MARCONIPHONE 920 H.M.V. 1354

Four-valve, plus rectifier, superhet for operation on short, medium and long wavebands from 100–130 and 195–255-volt A.C. or D.C. supplies. Marketed by the Gramophone Co., Ltd., and the Marconiphone Co., Ltd., Hayes, Middlesex.

Circuit.—The aerial is connected to V1, the frequency-changer, through transformer coils on each band, there being iron-dust cores to the M. and L.W. units. Both aerial and earth leads contain mains isolating condensers, and there is a static discharger, R16, between the two.

The oscillator section of V1 is tuned grid. There are reaction coils from the anode on S. and M.W., but on L.W. the reaction voltage is applied across C13, the padding condenser, and is thus introduced to the grid circuit.

A special feature is a bi-metal condenser, C28, across the S.W. oscillator circuit. This is associated with R23 in the heater circuit. The object of the arrangement is to maintain frequency stability and accurate tuning by introducing a change of capacity to offset that which occurs as the receiver changes in operating temperature.

Permeability trimmed I.F. transformers link up V2, the I.F. amplifier, and V3, the double-diode triode.

Only one diode is used. VR1, the volume control, is the diode load, R9 and C19 constituting an I.F. filter. The steady "carrier wave" component of the rectified voltage is led off by R8 for A.V.C. purposes.

Pick-up sockets are arranged across the volume control, and blocking condensers, C32 and C33, isolate the connections from the live chassis.

L.F. is applied to V3 grid via C20, and the valve develops its own bias across R10. An anode load of high value passes the signal to V4, the output tetrode via C22.

This circuit contains a novel form of local-distance amplification control. When the shorting plug is out, R15 forms a potentiometer with R12 and the grid is energised from a point giving a quarter of the voltage. C29 by-passes a proportion of high notes to preserve clarity.

In the output stage a degree of negative feed-back is introduced simply by omitting the decoupling condenser across the bias resistance, R14. Variable tone control is provided across the primary of the output transformer.

The usual A.C./D.C. half-wave rectifier arrangement is employed. The pilot lamp has a parallel surge absorber in R22 and is in series with the valve heaters which are arranged to minimise "noise" transference via heater-cathode capacities. On D.C. the positive main must be connected to the anode and the valve operates solely as a low resistance.

It must not be forgotten when handling the receiver that on either D.C. or A.C. mains the chassis may be live.

An extension speaker of 5 ohms may be connected across the speech coil tags (yellow and black).

GANGING

I.F. Circuits.—Set plug to "distance," tone and volume fully clockwise, and tune to S.W. maximum. Short R5. Keep input low to prevent operation of the A.V.C.

Inject 485 kc. (618.6 m.) to V1 grid via .1 mfd. and adjust four I.F. trimmers for maximum with non-metallic tool.

