

"TRADER" SERVICE SHEET  
**1484**

# ROBERTS RT7

## Two-Band Portable A.M. Radio Receiver

**S**EVEN transistors, two germanium crystal diodes and a printed circuit are employed in the Roberts RT7, a two-band portable A.M. radio receiver that operates from a large-capacity 9V battery. Waveband ranges are 182-570 m and 1,120-2,000 m, and waveband switching is press-button operated. A long internal ferrite rod aerial is fitted, but provision is made by means of a car aerial socket for the connection of an external aerial.

Release date and original price: October, 1960. £18 5s 8d including battery. Purchase tax extra.

### TRANSISTOR ANALYSIS

Transistor terminal voltages given in the table below are those supplied by the manufacturer. They are negative readings measured with a high resistance (20,000Ω/V) meter whose positive lead was connected to

#### Transistor Table

Transistor	Emitter (V)	Base (V)	Collector (V)
TR1 OC44	1.07	1.03	6.55
TR2 OC45	0.53	0.7	5.35
TR3 OC45	0.92	1.09	7.15
TR4 OC71	1.04	1.14	3.02
TR5 OC81D	1.6	1.69	8.7
TR6 OC81	—	0.2	9.0
TR7 OC81	—	0.2	9.0

chassis. The receiver was switched to M.W., but there was no signal input, and it was operating from a new 9V battery.

### CIRCUIT DESCRIPTION

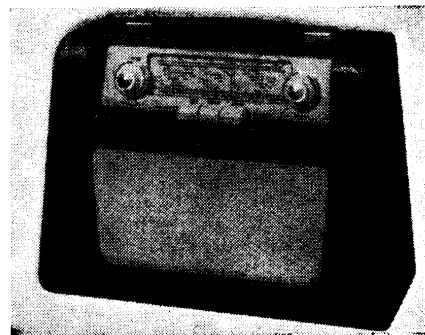
Ferrite rod aerial coils L3 (M.W.) and L2 (L.W.) are tuned by C1. A special winding L1 provides coupling for a car aerial or any other external aerial. Coupling to first transistor TR1 is effected by means of low impedance windings L4, L5 via capacitor C5,

which isolates the base electrode of the transistor from the coil circuit.

TR1 operates as a self-oscillating mixer, with reaction coupling by L6 and L7 between collector and emitter circuits. L8 is tuned by C13, with the addition of C12 on M.W., or of C10, C11 on L.W. The operation of the waveband switches is explained under "General Notes."

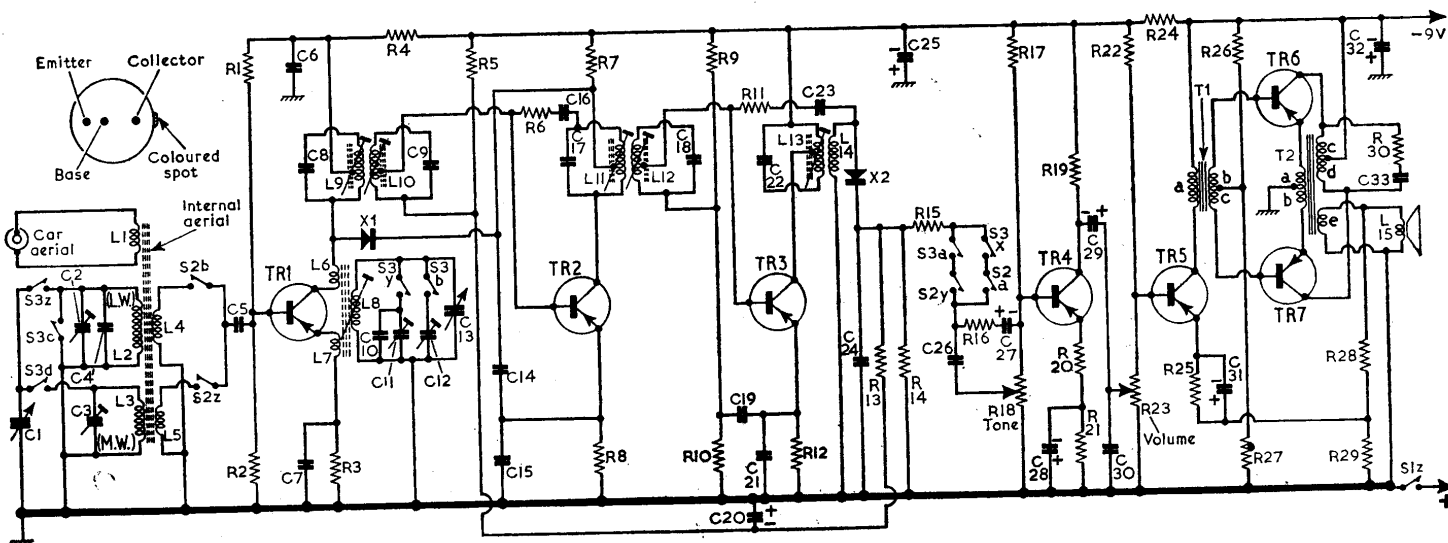
Signals at intermediate frequency in TR1 collector circuit are selected by double-tuned transformer L9, L10 and passed to a two-stage amplifier comprising TR2 and TR3, the transistor connections being tapped down on each coil winding to provide low impedance couplings and to avoid unduly damping the tuned circuits.

