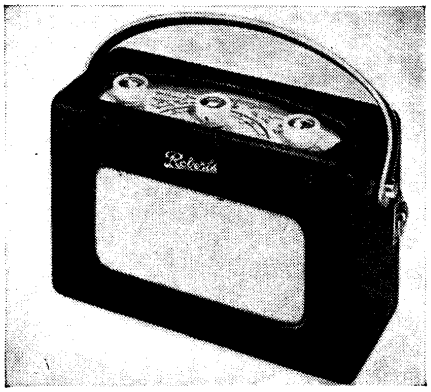
"TRADER" SERVICE SHEET

1449

ROBERTS R200

2-band Transistor Portable with Printed Circuit



Appearance of the Roberts R200

DESIGNED to operate from a single 9V battery, the Roberts R200 is a 2-band portable receiver fitted with six transistors, a germanium diode, a ferrite rod aerial, a 5in speaker, and a printed circuit panel. Provision is made for the connection of an external aerial. The waveband ranges are 188-556m (M.W.) and 1,130-1,970m (L.W.).

Release date and original price: February 1960, £14 6s, including battery. Purchase tax extra.

TRANSISTOR ANALYSIS

Transistor voltages given in the table below are those derived from the manufacturers' information. They were measured with a 20,000Ω/V meter, chassis being the positive connection in every case. The receiver was switched to M.W. but there was no signal input.

Transistor	Emitter (V)	Base (V)	Collector (V)
TR1 OC44 ..	1·5	1·43	7·5
TR2 OC45 ..	0·52	0·64	7·5
TR3 OC45 ..	0·9	1·08	7·5
TR4 OC78D ..	1·08	1·21	8·7
TR5 OC78† ..	0·022	0·18	9·0
TR6 OC78† ..	0·022	0·18	9·0

† *Matched pair.*

CIRCUIT DESCRIPTION

Aerial coils **L2** and **L3** are mounted, together with low impedance coupling coils **L4** and **L5**, on a ferrite rod to form an internal aerial. **L2** is tuned by **C1** and **C2** on M.W., for L.W. reception, **L2** and **L3** are connected in series, additional capacitance being provided by **C3**. A socket is provided for the connection of an external aerial, which is coupled to the ferrite rod via **L1**.

TR1 operates as a self-oscillating frequency changer. Oscillator coil **L8** is tuned by **C9** and **C10** on M.W. and, in addition, by **C7** and **C8** on L.W. Reaction coupling between the collector and emitter by **L6** and **L7**.

The intermediate frequency output of **TR1** is coupled via a two-stage I.F. amplifier formed by earthed-emitter transistors **TR2, TR3,** and single-tuned transformers **L9, L10; L11, L12;** and **L13, L14,** to germanium diode detector **X1. TR2** and **TR3** are neutralized by **C12** and **C15.**

Intermediate frequency 470kc/s.

The audio frequency component in the rectified output of **X1** is developed across the combined diode load and volume control **R8,** and is passed via **R9** and **C21** to the base of A.F. amplifier **TR4.**

Base bias for **TR1, TR2** and **TR4** is provided by potential dividers **R1, R2; R4, R5, R8;** and **R10, R11,** respectively. Base bias for **TR3** is obtained from the

