

PHILCO 471

Three-valve, plus rectifier, three waveband superhet in Baby Grand and console forms. The same chassis is used in a radiogram. Suitable for 200-260-volt, 40-100 cycle AC. Made by Philco Radio and Television Corporation of Great Britain, Ltd., Perivale, Greenford, Middlesex.

Circuit.—An aerial transformer with tuned secondaries feeds V1, the heptode frequency-changer. Red and black connections are available for a Philco all-wave aerial with aerial selector switch incorporated in the wavechange switch.

Tuned coils in the oscillator grid

circuit have the anode coil L11 for reaction, together with feed-back applied across the padding capacities via C21.

V1 is coupled to V2 by a normal arrangement, IFT1. V2 is a triode pentode with the latter section acting as an IF amplifier and the triode section as an LF amplifier fed from the control (volume) which forms part of the signal diode load of V3, a double-diode output pentode.

The signal diode is coupled to V2 by IFT2, and the AVC diode by C12. AVC load is R12 and R13, and bias is applied to the grid circuits of V1 and the pentode section of V2.

After amplification by the triode section of V2, the LF signal is resistance capacity (R11, C13) coupled to the grid of the pentode section of V3.

The energised speaker is transformer coupled to V3 with a hum bucking coil L18 in series with the speech coil L19. ELS sockets are connected in parallel with the speech coil.

A 3-way tone control switch connects

the extra tone correction condensers C16 and C17 from anode of V3 to cathode when desired. Later models have a 2-way switch with only one condenser.

PU sockets are connected across the volume control R9 via contacts on the wavechange switch.

HT is supplied by a conventional full-wave rectifier, V4, with the field of the speaker L20 and electrolytic condensers C18 and C20 for smoothing.

Standing bias for V2 (triode section) and V3 is obtained from R16 in the HT negative line. A tapping on R16 provides a delay voltage for the AVC diode of V3.

GANGING

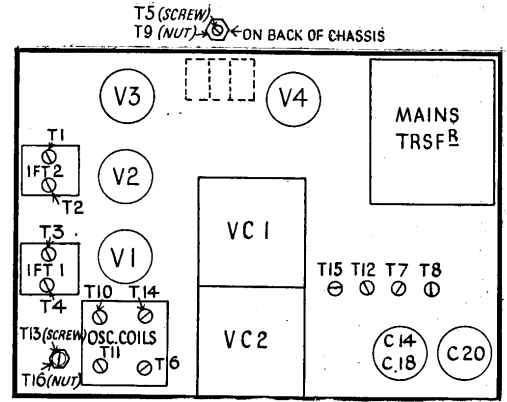
With gang ully open check that pointer coincides with extreme end of outside blue line on scale.

IF Circuits.—Switch to MW, turn volume control to max. and tone control to "brilliant."

Inject 451 kc to grid cap of V1 after removing lead to valve. Adjust T1,

Top of chassis layout diagram identifying the valves and trimmers of the Philco 471.

Novel circuit feature is the use of a triode pentode (V2) for both IF and LF amplification. The circuit is similar, therefore, to the usual four-valve plus rectifier arrangement.



T2, T3, T4, in that order for maximum output, keeping input from oscillator low.

IF Aerial Filter Circuit.—Inject 451 kc into A and E sockets, using a dummy aerial, and adjust T5 for minimum output.

LW Band.—Switch to LW and set pointer to 290 kc and inject 290 kc signal. Trim T6, T7, T8 in that order for maximum output. T7 and T8 are parallel trimmers of approximately half the required capacity so that fine adjustment can be obtained.

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VALVE READINGS

V	Type	Electrode	Volts	Ma
1	6A7	Anode	250	6.8
		Osc anode	175	6.0
		Screen	120	4.2
*2	6F7E	Anode	250	10.0
		Triode anode	100	2.0
		Screen	120	2.0
3	PEN/DD/61	Anode	245	26.0
		Screen	250	6.5
4	80	Anodes	370 AC	
		Pilot lamp	6.3 v, .3 amp.	

*In some instruments a 6F7B is used. R6 is then deleted and secondary of IFT1 is connected to junction of R3 and C6.

