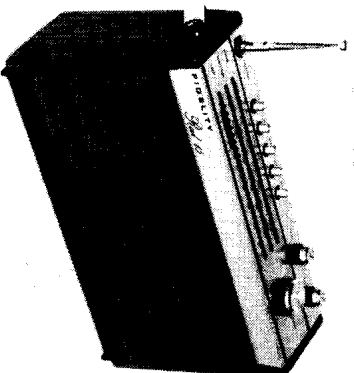


E R T

SERVICE CHART

1784



Fidelity RAD 15 has solid teak ends and bright metal trim

FIDELITY RAD 15 PORTABLE RADIO

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FIDELITY RAD 15 is a nine transistor portable radio with push-button operated switching for VHF, MW and LW bands. It has been designed to operate when used in a car. To facilitate this it has speaker grilles on both sides so that a reasonable output is obtained when the radio is placed on a shelf.

Battery. One 9V type PP9 or equivalent.

Wavebands. LW 1200-2000m, MW 186-550m and VHF/FM 87.5-108MHz.

Transistors. TR1 AM mixer/oscillator and first FM IF amplifier BF195D, TR2 first AM and second FM IF amplifier BC159, TR3 second AM and third FM IF amplifier BF194B, TR4 AF preamplifier BC159, TR5 output stage driver BC149, TR6 AC127 and TR7 AC128 complementary n-p-n/p-n-p output pair, TR8 RF amplifier BF195C, TR9 VHF/FM mixer/oscillator BF195C or BF194.

Diodes. D1 AA119 and D2 AA119 ratio detector, D3 AM detector AA119, D4 output stage stabilising AA129.

IF. AM 470kHz, FM 10.7MHz.

Aerials. Internal ferrite rod assembly for MW and LW. Telescopic rod for VHF/FM.

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Speaker. 4in. diameter 8ohm impedance.

Outlet. Normally closed miniature jack for earphone or tape recorder.

Price. £23.

Manufacturer. Fidelity Radio Ltd.

Service department. Fidelity House, Olaf Street, W11. Tel: 01-727 0131 (10 lines).

DISMANTLING

Pull off volume, tone and tuning knobs. Unscrew and remove three cross head screws from the bottom of the case. The case back may now be removed, giving access to the component side of the printed circuit panel. All cores and trimmers are accessible for alignment purposes.

In order to gain access to the ferrite rod aerial assembly for alignment adjustments further dismantling is necessary as follows: Remove handle assembly by taking out the securing bolts and spacers at each end. The control panel assembly may now be lifted off to the extent of the lead to the telescopic aerial. The ferrite rod aerial coils are now accessible.

To complete the removal of the chassis assembly in its entirety, first unplug battery

leads. Unscrew and remove three cross head screws securing the circuit panel and unplug speaker leads. The chassis assembly may now be removed.

CIRCUIT DESCRIPTION

Signals induced in L2/L4 (MW) and L3 (LW) are tuned by VC1, TC1 and C1 with the addition of C2 on LW. Selection is made with switches MW and FM—push-button labelled LW is merely a latch release—the signal then being fed via C5 to base of TR1.

Oscillator tuning for MW is obtained from the tuned circuit comprising L6, VC2, TC2, C8 and C10. Switch MW when in the released position includes TC3 and C9 for LW tuning.

After mixing in TR1 the signal component centred on 470kHz is selected and coupled by IF band-pass filter L8, L9 into a two stage RC coupled, gain controlled, amplifier TR2 and TR3.

The signal after amplification by TR3 is developed across TR7 and rectified by D3, C19, R18 and C21 filter out the residual IF component, and R17 is the detector DC load. AGC applied to TR2 base is derived from the DC component present in the rectified signal and filtered by R14/C17 and R8/C11.

