

BEETHOVEN P107

SUPER MINOR PORTABLE

THE Beethoven P107, Super Minor, portable receiver is a 4-valve battery-operated model with its own frame aerial. The cabinet is of the suitcase type, a turntable being fitted to the bottom. The valve arrangement comprises a pentode R.F. amplifier, a triode detector, a triode first A.F. amplifier and a tetrode output valve, and there is provision for an external aerial and earth and for an extension speaker or headphones.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L1, L2, C12** to R.F. pentode valve (**V1, Mullard metallised VP2**) which operates as R.F. amplifier with fixed grid potential. Provision for connection of external aerial and earth if required.

Tuned anode coupling by **L4, L5, C15** between **V1** and triode detector valve (**V2, Mullard metallised PM2HL**) which operates on grid leak system with **C2, R3, R4**. Reaction is applied from anode by coil **L3**, and controlled by **C14**. R.F. filtering in anode circuit by **R7, C4**.

Fixed tone correction in anode circuit by **C5**.

Auto-transformer coupling by **R6, C6**, manual volume control **R8**, and **T1** between **V2** and triode A.F. amplifying valve (**V3, Mullard metallised PM2HL**). Fixed tone correction in anode circuit by **C8**. R.F. filtering in grid circuit by **R9, C7** and **R10**.

Resistance-capacity coupling by **R11, C9** and **R12** between **V3** and beam tetrode output valve (**V4, Osram KT2**). Fixed tone correction in anode circuit by **C10**. Provision for connection of headphones across primary of speaker input transformer **T2**.

Fuse **F1** in H.T. negative lead affords

protection from damage in case of accidental short-circuit.

C11 is H.T. circuit reservoir condenser.

COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	Frame aerial L.W. damping ..	65,000
R2	V1 S.G. and anode H.T. feed ..	3,000
R3	V2 grid leak resistances ..	4,000,000
R4	V2 grid leak resistances ..	4,000,000
R5	V2 anode decoupling ..	12,000
R6	V2 anode load ..	10,000
R7	V2 anode R.F. stopper ..	3,000
R8	Volume control, ganged C14 ..	15,000
R9	V3 C.G. R.F. stopper ..	250,000
R10	L.W. stabilising resistance ..	250,000
R11	V3 anode load ..	30,000
R12	V4 C.G. resistance ..	100,000

CONDENSERS		Values μ F
C1*	V1 S.G. and anode decoupling ..	4.0
C2	V2 C.G. condenser ..	0.0001
C3*	V2 anode decoupling ..	4.0
C4	V2 anode R.F. by-pass ..	0.0001
C5	Fixed tone corrector ..	0.0025
C6	V2 to V3 A.F. coupling ..	0.2
C7	V3 C.G. R.F. by-pass ..	0.0003
C8	Fixed tone corrector ..	0.005
C9	V3 to V4 A.F. coupling ..	0.1
C10	Fixed tone corrector ..	0.0025
C11*	H.T. reservoir condenser ..	4.0
C12†	Frame aerial circuit tuning ..	—
C13†	Frame aerial M.W. trimmer ..	—
C14†	Reaction control ..	—
C15†	V1 anode circuit tuning ..	—
C16†	V1 anode M.W. trimmer ..	—

* Electrolytic. † Variable. ‡ Pre-set.

