PHILCO A638

Five-valve, plus rectifier three-waveband superhet for operation from AC mains, 50–100 cycles, 200–260 volts. Provision for pickup and extra loudspeaker. Made by Philco Radio and Television Corporation of GB, Ltd., Perivale, Middlesex.

AERIAL input is designed to be fed either by a double or an ordinary single-wire aerial. The link on the aerial input panel is connected to "B" for ordinary aerial, and "C" for the doublet aerial. The latter is connected to the red and black sockets. L1 is the aerial choke coil, while L2 is the aerial coupling coil for the long and medium wave circuits.

The aerial signal is coupled to the medium and long wave aerial transformer comprising L3 and L4 (LW), L5 and L6 (MW).

The short wave input circuits comprise L7 and L8 for doublet working, while for open aerial the signals are fed from the aerial socket via C8 to the primary, L9, of the short wave aerial transformer, the secondary of which is L10. VC1 section of the ganged condenser tunes the various secondary windings, and the signal is passed direct to the grid of V1, a pentode HF amplifier.

AVC is applied to the grid of this valve, but it has no cathode bias.

The screening grid of V1 (and of V2) is fed from the HT line via R6 with R5 completing a potential divider network between HT positive and chassis. C16 is the decoupler.

The suppressor grid of V1 is taken to cathode via a portion of the tapped resistance, R1, the tapping point being 30 ohms above chassis.

The output from V1 is coupled to the grid of V2, the heptode frequency changer, by the medium and long wave HF transformer comprising L11, L12, L13, and the short wave transformer, L14 and L15. These are tuned by VC2.

The frequency-changer cathode is biased by R13 decoupled by C18, while R12 is the grid to cathode resistance for the oscillator section of the valve. The oscillator grid coils are L16, L17, and L18, these being tuned by the oscillator section of the ganged condenser, VC3. Reaction is obtained from L19, which is in the oscillator anode circuit with R10 the voltage dropper.

The IF signal is transferred from V2 to the grid of V3, another pentode, by the IF transformer, L20 and L21. This incorporates a reaction winding, L22, which is in circuit between the suppressor grid of V3 and chassis, so that a certain amount of reaction, and hence increased sensitivity, is obtained by feedback from V3 to V2.

V3 is AVC controlled, and incorporates an electro-mechanical shadow-type of tuning indicator which is shunted by R21. This is decoupled by C27.

A second IF transformer, L23, L24, couples V3 to the double diode triode second detector valve, V4. The signal diode is fed direct from L24, the load resistance being R19, which is fed via the filter network R22, C28, and C29. The LF signal developed across R19 is coupled by C19 to the volume control, VR2, and thence via C20 to the grid of the triode section of V4. The volume control is tapped for connection to the bass boost components, R14, C21.

The pickup sockets are connected by a switch, SW2, to the top of the volume control element when gramophone reproduction is desired.

The AVC diode of V4 is fed from L24 via the small coupling condenser, C23, the load resistance being R15, which is connected to a second tapping on the bias resistance, R1, the tapping point being 38 ohms above chassis. This provides the delay volts, and the AVC bias is taken to the grids of the controlled valves

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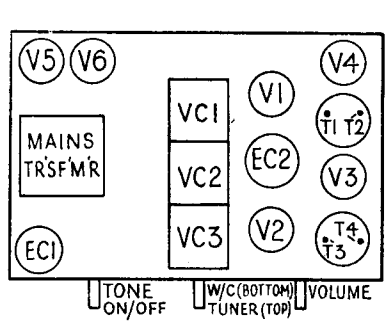
VALVE READINGS

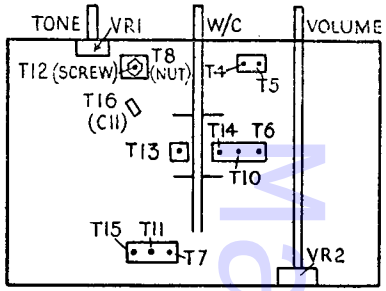
No signal. Volume maximum. 200 volts. AC mains. 1,000 ohms/volt meter.

