Marconiphone 859 AC-DC Five

Four valve, plus rectifier, three waveband manual tuned table superhet for AC or DC supplies, 200-250 volts, 25-60 cycles, price 11½ gns. Similar chassis in H.M.V. model 654.

CIRCUIT OUTLINE

USE is made of a special network in the aerial circuit which simplifies switching. The three windings are coupled to tuned circuits which are selected by a switch in the normal manner. These circuits form the input to the frequency changer, V1, a heptode.

This valve has a conventional oscillator section. The intermediate frequency transformers are trimmer tuned, the first being in the anode circuit of V1. The secondary works into the grid of V2, the intermediate amplifier. The steady bias for this stage is derived from a series bias resistance instead of the more general cathode resistor.

V3 is a double diode triode and derives its input from the secondary of IFT2. One diode is used for demodulation and the other for AVC. The series bias circuit provides the delay voltage for the AVC diode and also the bias for the triode amplifier.

Signal voltages are taken from the diode load through a simple filter to the volume control, and this forms the input to the triode section.

Resistance capacity coupling is used between the triode and the output tetrode, V4. This is fitted with a feedback circuit between anode and grid, the resistive element forming the tone control.

Power supply is taken from the mains through a strapped rectifier, V5. The mains input circuit includes a filter. The valve heaters are run in series through a volt-dropping resistance fitted with the usual adjustment tappings.

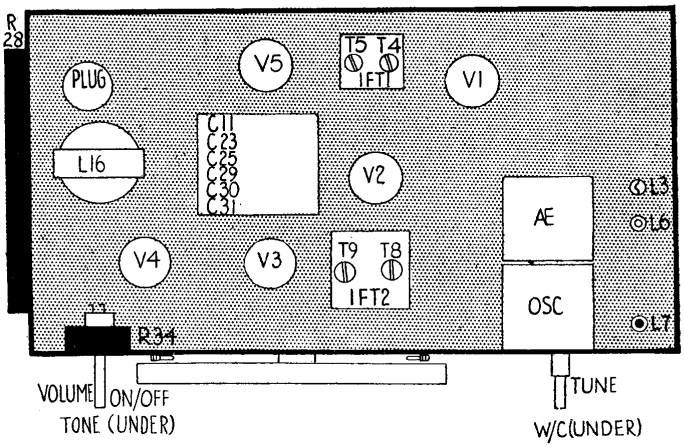
CONSTRUCTIONAL FEATURES

THERE should be little difficulty in identifying any of the components in the set, as there are no hidden sections. It will be noticed that all the electrolytic condensers, with the exception of one, are in a single case, and the connecting leads are colour coded. The coding is marked on the condenser case.

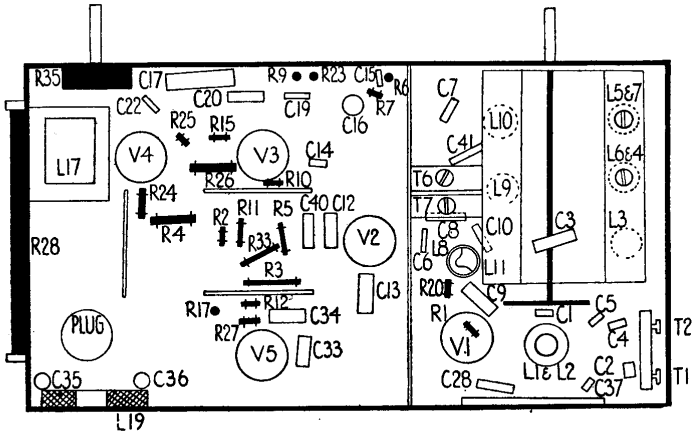
As the set is a universal model care must be exercised in taking any measurements to guard against the possibility of shock or short circuits.

The voltage adjustment is carried out by means of a special tapped-resistance assembly wound on a mica strip. The assembly is a separate unit bolted to the side of the chassis. This unit carries the

(*Continued on page iv.*)



Right, the top layout diagram of the Marconi chassis showing the positions of the I.F. trimmers and adjustable coils.



