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"TRADER" SERVICE SHEET 828

ROBERTS P4D

PORTABLE ALL-DRY SUPERHET

THREE wavebands are provided in the Roberts P4D portable battery superhet, an external aerial being used for S.W. operation. The S.W. range is 15-50 m. All-dry battery valves are used, and the carrying case is fitted with a turntable.

Release date and original price: April, 1946; £14 14s, plus £3 3s 3d purchase tax.

CIRCUIT DESCRIPTION

Input from frame aerial windings **L1** (M.W.) and **L1, L2** (L.W.) is tuned by **C17.** For S.W. operation only, provision is made for the connection of an external aerial which is directly coupled to the single-tuned circuit **L3, C17.**

First valve (**V1, Mullard metallized DK32**) is a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L4** (S.W.), **L5** (M.W.) and **L6** (L.W.) are tuned by **C18.** Parallel trimming by **C19** (S.W.), **C20** (M.W.) and **C21** (L.W.); series tracking by **C5** (S.W.), **C22** (M.W.) and **C23** (L.W.). Reaction coupling by anode coils **L7** (S.W.), **L8** (M.W.) and **L9** (L.W.).

Second valve (**V2, Mullard metallized DF33**) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C2, L10, L11, C3** and **C8, L12, L13, C9.**

Intermediate frequency 467 kc/s.

Diode second detector is part of single diode triode valve (**V3, Mullard metallized DAC32**). Audio frequency component in rectified output is developed across manual volume control **R5,** which acts as diode load resistor, and passed via A.F. coupling capacitor **C11** and C.G. resistor **R6** to grid of triode section, which operates as A.F. amplifier.

D.C. potential developed across **R5** is tapped off and fed back via decoupling circuit **R4, C1** as G.B. to F.C. (except on S.W.) and I.F. valves, giving automatic volume control.

Resistance-capacitance coupling by **R7, C12** and **R8** between **V3** triode and pentode output valve (**V4, Mullard DL35**). G.B. potential for **V4** is obtained from the drop along **R9** in the H.T. negative lead to chassis.

