



# PHILCO



## Radio Service Bulletin No. 72

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### TYPE CIRCUIT: Five-valve Superheterodyne Unit-constructed

Receiver with full delayed A.V.C. and Pentode Output (3 watts) for operation on Short, Medium and Long Wavebands. Built-in connections for Philco All-Wave Noise-Reducing Aerial, automatic bridge balanced aerial selector and alternative link connections—"B" for ordinary aerial and "C" for Philco All-Wave Noise-Reducing Aerial. 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. Provision is also made for connecting an external speaker of the permanent-magnet moving-coil type having an impedance of 2-3 ohms.

**POWER SUPPLY:** Alternating current mains of 200-230 volts or 231-260 volts, 50-100 cycles, when the voltage adjusting plug is fully screwed into the correct socket on the rear-of-cabinet panel.

**WAVEBANDS: COVERAGE:** Three: (a) Long, 320-150 Kc. (937.5-2,000 metres); (b) Medium, 1,700-550 Kc. (176.4-545.4 metres); (c) Short, 18-5.7 Mc. (16.6-52.6 metres).

**TUNING DRIVE:** Slow-motion drive, ratio 6-1, with integral vernier device, ratio 36-1, which enables fine tuning to be obtained.

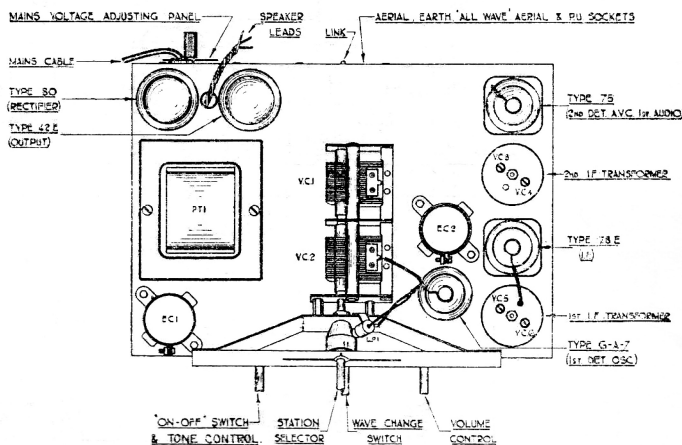
**TONE CONTROL:** This is continuously variable, enabling a fine degree of tone between brilliant and mellow to be obtained. The on/off switch is combined with this control, thus allowing a particular setting of the separate volume control to be maintained.

**LOUDSPEAKER:** A 6-inch diameter fully energised moving-coil speaker is used, which gives the highest efficiency audio output, and greater bass response is obtained due to the large baffle.

**INTERMEDIATE FREQUENCY:** 451 Kc.

**POWER CONSUMPTION:** 60 watts approx.

### Model C-537



TOP CHASSIS DIAGRAM.

TABLE 1 — VOLTAGES

Valve socket readings to chassis taken with an 065 or 077 Philco Set Tester, using the 500, 250 and 10 volts ranges. Volume control at minimum, wave-change switch in M.W. position, and no aerial connected. A.C. line 230 volts, 50 cycles.

POSITION.	VALVE.	ANODE.	SCREEN.	BIAS.
1st Detector and Oscillator, S.3 ... ..	6A7	Pin 3. 175 v. Pin 5. 130 v.*	Pin 4. 100 v.	—
I.F. Amplifier, S.5 ... ..	78E	Pin 3. 255 v.	Pin 4. 100 v.	Pin 5. -2 v.
2nd Detector, A.V.C. and 1st L.F. Amplifier, S.4 ... ..	75	Pin 3. 75 v.	—	—
Pentode Output, S.2... ..	42E	Pin 3. 250 v.	Pin 4. 255 v.	-15 v.†
Full Wave Rectifier, S.1 ... ..	80	Pin 3. 320 v. A.C. Pin 4. 320 v. A.C.	—	—

\* Oscillator Anode Volts. † Bias measured between R.1/1 and chassis.  
Total D.C. 335 volts measured between S.1/1 and R.1/1 V.1 filament, 5 volts A.C.; V.2, 3, 4, 5 and L.P.1 filaments, each 6.3 volts A.C., measured between Pins 1 and 2 on each socket.