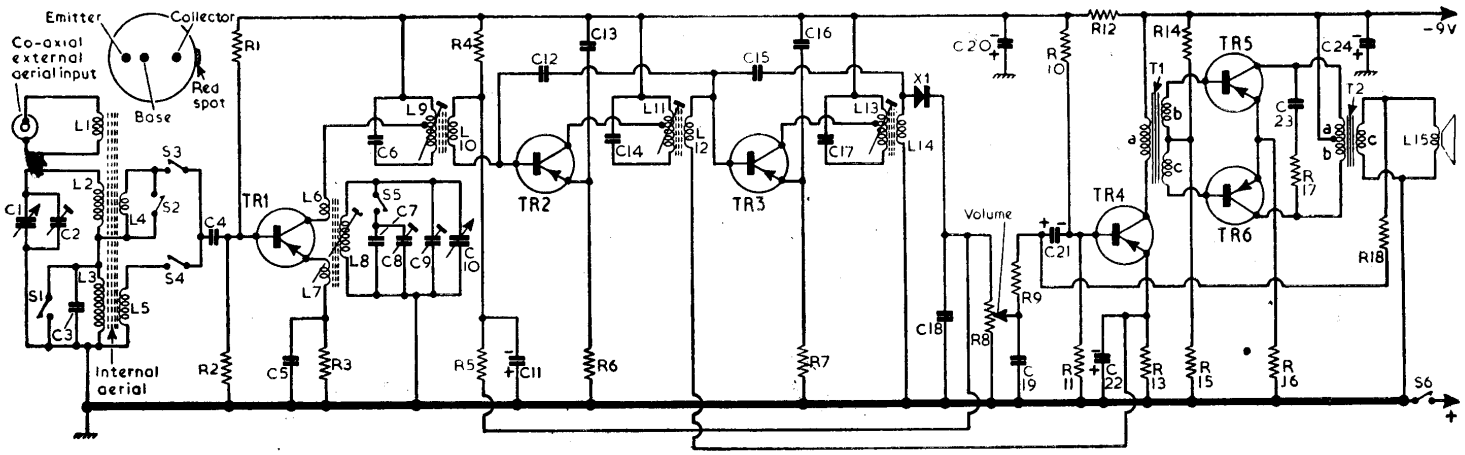
(*Continued overleaf, col. 1.*)

COMPONENT VALUES AND LOCATIONS

Resistors		
R1	33kΩ	C2
R2	8·2kΩ	B2
R3	3·9kΩ	B2
R4	82kΩ	C1
R5	8·2kΩ	B2
R6	560Ω	B2
R7	1kΩ	B2
R8	5kΩ	F3
R9	4·7kΩ	B1
R10	33kΩ	C1
R11	8.2kΩ	C1
R12	560Ω	C1
R13	560Ω	C1
R14	3·9kΩ	C2
R15	82Ω	C2
R16	5·6Ω	C2
R17	100Ω	D4
R18	220kΩ	C1
Capacitors		
C1	196pF	E3
C2	30pF	B1
C3	40pF	F4
C4	0·04μF	B2
C5	0·01μF	B2
C6	250pF	B2
C7	160pF	B1
C8	110pF	C1
C9	30pF	A1
C10	110pF	E3
C11	10μF	D4
C12	58pF	B2
C13	0·1μF	B1
C14	250pF	B1
C15	18pF	B1
C16	0·04μF	B2
C17	250pF	B1
C18	0·02μF	B1
C19	0·02μF	E3
C20	100μF	C2
C21	2μF	B1
C22	100μF	C1
C23	0·1μF	C2
C24	50μF	D4
Coils*		
L1	2·3	E4
L2	1·6	D4
L3	7·0	F4
L4	—	E4
L5	—	F4
L6	—	C2
L7	—	C2
L8	2·1	C2
L9	4·0	B2
L10	—	B2
L11	4·0	B1
L12	—	B1
L13	4·0	B1
L14	—	B1
L15	3·0	—
Miscellaneous*		
T1 a	135·0	C1
T1 b	78·0	C1
T1 c	total	C1
T2 a	4·1	C2
T2 b	4·1	C2
T2 c	0·27	C2
X1	OA70	B1
S1-S6	—	D3

* *Approximate D.C. resistance in ohms.*

If the component numbers in these tables are used when ordering spare parts, dealers are requested to mention the fact on the order, as these numbers may differ from those used in the manufacturers' service manual.



Circuit diagram of the Roberts R200. *The coupling coil* **L1** *and the co-axial socket permit the use of a car aerial.*

Circuit Description—*continued.*

emitter current of **TR4** flowing through **R13.** Collector currents are stabilized against changes in temperature by emitter resistors **R3, R6, R7** and **R13.** The bias potential divider for **TR2** includes the volume control **R8,** so that the positive-going D.C. component of the rectified signal developed across **R8,** reduces its gain on strong signals, thus providing A.G.C.

