



# PHILCO

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## Radio Service Bulletin No. 40.

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### Model 295 (Runs 1 & 2).

**TYPE OF CIRCUIT:** Five valve all-wave battery superheterodyne with pre-selector H.F. amplifier and Quiescent Push-pull Pentode output (1 watt). Built-in connections for Philco All-wave Aerial—aerial selector built into and operated by the wave-change switch. Provision is made for connecting a pick-up which may be left permanently connected to the receiver if desired, as the gramophone operation is controlled by the extreme clockwise rotation of the wave-change switch.

**POWER SUPPLY:** Low tension accumulator 2 volts; high tension, Philco/Siemens "Full-o'-Power" 165 volts combined H.T. and grid bias battery, type 1287.

**WAVE-BANDS COVERAGE:** Three: (a) Long, 150-350 Kc. (2,000-857 metres); (b) Medium, 550-1,500 Kc. (545-200 metres); (c) Short, 5.8-18 megacycles (51.7-16.6 metres).

**TUNING DRIVE:** Two-speed gear drive—ratios 10-1 and 50-1 for slow and accurate tuning.

**TONE CONTROL:** Four positions giving Normal, Bass boost, Top cut 1 and Top cut 2.

**INTERMEDIATE FREQUENCY:** 451 Kc.

**POWER CONSUMPTION:** L.T. current 0.7 amp. H.T. current, 11 milliamps Quiescent; 25 milliamps on maximum signal.

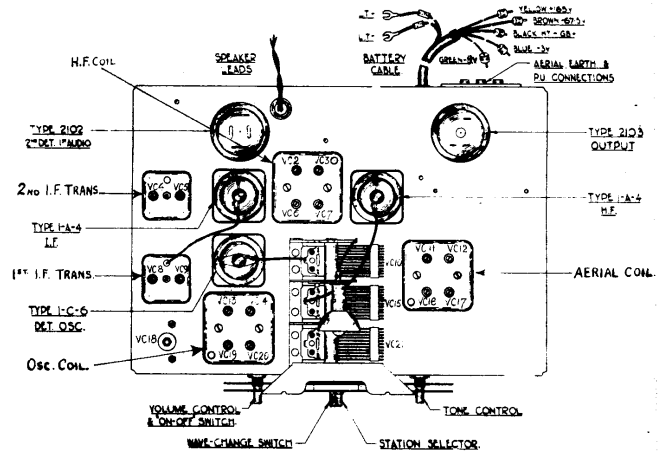


TABLE I. VOLTAGES.

Valve socket readings to chassis taken with an 025 or 099 Philco Set Tester using the 300 and 30 volts ranges. Volume control at minimum, wave-change switch at M.W. position and no aerial connected.

POSITION	VALVE	ANODE	SCREEN
H.F. Amplifier (S4) ...	1A4E	Pin 3. 165 Volts	Pin 4. 27.5 Volts
1st Det. and Oscillator (S3)	1C6	.. 3. 165 Volts .. 4. 120 Volts*	.. 6. 27.5 Volts
I.F. Amplifier (S2) ...	1A4E	.. 3. 160 Volts	.. 4. 27.5 Volts
2nd Detector, A.V.C. and 1st L.F. Amplifier (S1) ...	2102	.. 3. 120 Volts	—
Quiescent Pentode Output (S5)	2103	.. 3. 165 Volts .. 7. 165 Volts	5. 165 Volts

\* Oscillator Anode Volts.

TABLE 2. RESISTANCES OF COILS.

