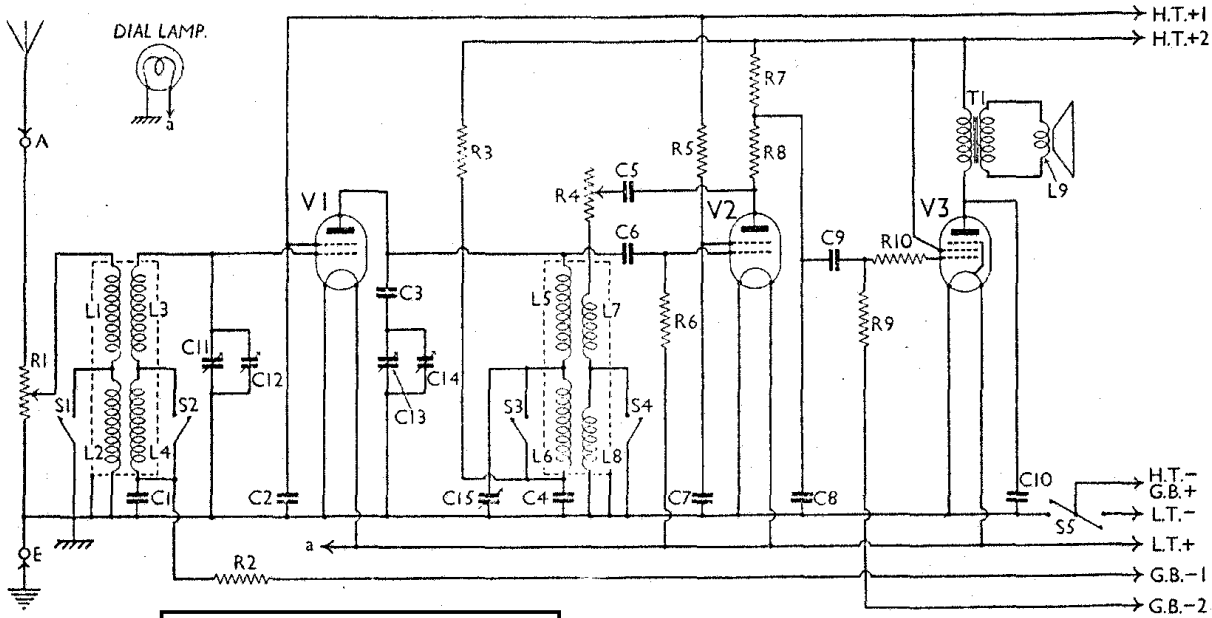


The circuit diagram of the Philco Model 233 3-valve battery receiver. The battery connections are taken to a multi-way cable and plug, the coding of which is given in General Notes overleaf. S5 is a 3-point shorting switch, ganged with the volume control R1.

PHILCO - 233

(version originale de 1934)

COMPONENTS AND VALUES

	Resistances	Values (ohms)
R1	Volume control, variable ..	20,000
R2	V1 cont. grid decoupling ..	51,000
R3	V1 anode decoupling	2,900
R4	Reaction control, variable ..	35,000
R5	V2 S.G. H.T. feed	16,000
R6	V2 grid leak	2,000,000
R7	V2 anode resistance	160,000
R8	V2 anode H.F. stopper	10,000
R9	V3 grid resistance	1,000,000
R10	V3 grid H.F. stopper	51,000

	Condensers	Values (μF)
C1	V1 cont. grid decoupling ..	0·09
C2	V1 S.G. by-pass..	0·1
C3	D.C. blocking condenser ..	0·05
C4	V1 anode decoupling	0·25
C5	Reaction condenser, fixed ..	0·00125
C6	V2 grid condenser	0·000035
C7	V2 S.G. by-pass..	0·09
C8	V2 anode H.F. by-pass.. ..	0·00011
C9	L.F. coupling to V3	0·01
C10	Tone corrector	0·003
C11	Aerial circuit tuning	—
C12	Aerial circuit trimmer, pre-set	—
C13	H.F. circuit tuning	—
C14	H.F. circuit trimmer, pre-set ..	—
C15	H.F L.W. trimmer, pre-set ..	—