The output of **TR4** is coupled via phase-splitting transformer **T1** to the bases of the common emitter, class B, push-pull output transistors **TR5, TR6.** Coupling to low impedance speech coil **L15** is via **T2.** Base bias for **TR5** and **TR6** is provided by the potential divider **R14, R15,** their collector currents being stabilized by the common emitter resistor **R16.** Negative feedback is applied to the base of **TR4** from **T2** secondary winding via **R18.**

CIRCUIT ALIGNMENT

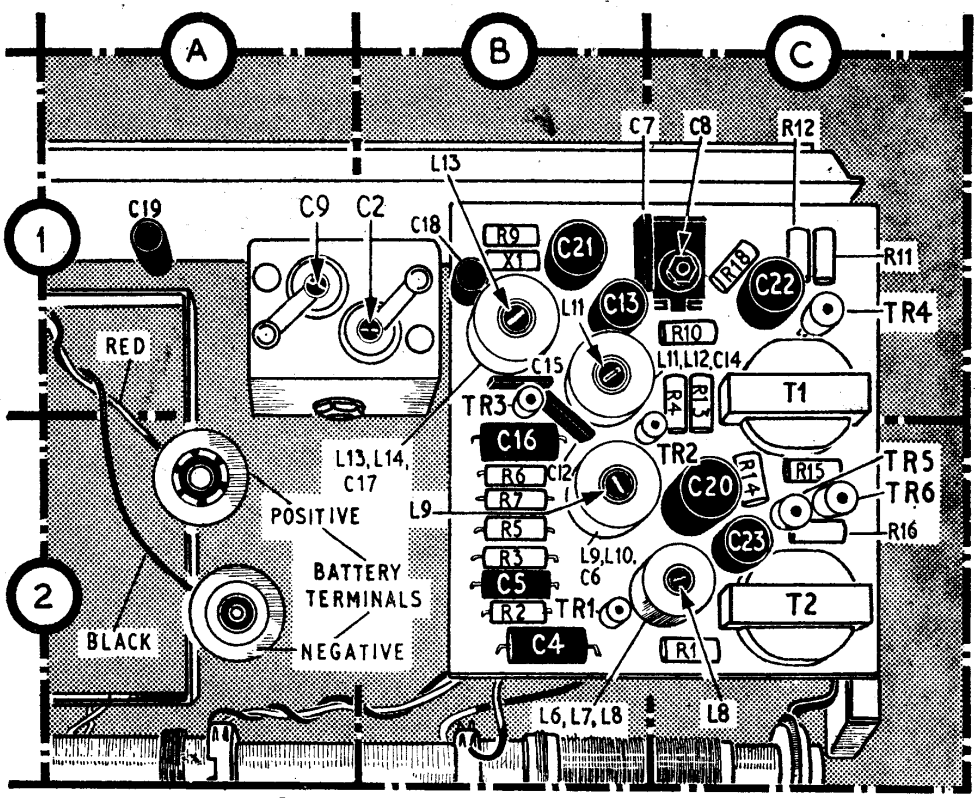
1.—Connect an output meter of 3Ω impedance in place of the speaker, or an A.C. voltmeter across the speaker. Connect a signal generator between chassis and the junction of **S3, S4** and **C4.** The generator output should be maintained as low as possible at all times during the alignment operations to prevent A.G.C. action from masking the adjustment peaks.

2.—Switch the receiver to M.W., turn the tuning gang to minimum capacitance and the volume control fully clockwise. Feed in a modulated 470kc/s signal and adjust the cores of **L13** (B1), **L11,** (B1) and **L9** (B2) for maximum output. Repeat these adjustments until no further improvement can be obtained.

3.—Turn the tuning gang to maximum capacitance and check that the pointer coincides with the high wavelength ends of the tuning scales.