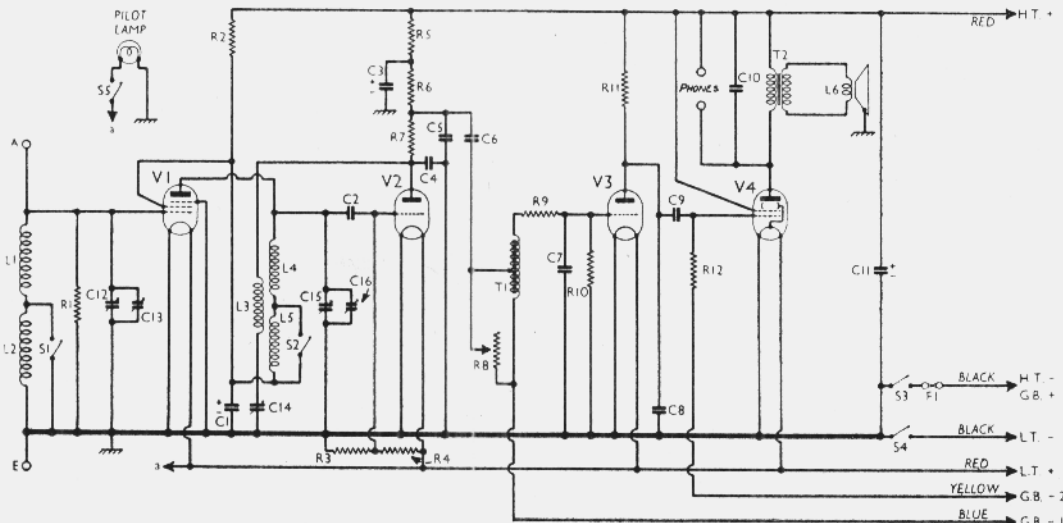
OTHER COMPONENTS		Approx. Values (ohms)
L1	Frame aerial windings ..	1.8
L2		10.0
L3		3.1
L4		2.2
L5		13.0
L6	Speaker speech coil ..	3.0
T1	Intervalve auto-trans. ..	5,000.0
T2	Speaker input trans. { Pri. ..	480.0
	{ Sec. ..	0.2
Sr, S2	Waveband switches ..	—
S3	H.T. circuit switch ..	—
S4	L.T. circuit switch ..	—
S5	Pilot lamp switch ..	—
F1	H.T. circuit fuse ..	—

DISMANTLING THE SET

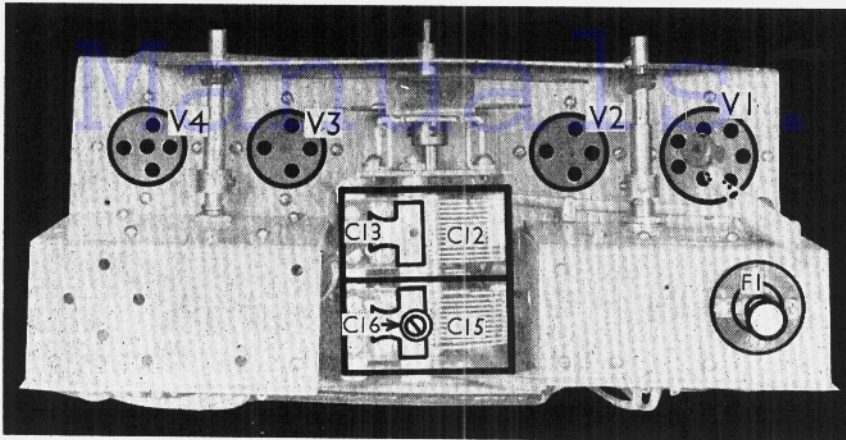
Removing Chassis.—To remove the chassis from the cabinet, first remove the top panel (two knurled nuts) and the batteries. Then remove the two countersunk-head wood screws holding the front of the chassis to the cabinet, the wood strip between the chassis and battery compartment (two countersunk-head screws with nuts and washers), the paxolin panel at the bottom of the battery compartment (two countersunk-head wood screws), and the three round-head wood screws holding the chassis to the bottom of the cabinet.

Now unsolder the earthing lead going to the tag at the front of the cabinet, when the chassis can be withdrawn to the extent of the speaker and frame aerial leads, which is sufficient for normal purposes.

Removing Frame Aerial.—If it is desired to remove the frame aerial from the cabinet, remove the countersunk-head



Circuit diagram of the Beethoven P107 Super Minor Portable, which employs a straight circuit and uses a battery tetrode in the output stage.



Plan view of the chassis. C13 is actually not used, its adjusting screw and mica dielectric being removed.

wood screw (with washer) holding the connector to the cabinet and remove the two wood strips holding the assembly in the lid of the cabinet (eight round-head wood screws). The frame and speaker may now be withdrawn together.

Removing Speaker.—Proceed as for removing frame aerial, then unsolder the leads to the speaker and remove the nuts from the four screws holding it to the sub-baffle. When replacing, see that the terminal panel is at the bottom and take the tinned copper lead in yellow insulating sleeving from the top tag on the transformer to the left-hand tag on the speaker, and the tinned copper lead in red insulating sleeving from the bottom tag on the transformer to the right-hand tag on the speaker.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating with an H.T. battery reading 110 V overall, on load. The receiver was tuned to the lowest wavelength on the medium band and the combined volume and reaction control was at *minimum*, but there was no signal input as the frame aerial connections were shorted.