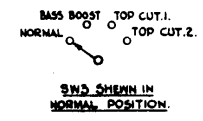
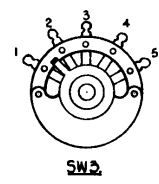
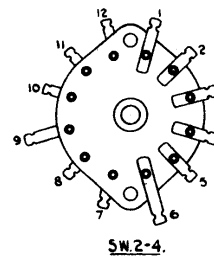
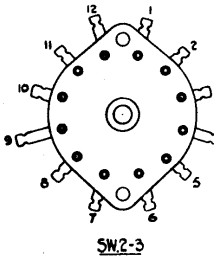
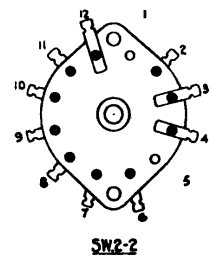
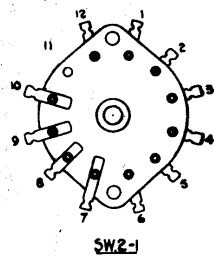
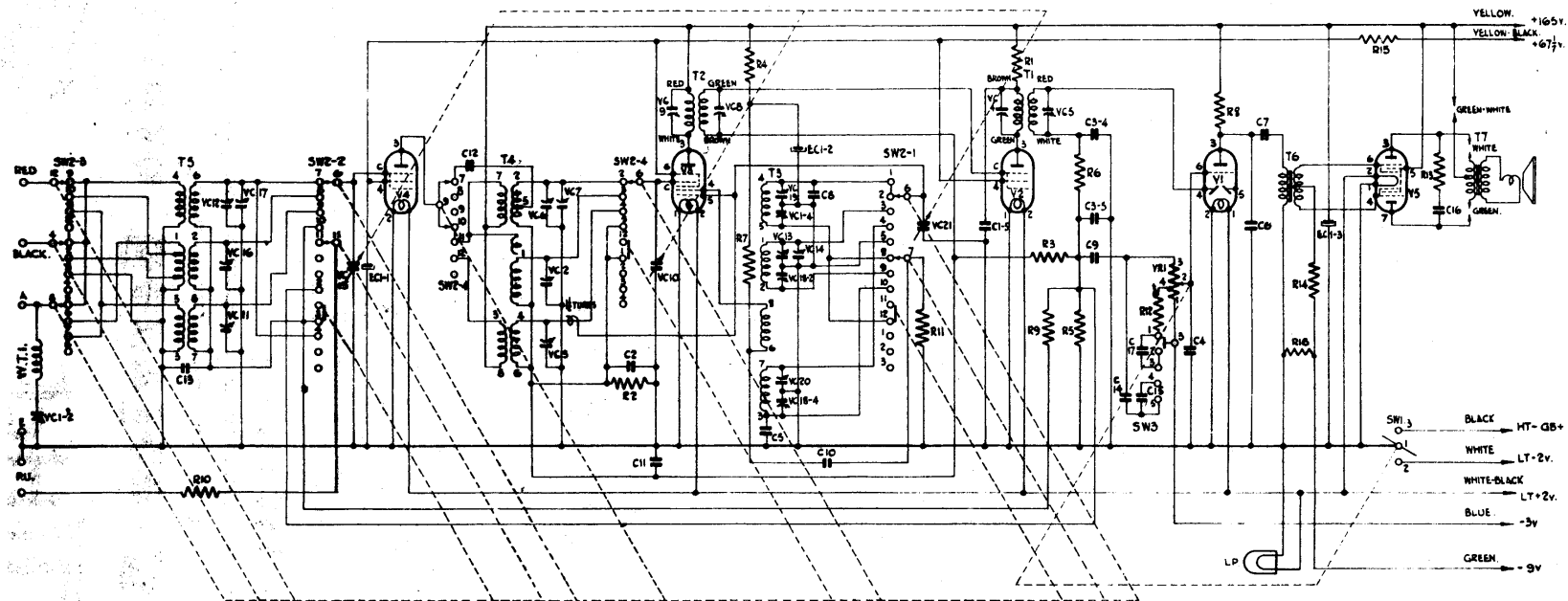
REF. NO.	PROD 1	PROD 2	RESISTANCE (OHMS)
WT1 ...	A	VC1/2	18
T5. Prim. ...	A	Chassis	S.W.2 L.W. 115. " M.W. 35. " S.W. 0.5. " Gram. Infinity
T5. Sec. ...	V4 Cap.	T5/7	S.W.2 L.W. 15. " M.W. 2.5. " S.W. 0.1. " Gram. Zero.
T4. Prim. ...	V4/3	EC1/3	S.W.2 L.W. 115. " M.W. 115. " S.W. 5. " Gram. 115.
T4. Sec. ...	V3 Cap.	TB1/1	S.W.2 L.W. 15. " M.W. 2.5. " S.W. 0.1. " Gram. Zero.
T3. Coupling	V3/4	T3/6	0.4.