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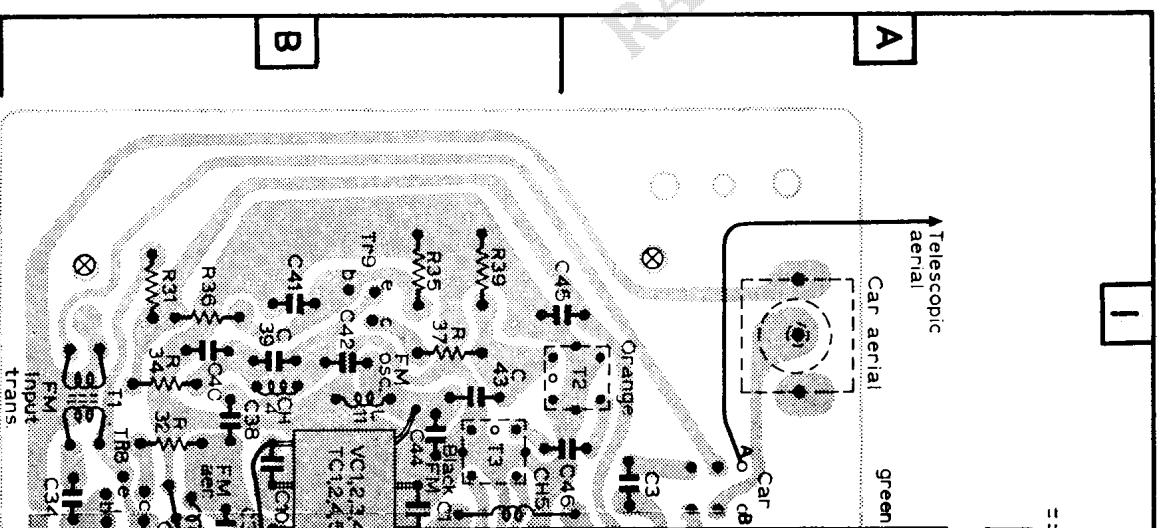
Audio frequencies after filtering are fed via a tone compensated volume control network to the base of AF preamplifier TR4. Additional tone control VR2/C29 in shunt with the volume control provides for variable top cut.

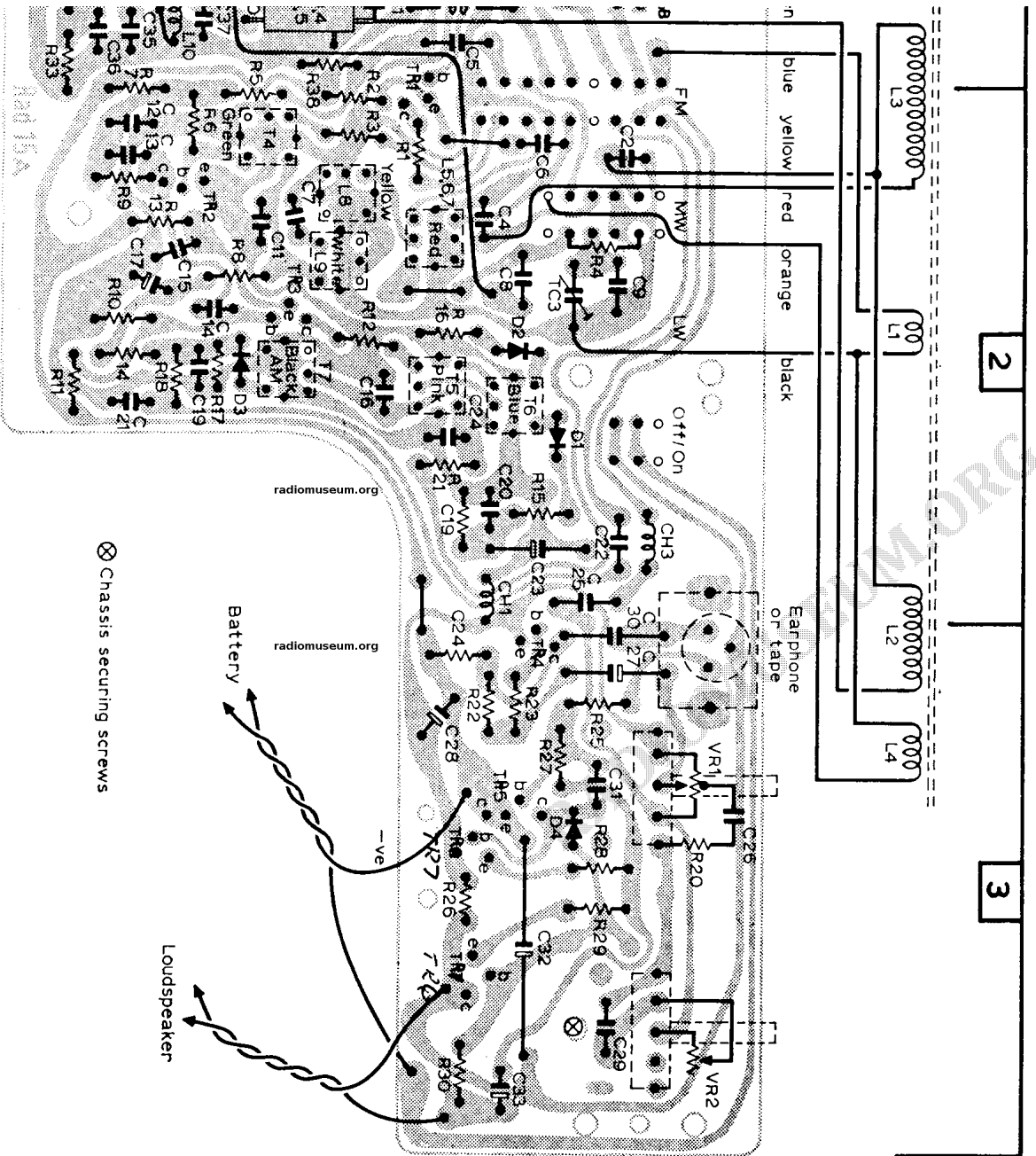
The output signal from TR4 is developed across R24 and fed via C30 (DC blocking), a normally closed jack (earphone) and R25 to base of output stage driver transistor TR5. Alternate positive and negative half cycles of signal are conducted in turn by TR6 and TR7, are recombined at the junction of emitter resistors R28, R29 and fed to the speaker via C33.

