ROBERTS' RADIO **P4D** ALL-DRY BATTERY PORTABLE

R 18

This compact receiver is made by Roberts Radio, of Creek Road, East Molesey, Surrey (Phone: Molesey 2684), and priced at £21 0s. 6d.

EMPLOYING an effective superhet circuit, this all-dry portable four-valver switches easily at will over the long, medium and short wave ranges.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L1, L2, C3** (MW, LW) and **L3, C3** (SW) to heptode valve **(VI, Mullard DK32).**

Oscillator grid coils **L4** (MW), **L5** (LW) and **L6** (SW), are tuned by **C6;** parallel trimming by **C8** (MW), **C9** (LW), and **C10** (SW); series tracking by **C11** (MW), **C12** (LW), and **C13** (SW). Reaction by coils **L7, L8** and **L9** between oscillator anode and HT.

Second valve **(V2 Mullard DF33)** is a variable mu R.F. pentode operating as intermediate frequency amplifier with tuned primary, tuned secondary couplings **C15, L10, C16, L11** and **C17, L12, C18, L13.** All the tuning capacitors are fixed and tuning is effected by adjustment of the iron dust cores.

The Intermediate frequency is 467 Kc/s.

Diode second detector is part of single diode triode valve **(V3 Mullard DAC32).**

Audio frequency component in rectified output is developed across load resistance **R4,** which is the manual volume control, and passed via the A.F. coupling condenser **C19** and grid leak **R5** to control grid of triode section which operates as A.F. amplifier.

D.C. Potential developed across **R4** is fed back as G.B. via **R6** to **V2** on all wavebands and **V1** on MW and LW giving automatic volume control.

Resistance capacity coupling by **R7, C21** and **R8** between **V3** triode and pentode output valve **(V4 Mullard DL35).** Tone correction by **C22.** G.B. potential for **V4** is obtained from the voltage drop across **R9.**

DISMANTLING THE SET

Removing Chassis.—Remove the two 4BA cheese headed steel screws on either side of the chassis. Unsolder aerial and earth leads from their sockets.

The whole chassis with the exception of the speaker but including the frame windings can then be withdrawn to the extent of the speaker leads.

This single operation gives access to every part of the chassis, while the receiver remains in working order. If it becomes necessary free the assembly entirely, unsolder the two leads connecting the speaker to the chassis.

When replacing be sure to connect red lead to upper tag and black lead to lower tag.

Removing Speaker.—Remove the four 4BA nuts round the rim of the speaker.

When replacing, see that the connecting tags are on the left.

GENERAL NOTES

Switches S1-9 are the waveband switches, in a single rotary unit indicated in our front view of the chassis.

The diagram below, drawn as seen looking in the direction of the arrow in the front chassis view, shows the switches in detail. The table beside it gives the switch positions for the three control settings, starting from anti-clockwise. Where a dash appears it indicates that the contacts are open. The letter C indicates closed contacts.

VALVE ANALYSIS

The voltages and currents given in the table at the foot of this page, column three, were measured with an H.T. Battery voltage of 90. The receiver was tuned to the lowest wavelength on the MW Band and the volume control was at maximum, but a 0·1 mfd condenser was connected from the top cap of V1 to chassis to ensure there would be no signal input. The voltages were measured on the 1,000 volts range of a Model 7 Universal Avonmeter, chassis being negative.

Coils, **L1, L2** are MW and LW frame aerial windings, and **L3** is the short wave aerial coil. **L4-L9** are in a single screened unit which with **S1-9** are mounted on a bracket on the underside of the top panel. The I.F. transformers **L10, L11** and **L12, L13** are in two screened units mounted on the rear of the chassis. **S10** is the on-off switch ganged with **R4.**

Battery.—The battery is a combined H.T. and L.T. Type All-dry No. 3.

The connection to the battery is via a four-way cable and plug. The connections to this plug as shown in the circuit diagram, are as seen when looking at the free end of the pins.

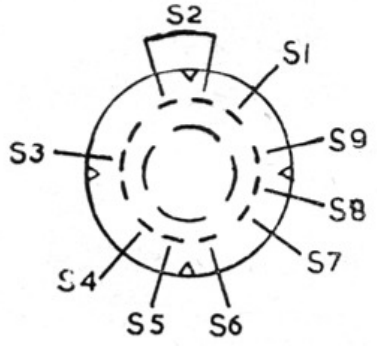
CIRCUIT ALIGNMENT

I.F. Stages.—Turn volume control to maximum. Connect signal generator to top cap of **V2** and chassis. Feed in a 467 Kc/s signal, and adjust **L12, L13** for maximum output.