Intermediate frequency 470 kc/s. Output from TR3 is applied via L14 to

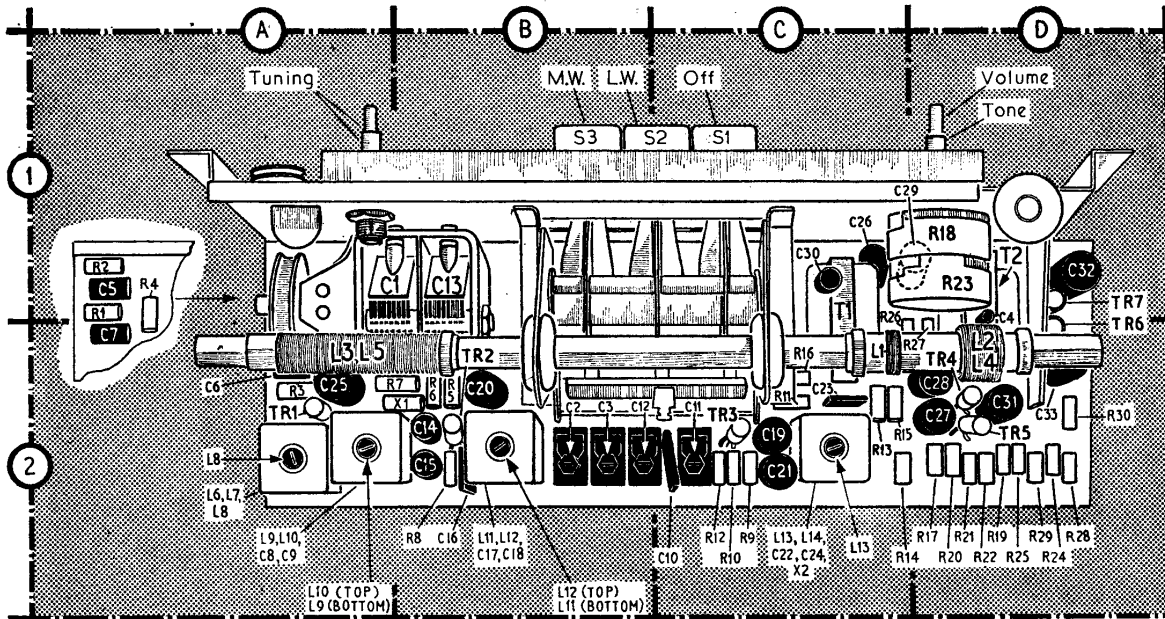


Appearance of the Roberts RT7.

