'TRADER' SERVICE SHEET 165

PHILCO 333

"PEOPLE'S SET"

A SIMPLE circuit using valves made specially for this particular set is employed in the Philco 333 "People's Set." It is a battery model with a variable-mu pentode H.F. amplifier, a pentode detector and a pentode output valve. No provision is made for either a gramophone pick-up or an extension speaker.

CIRCUIT DESCRIPTION

Aerial input via potentiometer volume control **R1** and coupling coils **L1, L2** to capacity coupled band-pass filter. Primary **L3, L4** tuned by **C13**; secondary **L5, L6** tuned by **C16**; top coupling by small capacity **C1**, bottom coupling by **C2.**

First valve (**V1, Philco metallised VP21**) is a variable-mu pentode H.F. amplifier operating with fixed G.B.

Tuned-secondary transformer coupling by **L7, L8, L10, L11, C20** between **V1** and H.F. pentode detector (**V2, Philco metallised SP21**) which operates on grid leak system with **C4** and **R2.** Reaction is applied from anode by coil **L9** and controlled by variable condenser **C17.** Anode H.F. filtering by stopper resistance **R5** and by-pass condensers **C6, C7.**

Resistance-capacity coupling by **R4, C8** and **R6** between **V2** and high-efficiency pentode output valve (**V3, Philco Pen23**). Fixed tone correction in anode circuit by condenser **C9.**

G.B. for **V1** and **V3** is obtained automatically from drop along resistances **R8, R9** in common H.T. negative line.

DISMANTLING THE SET

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the four control knobs (pull off) and the four bolts (with washers) holding the chassis to the bottom of the cabinet. The chassis can then be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes, by tilting the back slightly so that the tuning scale clears the speaker.

To free the chassis entirely, unsolder the speaker leads.

Removing Speaker.—To remove the speaker from the cabinet, remove the nuts and spring washers from the four bolts holding it to the sub-baffle. Alternatively, the speaker and sub-baffle can be removed together by removing the nuts, washers and collars from the four bolts holding the sub-baffle to the front of the cabinet.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Band-pass top coupling	Very low
C2	Band-pass bottom coupling	0·05
C3	V1 S.G. by-pass	0·1
C4	V2 C.G. condenser	0·00003
C5	V2 S.G. by-pass	1·0
C6	V2 anode H.F. by-passes	0·00025
C7		0·00011
C8	V2-V3 L.F. coupling	0·01
C9	Fixed tone corrector	0·003
C10*	Auto. G.B. circuit by-pass	35·0
C11‡	Band-pass pri. L.W. trimmer	—
C12‡	Band-pass pri. M.W. trimmer	—
C13†	Band-pass pri. tuning	—
C14‡	Band-pass sec. L.W. trimmer	—
C15‡	Band-pass sec. M.W. trimmer	—
C16†	Band-pass sec. tuning	—
C17†	Reaction control	—
C18‡	H.F. trans. sec. L.W. trimmer	—
C19‡	H.F. trans. sec. M.W. trimmer	—
C20†	H.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTANCES	Values (ohms)
R1	Aerial input control	100,000
R2	V2 grid leak	2,000,000
R3	V2 S.G. H.T. feed	100,000
R4	V2 anode load	160,000
R5	V2 anode H.F. stopper	51,000
R6	V3 C.G. resistance	490,000
R7	V3 C.G. H.F. stopper	490,000
R8	Automatic G.B. resistances	300*
R9		200†

