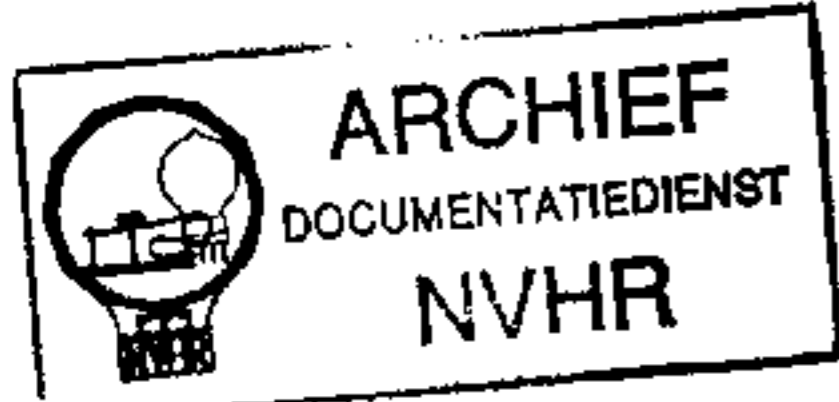
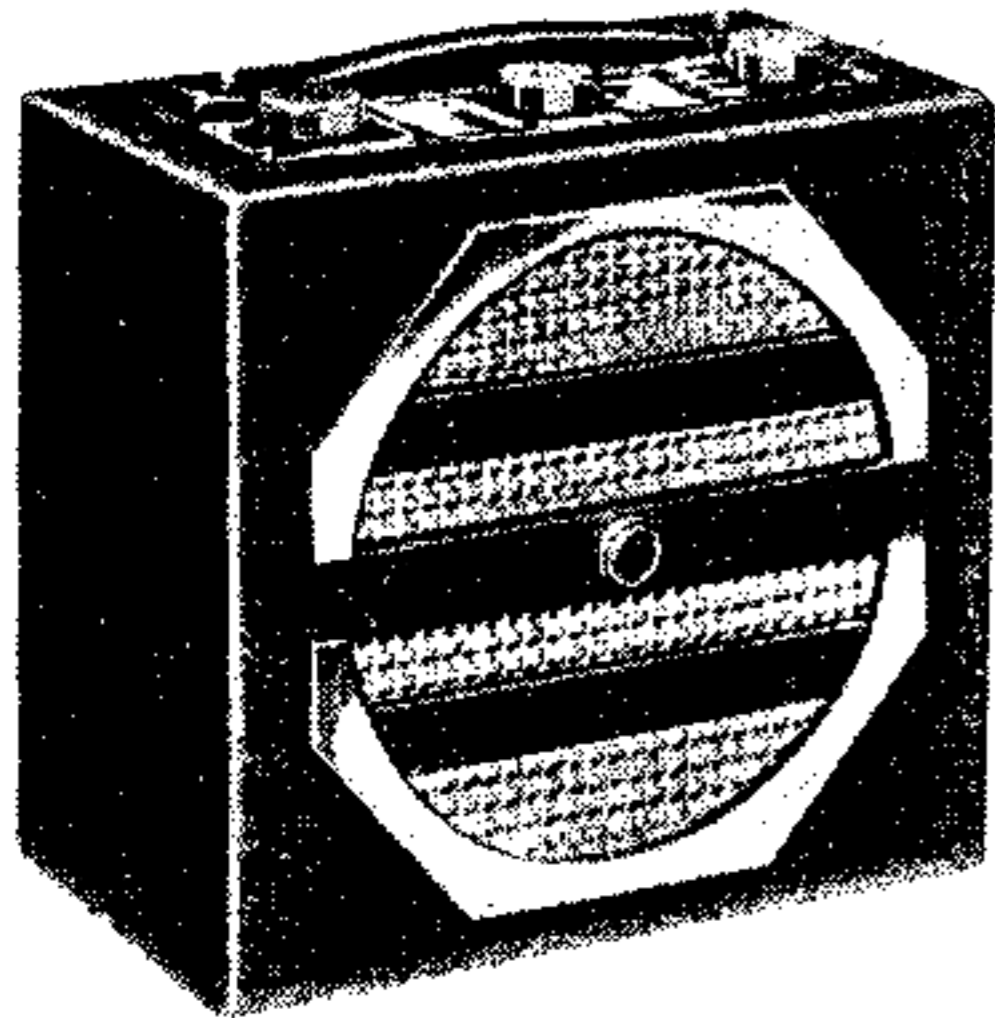


