PHILCO

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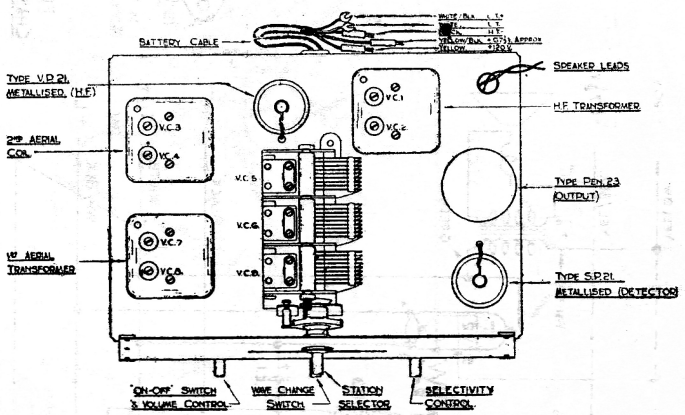
Model P.321

TYPE CIRCUIT : Three-valve battery T.R.F. Receiver with Pentode output (0.5 watt) for operation on Long and Medium Wavebands. Band-pass circuit using highly selective iron dust-core coils which give selectivity comparable with that of a normal superhet.

POWER SUPPLY : Low Tension Accumulator, 2 volts, size $3\frac{1}{4}$" × 3" × $6\frac{3}{4}$" height. High Tension Battery, 120 volts (tapped at 67.5 volts approx.), size $8\frac{1}{4}$" × $7\frac{1}{2}$" × 3". Suitable types are Exide Type OCG3 Accumulator and Exide Type H.1131 H.T. Battery or other good quality makes of similar size and type.

No bias battery is needed, as the circuit employs an automatic bias arrangement.



TOP CHASSIS DIAGRAM.

WAVEBANDS : COVERAGE : Two ; (*a*) Long, 2,240-820 metres (134-365.8 kilocycles) ; (*b*) Medium, 530-170 metres (566-1,764.7 kilocycles).

TUNING DRIVE : Geared 6 : 1 ratio for smooth and accurate tuning.

LOUDSPEAKER : An 8" diameter permanent magnet moving-coil speaker employing the latest nickel-aluminium alloy; gives the highest efficiency audio output and greater bass response is obtained due to the large baffle.

POWER CONSUMPTION : L.T. current, 0.45 amp. ; H.T. current, 8.5 milliamps.

TABLE 1 — VOLTAGES.

Valve socket readings to chassis taken with an 065 or 077 Philco Set Tester, using the 250- and 10-volt ranges. Volume and selectivity controls at minimum, wave-change switch in M.W. position and no aerial connected.

Position	Valve	Anode	Screen	Bias
H.F. Amplifier, S.1 ...	VP.21 (Met.)	Cap. 120 v.	Pin 7. 67.5 v. approx.	Pin 2. —2.5 v.
Detector, S.3	SP.21 (Met.)	Cap. 12.5 v.	Pin 7. 40 v.	—
Pentode Output, S.2 ...	PEN.23	Pin 1. 120 v.	Pin 5. 120 v.	—6.5 v. †