RESISTANCES

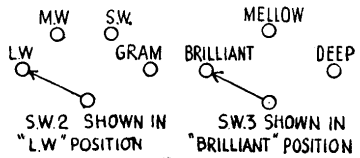
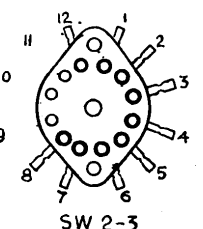
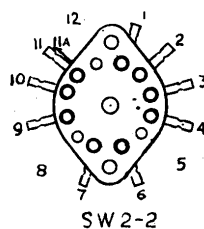
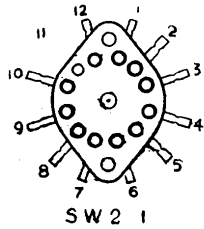
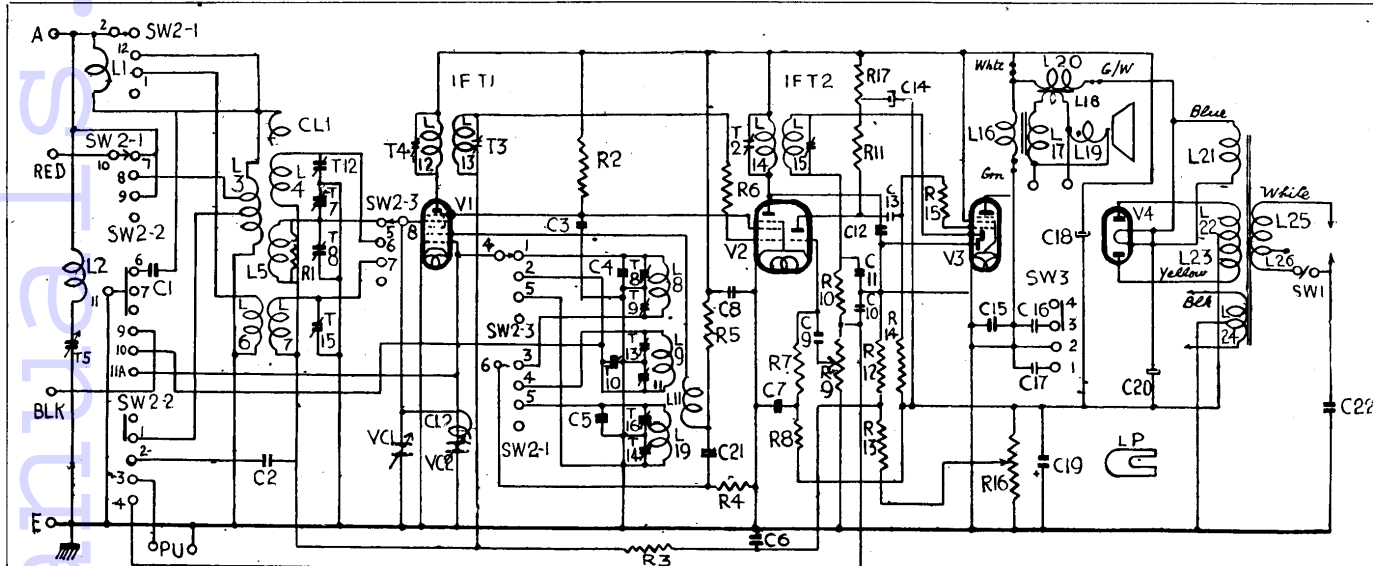
R	Ohms
1	490,000
2	20,000
3	1 meg
4	51,000
5	15,000
*6	5,000
7	490,000
8	1 meg
9	350,000
10	51,000
11	51,000
12	330,000
13	490,000
14	490,000
15	99,000
16	100 (60 plus 40)
17	10,000

*See note under valve readings.

WINDINGS

L	Ohms	L	Ohms
1	55	14	8
2	15	15	12
3	90 (60 plus 25)	16	250
4	.2	17	.2
5	.4	18	.1
6	.4	19	.2
7	15	20	2000
8	6	21	.1
9	2	22	240
10	.1	23	240
11	.4	24	.2
12	.8	25	30
13	12	26	5

CL1 is a capacity coupling loop of wire linking L3 and L4.
CL2 couples the grid and oscillator circuits. It is the small loop which will be found on the VC2 section of the gang.



GEC 4045

Four-valve, plus rectifier, two-waveband superhet with manual and mechanical push-button tuning. Suitable for 200-250-volt AC or DC supplies. Made by General Electric Co., Ltd., Kingsway, London, W.C.2.

Circuit.—As the set is a universal model the aerial and earth are isolated by C1 and C22 for safety. The signal is injected via L7 and C2 in parallel to single-tuned circuits in the grid of V1, the frequency-changer.

The oscillator section of V1 is tuned grid and there are separate trimmers and padders for each band. Feed-back is increased by returning the decoupler C6 to the top of the padder T7.