Ned. Ver. v. Historie v/d Radio



REVISED ISSUE OF SERVICE SHEET No. 249



# BEETHOVEN P202 BATTERY PORTABLE

Tuned anode coupling by **L4, L5, C16** between **V1** and triode detector valve (**V2, Mullard metallised PM2HL**) which operates on grid leak system with **C3** and **R2, R3**. Reaction is applied from anode by coil **L3** and controlled by **C15**. RF filtering in anode circuit by **R6** and **C6**.

Resistance-capacity coupling by **R5, C5, R7** between **V2** and triode AF amplifying valve (**V3, Mullard metallised PM2HL**). Fixed tone correction in grid circuit by **C7** and in anode circuit by **C8**.

Auto-transformer coupling by **R8, C9, T1** via RF stopper **R9** between **V3** and beam tetrode output valve (**V4, Osram KT2**). Fixed tone correction in anode circuit by **C11**. Provision for connection of headphones across primary of internal speaker input transformer **T2**. GB for **V4** is obtained from drop along resistor **R10** in HT negative lead.

### COMPONENTS AND VALUES

CAPACITORS		Values (μF)
C1*	V1 HT decoupling ...	2.0
C2	V1 LW fixed trimmer ...	Very low
C3	V2 CG capacitor ...	0.00015
C4*	V2 anode decoupling ...	2.0
C5	V2 to V3 AF coupling ...	0.0025
C6	V2 anode RF by-pass ...	0.00005
C7	Fixed tone correctors ...	0.004
C8		0.001
C9	AF coupling to T1 ...	0.05
C10*	Automatic GB by-pass ...	25.0
C11	Fixed tone corrector ...	0.004
C12*	HT circuit reservoir ...	4.0
C13†	Frame aerial circuit tuning ...	—
C14†	Frame MW trimmer ...	—
C15†	Reaction control ...	—
C16†	V1 anode circuit tuning ...	—
C17†	V1 anode MW trimmer ...	—

\* Electrolytic † Variable. ‡ Pre-set.

RESISTORS		Values (ohms)
R1	V1 HT feed resistor ...	4,000
R2	V2 grid leak and filament } pot. divider ...	4,000,000
R3		
R4	V2 anode decoupling ...	6,000
R5	V2 anode load ...	30,000
R6	V2 anode RF stopper ...	6,000
R7	V3 CG resistor ...	500,000
R8	V3 anode load ...	20,000
R9	V4 CG RF stopper ...	250,000
R10	Automatic GB resistor ...	300

OTHER COMPONENTS		Approx. Values (ohms)
L1	Frame aerial windings ...	2.2
L2		
L3	Reaction coil ...	4.1
L4	V1 anode circuit tuning coils ...	3.25
L5		
L6	Speaker speech coil ...	3.0
T1	Intervalve auto-trans., total ...	5,000.0
T2	Speaker input trans. { Pri. ...	590.0
	{ Sec. ...	
S1, S2	Waveband switches ...	—
S3	HT circuit switch ...	—
S4	L.T. circuit switch ...	—
S5	Pilot lamp switch ...	—

### VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on an H.T. battery reading 80 V on load. The receiver was tuned to the