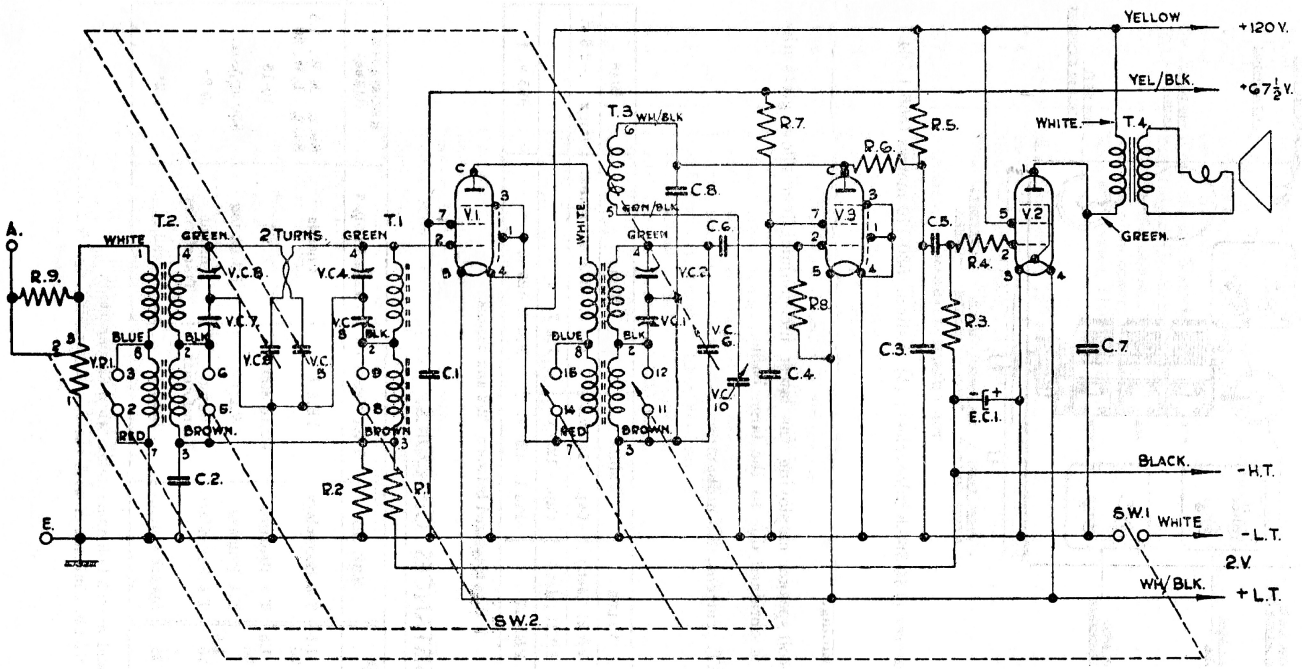
† Bias measured between C2/2 and chassis.

TABLE 2 — RESISTANCES OF COILS.

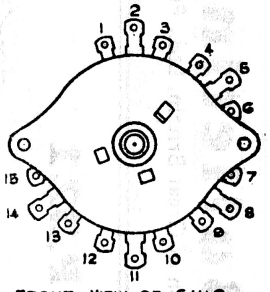
Ref. No.	Test Prod. 1	Test Prod. 2	Resistance (Ohms)	Ref. No.	Test Prod. 1	Test Prod. 2	Resistance (Ohms)
T.2 Primary	VR.1/3	Chassis	Sw.2. M.W. 1.5 Sw.2. L.W. 20	T.3 Secondary	TB.2/1	Chassis	Sw.2. M.W. 1.5 Sw.2. L.W. 20
T.2 Secondary	VC.9 Stator	C.2/3	Sw.2. M.W. 1.5 Sw.2. L.W. 20	T.3 Reaction	VC.10 Stator	V.3/6	10-15
T.1	V.1/2	C.2/3	Sw.2. M.W. 1.5 Sw.2. L.W. 20	T.4 Primary	V.2/1	TB.1A tag	850 approx.
T.3 Primary	V.1 Cap	TB.1A tag	Sw.2. M.W. 5 Sw.2. L.W. 25	T.4 Secondary	Output Transformer	Output Transformer	0.2*
				Speech Coil ...	Lead 1	Lead 2	2*

* Resistance of T.4 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.*, V.1-S.1.



S.W.2 SHEWN IN "L.W." POSITION.