REF. NO.	PROD 1	PROD 2	RESISTANCE (OHMS)
T3.	V3/5	SW2-1/7	S.W.2. L.W. 6. " M.W. 2. " S.W. 0.1. " Gram. 35,000 app.
T2. Prim. ...	V3/3	EC1/3	8.
T2. Sec. ...	V2 Cap.	TB1/1	12.
T1. Prim. ...	V2/3	C1/5	12.
T1. Sec. ...	V1/4	C3/4	8.
T6. Prim. ...	C7/1	Chassis	650 approx.
T6. Sec. {	V5/4 V5/6	T6/5 T6/5	3,000 approx. 3,000 "
T7. Prim. }	EC1/3 EC1/3	V5/3 V5/7	250. 250.
T7. Sec. ...	Output Transfmr.	Output Transfmr.	0.2.*
Speech Coil	Lead 1	Lead 2	2.*

\* Resistance of T7 Secondary alone and speech coil alone (taken when disconnected).

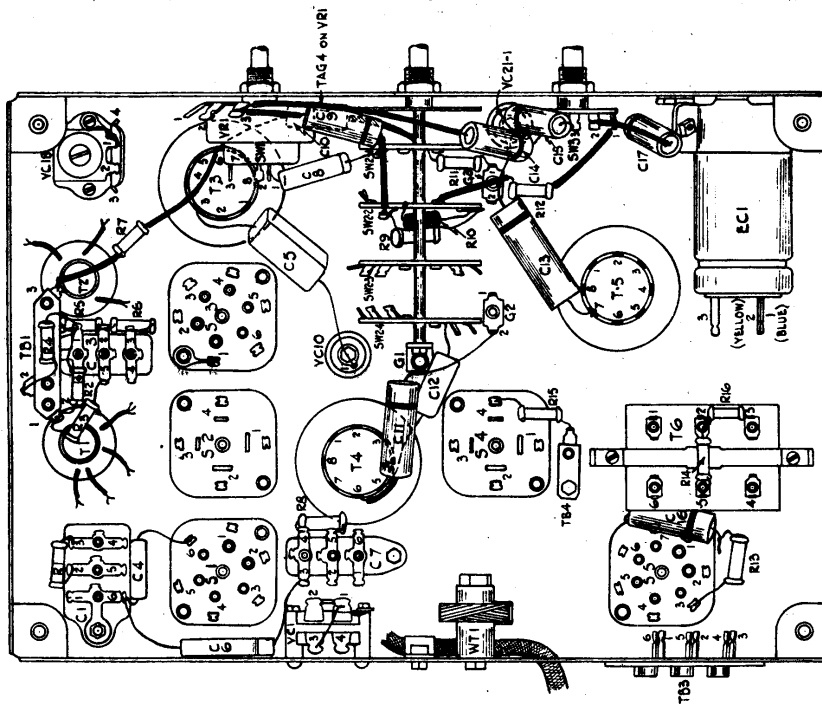
NOTE.—Reference numbers for valves should be read in conjunction with the socket numbers, e.g., V1-S1.



VIEWS OF SWITCHES FROM FRONT.  
CHASSIS BARS UP/INS. DOWN.

SCHEMATIC DIAGRAM. MODEL 295.

Note.—C. 2 is removed from Run 2 Models.



UNDER CHASSIS DIAGRAM. MODEL 295 - RUN 2.

- NOTE. -Run 1. (1) C.2 was connected between TB.1 tag 1 and C.1 tag 1. (3) End of C.5 shown joined to earth lug VC.10 was joined to VC.18 tag 1.  
 (2) End of R.2 shown joined to C.3 tag 1 was joined to C.1 tag 1.  
 (4) End of C.11 shown joined to lug G.2 was joined to lug G.1.

