

# BEETHOVEN 909

## "LITTLE PRODIGY" BATTERY MODEL

**T**HE Beethoven 909 is an all-dry battery portable having a 2-band superhet circuit, using four valves. It has self-contained frame aerials, and a socket is provided for the use of an external aerial if desired. Separate 1.5 V LT and 90 V HT dry batteries are employed. In appearance the receiver resembles the 909 AC model illustrated in Service Sheet 448.

Release date: August, 1939.

### CIRCUIT DESCRIPTION

Tuned frame aerial input L1, L2, C11 to octode valve (V1, Mullard metallised DK1), which operates as frequency changer.

Oscillator grid coils L3 (MW), plus L4 (LW), are tuned by C13; parallel trimming by C14 (MW) and C15 (LW); series tracking by C16 (MW) and C17 (LW). Reaction by L5 (MW) and L6 (LW).

Second valve (V2, Mullard metallised DF1) is a variable-mu RF pentode operating as IF amplifier with tuned-primary, tuned-secondary transformer couplings C18, L7, L8, C19 and C20, L9, L10, C21.

Intermediate frequency 450.5 KC/S.

Diode second triode valve (V3, Mullard metallised DAC1). Audio frequency component in rectified output is developed across manual volume control R4, which also operates as load resistance, and passed via AF coupling condenser C6 to CG of triode section.

IF filtering by C5 and C7.

DC potential developed across R4 is fed back via R3, C1 as GB to FC and IF valves, giving automatic volume control.

Resistance-capacity coupling by

R6, C8 and R7 between V3 triode and pentode output valve (V4, Mullard DL2). Fixed tone correction by C9 in anode circuit.

### DISMANTLING THE SET

**Removing Chassis.**—Remove the two control knobs (recessed grub screws); Remove the HT contact strip (three small counter-sunk head wood screws) from the bottom right-hand corner of the carrying case;

Remove the four screws (with nuts, washers and lock-washers) holding the chassis shelf to the sides of the case;

Lower the chassis to the bottom of the case, when it can be withdrawn to the extent of the frame aerial leads.

Now remove the three counter-sunk head screws (two with flat washers; one, in corner, with lock-washer) holding the shelf to the bottom of the chassis.

To free the chassis entirely, unsolder from the frame aerial tags on the side of the case the three leads connecting them to the chassis.

**When replacing,** connect the leads as follows, numbering the tags from the front of the case:

- 1, (plain) from top section of gang;
- 2, (knotted) from wavechange switch;
- 3, (plain) from wavechange switch.

The HT contact strip should be so placed that the positive contact (red sleeved lead) is near the front of the case.

**Removing Speaker.**—The speaker must be removed before access can be gained to the oscillator coil assembly and wavechange switch.

Remove the three counter-sunk head screws (with tubular distance-pieces and nuts) holding the speaker to chassis.

Unsolder the two leads from the speech-coil tags.

**When replacing,** the connecting panel should point towards the output transformer.

Connect the upper tag to chassis.

Connect lower tag to middle tag on the output transformer.

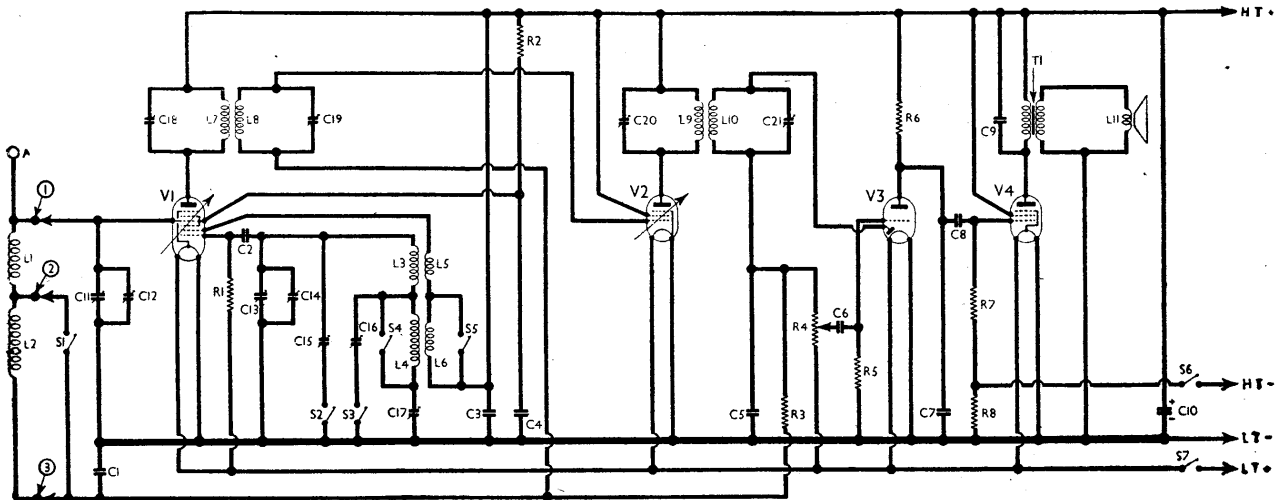
Fit the longest fixing screw and spacing tube near the output transformer.

### COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	V1 osc. CG resistance ...	250,000
R2	V1 SG HT feed ...	35,000
R3	AVC line decoupling ...	2,000,000
R4	Manual volume control; V3 signal diode load ...	500,000
R5	V3 triode CG resistance ...	2,000,000
R6	V3 triode anode load ...	500,000
R7	V4 CG resistance ...	2,000,000
R8	V4 auto GB resistance ...	950

CONDENSERS		Values (μF)
C1	AVC line decoupling ...	0.1
C2	V1 osc. CG condenser ...	0.00015
C3	HT circuit RF by-pass ...	0.1
C4	V1 SG decoupling ...	0.1
C5	IF by-pass ...	0.00015
C6	AF coupling to V3 triode ...	0.01
C7	IF by-pass ...	0.00015
C8	V3 triode to V4 AF coupling	0.0025
C9	Fixed tone corrector ...	0.0025
C10*	HT reservoir condenser ...	4.0
C11†	Frame aerial tuning ...	—
C12†	Frame aerial MW trimmer ...	—
C13†	Oscillator circuit tuning ...	—
C14†	Osc. circuit MW trimmer ...	—
C15†	Osc. circuit LW trimmer ...	0.00004
C16†	Osc. circuit MW tracker ...	0.00035
C17†	Osc. circuit LW tracker ...	0.00025
C18†	1st IF trans. pri. tuning ...	—
C19†	1st IF trans. sec. tuning ...	—
C20†	2nd IF trans. pri. tuning ...	—
C21†	2nd IF trans. sec. tuning ...	—

\* Electrolytic. † Variable. ‡ Pre-set



Circuit diagram of the Beethoven 909 all-dry battery portable.

Supplement to The Wireless & Electrical Trader, Feb. 10, 1940.

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OTHER COMPONENTS		Approx Values. (ohms)	
L1	Frame aerial windings	1.5	
L2		16.0	
L3		Osc. circuit MW tuning coil...	5.0
L4		Osc. circuit LW tuning coil...	9.0
L5		Oscillator MW reaction ...	4.25
L6	Oscillator LW reaction ...	7.5	
L7	1st IF trans.	Pri. ...	10.0
L8		Sec. ...	10.0
L9	2nd IF trans.	Pri. ...	10.0
L10		Sec. ...	10.0
L11	Speaker speech coil ...	2.5	
T1	Output trans.	Pri. ...	240.0
		Sec. ...	0.2
S1-S5	Waveband switches ...		—
S6	HT circuit switch) ganged		—
S7	LT circuit switch) R4		—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating with a new 90V HT battery reading 92V on load. The receiver was tuned to the lowest wavelength on the MW band and the volume control was at maximum. The three frame aerial leads were joined together.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 DK1	82	1.2	50	0.9
	82	0.6		
V2 DF1	82	1.4	82	0.33
V3 DAC1	19	0.08	82	—
V4 DL2	80	4.1	82	0.8

GENERAL NOTES

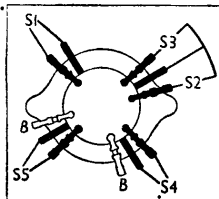
**Switches.**—S1-S5 are the waveband switches, in a single lever-operated rotary unit above the main chassis. It is indicated in our plan chassis view, and shown in detail in the diagram below, where it is drawn as seen looking from the front of the chassis. The table below gives the switch positions for the two control settings. The MW position is obtained with the lever towards the lower end of the tuning scale.