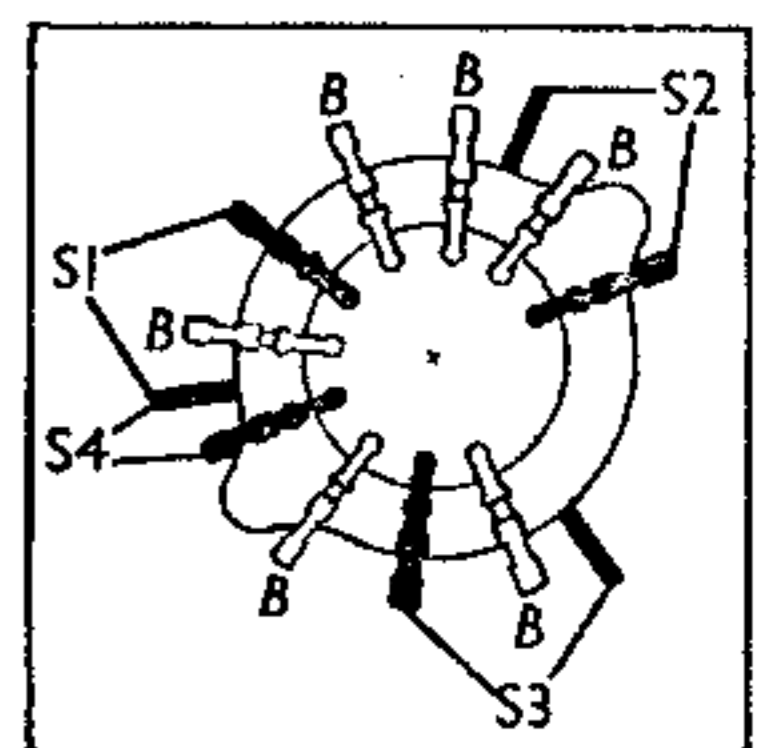
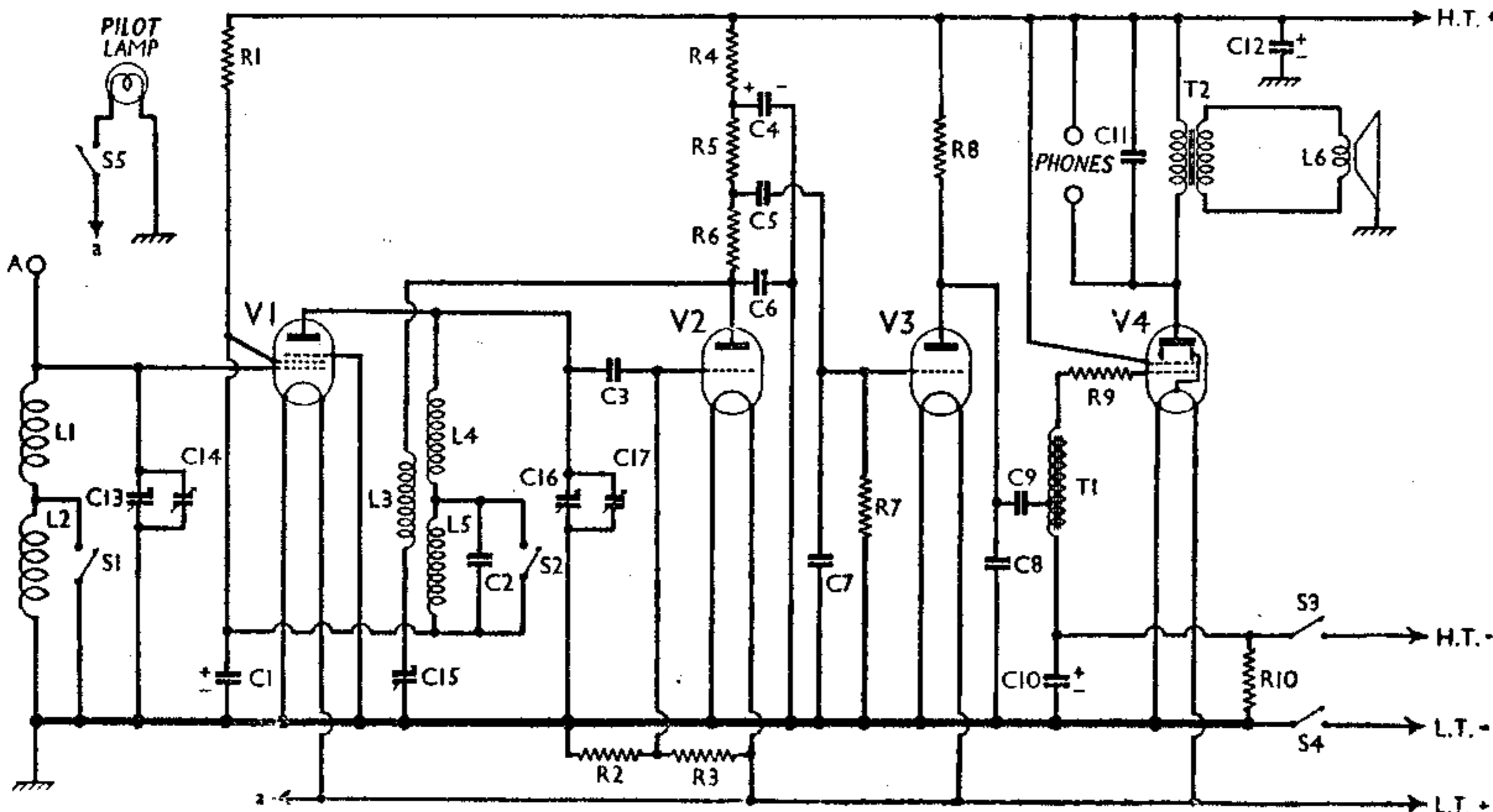
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VP2	75	0.6	75	0.2
V2 PM2HL	45	0.7	—	—
V3 PM2HL	60	1.0	—	—
V4 KT2	80	3.0	80	0.7

