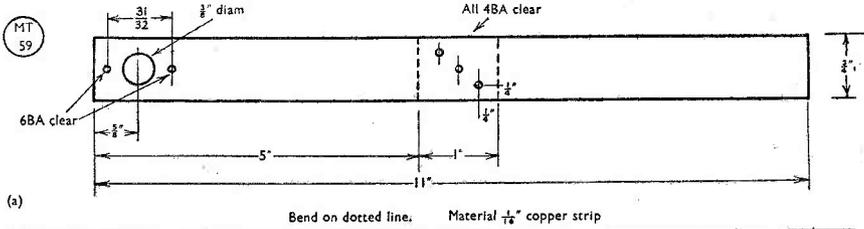


Fig. 3. Drawing detail for the construction of the strip inductances.

Power Supplies

It is not proposed to say much on this subject as most readers will—as in the writer's case—adapt existing power packs rather than build new ones. Initially, the writer ran the set off three separate packs. A 300-volt supply for the 6AG7, 6V6, and the screens of the 6L6G's and a 500-volt supply (which was suitably dropped) for the 815 and the anodes of the 6L6G's, while the 829B had its own 600 volt pack. This has now been altered and at the time of writing all exciter stages are fed from one 500-volt power pack, with series resistors where necessary. These resistors, which are shown in the circuit diagram, can be omitted or altered to suit individual requirements, considerable latitude being permissible.

The ideal supply would be one of about 400 volts at 200 mA for all exciter stages, with the 829B fed from its own 600-volt source. Table II shows voltages and currents as measured at the various electrodes and provided these are adhered to within reasonable limits, all should be well.

Operation and Adjustment

The testing and checking of each stage as it is completed is extremely helpful. This greatly contributes to the neatness of the wiring by avoiding the unsoldering that is very often essential in the tracing of faults. Furthermore, it allows the drive to each stage to be adjusted before completing the anode circuit.

The tuning of the crystal oscillator, as previously stated, is fairly flat and once it is peaked it can be locked and forgotten about. In the writer's case it tuned to 16 mc at about half-capacity. The average absorption wavemeter which covers the 14 mc band should also reach 16 mc and this is useful for checking purposes. The output from the buffer stage can be checked likewise.

With the grid meter in the 815 grids (left hand position of S1) the condensers C8 and C12 should be tuned to resonance, indicated by maximum grid current. This should be of the order of 4-5 mA. Next, the grid meter is transferred to the 829B grids, by means of the switch previously mentioned, and the tripler plate tuned to resonance. This should produce approximately 15-20 mA of grid current when the coupling between the tripler plate and final grid is correctly adjusted. HT can now be applied to the 829B and the tank circuit tuned for minimum dip, taking care that the screen switch (S2) at this stage is in the open position. With 600 volts of HT the minimum dip was about 20 mA, which increases when the screen volts are raised. The aerial or dummy load can now be coupled by means of L7 and the 829B loaded.

Modulation and Keying

The amplifier is plate-and-screen modulated, and for this purpose any modulator

Table II.
OPERATING VOLTAGES AND CURRENTS

Valve	Anode Volts	Screen Volts	Anode Current	Screen Current	Grid Current	Cathode Volts
V1	300	200	—	—	—	—
V2	300	200	20	5	2	0
V3 & V4	325	250	50	5	3	0
V5	375	200	75-80	12	5	75v.
V6	600	200	200	25	15	0

delivering enough audio power can be used. It is proposed, when time permits, to try the system of "self screen modulation" outlined by G6VX in the August issue of the *Magazine*, as it has distinct advantages.

Several methods of keying will suggest themselves, and the matter is left to individual taste. The writer adopted cathode keying in the final as this eliminated the need for a large fixed bias supply, necessary when an earlier stage is keyed, as well as being more economical. When this method of keying is employed great care should be taken in by-passing the cathode. As will be seen from the circuit diagram, it was found essential to by-pass not only the cathode pin itself but also the cathode side of the keying jack. In order to permit this method of keying, the heater supply of the 829B was left floating and

here again efficient by-passing at the heater pins is very necessary.

On the frequencies with which we are dealing it was found that the value of by-pass condenser, as well as the type of condenser used, was very much more critical than on the lower frequencies. Experimentation in this direction is always worth while.

Conclusion

Although it is not expected that many readers will follow this circuit in every detail it is hoped that the writer's experience and some of the suggestions made will prove to be helpful when tackling the problems of our new band. The writer will be pleased to hear from any readers who follow this design or who have any queries in connection with it.

TU5B as TU5B

Low Power MO-PA Transmitter for the LF Bands

By H. E. JAMES (G5JM)

THE range of Tuning Units, of which the '5B is the outstanding member, has now been described in a variety of conversions for any application other than that for which it was originally designed! The writer's simple adaptation of the units may be of interest to those about to commence operation on the 1.7 and 3.5 mc bands—or to others who may require a low-power transmitter standing by for these frequencies.

The units were designed to incorporate the two tuning circuits and certain other key components for a multi-range MO-PA transmitter using valves of the obsolete 211 type. The body of the RF section of the transmitter merely added to the tuning unit the valves and a few other components for which the values could be fixed throughout the frequency range. It was decided therefore to select two valves of the same general type as the originals, and duplicate as nearly as possible the BC-375 circuit. The addition of a simple aerial tuner and a combined power-pack with speech amplifier provided a compact self-contained CW/Phone transmitter, into which the units could be plugged for as many bands as

With all the modification and conversion data appearing on the TU5B series of surplus units, it may have been forgotten that the TU5B can also be operated in the way its designer intended—as an LF band driver unit.—Ed.

desired. A sketch of the final physical assembly is given in Fig. 1.

As already indicated, the tuning units were to be used without modification and the theoretical circuit is shown in Fig. 2a, whilst the theoretical additions are given in Fig. 2b, completing the RF circuit. The actual valves employed were of the PX4 class as they and suitable LT/HT supplies happened to be available in the spares cupboard. If any combination of the popular tetrode types is selected they should be triode connected to permit the PA being neutralised with the existing condensers. In addition, other valve types may require a source of fixed bias or cathode bias to maintain the anode dissipations within rating in the quiescent condition. The value of the cathode resistance must be at least as quoted by the manufacturer for AF working at the applied HT voltage. The voltage developed in the cathode resistance at full load must be deducted from the total bias voltage required, and the value of the grid-leak adjusted to give optimum excitation for the valve in use.

The aerial coupler incorporated has sufficient inductance and capacity to permit series or parallel tuning with a wide variety of systems, but may be modified

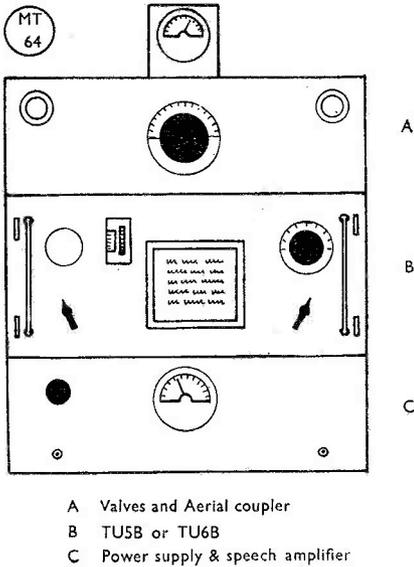


Fig. 1. General layout and panel arrangement of the transmitter built round the TUSB, for the 1.7 and 3.5 mc bands.

to suit any installation. At the writer's station external loading coils were inserted in the aerial-counterpoise system, so that the overall length constituted a half-wave at 1.7 mc ; series tuning is used, and losses in an earth connection eliminated. The whole of the RF power transferred to the aerial is thereby radiated and not dissipated in the average high-resistance earth.

As the basic idea may be varied to suit the valves and parts at hand the essential adjustments will be described before constructional details are given.

Adjustments

The valves were installed and HT initially applied only to the oscillator. With the oscillator tuning set up for the desired frequency as given in the calibration chart, it should be keyed and monitored for characteristics. If these are all that is desired nothing need be done to the oscillator, but if not satisfactory experimenting with a few values of grid-leak either way of the calculated value should produce "crystal" quality if the power supply is well smoothed and has reasonable regulation. A low-range milliammeter temporarily connected in the PA grid-leak will provide an indication

of the excitation to the stage and at the same time serve as a sensitive neutralisation indicator. Neutralisation is effected in the conventional manner by checking for minimum RF in the PA plate circuit. A flash-bulb may be connected across the output coil for this purpose, or grid meter flicker noted as the PA tuning is resonated. HT is then applied to the PA and a final check on neutralisation made by monitoring and observing the variation in oscillator frequency as the PA is tuned through resonance, trimming the neutralising condenser to reduce the variation to minimum.

When the aerial is coupled and the PA loaded to the desired input, a check on excitation should be made. With most valve combinations it is unlikely that it will be inadequate, but if it is excessive a reduction may be made by supplying the oscillator plate through a dropping resistor from the HT line.

Modulation

Whilst it is outmoded, the Heising system will be found to be the most economical for inputs of 10 watts when some 5 watts of audio power are required. If some sacrifice of quality may be tolerated a single Class-A modulator of the 6L6 variety will provide enough audio for inputs up to 20 watts, but for regular working at 25 watts a pair of 6V6's or similar would be preferable. In the latter case, matching of the PA to the speech amplifier would present little difficulty as a normal matching transformer would need to be employed. If the Heising system is used, however, it is probable that, working from a common power supply, a dropping resistance will have to be connected between the PA and the speech amplifier so as to enable the matching to be adjusted. (For connections see Fig. 3.) Calculation of the value of R1 must be made by trial and error. Assuming an HT line voltage of 400 volts and the speech amplifier load 8,000 ohms, a first approximation would give 320 volts at 40 mA for the PA input, representing a load of exactly 8,000 ohms but an input of 12.8 watts. If both the voltage and current are reduced to maintain the input at 10 watts and the load to the approximate theoretical value, a few calculations easily derive the products 280 volts and 35 mA. The value of R1 will then be $400-280 \text{ volts} \div 35 \text{ mA}$, which equals 3,500 ohms. The resistance will be bypassed for AF by the condenser shown in the circuit. If the speech amplifier is of the single-valve type and delivering

Table of Values

Fig. 2 (A & B). RF Section of "TUSB as TUSB."

Function only is given for components in the Tuning Units as they vary for each range.

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>C1, 2, 3, 4 = Oscillator Padding Condensers. (TU5B).
 C5 = MO Tuning.
 C6 = MO Grid Coupling.
 C7 = Neutralising.
 C8 = PA Coupling.
 C9, 10, 11 = PA Padding Condensers. (TU5B).
 C12 = PA Tuning.
 RFC1, 2 = MO and PA Grid RF Chokes.
 R1 = Parasitic Suppressor Wire-wound.
 S1A, B = Range Selection (TU5B).
 S2 = Variable Output Coupling.
 J = Key Jack.
 R2 = MO Grid. 47,000 ohm 1-watt for PX4, ACO44, etc. (V1).</p> | <p>R3 = PA Grid 47,000 ohm 1-watt for PX4, PX25 (V2) or appropriate value for any other valve.
 C13 = .01 μF mica. 500v.
 C14 = .002 μF mica. (This is part of effective capacity across modulation choke.)
 C15 = Twin Gang .0005 μF variable, receiving type.
 L4 = Tapped Inductance to suit aerial, 20/50 μH.
 RFC3, 4 = Receiver type RF Chokes for currents up to 50 mA.</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

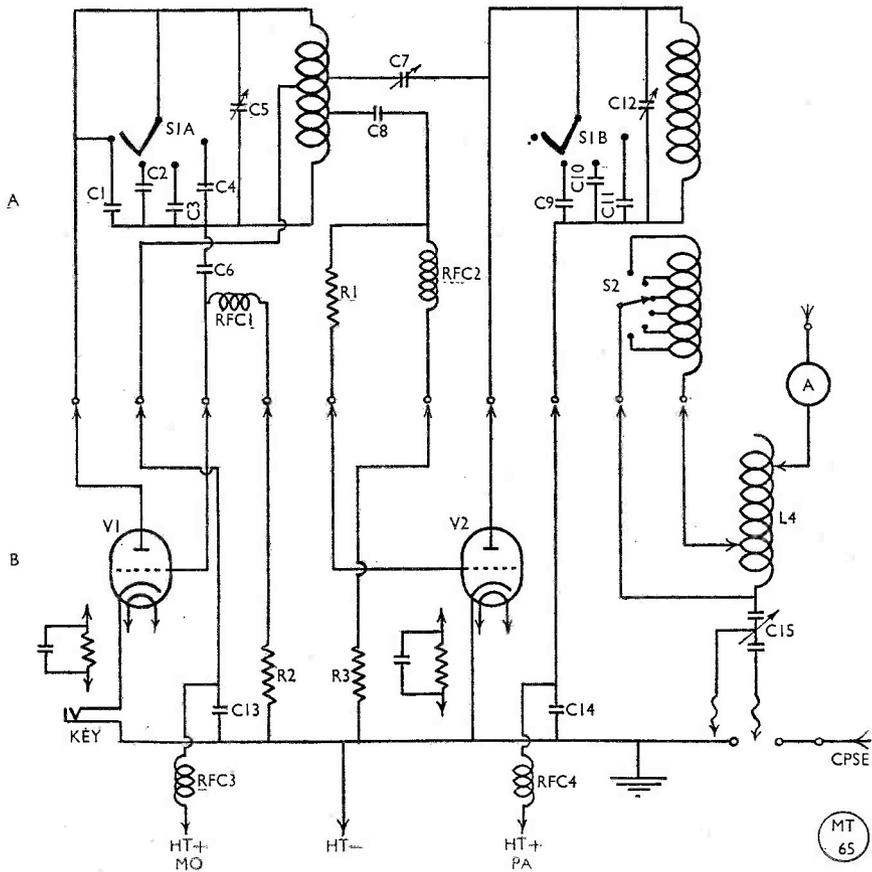


Fig. 2. Circuit of the additional RF section for the TUSB, as described in the text. (Section B in the drawing).

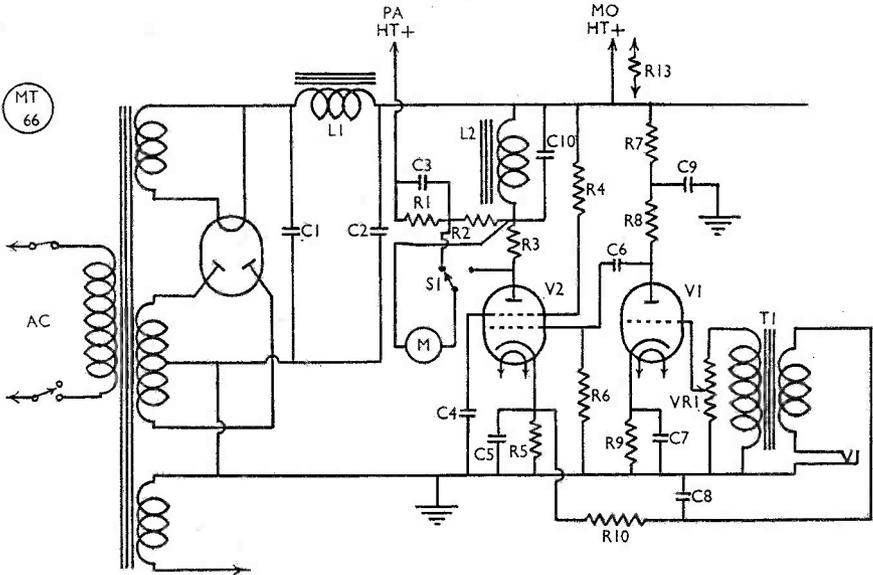


Fig. 3. Power supply and AF section for the TUSB transmitter. R1 is the load-matching resistor.

less than its rated maximum output, its load will not be found critical and in the original version a considerable mismatch existed without detrimental effect to the speech quality. Restriction of the frequency response by connecting a suitable "top-cut" condenser across the modulating choke will minimise the tendency inherent in tetrodes to excessive third harmonic distortion, which would produce unwanted side-bands at high degrees of modulation. It should be remembered that C14 in Fig. 2 is effectively in parallel with C10 in Fig. 3.

Both speech amplifiers are designed for use with high-sensitivity microphones, and an additional stage of voltage amplification will be required for microphones having low output. It should be a conventionally resistance coupled stage and precede V1. The method of obtaining polarising voltage for a carbon microphone will be noted. Since the resistance R10 in Figs. 3 and 4 in series with the microphone are in parallel with the output valve bias resistor, the value of R10 should be maintained as high as possible. Depending on the HT supply it is proposed to use, V2 in Fig. 3 may be any of the heavy duty tetrodes such as

Table of Values

Fig. 3. Power Supply and AF Section of the TUSB Transmitter.

Values are as used in the original version and are subject to variation to suit the valves actually employed.

- C1, 2 = 8 μF, 500-volt working.
- C3, 4 = 8 μF, 450-volt electrolytic.
- C5 = 50 μF, 50-volt electrolytic.
- C6 = .01 μF, 1,000-volt working, tubular.
- C7, 8 = 50 μF, 12-volt electrolytic.
- C9 = 4 μF, 450-volt electrolytic.
- C10 = Selected. See text.
- R1 = See text.
- R2, 3 = Meter shunts, 50-100 ohms.
- R4 = 20,000 ohm, 2 watt.
- R5 = 300 ohm, 5 watt.
- R6 = 0.5 megohm.
- R7 = 27,000 ohm, ½ watt.
- R8 = 47,000 ohm, ½ watt.
- R9 = 1,000 ohm, ½ watt.
- R10 = 2,000 ohm, 2 watt. See text.
- R13 = See text.
- VR1 = .25 megohm, gain control.
- T1 = Microphone transformer.
- M = Milliammeter 0/100 mA.
- S1 = Meter switch.
- L1 = 20 henry 150 mA choke.
- L2 = 20 henry, 100 mA choke.
- V1 = Mazda AC/HL.
- V2 = Mullard PM24D.

the 6L6, KT66 or the 4-volt heater variants, and the operating conditions determined from the maker's data. Smaller valves may be connected in

parallel to provide a margin of audio power and minimise distortion, with some possible benefit in reducing the value of the load resistance required and facilitating matching to the PA.

No provision was made to short-circuit the modulating choke to avoid the development of high peak voltages when keying, but this should be arranged if any trouble is experienced due to this cause. As a precaution against accidental over-modulation, the adjustment of VR1 should be carefully checked and marked for permanent reference at the 100 per cent. peak setting.

Keying

As the oscillator is keyed, break-in facilities are available. The current and voltage at the cathode will normally be small, and no click filter was required. If clicks are found to be excessive, however, simple filters should be tested, keeping the values of capacity or inductance as small as possible consistent with satisfactory suppression.

Construction and Layout

The assembly outlined here is probably as compact as any that can be achieved without sacrificing the main feature of the plug-in RF units. A little juggling proved that the RF valves, minor components and aerial coupler could be conveniently mounted on a standard 5½-in. rack panel cut to the same width as the tuning units, 16½ ins. As the panel

height was insufficient for the valves, these were mounted horizontally on to the panel and all connections were thus conveniently close to the tuning unit terminal strip. The aerial inductance L4, a somewhat bulky component, was mounted on a strap secured to the sides of the frame. The power and audio components were accommodated on another similar panel to which was attached a spare screening cover from one of the tuning units, providing a box-type chassis, on all sides of which the components were mounted. A simple frame was made up from light 1-in. mild steel angle, the overall width being 17½ in., height 18½ ins. and depth 10 ins. The two 5½-in. panels were mounted at the top and bottom of the vertical front members of the frame, leaving a panel space of 7½ ins. for the tuning units. The original mounting studs for the tuning units were removed from the transit case and attached to the frame uprights to locate and secure the tuning units when in position. A plug strip to match the output sockets of the

Table of Values

Fig. 4. Speech Amplifier for the TUSB Transmitter.

- R11 = 240 ohm, 2 watt.
- R12 = 10,000 ohm, 1 watt.
- T2 = Any good quality inter-stage transformer.
- T3 = Varimatch output transformer.
- V1 = 6J5.
- V2 = 6V6.

All other values as Fig. 3.

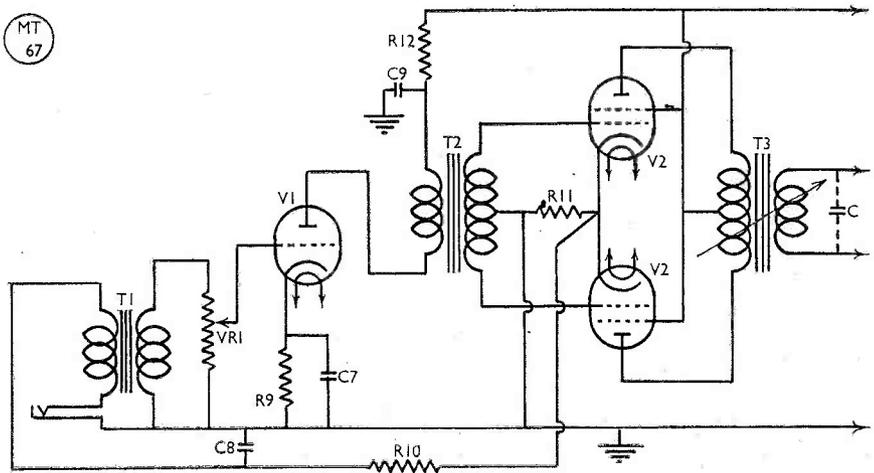


Fig. 4. Speech amplifier circuit when inputs are in excess of 10 watts.

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tuning unit was made from the highest grade insulating material to hand and provided with resilient pins to match the female section. If difficulty is experienced in securing pins to fit the sockets, these may be replaced by the heavy duty ones normally used for plug-in transmitting coils. Drilling dimensions for the terminal strip may be taken from the tuning unit.

The exact location for the male strip was determined with one of the tuning units in position on the frame and brackets made up from mild steel strap to secure it. Some little ingenuity was required to accommodate all the power audio components, but by utilising almost every cubic inch of space and securing them to panel, rear and sides of the chassis, this was accomplished. The wiring in this section is quite simple and the layout should not produce any undesirable effects if the first audio stage is isolated as much as possible from the mains transformer. Wiring of the RF section could hardly be easier and most of the components can be wired direct on to the male terminal strip or between it, the valve sockets or a 6-way terminal block bringing in the supplies from the power and audio section. This terminal block was mounted conveniently on the RF panel.

Performance

One of the most gratifying features of the tuning units is that the most critical adjustments are eliminated. Provided that the valves selected are, like the originals, of low or medium impedance, having relatively high inter-electrode capacities, the tapings on the oscillator coil for excitation and neutralisation will serve. After neutralising the PA, resonating and loading to the required input is all that is required. The CW tone and keying characteristic for both the TU5B and TU6B (3.5 mc) are all that could be desired for a simple transmitter, and normally T9 reports should be received. Although there is no isolating stage between the MO and the modulating amplifier, the modulating capability will be 100 per cent. if the PA is operated under the correct conditions. With the speech equipment described, no attempt was made to obtain better than "communications quality" but it will be appreciated that as the speech amplifier is operated well within its maximum capability under Class-A conditions, the voice reproduction will be principally a function of the characteristic of the microphone itself. As many operators choose to make

a point of securing superior 'phone quality on the lower frequency bands, they may decide to elaborate the audio section with this object.