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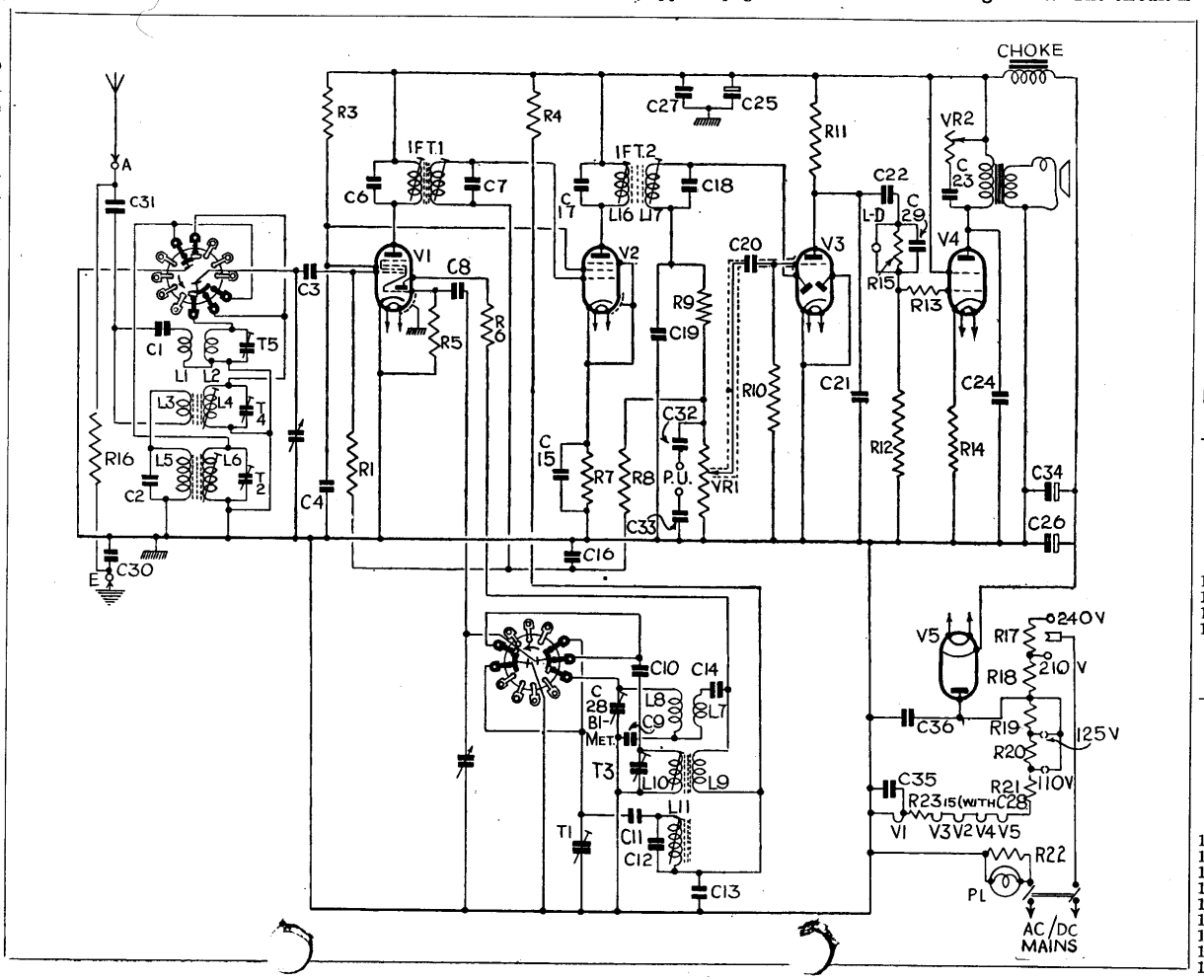
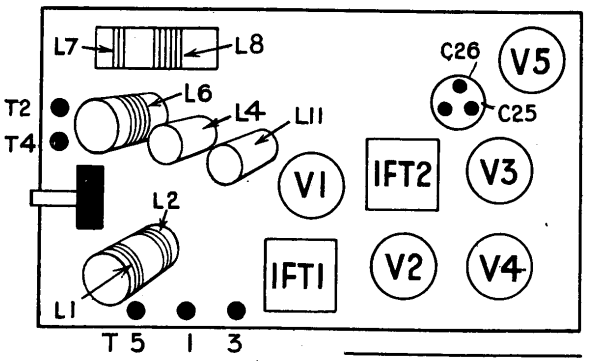
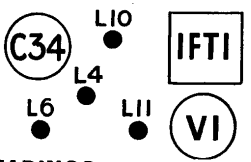


Main features of the underside of the chassis showing most of the trimmers. Remaining trimmers are shown in the detail of the top of chassis.



This receiver is an A.C./D.C. model covering short, medium and long bands. The circuit is economical and efficient.



VALVE READINGS

V.	Type.	Electrode.	Volts.	Ma.
1	X 65	Anode	150	1.6
		Screen	60	2
		Osc. anode	100	4.5
2	KTW61M	Anode	150	4
		Screen	60	2
		Cathode	1.5	6
3	DH63	Anode	50	.4
4	KT32	Anode	137	70
		Screen	150	5
		Cathode	7.5	75
5	U31	Anode	180 A.C.	—
		Cathode	166	91

Pilot lamp 6.2 v., .3 amp.

RESISTANCES

R.	Ohms.	R.	Ohms.
1	.5 meg.	14	100
3	23,000	15	1.5 meg.
4	10,000	16	.1 meg.
5	.1 meg.	17	71
6	100	18	75
7	230	19	167
8	2.3 meg.	20	36
9	50,000	21	95
10	10 meg.	22	23 5 w.
11	.23 meg.	23	15
12	.5 meg.	VR1	1 meg.
13	50,000	VR2	50,000

CONDENSERS

C.	Mfds.	C.	Mfds.
1	100 mmfds.	19	100 mmfds.
2	500 „	20	.0035
3	230 „	21	350 mmfds.
4	.05	22	.005
6	200 mmfds.	23	.15
7	200 „	24	.0023
8	75 „	25	32
9	.005	26	16
10	455 mmfds.	27	.05
11	500 „	29	.23
12	50 „	30	.05
13	350 „	31	.001
14	50 „	32	.01
15	.05	33	.05
16	.1	34	16
17	100 mmfds.	36	.05
18	100 „		

PHILCO "PEOPLE'S SET" 333

Three-valve, two waveband, tuned radio frequency receiver in moulded cabinet and for operation from accumulator and H.T. battery. Made by Philco Radio, Perivale, Middlesex.