THE Beethoven P202 Baby Portable is a 4-valve battery operated portable receiver of small dimensions, containing its own frame aerial. Provision is made for the connection of a pair of headphones and an external aerial, while there is a ruby pilot light in the centre of the speaker grille. A turntable is fitted to the bottom of the cabinet.

Release date and original price: July, 1937; £7 7s. complete with batteries.

### CIRCUIT DESCRIPTION

Tuned frame aerial input **L1, L2, C13** to RF pentode valve (**V1, Mullard metallised VP2**) operating as RF amplifier. Provision for connection of external aerial, if required.



Left: Circuit diagram of the Beethoven battery portable P202. The associated valve base diagrams are in col. 2 overleaf.

Above: Diagram of the switch unit, drawn as seen from beneath and in front of chassis.

lowest wavelength on the medium band and the reaction control was at minimum. There was no signal input, the frame aerial connections being shorted.

Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

**DISMANTLING THE SET**

**Removing Chassis.**—Remove the control knobs (recessed grub screws), the batteries and the valves;

from the panel at top of cabinet unsolder the HT leads;

from the phone sockets unsolder the leads and free them from their cleats;

remove the scale plate (four countersunk-head wood screws) and remove the bolt thus exposed;

remove the two round-head and one countersunk wood screws also holding chassis, and remove nut from the bolt holding bracket to speaker.

Turn receiver upside down and unsolder leads to panel on left carrying leads for pilot lamp, and LW frame winding;

unsolder red-braided lead to panel on right, and the two HT battery leads to panel (now at bottom), when chassis may be withdrawn.

When replacing, shorter of the two HT leads goes to left-hand tag on panel (viewed from rear, cabinet upside-down);

two screened leads go to one phone socket, and two unscreened leads to the other;

on pilot lamp panel, take black rubber lead with sleeving to top tag, and screened lead to second tag from bottom (set still upside-down), connecting screening to bottom tag. (This is most simply done by connecting the two with a piece of wire.)

**Removing Speaker.**—Remove chassis and unsolder lead from transformer core which passes through cabinet to turntable;

free strap at top (nut) and remove nut from bolt holding speaker to bottom of cabinet, when speaker and transformer can be withdrawn.