Transfer signal generator to top cap of **V1** and adjust **L10,L11** for maximum output. Re-check **L12, L13** and **L10, L11.**

R.F. and Oscillator Stages.—With gang at maximum, pointer should cover datum lines at upper wavelength end of scale. On MW and LW sufficient pick up from the signal generator should be obtained with the generator output lead laying on the bench close to the frame. Disconnect H.T. lead to second I.F. transformer, and insert a

(Continued on next page)



SWITCH POSITIONS

The S1–S9 unit, as seen looking in the direction of the arrow in the front view of the chassis

SWITCH	SW	MW	LW
S1	C	—	—
S2	—	C	C
S3	—	C	—
S4	C	—	—
S5	—	C	—
S6	—	—	C
S7	C	—	—
S8	—	C	—
S9	—	—	C

Valve Voltage and Current Readings

Valve	Anode Volts (V)	Anode Current (mA)	Screen Volts (V)	Screen Current (mA)
V1 DK32	82	0·62	50	1·09
	Oscillator			
	82	1·12		
V2 DF33	82	0·9	82	0·21
V3 DAC32	25	0·024		
V4 DL35	78	5·15	82	1·24

0-2 m/a meter in series to act as a tuning indicator.

MW.—Set switch to MW, tune to 250 mts. on scale, set generator to 250 mts. (1,200 Kc/s) adjust **C8** then **C1** for maximum output. Set generator to 500 mts. (600 Kc/s) tune in signal and adjust **C11** for maximum output, while rocking the gang for optimum results.

LW.—Set switch to LW, tune to 1,200 mts. on scale, set generator to 1,200 mts. (250 Kc/s) and adjust C9 then C2 for maximum output. Set generator to 1,800 mts. (166·7 Kc/s) tune in signal and adjust C12 for maximum output, while rocking the gang for optimum results.

SW.—Set switch to SW. Connect generator to aerial and earth leads via a dummy aerial. Set pointer to 16 mts. on scale, set generator to 16 mts. (18·75 M/cs.) and adjust **C10** for maximum output. Two settings will be found for **C10,** the setting involving the least capacity should be chosen. Check calibration at 50 mts. (6 Mc/s.).

ROBERTS' PORTABLE P4D—Circuit Diagram and Component Values

	CONDENSERS	Values (μF)
C1	Frame Aerial MW Trimmer	—
C2	Frame Aerial LW Trimmer	—
C3	Frame Aerial Tuning ...	—
C4	V1 SG Decoupling	0·1
C5	AVC Line Decoupling ...	0·1
C6	Oscillator Circuit Tuning ...	—
C7	V1 Osc. Grid Blocking ...	0·0001
C8	Osc. Circuit MW Trimmer	—
C9	Osc. Circuit LW Trimmer ...	—
C10	Osc. Circuit SW Trimmer ...	—
C11	Osc. Circuit MW Padder ...	—
C12	Osc. Circuit LW Padder ...	—
C13	Osc. Circuit SW Padder ...	0·005
C14	HT Decoupling	0·1
C15	1st IF Trans. PRI Tuning ...	0·0001
C16	1st IF Trans. SEC Tuning...	0·0001
C17	2nd IF Trans. PRI Tuning	0·0001
C18	2nd IF Trans. SEC Tuning	0·0001
C19	AF Coupling to V3 Triode	0·01
C20	IF By-pass	0·0001
C21	V3–V4 AF Coupling ...	0·005
C22	Tone Corrector	0·001
C23	V4 GB By-pass	50·0

	RESISTANCES	Values (Ohms)
R1	V1 SG HT Feed	30,000
R2	V1 Osc. Grid Stopper ...	100
R3	V1 Osc. Grid Leak ...	200,000
R4	V3 Diode Load Manual Volume Control	1,000,000
R5	V3 Grid Leak	2,000,000
R6	AVC Decoupling	1,000,000
R7	V3 Anode Load	1,000,000
R8	V4 Grid Leak	2,000,000
R9	V4 Grid Bias	750

	OTHER COMPONENTS	Values (Ohms)
L1	MW Frame Aerial	—
L2	LW Frame Aerial	—
L3	SW Aerial Coil	—
L4	Osc. Circuit MW Tuning Coil	1·7
L5	Osc. Circuit LW Tuning Coil	13·8
L6	Osc. Circuit SW Tuning Coil	—
L7	Osc. Circuit MW Reaction Winding	5·5
L8	Osc. Circuit LW Reaction Winding	10·2
L9	Osc. Circuit SW Reaction Winding	—
L10	1st IF Trans. PRI	10·5
L11	1st IF Trans. SEC	10·5
L12	2nd IF Trans. PRI	10·5
L13	2nd IF Trans. SEC ...	10·5
L14	Speaker Speech Coil ...	2·5
T1	Output Transfomer PRI ...	680
	SEC ...	0·25
	S1–9 Waveband Switches ...	
	S10 On-Off Switch Ganged R4