Trimmer-tuned IF transformers with iron-dust cores link up V2, the IF amplifier, and V3, the double diode triode. R9 and C11 form an IF filter, R10 being the load which passes LF via C12 to the volume control R16.

V3 triode grid is biased by returning R16 to the junction of R13 and R14 which form a potentiometer across R15, the common cathode bias resistor of V3 and V4.

The AVC diode of V3 is fed via C10 from the anode of V2 and the control voltages are applied from R11 to the grids of V1 and V2 through decoupling components. Standing bias for V1 and V2 is derived from R12.

V3 is resistance-capacity coupled to V4, an output tetrode which has a variable shunt tone circuit in R20 and C20.

The speaker is a PM type. Provision is made for connecting an extra LS of similar resistance (2 ohms) in parallel.

HT is obtained from the usual half-wave rectifier, V5, via a smoothing choke.

Valve heaters and dial lamp are in series with a barretter across the mains input so that no mains voltage adjustment is necessary. RF "noise" is prevented from entering from the mains supply by chokes in each line.

PB ADJUSTMENT

First release the locking screw by inserting a screw-driver through the hole in the side of the case. The screw is at the end of the shaft extension. This frees the control action on each button.

Tune the desired station accurately by the manual tuning knob. Then depress appropriate button to its fullest extent and relock the shaft screw. Test for accuracy by tuning in the station with the press button and readjust if necessary.

GANGING

IF Circuits.—Switch to LW, volume control at max., tone control to "brilliant," gang to maximum setting.

Inject modulated 456 kc to grid of V1 via a .1 mfd condenser. Chassis may be "live," so use .1 mfd between chassis and "earthy" output of oscillator. Keep output low to prevent AVC working.

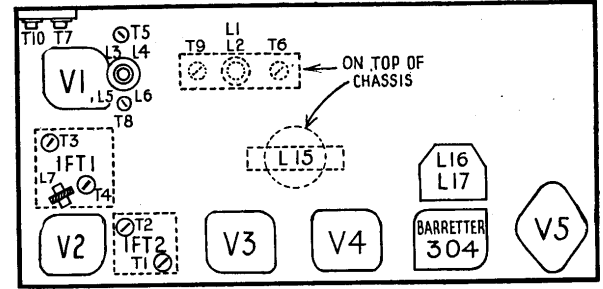
Adjust trimmers T1, T2, T3, T4 (underneath the chassis) in that order to give maximum reading on an output meter.

MW Band.—First check that junction of drive cord and indicator ribbon coincides with mark on scale when gang is at max. capacity. Tune to and inject 214m via dummy aerial to A and E sockets. Adjust T5 and T6 for maximum.

Tune to and inject 500m and adjust T7 while rocking gang. Check T5 and T6 adjustments.

LW Band.—Tune to and inject 1,000m. Adjust T8 and T9. Adjust T10 at 1818m rocking gang and then go over T8 and T9 adjustments.

Layout diagram of the G.E.C. chassis showing the positions of the valves, trimmers and certain coils.



WINDINGS

L	Ohms	L	Ohms
1	2.2	10	4
2	22.0	11	4
3	3.0	12	297
4	6.0	13	0.32
5	1.3	14	2.2
6	1.9	15	380
7	60.0	16	2.7
8	7	17	2.7
9	7		

RESISTANCES

R	Ohms	R	Ohms
1	1 meg	12	40
2	5,500	13	1 meg
3	99,000	14	220,000
4	22,000	15	200
5	15,000	16	1 meg
6	66,000	17	9,900
7	33,000	18	77,000
8	1 meg	19	440,000
9	330,000	20	55,000
10	99,000	21	100
11	440,000	22	77,000

VALVE READINGS

(Taken with 0-1,200 v meter total resistance 200,000 ohms.)

V	Type	Electrode	Volts	Ma
1	X63	Anode	186	1.4
		Screen	72	2.8
		Osc anode	113	3.3
2	KTW61	Anode	192	5.5
		Screen	67	1.9
3	DL63	Anode	88	0.36
4	KT33C	Anode	175	53.5
		Screen	192	9.0

Barretter: Type 304 Osram.
Dial lamp: Type S, 6.5 v, 0.3 amp, Osram, 10 mm MES round.

CONDENSERS

C	Mfds	C	Mfds
1	.005	14	30
2	.003	15	.0005
3	20 mmfds	16	4
4	.05	17	.02
5	50 mmfds	18	.005
6	.005	19	.24
7	.05	20	.1
8	.5	21	.16
9	.05	22	.05
10	20 mmfds	23	.0005
11	.0003	24	.01
12	.02	25	.0005
13	.25		

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Inject and tune to 160 kc, rock gang and adjust T9 padder for maximum output. Repeat 290 kc and then 160 kc adjustments for best results.