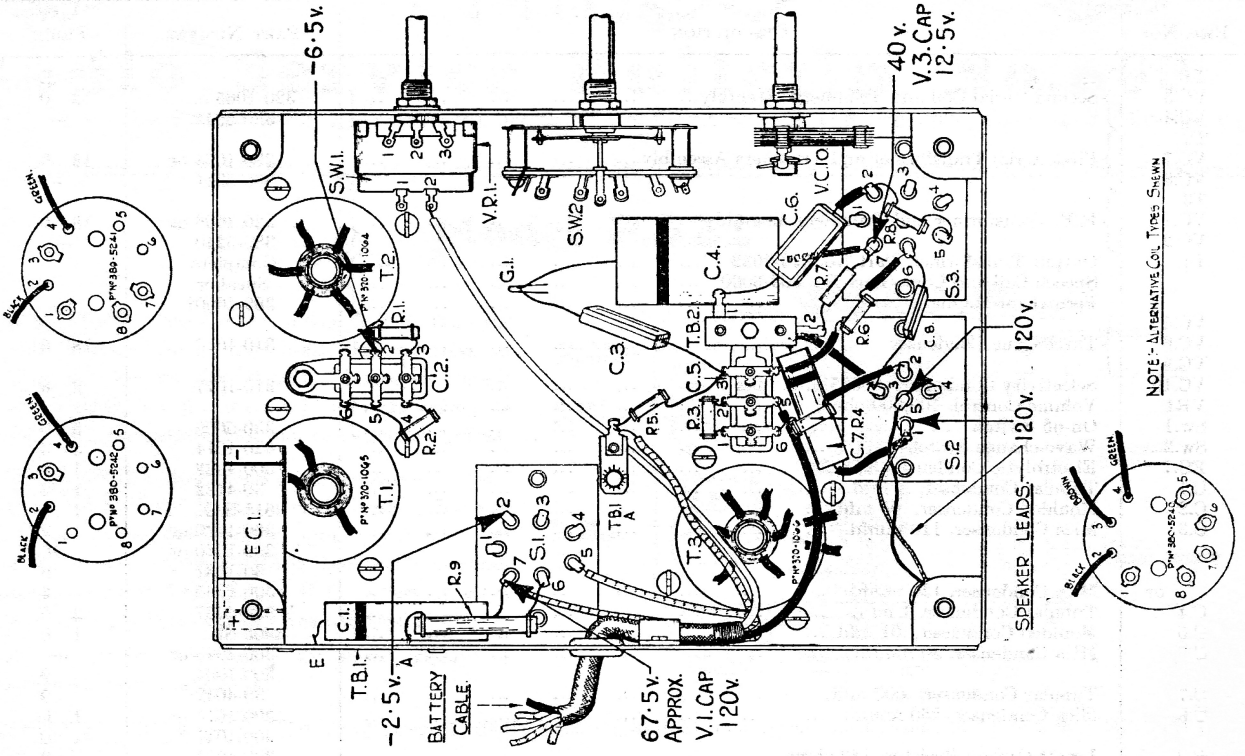


FRONT VIEW OF S.W.2 CHASSIS BEING UPSIDE DOWN

REF. Nº	DESCRIPTION	PART Nº
T.1	2ND AERIAL COIL.	
V.C.3.	L.W. TRIMMER.	320-1065.
V.C.4.	M.W. TRIMMER.	OR 380-5242
T.2.	1ST AERIAL TRANSFORMER.	
V.C.7	L.W. TRIMMER.	320-1064.
V.C.8	M.W. TRIMMER.	OR 380-5241
T.3	H.F. TRANSFORMER.	
V.C.1	L.W. TRIMMER	320-1066.
V.C.2	M.W. TRIMMER.	OR 380-5240
T.4.	OUTPUT TRANSF. SPEECH COIL & CONE. P.M. SPEAKER COMPLETE.	369-1000
V.C.9	1ST AERIAL SECTION	310-1018 GANG CONDENSER
V.C.6	H.F. SECTION	
V.C.5.	2ND AERIAL SECTION	
V.C.10	REACTION CONDENSER .00025 MFD. MAX.	310-1017.
V.P.1	VOLUME CONTROL. 100,000 OHMS.	330-5006.
S.W.1	ON-OFF SWITCH.	
S.W.2.	WAVE-CHANGE SWITCH.	420-1014
E.C.1	ELECTROLYTIC CONDENSER 35 MFD.	300-4022