XTAL XCHANGE

Insertions in this space are free, but in respect of exchanges of crystals only; they should be sent in on a separate slip headed "Xtal Xchange—Free Insertion," and set out as below; and all negotiations should be conducted direct.

G3DLG, 338 Poole Road, Bournemouth West, Hants.

Has 1000 kc bar, octal base holder : 8338.6 kc crystal : A-cut 2072.5 kc, 3-pin mounting. Wants crystals 7060, 7120, 7140, 7160 and 7180 kc.

G3DM, 36 Springwell Road, Liverpool, 20.

Has 3531 kc, mounted. Wants frequency near 7015 kc.

G3EKM, Trewindle, Tregurra Lane, Truro, Cornwall.

Has crystals 2333, 5615 and 8338.6 kc. Wants frequencies at LF end 3.5 mc band : or 7010-7050 kc.

G3NT, Hilton Grange, Northallerton, Yorks.

Has Q.C.C. Type P5 1800 kc crystal, mounted. Wants frequency between 3500 and 3530 kc.

G4BC, 35 New Road, Wood Green, London, N.22.

Has 100 kc, 7178 and 7275 kc crystals in standard holders, $\frac{3}{4}$ -in. pin spacing. Wants 3505 and 7005 kc crystals, similarly holdered.

ISRAELI CALLSIGNS

We are informed that the official prefix for Israel is now 4X4, taken from the new prefix sequence laid down at Atlantic City. The Israeli Government has decided that no amateur licences will be issued until the present trouble is over. However, three amateur stations have been licensed by the Chief Signals Officer for the area; these are operated by Service personnel, and are 4X4AA (ex-ZC6LA), 4X4AB (ex-ZC6LB), and 4X4AC (ex-ZC6LC). They are active on the DX communication bands and can be QSL'd via P.O. Box 4150, Tel-Aviv, Israel.

MULLARD VALVES—NOMENCLATURE

Changes in naming certain of their valve types have just been introduced by Mullards, to bring the type numbers into line with the Mullard system of nomenclature as applied to transmitting and industrial valves. Under this system, the QVO4-20 becomes QQVO4-20, and the QVO7-40 the QQVO7-40.

Effective Audio Filter

Obtaining Receiver Selectivity on the Output Side

By J. N. WALKER (G5JU)

BECAUSE of the crowded state of our communication bands, methods of increasing the effective or apparent selectivity of a receiver always arouse interest. One scheme which has much to recommend it is the use of an audio filter, particularly since it is easy to apply, without necessarily interfering in any way with the receiver itself.

Types of Filter

Filters can be designed to produce frequency/amplitude response curves having various characteristics. For amateur use, two major types are of interest. One gives a very peaked response over a very narrow band of frequencies, situated in the region between 800 and 1000 cycles. At such frequencies, the human ear develops maximum sensitivity, does not tend to become tired, and also to these audio frequencies many makes of the usual types of iron-diaphragm telephones show a peaked response. These factors add *intelligibility* to a CW signal, particularly if the latter is a weak one and is accompanied by interfering signals on higher or lower audio frequencies.

The second type of filter is more complicated. It is designed to pass, at a more or less uniform level, a band of frequencies between about 200 and 3,000 cycles, and to reject all frequencies above and below these figures. This pass-band gives what is known as "communication quality speech" and results in increased intelligibility under conditions where interference is likely. It also has other applications—for instance, when included in the modulator portion of a transmitter, it ensures greater efficiency by preventing unwanted frequencies modulating the carrier.

The particular design described hereafter is of the first type but can also be applied, to some extent, to telephony reception.

Benefits of a Filter

An audio filter can be used with any type of receiver, superhet or TRF. It is of

The general idea of getting improved selectivity by the employment of tone filters at the audio end of the receiver is not new. But in spite of the ease with which CW signals can be peaked up by means of such filters, their use has not been widely accepted in amateur practice. This article is an important contribution on the subject and the author offers an original design, applicable to any receiver, which will considerably increase its discrimination against unwanted signals

particular value with the TRF type, which is prone to suffer from lack of selectivity.

For CW reception, the note of the incoming signal is adjusted to correspond with the resonant frequency of the filter. Because of the special characteristics of the latter, it is then amplified to a considerably greater degree than other frequencies, with the result that interfering signals on adjacent frequencies (and possibly of originally greater strength) become much less prominent and are more easily "forgotten" by the ear.

In the case of telephony, a very peaked response, such as is desirable for CW, renders speech almost unreadable, as is actually the case with the present design. If, however, the response can be flattened out to some degree, the low and high frequencies will still be considerably attenuated and, although naturally the mid-band response will not be linear, the intelligibility can often be improved. Interfering signals, sidebands and heterodyne whistles caused by beating carriers will be much reduced in strength.

A further benefit is the reduction of background noise. It is a well-known fact that the narrower the pass-band, the less the noise, whatever its source or origin, internal or external. With high positive regeneration, the decrease in the level of background noise is very marked.

The present design does three things. With the positive and negative feedback controls (more of these later) suitably adjusted, the unit becomes a straightforward amplifier, but with relatively increased amplification between roughly 500 and 1,500 cycles. In this condition, it has been found excellent for telephony reception. For better linearity, the output tuned circuit may be replaced by a high-inductance choke. It may also be noted that if the input and output tuned circuits are replaced by resistances, the linearity can be made extraordinarily good.

Further adjustment of the positive feedback control, almost to the point of self-oscillation, results in the steep response curve illustrated in Fig. 1. It is necessary

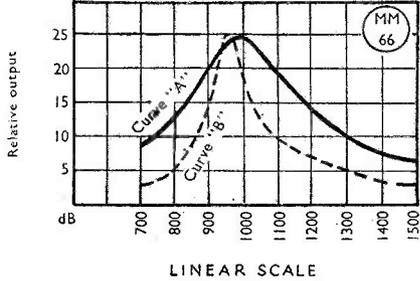
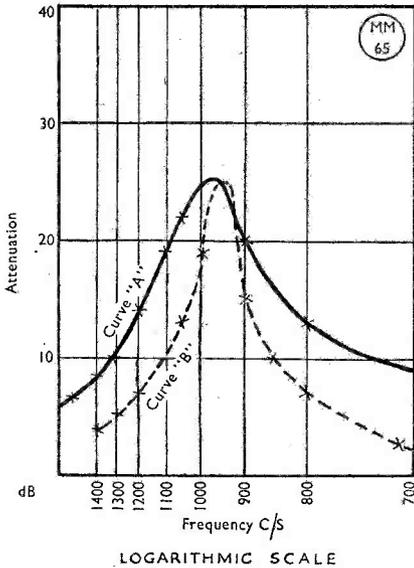


Fig. 1. Response curves of the filter unit, on an expanded scale. Curve A is with both R4 and R5 backed right off; the curve can be flattened by advancing R5. Curve B is with 80,000 ohms of R5 in circuit, and R4 advanced to a point just off self-oscillation.

for the receiver itself to possess good frequency stability or it will be difficult to hold the signal within the narrow pass-band of the filter.

The third use is an unusual one. With the positive feedback control well advanced, actual oscillation occurs and the output may be employed, after further amplification, to modulate a transmitter for MCW transmission. It is very likely that this form of transmission will be called for on the new VHF bands being allotted to amateurs. The note produced is entirely suitable for the purpose.

Points on the Design

The performance of a filter is related to the "Q" of the tuned circuit. Due to various factors (thin wire, iron core, external loading, and so on), it is impossible to achieve an inherently high value of "Q." The selectivity curve is not as steep as one would wish and the performance is disappointing.

To attain the desired objective, it is necessary to enlist the aid of valves and introduce positive reaction to increase the apparent value of "Q," at least of the input tuned circuit, to a really high value. At the same time, negative feedback is also introduced, to stabilise the action of the circuit and minimise the effect of variations of supply voltages, loads (both input

and output) and ageing or changing of valves.

The circuit, shown in Fig. 2, employs two triode valves, which may be of almost any medium-impedance type. For that matter, a double-triode can be used provided separate cathode connections are brought out, thereby making possible a very compact unit.

The first stage includes a tuned grid circuit, the constants of which should be such that resonance occurs between 900 and 1,000 cycles. The value of C2 (and C7) is given as .01 μ F but this will only be correct if the choke employed has an inductance of 3 Henries at 1,000 cycles. A word of caution is necessary here. The writer used initially a choke of unknown make plainly marked "3 Henries" but, in fact, a total capacity of .05 μ F was necessary to secure resonance at 1,000 cycles. Obviously, something was wrong somewhere, and on testing the choke, it was found to have an inductance between 2.5 and 3 Henries at 50 cycles but only about 0.4 Henry at 1,000 cycles, due presumably to magnetic leakage! A reliable make of choke should therefore be used. One of lower inductance than 3 Henries can be employed, at a pinch, but the results will not be quite so good, because of the lower dynamic resistance. Experiment will then be necessary to arrive at the proper value of C2. These remarks apply also to the anode circuit of V2.

The R4/C3 combination introduces positive feedback—R4 should be wired so that clockwise rotation increases the amount of feedback. The negative feedback path is through C5 and R5 to the

cathode of V1. In this case, clockwise rotation of R5 should decrease feedback, *i.e.* increase the resistance in circuit. No by-pass condenser must be connected across R2.

A tuned circuit, having constants identical to those of the input circuit, is connected in the anode circuit of V2 and assists in sharpening the response.

It is assumed that the gain will be controlled in the receiver itself. No gain control should be fitted in the grid circuits of V1 and V2 or the operation as a whole will be upset. One can of course be fitted preceding R1 and can take the usual form of a .5 megohm potentiometer connected across the input jack or terminals, with the moving arm connected to R1.

Construction

Little need be said about the construction. The unit is purely an audio frequency device (and a stable one at that) and liberties can be taken with the lay-out, wiring, and so forth, to suit the constructor's convenience. Since the two-valve combination gives quite a degree of amplification, the filter can be built in as the audio part of a receiver, in permanent form.

As shown, the circuit is suitable for use with telephones—if loud speaker operation is desired, it will be necessary to add an output valve of the 6V6 type, the grid being fed from C8 (reduced in value to 0.1 μ F) via a 250,000 ohm gain control. Many receivers will already incorporate an output valve and, if there is no objection to the making of internal modifications, the filter can well be fitted in between the first audio stage and the output valve.

There is one point to watch—that the insulation resistance of the coupling/blocking condensers C1, C3, C4 and C5 is high—otherwise the valve operating conditions will be altered.

Using the Filter

The input voltage will normally be taken from the telephone jack of the receiver and, in the case of commercial receivers, it should not be taken for granted that the sleeve is the "earthy" side of the telephone plug—in some receivers it may be the tip. This is the reason for the inclusion of the change-over switch which precedes R1—in many cases it may not be required.

In the first place, R4 (positive feedback) should be backed right off. With R5 (negative feedback) also backed off, the inherent gain will be evidenced by the strength of signals, noise level, and general "feel" of the receiver. As R5 is advanced, the gain will progressively fall off. A setting of R5 such that about 100,000 ohms, or somewhat less, is in circuit will generally

Table of Values

Fig. 2. Circuit of the Filter Unit

- R1 = 47,000 ohms
- R2 = 3,000 ohms
- R3 = 100,000 ohms
- R4 = 0.5 megohm potentiometer
- R5 = 0.25 megohm potentiometer
- R6 = 247,000 ohms
- R7 = 1,000 ohms
- (All fixed resistors, $\frac{1}{2}$ watt)
- C1, C3, C4, C5 = 0.1 μ F, paper
- C2, C7 = 0.01 μ F, mica
- C6 = 50 μ F, 12v electrolytic
- C8 = 0.5 or 1.0 μ F, paper
- LF Chokes = DP18 Varley, or similar
- V1, V2 = L63, 6J5, 6CS, etc.
- Switch = D.P. Change Over

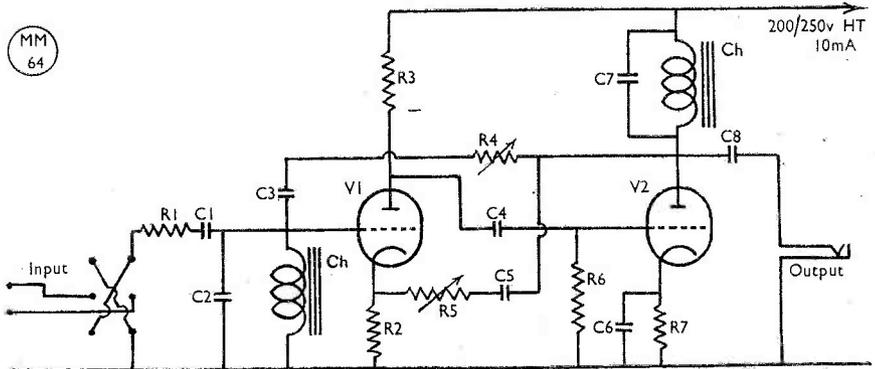


Fig. 2. Circuit of the GSJU audio filter ; it can be built as a separate unit.



be found about right—the operation of the filter will be stable without too much loss of gain.

On advancing R4, at the same time tuning through a heterodyne beat note, it will become more and more noticeable that the tone corresponding to 950/1000 cycles stands out above other frequencies. Beyond a certain point (dependent on the degree of negative feedback), self-oscillation will occur. When receiving CW, R4 should be set a little short of this point.

Too close an adjustment will give rise to "singing," rendering the incoming signals difficult to copy. For telephony, R4 should be backed off to the full extent, and R5 advanced if necessary—the additional negative feedback will tend to flatten out the response, but gain will be lost. The adjustment of R5 will therefore depend on reception conditions, strength of signal and the total amplification available external to the filter unit, so that no hard-and-fast rules can be given.

Few Watts on Forty

Is QRP Worth It?

By J. E. BOWDEN (G2AYQ)

IS QRP worth while? To those who wish just to push over a switch with 50 to 100 watts, call CQ and get dozens of other stations coming back—NO. If you want to make a contact every time you call CQ, then again the answer is NO. But if you want to capture the real *excitement* of a contact then its QRP you want. How many remember, as does the writer, building the first crystal set and the thrill of hearing that first station? Or the reception of your first W on short wave? All this and more can be got from QRP. (Some of the QRO types should try it sometime at the week-ends on 7 mc, instead of pushing out more and more power and making the QRM worse!)

The writer has yet to use more than 5 watts and although he lives on the other side of England to friend G3XT, Scotland, Northern Ireland, Eire, France, Germany, Belgium, Holland, Italy, Denmark, Sweden, the Azores and G's all over England have been worked. The best to date is SM7GI who gave RST-579. Many QSL cards received are endorsed "FB for QRP, OM." An outstanding G two-way QRP contact was with G3XT himself, he using one watt and the writer with two; signals were RST 569-559 respectively.

7 mc Used

All contacts were made either on 7035 or 7070, mostly at week-ends when QRM is worst. Although physically handicapped with only one arm, all gear (except a surplus wavemeter) is home-built, with the

The enthusiasm of low-power operators for QRP knows no bounds. We are glad to print here the contribution of another keen advocate of QRP working on our 7 mc band.—Ed.

aid of the XYL for some of the tough spots.

The beauty of QRP is that one can pull the Tx down and build it up again in a very short time. Circuits are constantly changing at G2AYQ. The present rig is a 6V6 regenerative CO, all power from batteries; 6-volt battery for heater, and HT from dry batteries made up from surplus 22½ volt blocks. The aerial is the "Multi-Band Aerial System" from the *Short Wave Magazine* for August 1946. This is link-coupled by 35 ft. of plastic flex to the Tx in another room.

The *modus operandi* is not to call CQ but to search the band for weak to fair CQ calls. Usually they are the ones who come back. Most of the QRO's do not seem to worry about a weak signal or even search the band, but just sit tight until someone drops in on them with an RST599 signal. Up to the present time 7 mc is the only band worked at G2AYQ, and operation there is most enjoyable in spite of the QRM.

On the whole, the writer feels that QRP is well worth while and if Sweden can be raised on 5 watts it should never need more than 25 watts to work the world. So have a go—G2AYQ will be listening!

★

STAMPS FOR SCOUTS, PSE

G6LH, Stickney Rectory, Boston, Lincs, asks for foreign stamps from readers, for passing on to his Scout troop. When your foreign QSL's come in, remember G6LH, and send the stamps to him direct—they will be greatly appreciated.

DX COMMENTARY

ON CALLS HEARD, WORKED & QSL'd

When DX work becomes as simple and as universal as it has been during the past month, it is in danger of being accepted as the natural state of affairs. This is made increasingly obvious by the number of letters received which state "Nothing to report this month except routine DX . . ." After examination we often find that "routine DX" means about 33 Zones and 60-70 countries worked *during one month!*

The next few years will show us just how much this easy DX-catching is due to improved technique and how much we owe to conditions. Personally, we feel that conditions are to be held responsible for about 80 per cent. of it; and that there will come a time when it is almost a DX achievement to work a VK or ZL again. However, we shall see.

DX Technique

There are no particular grumbles and grouses this month, but there is a very interesting letter on the subject of the present trend of behaviour. It is from a Very Old Timer who prefers to remain anonymous, and we quote *verbatim*: "So much has been said and written regarding 'spivvery' during DX chasing, but still, to my mind, the root of the evil has not been uncovered. The 'long caller' is the menace. I am convinced that the most effective way to raise that DX pearl is to call him on or near his frequency—it doesn't matter—four or perhaps five times at 14-15 w.p.m. If after six seconds of listening this station has not replied, try again tomorrow—or, in certain cases where there is no swarm of bees, repeat the procedure straight away.

"It is the man who calls ten times or even more who takes up and fills the precious few kilocycles that others want to listen on who is the real selfish killspout, albeit unwittingly.

"In other words, for 30 seconds present the DX pearl with a cacophony of notes and let him choose."

Now all this represents such sound common sense and truth that we will not spoil it with comments. Just try it, some of you long-callers; you might, at any rate, hear the DX man come back to

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

someone else and find out how the land lies. As it is he is usually half-way through a QSO before you listen.

Our correspondent also agrees heartily with last month's plea for "CQ-less periods" and suggests that if G stations would refrain from calling CQ between each hour and ten minutes past it would certainly lessen QRM. At this point Arabackle chips in and says "Why not only *allow* CQ calls for the first ten minutes of each hour and make the blokes listen a bit more for the other fifty?"

It also occurs to us that so much time is wasted by listening to G's calling CQ when they sound rather like DX stations, that the universal use of directional CQ's would probably help. In other words, if you hear "CQ ZS" or "CQ VK" don't bother to listen; it's probably a G. In

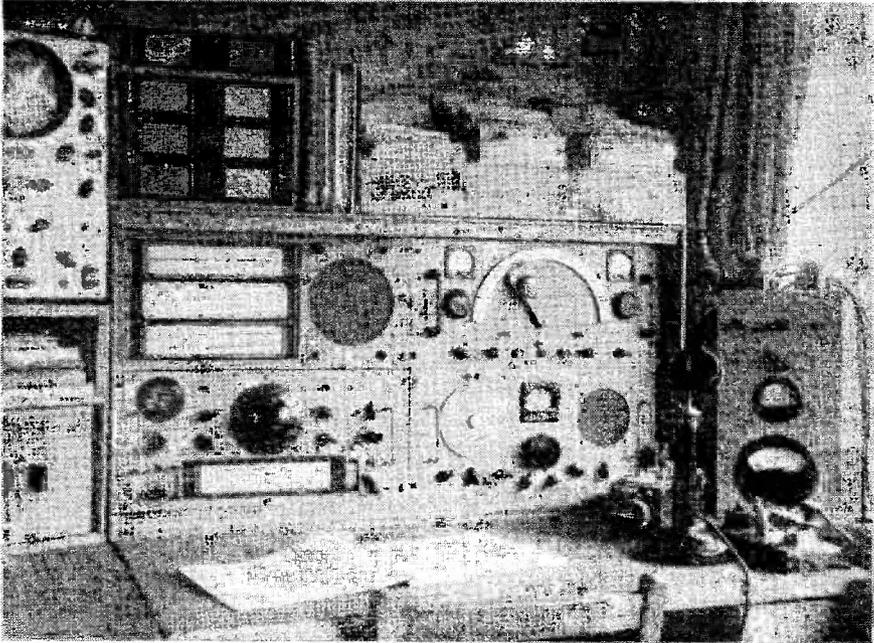
CQ DX CONTEST

Those who obtained the rules and log-forms from us, and are entering for this Contest, are reminded that logs should be sent direct to CQ, and not to the *Magazine*; we should, however, be very interested to have total scores claimed, for mention in this feature.

any case, should it be anyone else, you've no business to reply to it! (These remarks for G stations only, naturally.)

Four-Band DX

Quite a formidable array of four-banders appears in the table this month. The order of priority, this time, goes to 14 mc, as our prime DX band at present. Note that 60 per cent. of the people in the list have worked more than 100 countries on 14 mc! Last month we called it the Four-Band DX Club, but we should like to make it clear that there is no suggestion of forming an actual *club*; we were only following the modern trend of calling almost anything a club or a fellowship or



The operating position at G6HL, Shepperton, Middlesex. Main receivers are HRO (bottom left) and modified Hallcrafters 5-10 (to right of the HRO). Above the 5-10 is a frequency meter and to its left the HRO power supply, coil rack and speaker. Other units are an oscilloscope, aerial control panel and power input adjuster. The table flap folds up to provide a front lid for the receiver rack.

a gang. Loose thinking, that's what it was! So in future the fellows just see themselves listed under the title of "Four-Band DX."

You Can't Beat This One

Every time someone claims a new record someone else ups and beats it, but here is one that we guarantee will remain unchallenged. Concerning G3DAH's travels, we remarked last month that someone might "Visit All Zones" one day. To our amazement a letter arrived from G6SX (Ringwood) telling us that he has visited 38 of them, only being short of Zones 17 and 18! He can substantiate this claim in every detail with log-books, discharge books and so on.

This amazing record of DX travel can be attributed to the fact that G6SX was first a radio officer at sea, secondly a pilot in the RAF (seconded to the RCAF and USAAF) and thirdly a BOAC radio officer. Countries visited include such DX spots as UAØ (Vladivostok), HZ,

VU7, C8, XZ, VU4, HS, ZC2, PK4, KH6, VR2, EA8, CR4, ZD7, OQ5, FB8 and TF—to select only the rarer ones. 'SX says the easiest way to work DX is to get on the commercial frequencies and then travel out to the stations you want to work—but you don't get QSL's.