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 VP2 ..	100	1.7	100	0.6
V2 PM2HL	68	0.6	—	—
V3 PM2HL	76	0.8	—	—
V4 KT2 ..	103	5.0	106	1.1

GENERAL NOTES

Switches.—S1 and S2 are the waveband switches, and S3 and S4 the battery circuit switches, ganged in a single rotary unit beneath the chassis. The individual switches are identified in our under-chassis view, and no separate diagram is given.

The table (col. 2) gives the switch positions for the three control settings.

starting from fully anti-clockwise. A dash indicates open, and C closed.

Switch	M.W.	Off	L.W.
S1	C	—	—
S2	C	—	—
S3	C	—	C
S4	C	—	C

S5 is the pilot lamp switch, combined with the pilot lamp holder, behind the speaker panel. By rotating the knurled escutcheon of the lamp-holder, S5 can be made to open or close.

Coils.—L1 and L2 are the frame aerial windings, which are not shown in our chassis illustrations. L1 is the winding with the fewer turns.

L3, L4 and L5 are in a tubular un-screened unit beneath the chassis. L3 is actually on a smaller former inside that carrying L4 and L5.

Pilot Lamp.—This is an Osram M.E.S. type, rated at 3.5 V, 0.3 A, and having a small bulb.

Fuse F1.—This is similar to an M.E.S. lamp. It is an Osram type, rated at 1.25 V, 0.2 A.

Batteries.—L.T., Sterling 2 V 15 AH celluloid cased jelly acid cell, type 5001. H.T. and G.B., Sterling combined 105 V H.T. plus 3 V G.B. dry battery, type 2001

Battery Leads and Voltages.—All the leads are of red coloured flex. Black spade tag, L.T. negative; red spade tag, L.T. positive 2 V; black plug, H.T. negative, G.B. positive; red plug, H.T. positive 105 V; blue plug, G.B. negative 1, —1.5 V; yellow plug, G.B. negative 2, —3 V.

External Headphones.—Two sockets are provided at the bottom right-hand corner of the speaker panel for high impedance external headphones or speaker.

External Aerial and Earth.—Two sockets are provided at the bottom left-hand corner of the speaker panel for an external aerial (red) and earth (black).

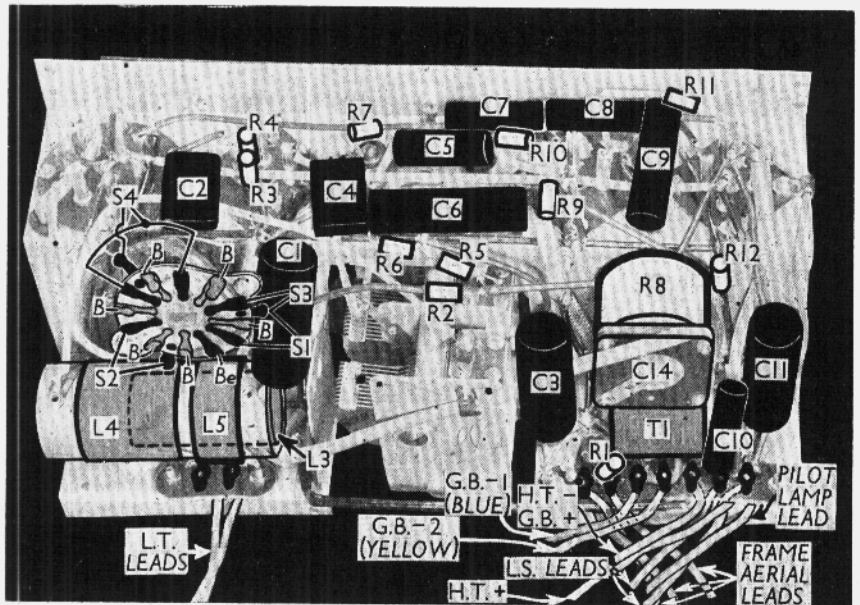
Trimmer C13.—In our chassis the adjusting screw and mica dielectric of this was taken out at the works, the trimmer not being used.

Chassis Divergencies.—R10 was not shown on the makers' diagram. R12 was shown as 1 MO by the makers; it is actually 0.1 MO. F1 was shown by the makers on the other side of S3.

CIRCUIT ALIGNMENT

Remove the battery cover, and take out the batteries, re-connecting them outside the cabinet, using extension leads.

Switch set to M.W., feed in a 198.5 m. (1,510 KC/S) signal, tune it in, and adjust C16 for maximum output. C13 is not used, the screw and mica dielectric being removed.



Under-chassis view. The individual switches in the rotary unit are indicated, as are also the various leads emerging from the chassis.