REF. Nº	DESCRIPTION	PART Nº
C.1.	TUBULAR CONDENSER. 0·1 MFD.	80-4122
C.2	MOULDED " .05 MFD.	3615 S.G.
C.3.	MICA CONDENSER. 110 M.MFD. OR 120 M.MFD.	300-1020 300-1065
C.4	TUBULAR " 1·0 MFD.	300-4057
C.5.	MOULDED " ·01 MFD.	8903 S.U.
C.6.	MICA " 30 M.MFD	300-1064
C.7.	TUBULAR " ·003 MFD.	80-4042
C.8	MICA " 250 MMFD	355-1014 OR 300-1041
R.1.	¼ WATT CARBON RESISTOR. 180 OHMS	330-1031
R.2.	¼ " " " 120 OHMS	330-1032
R.3	½ " " " 500,000 OHMS.	33-1051
R.4.	¼ " INSULATED. " 51,000 OHMS.	330-2015
R.5	¼ ¼ " CARBON " 150,000 OR 150,000	330-2027 33-1033
R.6.	¼ " " " 51,000 OHMS	6098
R.7	¼ " " " 100,000 OHMS	33-1035
R.8.	¼ " " " 2 MEGOHMS	33-1025
V.1	TYPE V.P.21 (MET.) VAR-MU H.F. PENTODE VALVE	340-2002
V.2	TYPE PEN 23 PENTODE VALVE.	340-2008
V.3	TYPE S.P.21 (MET.) H.F. PENTODE VALVE	340-2001
R.9.	1 WATT CARBON RESISTOR. 5,000 OHMS.	3526.

SCHEMATIC DIAGRAM—MODEL P-321.



UNDER CHASSIS DIAGRAM — MODEL P-321.

ALIGNMENT PROCEDURE—MODEL P.321.

Before leaving the Factory all Philco Receivers are accurately aligned, but if misalignment is suspected through damage, no alteration must be made 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 pointer reads on index line. Set wave-change switch to M.W. position (clockwise rotation), turn volume control (lower left-hand knob) fully clockwise and selectivity control (lower right-hand knob) fully counter-clockwise.

MEDIUM WAVES : Set pointer at 1,400 Kc. (214 metres on scale) and feed in a 1,400 Kc. signal from the Signal Generator through a Standard Dummy to the Aerial and Earth sockets of the Receiver. Adjust the Signal Generator Attenuator to give a half-scale reading on the Output Meter. Then adjust VC.'s 8, 4 and 2 in that order for maximum output. This trimming must be carried out *at least three times* to obtain accurate band-pass alignment.

Increase selectivity control setting and re-trim VC.2, repeating the operation with increasing selectivity until oscillation is about to commence. This setting is very critical.

NOTE : VC.'s 8 and 4 must not be re-trimmed after VC.2 has been adjusted.

Check calibration and sensitivity at 600 Kc. (500 metres on scale).

LONG WAVES : Turn wave-change switch to L.W. position (counter-clockwise rotation) and selectivity control fully counter-clockwise. Set pointer at 240 Kc. (1,250 metres on scale) and inject a signal of 240 Kc. from the Signal Generator. Keep input signal as low as possible by means of the Attenuator and adjust VC.'s 7, 3 and 1 in that order for maximum output. As in the case of Medium Waves, this operation must be repeated for accurate alignment.

Increase selectivity control setting and re-trim VC.1, repeating the operation with increasing selectivity until oscillation is about to commence. This setting is very critical.

NOTE : VC.'s 7 and 3 must not be retrimmed after VC.1 has been adjusted.

Check calibration and sensitivity at 160 Kc. (1,875 metres on scale).

PARTS AND PRICE LIST—MODEL P.321.