V	Type	Electrode	Volts	Ma
1	78E Philco	Anode	170	*
		Screen	60	V1 and V2 2.6
2	6A7	Anode	220	1.2
		Screen	60	V1 and V2 2.6
		Osc. anode	145	*
3	78E	Anode	220	3.8
		Screen	60	.8
4	75	Anode	110	.5
5	42E	Anode	273	37
		Screen	282	*
6	80	Filaments	342	

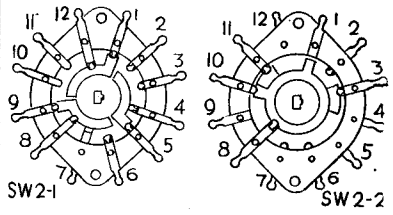
*Inaccessible.

Pilot lamp 6.3v .3 amp.

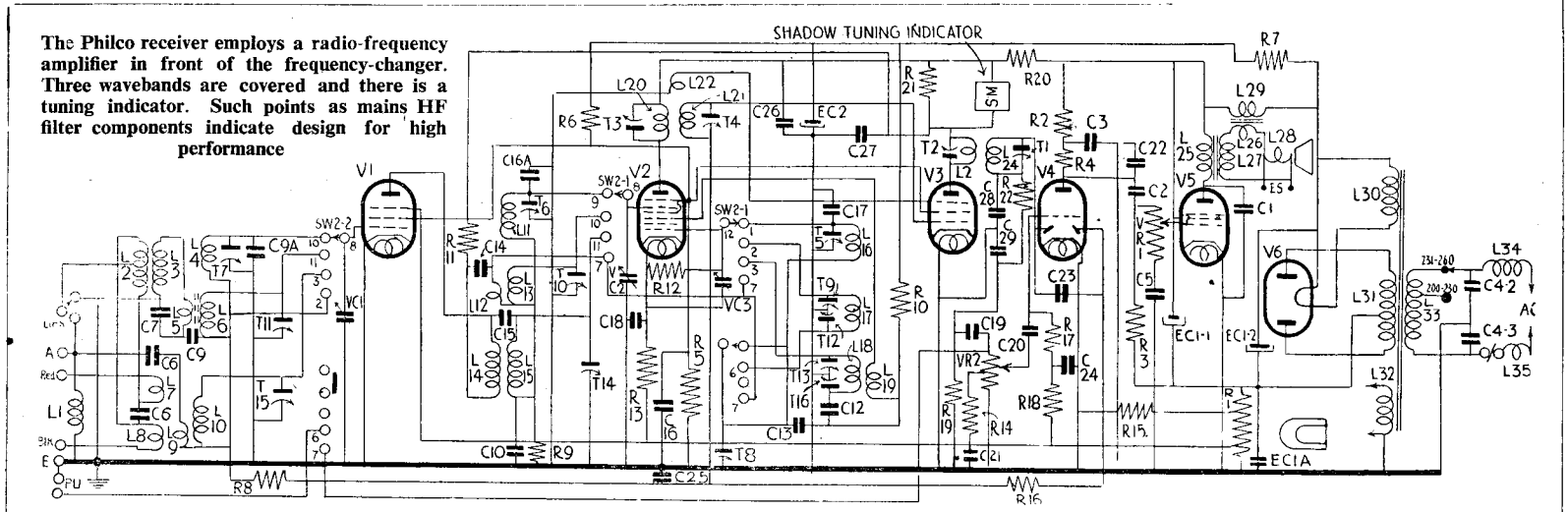




These two layouts of the Philco chassis identify the valves, trimmers and other major features.