CQ DX Contest

By the time you read this, the 'Phone leg of CQ's DX Contest will be over. The CW affray takes place next week-end (November 6-8). Please send your entries for this Contest direct to CQ and *not* to us; but, as a matter of interest, send us your final score if you care to do so, in order that we may see how things are shaping up.

The Emigrants

Ben Wallich, now only to be described as ex-G6BW, has got to New Zealand, whence he hopes to make himself heard soon. He closed his station at 1351 GMT on September 16, and during the previous one hour and thirty-five minutes worked

FOUR-BAND DX

Station	Countries Worked					Power
	14	28	3-5	7	Total	
G2VD	146	50	17	32	154	150
G6QB	140	101	27	48	170	150
G3DO	133	85	10	25	161	150
G3AAE	128	26	18	28	130	75/125
G3ATU	125	32	21	27	125	10/150
G3AKU	121	6	21	12	126	30
G5FA	110	8	7	66	119	150
G5WC	110	12	1	43	112	18/45
G8LO	106	10	10	27	106	150
G8IP	104	51	13	26	120	3/150
G3ACC	101	2	16	3	122	150
G2YS	97	12	18	21	98	150
OZ2NU	94	7	21	57	129	35/60
G8QX	89	60	3	15	115	150
G8VB	87	11	38	28	110	150
G4QK	70	2	19	22	74	100
G3AKF	64	21	22	30	83	60/150
G2DHV	52	2	12	21	53	35
G2VJ	48	36	4	6	79	25/100
G3AGQ	22	5	20	33	48	?

out a WAC on 28 mc 'phone—a fitting swan-song from a real enthusiast.

David Mitchell (ex-G2II and GW6AA) now rejoices in the call of ZL1MP. He is very anxious to work old friends and would appreciate calls or reports from anyone hearing him on 14 or 28 mc. Best times, he finds, are 0630-0930 GMT on 14, and 0900-1100 GMT on 28. QTH—see list.

Good Work on 7 mc

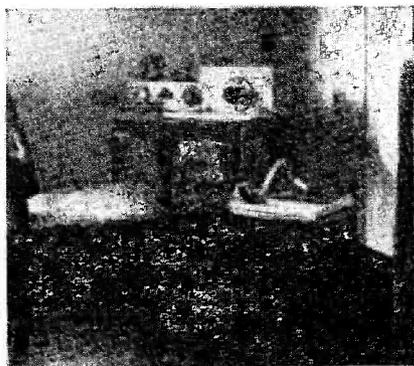
Our 7-mc stalwarts will be pleased to hear that W2RDK has made his DXCC on 7 mc only, with 111 countries worked and 105 confirmed. G3HK (Maryport) sends this news and suggests that some of the DX fraternity who have backed out of the WAZ list might care to let us know what they have done on the individual bands. Let us hope they show up in that Four-band DX table; although just now some of the top-scorers are extraordinarily coy about their doings.

Talking of 7 mc, here is G5FA (London,

N.11), who is the top scorer for the band in the present four-band list, with 66 countries. He says he had a few days up there recently and worked a lot of old friends in W1, 2, 3, 4, 5, 8, 9, Ø, PY, KP4, CN8, CT3 and VK. He thinks the band is going to be good this season and is building a separate final for it. 'FA tells us that ON4JW is putting up "a couple of 120-foot sticks" for 7 mc. On quite another subject, he asks how it is that so many QSL's seem to get lost in transit? He has been chasing up his necessary cards for DXCC (92 confirmed so far) and finds that cards said to have been despatched six months ago simply have not turned up. Similarly, stations that he has QSL'd by air mail tell him that his card has never reached them. What happens? They can't all be telling lies!

G8VB (London, W.5) in submitting a claim which puts him at the top of the 3-5 mc scores with 38 Countries Worked, tells us that he has established the first-ever 'phone QSO's with PY and KP4 on that band. He asks us to tell all the G's and other Europeans who try to "barge in" during these contacts that he spends a lot of time actually trying to sort out a clear channel for them, and their impatience only makes things much worse. If they would only hold their horses they would be far more likely to find themselves put through.

KP4ES operates 'phone on 3925 kc and is there from 0300 GMT for about



The neat little outfit at VK3NC, Casterton, Victoria, whose Tx runs a 6V6 in the final with 5 watts input; the Rx is a home-built two-valve superhet, using 6K8-6C8 without an IF stage; but the aerials are a 6-wave terminated rhombic and three vertical Vee's 63 ft. high at the apex. On this equipment VK3NC (who is a member of our First Class Operators' Club) has worked 98 countries on 14 mc!

an hour, and G8VB operates between 3740 and 3560. European stations who are invited to zero-beat with him should see that they really *do* (at the right time !) and not vaguely get somewhere near. G8VB also asks us to mention that VE1GR, that staunch DX worker on 80-metre 'phone, is seriously ill, in hospital, with a heart attack and will possibly never be heard on the air again. This will be sad news to many of the 80-metre fraternity who knew VE1GR as a real friend ; they will without doubt join in wishing him a speedy and complete recovery.

An old friend has cropped up again—Harry Pain, one-time “proprietor” of ZB2A, and now VS7PH. He tells us that VU4AC is not yet licensed officially, but will be shortly. His QTH is Minikoi, Laccadive Islands. VS7PH is active on 14 mc CW, and the list of stations worked during August and September shows that he gets around in great style.

G8IH (London, W.5) sends in his first WAZ score, which is a good one, and passes on the QTH of VP8AK—inter-



“ Wotcha mean, poor quality, only S3, pull the string tighter then ”

ZONES WORKED LISTING

POST-WAR

(Starting Figure : 30 Z)

Station	Z.	C.	Station	Z.	C.
'Phone and CW			'Phone and CW		
G8KP	40	179	G8VR	35	104
ON4JW	40	172	G2YS	35	98
G6QB	40	170			
G8IH	40	168	G5WC	34	110
G2AJ	40	167	G8PL	34	105
G2WW	40	163	GM3CSM	34	94
G3DO	40	161			
G4CP	40	161	OZ2NU	33	129
G2AVP	40	142	G3DAH	33	103
G3AAE	40	130	G5HH	33	92
G8IP	40	120			
			G3ACC	31	101
G2FSR	39	160	G2BJY	31	96
D2KW	39	158	G3BNE	31	76
G2VD	39	154			
G3BI	39	131	'Phone only		
ON4MS	39	130			
G4AR	39	128	G2ZB	39	144
G5CW	39	126			
G3AAG	39	124	G3ZI	37	136
G5MR	39	108	G3DO	37	127
G6PJ	39	82			
			G6BW	36	130
G3ATU	38	135	G2BXP	36	81
G5FA	38	119			
G8KU	38	115	G8QX	34	115
G2AO	38	114			
			G3DAH	31	91
G3AKU	37	124			
G8LO	37	104	G2VJ	30	79
G6BB	36	99			
G2BXP	36	65			

esting because he is in the South Shetlands.

G6PJ (Sheffield) recently worked VP6CDI and was greeted by G5IH, who was on the key there. 'IH is in the Navy and seems to be getting around.

G2FSR (London, E.4)—you may remember him as VS4JH—also sends in his first claim. He has the countries all right, but Zone 23 still eludes him. Recent scalps include HR1MB, PJØX, VK9GW, KX6AF and HP1LL, all of which sound quite nice.

Some choice pieces on the 7-mc band come from G3AKF (Catterick), who has collected PY7WS (2300), KZ5AX (0045), KP4GO (2330), KP4HU (0215), YV5AL (0240), CM3CS (2355), and UA9KWA (0215). All times GMT (unfortunately), showing that you can't have both sleep and 40-metre DX. All these, by the way, with 60 watts.

GW3ECH (Trecwn), whose “beginner's” luck was mentioned last month, reports that it has failed him a little, but he has chased up VP8AD, VP9CC, KZ5CP and HC7KS—all 14 mc in the evenings. On 28 mc he received a 599 report from a W6 when he was using a dipole 15 feet high and tied to the house wall !

Pirates Again

Nefarious activities continue, this time by someone borrowing the call of old-timer G2HP (London, S.E.4). The pirate

DX QTH's

AC3NC	P.O., Gangtok, Sikkim.
C3EA/C3	Sgt. Al Hattlested, AAG Nanking, APO 909, c/o PM, San Francisco.
C7OO	C. H. Sun, Box 52, Peiping.
CT3AA	Beco, Chao da Loba 8, Funchal, Madeira.
EA8AO	Apertado 22, Villa Cisneros, Rio de Oro.
ET3AE	R. Newberg, Box 145, Addis Ababa, Ethiopia.
HC7KD	Box 340, Quito, Ecuador.
J7ABN	APO 468, c/o PM, San Francisco.
MD4TH	Box 436, Mogadiscio, Somalia, East Africa.
OA4CJ	J. W. Spack, W9BJN, Panagra, Lima, Peru.
OY8LA	Box 35, Thorshavn, Faroes.
PK4PO	Box 222, Soerabaia, N.E.I.
VP8AK	J. W. Knox, c/o PM, Port Stanley, Falklands. (<i>Sin. in South Shetlands.</i>)
VU7AF	Surjit Singh Majithia, Indian Ambassador, Katamandu, Nepal.
W3LYK/Antarctica	APO 912, c/o PM, San Francisco.
W8OZG/C1	Box 501, Tsingtao, China.
ZL1MP	D. Mitchell (ex-GW6AA), c/o Bank of New Zealand, Queen Street, Auckland, N.Z.
ZP3CM	M. Zibatowsky, Rio Blanco e Independencia, Asuncion, Paraguay.
ZS6TP	Ex-VS1AK, Box 6406, Johannesburg.

seems to be on 7 mc, and G2HP remarks that as he has been on the air for 23 years he doesn't want someone blotting his copybook for him now.

GC2AWT (Jersey) has received a card from the notorious DA7AA listing all his achievements, and adds that he has had a number of cards from DA's, including one from the Soviet Zone, complete with Soviet stamp, and sent openly with no envelope! He diagnoses YQ5E as being another Roumanian pirate like YQ5U, who blandly announced that he used the prefix YQ "because no licence."

Shorts

A newcomer to all bands is G3EIZ (Liverpool), whose first QSO was UB5KAB, and second VK3XU. Since that he has worked VK5, ZL1 and VP8AP—all before working his first G or W! This with 25 watts to an 807.

G8VR (London, E.2) was QRT six

months for a little matter of getting married, but since then has rebuilt the station with the help of the enthusiastic XYL! This seems to presage great activity from G8VR in the future . . .

G4QK (Croydon) says suitably rude things about local contacts on the DX bands. He was trying to help VP6CDI, HK3FF and CT3AB to work each other when a local started calling another local. On being told it was all a pity, said local admitted that he "couldn't hear any DX." That's usually the trouble. But so many of these types who can't hear any DX have got perfectly good commercial receivers and simply don't know how to listen.

An interesting letter has arrived from VE2KS (Montreal) who has been taking note of the inputs quoted on British QSL cards. He finds that his cards show the following: 100-150 watts, 28 per cent.; 50-100 watts, 23 per cent.; 25-50 watts, 19 per cent.; 15-25 watts, 28 per cent.; under 15 watts, 1 per cent. Talking of notes, he says "G notes are good as a whole, but a lot of the boys should get a VR150 stabiliser. It is absolutely impossible to work DX here without a good crystal filter . . . but many G's 'yoop' so badly as to be unreadable." Final heart-cry from VE2KS: "Wish to heck that VS2CB, VS7RP, AP5B and VU2BG would listen for someone other than W6's calling them—namely me!"

Talking of notes, we recently chatted with a VK and a W6 on the subject, and they both remarked that if they gave anyone a T9x they invariably found that he was using either a crystal or a Clapp oscillator. Interesting, that, because we find the Clapp is infinitely better than anything tried before, and quite indistinguishable from crystal in the monitor. A great future for the Clapp oscillator is certain—some of you "yoopers" please note. And it does *not* need stabilized HT.

George Tompkins, one-time operator of VS9GT, noted the remark that MP4BAB was ex-VS9GT, and writes to say that he was "the" VS9GT and is now in the U.K. But another operator definitely adopted the call-sign during this spring and was worked by all and sundry, and it is this same op. who is now MP4BAB.

G3AKU (St. Ives) puts in a plea for the occasional "CQ DX" call, and says that he worked KS4, CZ2, MD7, VS9 and KA1 that way. Well, we have never suggested a *veto* on CQ calls; after all,

if no one called CQ there wouldn't be any QSO's except by schedule. And we have never forgotten the red-letter day last year when we called CQ on a dead band and had replies from VR2AR and ZM6AF on the same frequency! The real folly is calling CQ DX on a lively band full of DX stations also calling CQ DX—and you'd be surprised how much of that goes on.

Nice new ones from G8OJ (Manchester) include ZD8B, VP8AD, HK3FF and F18ZZ. The latter seems to be genuine in spite of his funny call.

GM3CSM (Glasgow) set out to work 100 countries during his first year on the air. In 51 weeks of it he has raised 94 of them, in 34 Zones. Will he succeed? Another thrilling instalment next month!

G3AWR, one of these globe-trotting types, found two copies of the *Magazine* in a bookshop in Hong Kong. He noticed that in July we bewailed the lack of a UM8 (since rectified!) and tells us that he heard UM8KAA when in Singapore—and on 7 mc. While his ship was in ZL waters he listened on 7 mc, and Europeans were putting reasonable signals in at about 0330 GMT.

G3CHN (T.E.V. *Francine Clore*) did some hard listening on the LF bands during his last Transatlantic trip. This



For the W/VE Field Day VE2CO (operating) and VE2KS, president of the Montreal Amateur Radio Club (see p. 615, December, 1947), set up a 7-14 mc station on Mount Royal.

1948 MARATHON

Station	Z.	C.	Station	Z.	C.
'Phone and CW			'Phone and CW		
G2EC	40	152	G3BNE	30	72
G3AAE	40	110	G2DFR	30	61
G4CP	39	138	G5MR	30	43
G8KP	39	131	G2BJY	29	89
G2VD	39	125	G2AO	29	80
G3DO	39	122	G8LO	29	73
G2AVP	39	108	G2BXP	28	66
G3BI	39	108	G6XX	26	52
G3ATU	38	114	G5HH	25	62
G2AJ	38	110	G3ACC	25	55
G8IP	38	92	Phone only		
G5FA	37	111	G3DO	35	104
ZC1CL	36	109	G3ZI	32	81
G3AAG	36	103	G3DAH	31	86
G2WW	35	112	G2BXP	28	65
G2DC	35	92	G2VJ	27	64
G8KU	34	95	G8QX	25	80
G8PL	34	95	G6CB	25	54
G3DAH	33	102			
GM3CSM	33	84			
G4AR	31	88			

makes him remark "If the boys must give out long-winded CQ calls on CW, they might send their own calls a little more frequently. Several times I would hang on like grim death to a weak CQ; he would just get to 'de G . . .' and on would come a kilowatt. 'Nuff said.'"

The most interesting reception by G3CHN was on the 1.7 mc band, when 360 miles south-west of Land's End. He logged G2FiS, 3ACK, 3ARS, 3BFG, 3DUC, 3EGT, 4LP, 4LQ and 6RQ. G3ARS was S9 plus 20 db, and G6RQ was 599. The 3.5 mc CW band, at a QTH 1,350 miles south-west of Land's End, yielded G2CGQ, 2SF, 3AMR, 3DAG, 3DOB, 3UD and GM3DZQ. 3.5 'phone, between 1350 and 750 miles out, produced G2ACV, 2DRT, 3BUX and 3UD.

Middle East News

MD5KH sends us news of the MESRA (Middle East Services Radio Association), and what he calls an incomplete list of call-signs. They include stations in VS9, MD7, MD1, MD2, MD3, MD5, ET3, SVØ, ST2 and MD4. ZB1 and VQ3, 4

and 5 are also coming under their wing shortly.

The Coming Season

We are constantly being asked to do long-range predictions concerning the behaviour of the DX bands, and the only predictions we are really any good at concern the previous month rather than the following one! But, in particular, there seems to be an awful amount of interest in 7 mc for the coming winter.

At the risk of becoming very unpopular with the 7 mc enthusiasts, we have turned up some back logs to look up times and places on the band, and quote from them—for what they are worth.

In December, 1932, the log shows QSO's with VK6 (1545), VQ4 (1645), ZL (0745), ZL (1855); ST (1640), VK3 (1650), YI (1710). December, 1933, to February, 1934, shows the following: ZL's and VK's (1530 to 1740 on a Sunday afternoon!); ZS's (1920, 2200 and 0150); VU's (0200 and 0250); ZD1 (0300); VS6 (1700); CR7 (1940). The year 1935 shows much the same tale, plus ZL's at 0700 in May and June.

By the winter of 1935-36 the 28 mc band was wide open, but 7 mc was still yielding ZL's (1800 and 0700), VK's (mostly 1900) and VU's, VS6's and VS1's at all times between 2000 and midnight. In 1937-38 we apparently didn't use 7 mc except for local phone! *Not* during the DX periods.)

Stop Press

G8BR (Southend-on-Sea) reports that his call is being "pirated" by someone giving his QTH as Rugby. The station concerned does not seem to work anyone but sends a lot of "tripe from a book." Strange that he should need a call-sign—let alone someone else's.

We are asked by a correspondent who knows the facts to state that last month's tirade from a listener about "one station with a punk transmitter and one with a punk receiver" does not, in this correspondent's opinion, bear much relation to fact. Two stations in the Durham area have been carrying out tests; one station, without much in the way of aerial facilities, asked another to request some of his contacts to QRX and listen for him—quite a normal procedure. Fortunately the two gentlemen concerned have taken the listener's remarks in the right spirit and with a sense of humour.

Next month's deadline is first post on November 11. Address everything, as usual, to DX Commentary, 49 Victoria Street, S.W.1, but *please* keep those WAZ and Marathon and Four-Band statistics out of the letters! On a separate postcard or just a piece of paper they are so easy to deal with; in the middle of a long letter they can be really difficult. Until then, Good Hunting. 73 and BCNU.

FIRST CLASS OPERATORS' CLUB

President: Gerald Marcuse, G2NM

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

Members who have booked for the F.O.C. dinner should by now have had the circular giving the necessary details. If anyone booking has not received this circular, please write G2ZC direct for a copy. If cancellations are in prospect, early notice is requested, as there is a waiting list for dinner seats.

Marathon Contest

The Club Marathon is now in full swing and judging from the intense activity, more members are competing this year—so the contest may finish earlier than it did in 1947. With F.O.C. membership at 170 *plus*, it should not be difficult to work the necessary 75, as a contact can be claimed for any band used.

Election Notice

In accordance with the Rules of the

Club, the following have been elected to active membership:

I. Tonnesen, LA3BA (Tonsberg); J. Lamb, G6LD (Blackpool); F. Philip, OZ7FP (Copenhagen); G. J. Bennett, G3CYL (Burton-on-Trent); J. Dunn, G3BIU (Lands End); R. Penfold, G3DHZ (Kingston-on-Thames); V. H. Thorne, G3DFI (Cambridge); J. Worthington, G3COI (Wolverhampton); T. F. Hall, ZD4AB (Koforidua, Gold Coast); C. R. Thompson, G8WI (Woodbridge, Suffolk).

Circular Letters

These now circulate monthly on regular rotas, and cover matters of domestic interest to the Club; the *Magazine* notes are therefore intended to give a more general idea of its activities. In connection with the circulation rotas, a cup has been donated for an "inter-rotas" contest, teams to be made up of members of each rota. The details are at present under discussion, but it is intended that the contest shall take place next spring.

All correspondence regarding the F.O.C. should be sent direct to: Capt. A. M. H. Fergus, G2ZC, 89 West Street, Farnham, Surrey.

Aerial Switching Relays

Design and Construction of Suitable Units

By M. D. MASON (G6VX)

ONE of the most important items in any amateur station is the aerial switching: it is a hit-or-miss affair in a good many, for various reasons.

In the days of Zepp feeders, the aerial switching was usually done with the good old-fashioned double-pole change-over type of thing, on a porcelain base. This method in many cases was probably the most efficient that could be devised, especially as the feeder lines were usually spaced from 2 to 6 inches. In these days, when the coaxial and close spaced line are by far the most popular, a relay of some sort or another is desirable, but should be chosen with considerable care.

Unfortunately, many a good feeder system is spoilt by the inclusion of an unsuitable relay, just because it happened to be handy and convenient. But in practice it probably upsets the feeder system and does more harm than is imagined. There are of course plenty of relay installations that give excellent results although the relay in use may never have been intended for switching RF. There are cases where an amateur has decided that he has matched up a transmission line very nicely, but when the relay has been installed at some point in the line, a bad mis-match or a completely different tuning position of the final PA has become apparent. It too often depends on whether one is lucky or not, and whether the line was switched at a voltage or current point. If the feeder is perfectly terminated, and the relay has been designed to switch such a line, it should not matter where it is inserted. Losses due to poorly fitted relays are not always obvious unless very serious (such as the relay contacts having melted and dropped off!).

Relay Tests

The higher the frequency, the more care should be taken in checking change-over relays, and certain tests to make sure that all is well can quite easily be made. The

Though this article describes in particular relays designed for VHF aerial switching applications, the arguments put forward by our contributor are equally true of aerial relays for use on the lower-frequency bands. As he explains, much valuable RF can be lost and receiver performance seriously impaired by ineffective change-over arrangements.—Ed.

easiest way to check the performance of a relay that looks as if it might be "just what is wanted for the job" is to connect the feeder line, less relay, to the Tx and measure the power being dissipated at the other end of the line in the (correct impedance) non-inductive terminating resistance. Make a note of this figure, then insert the relay, and see if the power is the same; also that there has been no change in the tuning of the final PA, or input power level. If there has been a serious change don't use that relay. A few watts more or less going in or out of the transmitter does not matter

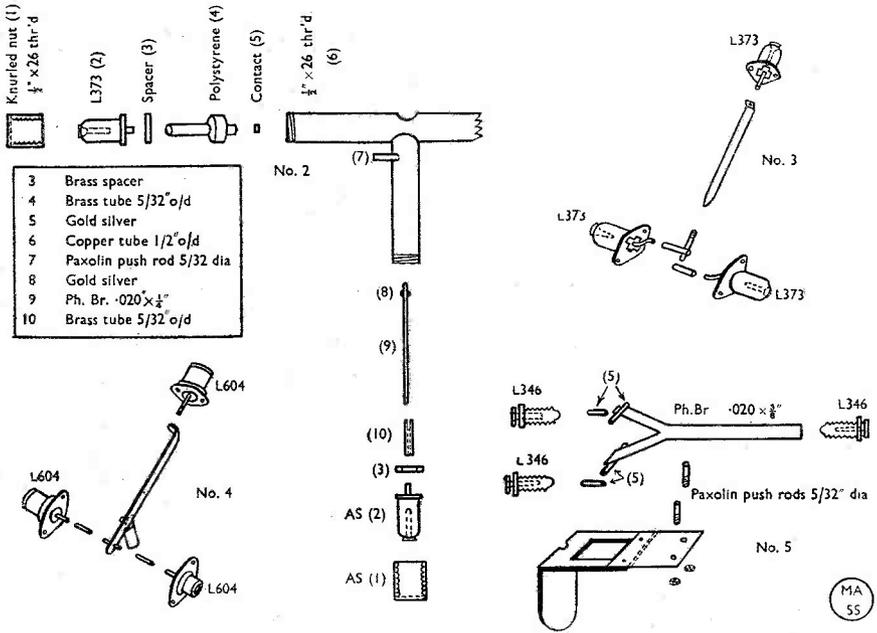


The five different types of home-made or adapted relays discussed in G6VX's article.

much, but the receiving side will suffer. The transmitter test properly done will go a long way towards taking care of the receiving side.