#### ALIGNMENT PROCEDURE.

Before leaving the Factory all Philco receivers are accurately aligned, but if mis-alignment is suspected through damage it should not be attempted without instruction in the correct adjustment of the trimming and padding condensers. It should only be carried out with the aid of an accurately calibrated Signal Generator covering Long, Medium and Short wave frequencies, and for this purpose the PHILCO ALL-PURPOSE SET TESTER MODEL 099 is recommended.

Connect the Output Meter across the Primary of the Output Transformer, i.e., green and white leads. Set Wave-change switch to M.W. (2nd position, left hand), and turn gang open to fullest extent. Check that indicator reads on index line (above 1,500 Kc.). Turn Volume Control to maximum and Tone Control to Normal (extreme left hand rotation).

The I.F. trimmers (VC's 5, 4, 8 and 9) should first be adjusted in that order, by feeding in a 451 Kc. signal from the Signal Generator to the Grid cap of the IC6 valve (with grid lead disconnected) and the Signal Generator earthed to the Receiver Chassis. Adjust the Signal Generator attenuator to give a half-scale reading on the Output Meter. The I.F. trimmers must then be adjusted for maximum output.

Transfer Signal Generator lead via a Standard Dummy to the Aerial socket and replace grid lead of the IC6 valve. Feed in a 451 Kc. signal and adjust VC.1 (screw) for *minimum* output.

Turn wave-change switch to L.W. (1st position, left hand) and set gang condenser at 290 Kc. Adjust VC.1 (nut) to three-quarters of a turn from tight. Feed in a 290 Kc. signal and trim VC's 19, 6, 7, 12 and 17 for maximum output. There are two trimmers each on the Aerial and H.F. coils for this waveband and fine adjustment can be obtained.

NOTE: If VC.1 (nut) is too tight, violent oscillation may occur.

Feed in and tune a signal of 160 Kc. Rock gang and pad VC.1 (nut) for maximum output. Re-adjust trimming at 290 Kc. and padding at 160 Kc. until no further improvement is obtainable.

Turn wave-change switch to M.W. (2nd position) and set gang condenser at 1,400 Kc. Feed in a signal of 1,400 Kc. and trim VC's 13 and 14 for maximum output. There are two oscillator trimmers on this waveband; one is of smaller capacity and can be used for fine adjustment. Both should be reasonably tight. Then trim VC's 2 and 16 for maximum output.

Feed in and tune a 600 Kc. signal. Rock gang and pad VC.18 (screw) for maximum output. Re-adjust trimming at 1,400 Kc. and padding at 600 Kc. until no further improvement results.

Turn wave-change switch to S.W. (3rd position). Substitute a 400 ohms resistor for the Standard Dummy; feed in an 18 Mc. signal from the Signal Generator and trim VC.20. To avoid adjusting to the Image frequency, the Signal Generator attenuator should not be too far advanced, and, with VC.20 fully tight, slowly unscrew trimmer until the second signal (minimum capacity) is obtained.

NOTE: Due to the very small difference between the pre-selector and oscillator frequencies, "locking" is prevalent at the high frequency end when trimming VC's 3 and 11. To overcome this, a 21 plate variable condenser (approx .00035 mfd.) is used to shunt the oscillator as follows:—

Connect the shunt condenser across VC.21 (gang section nearest scale), and tune the same (about half open) for signal at 18 Mc. Trim VC's 3 and 11 for maximum output. Disconnect shunt condenser and re-trim VC.20.

Check for the Image Frequency, which should be weaker than the fundamental at approximately 17.1 Mc. on the scale.

Feed in and tune in a 6 Mc. signal; rock gang and pad VC.18 (nut) for maximum output. Re-adjust trimming at 18 Mc. as above, and padding at 6 Mc., until no further gain can be obtained.

Check calibration.