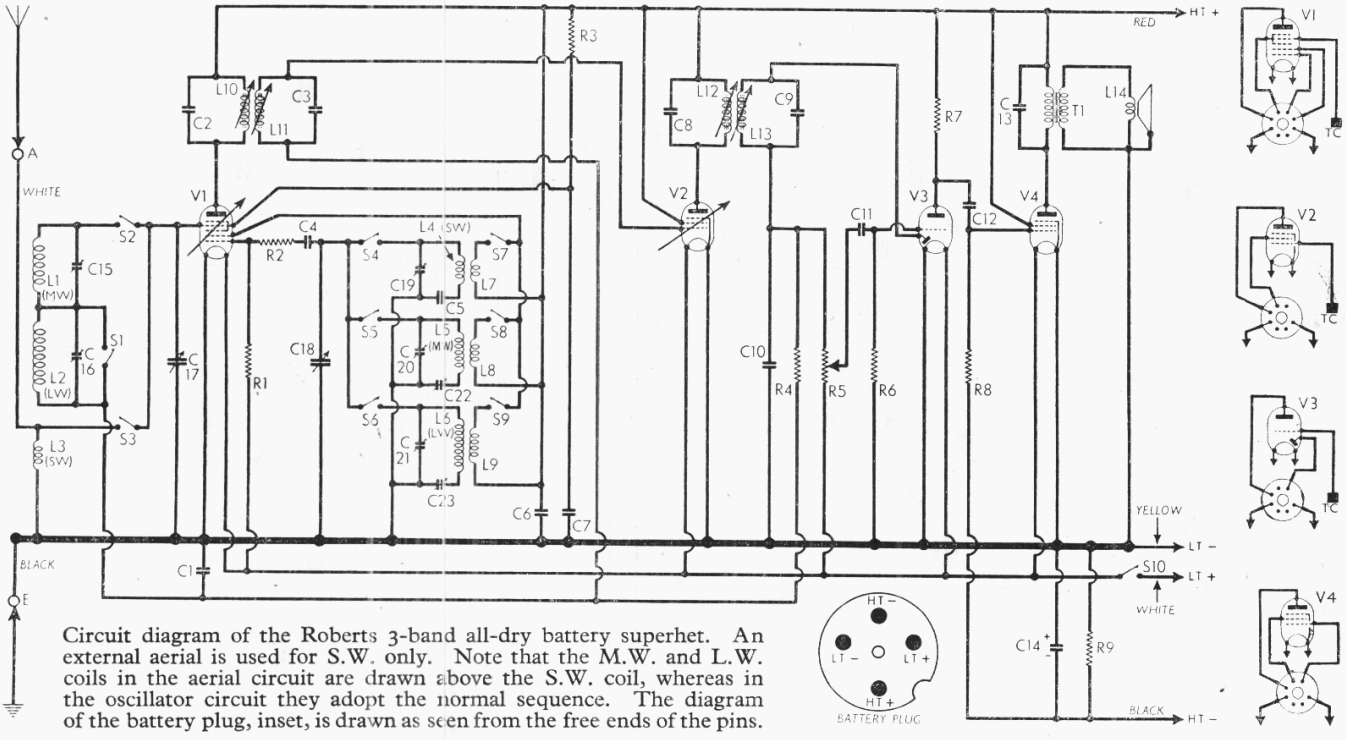
COMPONENTS AND VALUES

	RESISTORS	Values (ohms)
R1	V1 osc. C.G. resistor ...	200,000
R2	V1 osc. C.G. stabilizer ...	100
R3	V1 S.G. H.T. feed ...	30,000
R4	A.V.C. line decoupling ...	1,000,000
R5	Manual volume control ...	1,000,000
R6	V3 triode C.G. resistor ...	2,000,000
R7	V3 triode anode load ...	1,000,000
R8	V4 C.G. resistor	2,000,000
R9	V4 G.B. resistor	750

	CAPACITORS	Values (μF)
C1	A.V.C. line decoupling ...	0·1
C2, C3	1st I.F. transformer fixed tuning capacitors ...	0·0001
C2, C3	1st I.F. transformer fixed tuning capacitors ...	0·0001
C4	V1 osc. C.G. capacitor ...	0·0001
C5	Osc. circ. S.W. tracker ...	0·005
C6	H.T. circuit R.F. by-pass	0·1
C7	V1 S.G. decoupling ...	0·1
C8, C9	2nd I.F. transformer fixed tuning capacitors ...	0·0001
C8, C9	2nd I.F. transformer fixed tuning capacitors ...	0·0001
C10	I.F. by-pass capacitor ...	0·0001
C11	A.F. coupling to V3 triode	0·01
C12	A.F. coupling to V4 C.G....	0·005
C13	Fixed tone corrector ...	0·001
C14*	V4 G.B. by-pass	50·0
C15‡	Aerial circ. M.W. trimmer	—
C16‡	Aerial circ. L.W. trimmer	—
C17†	Frame aerial tuning ...	—
C18†	Oscillator circuit tuning...	—
C19‡	Osc. circ. S.W. trimmer...	—
C20‡	Osc. circ. M.W. trimmer...	—
C21‡	Osc. circ. L.W. trimmer...	—
C22‡	Osc. circ. M.W. tracker ...	—
C23‡	Osc. circ. L.W. tracker ...	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1, L2	Frame aerial windings ...	5·0, 31·0
L3	Aerial S.W. tuning coil ...	Very low
L4	Osc. S.W. tuning coil ...	Very low
L5	Osc. M.W. tuning coil ...	1·7
L6	Osc. L.W. tuning coil ...	13·8
L7	Osc. S.W. reaction coil ...	0·2
L8	Osc. M.W. reaction coil ...	5·5
L9	Osc. L.W. reaction coil ...	10·2
L10	1st I.F. trans. Pri. ...	13·0
L11	1st I.F. trans. Sec. ...	13·0
L12	2nd I.F. trans. Pri. ...	13·0
L13	2nd I.F. trans. Sec. ...	13·0
L14	Speaker speech coil ...	3·5
T1	Output trans. Pri. ...	780·0
T1	Output trans. Sec. ...	0·25
S1–S9	Waveband switches ...	—
S10	L.T. circuit switch, ganged R5	—