Left, H.F. and L.F. portions of the receiver are sectionalised. Resistances are indicated in solid black, condensers in outline.

VALVE READINGS

V.	Type.	Electrode.	Volts.	Ma.
	(*All Marconi*).			
1	X63	Anode	180	2
		Screen	65	1.5
		Osc. anode	140	3
2	KTW63	Anode	180	7
		Screen	90	1.5
3	DH 63	Anode	120	5
4	KT32	Anode	120	60
		Screen	125	4
5	U31	Cathode	188	—
Pilot lamps.	MES frosted tubular		6–8	

RESISTANCES

		Ohms.
1	V1 osc. grid	100,000
2	Osc. anode decouple	3,500
3	Osc. anode load	10,000
4	V2 screen pot. (part)	5,000
5	V2 screen pot. (part)	15,000
6	Signal diode load	500,000
7	HF stopper	230,000
9	V3 anode load	750,000
10	AVC diode load (part)	1 meg.
11	AVC diode load (part)	500,000
12	AVC diode load (part)	2.3 meg.
15	V4 grid lead	350,000
17	Series bias	28
20	Het. volt control	150
23	V3 anode decouple	35,000
24	Sub-HT line decouple	5,000
25	V4 grid stopper	50,000
26	V4 cathode bias.	100
27	Bias decouple	100,000
28	V4 anode decouple	1,000
30	Mains resistance (part)	62
31	Mains resistance (part)	370
32	Mains resistance (part)	64
33	V1 screen decouple	75,000
34	Volume control	2 meg.
35	Tone control	2 meg.

WINDINGS

L	Ohms	Range	Where measured
1+2+5	44	SW	C4+C5 and chassis.
1+2+ 4+5.	10	MW	C4+C5 and chassis.
(L1, 9.5 ohms; L2, 33 ohms; L4, very low; L5, 1.6 ohms.)			
3	Very low.	SW	V1 grid and C3.
6	2	MW	V1 grid and C3.
7	9	LW	V1 grid and C3
8	Very low.	SW	C6 and C9.
9	2.8	MW	C6 and C9.

10-MINUTE FAULT-FINDER

MARCONI 859

Power Test.—The object of this test is to make sure general operating conditions are correct and to reveal any major H.T. circuit faults. As the smoothing choke is not in the main total H.T. line, the power test is taken across R17, the series bias resistance.

No external tests are available, as the set is a universal model with all live points shielded. The italic letters refer to the test points shown in the circuit diagram. *E* refers to chassis, not the actual earth connection.

Voltage : *A-E*, 1.8 volts.

Resistance : *A-E*, 23 ohms.

Total feed is 1.8 v. ÷ 23 ohms = 79 ma.

Output Stage, V4.—Inject 2 volts A.F. etween V4 grid and chassis. If defective, eck :—

Voltages : *D-E*, 120; *F-E*, 125.

Resistances : *B-D*, 1,146; *F-C*, 5,000; *G-E*, 355,000 ohms.

A.F. Stage, V3.—Inject 0.5 volt A.F. V3 grid and chassis. If defective, check :—

Voltage : *H-E*, 120.

Resistances : *H-C*, 100,000 ohms; *I-E*, 2.1 megohms.

Demodulation Stage.—Inject very strong 465 kcs. signal at V2 anode. If defective, check :—

Resistances : *J-E*, 500,000; L15, 4 ohms.

I.F. Stage, V2.—Inject a 465 kcs. signal at V2 grid. If defective, trim T8, T9, and check :—

Voltages : *K-E*, 180; *L-E*, 90.

Resistances : *K-C*, 4; *L-C*, 10,000; *L-E*, 15,000 ohms.

Mixer Section, V1.—Inject 465 kcs. signal V1 anode. If defective, trim T5 and check :—

Resistances : L13, 4 ohms; *M-E*, 2.4 megohms.

Inject 465 signal V1 grid. If defective, trim T4 and check :—

Voltages : *N-E*, 180; *O-E*, 65.