## Parts and Price List. Model 295.

Ref. No.	Description.	Part No.	Price. List.	Ref. No.	Description.	Part No.	Price. List.					
T. 5	Aerial Coil Assembly .. .. .	32-1891	12/5	R. 10	¼ watt Carbon Resistor, 51,000 ohms.	6098	-/9					
VC. 11				R. 11	¼ watt Carbon Resistor, 32,000 ohms.	33-1208	-/9					
VC. 12				R. 12	¼ watt Carbon Resistor, 25,000 ohms.	33-1013	-/9					
VC. 16				R. 13	½ watt Carbon Resistor, 25,000 ohms.	4516	-/9					
VC. 17				R. 14	¼ watt Carbon Resistor, 240,000 ohms.	33-1097	-/9					
T. 4	H.F. Coil Assembly .. .. .	32-1892	12/3	R. 15	½ watt Carbon Resistor, 20,000 ohms.	6650	-/9					
VC. 2				R. 16	¼ watt Carbon Resistor, 1,000 ohms	33-1028	-/9					
VC. 3				VR. 1	Volume Control, 1 megohm, tapped at 215,000 ohms.	33-5127	4/3					
VC. 6				SW. 1	On-Off Switch .. .. .							
VC. 7				SW. 2	Wavechange Switch .. .. .	42-1133	9/3					
T. 3	Oscillator Coil Assembly .. .. .	32-1974	4/-	SW. 3	Tone Control Switch .. .. .	42-1141	2/2					
VC. 13				T. 7	Output Transformer } Speaker Speech Coil } complete	360-1016	27/6					
VC. 14				1st I.F. Coil Assembly .. .. .	32-1705	5/4	Dial Scale and Hub Assembly ..	380-5092	2/-			
VC. 19							2nd I.F. Coil Assembly .. .. .	32-1706	5/3	Pilot Bulb .. .. .	34-2065	1/4
VC. 20										I.F. Trap Coil .. .. .	32-7009	7/3
T. 2	3 Gang Condenser .. .. .	31-1763	16/3	Speaker Cable, 3-way .. .. .	L-1866	1/2						
VC. 8				Double Padder, 1,500+600 mmfd.	31-6027	2/11	Battery Cable, 7-way .. .. .	LO-1018	3/5			
VC. 9	Double Padder, 375 + 45 mmfd..	31-6074	1/8				Wander Plug, yellow, 165 volts ..	380-5004	-/2			
T. 1	Intervalve Transformer .. .. .	320-7009	7/3	C. 1	Moulded Condenser, .09+.09 mfd.	4989 DG	1/3	Wander Plug, brown, 67.5 volts	380-5005	-/2		
VC. 4								I.F. Trap Coil .. .. .	38-6851	1/-	C. 2	Tubular Condenser, .05 mfd. ..
VC. 5	3 Gang Condenser .. .. .	31-1763	16/3	C. 3	Moulded Condenser, 110+110 mmfd.	8035 DG	1/-				Wander Plug, blue - 3 volts ..	380-5008
T. 6				Double Padder, 1,500+600 mmfd.	31-6027	2/11	C. 4	Mica Condenser, 110 mmfd. ..	300-1020	-/8	Wander Plug, green - 9 volts ..	380-5021
WT. 1	Double Padder, 375 + 45 mmfd..	31-6074	1/8				C. 5	Mica Condenser, 2,250 mmfd. ..	300-1023	1/3	Wander Plug, plain red .. .. .	380-5087
VC. 10				Moulded Condenser, .09+.09 mfd.	4989 DG	1/3	C. 6	Mica Condenser, 800 mmfd. ..	300-1005	-/8	Wander Plug, plain black .. .. .	380-5015
VC. 15	Mica Condenser, 110 mmfd. ..	300-1020	-/8				C. 7	Moulded Condenser, .09 mfd. ..	4989 SU	-/9	Spade Tag .. .. .	280-1012
VC. 21				Mica Condenser, 2,250 mmfd. ..	300-1023	1/3	C. 8	Mica Condenser, 50 mmfd. ..	300-1003	-/4	Rubber Bush .. .. .	270-7136