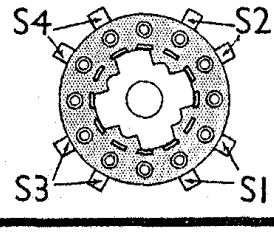
VALVE ANALYSIS

All values given in the table below were obtained from an average receiver with a new combined H.T. and G.B. battery in use. The reaction control was set at minimum. Voltages were measured on the 1,200 V scale of an Avometer with the chassis as negative, and the currents of **V1** and **V2** were taken with a milliammeter in the low H.F. potential ends of the circuits.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 32 E ..	140	2·2	73	0·4
V2 32 E ..	25	0·75	26	0·3
V3 2101 ..	144	7·2	146	2·3

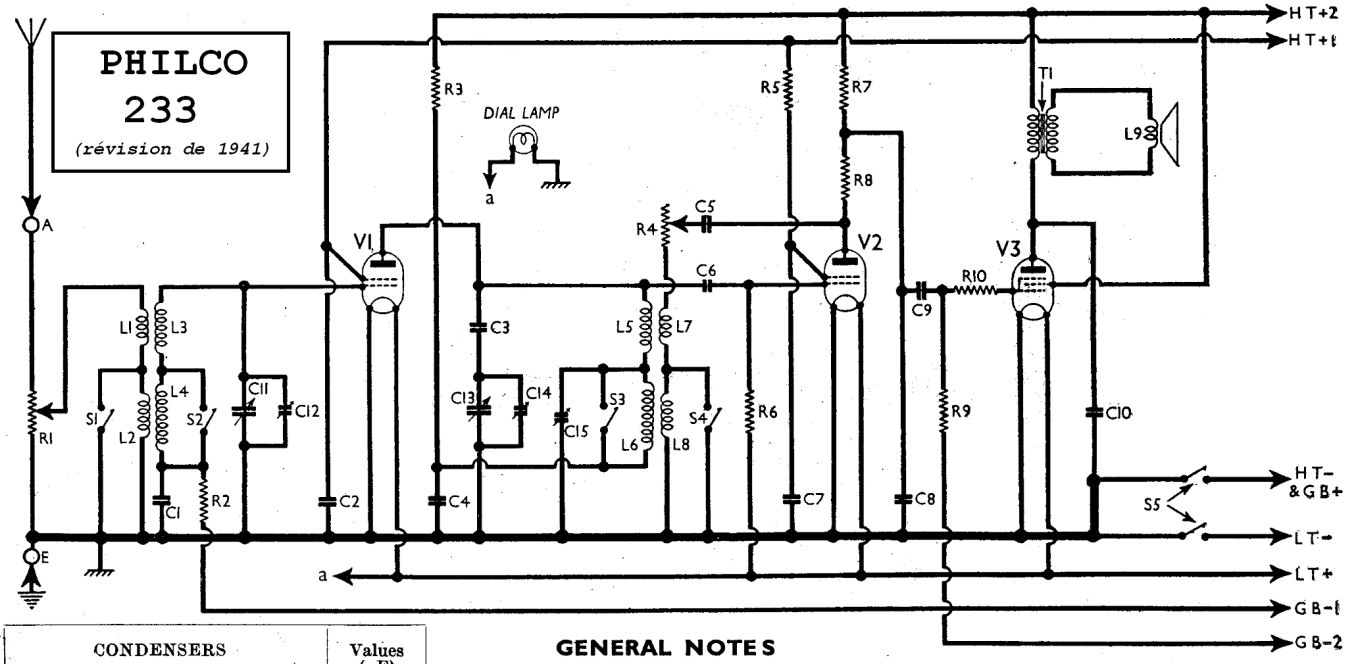
	Other Components	Values (ohms)
L1	Aerial coupling coils ..	2·5
L2	Aerial coupling coils ..	107·5
L3	Aerial tuning coils ..	5·0
L4	Aerial tuning coils ..	40·0
L5	H.F. tuning coils ..	5·0
L6	H.F. tuning coils ..	40·0
L7	Reaction coils	8·0
L8	Reaction coils	4·5
L9	Speaker speech coil	1·25
T1	Speaker input transformer .. Pri.	0·15
T1	Speaker input transformer .. Sec.	420·0
S1-S4	Waveband switches, ganged..	—
S5	Filament and H.T. switch ..	—

Switches.—The waveband switches, **S1-S4** are in one assembly, of the rotary type, which is shown in a separate sketch. In this the two contacts of each switch are indicated. Each pair is short-circuited on the M.W. band, and open on the L.W.



The wavechange switch assembly.