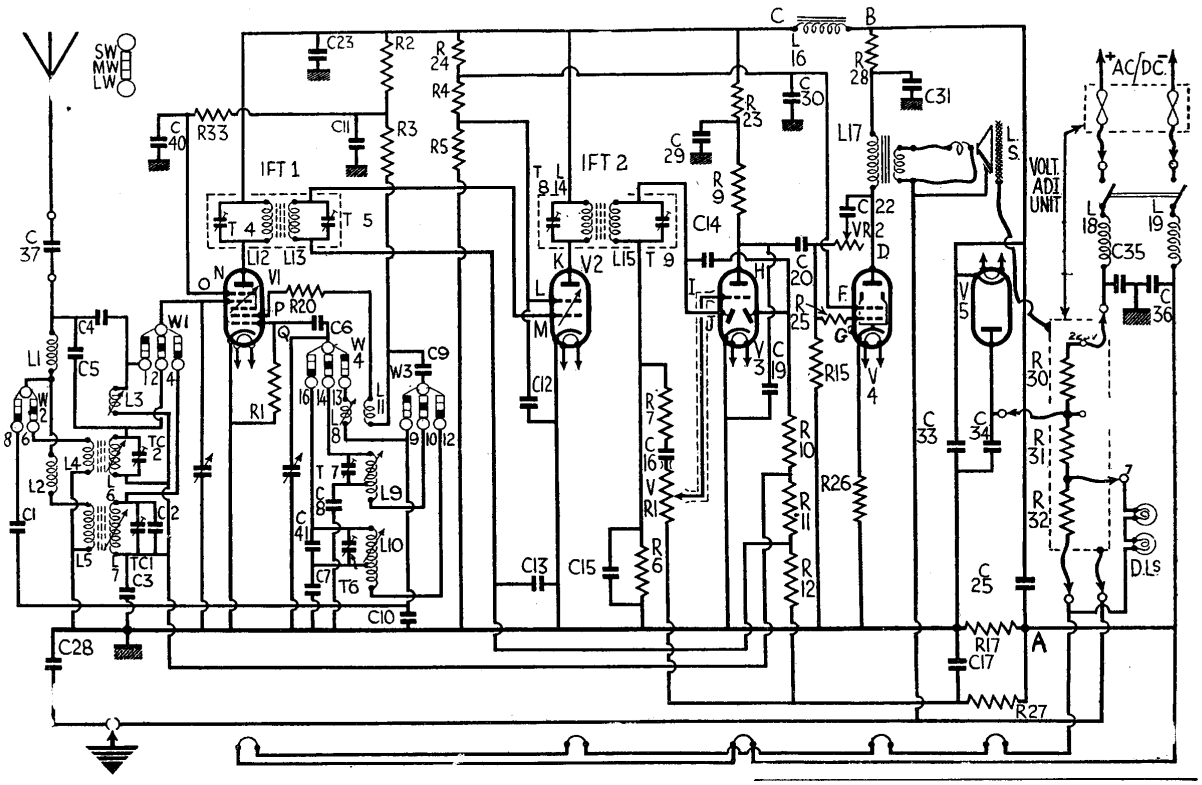
Resistances : *N-C*, 4; *O-C*, 78,500 ohms.

Oscillator Section, V1.—Check voltage *P-E*, 140.

Resistances : *P-C*, 13,650; *Q-E*, 100,000 ohms.

Tune to local station and inject local station plus 465 kcs. at oscillator grid. Signals then show oscillator fault.

If no signals are obtained, test input circuits, switches and connections, for shorts or open circuits.



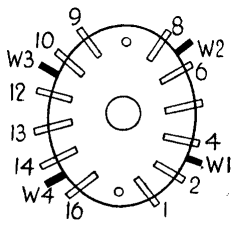
The 859 is a universal model. The chassis is connected to one side of the mains and isolated from earth by a condenser.

Windings (continued)

10	3.6	LW		C6 and C9.
11	1.2			R3 and R20.
12	4	—		V1 anode and HT positive.
13	4	—		V2 grid and C13.
14	4	—		V2 anode and HT positive.
15	4	—		Signal diode and R6+R7.
16	550	—		On tags.
17	146	—		V4 anode and C33, R28
18	3	—		On tags.
19	3	—		On tags.