Relays for open lines are comparatively easy to acquire, or construct, to do a very good job at practically any installation, but the type suitable for close-spaced or coaxial lines is a little more difficult. The ones to be described have been made to cope with the aerial switching problem at 60 and 145 mc. The transmission lines in use are 100-ohm twin screened, 80-ohm small diameter coaxial, and 45-ohm half-inch diameter coaxial.

Relay No. 1 is a modified Type 78 twin coaxial (surplus market). This relay operates from 24v DC and will switch two separate feeders simultaneously. The one shown has had the inputs and outputs



Details of relays 2, 3, 4 and 5 described in the text.

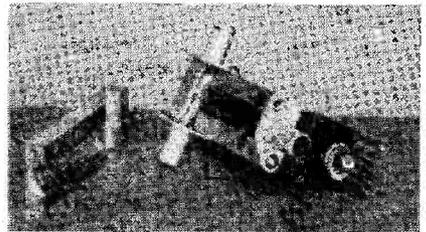
modified to fit a Belling-Lee plug type L373. Any of the many different types of coaxial fittings can easily be adapted to suit individual requirements. The 24v winding was removed and 2,300 turns of 38 g. enamel wound on in place. With this winding the relay will pull up satisfactorily on 50 mA. The resistance is 150 ohms.

For those who like to roll their own, the following relays will no doubt suggest practical ways of adapting existing parts for the job on hand.

Relay Construction

No. 2 relay is a combined low-capacity double-pole change-over for parallel lines, with a single-pole coaxial change-over built on, and operated by, the same armature action. The drawing shows clearly the operation and construction of the coaxial part. The contacts are made from $\frac{3}{32}$ in. 10 per cent. gold silver wire (Johnson & Matthey). The end connections are made from parts of surplus coaxial fittings. The tubular construction is $\frac{1}{2}$ in. thinned wall copper sweated together in the form of a "T" after first of all shaping the input side

to fit snugly at the butt joint. Then a drill that just fits the inside of the tubing is used to complete the through hole. A $\frac{1}{4}$ in. hole is drilled opposite the "T" joint so that the contacts will be visible during assembly and later for cleaning after use. A small clearing hole is drilled in the side so that the insulated pushrod can enter and bear against the spring change-over arm. The position of this hole will depend on the type of relay selected for the operating mechanism. The moving arm is constructed from a $\frac{1}{4}$ in. strip of .02 in.



The No. 3 relay, made from aluminum.

MA 55

phosphor bronze. The thickness of the material again can be varied depending upon the power available in the relay armature. The contact for this arm is made by drilling a $\frac{3}{32}$ in. hole $\frac{1}{4}$ in. from the end and then a $\frac{1}{4}$ in. length of contact wire is passed halfway through. This can be lightly soldered in place and then both sides are hammered down to form a double-sided domed-shaped contact about $\frac{1}{16}$ in. thick and $\frac{3}{16}$ in. wide.

Incidentally, the best contact face for RF seems to be a knife edge or two pieces of round rod touching at right angles to one another.

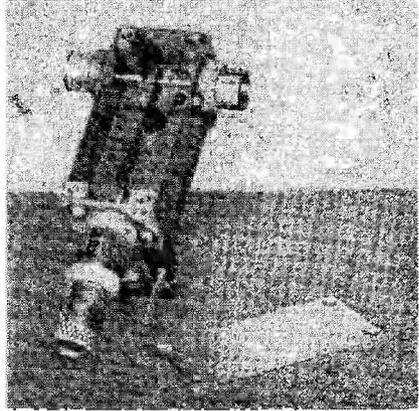
The third relay is a very simple type to construct and will perform equally as well as the others. The casing for this relay was made from two pieces of duralumin (or aluminium) $\frac{3}{8}$ in. by $1\frac{1}{4}$ in. by 3 in. long. The two pieces were clamped together to form a block $\frac{3}{4}$ in. by $\frac{3}{4}$ in. by 3 in. A $\frac{1}{2}$ in. hole was drilled right through along the joint to take the output connections, and a similar hole was drilled from one end to meet the first hole. This completes the "T" which was formed in the previous case by joining two tubes at right angles. By this construction the whole job is greatly simplified, because the coaxial fittings may now be screwed directly into the casing. The two halves are screwed together to form a solid block. The drawings and photograph shows the rest of the construction.

Receiver Relays

The fourth relay has been designed for low power switching such as the output from two convertors. The coaxial fittings are Belling & Lee Type L604. These are suitable for the smaller diameter cables.

The case for this relay was constructed from $\frac{1}{8}$ in. brass to form a completely screened box roughly the same size as the coil assembly. Although the true physical dimensions of the cable are not adhered to in the construction of this relay the performance, when tested in series with a 100-ohm line, was very good. The method of actuating the moving arm is slightly different from the previous models. The arm is pushed to one side for the "make" contact by the action of a conical shaped paxolin rod which is mounted on the armature, and travels upwards for about $\frac{1}{8}$ in. The movement is not as powerful as a direct push, but is sufficient for the light construction employed throughout.

The fifth type of relay has been designed to switch a twin 100-ohm cable. The connecting plugs and sockets in this instance are Clix. Four of the sockets have been

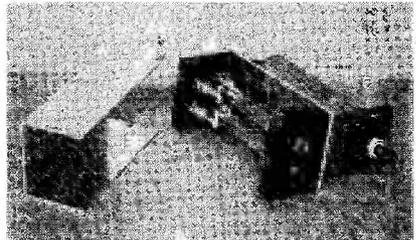


This is a very neat design for low-power or receiver applications—No. 4 in the text.

drilled so that a piece of gold-silver wire can be sweated in the end to form the contacts. The moving arms are made of .020 in. phosphor bronze and have the ends split so that each contact has its own individual tensioning when made in either position.

The contacts are also short pieces of gold-silver wire sweated to the phosphor bronze arm. The contact supports are made of $\frac{1}{4}$ in. thick high grade paxolin, and the base plate and cover are 16-gauge aluminium. In this case there are two push rods, working together from a common plate fixed to the armature of the original relay assembly. The push rods in all cases are made from gear fibre, which is reasonably tough and can be machined quite well.

It can be seen from the simple construction of this set of relays that it is really worth while to spend a little time on this side of the equipment and make a good job of the RF switching.



Relay (No. 5) designed to switch a twin 100-ohm feeder line.

THE VHF BANDS

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

*Six Metres Open Again—
Two-Metre Propagation—
Compact 145 mc Beam—
Individual Reports—
Contest Notes—*

WITH four VHF bands at our disposal as well as one UHF, it looks as if the Four-Band DX Club is in the wrong feature! Just as we put pen to paper, permission arrived to operate again on the 50-54 mc band until the end of the year. Apparently, this facility is available only to those who were granted it during the first five months of this year. One doubts if conditions will peak as they did last autumn, but we understand that there have been openings between North and South America during the past few weeks.

VHF activity generally appears to have been at rather a low ebb during the last month. The 58 mc band has been nearly deserted (or so we are informed), although to judge by the number of complaints about an empty band, it appears that the trouble is that everyone is listening and nobody transmitting.

A number of new stations have appeared on 145 mc, but there is still room for many more. A little 420 mc news has come in, but no outstanding contacts have yet been reported. On the UHF band of 2300 mc some interesting tests have been made in the Nottingham area.

Lack of activity on the VHF air is probably the sign of a high level of operations behind the scenes, and, in fact, considerable constructional work is in progress at most stations. We, therefore, look forward to a real increase in activity in a few months' time. Initial tests on 145 mc showed up weaknesses and inefficiency in the equipment at many stations and in some cases complete rebuilds have been considered necessary. We gather that every effort is being made to complete the work in time for the *Magazine* VHF Contest.

The comments last month on the quality of the Tx notes on 145 mc has brought us some rebukes from users of crystal-controlled converters, who point out that in actual fact, many, if not most, notes are chirpy (and that includes G2XC!). While placing on record our complete agreement that chirps are most

undesirable—and giving a solemn promise to make every endeavour to remove our own—we must, at the same time, say that of the 40 signals we have so far heard on the band, only one has drifted enough to make reception on a selective communication receiver difficult, and one had a T6 note. The remainder have all had CC characteristics. This we think is very commendable, and a good answer to those who anticipated an outbreak of SEO's.

And now, it appears that the same state of affairs is likely on 420 mc. Amongst those ready with crystal control for this band are G3APY, G5BY and G6LK. The band from 420 to 460 mc is far too wide to search properly and so we have been asked to get everyone working in the same part of the band. As presumably most people will use their 145 mc gear as a driver it seems best to confine operations, for the time being, to

SIX METRES REOPENED

Holders of the original 6-metre permits have been notified by the General Post Office that the band 50-54 mc may be used again until December 31, 1948. But it should be noted that this facility is granted only to those who obtained these permits earlier in the year.

section of the 70 cm. band in harmonic relation with 144-146 mc—that is, 432-438 mc. Even this is more than ample, and we therefore suggest that whenever possible the frequency should be between 432 and 435 mc. G5BY is on 432.5 and G3APY on 435 mc. G2XC will be on 434.7, but not just yet!

Propagation Notes

The past few weeks have further confirmed the fact that when the weather favours us two metres can be extremely good, possibly better than five; but on the other hand, when the depressions

get around, conditions on 145 mc really flop. We have been very keen to determine whether the 2-metre DX is due to a grazing reflection from air mass boundaries (inversions and the like) at a height of several thousand feet, or to ducting, *i.e.*, super-refraction due to an inversion at or very near ground level. Both methods are of course liable to be produced by the same type of weather, but whereas ducting is more effective at higher frequencies the reverse should apply to reflection. It has therefore been of interest to compare the reception in Portsmouth of the London TV on 45 mc with the London area 145 mc stations. The correlation is remarkable, and it has been possible accurately to estimate 145 mc conditions by looking at the TV picture. The only discrepancy is in the matter of fading, which is usually more pronounced on 145 than 45 mc. This evidence is, we feel, slightly in favour of reflection, and so far the Air Ministry weather data has indicated the same, but these are early days to come to definite conclusions. Comparisons between actual signal strengths on five and two metres may be misleading, as in general, more elaborate beams are in use on 145 mc and the whole question of Tx and Rx efficiency is involved.

Those who worked on five metres in 1946 will undoubtedly remember the astonishing signal G5TX (portable G5TZ) put out from the Isle of Wight. Most of us looked with envy at the site on the top of the Downs from which these S9 *plus* signals emanated. But during the last month G5TZ has demonstrated that he can do just as well, if not better, on two metres from his fixed QTH down in Newport, at sea level. Within the last week or so he has been joined by G3DEP in Ryde who has given a further proof of the amazing VHF DX possible from that locality. Our own location is 200 feet up on the northern slope of a hill, yet G3DEP and G5TZ work 200-mile DX at S9 when the DX cannot be heard at G2XC even at S1. Our receiver? Maybe! But this discrepancy is not evident to anything like such a marked degree in directions other than north, or on shorter paths, to say the London area. We think it is all part of the same puzzle as to why the Torquay stations are such consistently good GDX signals in London on 5 metres, and why certain other stations, well-known to you all, hear and work GDX when the bands seem completely dead to most of us. Much has been said about poor receivers, and many suggestions



In our October issue we noted some details of the new 2350 mc record of 13 miles set up on the South Coast by G3CBN and G8IH. Here is G8IH aiming the beam from the mobile location. On October 24, working in the London area, they increased the distance to 20 miles, a new record.

made about QRO. But it certainly seems that there is a "something" about some locations which makes them outstandingly good, and that that "something" cannot be measured only in terms of height.

To work 200-mile DX by reflection from a layer at, say, 5,000 feet, very near horizontal radiation from the aerial is required. In fact, the effective angle is less than $\frac{1}{2}$ -deg. Thus, any obstruction which subtends an angle of more than $\frac{1}{2}$ -deg. above horizontal is an effective barrier to tropospheric DX, and can only be surmounted by diffraction. G5TZ has supplied his National Grid Reference, and this has enabled us to

Two-Metre DX Working

Worked Over 250 miles	Station G5BY, G6OS
200 to 250 miles	G2IQ, G2OI, G3APY, G3BY, G3DEP, G5MQ, G5TZ, G6DH
150 to 200 miles	G2AJ, G2BMZ, G2MV, G2NH, G3AEX, G5US, G6LK, G6PG, G6VX
100 to 150 miles	G2XC, G3EJL, G8DM, G8DV

Claims are invited for insertion in this table.

calculate the angle above horizontal which hills and other obstructions subtend at his 35-foot beam. In the direction of Yorkshire the angle is 20 mins. In our own case, the South Downs make 1 deg. 24 mins, and here would seem to be the answer. Space will not permit us to pursue the subject further here, but we believe other examples of the same thing will readily spring to mind, and we should of course be interested to have readers' views on the matter.

At the same time, may we make it very clear that nothing we have said above is intended to imply that the equipment at these successful VHF stations is not also playing its part in achieving results. The signal received at G2XC from G5TZ at 18 miles leaves no doubt whatever that he is radiating a very useful quantity of RF. One other point, just before we leave the subject! On distances up to, say, 50 miles or so, where the signal follows the earth's curvature, not only obstacles above the horizon, but *all* high ground in between must be considered.

Conditions

Outstanding periods for 2-metre propagation have been September 24-26, October 1-3, October 7-8 and October 10. Many, if not all, these days were also good on 5 metres. The 145 mc DX record still stands at 287 miles (G5BY/G6OS) but some good contacts have been made between North and South, and across Southern England from Devon to Essex. Probably the best day, at least in the South, was September 26 when every signal seemed to be S9. PAØPN has been heard in Gloucestershire by G2AOK/A, and there have been rumours that weak signals from the direction of this country have been heard in the South of France on 145 mc! This again stresses the *need for signing on CW*. While the 2-metre stations were enjoying the September 26 thrills, the 5-metre contingent were busy adding to their county scores with good signals from Flintshire, Derbyshire,

58 mc DX AGAIN

At 2337 on October 23, G3HW/A worked F8YZ (Nancy-Villers) on five metres, over a distance of 457 miles. At the moment of writing it is not quite certain what type of propagation assisted this QSO, which occurred on the day Alexandra Palace TV was successfully received in South Africa by ZSIP, Cape Town.

TWO METRES COUNTIES WORKED

Worked	Station
14	G2AJ, G6LK
12	G2XC, G5BY, G5TZ
10	G6PG

Herefordshire and Cornwall, amongst others.

Compact 145 mc Beam

G6VX has sent details of a very compact and easily constructed 2-element beam, which appears to have a gain comparable with a normal 4-element Yagi. As G6VX is not the originator of this design, he cannot supply any further information than we give here, but he suggests that the beam is well worth a trial and a rough experimental one he has made up has given some very promising results (see sketch). Both radiator and reflector are in the form of a square with quarter-wave sides, two complete loops being used in each case. The squares are mounted vertically (diagonal vertical) one behind the other at a spacing which can be determined by experiment. Somewhere between tenth- and quarter-wave spacing looks probable for best results. The radiator is fed at the bottom corner with 300-ohm line, although 600-ohm line may be a better match. The reflector is made 10 per cent. longer than the radiator, the extra length hanging down like a stub and tuned by a variable condenser for optimum results. The beam performance is practically flat, it is claimed, from 144 to 146 mc. There is obviously much room for experiment in this and we shall be interested to hear from any reader who makes up such a beam. We hope to try it shortly at G2XC. When G6VX worked us with the square beam at 25 ft. it was at least as good as his 4-element at 50 ft.

And please note again—all the information we have on this design is given here.

The Contest

May we remind you that the *Short Wave Magazine* VHF Contest, which covers both 58 and 145 mc, is scheduled for November 12-14? Several readers have written regarding this two-band operation, and with some concern since they are only equipped for one band. But may we point out that there will be *three* winners, one for *each* band and a *Victor Ludorum* (for the

two bands together). Hence, you can still make a contest of it even if you do operate only one band—nor does it matter which band that is. So please send in an entry even if you only work one band. Although check logs are useful to us, and gratefully received, we would far sooner have an entry!

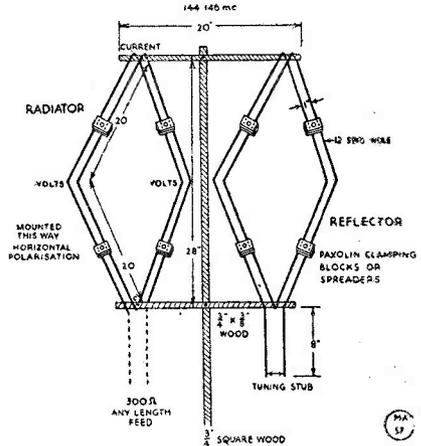
We look upon a Contest as a bit of fun, as much as anything else, and there is no "disgrace" attaching to a low score. A Contest produces a high level of activity and provides everyone with a good opportunity to test out their gear. That is one reason why we do not offer a cup to the winner. The full rules were in the October issue of the *Short Wave Magazine*.

2300 mc

Following on last month's news of a new British 2350 mc record, comes a report from G8DD (Nottingham) who is active on that band. Tests at his home location showed that it was impossible to work even short distances through buildings. He accordingly took the Tx to G6CW's QTH, which enabled a clear path of about 4½ miles to be obtained. At the 4½-mile point, which was 400 ft. high, signal strength was as good as within a few yards of the Tx. Some more extensive tests are anticipated for the near future. The transmitter in use is a CV90 with a much-modified cavity taken from a CV67 Sutton tube. The receiver is a ½-wave co-ax. line fed from a dipole in a parabolic reflector, using a silicon crystal as detector.

145 mc Station Reports

G2AJ (Hendon) has a new converter in use, with improved results. It has two 6AK5's as RF, 6AG5 mixer and harmonic type oscillator. G2AOK/A (Stow-on-the-Wold) is on 145.2 mc with 15 watts input. The Rx has 9003's as RF and mixer, and 9002 osc., feeding into a BC-312N; a 3-ele beam is at 45 ft. He is active on 'phone



Dimensions of the Compact Two-Metre Beam discussed in the text. A certain amount of experiment is necessary with the spacing between reflector and driven element. The performance of this beam can be compared with that of a 4-element job on 145 mc.

and MCW daily from 2030 to 2100 and 2130 to 2230. His reception of PAØPN on two occasions is very good going. G2FLC (Newmarket) has changed to horizontal polarisation, and has been heard at 20-30 miles. He tells us that East Anglian activity should improve very soon as G2XV, G5YM (ex-VQ3EDD), G8QM and G8SY are all preparing gear for 145 mc. G2CIW (Brentwood) is using his original VFO (now on 6 mc) driving an RK34 push-push doubler in the final via a chain of multipliers. His Rx consists of 955 GGT-EF54 mixer-9002 osc. into an AR77; the aerial is a 4-ele w.s. beam at 25 ft.

G3DA (Speke, Liverpool) having removed from Handforth, discovered the roof space of his new house to be a mass of steel joists, beams (not the VHF type!), and cross bracers. So the 2-metre beam has gone outside! His Tx is a BC-625A with 829 PA. The Rx is 9002 RF, 9002 mixer and 9001 osc. into a BC-348. G3EJL (Southampton) is another who has made his Amateur Radio debut on two metres. He has 25 watts to an 832 PA, while the Rx is 6AK5 RF, 954 mixer, 955 osc. A second 6AK5 stage is being added to improve the sensitivity still further. Good contacts have been made to the south-west and reports from the London direction would be greatly valued. G3RI is also active in the same town but his location is badly screened. G3BNE (Hampstead)

VHF CENTURY CLUB

NEW FULL MEMBERS

- G2KI** G. A. Spencer
(Walton-on-Thames)
- G5YV** H. Beaumont (Leeds)
- G6KB** W. O. Greener
(Checkendon)

G6XM now has 200 cards

NEW ASSOCIATE MEMBERS

- G3BTC** W. E. Green (Welling)
- G3WW** R. F. G. Thurlow
(Wimblington)

hopes to be on very soon, with a RK34 PA and a much modified 1147 for Rx; his frequency will be 145.35 mc.

G4LX (Newcastle) is busily preparing for two. He has changed the RF section of a 1132A to 6J6 RF, and 6J6 osc/mixer, but has heard nothing yet. G4LU (Oswestry) has been receiving good DX on occasions, including G6OS and G6VX, but has had no luck with QSO's. He is just above 145 mc and asks for reports on his 21 watts to an 832.

As mentioned earlier G5TZ (Newport, I.o.W.) has been achieving some excellent results from a low-lying QTH, surrounded on most sides by downs. His Rx is a 2-valve converter, 955 regenerative mixer and 955 oscillator, with output on 31 mc into an Eddystone 640; it was built in exactly 58 minutes. The Tx is 6V6 CO, pair EC52's, pair EC52's into QVO7-40. The aerial is a 6-ele w.s. beam about 35 ft. high. It gives a reading of 8 mA on a field meter using a 1N22 detector and half-wave dipole, at a distance of 100 yards.

This meter is always in operation enabling a rapid check of Tx performance to be made at any time. G5RP (Abingdon) has been temporarily off the band for a rebuild. The same applies to G6HD (Beckenham).

In Wiltshire, G6ZH (Devises) is on 145.2 and has worked G8DM. At present he can only receive modulated signals. He is active daily at 1900-1930, but will arrange schedules for almost any time. G6OS (Hull) has found the band very disappointing, activity in the north being much below expectations. G6CB (Wimbledon) will be running 25 watts to an 815 soon, feeding a 4-ele Yagi. G8TS (Farnham) is using the RF unit out of an IFF Mk. III responder, much modified to 2 EF54 RF, 955 mixer, 6J6 osc, one half on 36.4 to 37.15 mc and the other quadrupling. This gives remarkably stable performance, and excellent signal-to-noise ratio. A new 4-ele beam has just been put into service.

G8AO has been listening on 145 mc from his ship sailing up and down the East

TWO-METRE ACTIVITY REPORT

G2AJ, Hendon, Middlesex.

HEARD or WORKED: G2AAN/A, 2AHC/P, 2AOK/A, 2AXG, 2BMZ, 2CIW, 2FMF, 2IQ, 2MR, 2NH, 2XC, 3BPM/A, 3CQ, 3CWW, 3DEP, 3EJL, 3FD, 4AP, 4CG, 4DD, 5BY, 5CD, 5IB, 5KH, 5MA, 5MI, 5MO, 5O, 5PY, 5TP, 5TZ, 5US, 5WP, 5XA, 6CB, 6DH, 6LK, 6OH, 6OT, 6PG, 6VX, 8DM, 8DV, 8GX, 8KZ, 8SK, 8TL, PAØPN.