When switched to VHF/FM, signals introduced in the telescopic, or external aerial if car push-button is operated, are transformer coupled into the emitter of an earthed base RF amplifier TR8, then top capacity coupled by C38 into the emitter of mixer/oscillator TR9.

Bandpass coupling components L10, C37, and TC4 are tuned over the band by VC3, VC4 which is ganged with VC3 is the variable capacitor providing oscillator tuning in conjunction with L11, C44 and TC5.

The IF component centred on 10.7MHz selected by T2 the first of a pair of top capacity coupled bandpass transformers T2 and T3 is then fed to base of TR1 which when working VHF/FM becomes the first IF amplifier.





KNOW ALL THE ANSWERS

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SERVICE NOTES

After further amplification by TR2 and TR3 the signal is fed via T5 to discriminator transformer T6 the output of which is connected to an unbalanced ratio detector. Demodulated audio frequencies are then fed via the tertiary winding of T5, and C24, R21 to the AF amplifier for further amplification as for AM operation.

Voltages shown on the circuit diagram and in the table were obtained from information supplied by the manufacturer. They were measured under quiescent conditions with a 20,000ohm/V meter and the receiver was switched to MW. For the AF stages all voltages are negative with respect to battery positive, RF and IF with respect to car aerial bracket.

Resistor R21 (22Kohm) has been changed to 10Kohm in later models.

Drive cord replacement. In the event that it is necessary to replace the drive cord, first remove chassis from case then fit new cord as illustrated.

ALIGNMENT

Equipment required AM. An RF signal generator amplitude modulated 30 per cent at 400Hz, an audio output meter with an 80hm impedance, and an RF coupling coil.

Replace speaker with output meter, rotate volume control to maximum and tone control mid-way. Maintain an audio output power of 50mW by suitably attenuating signal as receiver sensitivity increases.

AM IF. Connect signal generator (low

impedance output) across VCI. Render oscillator inoperative by short circuiting R4. Switch receiver to MW, rotate tuning gang to maximum capacitance and feed in a 470KHz AM signal. Adjust L8 (yellow), L9 (white) and T7 (black) in that order for maximum output. Repeat with reduced signal input, then repeat for optimum results. Remove short circuit from R4.

AM RF. Terminate signal generator in an RF coupling loop and loosely couple to ferrite rod aerial assembly.