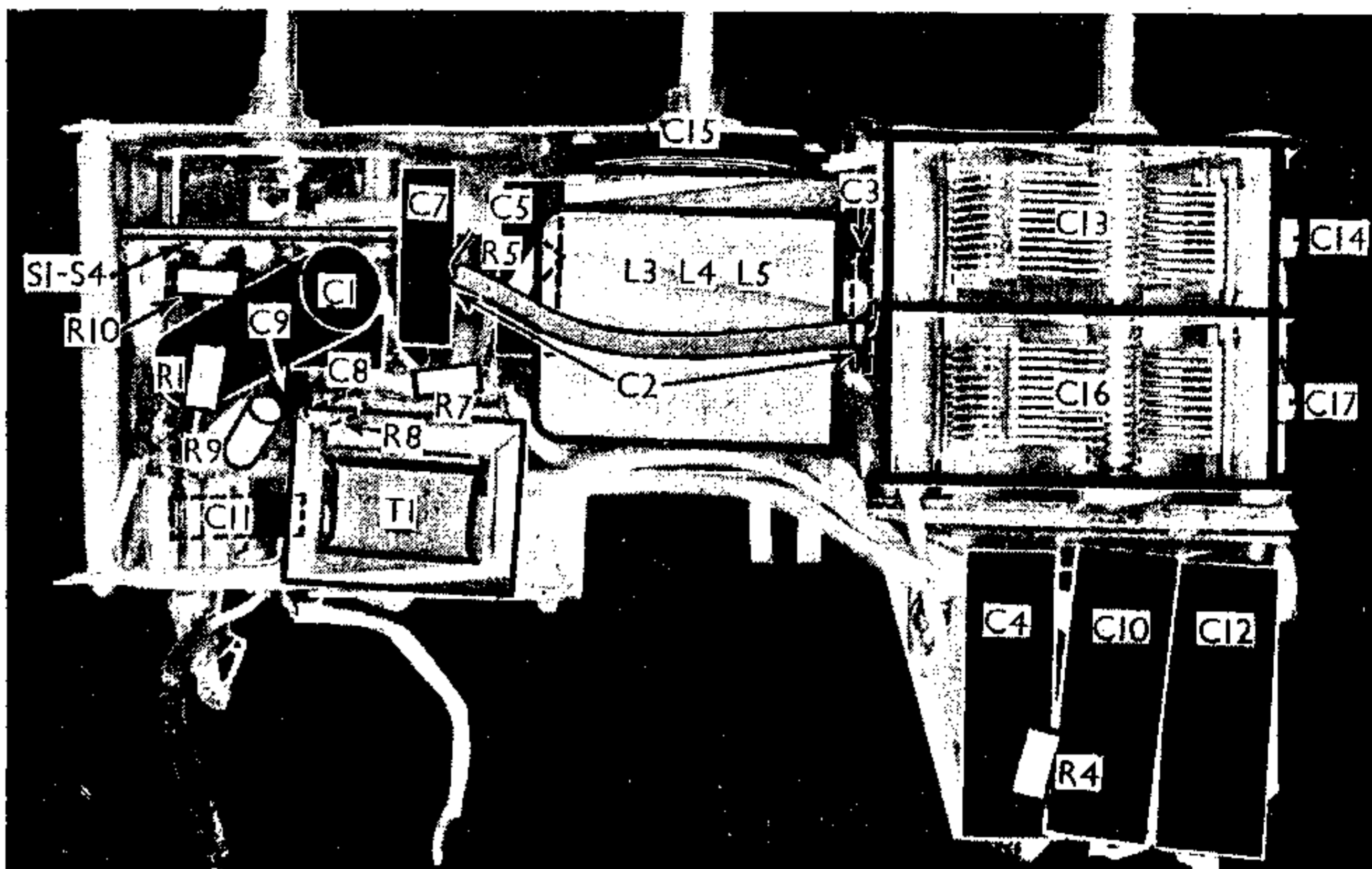
If the transformer is removed from the speaker, disconnect the leads from the speaker terminal panel to the outside tags on the transformer terminal panel.

When replacing the speaker see that the terminal panel is at the top (with the set standing normally).

**Frame Aerial.**—If the frame windings need attention it is advisable to return the set to the makers, as this job cannot be performed easily in the workshop.

**GENERAL NOTES**

**Switches.**—S1, S2 are the waveband switches, and S3, S4 the HT and LT circuit switches, all ganged in a single rotary unit, indicated in our view of the chassis resting on its back, with the control spindles at the top. The switches are shown in detail in the diagram inset with the circuit diagram, where they are drawn as seen in the direction of the arrow in the chassis illustration.



The chassis as seen resting on its back. An arrow shows direction in which switch unit is viewed in diagram overleaf. C2 is located inside the sleeving indicated.