TABLE 2 — RESISTANCES OF COILS.

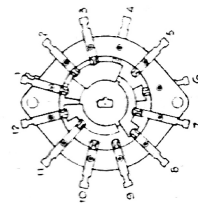
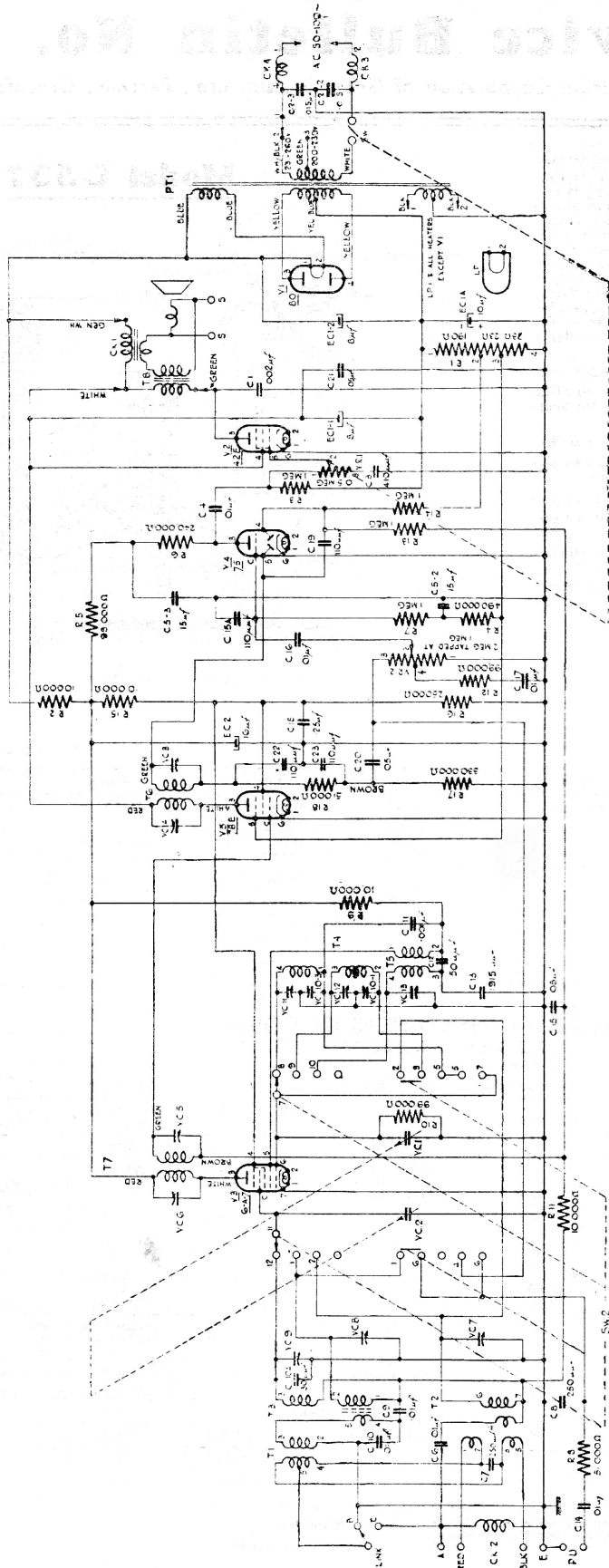
(Link on TB.3 to be in Socket "B.")