Circuit diagram of the Roberts 3-band all-dry battery superhet. An external aerial is used for S.W. only. Note that the M.W. and L.W. coils in the aerial circuit are drawn above the S.W. coil, whereas in the oscillator circuit they adopt the normal sequence. The diagram of the battery plug, inset, is drawn as seen from the free ends of the pins.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the manufacturers. Their receiver, operating from an H.T. battery reading 90 V, was tuned to the lowest wavelength on the M.W. band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 1,000 V scale of a model 7 Avometer, chassis being the negative connection.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (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

GENERAL NOTES

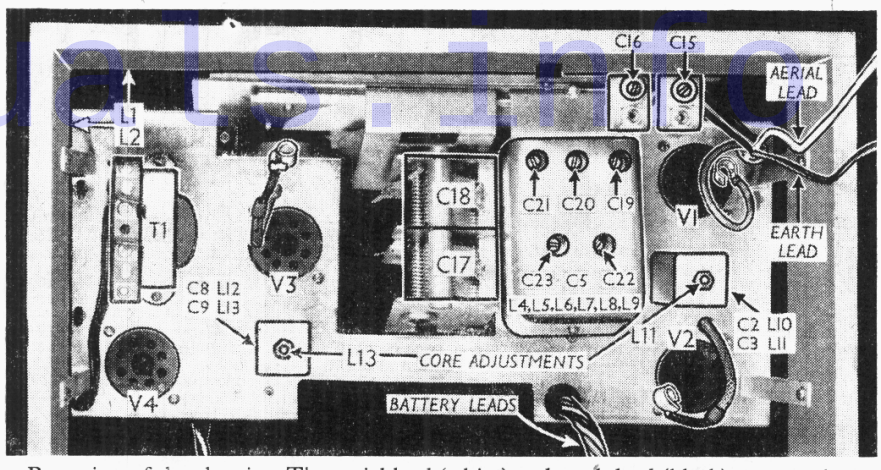
Switches.—**S1-S9** are the waveband switches ganged in a single rotary unit beneath the control panel. This is indicated in our front view of the chassis, and shown in detail in the diagram in col. 2, where it is drawn as seen from below. The table below gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control. A dash indicates open, and **C**, closed.

Coils.—**L1**, **L2** are the frame aerial windings, on a wooden support at the rear of the chassis. **L3** is the S.W. aerial coil, beneath the waveband switch unit. Owing to the arrangement of the circuit, we show **L3** beneath **L1**, **L2** in our diagram, instead of above it as usual, but the wavebands are indicated there by lettering to avoid confusion. The oscillator coils **L4-L9** and the I.F. transformers **L10, L11** and **L12, L13,** are in screened units on the chassis deck, facing the rear, with their associated adjustments.

Battery.—This is an Ever Ready "All Dry No. 3" combined H.T. and L.T. unit, rated at 90V+1.5V. The internal connections are brought out to a 4-pin valve socket, which takes the battery plug which is attached to the chassis by a flexible lead. The lead colours and plug pins are identified in our circuit diagram overleaf, where a diagram of the plug is inset, drawn as seen from the free ends of the pins.

Switch Table

Switch	S.W.	M.W.	L.W.
S1	—	C	—
S2	—	C	C
S3	C	—	—
S4	C	—	—
S5	—	C	—
S6	—	—	C
S7	C	—	—
S8	—	C	—
S9	—	—	C



Rear view of the chassis. The aerial lead (white) and earth lead (black) go to sockets mounted on the hinged door covering the rear of the receiver.

DISMANTLING THE SET

The chassis and frame aerial may be removed from the carrying case as a complete assembly, and the construction is such that free access may then be gained to all components. Care should be exercised in removing and replacing the assembly in order to avoid damage to the frame aerial windings.

Removing Assembly.—Unsolder the two plastic-covered leads joining sockets on the back of the carrying case to the chassis;

remove the four cheese-head screws from the left- and right-hand sides of the chassis, close to the metal flanges;

slide out the assembly, top edge of frame first to enable the control knobs to clear the escutcheon, to the extent of the speaker leads, which is sufficient for most purposes.

To free the chassis entirely, unsolder the two leads from the connecting panel on the speaker.