All of these switches close on MW and open at "OFF." On LW, S1, S2 are open, and S3, S4 closed.

S5 is the pilot lamp switch, combined with the pilot lamp holder in the centre of the speaker grille. On rotating the

**Pilot Lamp.**—This is an Osram MES-type lamp, rated at 3.5 V, 0.15 A, fitted with a small bulb. It can be reached by pulling out the combined holder and switch from the speaker grille, and withdrawing the rear portion which is sprung into the casing.

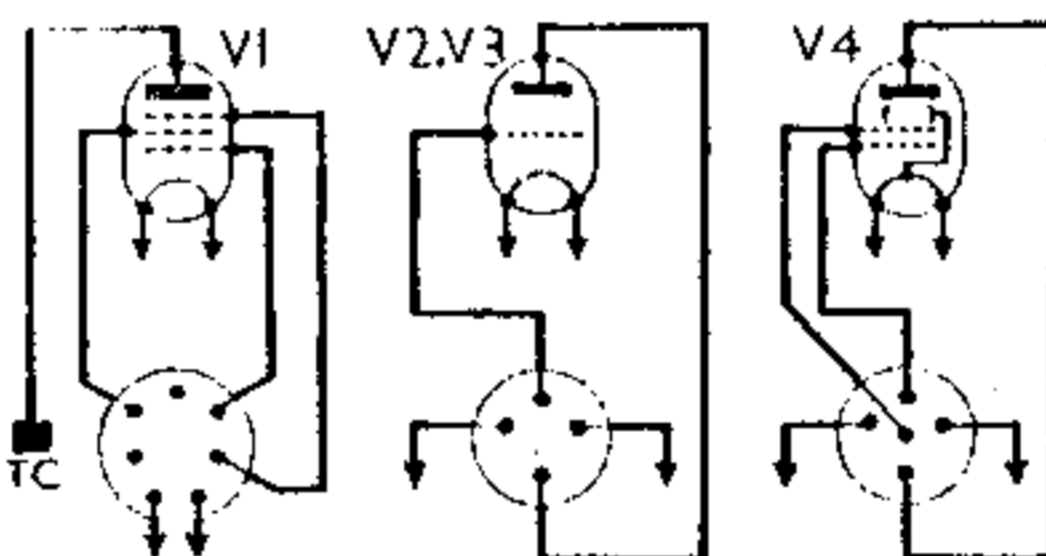
**Capacitor C2.**—This is a small LW anode trimmer, formed by a copper wire wound over an insulated wire, the whole being covered by insulating sleeving. It is shown passing over the coil unit in one of the chassis pictures.

**External Phones.**—Two sockets are provided at the left-hand side of the cabinet for high resistance headphones.

**External Aerial.**—A socket is provided at the right hand side of the cabinet for an external aerial.

**Batteries.**—LT, Sterling 2 V, 14 AH celluloid-cased jelly acid cell, type 5002. HT, special Sterling 80 V HT battery, with positive and negative strip contacts, type 2002. Grid bias is automatic.