The Philco receiver employs a radio-frequency amplifier in front of the frequency-changer. Three wavebands are covered and there is a tuning indicator. Such points as mains HF filter components indicate design for high performance



RESISTANCES

R	Ohms	R	Ohms
1	30+8+245	13	400
2	99,000	14	51,000
3	240,000	15	1 meg
4	99,000	16	1 meg
5	25,000	17	1 meg
6	20,000	18	490,000
7	15,000	19	330,000
8	10,000	20	6,000
9	10,000	21	10,000
10	10,000	22	51,000
11	10,000	VR1	500,000
12	99,000	VR2	2 meg (tapped at 1 meg)

CONDENSERS

C	Mfds	C	Mfds
1	.002	16A	.00003
2	.015	17	.00005
3	.1	18	.05
4	.015+.015	19	.01
5	.00041	20	.01
6	.00025	21	.01
7	.01	22	.00011
8	.01	23	.00011
9	.008	24	.1
9A	.00003	25	.05
10	.004	26	.05
11	(T16) .00165	27	.05
12	.00003	28	.00011
13	.00025	29	.00011
14	.00025	ECIA	10
15	.000014	ECI	8+8
16	.25	EC2	16

WINDINGS

L	Ohms	L	Ohms
1	17.5	20	8
2	5	21	12
3	16.5	22	Very low
4	25	23	12
5	.5	24	12
6	2.5	25	240
7	5.5 with L2 in series	26	.2
8		27	—
9	Very low	28	2
10	.1	29	1,140
11	25	30	35 (total)
12	.5	31	240+240
13	2.5	32	.1
14	1	33	.2
15	.1	34	5
16	16.5	35	5
17	2	Tuning Indicator with R21 in shunt—2,600 ohms	
18	.1		
19	.5		

ALBA 35

Four-valve, two-waveband, all-dry battery superhet with separate HT and LT dry batteries. Made by A. J. Balcombe & Co., Ltd., 52-58, Tabernacle Street, London, EC2.

MW and LW frame aerials are connected in series across the VC1 section of the tuning condenser and feed signals direct to the control grid of V1, the heptode frequency-changer.

The oscillator section of this valve has tuned grid circuits L3 (MW) and L4 (LW), tuned by VC2 section of the gang condenser. R2 and C3 are the grid leak and condenser. Reaction coils in the anode circuit are L5 (MW) and L6 (LW) with R3 and R4 the oscillator anode voltage dropping resistances for MW and LW bands respectively.

The screening grid of V1 is fed from the HT line through R1, which is decoupled by C2.

The IF signal is transferred to V2, the IF amplifier valve, by the first intermediate frequency transformer, comprising L7-T4, L8-T3.

A second intermediate frequency transformer L9-T2, and L10-T1, couples the signal from V2 to the diode of the single diode triode valve V3. The signal load is the volume control R7, while R6 and C5 provide the IF filtering.

AVC is obtained from the voltages produced across the resistance network R6 and R7, and is applied to V1 and V2 via C4 as a filter condenser and R5 as a decoupling resistance with C1.

The LF signal developed across R7 is picked off by the slider of the volume control and fed via C6 to the grid of V3 with R11 as the grid to filament resistance. The LF signal is resistance-capacity coupled by R8 and C7 to the grid of the output pentode V4.

RESISTANCES

R		Ohms	R		Ohms
1	.. ..	50,000	7	.. ..	2 meg
2	.. ..	250,000	8	.. ..	1 meg
3	.. ..	1,000	9	.. ..	2 meg
4	.. ..	5,000	10	.. ..	800
5	.. ..	2 meg	11	.. ..	10 meg
6	.. ..	.1 meg	12	.. ..	.5 meg

CONDENSERS

C		Mfds	C		Mfds
1	..	.05	6	.. ..	.002
2	..	.1	7	.. ..	.006
3	..	300 mmfd	8	.. ..	001
4	..	100 mmfd	9	.. ..	8
5	..	100 mmfd			

WINDINGS

L		Ohms	L		Ohms
1	.. ..	Very low	8	.. ..	10
2	.. ..	15	9	.. ..	10
3	.. ..	Very low	10	.. ..	10
4	.. ..	Very low	11	.. ..	500
5	.. ..	34	12	.. ..	Very low
6	.. ..	66	13	.. ..	3
7	.. ..	10			

R9 is the grid to filament resistance for V4 and is connected to the extreme HT negative end of the chassis line so that R10 provides automatic bias for V4.