G2AOK/A, Stow-on-the-Wold, Glouc.

WORKED: G2AXG, 2XC, 3AZT, 4AP, 5BY, 5LO, 5MA, 5TP, 6LK, 6VX, 8DM.

HEARD: PAØPN.

G2CIW, Brentwood, Essex.

WORKED: G2AJ, 2BRH, 2FMF, 2MR, 2MV, 2NH, 2WS, 2XC, 3AEX, 3BPM/A, 4CG, 5IB, 5PY, 5US, 5WP, 6LK, 6OT, 6VX, 8TS.
HEARD: G2AXG, 5AA, 5MA, 5TP, 5RP, 6DH, 8DM, 8GX, 8SK, 8TL.

G2NM, Bosham, Sussex. (N.G.R. 41/803044).

HEARD or WORKED: G2XC, 3DEP, 3EJL, 6LK, 8TS.

G2XC, Portsmouth, Hants. (N.G.R. 41, 670069).

WORKED: G2AJ, 2AOK/A, 2AXG, 2BMZ (110), 2CIW, 2MC, 2MR, 2NH, 2NM, 3AEX, 3DEP, 3EJL, 3FD, 3RI, 4CG, 5BY (132),

5MA, 5NF, 5OO, 5TP, 5TZ, 5US, 5WP, 5XA, 6DH (116), 6LK, 6ON, 6VX, 6WT (114), 8DM, 8KZ, 8TS.
HEARD: G2FMF, 2IQ, 6OS, 8SK.

G3APY, Kirkby-in-Ashfield, Notts. (N.G.R. 43, 490568).

HEARD or WORKED: G2IQ, 2MA, 3DYZ, 4DS, 5BY (226), 5GX, 5TZ (167), 6DP, 6OS, 6PG (132), 6VX (132).

G3EJL, Southampton, Hants.

WORKED: G2NM, 2XC, 3DEP, 3RI, 5TZ, 5BY, 6WT.

HEARD: G6LK, 8DM.

G5BY, Bolt Tail, Devon (N.G.R. 20, 688388).

WORKED: G2AOK/A (148), 2MC (180), 2MV (182), 2NH (175), 2OI (234), 2XC (132), 3AEX (186), 3AHH (162), 3APY (226), 3DEP (124), 3EJL (119), 5MA (171), 5TZ (117), 5WP (160), 6DH (242), 6LK (159), 8DM (135).

HEARD: G4AP, 5US, 6VX.

G5NF, Farnham, Surrey.

WORKED: G2NH, 2XC, 3BPM/A, 3DEP, 5MA, 5WP, 5US, 6LK.

HEARD: G2AJ, 2MR, 3DQP, 5TZ, 6DH, 6VX.

G5TZ, Newport, Isle of Wight (N.G.R. 40/497891).

WORKED: G2AJ, 2AXG, 2IQ (187), 2MC, 2MR, 2NH, 2XC,

3AEX, 3AHH, 3DEP, 3BPM/A, 3EJL, 3RI, 5BY (117), 5MA, 5TP, 5US, 5WP, 5XA, 6DH, 6LK, 6OS, 6OT, 6VX, 6WT (100), 8DM, 8GX, 8TS.

HEARD: G2OI, 2CIW, 2FMF, 3APY, 3CQ, 3FD, 4AP, 4CG, 5MQ, 5NF, 5RD, 5RP, 6ON, 6PG, 8DV, 8SK, PAØPN.

G6CB, Wimbledon, S.W.19.

HEARD: G2AJ, 2AXG, 2CIW, 2MR, 2NH, 3CQ, 3FP, 4CG, 5AA, 5IB, 5PY, 6VX, 8KZ.

G6OS, Hull, Yorks.

WORKED: G2CGL, 2CSC, 2IQ, 2MA, 3ALD, 3APY, 3DEP (208), 3DYZ, 3OS, 5BY (287), 5GX, 5TZ (215), 6BX, 6DP, 6VX.

G6PG, Dartford, Kent (N.G.R. 51/524736).

WORKED: G2BRH, 2IQ (155), 2NH, 3AHH, 3FP, 4AP, 5PY, 6OH, 6OT, 6VX, 8TL, PAØPN.

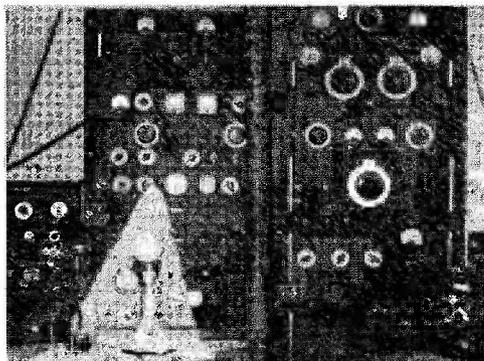
HEARD: G2AOK/A, 2XC, 3APY, 5BY, 5RP, 5TP, 5TZ, 5US, 6OS, 8DM.

G8TS, Farnham, Surrey.

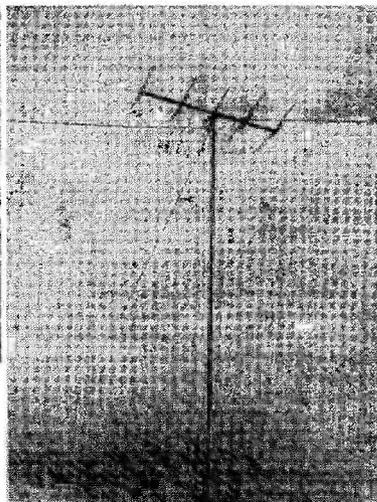
WORKED: G2CIW, 2NH, 2XC, 3DEP, 5MA, 5TZ, 5US, 6LK, 8DV.

HEARD: G2WS, 5BY, 5MI, 5NF, 5WP, 6VX.

All the above reports cover the period mid-September to mid-October.



When G2AJ goes /P on Dunstable Downs, this is some of the gear used. The patch of light is the tent opening.



Coast. He uses a BC-639A and a five-ele. beam. He has heard PAØPN at S9 plus, while off Great Yarmouth. G6DH and G6VX were also very strong signals. He draws attention to the experience in the States that the early morning hours about dawn frequently produce peak conditions and suggests activity at that hour. He reports G3CYY, 5YO, 8JO, 8IF and himself are all preparing for 145 mc up Newcastle way.

In France F8OL (Maudon, near Paris) who made the first 50 mc contacts with VE and W, is active on 144 mc exactly with beam giving 8 dB gain, and 30 watts output. He has 6J4, GG RF and 6J6 mixer, and beams on G from 1930 to 2030 GMT daily.

58 mc Reports

We make no apology this month for the small amount of space we are devoting to 5 metres for it is entirely due to the scarcity of reports. G2AOL (Oxford), who came on the band in early September, has managed to reach his 14 counties and is hoping to get to 100 stations before we lose the band. G2K1 (Walton) is loath to leave five before he has to, but thinks the inactivity may force the issue. G3WW (Wimblington) continues to increase his counties score in spite of the nearly dead band. G5LC (East Molesey) claims his contact with D4ADD on August 21 at 1925 as the first G/D4 five-metre 'phone QSO. He worked F8NW recently. G3EHY is the callsign of the ex-second operator at G3KX/A (Banwell). He is willing to arrange schedules at any time for anyone requiring Somerset. G3BLP

(Selsdon) is nearing his 200 cards and is in the midst of a big reorganisation of his station. G6XM (Farnborough) will continue active on five metres until the band is lost, but the building of a TV set is taking up much time. G6HD (Beckenham) continues to climb the Counties ladder, as also does G8WC (Portsmouth) who managed to work G3AGA in Cornwall on September 26.

The ZB2 Converter

As a result of the publication of that photograph of the modified ZB2 on p. 487 of our September issue, G6VX has been receiving requests for full modification data at the rate of several a day! He asks us to say that he cannot deal with any further enquiries; and for the information of those interested, we would add that it is hoped that details of this conversion will appear in an early issue of the *Magazine*—so in the meantime, please do not write to G6VX for them.

In Conclusion

We have had to drop some of the Achievement Tables due to demands on space, but these are being kept up-to-date on the files. However, in anticipation of the loss of five metres in due course, may we ask all interested to send us a final claim for the band as soon as possible after its closing for amateur operation. This will enable us to produce correct and final tables rapidly. Next month's closing date is November 12. The address is E. J.

Williams, G2XC, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1. CU on December 1—and we look forward to a good Contest entry.

AT THE SHOW

Your earnest conductor hopes to be on the *Magazine* Stand at the Amateur Radio Exhibition on Saturday, November 20, and is looking forward to the opportunity of meeting many of you in person. If you are visiting the Show on that day, please ask for G2XC on Stand 5.

FIVE-METRE COUNTIES WORKED LIST

Starting Figure, 14
From Fixed QTH only.

Worked	Station
43	G3APY (222)
42	G3BLP (250)
41	G5WP
40	G6CW
39	G2AJ (317), G2ADZ, G2OI (186), G5BD (225)
38	G3ABA (170)
37	G2CIW (219), G3DCV (140), G5MA
36	G6OS (186), G8UZ
35	G2MR, G5YV (179)
34	G2RI (150), G5VB, G5BM, G6LK, G6VX
33	G5BY, G5GX (147), G6MN (147), G6XM
32	G2XC (320), G3IS (141), G3WW (141), G4LU, G5BJ (114), G6OH G3BXE (126), G5PP, G5RP, G8KL (145)
31	G2KI (171), G2NH (251), G5PY (241)
29	G2IQ, G4AP, G5JU, G8WV
28	G3PZ, G5MQ, G6HD (175)
27	G3BBA (127), G3KX/A, G4IG
26	G6NF (170), G6YU (126), G8SM (157)
25	G2AOK/A, G4RX, G5LC (126), G8UR
24	G4RO G6VC (137), G8GX, G8WC
23	G3BOB, G3DA (104), G5LO
22	G2ATK, G2HLF (134), G3CGQ, G5IG
21	G2KF (121), G2QY (124), G6KB (152), G8KZ
20	G2BMZ, G2YL, G3BW, G3CWW, G5CP, G6LC, G6SM (104), G6TF, G8AL, G8PX, G8VN G2NM, G6ZO, G8LY
19	G2ADR, G2AUA, G3BK, G2HDY, G5HN, G5MR, G5UM (136), G6UW
17	G2HDI, G3WS
16	G2LC (123), G3COJ
15	G3AEZ, G6CB, G6VD, G8TS (170)
14	G2AOL, G8IC, G8JO

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

Building a Beam Tower

Construction and Erection of a Lattice Mast for VHF Beam Support

By R. F. G. THURLOW (G3WW)

This tower cost our contributor less than £10 and, as he says, the labour involved in its construction has been amply repaid by the results achieved. To those who might be deterred by the work entailed, let it be said that the sections for this one were prefabricated in his kitchen, and the materials for it brought home in a 10 h.p. car.—Ed.

ALTHOUGH a rotary beam may be the answer to the aerial problem in a suburban garden, the difficulties of getting the materials for the self-supporting tower into the garden (and in some cases through part of the house itself) are hard to overcome if the usual 16 ft. to 18 ft. lengths of angle-iron are used.

The methods and materials used here in constructing a 52-ft. tower may therefore be of some help to those with only restricted space available, and can be easily adapted for the more usual 32-ft. tower, which height is recommended for those who do not number firemen or other expert climbers among their friends!

The fenlands of Cambridgeshire may give a VHF signal a good start off, but G3WW is only some 10 ft. a.s.l., with high screening trees to the south and north-west; so "good" VHF conditions at Wimblington, Cambridgeshire, approximate to "normal" conditions elsewhere. The fens seem, as they are in actual fact, at the bottom of a shallow bowl with S8 signals roaring across overhead. G5GX (Hull) reports reception of 5-metre signals from London before the fenland signals are audible. The excellent signals put out by G2AJ/P and G5MA/P from Dunstable and the South Downs respectively indicate that *aerial height* is of paramount importance on VHF. This was confirmed on a visit to Stowe-on-the-Wold, when a signal from G2AJ from his own QTH in Hendon, Middlesex, described by G2AOK as "medium" and only S4, would have been S8 at Wimblington.

The Plan

Inspection of G8DT's home-built 32-ft. steel lattice mast at Cheltenham settled any

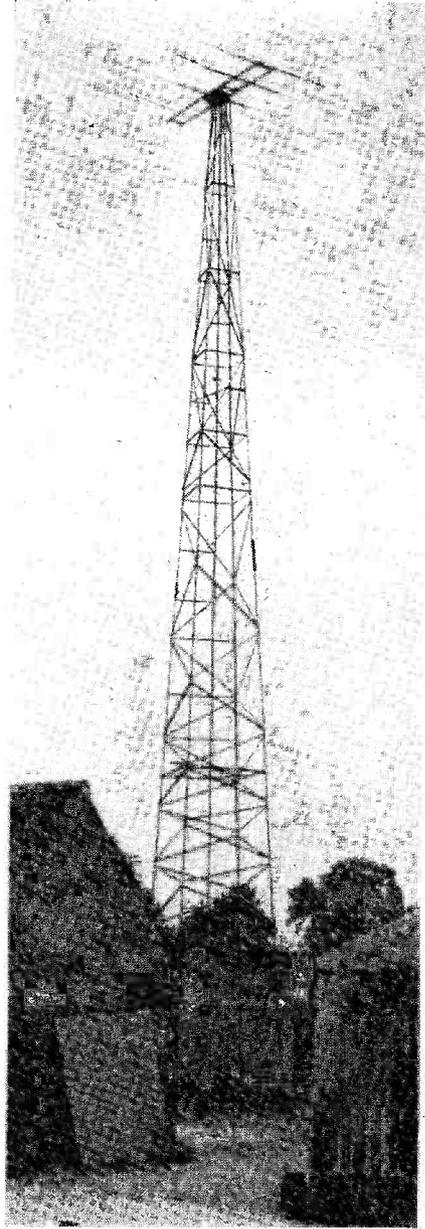
doubts as to construction problems and a start was made early in August on a 52-ft. steel tower with a 6-ft. square base and a 9-in. square top. G8DT used inch angle-iron in 16-ft. to 18-ft. lengths with 1 in. \times $\frac{1}{2}$ in. flat steel for bracing; although a limited supply of this material was available locally the cost was found to be almost prohibitive for a 52-ft. tower having regard also to the extra bracing which would be required. A good supply of ex-Government inch angle iron in 4 $\frac{1}{2}$ -ft. lengths (racking supports painted olive green) was found some 30 miles away, and this was chosen as it was much cheaper than the longer new material; moreover it was easily transportable in the back of a Ford 10 which, in the course of two "official" journeys, brought back some 170 lengths.

Each of the four sides of the tower consists of 13 lengths, overlapping upwards 6 in. and bolted together with two $\frac{1}{2}$ in. high tensile bolts, one on each side of the angle. These sides were "prefabricated" in the kitchen with the aid of a vice and a borrowed electric drill.

The mast was designed to avoid as much cutting as possible by one whose professional occupation includes the building of bridges, and with 4 $\frac{1}{2}$ -ft. as the unit length, the holes in all diagonal and cross pieces were drilled $\frac{1}{2}$ in. from end and $\frac{1}{2}$ in. from side. Two complete sides were laid out side by side, the top and bottom cross-pieces 9 in. and 6-ft. respectively fitted, and a length of string laid down the dead centre. The first diagonal (4 ft 6 in.) was bolted on some 2 $\frac{1}{2}$ in. below the top of the left-hand side and the diagonal cross-piece laid across the right-hand side so the bolt hole in the end was in the centre of the angle iron, which was then marked for drilling. (The diagonal sloped from left to right downwards.) Actually the holes for the diagonals and all pieces to be fastened to the sides were made out-of-doors, but there is no reason why once marked (after laying out), all the drilling could not have been carried out in the kitchen ("workshop") as it would only have meant the unbolting of the sides after careful marking. (See sketch.)

At 1 $\frac{1}{2}$ and 3 in. below the leader hole, two other holes were marked and drilled, the first for the horizontal cross-piece sloping from right to left downwards—the horizontal cross-pieces had to be cut to the fitting length.

This procedure was followed all the way down the tower until it became necessary to increase the unit length of 4 $\frac{1}{2}$ ft. by overlapping suitable lengths of angle-iron



The G3WW mast complete; it cost him less than £10 for material and is 52 ft. high.

some 6 in. to act as diagonals; while still keeping the 3 in. between ends of diagonals, each diagonal had to be placed parallel to the related diagonal and from this point downwards no horizontal pieces were required.

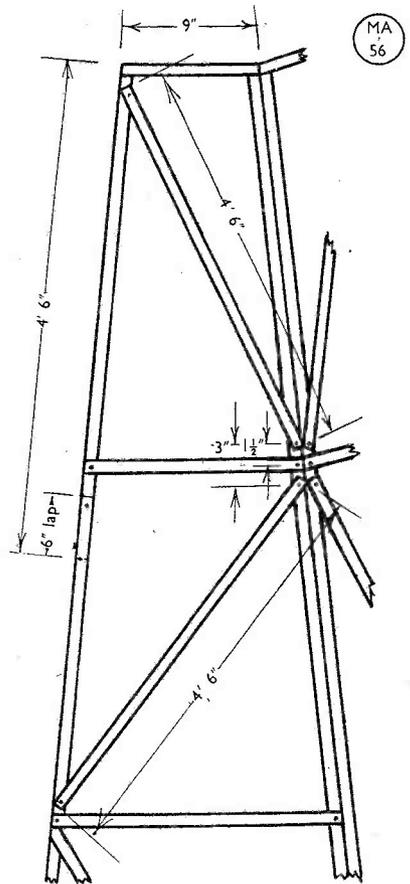
The important thing to remember is that each hole has to be repeated on the other side of the angle iron. When one side of the tower was finished an exact (?) replica was made. Both sides were then stored on their sides with "underneath" facing inwards, and joined together with diagonals and horizontal pieces similar to those used on the sides, to make a four-sided tower. Each diagonal or horizontal piece on the original side required three replicas to complete the other three sides. A $\frac{1}{4}$ -in. steel plate suitably drilled to take the top thrust bearing and beam rotating pipe was bolted to the top; internal cross bracing across the corners was only found necessary across the bottom, one-third and two thirds up.

The beam support itself is 19 ft. of $1\frac{1}{4}$ -in. pipe protruding 1 ft. through the top plate with a tapered collar welded on to fit the thrust bearing (ex DF). Holes were drilled in this pipe below the top plate so that a similar length of 1-in. pipe can be pushed up through the $1\frac{1}{4}$ -in. pipe to take a 2-metre beam and/or a television aerial some 10 ft. above the tower. The beam is turned by a small motor at ground level and extra lengths are bolted to the $1\frac{1}{4}$ -in. pipe for this purpose, passing through bearings supported on cross pieces.

As the tower is merely a "temporary" erection for more purposes than one, it is bolted to four 2 ft. 3 in. lengths of this self-same angle iron set at ground level in 18-in. holes filled with concrete; this has proved a satisfactory and sufficiently stable base. Two coats of bitumastic paint were applied after removing rust patches with a wire brush.

Getting It Up

Erection of the tower in one piece proved to be the only practical method, but next time—if there is one—the beam *will* be in position before erection! The actual erection proved easy. The bottom two legs of the tower were bolted to the concrete encased "stubs" and a heavy rope fastened 48-ft. up, led first through a pulley on a 15-ft. high tripod of scaffold poles erected behind the base for the tower and the fence seen in the photograph, then through a second pulley in the ground directly below the first pulley and out through a gate in the fence back towards



Design of a section, as described by G3WW in the text.

the top of the tower as it lay on the ground. Ten "slight" men lifted the mast from the ground and pushed it up until the weight became too great, eight children pulling on the rope the while. Then two of the chaps pushed a 25-ft. ladder under the end of the tower and three more joined the boys on the rope—the rest still pushed, and "up she went" with pieces of 2 in. x 2 in. replacing the ladder.

Eventually, three men lowered her gently into position with a back rope and it immediately came on to rain for the rest of the day! The tower neither whipped nor buckled and rode out a gale that night with the back and front ropes

hanging in position. A climbing friend eventually fixed four wire guys 4 ft. 6 in. below the top and the trusty 4-element close spaced 5-metre beam in position, because neither the projected 2- nor 10-metre beams were ready. Before erection steps (too wide, it was found) had been bolted on, from 30 ft. up to the top.

Nearly 400 $\frac{3}{4}$ -in. bolts were used, with two holes drilled for each bolt. Lest others may think such construction is beyond them, let them take heart from the fact that G3WW had never used an electric drill before this effort. G3DCV, of March, Cambs, who assisted in the construction of this tower, has himself since built a 32-ft. tower of the same material with a 4 ft. 6 in. base but has made provision, by having a 2 ft. 6 in. top, for extension upwards to 50-ft. or so. A 32-ft. tower with a 9-in. top and 4 ft. 6 in. base would be a beauty, but the first diagonal with a 9-in. top should not exceed 4-ft. in length, to clear the joint of the top part of the side.

APPROXIMATE COST

170 lengths of 4 ft. 6 in. angle iron @£25 per ton (about 3 $\frac{1}{2}$ lbs. each)	£	s.	d.
Bolts, nuts and spring washers	6	15	0
High speed drill $\frac{3}{8}$ in.	1	10	0
Oil for drill	4	0	0
Paint and brush	1	0	0
Top plate	9	6	0
Cement and sand	5	0	0
	7	6	0
	<hr/>		
	9	12	0

No figure has been included for thrust bearing (a present) or for three or four lengths of piping to turn the beam as the cost will depend solely on whether they are new of "ex dump"; those actually used had been employed for the previous beam support.

G3WW will be pleased to help anyone who may want to build this type of tower, but will not climb up it beyond 10-ft. to take measurements! Greatly improved VHF results have amply justified much labour expended on the project.

More About Parasitics

Causes and Cures

By F. W. T. Atkin, A.M.Brit.I.R.E.

THE article by K. E. Marcus in the July issue of the *Short Wave Magazine* prompts the present writer to add from his own experience some further causes of this troublesome (and often unsuspected) phenomenon, together with a few suggestions for cures which have been found effective.

It is the writer's opinion that parasitic oscillation is far more prevalent than is suspected, both in RF and AF amplifiers; they are the source of many mysterious troubles, such as distortion in AF amplifiers, not amenable to ordinary methods of analysis. This opinion is strengthened by the elaborate steps that are taken in commercial transmitters, in both RF and AF sections, to prevent parasitics. Admittedly, there is a world of difference both in power output and layout, as well as in many other ways, between commercial and amateur gear. But on the other hand, amateur gear is very often working "all out" in an effort to obtain the highest efficiency, and

Our contributor has had much practical experience with the operation of commercial equipment, in which special precautions are taken for the elimination of AF and RF parasitic oscillation. His article will therefore be of considerable value to those wrestling with parasitics in amateur-band transmitters.—Ed.

it is precisely under these conditions that parasitics are most likely to occur. High efficiency stages—Class-C RF and Class-B AF—are particularly susceptible to parasitics.