Circuit.—The aerial is connected to V1, a pentode radio-frequency amplifier, through a band-pass tuning filter. The actual aerial connection is made to the slider of VR1, a potentiometer placed across the input coils and acting as a volume control.

The first four coils form an R.F. transformer with tuned secondaries, and this section is coupled to the tuned grid circuit of V1 by "top capacity," C1, which consists simply of wires twisted together.

V1 is a variable-mu type, and is given a fixed value of bias, as the bottom of the grid coils is returned to the junction of R7 and R8. C2 provides decoupling. This fixed bias enables the valve to handle reasonably large input signals without overloading.

Transformer coupling passes the output of V1 to V2, the leaky-grid detector. A reaction winding, L10 feeds energy from the anode of V2 to the grid coils. Feed-back is controlled by a reaction condenser, VC, which acts as a sensitivity and second volume control.

It will be noted that all the coils have iron-dust cores. These enable the required inductance to be obtained with fewer turns. The lowered D.C. resistance increases both gain and selectivity. Each tuned winding has its separate trimmer.

C4 and R2 are the grid condenser and leak of V2, the detector. R4 forms an R.F. stopper and by-passes the energy through C6 or through L10 and V.C.

R3 is the high-value anode load developing amplified L.F. which is fed to V3, the output pentode, through C7. R6 and C8 form another R.F. filter. The grid resistance R5 is returned to H.T. negative, which is negative to the filaments by the voltage drop of the return H.T. current through R8 and R7.

C10 is a low-voltage electrolytic condenser which decouples the bias.

The set is intended for use with a 120v. H.T. battery and a 2v. accumulator. There are no P.U. or extension speaker connections.

Battery leads are coded: H.T. + 1, yellow; H.T.+2 (67.5v. approx.), yellow-black; H.T.—, black; L.T.+, white-black; L.T.—, white.

GANGING

See that pointer registers with t in "metres" with gang at minimum. Turn volume to maximum and reaction to minimum.

M.W. Band.—Tune to 214 m., inject 1,400 kc. to aerial and earth, and adjust T1, T2 and T3 for maximum. Repeat operations until no further improvement results, and then adjust T3 while bringing up reaction to the verge of oscillation. Do not touch T1 and T2 while adjusting T3 and reaction.

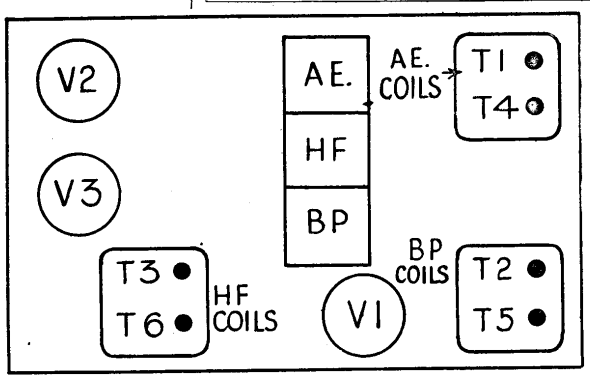
L.W. Band.—Tune to 1,035 m., inject 290 kc. and adjust T4, T5 and T6. Give final setting to T6 while applying reaction.