The loudspeaker coupling transformer has its primary shunted by C8 for permanent tone correction, while C9 decouples the HT battery.

The standard batteries are two 45v HT units, GEC No. BB390 and one LT unit, GEC No. 389. These are fitted with non-interchangeable sockets. The total HT consumption is 9.8 ma, LT, .25 amp.

GANGING

IF Circuits.—Inject a 470 kc signal into the grid of V1 and adjust T1, T2, T3 and T4 for maximum output.

MW Band.—Couple the service oscillator to the receiver by a short piece of wire round the frame aerial. Set the receiver tuning pointer to the 250-m calibration and inject a signal of this wavelength into the frame aerial. Adjust T5 to being calibration into line.

Adjust T6 for maximum output.

Inject and tune-in a signal of 500 metres and adjust T7 for maximum output while rocking gang condenser.

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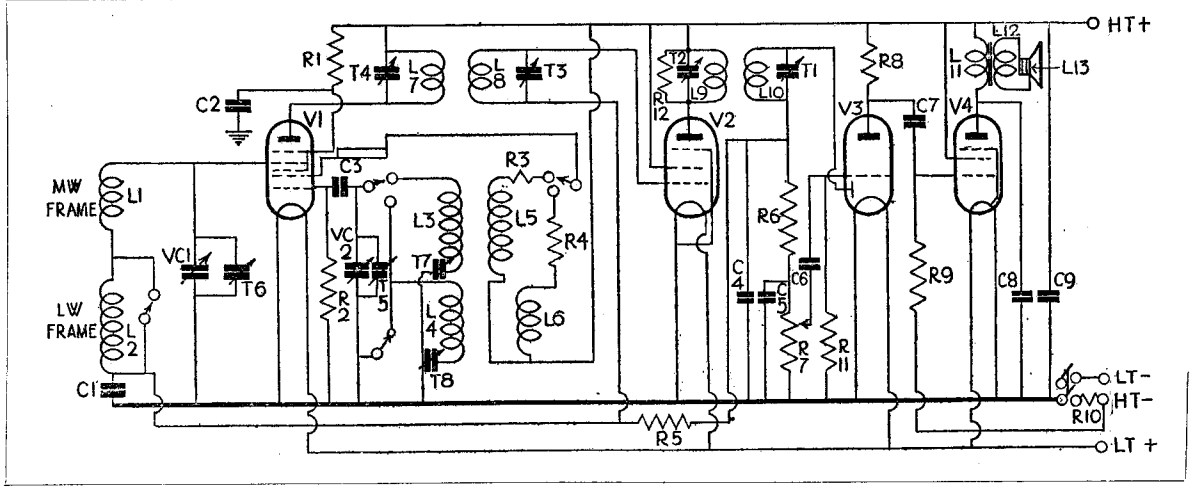
VALVE READINGS

V	Type	Electrode	Volts	Ma
1	FC141	Anode	90	.9 total
		Aux grid	75	
		Osc anode		
2	SP141	Anode	90	.65 total
		Aux grid	90	
3	H141D	Anode	40*	.05
4	PEN141	Anode	90	8.2 total
		Aux grid	90	

* Actual volts. The high anode resistance prevents a practical reading being obtained.



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via the decoupling components, R16 and C25 and R8.

Bias is applied to the triode section of V4 by connecting the grid circuit resistances, R17 and R18, to the first 30-ohm tap of R1. The anode circuit of V4 comprises R4, the LF coupling resistance and R2 the voltage dropper, which is decoupled by C3. The anode to cathode HF by-pass condenser is C22, and the LF coupling condenser, C2. This couples the signal to the grid of the pentode output valve, V5.

Tone control is effected by the variable resistance, VR1, and condenser C5, which are connected across the grid to cathode resistance, R3. This resistance is connected to the top of R1 so that maximum bias is applied to the output valve. A permanent degree of tone correction is effected by the anode to cathode condenser, C1, and the output from V5 is coupled to the low impedance moving-coil loudspeaker by the output transformer, L25, L26. L27 is the hum-bucking coil, and L28 the speech coil, across which are connected sockets for an external loudspeaker.