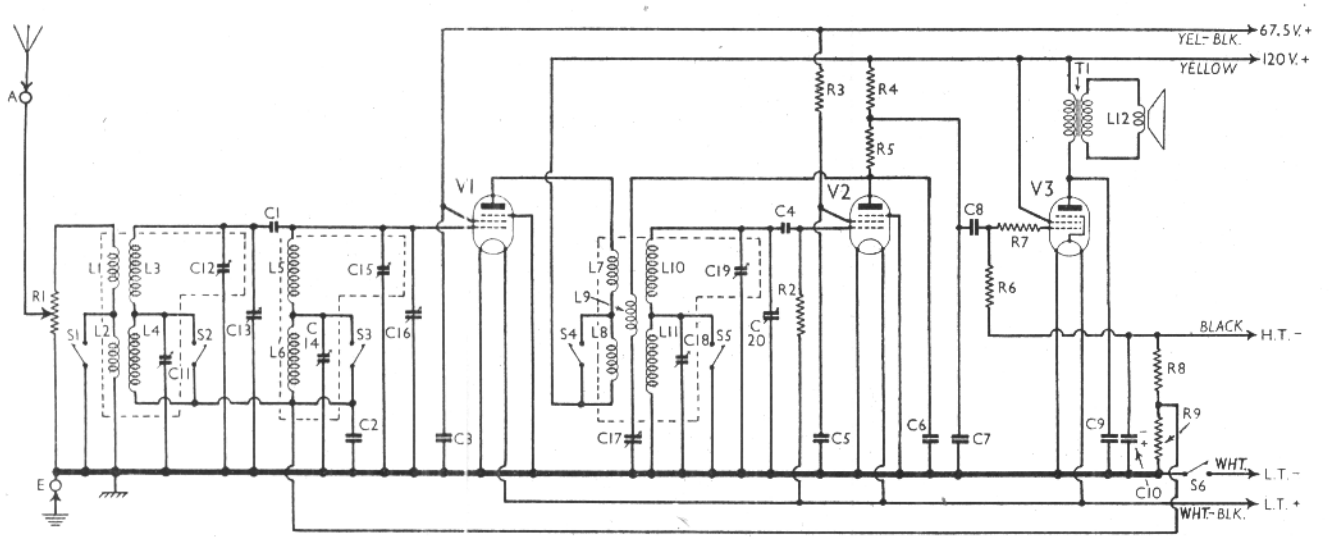
* 180 Ω in later models. † 120 Ω in later models.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial coupling coils	1·5
L2		18·5
L3	Band-pass primary coils	1·5
L4		18·5
L5	Band-pass secondary coils	1·5
L6		18·5
L7	H.F. transformer primary	5·0
L8		20·0
L9	Reaction coil	15·0
L10	H.F. transformer secondary	1·5
L11		18·5
L12	Speaker speech coil	2·0
T1	Speaker input trans. Pri.	850·0
	Sec.	0·2
S1-S5	Waveband switches	—
S6	L.T. circuit switch, ganged R1	—

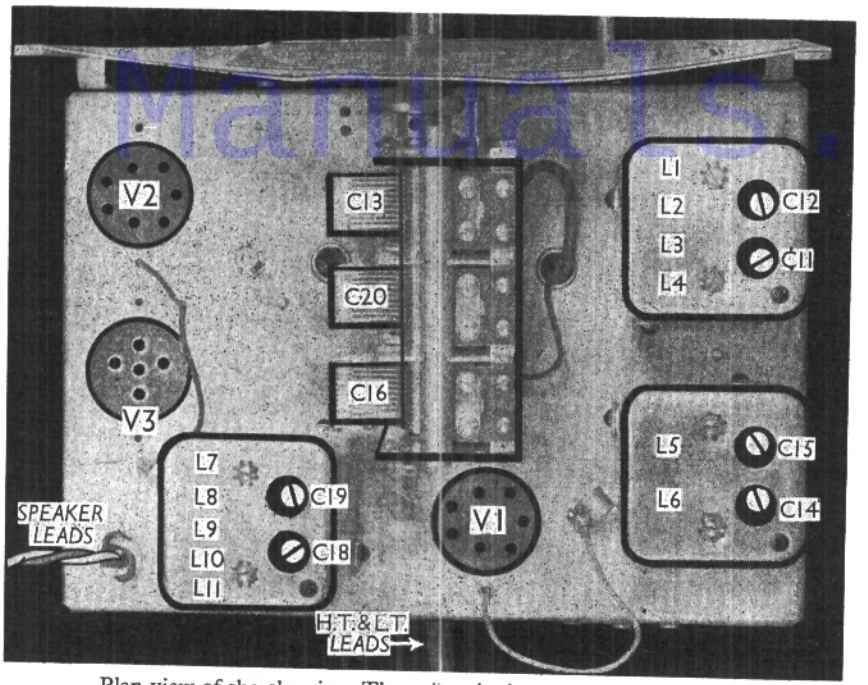
VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VP21	120	2·1	67·5	0·6
V2 SP21	15	0·4	15·0	0·2
V3 Pen23	115	2·4	120·0	0·5



Circuit diagram of the Philco 333 "People's Set." This is the battery model. Note that automatic grid bias is employed.



Plan view of the chassis. The coil units incorporate their trimmers.

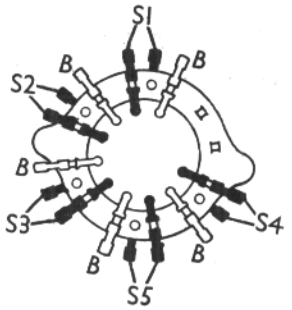
receiver when it was operating on an H.T. battery reading 120 V. The volume control was at maximum but the reaction control was at minimum. There was no signal input.

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

NOTE. — In later chassis the bias resistors have been lowered in value, and the anode and screen currents will be somewhat higher than those given.

GENERAL NOTES

Switches.—S1-S5 are the waveband switches, in a single rotary unit beneath the chassis. This is indicated in our under-chassis view, and a separate diagram is given on this page, looking at the unit from the rear of the underside of the chassis. The switches are all *closed* on the M.W. band and *open* on the L.W. band.