CONDENSERS

		Mfds.
1	Neutralising	.00005
2	LW input fixed trimmer	.00005
3	V1 AVC decouple	.05
4	SW aerial coupling	.000015
5	MW top coupling	.0000023
6	Osc. grid	.0001



The single switch bank with wipes and contacts numbered as in the circuit.

Condensers (continued)

7	LW fixed padder	.0003
8	MW fixed padder	.000175
9	Osc. anode coupling	.005
10	SW fixed padder	.005
11	Osc. anode decouple	4
12	V2 screen decouple	.05
13	V2 AVC decouple	.05
14	AVC coupling	.000075
15	Diode load shunt	.0001
16	LF coupling	.001
17	Bias shunt	50

Condensers (continued)

19	V3 anode shunt	.00035
20	LF coupling	.023
22	Tone control	.0005
23	HT smoothing	8
25	HT smoothing	16
28	Chassis isolating	.01
29	V3 anode decouple	1
30	Sub-HT line decouple	4
31	V4 anode decouple	32
33	HF shunt	.05
34	HF shunt	.05
35	Mains filter	.01
36	Mains filter	.01
37	Aerial coupling	.05
40	V1 screen decouple	.05
41	LW osc. fixed trimmer	.000175

Replacement Condensers.

Exact replacement condensers are available from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18. For the block, C11 23, 25, 29, 30 and 31, there is unit 1,283, 18s. 6d., and for C17, unit 2,915, 1s. 9d.

Test Report

Voigt Light-coil Speaker

WE have been afforded an opportunity of conducting exhaustive tests on a Voigt corner reflector-type horn and new light-coil twin diaphragm unit.

The Voigt corner horn is a large wood structure—which can be supplied in any desired form and colour to match existing furniture schemes—and incorporates a large reflecting surface of conical formation known as the distributing cone.

The energy from the unit, which is mounted near the bottom, first impinges upon a concrete reflecting surface which directs the sound waves on to the specially-shaped double distributing cone, which is, on an average, about 4 feet from the floor.

In addition, there is a bass chamber. The energy from the back of the speaker cone is directed into this chamber, which has an opening at floor level. The function of this is to offset the cut-off which is bound to be produced by the normal horn opening.

The speaker unit resembles the familiar Voigt unit with the exception that a twin cone with new design of ultra-light coil is fitted.

The inertia of the whole system is reduced to a minimum by cutting down the weight. The drive coil is wound from aluminium wire, and is a multi-layer coil wound on both sides of a supporting former of almost negligible mass. Another feature is the high flux magnetic system giving, we believe, about 17,000 lines per sq. cm., which is obtained with about 40 watts in the field coil.

It is unnecessary to comment on the construction and workmanship of the equipment, since it is obvious that in high class, specialised gear nothing but precise construction and finish would prove effective.

We can state, without any doubts, that the reproduction obtained is the most realistic and natural we have experienced with any sound-reproducing gear.

It is essential to use the speaker with a set having a level output with a proper frequency range, and one that is free from demodulation or harmonic distortion of most kinds.

On the B.B.C. transmissions we found it preferable to cut the top to some extent. The manufacturers have found that this is advisable and recommend a small top cut filter. Response investigation appears to show a level top characteristic in the speaker, and one forms the conclusion that the top in the B.B.C. transmission is lifted.

Another adjunct equally necessary is a good whistle filter to cut at about 9 kc.

The most important point we noticed in our domestic tests was that the bass response, as might be imagined, is materially affected by the room constants and construction. In our room we found it desirable to lift the bass slightly.

Bass reproduction is extremely natural. One very interesting test was with the double bass, a musical instrument played by the writer. The natural tone of this, both fundamentally and also from the point of view of the "edge" on the strings, showed how faithfully the equipment deals with a wide frequency band under transient conditions.

Another noticeable point was the absence of any focus effect.

Static frequency tests showed that the characteristic was for all practical purposes level over the useful range, going right up to, and even above, the limit of audibility of most listeners.

To summarise the equipment, we can recommend it as giving the most natural reproduction we have yet heard. As the electro-acoustic efficiency is very high, we doubt whether a single unit would handle more than about 9 watts. Under these conditions its sound output would be similar to that obtained from a small dance band. Finally, it must be used with a good receiver or amplifier, as otherwise its value is completely lost.

