

BEETHOVEN 909

"LITTLE PRODIGY" BATTERY MODEL

THE 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- μ 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 detector is part of single diode 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Lower the chassis to the bottom of the case, when it can be withdrawn to the extent of the frame aerial leads.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.

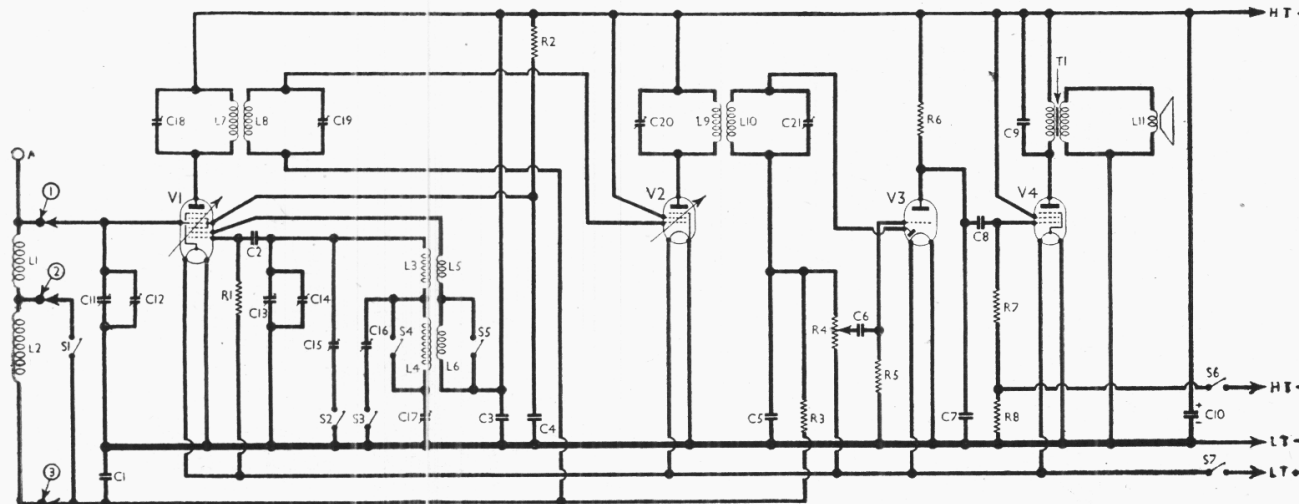
Fit the longest fixing screw and spacing tube near the output transformer.

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 (μ F) |
|------------|-------------------------------|-------------------|
| 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.

BEETHOVEN 909—Contd.

| 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 Oscillator | 1.2 | 50 | 0.9 |
| V2 DF1 | | 0.6 | 82 | 0.33 |
| V3 DAC1 | 82 | 1.4 | — | — |
| V4 DL2 | 19 | 0.08 | 82 | 0.8 |
| | 80 | 4.1 | — | — |

GENERAL NOTES

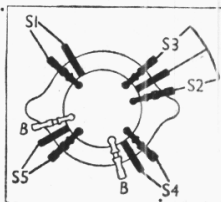
Switches.—S1-S5 are the waveband switches, in a single lever-operated rotary unit above the main chassis. It is indicated in our plan chassis view, and shown in detail in the diagram below, where it is drawn as seen looking from the front of the chassis. The table below gives the switch positions for 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.

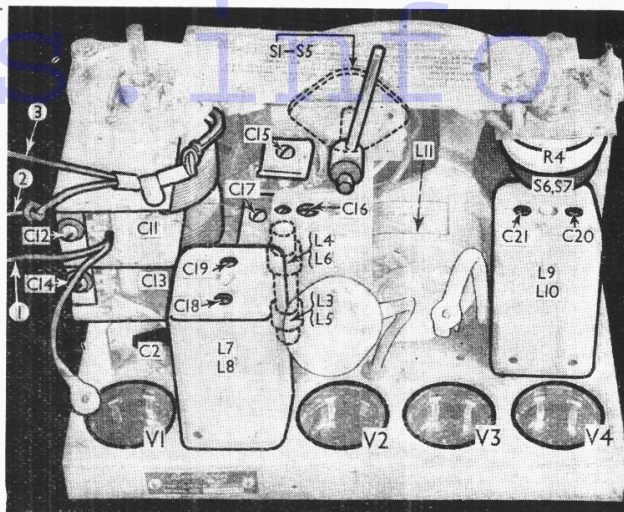
SWITCH TABLE

| Switch | MW | LW |
|--------|----|----|
| S1 | C | C |
| S2 | C | C |
| S3 | C | C |
| S4 | C | C |
| S5 | C | C |

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 un-screened 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 un-screened 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.—LT, 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.