In the case of a modulated Class-C stage, when the modulation reaches 100 per cent. the anode voltage rises from its normal DC value to twice this, and at the same time the RF excitation on the grid is at a high value, the grid polarity changing from negative to positive peak. At instants when the anode voltage is high and the grid is positive, the conditions for parasitic oscillation are very favourable. Similarly, in an AF Class-B amplifier driven to or near its maximum power output, parasitics may occur. Another case is that of a Class-A AF amplifier which is being over-driven by too great an input.

Symptoms

The symptoms of parasitic oscillation in the case of a Class-C stage are:

(1) Anode current abnormally high—it may "stick" at such a very high value as to damage the valve, and will certainly result in overheating of the anode. This abnormally high anode current will not

be much affected by swinging the tank condenser, and a lamp coupled to the tank coil will *not* light (assuming drive is off).

(2) Grid current will probably be abnormally high.

In the case of an AF amplifier, abnormally high anode currents may be observed, *but not necessarily in the stage which is generating parasitics*. It may occur in a later stage which is being "driven" by the parasitic RF incoming from a previous stage, which is the real culprit. The point of this is that the writer was once nearly turned grey by parasitic oscillation in a 1-kW Class-B modulator, and worked many long hours before discovering the real source of the trouble. The output stage consisted of two Western Electric 212-D triodes in push-pull, and at irregular intervals the anode current of each of these shot up from the normal value to over 300 mA, and *stayed there* until HT was shut off. On switching on again, everything was normal, and continued so for a time even when modulation was put on. Then it was noticed that the jump in anode currents occurred always when a fairly high modulation peak came along, which carried the current up to or over the 300 mA point (which was normal for full modulation). But as soon as this point was reached, the parasitic oscillation started and persisted, even with modulation off. All the usual anti-parasitic measures were tried—*on the output stage*—but without success.

Then investigations were transferred in desperation to the voltage amplifier preceding the output stage. The valve line-up here was an MH4 parallel-fed transformer coupled to a pair of ML4's in push-pull, transformer coupled to a pair of PX25's in push-pull, cathode-choke coupled to the grids of the output stage, and all working in Class-A. Eventually, the source of the trouble was pin-pointed on the ML4 stage, but here again stoppers in anode and grid leads had no effect at all. Finally, a 100,000 ohm resistor was connected across each half of the secondary of the push-pull transformer feeding the ML4 grids—and the trouble was cured. Subsequently, the writer discovered that the manufacturers of the apparatus in question had fitted similar resistors in later versions of the modulator, and for the same reason!

Parasitics in P/P Stages—

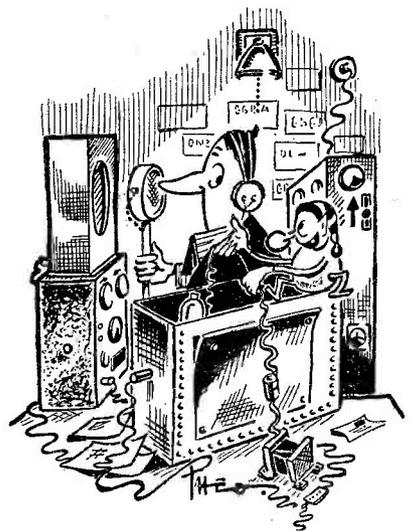
The above experience suggests another source of parasitics—push-pull stages, even though they may be triodes and working in Class-A. What appears to happen here is that although the circuit connections on paper are push-pull, and

the physical circuit at low frequencies corresponds, the valves oscillate at very high frequencies as if the anodes and grids are connected in parallel. A point worthy of note is that in this mode, the anode current of the affected stage may not be high—this was the case in the writer's experience quoted above, and misled him for some time until he got down to stage-by-stage analysis. It is recommended that damping resistors should in all cases be connected across each half of push-pull transformer secondaries, whether feeding into Class-A or B stages. The values should not be much less than 50,000 ohms in case the frequency response is affected.

—And in the HT Supply!

Another source of parasitics may be found when mercury-vapour rectifier valves are used for HT supply. RF oscillations of high frequency may occur which cause an awful "hash" in receivers situated in the same building. The remedy here is to connect RF chokes, or preferably non-inductive resistors of 50-100 ohms in series with the anodes. The wattage ratings should be high in order to carry without overheating the full current of the rectifiers. When calculating wattage ratings, it is well to base calculations on *twice* the rectified DC output of the valves.

It is probably unnecessary to say that all stopper resistors used as anti-parasitic



"..... Early to-night, aren't you?"

devices should be non-inductive, mounted close up to the grid or anode sockets (preferably soldered directly on), and of adequate wattage rating. This point may be overlooked in grid circuits of Class-C stages, where the normal grid current of the valve is appreciable. Resistance values should not need to be greater than 50-100 ohms.

Finally, in Class-C stages, the possibility of oscillation at the fundamental (working) frequency should not be overlooked—a lot of time may be wasted chasing parasitics when the real trouble is fundamental oscillation. This is where an absorption wavemeter comes in useful, for checking the actual frequency of oscillation. At any rate, in such cases adjustment of the neutralising condensers, under zero-drive

conditions, *i.e.* with the exciter stages switched off, should be tried first. If adjustment of the neutralising condensers does not cure the trouble, and if tuning the tank circuit under zero-drive conditions does not produce a reaction on the grid current of the valve, then parasitics may be suspected.

It is hoped these notes may prove helpful in tracing and curing obscure faults in amateur transmitters, as, with the increasing usage of the VHF bands, there is a possibility of unwitting interference radiation due to parasitic oscillations occurring in transmitters working nominally on frequencies far removed from the band on which the interference is being caused. It is not impossible that "difficult" cases of TVI might be traced to this source.

Inexpensive 30-Watt Modulator

Five Valves—P/P 6V6 Output

By J. H. JOWETT (G3CFR)

THE modulator was built primarily with a view to using it as a driver for the push-pull Class-B 807 amplifier described in the February and March (1948) issues of this *Magazine*. Due to a "slight accident" with the large modulation transformer, however, it was decided that 807's were out of the question, and 6V6's were used as modulating valves to modulate the push-pull 807 RF amplifier direct.

The speech-amplifier modulator was designed to obtain:

- (a) Good quality and stability.
- (b) Low hum and noise level.
- (c) Plenty of gain.
- (d) Low construction cost.

Conditions (a) and (b) are met by using plenty of decoupling, and top-cap grids in the first two stages. Any hum caused by the heater in the first stage is minimised by putting a small positive voltage upon the heaters; using good screening of components and a single earth point for the first stage; use of coaxial wiring where possible; correct choice of first stage valve. Various types of phase inverters were tried, and the most satisfactory one is shown in the circuit diagram. It is extremely easy to adjust.

Two 6V6's were available, so they were triode-connected, the screen being connected to anode *via* a 100 ohm resistor. This triode-connection gives the advantage that no large screen components are required.

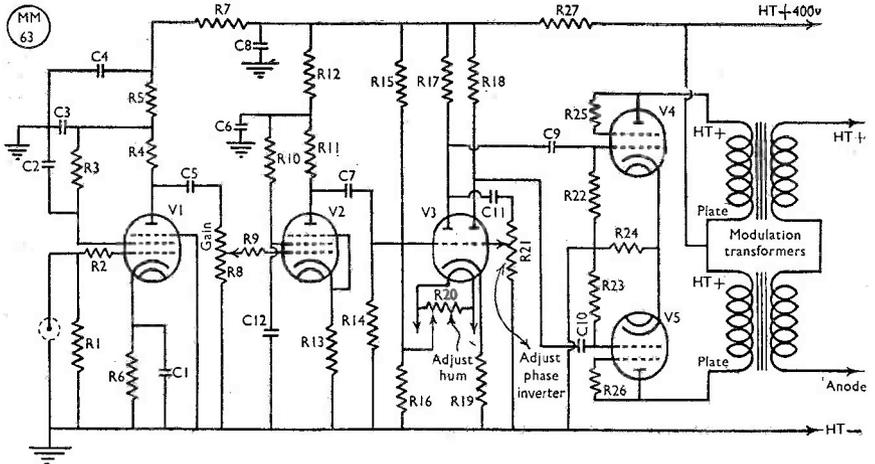
Digging still deeper into the spares department, two Ferranti OPM1 high impedance speaker transformers were found, and by connecting them in series as shown, a centre-tap can be taken to HT; on the secondary, the same thing can be done although the centre tap is not required.

Here is the design data for a speech amplifier-modulator to swing a 50-watt carrier, using valves which are readily obtainable. Alternatively, by reducing plate voltage, the unit can be operated as an amplifier-sub-modulator for a high-power Class-B modulating stage.—Ed.

The connections are arranged such that the current in the secondary cancels the current in the primary of each transformer. This works very well in practice, and although there is quite a mis-match between the PA and the modulator, the push-pull 807 RF amplifier is sufficiently modulated when running at 60-65 watts input. The needle of the PA meter moves slightly on speech, but no distortion is apparent, and no station has yet given a bad report on quality.

Microphone Input

A moving coil and a crystal microphone have been tried both giving excellent results (the moving coil particularly); an ex-Service m/c microphone, the Hand Type 7, used without a matching transformer, gives high-pitched speech quality,



Circuit of the speech amplifier-modulator complete ; it will give sufficient output to swing a 50-watt carrier, using 6V6's for the V4, V5 positions.

which appears to be excellent for communication purposes. The gain is more than adequate under all conditions and the whole unit is completely stable.

The phase inverter is easily set by connecting an AC voltmeter between earth and each of the grids of the 6V6's in turn. The pre-set potentiometer, R21 is then adjusted for equal voltage on each grid, using a Morse oscillator in front of the microphone. (When doing this, do not forget to put a load across the modulation transformer, or to disconnect the 6V6's from HT.)

A carbon microphone could be placed in the cathode circuit of the second stage and the gain control then turned to minimum. If intended to use with a carbon microphone, a volume control may be necessary, between the 6N7 and the second stage.

Power Supply

A power pack giving 400 volts at about 80 or 90 mA is used, smoothed by two 4 μF condensers and a 10 Henry choke. The 6V6's consume about 70 mA of this, and the current drawn by them does not alter appreciably on speech peaks. The LT required is 6.3 volts at about 2.1 amps.

For the first stage, although an SP61 is specified, a 6J7 would be quite satisfactory, and one could also be used for the second stage if desired. Both stages are completely screened in cans, and screened wire is used for all grid circuits.

The amplifier has been tested for a

Table of Values

The 30-Watt Amplifier-Modulator

- C1 = 50 μF
- C2 = 0.5 μF
- C3 = 2 μF
- C4, C6, C8 = 8 μF
- C5, C7 = 0.01 μF, mica
- C9, C10 = 0.05 μF (preferably mica)
- C11 = 0.01 μF
- C12 = 1 μF
- R1, R10 = 1 megohm, ½ watt
- R2, R9 = 10,000 ohms, ½ watt
- R3, R14 = ½ megohm, ½ watt
- R4 = 0.1 megohm, ½ watt
- R5, R12 = 44,000 ohms, ½ watt
- R6 = 1,000 ohms, ½ watt
- R7, R16 = 5,000 ohms, ½ watt
- R8 = ½ megohm potentiometer
- R11 = 330,000 ohm, ½ watt
- R13 = 4,700 ohm, ½ watt
- R15 = 150,000 ohms, ½ watt
- R17, R18 = 50,000 ohms, ½ watt
- R19 = 500 ohms, 1-2 watt
- R20 = 50-500 ohms pre-set potentiometer (adjust to minimum hum)
- R21 = 100,000 ohms pre-set potentiometer
- R22, R23 = 220,000 ohms, ½ watt
- R25, R26 = 100 ohms, ½ watt
- R27 = 10,000 ohms, 1 watt
- V1 = SP61, 6J7
- V2 = EF36, 6J7, etc.
- V3 = 6N7
- V4, V5 = 6V6

period and is extremely satisfactory, and although the output valves have a high anode voltage, the current taken is not excessive, and they show no signs of being overworked. The output should be even higher with the correct modulation transformer ; it is not, of course, sufficient to give maximum control of a carrier input of more than about 50 watts.

Here and There

Legend is Right

A correspondent writes as follows " . . . I have at last received a card from the Soviet Union, which has been a revelation to me ; it bears the photograph of a venerable old gentleman, underneath which in bold red letters is the legend 'Popov—Inventor of Radio.' Now, isn't that something? These other guys like Clark-Maxwell, Hertz, Oliver Lodge and Marconi were just a mob of Fascist bandits, I guess ; but I am certainly grateful that Box 88, Moscow, has put me on the right track at last.

"Of course, there are those who might say that judging by the notes from some of the Russian stations, OM Popov is still trying to perfect his invention . . . but I must stop now and put up a new aerial, a halfwave Popov ! And what's this Iron Curtain they're using over there? Does it give more gain than a Sterba? . . ."

British Old Timers' Club

"Our total is now 126 members enrolled, the newcomers being: W. H. Maycock (G5SK), 1925 ; F. Aughtie (G6AT), 1925 ; and F. W. Davies (G2FD), 1926.

The B.O.T.C. exists only to bring on record those of British nationality (home or overseas) who held a full transmitting licence before June 30, 1928, and are still active today. If you are eligible, send us a note of the details.

New QTH's

Inevitably, we receive rather more each month than the page of space normally allotted to this feature will carry. This means that there is, in some cases, a delay of two months before a new call sign actually appears in print. When the backlog warrants it, we take some extra space to get up to date again. And for the information of those interested, it might be added that we airmail our lists to the *Radio Amateur Call Book*—also, that we only print an address in "New QTH's" at the direct request of the owner of the call sign.

Amateur Radio Exhibition

Latest information is that a total of 27 firms have taken stands for the RSGB's second annual Exhibition, which

promises to be a most interesting and successful show. Admission is by catalogue (1s. at the door), the dates are November 17-20, closing hour 9.0 p.m., and we shall be on Stand 5.

Errors Crep' In

We can never dodge 'em altogether. On p. 549, October, the power supply unit in Fig. 2 will work much better if the connection between the live side of switch S2 and the heater winding is omitted.

There is also some comment called for in regard to G2RX's article on p. 547 of the same issue. In the first place, he says that capacities for C4 and C5 should have been shown as .001 μ F, and there are those who say that the values can with advantage be even higher. This correction will substantiate G2RX's argument that his modification is an effective method of band-spreading the Clapp, though it may be open to theoretical objections.

Small Advertising—*Short Wave Listener*

Just to remind readers that small advertisements can be placed with our *Short Wave Listener*; the charges are: Readers', 2d. per word, minimum 3s.; Trade, 6d. per word, minimum 7s. Box numbers are 1s. 6d. extra. A good coverage is assured and these rates are very moderate. Closing date for the next possible issue (December) is November 9, or December 7 for the issue of the *Short Wave Listener* dated January.

K. B. Warner, W1EH

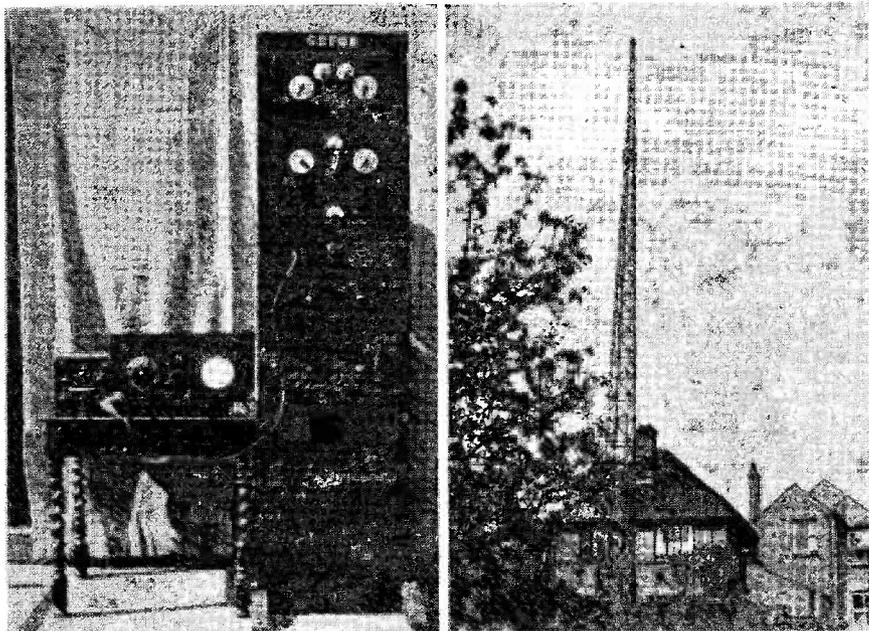
As many of our readers will already know, Kenneth Warner, for nearly 30 years Secretary and General Manager of the American Radio Relay League, died on September 2 last.

He was a man who made a very large, important and lasting contribution to the cause of Amateur Radio ; as the current issue of *QST* so rightly says ". . . The man who, perhaps more than any other single amateur, left his mark in the history of Amateur Radio." In him, the ARRL possessed a chief executive of balance, perception and experience which was one of the greatest assets the League possessed. —*Valete.*

NEW QTH'S

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

E15X	W. Rothwell, 115a North King Street, Dublin, Eire.	G3EEK	E. R. Greenwood, 1 Longridge Avenue North Heaton, Newcastle-upon-Tyne, 7, Northumberland.
G2BSN	R. E. Sedgwick, 6 The Drive, Collier Row, Romford, Essex.	G3EEW	F. J. Heasman, 11 Peter Street, Dover, Kent
G12HML	B. W. Aldwell, 21 Shrewsbury Gardens, Belfast, Northern Ireland.	G3EFA	T. F. Warcing, 105 Shellfield Road, Southport, Lancs.
G2JO	Major M. H. Wilkinson, West Riding Signal Training Officer ACF, Southlea, New Way, Tranmere Park, Guiseley, Yorks.	G3EFN	J. A. W. Laws, 150 Staines Road, Feltham, Middlesex.
G3BHZ	A. Hickling, 179 Barnsley Road, Wombwell, Yorks. (Tel: 190.)	G3EFO	G. B. Hobbs, 15 Vincent Road, Coulsdon, Surrey.
G3BHZ/A	A. Hickling, Geraldine Staff Club, Great Malvern, Worcs.	GM3EFS	W. H. Borland, 79 Bank Street, Alexandria, Dumbartonshire, Scotland.
G3BKL	R. Bland, Millers Farm, Morden, Wareham, Dorset.	G3EFY	T. W. A. Smith, Datoma, 98 Ladysmith Road, Exeter, Devon.
GM3BLQ	T. Harper, 13 Maulc Street, Monifieth, Angus, Scotland	G3EGC	J. V. Hoban, 21 Millford Road, Bolton, Lancs.
G3BMV	A. Shaw, 22 May Street, Burnley, Lancs.	G3EGE	D. C. G. Johnson, 16 Lorne Grove, Woodborough Road, Nottingham.
G3BQP	K. C. Harrison, 102 Camden Street, Stockton-on-Tees, Co. Durham.	G3EGG	W. L. Middlemiss, c/o Claydon House, Claydon Estate, Bletchley, Bucks.
G3BYW	W. Dunell, 22 Stanley Road, Broadstairs, Kent.	G3EGH	K. M. Hodgson, Heathside Road Post Office, Withington, Manchester, 20, Lancs.
G3BZX	D. Mackenzie, 22 Tipton Road, Dudley, Worcs.	G3EGR	A. T. Felgate, Royal Hotel, Mundesley, Norfolk.
G3CAI	F. Priestley, A.M.I.P.R.E., 80 Rashcliffe Hill Road, Huddersfield, Yorks.	G3EGS	R. W. Collett, 47 Lindsworth Road, Kings Norton, Birmingham, 30.
G3CGX	H. V. Eastwood (ex-VK3AAB/MM), 17 Green Walks, Prestwich, Manchester, Lancs.	G3EHL	A. Smith, 38 Manchester Road, Tyldesley, Lancs.
G3CTY	W. J. Holder, 8a Titchmarsh, Horton Estate, Epsom, Surrey.	G3EHT	J. Tremain, High Lanes, Little Petherick, Wadebridge, Cornwall.
G3CUW	F. L. Church, White House, Newark, Notts.	G3EIM	M. R. Jenkins, 1193a High Road, Whetstone, London, N.20.
G3DBH	K. G. Reynolds, 14 Lucknow Avenue, Mapperley Park, Nottingham.	G3EIO	K. J. Marley, 44 Woodland Way, Woodford Green, Essex.
G3DBH/A	K. G. Reynolds, A.T.C. H.Q., Mundella School, Nottingham.	G3FJN	N. F. Joly (ex-SY1RX), 12 Acol Road, London, N.W.6.
G3DEY	E. T. Ford, 5 Dairy Farm Cottages, Higham, Rochester, Kent.	G3IU	J. Pearce, 110 Marborough Avenue, Hull.
G3DHL	R. H. Pennison, 105 Ratcliffe Road, Loughborough, Leics.	G5BG	J. B. Kaye, Little Kingsbury, Verulam Road, St. Albans, Herts.
G3DHV	C. W. Wightman, 11 Turner Avenue, Loughborough, Leics.		
G3DJR	F. W. Jefferies, Radio Club, Headlands Grammar School, Swindon, Wilts	CHANGE OF ADDRESS	
G3DNJ	G. F. Weller, 76 Morden Way, Sutton Surrey.	G2AND	R. H. Broadbent, 4 Seagrave Road, Crosland Moor, Huddersfield, Yorks.
G3DNK	K. Turfrey, Hazelcroft, Scatterdell Lane, Chipperfield, Kings Langley, Herts.	G2BHR	P. L. Stiles, 5 Woodcote Court, Dorking Road, Epsom, Surrey.
G3DNR	P. O'Brien, (ex-VS2BW), Claremont, 48 Vale Square, Ramsgate, Kent.	G2DBA	F/L P. M. S. Hedgeland, M.B.E., 3 Oakwood Avenue, Beckenham, Kent.
G3DSL	J. H. Cannell, Shipton-under-Wychwood, Oxfordshire.	G3AOS	J. G. Barnes, 5 Prospect Drive, Hale Barns, Altrincham, Cheshire.
G3DTT	V. Bickers 29 Hound Road Gardens, Netley Abbey, Southampton, Hants.	G3BTR	T. J. A. Rose, 1 Raywood Street, London, S.W.8.
GW3DZL	I. C. Elias, 2 Pinkney Street, St. Thomas, Swansea, South Wales.	G3BYE	C. H. Lees, 83 Sprowston Road, Norwich, Norfolk.
G3EAH	D. Ketteringham (ex-D2C), 183 Roxeth Green Avenue, S. Harrow, Middlesex. (Tel: BYRon 1425.)	G3DA	A. B. Boswell, 91 Central Avenue Speke, Liverpool.
G3EBA	D. R. Wilde, 7 Mornington Terrace, Camden Town, London, N.W.1	G3DSC	W. E. Taylor, 26a Longton Grove Sydenham, London, S.E.26.
G13ECD	H. M. Robinson, 14 Mountjoy Street, Londonderry, Northern Ireland.	G3EEE	J. Cordeaux, 4 Longridge Road, London, S.W.5.
G13EDN	Lieut. (E) T. D. Aldwell, R.N., 21 Shrewsbury Gardens, Belfast, Northern Ireland.	G3LS	R. W. Stewart, 4a Church Street, Seaton Carew, West Hartlepool, Co. Durham.
GM3EDQ	J. R. Woods, 13 The Neuk, Wishaw, Lanarks, Scotland.	G4DS	T. S. White, Lyndene, Fern Street, Sutton-in-Ashfield, Notts.
G3EDT	J. E. Rickaby, 26 Chretien Road, Northenden, Manchester, Lancs.	G4HM	J. I. Myers, 6 Strines Road, Strines, Stockport, Cheshire.
G3EDW	P. R. Gollidge (ex-D2DW), Lynwood, 151 Down Hall Road, Rayleigh, Essex.	G5XD	B. C. Christian, Attwood, Bromham Road, Biddenham, Beds.
GM3EDZ	T. P. Hughes, 101 Grove Street, Glasgow, C.4., Scotland.	GM8BO	H. J. Beach, 68 Fraser Road, Rosyth, Fife, Scotland.
		CORRECTION	
		G3YM	Major L. W. Richards, 13 Gordon Place, London, W.8



The other man's station G2FQR

Here is a view of the essential equipment at G2FQR, operated by N. W. Austin at 273 Stone Road, Stafford. An outstanding feature of his station is that with the sole exception of the Class-D wavemeter, all the gear is home-built—he even wound his own mains transformer, which in these days is a most unusual undertaking.