When replacing, connect the white plastic-covered lead to the upper socket on the back of the carrying case, and the black lead to the lower socket.

The red speaker lead should be soldered to the upper tag on the speaker connecting panel, and the black lead to the lower tag.

Removing Speaker.—Remove the four 4BA nuts securing the speaker to the carrying case.

When replacing, the connecting panel should be on the left, and if the leads have been unsoldered they should be reconnected as previously described.

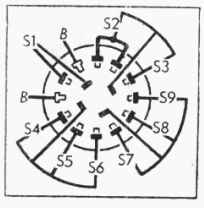


Diagram of the waveband switch unit, as seen from below. Tags marked ***B*** are blank.

CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator leads to top cap (control grid) of **V2** and chassis, leaving existing connector in position. Turn volume control to maximum, feed in a 467 kc/s (642.4 m) signal, and adjust the cores of **L12** and **L13** for maximum output.

Transfer signal generator leads to top cap (control grid) of **V1** and chassis, again leaving existing connector in position, and adjust the cores of **L10** and **L11** for maximum output. Repeat this procedure and re-seal the core adjustment screws.

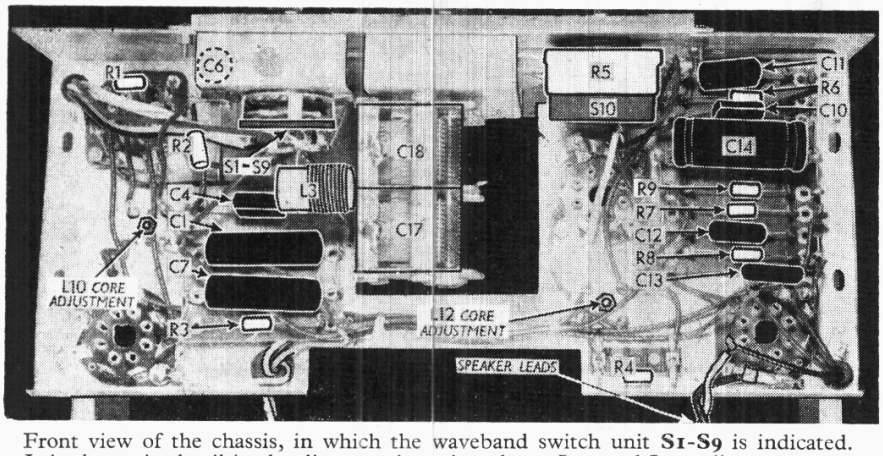
R.F. and Oscillator Stages.—Owing to the interdependence of certain adjustments, it is important that the procedure described should be closely followed. With the gang at maximum capacitance the pointer should cover the horizontal lines at the high wavelength ends of the three scales.

The signal generator leads should be secured to the bench, close to the assembly, and an 0-2 m/A meter should be connected in series with the lead to the H.T.+ (red) tag on the second I.F. transformer primary **L12**, to act as an alignment indicator.

M.W.—Switch set to M.W., tune to 250 m on scale, feed in a 250 m (1,200 kc/s) signal, and adjust **C20,** then **C15,** for minimum deflection of the alignment indicator. Feed in a 500 m (600 kc/s) signal, tune it in, and adjust **C22,** while rocking the gang, for minimum meter deflection, which should coincide with correct calibration.

L.W.—Switch set to L.W., tune to 1,200 m on scale, feed in a 1,200 m (250 kc/s) signal, and adjust **C21,** then **C16,** for minimum meter deflection. Feed in an 1,800 m (166.7 kc/s) signal, tune it in, and adjust **C23,** while rocking the gang, for minimum meter deflection, which should coincide with correct calibration.

S.W.—Switch set to S.W. and connect signal generator to **A** and **E** leads via a suitable dummy aerial. Tune to 16 m on scale, feed in a 16 m (18.75 Mc/s) signal, and adjust **C19** for correct calibration, choosing the peak involving the lesser trimmer capacitance. Check calibration at 50 m (6 Mc/s).



Front view of the chassis, in which the waveband switch unit **S1-S9** is indicated. It is shown in detail in the diagram above in col. 2. **L10** and **L12** adjustments are indicated.

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