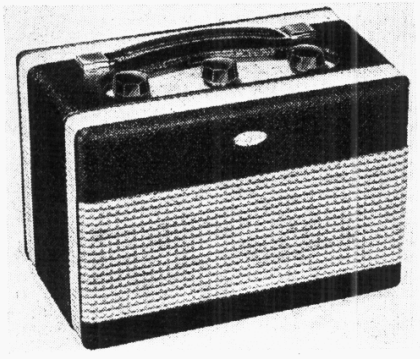
"TRADER" SERVICE SHEET
909

ROBERTS "JUNIOR"

All-Dry Battery Portable



OF very compact design, the Roberts "Junior" is a 4-valve 2-band all-dry battery superhet portable using a large-capacity layer-type H.T. battery. The chassis is sturdy, and can be removed in a few minutes, when it is accessible while still in working order.

It is provided with a separate waterproof carrying bag with sling handles and a zip fastener, which affords an attractive disguise for travelling and protects the receiver from dust.

Release date and original price: April 1949; £14 14s., including batteries and carrier, plus purchase tax.

CIRCUIT DESCRIPTION

Tuned frame aerial input by **L1, C23** (M.W.) or **L1, L2, C23** (L.W.) precedes a heptode valve **(V1, Mullard DK91)** operating as frequency changer with mixed coupling.

Oscillator grid coils **L3** (M.W.) or **L4** (L.W.) are tuned by **C24,** with parallel trimming by **C25** (M.W.), **C26** (L.W.), and series tracking by **C6** (M.W.), **C5, C7** (L.W.). Capacitative reaction coupling, due to the common impedance of trackers in grid and anode circuits, is employed on both bands, with additional inductive coupling on M.W. by **L5.**

Second valve **(V2, Mullard DF91)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-transformer couplings **C2, L6, L7, C3** and **C10, L8, L9, C11,** in which the tuning capacitors are fixed and alignment adjustments are effected by varying the positions of the iron-dust cores.

Intermediate frequency 455 kc/s.

Diode second detector is part of single diode pentode valve **(V3, Mullard DAF91).** Audio frequency component in rectified output is developed across manual volume control **R5,** which is the diode load resistor, and passed via **R6,** A.F. coupling capacitor **C14** and C.G. resistor **R7,** to grid of pentode section, which operates as A.F. amplifier. I.F. filtering by **C12, R6, C13** in diode circuit.

The D.C. potential developed across **R5** is tapped off and fed back through a decoupling circuit **R4, C1** as G.B. to F.C. and I.F. valves, giving automatic gain control.

Resistance-capacitance coupling by **R9, C16, R10** between **V3** pentode and pentode output valve **(V4, Mullard DL92),** whose twin filament sections are wired in parallel. Fixed tone correction in **V4** anode circuit by **C19,** and H.T. R.F. filtering by **C20.**

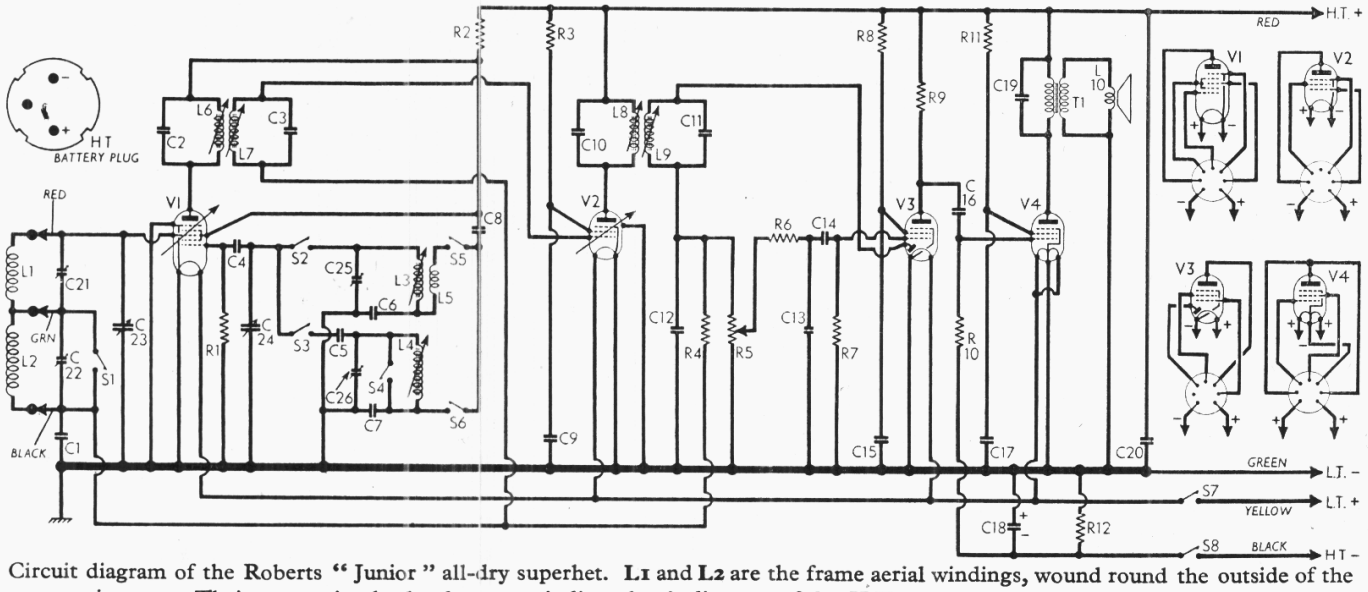
G.B. potential for **V4** is obtained from the drop across **R12** in the H.T. negative lead to chassis.