Coils*		Capacitors		Resistors		Miscellaneous*	
L1	2.5	C1	A1	R1	39kΩ	T1	a 90.0
L2	0.8	C2	B2	R2	8.2kΩ		b 35.0
L3	5.0	C3	D1	R3	2.7kΩ		c 35.0
L4	0.1	C4	A1	R4	1kΩ	T2	a 2.5
L5	0.8	C5	A2	R5	68kΩ		b 2.5
L6	1.65 total	C6	A2	R6	6.8kΩ		c 0.5
L7	1.65 total	C7	A2	R7	1.5kΩ		d 0.5
L8	0.7	C8	A2	R8	470Ω		e 0.2
L9	0.3	C9	A2	R9	22kΩ	X1	OA70
L10	2.5	C10	C2	R10	4.7kΩ	X2	OA70
L11	1.65 total	C11	C2	R11	3.9kΩ		
L12	1.65	C12	B2	R12	1kΩ		
L13	4.0	C13	B1	R13	8.2kΩ		
L14	1.3	C14	B2				
L15	3.0	C15	B2				
C16	10pF	C16	A1				
C17	800pF	C17	A1				
C18	800pF	C18	A2				
C19	0.1μF	C19	A1				
C20	10μF	C20	B2				
C21	0.1μF	C21	A2				
C22	250pF	C22	B2				
C23	18pF	C23	A2				
C24	0.01μF	C24	A1				
C25	100μF	C25	B2				
C26	0.1μF	C26	A2				
C27	2μF	C27	A2				
C28	100μF	C28	A2				
C29	2μF	C29	A2				
C30	0.01μF	C30	A2				
C31	100μF	C31	A2				
C32	100μF	C32	A2				
C33	0.25μF	C33	A2				



Circuit diagram of the Roberts RT7. The method adopted for numbering the switches is explained under "General Notes" overleaf.



Plan view of the chassis. The small section inset in location A1 shows the components which are hidden by the tuning drive drum. The drive cord is not included in this illustration.

**Circuit Description—continued**

crystal rectifier X2, which operates as signal detector, and its rectified output is developed across load resistor R14. The D.C. component developed across R14 is tapped off and applied to TR2 base circuit as bias, giving A.G.C.

Actually, the A.G.C. bias is developed in part of the base bias potential divider for TR2, which comprises R5, R13 and R14, and it is decoupled by C20. Supplementary A.G.C. is derived from the action of diode of the rectifier, which rectifies large positive excursions R7 across L9, and shunts current through R7 biases the TR2 collector rectifying smaller signal excursions.

Audio frequency component in the rectified output from X2 is passed via either S3a and S2y or S3x and S2a, according to which button is pressed, and R16, C27 to base of TR4 which operates as A.F. amplifier. When the M.W. button is pressed, S3a and Sy close, and when the L.W. button is pressed, S3x and S2a close.

Output from TR4 collector is coupled via C29, C30 and volume control R23 to base of driver transistor TR5, which is transformer coupled by T1 to class B output stage TR6, TR7. A split-load output circuit is used, in which part of the load is in the emitter circuit (windings a and b on T2) while the

larger proportion is in the collector circuit (windings c and d). This method requires increased drive to the output stage, but it reduces cross-over distortion when the battery voltage begins to fall.

The speaker speech coil is coupled by means of an isolated secondary winding e whose output voltage is developed across the potential divider R28, R29, tapped off at their junction, and fed back to TR5 emitter circuit, giving negative feed-back over the two stages.

**CIRCUIT ALIGNMENT**

Connect a 3Ω output meter in place of the speaker speech coil, or alternatively connect an A.C. voltmeter across the speech coil. Reduce the input signal as far as possible consistent with pointer indications by reducing the input signal as far as possible into line to prevent A.G.C. action.

**I.F. Stages.**—Switch receiver to M.W., turn the gang to maximum capacitance and the volume control to maximum. Connect signal generator output to the junction of S2 and C5 (location reference A1) and chassis, feed in a 470kc/s signal, and adjust the cores of L13 (C2), L12, L11 (B2), L10 and L9 (A2) for maximum output.