Ref. No.	Description	Part Number	List Price
			s. d.
T1 VC.3 VC.4	Second Aerial Coil and Trimmers Assembly...	320-1065 or 380-5242	12 0 —
T2 VC.7 VC.8	First Aerial Transformer and Trimmers Assembly	320-1064 or 380-5241	16 0 —
T3 VC.1 VC.2	H.F. Transformer and Trimmers Assembly	320-1066 or 380-5240	18 0 —
T4	Output Transformer, Part No. 320-7032 Speech Coil and Cone, Part No. 369-3000 Permanent Magnet	Complete Speaker 369-1000†	 —
VC.5 VC.6 VC.9	Three Gang Condenser	310-1019	18 6
VC.10	Selectivity Condenser, .00025 mfd. max.	310-1017	2 6
VR1 Sw.1	Volume Control, 100,000 ohms On-off Switch	330-5006	5 0
Sw.2	Wave-change Switch	420-1014	3 6
EC.1	Electrolytic Condenser, 35 mfd.	300-4022	1 9
C.1	Tubular Condenser, .1 mfd.	30-4122	1 0
C.2	Moulded Condenser, .05 mfd.	3615-S.G.	1 0
C.3	Mica Condenser, 110 mmfd.	300-1020 or 300-1040 or 30-1031	9 10 9
or	Mica Condenser, 120 mmfd.	300-1065	9
C.4	Tubular Condenser, 1 mfd.	300-4037	2 6
C.5	Moulded Condenser, .01 mfd.	3903-SU	1 0
C.6	Mica Condenser, 30 mmfd.	300-1043 or 300-1064	— 9
C.7	Tubular Condenser, .003 mfd.	30-4042	9
C.8	Mica Condenser, 250 mmfd.	300-1014 or 300-1041	1 0 1 0
R.1	½ watt Carbon Resistor, 180 ohms	330-1031	9
R.2	¼ watt Carbon Resistor, 120 ohms	330-1032	9
R.3	½ watt Carbon Resistor, 500,000 ohms	33-1051	9
R.4	½ watt Insulated Resistor, 51,000 ohms	330-2015	9
or	¼ watt Carbon Resistor, 51,000 ohms	6098	9
R.5	¼ watt Carbon Resistor, 150,000 ohms	33-1183	9
or	½ watt Carbon Resistor, 160,000 ohms	5331	9
R.6	¼ watt Carbon Resistor, 51,000 ohms	6098	9
or	½ watt Insulated Resistor, 51,000 ohms	330-2015	9
R.7	¼ watt Carbon Resistor, 100,000 ohms	33-1035	9
R.8	¼ watt Carbon Resistor, 2 megohms	33-1025	9
R.9	1 watt Carbon Resistor, 5,000 ohms	3526	9
S.1	7-prong Valve Holder	270-6007	9
S.2	5-prong Valve Holder	270-6005	9
S.3	7-prong Valve Holder	270-6007	9
	Rubber Bush	4126	6
	Dial Scale and Brackets Assembly	380-5598	—
	Dial Scale and Stiffener	270-5106	—
	Pointer and Hub Assembly	380-5228	1 3
	Grubscrew	WB.316	—
	Battery Cable Clamp	28-2345	—
	Battery Cable, Part No. LO-1037 Yellow Plug, 120 volts, Part No. 380-5225 Black Plug, H.T., Part No. 380-5226 Brown Plug, 67½ volts, Part No. 380-5005 Spade Tag, Part No. 280-1012	Complete Assembly 410-3006	4 6
	Speaker Cable	LO-1041	9
	Grid Clip	28-2214	—
	Red Wander Plug	380-5015	—
	Black Wander Plug	380-5087	—
	Dial Screen	270-5105	2 0
	Large Tuning Knob and Spring	270-4054	9
	Volume Knob and Spring	270-4055	9
	Wave-change Knob and Spring	270-4056	9
	Small Plain Knob and Spring	270-4057	9
	Knob Spring	280-5262	—
V.1	Type VP.21 (Metallised) Variable-mu H.F. Pentode Valve	340-2002	—
V.2	Type PEN.23 Pentode Output Valve	340-2003	—
V.3	Type SP.21 (Metallised) H.F. Pentode Valve	340-2001	—

† When ordering Speaker parts, the letter which will be found in the part number of the Speaker must also be given.

ABOVE PRICES DO NOT APPLY IN EIRE.