4.—Loosely couple the signal generator output to the ferrite rod aerial coils **L1-L5.** Tune the receiver to 500m. Feed in a 600kc/s signal and adjust the core of **L8** (C2) for maximum output. Then slide the former of **L2** (D4) along the ferrite rod for maximum output.

5.—Tune the receiver to 214m. Feed in a 1,400kc/s signal and adjust **C9** (A1) and **C2** (B1) for maximum output.



Rear view of the chassis. Details of the ferrite rod aerial assembly are given in the front view illustration below.

6.—Repeat operations 4 and 5.

7.—Switch the receiver to L.W. and tune it to 425m. Feed in a 185kc/s signal and adjust **C8** (C1) for maximum output. Then slide the former of **L3, L5** (F4) along the ferrite rod for maximum output.

GENERAL NOTES

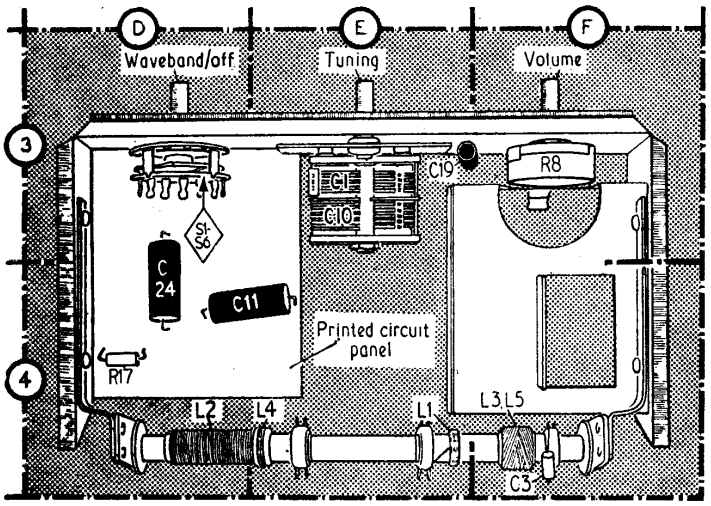
Battery.—The battery recommended by the manufacturer is an Ever Ready PP9, rated at 9V. Total battery current with no signal input is 8mA.

TR5,TR6.—In the event of the replacement of transistors **TR5** or **TR6** (OC78's) being necessary, *both* transistors must be replaced with a matched pair.

Warning.—Transistors may be permanently damaged if the full negative voltage is connected to their bases, or if continuity measurements are made with the transistors in circuit. They may also be damaged by the application of excessive heat. If a transistor has to be removed or replaced, the soldering or unsoldering operation should be completed as quickly as possible using an earthed soldering iron. A heat shunt, such as a pair of pliers, should be clamped across the transistor lead between the transistor and the soldering iron during the soldering or unsoldering of its leads.

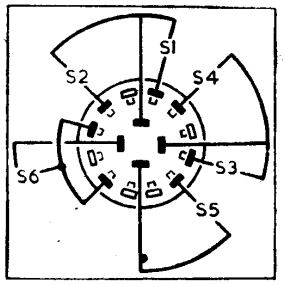
Removing Chassis.—Remove the control knobs (recessed grub screws). Lay the receiver face down and remove the screws which secure the two wooden wedges to the inside of the cabinet, one below each end of the chassis. Ease the tuning scale and panel from the recess in the top of the case and withdraw the chassis to the limit of the speaker and external aerial socket leads.

Switches.—**S1-S6** are the on/off and waveband switches, ganged in a rotary unit on the printed side of the panel. The unit is indicated in our front view illustration of the chassis (location reference D3) and a detailed sketch is shown below, where the contacts are drawn as seen when viewed in the direction of the arrow in the chassis illustration. **S1, S3** and **S6** close on M.W.; **S2, S4, S5** and **S6** close on L.W.



Left: *Front view of the chassis. The printed circuit panel is shown on the left in this view.*

Right: *Diagram of the on/off and waveband switch unit drawn as seen from the point of view indicated by the arrow in our front view illustration.*



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