REF. No.	TEST PROD. 1.	TEST PROD. 2.	RESISTANCE (OHMS)	REF. No.	TEST PROD. 1.	TEST PROD. 2.	RESISTANCE (OHMS)
OK.2 ... ..	TB.3 Socket "A"	Chassis	17.5	T.5 ... ..	V.3/6	Joint of C.12 and C.13	SW.2 S.W. 0.1 ,, Gram. Infinity
T.1 Primary ... ..	T.1/1	T.1/4	5	T.5 Reaction ... ..	V.3/5	TB.6	Less than 0.1
T.1 Primary tapping ... ..	T.1/1	Chassis	2.5	T.6 Primary ... ..	V.5/3	TB.9/3	12
T.1 Secondary ... ..	T.1/3	Chassis	16.5	T.6 Secondary ... ..	V.4/5	TB.9/2	51,000 approx.
T.2 Primary No. 1 (with T.1 Primary in series) ... ..	TB.3 Socket "Red"	TB.3 Socket "Blk"	5.5	T.8 Primary ... ..	V.2/3	V.2/4	240
T.2 Primary No. 2 ... ..	TB.4/2	TB.5	Less than 0.1	T.8 Secondary ... ..	Output Transformer	Output Transformer	0.2*
T.2 Secondary ... ..	V.3 Cap	TB.5	SW.2. S.W. 0.1 ,, Gram. Infinity	Speech Coil ... ..	Lead 1	Lead 2	2*
T.3 Primary ... ..	TB.7/1	TB.7/2	0.5	CK.1 ... ..	EC.1/1	EC.1/2	1,140
T.3 Secondary ... ..	V.3 Cap	TB.5	SW.2. L.W. 25 ,, M.W. 2.5	P.T.1 Primary ... ..	C.2/2	200-230v. tap 231-260v. tap	SW.1. ON 17.5 SW.1. OFF Infinity
T.7 Primary ... ..	V.3/3	TB.1/1	8	H.T. Secondary ... ..	V.1/3 V.1/4	R.1/1 R.1/1	240 240
T.7 Secondary ... ..	V.5 Cap	C.15/3	12	Rectifier L.T. Secondary	V.1/1	V.1/2	0.1†
T.4 ... ..	V.3/6	SW.2/5	SW.2. L.W. 16.5 ,, M.W. 2.5	Heater L.T. Secondary ...	V.2/1	V.2/2	0.2†
				CK.3 ... ..	TB.1A./4	C.2/2	5
				CK.4 ... ..	TB.1A./3	C.2/3	5

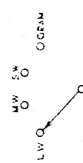
\* Resistance of T.8 Secondary alone and Speech Coil alone (taken when disconnected).

† Resistance of L.T. windings taken with all valves removed.

NOTE.—Reference numbers for valves should be read in conjunction with the socket numbers, e.g., V.1-S.1.



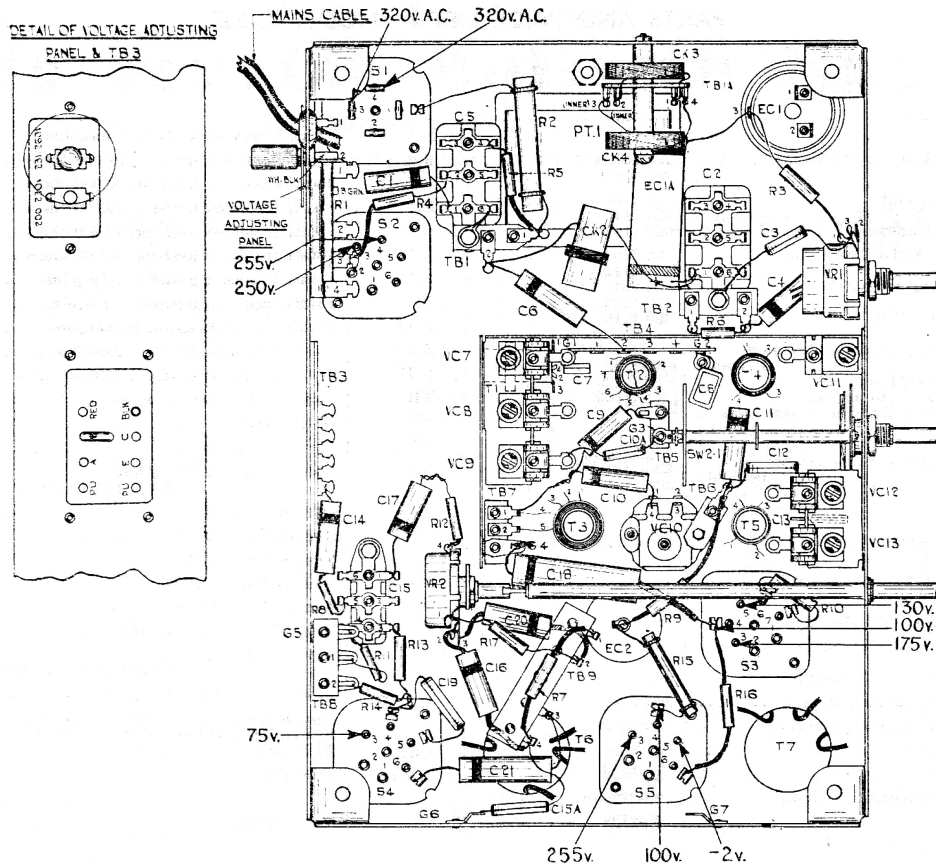
VIEW OF SW. 2 FROM FRONT  
CHASSIS BEING UPBROKE DOWN  
NOTE - SPINDLE LOCATING NOTCH ON SW. 2