The wooden rack on the right is to standard dimensions and utilises wood panels against aluminium chassis. In descending order, the rack carries: Aerial coupling unit; CC exciter and PA, using a 6N7 oscillator-doubler driving an 807 to 25 watts on either 7, 14 or 28 mc; the modulator, giving up to 20 watts of audio and using 6J5-6C5-P/P 6L6's, with carbon microphone input; the RF stage power pack, giving 400 v. at the plate of the 807; and the modulator power supply, with outputs of 360 v. and 250 v.

Remaining panels are for future expansion, the objective being a 100-watt PA using a pair of 807's.

On the left of the operating table can be seen the Class-D wavemeter, and on the right is G2FQR's home-built receiver. This is a superhet covering 7, 14 and 28 mc with plug-in coils, the valve line being RF 6SK7-FC, 6K8-IF, 2 6K7-Det., AVC and 1st audio 6Q7-Output 6V6-BFO 6J5-Rect., 5Y3. Output is to a 4-in. energised speaker, or high-impedance 'phones can be jacked into the 6Q7.

The lattice mast is also of wooden construction throughout; it is 40 ft. high and supports a 66-ft. aerial centre-fed with 600-ohm line. G2FQR remarks that his achievements in the way of DX are not startling, the main interest being 7 mc 'phone as hours of operating are very limited—but readers will agree that he runs a real amateur station which is a great credit to him by reason of the amount of constructional work he has put into it and the neat and "professional" layout which he has achieved.

The Short Wave Listener is our Companion Monthly

THE MONTH WITH THE CLUBS

FROM REPORTS

Thirty-five clubs have reported their activities this month, including some newcomers to the ranks. Winter programmes are in full swing, and practically every one now runs its Morse classes and its series of technical lectures for beginners.

Quite a large number of the clubs have their own transmitting licences, and in some cases the club station is an ambitious affair, with power up to 150 watts and a good communications receiver.

For the 1.7 mc Club Contest (MCC), which runs from December 4-12, power is limited to 10 watts and all entrants are on an equal footing—which puts the premium on good operating. Next month we shall publish a full list of entries; for the time being, we give the following, which have been received to date:

Beaumanor (G3BMR), Boringdon (G3DGS), Brighton & Hove (G3JDJ) Burton (G2DAN), Catterick (G3AKF/A), Coventry (G3FAB), Darlington (G8IA/A), Edgware (G3ASR/A), Grafton (G3AFT), Harrow (G3EFX), Merseyside (G3DPZ), Petersfield (G3DDM), Rhigos (GW3FFE), Spenn Valley (G2CSJ), Stoke-on-Trent (G3UD), Wansstead & Woodford (G3BRX), West Bromwich (G3BWW), West Kent (G4IB), West Somerset (G3SB) Wirral (G2AMV).

We shall be glad to see further entry forms in time for the final list in the next issue. It should be noted, however, that a complete list of entrants is not actually necessary here for the purpose of the Contest, since all Clubs entered will sign "MCC" for identification; we are accepting entries up to December 3, though any received after November 12 will be too late to appear in print in the December list.

Next month's deadline for reports is first post on November 12. Address them, as usual, to Club Secretary, *Short Wave Magazine*, 49 Victoria Street, London, S.W.1.

West Somerset Radio Society.

—A visit was recently paid to the BBC Welsh Home Service transmitter at Washford Cross, and the September meeting was devoted to a discussion on next year's Arts & Crafts Exhibition. In October a Meeting was held at which Major Longhurst demonstrated models he has made for experimental radio control.

Beaumanor Amateur Radio Society.

—This club has had to vacate its old premises and now meets at the Hon. Secretary's QTH (see panel). Activity has been at a low ebb during the summer, but some members have been keeping the Club call, G3BMR, on the air on 59 mc. Beaumanor intends to enter for MCC and hopes to meet old friends on the top band again.

Nottingham Short Wave Club.

—Several call signs are now owned by the members, and it is hoped that the club Tx will be on the air for MCC. Meetings are held on Monday evenings, 7.15, at 23 Gamble Street, and new members can be sure of a hearty welcome. Recent lectures covered the construction and use of a field-strength meter and a multi-range test meter.

Chester & District Amateur Radio Society.

—Welcome to this newcomer, inaugurated in July. Meetings are being held every fortnight, on Tuesdays, at the United Services Club, Watergate Street. Members are giving lectures and special help is being given to the beginners. Secretary's QTH in panel.

Chippenham & District Short Wave Radio Club.—The AGM was held during September at the old club room in the Chippenham Community Centre. A new committee was elected and the winter programme outlined.

Sutton & Cheam Radio Society.

—A full programme has been arranged, covering dates right up to April, 1949. Events in the near future include an organised visit to the Amateur Radio Exhibition on November 19, and a lecture and demonstration on Interference Suppression (GPO Radio Branch) on the 16th. Regular meetings are held on the first and third Tuesdays of the month, at Ye Olde Red Lion, Cheam.

Reading Radio Society.

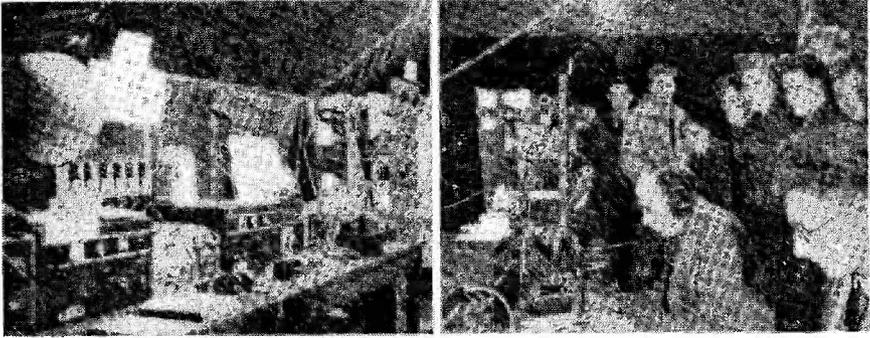
—Meetings continue on the second and last Saturday of the month, 6.30, at the Palmer Hall, West Street. At a recent meeting the President, Dr. Lemon, gave a talk on the design of simple transmitters and receivers for the VHF bands, and on September 26 a five-metre D-F Contest was held; competitors' bearings, we are told, are improving with practice!

West Middlesex Amateur Radio Club.

—This club is now the proud holder of the call G3EDH—150 watts and all. The last meeting was devoted to a discussion of the transmitter and its use, and it was decided that it should be put on the air at every Club meeting. At the next meeting every member is bringing for exhibition an item of gear that he has built or converted himself. Meetings are on second and fourth Wednesdays, Labour Hall, Southall.

Liverpool & District Short Wave Club.

—Attendance is increasing steadily and activity gaining momentum. It is hoped that construction of a 35-mm. projector will be



The R.A.F. Amateur Radio Society (Cranwell) ran a very successful display for "Battle of Britain Week", with equipment on 1.7, 3.5, 14 and 28 mc; contacts obtained totalled 65 during the display.

finished shortly, so that film lectures may be given. The October lecture is on High Fidelity Equipment, and during the month parties of members are also visiting the main automatic telephone exchange.

Stourbridge & District Amateur Radio Society.—At the October meeting two discussions took the place of the usual lecture. The first was on Band Planning, the second on 144 mc operation. The November meeting takes the form of a lecture on Home Recording.

South Manchester Radio Club.—The October meeting started with Morse, proceeded to a "Junk Swap" and concluded with a talk on Transmitter Technique. Later in the month a tour of the Manchester telephone headquarters has been arranged. November meetings are on the 12th and 26th; a welcome awaits all interested amateurs.

City of Belfast YMCA Radio Club.—This Old Timer among clubs has just celebrated its Silver Jubilee with the 25th AGM. The club now possesses three fine transmitters and a Super-Pro receiver, and, except for the war years, has been on the air on all amateur bands every week. The members would like to know if any other clubs can claim 25 years of continuous activity. The club room is open every night except Sunday; A

Morse class is held on Tuesday nights and new members are welcomed on Wednesday nights.

West Cornwall Radio Club.—*Radio Link*, the club journal, has appeared once more and shows a high standard of technical interest. Apart from the District Notes there are most informative articles on Aerials and on the "Q5-cr." Regular meetings are held in Penzance and in Falmouth, and a Special General Meeting took place at Camborne during October.

Ashton-under-Lyne & District Amateur Radio Society.—The October meeting took the form of a lecture on 2-metre work, and a discussion on the subject of valve voltmeters will take place at the next meeting—November 7—at the Katherine Street Room. The club will be entering for MCC, although transmitting activity from their station, G3BND, has been curtailed, pending a favourable reply from the Fuel Office!

Lothians Radio Society.—Regular monthly meetings have begun again and are well attended. They will be held on the last Thursday, 7.30, at Chamber of Commerce Rooms, Charlotte Square, Edinburgh. The November meeting, on the 25th, will be addressed by G6RG; meanwhile, arrangements are being made to hold a social evening on the second Thursday of each month.

Kingston & District Amateur Radio Society.—At the September meeting the G6BI Challenge Cup—awarded each year to the member producing the best piece of apparatus—was presented to Lt.-Col. Stephens, G2BN. The October meeting was the AGM, at which the Chairman and Hon. Sec. were re-elected. Next meetings are on November 18 and December 1—both at Kingston Hotel, 7.30 p.m.

Solihull Amateur Radio Society.—At the last two meetings, two members described the construction and technical details of their automatic sender, using timed relays to send Morse characters at the correct intervals. Meetings are held on alternate Wednesdays at the club's HQ, The Old Manor House, Solihull. Prospective members and visitors are assured of a cordial welcome.

Barnsley & District Radio Club.—This club, which was founded in 1913 and is therefore one of the oldest in the country, recently held its AGM, at which an interesting syllabus was arranged. Meetings are held fortnightly at the King George Hotel, Peel Street, the next being on November 12, 7.30. The new Hon. Sec. will be pleased to welcome new members—QTH in panel.

Lincoln Short Wave Club.—This club has just been formed;

the opening meeting was well attended and future meetings will be held on alternate Wednesdays at the Lincoln Technical College. On November 10 there is to be a Radio Quiz, and on the 24th a talk by G3BCA on the Development of the Radio Receiver. The AGM will be held on December 8. Secretary's QTH in panel.

Hounslow & District Radio Society.—The Quarterly Meeting was held in September, and the forthcoming season's programme agreed upon. After the meeting much "junk" changed hands. The October meetings took the form of a talk on Fundamentals by the Hon. Sec., and an open discussion for members entitled "Your Point of View." Two members were successful at the last RAE.

Malvern & District Radio Society.—At the October meeting the important subject of Band Planning was discussed, G2AO's talk on the Atlantic City Conference having been postponed; it

will now take place on November 3.

Harrogate Radio Society.—The club transmitter is now on the air with the call G3EDJ/A, on 14 mc. The words "Short Wave" have been dropped from the society's title, but the club carries on as usual. Membership is growing steadily and at the end of the first year in its own premises the club looks back with satisfaction on the results.

Wirral Amateur Radio Society.—The AGM was held in October, and G8BM was re-elected as Chairman with G2AMV as Hon. Sec. Membership now totals 76. A visit was paid recently to Seaforth Radio (GLV) and proved to be of great interest. November meetings are on the 10th and 24th — YMCA, Whetstone Lane, Birkenhead, at 7.30.

Derby & District Amateur Radio Society.—This club recently ran a stand at an exhibition organised by the Derby Society of Model Engineers, and interest has increased considerably as a result. The club

transmitter is proceeding, and arrangements are being made for members to visit Messrs. W.B.'s loudspeaker factory next month.

Radio Society of Harrow.—With members from Ruislip, Eastcote, Wembley, Stanmore, Northwood and Pinner, this club is growing steadily. It now has its own transmitter (G3EFX) and hopes to be on all bands from 10 to 80 in the near future. A junk sale was held during October, and there was also a demonstration of the new DCR 19 receiver by Denco. November meetings are fixed for the 9th and 23rd (Tx nights) and the 16th (lecture and demonstration by GEC).

Darlington & District Amateur Radio Society.—This club has now acquired its own clubroom, in Old School Yard, Skinnergate, and meetings are held every Thursday at 7.30. Application for a transmitting licence has been made.

Ribblesdale Amateur Radio Society.—Since its formation last spring this club has been

Herewith the names and addresses of the Hon. Secretaries of Clubs reporting this month. They will be pleased to give every assistance to prospective members:

ASHTON-UNDER-LYNE. N. H. Brown, B.Sc., A.R.I.C., G3DRS, 63 Corporation Road, Audenshaw, Manchester.

BARNSELY. R. Hickling, 179 Barnsley Road, Wombwell, Yorks.

BELFAST. F. A. Robb, G16TK, 60 Victoria Avenue, Sydenham, Belfast.

BEAUMANOR. E. T. Pethers, G6QC, 24 Brandhill, Woodhouse Eaves, Loughborough, Leics.

CHESTER. S. H. Dutton, 17 Victoria Pathway, Queens Park, Chester.

CHIPPENHAM. J. Mathers, 23 Canterbury Street, Chippenham, Wilts.

COVENTRY. J. W. Swinnerton, G2YS, 118 Moor Street, Coventry.

DARLINGTON. G. Walker, G2AWR, 7 Geneva Crescent, Darlington.

DERBY. F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.

HARROGATE. A. Wilson, 16 St. Georges Road, Harrogate.

HARROW. J. R. Pickett, 93 Whitmore Road, Harrow, Middx.

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

KINGSTON. A. W. Knight, G2LP, 132 Elgar Avenue, Tolworth, Surrey.

LIVERPOOL. W. G. Andrews, G3DVW, 17 Lingfield Road, Liverpool 14.

LINCOLN. L. T. Mullins, G3XM, 97 West Parade, Lincoln.

LOTHIANS. I. Mackenzie, 41 Easter Drylan Drive, Edinburgh 4.

MALVERN. E. Cross, Dalvington, Priory Road, Malvern, Worcs.

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

MIDLAND. W. J. Vincent, G4OI, 342 Warwick Road, Solihull, Birmingham.

NOTTINGHAM. J. Rowbottom, 9 Mansfield Street, Sherwood, Nottingham.

READING. L. Watts, G6WO, 817 Oxford Road, Reading.

RHIGOS. F. Hamer, GW8BW, 7 Neath Road Bungalows, Aberdare, Glam.

RIBBESDALE. W. F. Robinson, The Manor House, Chatburn, Clitheroe, Lancs.

SOLIHULL. H. C. Holloway, 20 Danford Lane, Solihull, Birmingham.

SOUTH MANCHESTER. M. I. Wilks, 57 Longden Lane, Northenden, Manchester.

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

SURREY (CROYDON). L. C. Blanchard, 122 St. Andrews Road, Coulsdon, Surrey.

SUTTON AND CHEAM. L. Seaton, 8 Croft Road, Sutton, Surrey.

WANSTEAD (G3BRX). R. J. C. Broadbent, G3AAJ, Wanstead House, The Green, Wanstead, E.11.

WEST CORNWALL. R. V. A. Albright, G2JL, Greenacre, Lidden, Penzance.

WEST MIDDLESEX. C. Alabaster, 34 Lothian Avenue, Hayes, Middx.

WEST SOMERSET. T. C. Bryant, G3SB, 29 Lower Park, Minehead, Som.

WIRRAL. B. O'Brien, G2AMV, 26 Coombe Road, Irby, Heswall, Cheshire.

WORTHING. F. T. Tooley, 62 Becket Road, Worthing, Sussex.

YEAVIL. D. L. McLean, 9 Cedar Grove, Yeovil, Som.

holding weekly meetings in Clitheroe. For the coming season Morse and Radio Theory classes have been arranged—new members from Ribblesdale and Bowland will be welcomed. Prospective members are invited to write to the Hon. Sec., who will inform them of the next meeting date—QTH in panel.

Midland Amateur Radio Society.—Officers for the next twelve months were elected at the recent AGM, and the Annual Dinner on October 5 was a great success, with nearly 90 people attending. G5VM was among the visitors. Next meeting, November 16, at the Imperial Hotel—business commences at 8 p.m., but doors open at 6.45.

GEC Model Engineering & Electronics Society.—The Amateur Transmitting Group of this Society is purely a House Social organisation, and is therefore unable to accept outside membership. Prospective staff members should apply to the Society Secretary and not to G3ANQ personally.

Coventry Amateur Radio Society.—At the recent AMG G5PP retired after valuable service since the early days of the society. All other officers were re-elected. At the subsequent meeting some £20 changed hands for members' surplus gear, and G3YO lectured on Interference Sup-

pression and TVI. G3FAB will uphold the club's reputation in the forthcoming MCC.

Surrey Radio Contact Club (Croydon).—At the October meeting G2AXG gave an interesting talk on "Getting Started on the 2-metre Band," describing in some detail the conversion of several ex-service receivers, together with some new converters. Junk sales are in future to be held every four months instead of every six months; next meeting is on November 9, 7.30, at the Blacksmiths Arms, South End, Croydon.

Rhigos & District Radio Club.—The call GW3FFE has been allocated to this club. Recent meetings have heard lectures on Aerials and Feeders (GW2VL) and Receiver Alignment (GW3ZV). Morse and theory classes continue to flourish, and it is proposed to organise a Sunday Hamfest on November 14 or 21.

Worthing & District Amateur Radio Club.—Band Planning was discussed at the October meeting, and extra time had to be taken to wind up the junk sale. Future meetings will be held at the Norfolk Hotel, Chapel Road, at 7.30 on the second Thursday. High Salvington, the HQ of the

club, was the site of one end of the recent record-breaking 13-cm. tests.

Merseyside Radio Society.—Club premises have been extended by a large room to be used as clubroom, library and so on. The transmitter, G3DPZ, is very active, with a bag of 23 countries on 14 mc CW. The receiver has also been overhauled in readiness for the coming season.

Yeovil Amateur Radio Club.—Regular weekly meetings were held through the summer with good attendances. The new transmitter, G3CMH, was put on the air in mid-September, and an Eddystone 640 has now replaced the R 103 in the club station. The licence now covers 'phone and CW on all bands up to the maximum power. At a recent meeting two visitors were the Mayor of Yeovil and a German SWL from Brunswick.

Wanstead & Woodford Radio Society.—They held their AGM on October 5, all the officers of the society being re-elected, but with a new committee of three. The programme for the next two months includes lectures on converters, a junk sale, a transmitter demonstration and the entry of G3BRX for MCC.

CARDS IN THE BOX

Following are the call signs for which card(s) are held in our QSL Bureau. Please claim by sending a large stamped addressed envelope, with name and call sign, to BCM/QSL, London, W.C.1. If you would like your address to appear in our "New QTH's" feature when space becomes available, please mention that at the same time. Publication will also take place in the *Radio Amateur Call Book*.

G2AFO, 2BKC, 2FYX, 2HAS, 2MX, 2ZV, 3BGV, 3BHL, 3BYA, 3CBP, 3CIC, 3CTG, 3CVR, 3CXY, 3DFI, 3DJY, 3DTL, 3DVJ, 3DVK, 3DZI, 3DZP, 3EBO, 3ECW, 3EFC, 3FM, 3VC, 3WJ, 5IB, 6SP, GC3DXL, GD3UB, GI3DXU, GM3CAN, G3CSO, 8SV.

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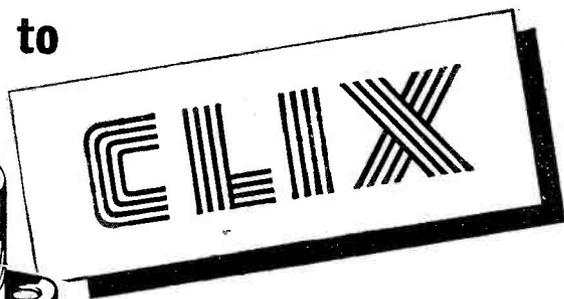
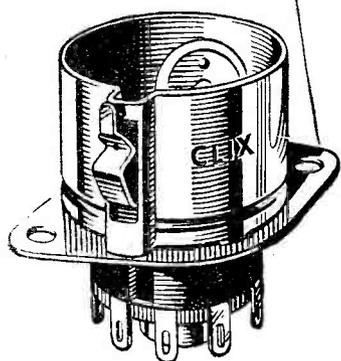
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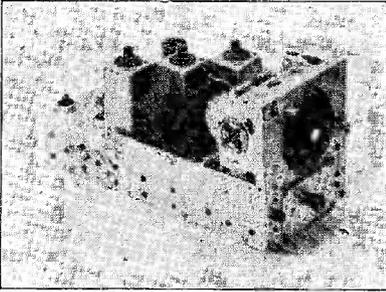
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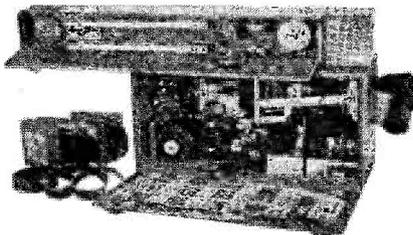
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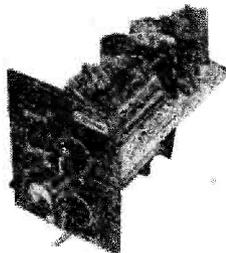
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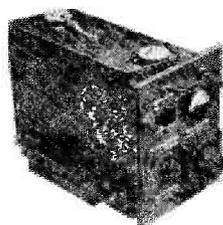
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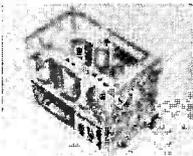
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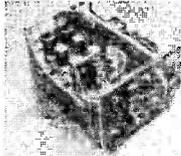
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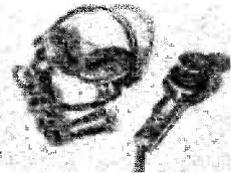


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AR88 Owners should see our Ad. on page 673.—G2AK.