VC. 18	Mica Condenser, 800 mmfd. ..	300-1005	-/8				C. 9	Tubular Condenser, .01 mfd. ..	30-4124	-/6	Bezel Escutcheon .. .. .	290-1018
VC. 1				Mica Condenser, 2,250 mmfd. ..	300-1023	1/3	C. 10	Mica Condenser, 250 mmfd. ..	300-1014	-/6	Bezel Window .. .. .	270-5029
C. 1	Tubular Condenser, .05 mfd. ..	30-4020	-/7				C. 11	Tubular Condenser, .05 mfd. ..	30-4020	-/7	Bezel Gasket .. .. .	270-7023
C. 2				Mica Condenser, 410 mmfd. ..	300-1011	-/8	C. 12	Tubular Condenser, .001 mfd. ..	30-4201	-/6	Chassis Mounting Rubbers ..	5189
C. 3	Tubular Condenser, .05 mfd. ..	30-4020	-/7				C. 13	Tubular Condenser, .001 mfd. ..	30-4201	-/6	Knob, Tuning and Spring .. .. .	270-4017
C. 4				Tubular Condenser, .01 mfd. ..	30-4124	-/6	C. 14	Tubular Condenser, .001 mfd. ..	30-4201	-/6	Knob, Tone Control .. .. .	270-4039
C. 5	Tubular Condenser, .01 mfd. ..	30-4124	-/6				C. 15	Tubular Condenser, .01 mfd. ..	30-4169	-/7	Knob, Volume Control .. .. .	270-4037
C. 6				Tubular Condenser, .01 mfd. ..	30-4124	-/6	C. 16	Tubular Condenser, .01 mfd. ..	30-4169	-/7	Knob, Wavechange .. .. .	270-4038
C. 7	Tubular Condenser, .01 mfd. ..	30-4124	-/6				C. 17	Electrolytic Condenser, 4+8+2 mfd.	300-2006	4/-	Knob Spring .. .. .	280-5262
C. 8				Electrolytic Condenser, 4+8+2 mfd.	300-2006	4/-	E.C. 1	Electrolytic Condenser, 4+8+2 mfd.	300-2006	4/-	4-Prong Socket .. .. .	27-6034
C. 9	¼ watt Carbon Resistor, 1,000 ohms.	33-1028	-/9				R. 1	¼ watt Carbon Resistor, 1,000 ohms.	33-1028	-/9	6-Prong Socket .. .. .	27-6036
C. 10				¼ watt Carbon Resistor, 2 megohms.	33-1025	-/9	R. 2	¼ watt Carbon Resistor, 2 megohms.	33-1025	-/9	7-Prong Socket .. .. .	27-6037
C. 11	¼ watt Carbon Resistor, 2 megohms.	33-1025	-/9				C. 3	¼ watt Carbon Resistor, 2 megohms.	33-1025	-/9	Valve Shield .. .. .	28-2726
C. 12				¼ watt Carbon Resistor, 2,000 ohms.	33-1029	-/9	R. 4	¼ watt Carbon Resistor, 2,000 ohms.	33-1029	-/9	V. 4	Type 1A4E Variable-mu H.F. Valve
C. 13	¼ watt Carbon Resistor, 330,000 ohms.	33-1200	-/9				R. 5	¼ watt Carbon Resistor, 330,000 ohms.	33-1200	-/9	V. 3	Type 1C6 Variable-mu Heptode Valve
C. 14				¼ watt Carbon Resistor, 51,000 ohms.	6098	-/9	R. 6	¼ watt Carbon Resistor, 51,000 ohms.	6098	-/9	V. 2	Type 1A4E Variable-mu H.F. Valve
C. 15	¼ watt Carbon Resistor, 10,000 ohms.	33-1000	-/9				R. 7	¼ watt Carbon Resistor, 10,000 ohms.	33-1000	-/9	V. 1	Type 2102 Double Diode Triode Valve
C. 16				¼ watt Carbon Resistor, 51,000 ohms.	6098	-/9	R. 8	¼ watt Carbon Resistor, 51,000 ohms.	6098	-/9	V. 5	Type 2103 Quiescent Pentode Valve
C. 17	¼ watt Carbon Resistor, 2 megohms.	33-1025	-/9				R. 9	¼ watt Carbon Resistor, 2 megohms.	33-1025	-/9		

NOTE.—C. 2 is removed from Run 2 Models.