SW. 2 SHOWN IN L.W. POSITION

NOTE - In later models, a 4-watt Carbon Resistor, 150,000 ohms, part No. 33.1183, is inserted in the lead to V2/5.

SCHEMATIC DIAGRAM—MODEL C-537.



UNDER CHASSIS DIAGRAM—MODEL C-537

### 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 and for this purpose the PHILCO ALL-PURPOSE SET TESTER MODEL 077 is recommended.

Connect the Output Meter across the Primary of the Output Transformer, *i.e.*, green and white leads. With gang condenser fully open, check that indicator reads on index line (beyond 1,700 Kc.). Set wave-change switch in second position from left (M.W.) and turn volume control fully clockwise.

**NOTE.**—The link on TB3 must be placed in socket "B."

**INTERMEDIATE FREQUENCY.**—The I.F. trimmers (VC's 3, 4, 5 and 6) should first be carefully adjusted by feeding in a 451 Kc. signal from the Signal Generator to the grid cap of the 6A7 valve (with grid lead connected) 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.

**NOTE.**—It is important that the following order of alignment be followed.

**LONG WAVES.**—Turn wave-change switch to L.W. position (fully counter-clockwise rotation) and set gang at 290 Kc. Feed in a 290 Kc. signal and trim VC's 11 and 9 underneath chassis in that order for maximum output.

Feed in and tune a 160 Kc. signal. Rock gang and pad VC.10 (nut) for maximum output. Readjust VC.11 at 290 Kc. Repeat the above operation until no further improvement is obtainable.

**MEDIUM WAVES.**—Turn wave-change switch to second position clockwise (M.W.) and set gang at 1,400 Kc. Feed in a signal of 1,400 Kc. and trim VC's 12 and 8 underneath chassis in that order for maximum output.

Feed in and tune a signal of 600 Kc. Rock gang and pad VC.10 (screw) for maximum output. Readjust VC.12 at 1,400 Kc. Repeat the above operation until no further improvement results.

**SHORT WAVES.**—Turn wave-change switch to third position clockwise (S.W.). Substitute a 400 ohms resistor for the Standard Dummy and feed in an 18 Mc. signal. Set gang at 18 Mc. and adjust VC. 13 underneath chassis for the second signal heard from tight (care is necessary as the two peaks are narrowly spaced).

**NOTE.**—Due to the very small difference between the pre-selector and oscillator frequencies, the adjustment of VC.7 will have a tendency to "pull" or change the frequency of the oscillator. By shunting a 21-plate variable condenser (approx. .00035 mfd.) 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" will be minimised.

Connect the shunt condenser between VC.13 tag and chassis and tune it (about half open) for signal at 18 Mc. Trim VC.7 underneath chassis for maximum output. Disconnect shunt condenser and retrim VC.13.

Check that the 18 Mc. image is obtained at approximately 17.1 Mc.

Feed in and tune a signal of 6 Mc. and check for correct reading on scale. It should not be necessary to adjust the semi-fixed tracker (C13) but if sensitivity is found to be low at 6 Mc., very slight adjustment only may be made while rocking the gang. Finally retrim VC.13 at 18 Mc.

Check calibration.

PARTS AND PRICE LIST — MODEL C-537.