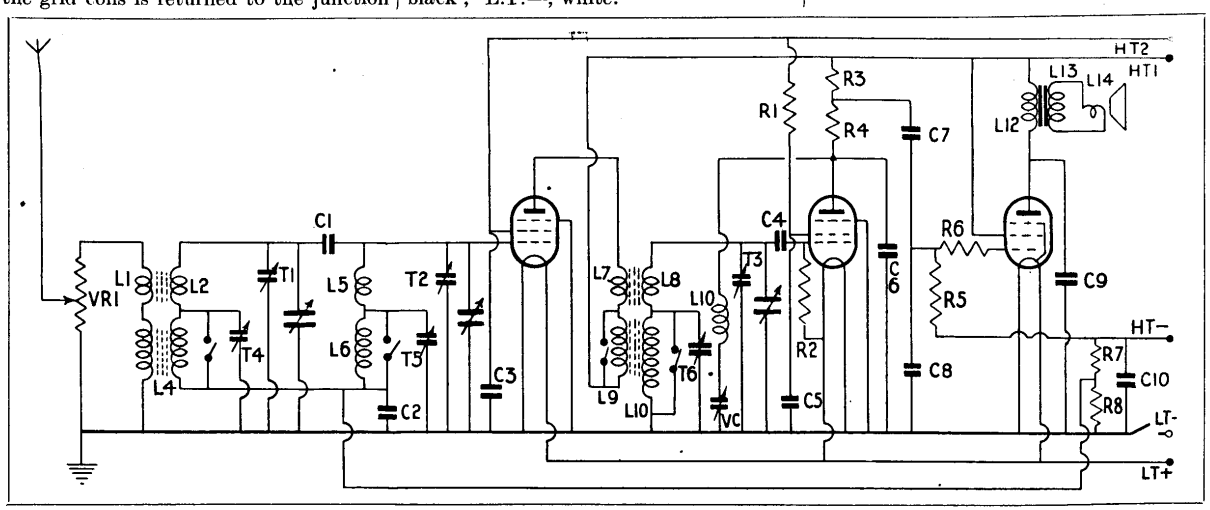
RESISTANCES

R.	Ohms.	R.	Ohms.
VR1 ..	100,000	5 ..	490,000
1 ..	100,000	6 ..	490,000
2 ..	2 meg.	7 ..	180 or 300
3 ..	150,000	8 ..	120 or 200
4 ..	51,000		

The chassis is compact and orderly with the trimmers accessibly placed on the coil cans.

The circuit is "straight three" with reactive detector. Band-pass input and iron-dust cores are features.





VALVE READINGS

V.	Type.	Electrode.	Volts.	Ma.
1	VP21	Anode	120	2
		Screen	67.5	.5
2	SP21	Anode	*	.4
		Screen	*	.2
3	Pen 23	Anode	115	2.5
		Screen	120	.5

**High series resistances give inaccurate readings.*

CONDENSERS

C.	Mfds.	C.	Mfds.
1 ..	V. low	6 ..	.00025
2 ..	.05	7 ..	.01
3 ..	.1	8 ..	.0001
4 ..	.0003	9 ..	.003
5 ..	1	10 ..	35

WINDINGS

L.	Ohms.	L.	Ohms.
1, 2, 5, 8 ..	1.5	11 ..	15
3, 4, 6, 10 ..	18.5	12 ..	850
7 ..	5	13 ..	.2
9 ..	20	14 ..	2

H.T. Leak Across I.F. Transformer

THE following rather peculiar fault was present in a Philips 456A receiver. When first tested the set was dead on radio reception but O.K. on 'gram. Testing revealed that a resistor feeding the anode of the second valve and the screen of the first was burnt out. Testing from the load side of this resistor to chassis did not show any leakage at all, and all the associated condensers were perfect. A new resistor was fitted and the set switched on.

There were still no signals and the resistor became very warm after a short time. The valves were tested, but did not reveal anything excessive.

By accident, the 2D4A valve (rectifier for I.F. and detection) was removed, and the set started to function. Further testing showed that the VP4A (the I.F. amplifier) was acting as a detector.

The voltage on the 2D4A valve pin sockets was tested, and on one diode there was H.T., proving that there existed a short between the I.F. coils. This was checked with the ohmmeter and turned out to be the cause of the trouble. The I.F. valve was coupled to the L.F. part of the set *via* the I.F. coil short circuit.

When the coil was removed from the receiver for test it was found that one of the enamelled leads from the primary to its connecting lug was embedded in the wax of the secondary and causing the short circuit.—F. Day-Lewis.

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When endeavouring to obtain smooth reaction with a "straight" receiver it is useful to remember that the voltage on the screen of the preceding H.F. valve has some effect.—D. M.

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L.W. Band.—With gang at minimum, see that gang registers with 1° mark. Tune to 4°, inject 720 m. (416.7 kc.) to aerial and earth and adjust T1 for maximum.

Tune to 77°, inject 1,900 m. (157.9 kc.) and adjust L11. Tune in 850 m. (352.9 kc.), and adjust T2. Tune in 1,900 m. and adjust L6.

Repeat operations.

M.W. Band.—Tune to 4°, inject 190 m. (1,578.9 kc.) and adjust T3. Tune to 77°, inject 530 m. (566 kc.) and adjust core of L10.

Tune in 210 m. (1,428.6 kc.) and adjust T4. Tune in 530 m. (566 kc.) and adjust core of L4.

Repeat operations.

S.W. Band.—Tune to 86°, inject 50 m. (6 mc.) and adjust loop L8. Tune in and rock gang, injecting 18 m. (16.667 mc.) and adjust T5. Tune in 50 m. (6 mc.) and adjust loop L2.

Repeat operations.

Adjustment of coil loops is done by bending loop across the inside of the coil former up or down, using a strip of insulating material with a nick in it.

WINDINGS

L.	Ohms.	L.	Ohms.
1	.6	9	1.7
2	V. low	10	2.5
3	26	11	7.5
4	2.5	12	5
5	70	13	5
6	20	16	6.5
7	.7	17	6.5
8	V. low	Choke ..	160