**R.F. Stages.**—Transfer signal generator leads to the vicinity of the ferrite rod aerial, so as to obtain loose coupling. Check that with the gang at maximum capacitance the cursor coincides with the high wavelength end of the tuning scales, then tune to 500m on scale, feed in a 600kc/s signal, and adjust the cores of L8 and L3 for maximum output. Tune to 200m on scale, feed in a 1,500m signal, and adjust C12 and C3 (B2) for maximum output.

Return to 500m and repeat the adjustment of L8, then that of L3, alternately until no improvement can be obtained. Then return to 200m, and readjust C12 and C3 in turn. Then repeat the 500m and 200m adjustments for optimum results.

Switch set to L.W., tune to 1,500m on scale, feed in a 200kc/s signal, and adjust C11 (C2) for maximum output. Feed in a 250kc/s signal, tune it in, and adjust C2 (B2) for maximum output. Feed in a 164kc/s signal, tune it in, and adjust L2 by sliding it along the ferrite rod for the maximum output. Repeat the L.W. adjustments throughout for optimum results.

**GENERAL NOTES**

**Transistors.**—The makers warn service engineers not to make continuity measure-

ments with the transistors in circuit, and they point out that they may be damaged if the full battery voltage is applied to their bases. When a transistor is replaced, its leads must not be cut shorter than ¼ in, and then a heat shunt should be used while soldering them. If either of the output transistors TR6 or TR7 is replaced, they must both be replaced with a matched pair.

**Battery.**—The battery supplied with the receiver is an Ever Ready PP10, rated at 9V.

**Modifications.**—In a small number of early models the value of R27 was 43Ω (instead of 51Ω), and the value of R28 was 180Ω (instead of 270Ω). Similarly, C30 was 0.02μF (instead of 0.01μF).

**Switches.**—Waveband switching is performed by a press-button unit with "off," "L.W." and "M.W." buttons, reading from left to right as seen from the front. The tags of these switches are identified in the diagram below. The action of the switches is indicated by the suffix letter of each switch number. If the suffix is a, b, c or d the switch closes when its button is pressed; if the suffix is x, y or z it opens.

The number of any switch is derived from the button that operates it. Thus S1z belongs to button No. 1, which is the "off" button, and it opens when the button is pressed to switch the set off. Most of the switches are operated by the M.W. button, and therefore they are numbered 3. Thus when the M.W. button is pressed S3d closes to connect C1 to the M.W. aerial coil, and S3z opens to disconnect L2. And so on.

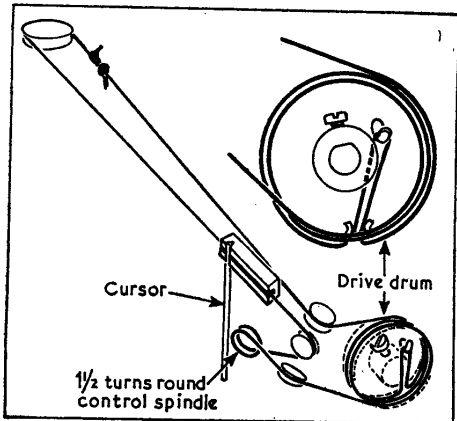
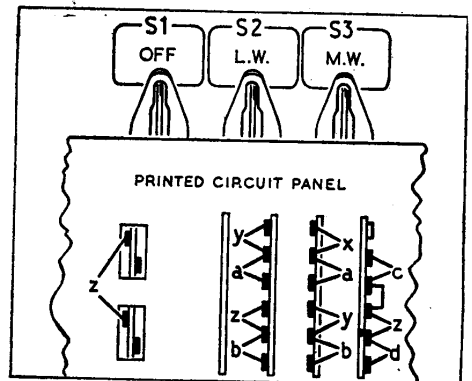


Diagram of the tuning drive system. When replacing the cord, begin with one end at the position of the knot and run to the right over the drive drum as shown.



Sketch of the switch connections, as seen below the printed circuit panel.