The equipment, which is, of course, available from Voigt Patents, Ltd., The Courts, Silverdale, Sydenham, London, S.E.26, is priced as follows: Corner reflector-type horn, with bass chamber, in unfinished wood, £17 5s.; new light-coil, twin diaphragm unit, £16.

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voltage-adjustment strip and two fuses, in addition to a double-pole safety plug, and is connected to the chassis through a multiple plug and socket.

The greatest difficulty likely to be experienced with the set is in the matter of ganging. Particular care must be paid to the ganging instructions, as they involve the adjustment of cores for medium and long waves and the movement of a wire loop on the short waves.

A "spade" or inductance adjuster is used on the MW oscillator coil, for example. The adjustment of L6 and L7, the MW and LW input coils, is carried out through holes in the top of the chassis and really requires a special tool. The oscillator coils can be adjusted through holes in the coil screen underneath the chassis.

It is most important to realise that in none of the ganging operations is it necessary to rock the condenser gang, in fact, this must be particularly avoided.

The set includes provision for aerial connection and earthing through a special split socket now usual in universal sets. Extra speakers have to be fitted by soldering leads to the speech coil tags, which operate at a total impedance of 3.75 ohms.

Wave-change Switches.

All switching is carried out by a single wafer which carries twelve contacts and four wipes. The drawing shows how the wafer appears when viewed from the back of the chassis.

The wipe W1 controls the tuned input and W2 controls the aerial circuit on MW. and LW.

The oscillator circuit is associated with W3 and W4, which respectively select the untuned and tuned portions of the oscillator coils for the three bands.

Chassis Removal.

Four bolts retain the chassis but before they can be unscrewed it is necessary to release two wooden strips which act as protection to live metal parts. These strips are held by two small wood screws.

Protection of the grub screws in the control knobs is also provided, and before the knobs can be removed it is necessary to scrape away the sealing compound.

The chassis can then be removed after unsoldering the two speaker leads. One speaker tag is earthed to the frame and the wire on this tag should go to the earthy lead (black) on resoldering.

Bolts retain the speaker itself and removal of this can be effected by releasing the bolts or unscrewing the sub-baffle.

Alignment

IF Circuits (Frequency 465 kc.)

Connect an output meter to the set and the generator to the grid of V1 and inject a signal of 465 kc.

Adjust T4, T5, T8 and T9 in that order for maximum, always using a low input below the value at which the AVC operates.

Medium Waves (195-580 metres).

Before trimming, check that the pointer spindle hole is concentric with the spindle and see that the scale is square in its frame. Turn the gang to maximum and check the alignment of the pointer with the small black spot at the top right hand corner.

Tune the generator to 225 metres (1,333.3 kc.) and adjust the pointer to this position (shown on the scale by another black spot) and adjust T7 for maximum.

Tune set and generator to 530 metres (566 kc.) and adjust the spade inductance trimmer of L9.

Repeat these operations and re-check at 225 metres. Then adjust T2 for maximum at 225 metres.

Retune set and generator to 530 metres and adjust the upper core of L6 by means of the special tool or an insulating strip. Re-check at 225 metres.

Long Waves (1,000-2,000 metres).

Tune set and generator to 1,100 metres (272.7 kc.) and adjust T6 for resonance.

Tune set and generator to 1,900 metres (158 kc.).

Adjust L10 for resonance in a similar manner to that adopted for adjusting the MW. coil.

Repeat the operation and re-check at 1,100 metres, adjusting T1 for maximum.

Tune set and oscillator to 1,900 metres and adjust hexagonal-headed screw core of L7 for maximum.

Tune set and generator to 1,400 metres (214.3 kc.) and adjust T1 for maximum.

Short Waves (13.8-50 metres.)

Connect generator to set through a 400-ohm series resistance and 100 ohm shunt dummy aerial and tune set and generator to 50 metres (6 mc.).

Adjust the loop in L8 for maximum, using an insulating strip to push the wire up and down.

Then adjust the loop in L3 in a similar manner.

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