REF. No.	DESCRIPTION.	PART No.	LIST PRICE s. d.	REF. No.	DESCRIPTION.	PART No.	LIST PRICE s. d.
CK.2	Aerial Choke .. .. .	320-1189	1 3	R.7	½ watt Insulated Resistor, 1 megohm ..	330-2018	9
CK.3	Mains Filter Unit .. .. .	320-1245 or	2 9	R.8	½ watt Insulated Resistor, 51,000 ohms ..	330-2015	9
CK.4		320-1254		R.9	½ watt Insulated Resistor, 10,000 ohms ..	330-2014	9
T.1	Aerial Coupler Coil .. .. .	32-2490 or	2 3	R.10	½ watt Insulated Resistor, 99,000 ohms ..	330-2012	9
T.2	S.W. Aerial Transformer .. .. .	320-1145	2 3	R.11	½ watt Insulated Resistor, 10,000 ohms ..	330-2014	9
T.3		320-1199	4 0	R.12	½ watt Insulated Resistor, 99,000 ohms ..	330-2012	9
T.4	M. and L.W. Aerial Transformer .. .. .	32-2504 or	5 0	R.13	½ watt Insulated Resistor, 1 megohm ..	330-2018	9
T.5	M. and L.W. Oscillator Coil .. .. .	320-1142	5 0	R.14	½ watt Insulated Resistor, 1 megohm ..	330-2018	9
T.6		32-2513 or	2 6	R.15	1 watt Carbon Resistor, 10,000 ohms ..	3524	9
VC.3	S.W. Oscillator Coil .. .. .	320-1136	2 6	R.16	½ watt Insulated Resistor, 25,000 ohms ..	330-2007	9
VC.4		320-1219	3 0	R.17	½ watt Insulated Resistor, 330,000 ohms ..	330-2017	9
C.22	2nd I.F. Transformer and Trimmers Assembly ..	32-2503 or	7 6	VR.1	Tone Control, 500,000 ohms .. .. .	33-5200	4 6
C.23		Mica Condenser, 110 mmfd. .. .. .	320-1126 or	7 6	SW.1		
R.18	Mica Condenser, 110 mmfd. .. .. .	320-1155	7 6	SW.2	Wave-change Switch .. .. .	42-1302	5 9
T.7	1st I.F. Transformer and Trimmers Assembly	32-2101 or	7 6	VR.2	Volume Control, 2 megohms (tapped at 1 megohm)	33-5158	3 0
VC.5		320-1125 or	7 6	S.1	4-prong Valve Holder .. .. .	27-6044	9
VC.6	320-1186	7 6	S.2	6-prong Valve Holder .. .. .	27-6036	9	
VC.1	Two-gang Condenser .. .. .	310-1027	18 0	S.3	7-prong Valve Holder .. .. .	27-6037	9
VC.2		310-6020	2 3	S.4	6-prong Valve Holder .. .. .	27-6036	9
VC.7	Triple Padder, 35+35+35 mmfd. ..	310-6028	2 0	S.5	6-prong Valve Holder .. .. .	27-6036	9
VC.8		31-6176	1 0	P.T.1	Power Transformer, 50-100 cycles ..	320-7029	22 0
VC.9	Double Padder, 125+375 mmfd. ..	310-6018	1 6		Power Transformer, 40-100 cycles (special)	320-7007	22 9
VC.10		300-4081	1 6		Power Transformer, 25 cycles .. .. .	320-7040	32 0
VC.12	Electrolytic Condenser, 10 mfd. ..	30-2079	7 6	T.8	Output Transformer, Part No. 320-7026 ..	360-1106†	24 0
VC.13		30-2079	7 6	CK.1	Speech Coil and Cone, Part No. 360-4008-Field Coil .. .. .		
EC.1A	Electrolytic Condenser, 8+8 mfd. ..	27-7194	—	L.P.1.	Pilot Bulb .. .. .	34-2064 or 34-2141	
EC.1	Insulator for EC.1 .. .. .	28-1022	—		Valve Shield .. .. .	28-2726	9
EC.2	Lug for EC.1 .. .. .	30-2126 or	6 0		Grid Clip .. .. .	28-2214	—
	Electrolytic Condenser, 16 mfd. ..	30-2128	—		Rubber Bush .. .. .	270-7264	—
C.1	Tubular Condenser, .002 mfd. .. ..	30-4177	9		Mains Cable .. .. .	LO-1009	1 9
C.2	Moulded Condenser, .015+.015 mfd. ..	3793-D.G.	1 6		Speaker Cable .. .. .	LO-1004	1 0