Printed circuit panel viewed from foil side. Component locations shown as seen through the panel

Check that the scale pointer is correctly positioned (see illustration). Switch receiver to MW, tune to centre "0" of 500m and feed in a 600kHz AM signal. Adjust L5-7 (red) for maximum output.

Tune receiver to "B" of Luxembourg, feed in a 1440kHz AM signal and adjust TC2 maximum output.

Repeat adjustments for optimum results.

Retune receiver to centre "0" of 500m and feed in a 600kHz AM signal. Adjust position of L2/4 on ferrite rod for maximum output.

Tune receiver to "B" of Luxembourg and feed in a 1440kHz AM signal. Adjust TC1 for maximum output.

Repeat these adjustments for optimum results.

Switch receiver to LW, tune to 1500m and adjust TC3 for maximum output of the BBC Radio 2 broadcast signal.

FM IF. Two methods are described for the alignment of the FM IF circuits. The preferred method, method A, uses a wobulator and oscilloscope. A less accurate but sometimes a more convenient method B, uses an AM/FM signal generator and output meter.

Equipment required method A. A wobulator with 75ohm output impedance, a CRO (oscilloscope) with a 20mV/cm sensitivity and a 33Kohm resistor.

Connect the wobulator output across VC4—the FM mixer section of tuning gang. Connect CRO via a 33Kohm resistor to junction C25 and switch tag on FM switch.

Feed in a 10.7MHz \pm 200kHz signal and adjust T6 (blue) so that trace is centred on 10.7MHz. Adjust T5 (pink), T4 (green), T3 (black) and T2 (orange) for maximum amplitude (S-curve height) and minimum bandwidth (S-curve width). Maintain wobulator output so that maximum trace amplitude does not exceed 5cm.

Repeat the adjustments until the centre part of the S-curve is linear. Disconnect and remove test equipment.

Equipment required method B. An AM/FM signal generator, a 100KpF capacitor and an audio output meter with 80hm impedance.

Connect output meter in place of speaker, detune T6 (blue) so that core just protrudes from top of former and connect signal generator output across VC4—mixer section of tuning gang—via a 100KpF capacitor.

Feed in a 10.7MHz FM signal, deviation 25kHz, and adjust T5 (pink), T4 (green), T3 (black) and T2 (orange) for maximum output.

Switch signal generator to AM (30 per cent modulation) and adjust T6 (blue) for minimum output (maximum AM rejection).

Repeat these adjustments as necessary for optimum results.

FM RF. Equipment as for IF alignment method B. Feed in signals via car aerial socket.

Depress car push-button, tune receiver to 87.5MHz and feed in an 87.5MHz FM signal. Adjust turns spacing of L11 and L10 for maximum output.