COMPONENTS AND VALUES

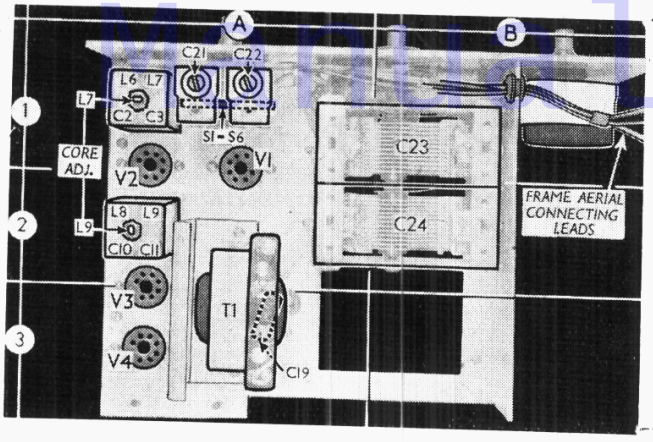
	RESISTORS	Values (ohms)	Locations
R1	V1 osc. C.G. ...	100,000	E4
R2	Osc. anode load ...	10,000	E4
R3	V2 S.G. H.T. feed	68,000	F5
R4	A.G.C. decoupling	2,200,000	F6
R5	Volume control ...	1,000,000	C4
R6	I.F. stopper ...	56,000	F7
R7	V3 pent. C.G. ...	4,700,000	F7
R8	V3 S.G. H.T. feed	4,700,000	F6
R9	V3 pent. load ...	560,000	F8
R10	V4 C.G. resistor ...	1,000,000	F8
R11	V4 S.G. H.T. feed	18,000	F7
R12	V4 G.B. resistor ...	680	E8

	CAPACITORS	Values (μF)	Locations
C1	A.G.C. decoupling	0·05	E6
C2	1st I.F. transformer tuning	0·0001	A1
C3		0·0001	A1
C4	V1 osc. C.G. ...	0·0001	E4
C5	Osc. L.W. tracker	0·0002	E4
C6	Osc. M.W. tracker	0·00065	D4
C7	Osc. L.W. tracker	0·00065	F4
C8	Osc. anode coup.	0·0005	F5
C9	V2 S.G. decoup. ...	0·01	F6
C10	2nd I.F. transformer tuning ...	0·0001	A2
C11		0·0001	A2
C12	I.F. by-passes ...	0·0001	F6
C13		0·00005	E7
C14	A.F. coupling ...	0·002	F7
C15	V3 S.G. decoup. ...	0·1	F6
C16	A.F. coupling ...	0·005	F8
C17	V4 S.G. decoup. ...	0·1	F7
C18*	V4 G.B. by-pass...	20·0	E7
C19	Tone corrector ...	0·002	A3
C20	H.T. R.F. by-pass	0·1	E6
C21‡	Aerial M.W. trim.	0·00007	A1
C22‡	Aerial L.W. trim....	0·00007	A1
C23†	Aerial tuning ...	0·000532	B1
C24†	Oscillator tuning...	0·000532	B2
C25‡	Osc. M.W. trim. ...	0·00007	D4
C26‡	Osc. L.W. trim. ...	0·00007	E4

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Roberts "Junior" all-dry superhet. **L1** and **L2** are the frame aerial windings, wound round the outside of the carrying case. Their connecting lead colours are indicated. A diagram of the H.T. battery plug is inset at top left corner.