HT and LT supplies are provided in conventional manner by V6 and the mains transformer. Smoothing is effected by the speaker field, L29, and condensers EC1–1 and EC1–2. The mains input is filtered from HF by the chokes, L34, L35, and condensers C4–2 and C4–3.

GANGING

IF Circuits.—Connect an output meter across the primary of the speaker transformer—*i.e.*, the green and white leads. Connect a service oscillator between the top grid cap of V2 and chassis, with grid lead still connected. Switch to the medium waveband and fully engage the vanes of the gang condenser. Set the volume control to the maximum volume position and the tone control as far counter-clockwise as possible.

Tune the oscillator to 451 kc and adjust the trimmers T1, T2, T3, and T4, in that order for maximum response, reducing the input from the service oscillator as the circuits come into line so as to render the AVC inoperative.

Signal Circuits.—Leave the output meter connected as before, but feed the service oscillator via a dummy aerial or fixed condenser to the aerial and earth terminals of the receiver, making sure that the connecting link at the rear of the chassis is in the socket marked B. Feed only sufficient input from the service oscillator to obtain definite peaks in the output meter, so as to keep the AVC inoperative. Align the receiver in the following order of wavebands :—

Long Waves.—Tune set and oscillator to 1,034 metres (290 kc) and adjust T5 and then T6 and T7 for maximum response.

Tune set and oscillator to 1,875 metres (160 kc) and adjust T8 (the nut of the padding condenser) for maximum response, simultaneously rocking the gang to ensure optimum results.

Repeat the operations until no further improvement is noticed.

Medium Waves.—Tune set and oscillator to 214 metres (1,400 kc), and adjust T9, T10 and T11 in that order for maximum response.

Tune set and oscillator to 500 metres (600 kc), and adjust T12 (the screw of the padding condenser) for maximum response, simultaneously rocking the gang to ensure optimum results.

Repeat both the operations until no further improvement is noticed.

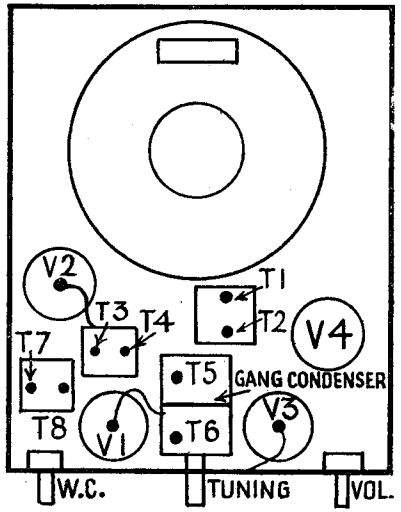
Short Waves.—Feed the service oscillator through a 400-ohm resistance in place of the dummy aerial or fixed condenser.

Tune the set and oscillator to 16.7 metres (18 mc). Screw T13 right up, and then unscrew until the second peak is heard.

(Some models may have a tendency to pull and change the frequency of the oscillator. By shunting a .00035-mfd variable condenser across the oscillator section of the gang and tuning it so that the second harmonic, instead of the fundamental, beats with the incoming signal, this pull can be minimised.)

Connect the shunt condenser between the tag of T13 and tune it (about half-open) for the signal at 18 mc. Then trim T14 and T15 for maximum response. Check that the 18 mc image is obtained at approximately 17.1 mc.

Feed and tune in on the receiver a signal of 50 metres (6 mc) and check for correct reading on the wavelength scale. If sensitivity is very low at 50 metres, then adjust T16 very slightly to compensate, and then retrim T13.



The layout above shows the trimmer locations on the Alba 35 chassis, and, left, the circuit of this all-dry portable.

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Repeat both operations until no further improvement can be obtained.

LW Band.—Inject and tune-in a signal of 1,900 metres and adjust T8 for maximum output while rocking gang.