Switch diagram, looking from the rear of the underside of the chassis.

S6 is the L.T. circuit switch, ganged with the input control **R1.**

Coils.—All the tuning coils are in three screened units on the chassis deck, with two trimmers in each.

External Speaker.—There is no provision for this, though a high resistance type could be connected across the primary of **T1.**

Batteries.—No special types are recommended, but the set requires a 2 V L.T. cell, not larger than 3¼ in. by 3 in. by 6¾ in. high, and a 120 V H.T. battery, tapped at 67·5 V, not larger than 8¼ in. by 7½ in. by 3 in. high. No G.B. battery is needed.

Battery Leads and Voltages.—White lead, spade tag, L.T. negative; white and black lead, spade tag, L.T. positive 2 V. Black lead and plug, H.T. negative; yellow and black lead, brown plug, H.T. positive 67·5 V; yellow lead, yellow plug, H.T. positive 120 V.

Condensers C2, C8.—These are two of the usual Philco black moulded types. The condenser, in each case, is connected between the two outer tags. The centre tag is used only as a bearer.

Condenser C1.—This is shown in our under-chassis view, and merely consists of two connecting wires twisted round each other.

Chassis Divergencies.—Our chassis was a Run 1 model. In the Run 2 series, the bias resistors **R8** and **R9** are altered. **R8** becomes 180 O and **R9,** 120 O. This has resulted in an increase of power output from 0·4 W to 0·5 W, and an increase in total H.T. consumption from 6 mA to 8·5 mA.

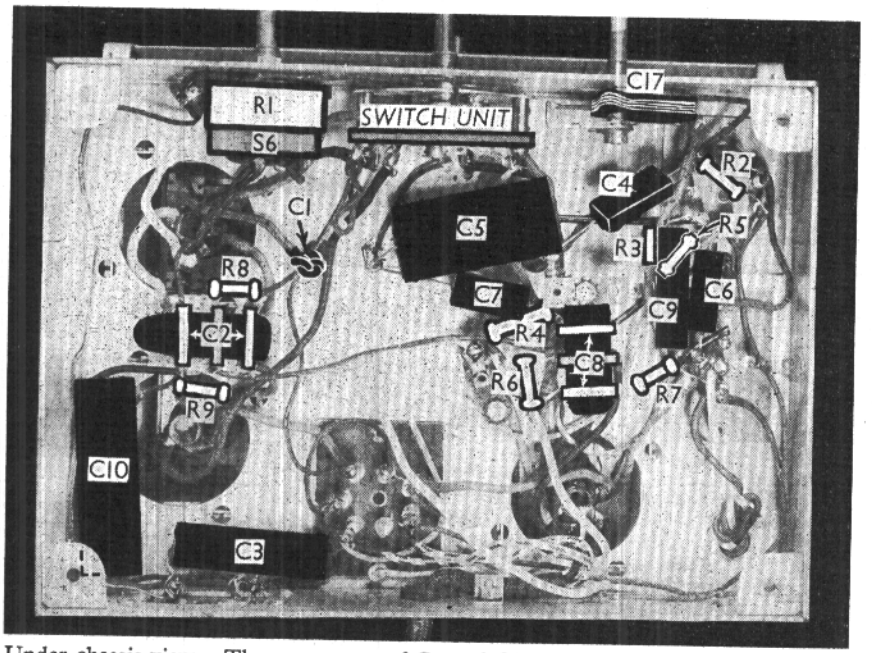
Alternative coil types are also used in later models, but these do not affect the circuit.

CIRCUIT ALIGNMENT

With gang condenser at minimum see that pointer is opposite the arrow at the top of the scale or over the "T" in "metres." Switch set to M.W., turn volume control to maximum, and reaction to minimum.

Set pointer to 1,400 KC/S and feed a 1,400 KC/S signal into the A and E sockets. Adjust **C12, C15** and **C19** in that order for maximum output. Repeat this several times to improve results. Increase reaction gradually, at the same time re-adjusting **C19,** until set is on the verge of oscillation. This adjustment is very critical. Do not alter **C12** and **C15** after **C19** has been finally adjusted. Check calibration at 600 KC/S.

Switch set to L.W. (anti-clockwise), and return reaction control to minimum. Set pointer to 290 KC/S and inject a 290 KC/S signal. Adjust **C11, C14** and **C18** in that order for maximum output. Repeat these adjustments. Increase reaction gradually, and re-adjust **C18** at the same time until set is just short of oscillation. This adjustment is also critical. Do not re-adjust **C11** and **C14** after **C18** has been finally adjusted. Check calibration at 160 KC/S.



Under-chassis view. The centre tags of C2 and C8 are used as bearers only. C1 is a small capacity.