Rear view of the chassis. The frame aerial trimmers **C21** and **C22** are accessible when the chassis is in its case. The waveband switch unit **S1–S6** is shown dotted through them, an arrow showing the direction in which it is viewed in the diagram below.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	Frame aerial windings	4·9	—
L2		30·5	—
L3	Oscillator tuning coils	5·4	D4
L4		19·5	F4
L5	Osc. react. coil	1·0	D4
L6	1st I.F. trans. Pri.	13·8	A1
L7	1st I.F. trans. Sec.	13·8	A1
L8	2nd I.F. trans. Pri.	13·8	A2
L9	2nd I.F. trans. Sec.	13·8	A2
L10	Speech coil	3·0	—
T1	Output trans. Pri.	680·0	A3
	Output trans. Sec.	0·5	
S1-S6	W/band switches	—	A1
S7	L.T. circuit switch	—	C5
S8	H.T. circuit switch	—	C5

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the manufacturers, whose receiver was tuned to the lowest wavelength on the M.W. band and was operating from a new set of batteries. The volume control was at maximum, an 0.1 μF capacitor was connected between **V1** signal grid and chassis, and voltages were measured on the 400 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 DK91	54·0	0·75	54·0	2·33
V2 DF91	84·5	1·49	36·5	0·64
V3 DAF91	13·0	0·09	4·25	0·016
V4 DL92	80·5	5·0	59·5	1·14

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (recessed grub screws), lift the rubber grommet of the frame aerial leads from its slot close to the gang, and free the speaker leads, which are looped round the output transformer;

withdraw the three round-head wood screws securing the control panel to the top of the carrying case, and the two round-head wood screws securing the bottom edge of the chassis;

Gripping the chassis by the metal screening plate close to the output transformer, lift the chassis from the carrying case, bottom edge first, to the extent of the connecting leads, which is sufficient for most purposes.

When replacing, it is advisable to close the gang in case its vanes foul the speaker magnet.

If the frame aerial leads have been unsoldered, they should be reconnected as follows, numbering the tags on the connecting strip in the carrying case from front to rear: 1, red; 2, green; 3, black.

Removing Speaker.—Remove chassis, as previously described, and the four nuts (with washers) securing the speaker to the baffle, and lift out the speaker.

When replacing, the connecting tags should be at the bottom.

GENERAL NOTES

Switches.—**S1-S6** are the waveband switches, ganged in a single rotary unit mounted on the control panel. The position of the unit is indicated in our rear view of the chassis by broken lines, the unit itself being obscured by the aerial trimmers **C21, C22.**

An arrow there shows the direction in which it is viewed in the diagram below, where it is

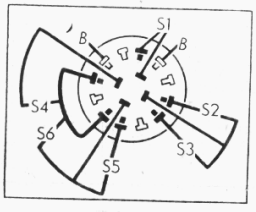


Diagram of the waveband switch unit *B* indicates a blank tag.

seen in detail. **S1, S2, S4** and **S5** close on M.W. (control knob clockwise); **S3** and **S6** only close on L.W.

Frame Windings.—**L1** and **L2** are wound in channels cut into the outside of the carrying case, their terminations being taken to a tag strip inside the case. The windings are covered with strips of cream plastic material with corrugated decoration, which must be removed to obtain access to the windings.

To obtain access to the windings, the plastic bands may be eased off over one corner. To replace a band, warm it (in fairly hot water is one good method) when it will give quite easily and can be slipped back into its slot to cool off.

The M.W. winding consists of 18 turns of 33 S.W.G. D.S.C. copper wire, and the L.W. winding 62 turns of 38 S.W.G. D.S.C. copper wire. The M.W. winding is the front one.