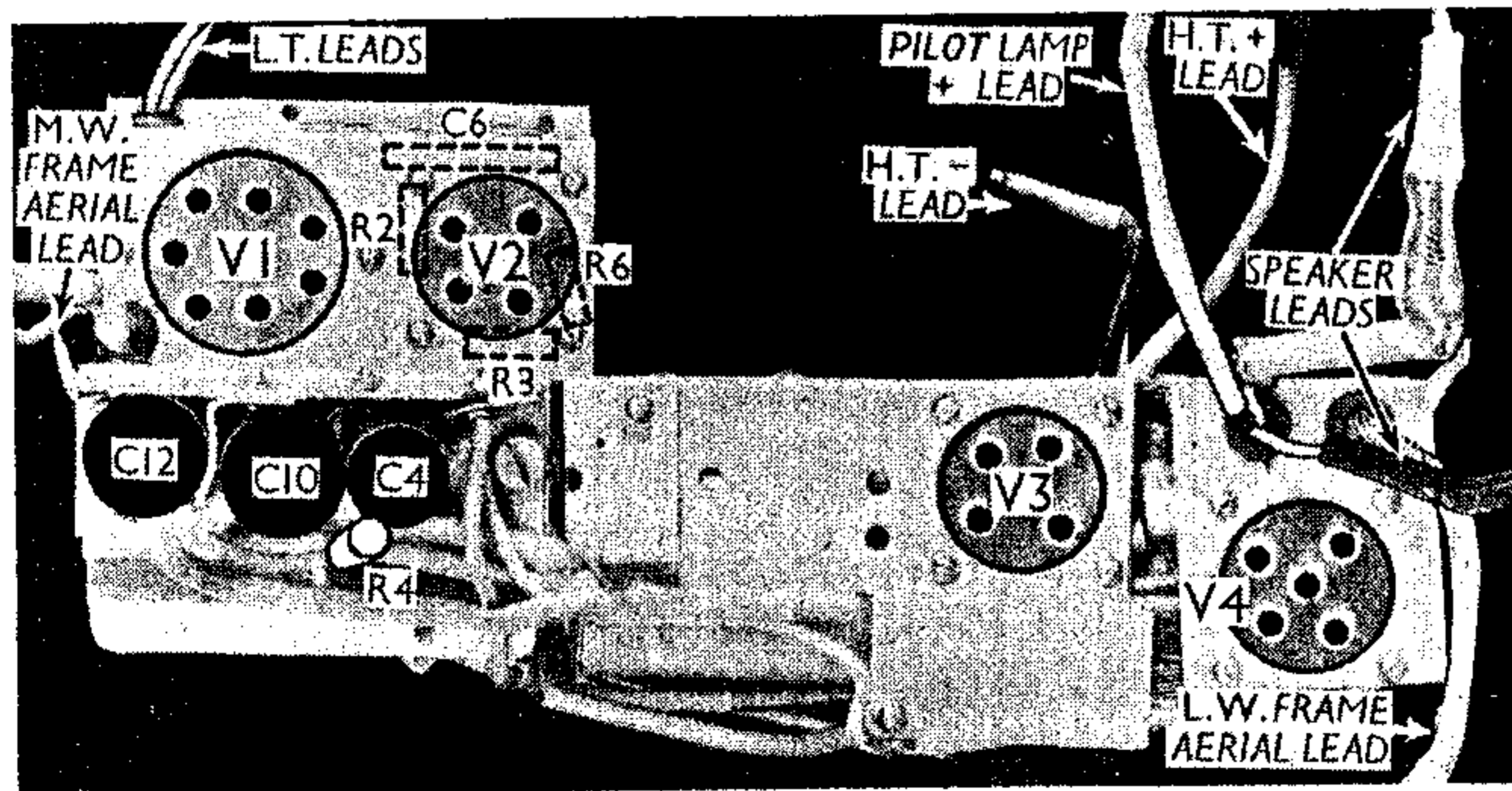
**Battery Leads.**—The only leads used are for LT. Red lead, black spade tag, LT negative; red lead, red spade tag, LT positive 2 V. The HT battery makes contact with two flat strips fitted inside the top of the cabinet. The battery should be inserted with its contact strips at the top, with the side from which the strips emerge facing towards the speaker (free ends of the contact strips to the back of the cabinet). Looking from the back of the cabinet, the right hand contact is negative.



Diagrams of the four valves used.

holder by the milled disc, S5 closes or opens, switching the light on or off.

**Coils.**—The frame aerial windings L1, L2 are built into the cabinet. The RF anode coils are in a screened unit in the centre of the chassis.



View of chassis as seen from below. The leads are all identified. The valves are suspended in use vertically downwards.

**CIRCUIT ALIGNMENT**

This must be carried out with the receiver chassis connected up normally in the cabinet. Remove the metal "name" plate at the right-hand side of the cabinet, which will expose the adjusting screws of the two trimmers. Couple a coil to the frame aerial windings (a few turns of wire round the cabinet will suffice), connect the signal generator to the ends of this coil, and feed in a 200 m (1,500 kc/s) signal. Tune to 200 m on scale, and adjust C17, then C14 for maximum output. It may be desirable finally to readjust C14 on an actual station of low power, after the temporary coupling coil has been removed.