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

HRO 9 coils, P/P, perfect condition, quick sale, £50, buyer collects.—Frearson, 66 Wheelwright Road, Erdington, Birmingham 24.

SALE. R1116 modified, fitted S-meter, power pack, also numerous components.—Write for list and make an offer.—Box No. 391.

R208 Receiver. Good condition, with Z66 RF stage and built-in, amateur constructed 1 mc crystal calibrator. Offers?—Box No. 392.

R1155 S Meter, noise limiter, crystal gate S/R switch. Separate speaker with power supply, 2-stage output, phones, jacks. £15.—Write 28 Sycamore Grove, New Malden, Surrey.

R103A Communication receiver, 230v AC, complete with valves. New, perfect condition. Offers over £7.—6 Beech Avenue, Birmingham 32.

HRO/MX Receiver, with general coverage coils, 48 to 30 mc, power pack 115/230 AC input, also Hallicrafters S27, 15 valves 27/145 mc continuous, AM/FM BFO, etc., 115/230 AC input. Both receivers aligned for excellent performance. Offers one or both to Box No. 394.

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SURPLUS TX gear. Condensers ceramic insulation. Shammarlund, etc. All -08 in. spacing: 20 µF, 2/6; 80, 100, 120, 5/9. Split stator 50+50, 60+60, 7/-; 2 in. dia. threaded ceramic coil formers, 1/3. National velvet drive and dial, 5/6. Western Elec. Xtals, harmonic operation, FT241A, ½ in. pin spacing 20 mc by 100 kc to 28 mc, 5/6. Post free over 10/-.—Hayward, 25 Walsingham Road, St. Paul's Cray, Kent.

CR100 £30. HRO, pack, six coils, 20/40 bandspread, £35: 1155 complete, £15: American TRF, 21-1500 metres, complete, £10: 145 VFO Pack, £12: No. 11 Transceiver, £6: R1132 (126 mc), £3 10/-: HRO Pack, £5: S meter, 50/-: Westinghouse PPI, £25: 6SN7G, 4/-: EF50, ceramic based, 4/-: Transformers, 10v CT 2a, 4v CT 2a, 10/-.—S.A.E. List.—Box No. 396.

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A MATEUR has surplus to requirements, genuine B2 ceramic coil formers, 1/6: 0001v condensers with long spindles, ideal C.O. or buffer, 3/6: RF meters, 1 amp. 4/6, EF50 valveholders, micaeal, 6d.: 5-core metal shielded maroon cotton covered cable, 1/6 yd.: HT cable, as used sparking plugs, 6d. yd.: 250 ohm 25W vitreous resistors, 6d.: round jack plugs, 3d.: NIFE batteries, 11 units delivering 26v at 125 amps., weight about 2 cwt., £26: small single units delivering 1.3v, size 6 in. x 1½ in. square, weight about 11 lb., 2/6 each. Please add little for carriage. Large batteries to be collected by purchaser.—G2FXX, 82 Walsall Road, Aldridge, Staffs.

SMALL ADVERTISEMENTS

READERS'—continued

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HALLICRAFTER SX24 9-tube super, 540 kc to 43.5 mc. Xtal gate, bandspread ham bands. Excellent condition, as new, circuit available, £25 or nearest.—GW2FKW, 98 Wern Street, Clydach Vale, Rhondda.

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SELVYN motors for remote control of beams, etc. Weight 4 lb., torque 1½ lb. Brand new in sealed tins with instructions. Set of 3 motors to work direct from 230v AC (in series), £3/10/6. **MOVING COIL** microphones, each with 1 pair M/C headphones. Brand new, boxed, 4/6, post 9d.—Logan, 1 West Alley, Hitchin, Herts.

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TX1154 with all valves and meters. Tested on the air, 6 gms.—G3DYF, 23 Rydal Road, S.W.16.

FOR SALE.—1155N. Internal AC power pack. S meter fitted. Illuminated dial. Perfect condition. Complete with speaker. Best offer secures.—Box No. 398.

HALLICRAFTER SX25, 12 valve, 2 stage RF, crystal filter, S meter, noise limiter, new cabinet with internal loudspeaker, 200 to 250v AC, £30.—Fenton, 25 Abbey Road, Blackpool.

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AR88LF Speaker, phones, manual, less cabinet. Exchange miniature camera or sell £35, buyer collect.—R. Heath, Grange Hostel, Hawley Lane, Farnborough, Hants.

SELL.—Hallcrafters SX24, £20. Wanted HRO Amateur Band Coils for cash, or exchange LF coils.—52 Bannerman Avenue, Prestwich, Manchester.

HRO Senior 4, Amateur Band coils, complete valves less power pack and speaker, £28.—82 Ostrich Lane, Heaton Park, Manchester.

TROPHY Com. Rx. AC bands spread, 6v 6-550 metres, speaker, fine condition, £9.—15 Temperley Road, Balham, London.

HRO coils, B.S. or GC-D104 crystal, also latest Sure M.C. mike, Woden UM2 transmitting components, AVO Model 40. Offers. Stamp reply.—G2UZ, 2 Cliff Road Gardens, Leeds, 6. Phone: 55011.

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100-150 mc. receiver. Two E.F.54 R.F. Stages, E.F.50 mixer. Three I.F. stages.

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These transmitters are a new and improved version of the well-known 41 Series, and, in our opinion, are likely to prove even more popular, either as a self-contained rig or as a driver for higher power PA.

The circuit of the Type 44 is briefly:—CO, consisting of Harmonic Amplifier circuit giving high output on several bands from one crystal with perfect stability and excellent note. This stage is inductively coupled to an 807 acting as PA on all bands. The PA Stage is free from parasitics and spurious oscillations. Facilities for metering and modulation are provided and overbias keying system is incorporated in all models.

The 44 is supplied completely wired and tested and with set of coils for any one band but less crystal and valves. Price £7

Type 44P incorporates a power supply and is supplied with rectifier, set of coils for any one band, but less crystal and RF valves. The power supply delivers 350v at 130mA. Price £13/2/6

These transmitters can be seen at the forthcoming R.S.G.B. Amateur Exhibition on Stand No. 4.

Lists are available giving details of the above and other RADIOCRAFT equipment. May we suggest you write for your copy.

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We can construct special equipment to order, and modify, adapt and service existing gear. Quotations provided upon receipt of details.

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SMALL ADVERTISEMENTS

READERS'—continued.

HAMMARLUND super pro., 18 tubes, with power pack, £26/10/-; SX28, £32/10/-; BC342N, as new, £12/10/-; U.H.F. frequency meter, 375-725 mc, by Lavoie Laboratories, U.S.A., £6/10/-; PE.110 Power Supplies, 500v 450 mA; also 250v 120 mA; input 110v 50 cycles; in transit case, £5.—Taylor, 75 Edgell Road, Winton, Bournemouth.

WANTED.—APR/4 RECEIVER, WITH OR WITHOUT TUNING UNITS. FOR CASH OR ENDEAVOUR TO EXCHANGE FOR YOUR REQUIREMENTS IN OTHER GEAR. TUNING UNITS TYPE TN/? FOR APR/4 ALSO WANTED SEPARATELY.—GSIW, BARLOW, 45 HOLLYWOOD LANE, HOLLYWOOD, BIRMINGHAM.

SCR522 Receiver, two, £3 each with valves. Modulator, 150 watts audio TZ40's, 10 valves, £25. 13-valve 6-band double superhet; extremely sensitive, selective; 300 cycles crystal band-pass filter, £25, as new, worth double. Several 145 mc converters, cheap: 805's, new, £2—G2IQ, 44 Tipton Hill Road, Sheffield 10.

HALLCRAFTERS S.38 Universal Mails, 1-6-30 mc. Separate bandspread, noise limiter, variable BFO, speaker or 'phones switch, send/receive switch. Best offer to £25.—20 George Road, Erdington, Birmingham 23.

HALLCRAFTERS for sale.—SX28, £60; SX24, £30; and Phillips Communication Rx PCR, £20; or would consider a good offer: will sell all three together or singly.—BM/AG1, London, W.C.1.

SX16, 62 mc-550 kc, S-meter bandspread: £20 or offer.—Wallace, 13 Auckland Hill, London, S.E.27.

£45 worth of mostly new radio components TX and RX, to clear, £20. Lists free. Would exchange for portable typewriter or new BC.221 with adjustments.—Boulton, 62 Tixall Road, Stafford.

SALE.—AR88LF, recently overhauled and realigned, fitted S-meter: first class condition mechanically and electrically, £50. Also P29 receiver, 250-600 mc, £6.—Box No. 403.

WANTED to buy or loan, copy of QST, January, 1947, or any publication containing modification details of BC348.—6 Beech Avenue, Quinton, Birmingham 32.

640 Eddystone wanted.—Reeves, 174 Strathyre Avenue, S.W.16.

WANTED.—Four H.R.O. bandspread coils. Exchange "AVO" battery all-wave oscillator in leather case, excellent condition, or cash.—Clarke, 79 St. Mary Street, Woolwich, S.E.18.

AR88LF £33; also B28/CR100, £22, sent passenger train. TCS12 transmitter and receiver, £10, plus carriage, or £5 each unit. Guaranteed valves, TZ40, 15/-; 6J7, 5/-; many others cheap. Type 37 transmitter, £10.—Jones, Burnbank, Goosewell Hill, Egg Buckleyland, Plymouth.

SALE.—Marconi CNY1 transmitter and receiver. 'Phone or CW 160, 80, 40 m: new and complete 250v mains. Hallcrafters S.27: Hammarlund Comet Pro. £15 each.—J. Woods, The Neuk, Wishaw, Lanarks.

FOR SALE.—BC348, fully modified, S-Meter, noise limiter, Xtal phasing, power peak, speaker, manual, and BC453 (Q filter) modified for 348, all in new condition.—Reasonable offer to G2HIW, 266 Avenue Parade, Accrington, Lancs.

SX24 new valves, no xtal, range 4 u/s, otherwise 30K, £15 or offer: 9-valve, 160 to 20 metre super. Tobe tuner, noise limiter, etc., no cabinet, £15; B2 Rx, new, £4; (2) ESU150, (2) T20, new and boxed, £1 each.—G6SG, 26 High Road, Buckhurst Hill, Essex.

HALLCRAFTER Sky Traveller S29: 540 kc-30.5 mc, 110v AC/DC. Batteries Manual, ideal for NFD. £25.—G3CGE, 42 Norham Avenue, Southampton.

CONDENSER Mike. STV 280/80 and 280/40, Model 7 AVO, Universal Avomitor. Every pre-war S.W.M. RSGB Bulls from June 1945. Reasonable offers. 832s, 17/6; PT15s, 10/-; GAM-24, 10/-; 12A6s, 6/-; 9002/3, 10/-; 6D6s, 5/6; 6AG5s, 10/-; G3AGQ, Benson, Oxon.

SMALL ADVERTISEMENTS

READERS'—continued.

R208 Communication Rx, 10-60 mc, £10: Bendix RA-1B Communication Rx (unmodified), 1.5-15 mc, requires power supply, good condition, £5/10/-: R1155N (unmodified), covers top band, 80-40-20, requires power supply: good condition, £8.—W. Jennings, Grafton School, Eburne Road, London, N.7. (Tel. ST4 3891.)

HALLICRAFTER Skyriver, 10 valves, 79-5.5 mc, xtal, BFO bandsread, noise limiter, £25.—Todd, 68 Venner Road, Sydenham, S.E.26.

G200'S announcements now appear in the Trade Small Advertisement column and on Page 680.

SCR522 144 mc Tx-Rx, two only: perfect condition, less valves. Highest offers. Buyer pay carriage or collect S. London. 832s for above 15/- each. Also MCRI complete, plus miniature speaker, £8.—Box No. 405.

SWOP Tu6B for gear useful to Ham just starting. S.A.E. list valves, components, very cheap.—82 Fairfield Road, Widnes, Lancs.

EXCHANGE or sell. C43 Transmitter, R.1147A, T37 osc. Many other bargains: first reasonable offer accepted. Want HRO Senior, 144 mc gear.—Newland, 161 Penrose Avenue, Blackpool.

NEW boxed valves.—5Z4's, 5Y4's, 6B7's, 6G6's, 6SL7's, 6SA7's, 6SJ7's, 6K7's, 1LH4's, 5/3: 6V6G's, 6/-: 1 1/2 in. CRT's, 9/6: unboxed 5U4G's, 4/6: T.G.10 C/W tubes, £6/10/-, carriage paid: Det.12's, 15/-: S.A.E. list other gear and valves.—Anglin, G4GZ, 233 Welholme Road, Grimsby.

As new. HRO GC coil, 3-5-7.3 mc, 30/-: Mullard AR/C bridge, 0-1 ohm-10 megs. 10 pF-10 mF, etc., 100-250 AC, £7: Woden transformer, 2-5v 10A, 15/-: Premier Swinging Choke, 5/25S, 250 mA, 10/-: 6SG7, 6SC7 (3), 5U4G, 5/-—1 Welburn Avenue, Leeds, 6.

NEW 7/BL TX/RX, mains operated, 35 valves: best offer or would consider part exchange for good communications receiver. Cash adjustment.—Box No. 404.

FOR TX OR AERIAL COUPLER COILS, ETC. EDDYSTONE FREQUENTITE CERAMIC BASE AND SUB-CASE (CAT. No. 1091 AND 1092, PRICE 12/-) FITTED FIVE POWER TYPE PLUGS AND THREE SOCKETS. BRAND NEW. MY PRICE 2/9 POST FREE.—G2CKW, 203 HOLLYDALE ROAD, LONDON, S.E.15.

ASB8 for 420 mc 12-valve double superhet, lighthouse RF stage. New and unused, with details, £8.—G2BVN, 51 Pettits Lane, Romford, Essex.

SECTIONAL tubular aerial masts—34 ft.—complete with base plate, pulley, 1.7 steel guys, etc. Bargain at £4, carriage paid.—G6BS, 96 Hinton Way, Great Shelford, near Cambridge.

V55R Communication receiver and 5-10 m. converter. Perfect condition, also matching speaker: £25 the lot, or nearest offer. Buyer collects.—36 Rotherwick Road, London, N.W.11. Speedwell 4969.

SALE.—D.B.20, Preselector, £12: Canadian 58 Set, complete, £10: W. & B. 12 in. P.M. speaker, £3: Rola 10 in., energised, £2. Wanted: TN17/APR4, TN18/APR4, TN19/APR4, TU57A or B, TU58A or B, TN2/APR1, TN3/APR1, and AN/APA10: also 5Y3G valves. Exchange or cash.—Ellett, G3ARJ, Meppershall, Shefford, Beds.

MULTI-MATCH modulation transformer: 70 different ratios: particulars supplied. Match push-pull audio amplifier, 250 mA max. into power amplifier 425 mA max. or reverse: 14 1/2 lb.: heavy lugs, 30/-.—Kni'ht, 36a Albert Road, Widnes, Lancs.

22 Set. Good condition, 12v power pack. Full provision for crystal control: £10 or exchange for SCR522. Box No. 412.

WANTED.—Top price paid. Manual for BC348 Model L: will exchange manual Model Q.—Nelson, Sherwood, Douglas, Isle of Man.

SALE.—500 kc crystal, 12/6: 38 set (transceiver), 5 less valves, 10/6, Transformers, 220-230v to 1540v 1-75 mA, 2v 2A, 4v 1A, 15/6: 465 kc permeability tuned, IF transformers, 5/6 a pair.—Box No. 406.

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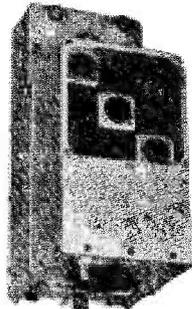
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24v Power Units, 7/6 each (callers only). 24v Rotary transformers, 250v D.C. output, 3/6, post 1/-.

813 valves, brand new and boxed, £3. Metal valves, brand new and boxed : 6L6, 10/6 ; 6V6, 8/- ; 6S17, 10/6. Glass valves, brand new and boxed : 807, 12/6 ; 80, 8/- ; 812, 30/-.

8D2, used but in good condition, 4/-. Metal valves in stock, not ex-Government, 6K8, 6K7, 6J7, 6C5, 6J5, OZ4. Electronic television chassis : Vision, 22/6 ; sound, 18/9 ; time base, 18/9.

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Transmitter—2, 1B22 ; 4, 3B24 ; 3, 6J6 ; 1, 725A. **I.F. Amp.** 6, 6AK5. **Range Alarm Unit** 15, 6J6 ; 1, 6AK5. **LV Power.** 3, 5U4 ; 1, 6J6 ; 5, 6V6 ; 1, 6SL7 ; 1, VR105/30 ; 4, VR150/30. **Receiver.** 2, 6J6 ; 3, 6AK5 ; 1, 6SL7 ; 2, 723A/B ; 2, 724A. **Control Amp.** 1, 6AK5 ; 2, 6J6. **Beacon Tuner.** 1, 6J6. Sixty-two tubes altogether. \$3,000 worth for only £37/10/-. Would be very useful at sea during fog!

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All carriage paid

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SMALL ADVERTISEMENTS

READERS'—continued.

FOR SALE.—150-watt four-band Tx, VFO 6V6. 6L6-807-TZ40-PP834's : modulator 6J7-6N7-6V6's-TZ40's, Class B : power supplies 1000v 150 mA, 750v 250 mA, 500v 180 mA, 350v, 180 mA, with stabilised supplies for driver stages : the whole mounted in 6-chassis rack. First offer over £60 secures. Also Hammerlund Super Pro Rx, covering 28 mc : first offer over £25. Or what offers Tx/Rx together ?—Box No. 395.

NATIONAL MC.44 AC/DC communications receiver, complete with speaker, crystal filter, electrical breadboard : offers around £24.—GM3EDZ, 101 Grove Street, Glasgow.

RV19, 6 tube, 21-1400 metres, 8 H.R.O. type coils, £4 : R208, 6AK5, R-Niner, £12. Wanted 342, 348.—Verrinder, Iwerne, Dorset.

832A all-glass twin beam-power tetodes, full rating, 22 watts 'phone, 36 watts CW to 200 mc. Boxed, new, 35/-, post free. Post orders only to Barker, 44 Talgarth Road, W.14.

AMERICAN IFT'S, 455/465 kc, 6/6 pair : 6AC7, 66SL7, 6SN7, etc., 6/6 : AC/DC 6-valve chassis, 25/-. Emerson 6-valve AC/DC Superhet, walnut cabinet, medium and short wave, £8/10/-. Celestion extension speaker, 8-in. oak case, volume control, 33/-.—Maker, 74 Jer Lane, Bradford.

FOR SALE.—Canadian R.103 7-tube superhet, little used, complete with spare set of valves, vibrator, etc. : range 1-16 mc, 6v battery operated, easily convert to mains use. All offers over £15 considered.—Box No. 408.

TU6B, TU7B, TU9B, all new, unused, 11/- (carriage 2/6), the three units 30/- (carriage 5/-).—82 Fairfield Road, Widnes, Lancs.

FOR SALE.—D104 Mike, with stand, £3/10. Two 832 valves at £1 each. A number of books, including "Radio Physics Course," 2nd enlarged.—Box No. 407.

WANTED.—Amplifier unit, AN/APR.4, UHF Rx. Offers to N. H. Crouch, 19 Thornton Road, Clapham Park, London, S.W.12.

RCA Tx ET4332. 813's PA/805's Mod. : 2/20 mc. As new, complete with speech amplifier. Nearest offer £150.—Box No. 413.

HAMBANDER bargain. Quick sale. Perfect condition, as new. Nearest offer to £18.—W. Neal, 217 Sladfield Road, Ward End, Birmingham.

6J5, 6C5, 6AC7, 6SN7, 6SH7, 2/9 each. Wanted, 6AK5, 6AK5, 6C4, 6J6.—BRS.16629, 15 Bonaly Road, Edinburgh.

R1116A battery communications superhet internal speaker. BFO pitch. 'Phone jack. Eliminator, trickle-charger. Accumulator. FB working order. £12/10/- or nearest.—G3AVJ, 45 Broadway, Liverpool, 11.

NATIONAL FB7A receiver for sale, with BC453 bolted to its side and wired : very hot on ten : bandspread coils 10, 20, 40, 80 : £12. Power supply £4 extra. Pair 810's, £2/10/- each : HK24, £1 : EF50's, new and boxed, 10/6.—W. Stirling, 137 Glasgow Street, Ardrossan, Ayrshire.

ECHOPHONE Communication Receiver Model EC2 : seldom used : 55 to 30 mc : noise limiter : B.F.O. complete with external L/S, £17. Valves 810, 813, 803, £2 each.—Stewart, 4 Craiglockhart Place, Edinburgh.

HRO Senior, with 14-30 and 7-14.4 mc general coverage coils, less power pack.—Offers. Require 1000-0-1000v 300 mA and 2-5v 10a transformers.—Box No. 401.

HALLICRAFTERS SX28, 15 valves. 545 kc-43 mc, £35. Also RCA AR77, 10 valves, 550 kc-30 mc, £30. Hallicrafter S20 (Sky Champion), 8 valves, 550 kc-42 mc, £12. All excellent condition. AR88D wanted.—Box No. 400.

SALE.—Sky Champion, realigned Webb's. Perfect, £20. TZ40 (4), 15/- : RK46 (2), 20/- : 813 (2), 35/- : RK20 (2), 35/- : 2-5v 10a Woden trans., 25/-.—G2DTQ, 128 Victoria Street, Mansfield, Notts.

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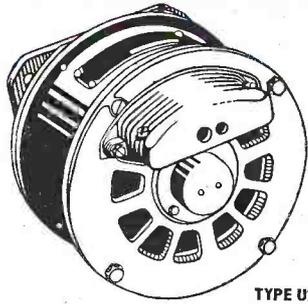
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The HT supply for the T1154 Transmitter. Brand new equipments in cartons. Input 12v. Output 1,200v 200 m/a. Nominal rating 240 watts. Also ideal for conversion to a $\frac{1}{4}$ H.P. electric motor for use on A.C. or D.C. mains. A starter is incorporated in each unit, which is fully smoothed. Enclosed in a sound-proof steel cabinet. **ONLY 15/-** (carriage and packing 6/-).

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