MW Band.—Switch to MW and tune to 1,400 kc. Inject 1,400 kc signal and trim T10, T11, T12 in that order. (T10 and T11 are in parallel, T12 in that order.)

Inject and tune at 600 kc, rock gang and pad T13 for maximum output. Repeat trimming and padding until no improvement is obtained.

SW Band.—Switch to SW. Substitute a 400-ohm resistance for the dummy aerial and inject an 18 mc signal. Set pointer to 18 mc. Screw T14 full in (maximum capacity) and then adjust T14 very carefully for the second signal, heard as it is slowly unscrewed.

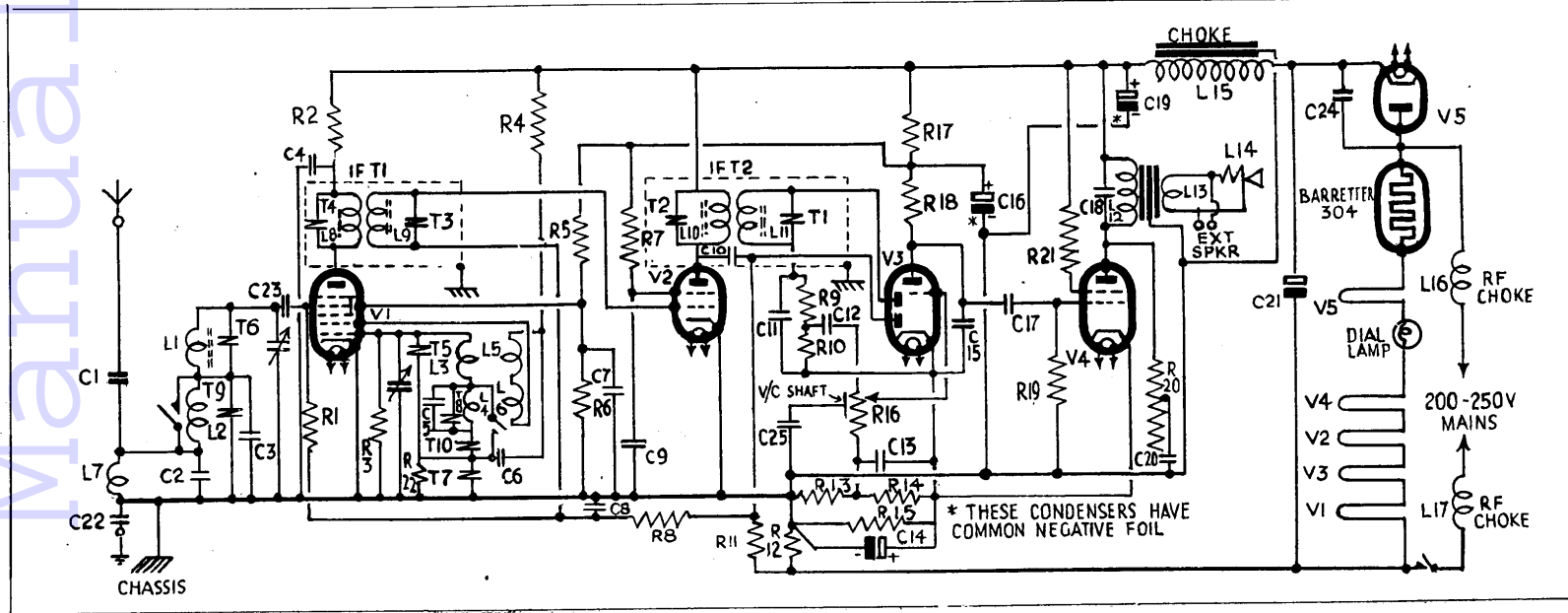
The setting of T15 will tend to "pull" the oscillator frequency. It is recommended that a .00035 mfd variable condenser be connected across VC2 so that the second harmonic is filtered out of the fundamental beats with the signal frequency.

Connect the shunt condenser across VC2, and tune it (about half its capacity) to 18 mc. Trim T15 for maximum output. Disconnect shunt condenser and readjust T14.

Check that the 18 mc image is tuned in at about 17.1 mc on the scale.

Inject and tune at 6 mc, rock gang and pad T16 for maximum output.

Retrim and pad for best results.



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