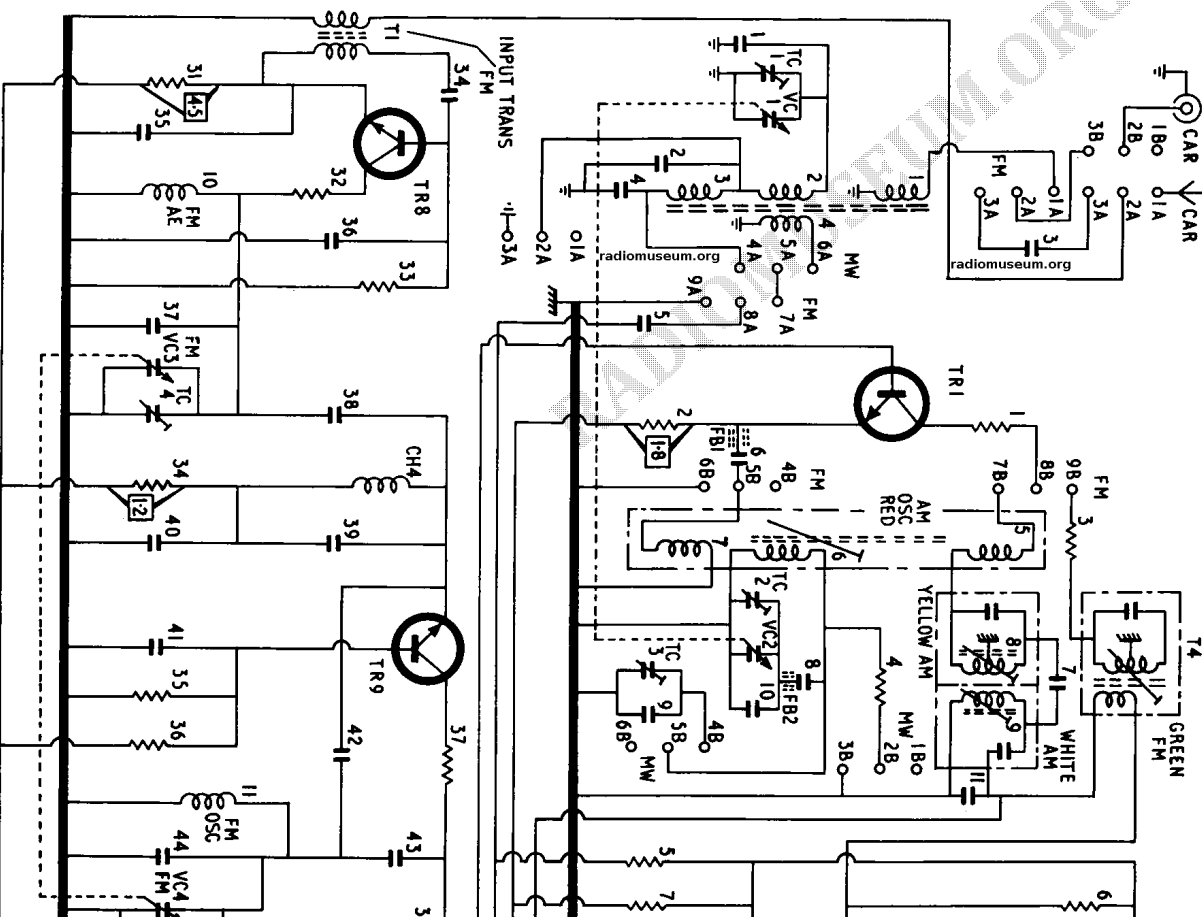
Tune receiver to 108MHz and feed in a 108MHz FM signal. Adjust TC5 and TC4 for maximum output.

Repeat adjustments for optimum results then disconnect and remove test equipment and reconnect speaker.

TRANSISTOR VOLTAGES			RESISTORS																
No.	Type	E	B	C	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
TR1	BF195D	5.8	4.9	0.5	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
TR2	BC139	0	0.5	5.4	470	100	68K	10K	B2	R16	R17	R18	R19	R20	R21	R22	R23	R24	R25
TR3	BF194B	6.8	6.0	0.4	10K	68K	10K	10K	B2	R16	R17	R18	R19	R20	R21	R22	R23	R24	R25
TR4	BC159	1.3	0.6	5.0	10K	68K	10K	10K	B2	R16	R17	R18	R19	R20	R21	R22	R23	R24	R25
TR5	BC149	9.0	0.6	4.5	470	10K	68K	10K	B2	R16	R17	R18	R19	R20	R21	R22	R23	R24	R25
TR6	AC137	4.4	4.3	0	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22
TR7	AC128	4.4	4.5	9.0	680	680	3K3	33K	B2	R16	R17	R18	R19	R20	R21	R22	R23	R24	R25
TR8	BF195C	2.5	1.1	0.1	390	8K2	1K	1K	B2	R16	R17	R18	R19	R20	R21	R22	R23	R24	R25
TR9	BF195C	5.5	5.0	0.15	1K	1K	1K	1K	B2	R16	R17	R18	R19	R20	R21	R22	R23	R24	R25

Circuit diagram and drive cord details. Switch coding corresponds with switch tag connections on printed panel illustrated overleaf. Numbering is from top to bottom

R	C	L	1	2	3	4	5	6	7	8	9	10	11	12
31	TC1	2 10	32	33	34	35	36	37	38	39	40	41	42	43
34	VC1	1 3	35	36	37	38	39	40	41	42	43	44	45	VC4
2 10	4	3	4	5	6	7	8	9	10	11	12	13	14	15



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