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 32 E ..	140	2·2	73	0·4
V2 32 E ..	25	0·75	26	0·3
V3 2101 ..	144	7·2	146	2·3



CONDENSERS		Values (μF)
C1	V1 CG decoupling ...	0·09
C2	V1 SG decoupling ...	0·1
C3	HT isolating condenser ...	0·05
C4	V1 anode decoupling ...	0·25
C5	Reaction coupling ...	0·000125
C6	V2 grid condenser ...	0·000035
C7	V2 SG decoupling ...	0·09
C8	RF by-pass	0·00011
C9	V2 to V3 AF coupling ...	0·01
C10	Fixed tone corrector ...	0·003
C11†	Aerial circuit tuning ...	—
C12‡	Aerial circ. MW trimmer	—
C13†	V1 anode circ. tuning ...	—
C14‡	V1 anode MW trimmer ...	—
C15‡	V1 anode LW trimmer ...	—

RESISTANCES		Values (ohms)
R1	Volume control	20,000
R2	V1 CG decoupling ...	51,000
R3	V1 anode decoupling ...	2,900
R4	Reaction control	35,000
R5	V2 SG HT feed	16,000
R6	V2 grid leak	2,000,000
R7	V2 anode load resistance...	160,000
R8	V2 anode RF stopper ...	10,000
R9	V3 CG resistance... ...	1,000,000
R10	V3 grid stopper	51,000

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial coupling coils ...	2·5
L2		107·5
L3	Aerial tuning coils... ...	5·0
L4		40·0
L5	V1 anode RF tuning coils	5·0
L6		40·0
L7	Reaction coils	8·0
L8		4·5
L9	Speaker speech coil ...	1·25
T1	Output trans. Pri.	420·0
	Sec.	0·15
S1-S4	Waveband switches ...	—
S5	HT and LT circuit switch, ganged R1	—

VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 32E ...	140	2·2	73	0·4
V2 32E ...	25	0·75	26	0·3
V3 2101 ...	144	7·2	146	2·3

Valve voltages and currents given in the table are those measured in an average receiver when it was operating with a new HT battery. The reaction and volume controls were at minimum.

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

GENERAL NOTES

Switches.—S1-S4 are the waveband switches, in a single rotary unit beneath the chassis. The assembly is indicated in our under-chassis view, and shown in detail in the diagram below, where it is drawn as seen when viewed from the rear of the underside of the chassis. All the switches close on MW and open on LW.

S5 comprises the HT and LT switches, in a QMB unit ganged with the volume control **R1.**

Coils.—The tuning coils **L1-L4** and **L5-L8** are in two screened units on the chassis deck.

Condensers C1, C7, C8, C9.—These are fitted in black moulded cases, with tags, and are held to the chassis by a single bolt in each case. This bolt also earths the particular tag through which it passes. **C1** and **C7** are connected between the two outer tags in each case, the centre ones merely acting as anchorages for other leads. **C8** is connected between the two outer tags, while **C9** is between the centre and the unearthed outer tag.

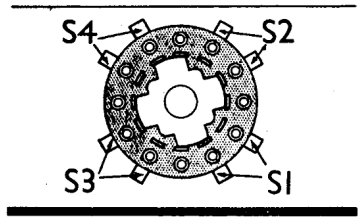
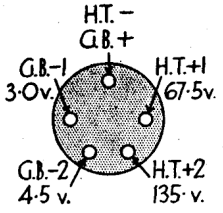


Diagram of the switch assembly as seen in the under-chassis view. The thick black line indicates the position of the chassis deck.

Dial Lamp.—This is a Philco type 5316 bulb, with a tubular bulb. It is a low-consumption bulb, rated at 2 V, and has an MES cap.

Diagram of the HT battery socket, as seen on the battery.



Chassis Divergencies.—R10 may be 490,000 Ω in some chassis, and in some cases a 15,000 Ω resistance shunted by a 0.05 μF condenser may be found in series with the screen (pin 4) of **V3.** Where this latter modification has not been made, dealers are advised to introduce it, since it reduces the HT current by 2-3 mA without any appreciable drop in output.

CIRCUIT ALIGNMENT

Connect signal generator leads to **A** and **E** clips, via a suitable dummy aerial. Turn volume control to maximum, and reaction to minimum.

MW.—Switch set to MW, tune to 1,500 KC/S on scale, feed in a 1,500 KC/S (200 m) signal, and adjust **C12** and **C14** for maximum output. Repeat the adjustment, slowly advancing the reaction control until it reaches a point just short of oscillation.

LW.—Switch set to LW, reset the reaction control to minimum, tune to 300 KC/S on scale, feed in a 300 KC/S (1,000 m) signal, and adjust **C15** (at rear of chassis) for maximum output, while gradually increasing reaction control until a point just short of oscillation is reached.