S6, S7 are the QMB HT and LT circuit switches, ganged with the volume control R4.

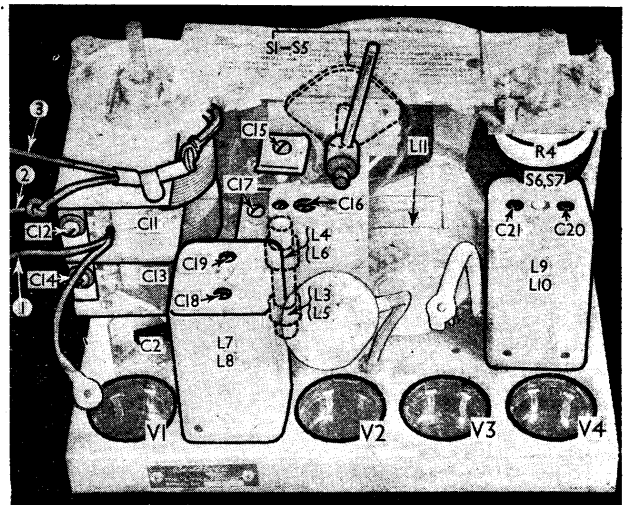
SWITCH TABLE

Switch	MW	LW
S1		
S2		
S3		
S4		
S5		

Diagram of the S1-S5 unit, as seen looking from the front of the chassis, after removal of the speaker



Half-plan view of the Beethoven 909, showing the frame aerial leads numbered to agree with the circuit diagram. L3-L6 is the unscreened oscillator coil unit, behind the L7-L8 unit.



**Coils.**—L1, L2 are the frame aerial windings, incorporated in the top, bottom, and sides of the cabinet. There are three connecting tags inside the cabinet on the left-hand side. These are numbered 1 to 3 in our illustrations, tag 1 being that nearest to the front of the cabinet.

L3-L6 are in an unscreened unit mounted above the main chassis deck. L7, L8 and L9, L10 are in two screened units on the chassis deck, with their associated trimmers.

**Batteries.**—L1, Ever Ready 1.5 V "All-Dry" No. 14 LT dry battery. HT, Ever Ready 90 V Portable No. 63 HT battery.

**Battery Leads.**—The two LT leads terminate in a 2-pin plug, which fits a socket in the LT battery. The thicker pin is the positive. The HT leads go to two contacts on a paxolin plate at the right-hand side of the cabinet. The positive contact is nearest the front of the cabinet.

**Chassis Divergencies.**—In some models, the first IF transformer may be iron-cored, in which case the resistance of L7 and L8 will be 4.0 O. Several divergencies were noticed in the values of components, the figures in our tables being those found in our chassis. In some models C2 may be 0.0001µF; C3 may be 0.015µF; C5 may be 0.0001µF; C6 may be 0.015µF, and C8 and C9 may be 0.002µF.

CIRCUIT ALIGNMENT

**IF Stages.**—Connect signal generator, via a 0.1µF condenser, to control grid (top cap) of V1, and to chassis. Switch set to MW, feed in a 450.5 KC/S signal, and adjust C21, C20, C19 and C18 in turn for maximum output.

**RF and Oscillator Stages.**—With gang at minimum, pointer should cover 200m mark on scale. Couple signal generator to external A socket.

Switch set to MW and turn gang to minimum. Feed in a 200 m (1,500 KC/S) signal and adjust C14 for maximum output. Switch set to LW, and with gang still at minimum, feed in an 895 m (335 KC/S) signal and adjust C15 for maximum output.

Turn gang to maximum, and with set switched to LW, feed in a 2,040 m (147 KC/S) signal and adjust C17 for maximum output. Re-adjust C15 at 895 m if necessary. Switch set to MW, and with gang at maximum, feed in a 550 m (543 KC/S) signal and adjust C16 for maximum output. Re-adjust C14 at 200 m if necessary.

Remove signal generator, and tune in a weak station near 200 m. Adjust C12 for maximum output. Next tune in a LW station at about 1,700 m and re-adjust C17, while rocking the gang, for maximum output. Finally tune in a MW station at about 450 m, and re-adjust C16, while rocking the gang, for maximum output.

Underneath view of the Beethoven 909, with the battery leads indicated.