C.3	Mica Condenser, 410 mmfd. .. .. .	300-1063	1 3		Mains Voltage Adjusting Panel .. .. .	380-5342	9
C.4	Tubular Condenser, .01 mfd. .. .. .	30-4169 or	9		Mains Voltage Adjusting Plug .. .. .	380-5340	6
		30-4124	9		Dial Scale .. .. .	270-5070c	2 6
C.5	Moulded Condenser, .15+.15 mfd. ..	6287-D.G.	2 6		Pointer .. .. .	280-1353	9
C.6	Tubular Condenser, .01 mfd. .. .. .	30-4124	9		Reduction Drive Assembly .. .. .	420-5039	5 0
C.7	Mica Condenser, 250 mmfd. .. .. .	300-1057	1 3		Scale Tension Spring .. .. .	280-1226	—
C.8	Mica Condenser, 250 mmfd. .. .. .	300-1057	1 3		Dial Screen .. .. .	270-5046	1 6
C.9	Tubular Condenser, .01 mfd. .. .. .	30-4124	9		Chassis Mounting Rubbers .. .. .	5189	6
C.10	Tubular Condenser, .01 mfd. .. .. .	30-4124	9		Chassis Mounting Washers .. .. .	29-2089	—
C.10A	Mica Condenser, 30 mmfd. .. .. .	300-1064	9		Chassis Mounting Bolts .. .. .	W-1345A	—
C.11	Tubular Condenser, .001 mfd. .. .. .	30-4201	10		Black Tuning Knob and Spring .. .. .	270-4054* or	9
C.12	Mica Condenser, 50 mmfd. .. .. .	300-1058	1 0		Brown Tuning Knob and Spring .. .. .	270-4111*	—
C.13	Mica Condenser, 1,915 mmfd. .. .. .	31-6239	1 9		Black Knob (Volume) and Spring .. .. .	270-4151* or	—
C.14	Tubular Condenser, .01 mfd. .. .. .	30-4124	9		Brown Knob (Volume) and Spring .. .. .	270-4140*	—
C.15	Moulded Condenser, .05 mfd. .. .. .	3615-S.G.	1 0		Black Knob (Wave-change) and Spring ..	270-4087* or	—
C.15A	Mica Condenser, 110 mmfd. .. .. .	300-1040	10		Brown Knob (Wave-change) and Spring ..	270-4110*	—
C.16	Tubular Condenser, .01 mfd. .. .. .	30-4124	9		Black Knob (Tone) and Spring .. .. .	270-4172* or	—
C.17	Tubular Condenser, .01 mfd. .. .. .	30-4124	9		Brown Knob (Tone) and Spring .. .. .	270-4114*	—
C.18	Tubular Condenser, .25 mfd. .. .. .	30-4446	10		Knob Spring .. .. .	280-5262	—
C.19	Mica Condenser, 110 mmfd. .. .. .	300-1040	10		Red Wander Plug .. .. .	380-5087	—
C.20	Tubular Condenser, .05 mfd. .. .. .	30-4020	9		Black Wander Plug .. .. .	380-5015	—
C.21	Tubular Condenser, .05 mfd. .. .. .	30-4123	1 0	V.1	Type 80 Full Wave Rectifier Valve ..	3149	—
R.1	Candohm Wire-wound Resistor, 23+23+190 ohms	33-3312	1 6	V.2	Type 42E Pentode Output Valve .. ..	6447-E	—
R.2	2 watt Carbon Resistor, 10,000 ohms ..	33-1024	1 0	V.3	Type 6A7 Variable-mu Heptode Valve ..	34-2002	—
R.3	½ watt Insulated Resistor, 1 megohm ..	330-2018	9	V.4	Type 75 Double Diode Triode Valve ..	8002	—
R.4	½ watt Insulated Resistor, 490,000 ohms .	330-2013	9	V.5	Type 78E Variable-mu H.F. Pentode Valve	8315-E	—
R.5	½ watt Insulated Resistor, 99,000 ohms ..	330-2012	9				
R.6	½ watt Insulated Resistor, 240,000 ohms	330-2002	9				

† When ordering Speaker parts, the letter which will be found in the part number of the Speaker must also be given.  
\* The knobs are not separately interchangeable.