Batteries.—L.T., Ever Ready all-dry No. 4 or Drydex H1158, 1.5 V. H.T., Every Ready Batrymax B107 or Drydex 507, 90 V. G.B. is automatic. The L.T. connector is a 2-pin non-reversible plug (thicker pin is positive). The H.T. connector is a three-pin non-reversible plug, of which the centrally disposed pin is blank. A diagram of this H.T. plug, viewed from the free ends of its pins, is inset in the top left-hand corner of our circuit diagram.

CIRCUIT ALIGNMENT

Before commencing these operations the chassis must be removed from the carrying case.

I.F. Stages.—Switch set to M.W., turn gang to minimum capacitance and volume control to maximum, connect signal generator via an 0.05 μF capacitor in the "live" lead, to control grid (pin 6) of **V1** and chassis, feed in a 455 kc/s (659.3 m) signal and adjust the cores of **L9, L8, L7** and **L6** (location references **A2, F6, A1, F4**) for maximum output. Repeat these operations until no improvement results.

Oscillator & R.F. Stages.—With the gang at maximum the pointer should coincide with the high wavelength ends of the two scales. It may be adjusted in position if the two grub screws on the slow-motion drive are slackened. The signal generator leads should be secured on the bench, close to the frame aerials.

Oscillator Stage

M.W.—With set still switched to M.W., tune to 220 m on scale, feed in a 220 m (1,364 kc/s) signal, and adjust **C25** (D4) for maximum output. Tune to 530 m on scale, feed in a 530 m (566 kc/s) signal and adjust the core of **L3** (D4) for maximum output. Repeat these operations until no improvement results.

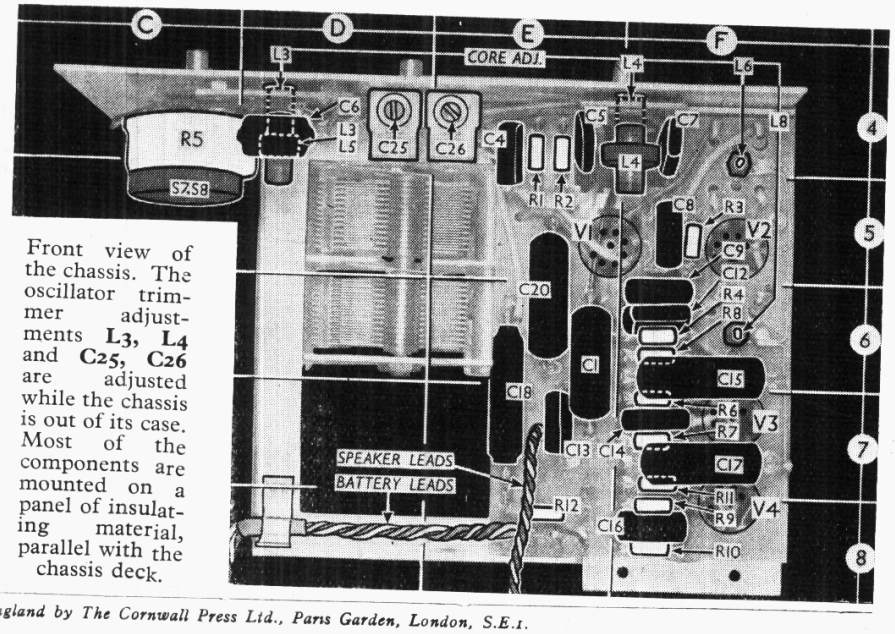
L.W.—Switch set to L.W., tune to "Luxembourg" on scale, feed in a 1,293 m (232 kc/s) signal, and adjust **C26** (E4) for maximum output. Tune to "Overseas" on scale, feed in a 1,796 m (167 kc/s) signal, and adjust the core of **L4** (F4) for maximum output. Repeat these operations until no improvement results.

R.F. Stage

Before commencing these operations the chassis and batteries must be replaced in the carrying case.

M.W.—Switch set to M.W., tune to 220 m on scale, feed in a 220 m signal, and adjust **C21** (A1) for maximum output.

L.W.—Switch set to L.W., tune to "Luxembourg" on scale, feed in a 1,293 m signal, and adjust **C22** (A1) for maximum output.



Front view of the chassis. The oscillator trimmer adjustments **L3, L4** and **C25, C26** are adjusted while the chassis is out of its case. Most of the components are mounted on a panel of insulating material, parallel with the chassis deck.

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