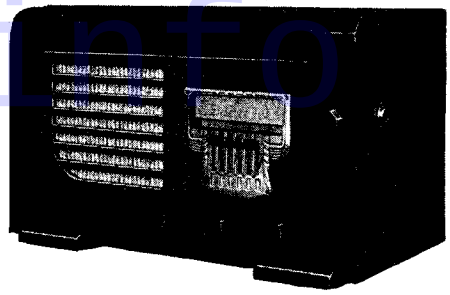
TRUPHONIC MA5 A.C. FIVE

Four valve, plus rectifier, three waveband manual and press-button tuned table superhet for 200-250 volt, 50 cycle A.C. supplies, price 10½ gns. Similar chassis also used in MA5T upright model.



CIRCUIT OUTLINE

COUPLED aerial circuits form the input to V1, a triode hexode. The anode circuit contains the primary winding of the first I.F. transformer, which is permeability tuned. A single oscillator coil is coupled between the anode and grid of the triode portion.

For intermediate amplification there is an H.F. pentode, V2, deriving its input from the secondary of the first I.F.T.

The second I.F.T. works into the diode section of V3, a double diode triode. The signal diode load is tapped down and goes through the coupling condenser to the volume control. The slider of this goes to the tone control, the grid of the triode working direct from the tone control.

Automatic volume control is provided by the other diode, the delay voltage being derived from a series resistance network. Decoupling is provided for each A.V.C. control point, the delay voltage also being transferred to V1 and V2 through the A.V.C. returns.

Coupling to the output valve V4 is by resistance and capacity. Feedback is provided by resistance injection from the speaker transformer to the cathode of V3.

Power supply is from V5, a full wave rectifier, in conjunction with a separate smoothing choke and the speaker field. The latter has the usual large capacity condensers, but the field is shunted with a 1 mfd. condenser. The standing bias of the first two valves is obtained from the common series bias network, there being no separate cathode resistances.

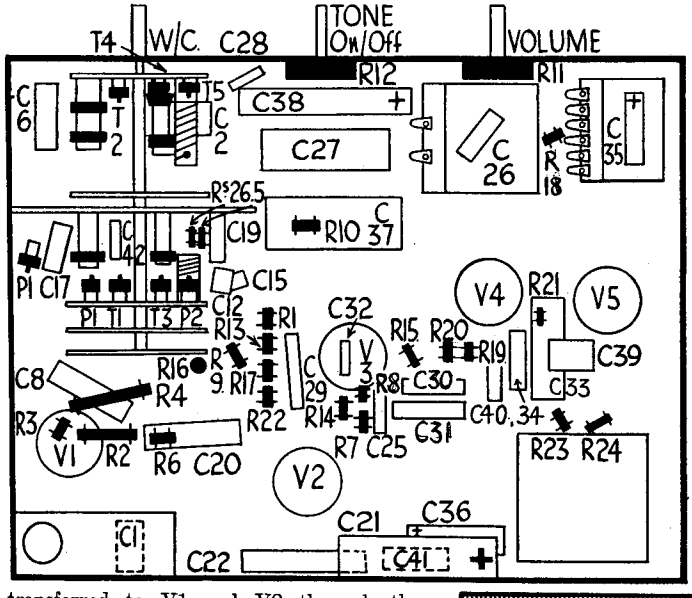
Wavechange Switches.—This receiver has a very unusual wafer arrangement. The first four wafers—there are six in all—only control one effective wipe.

By means of a special cross-over arrangement obtained through the construction of the rotor, the short and long coils are on one half of the wafer and the medium is on the other half. This applies to both input and oscillator coils. In order to avoid further confusion, only the three

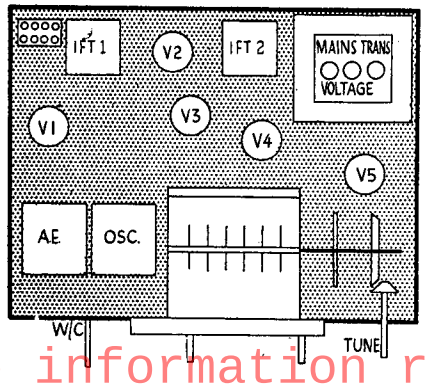
(*Continued on page* 33)

VALVE READINGS

V.	Type.	Electrode.	Volts.	Ma.
	All Mullard.			
1 ..	TH4B ..	Anode ..	260 ..	1.75
		Screen ..	86 ..	7
		Osc. anode	90 ..	6
2 ..	VP4B ..	Anode ..	260 ..	9.7
		Screen ..	260 ..	3.5
3 ..	TDD4 ..	Anode ..	126 ..	2.2
4 ..	Pen. A4 ..	Anode ..	240 ..	32.5
		Screen ..	260 ..	5
5 ..	IW4/350..	Heater ..	350 ..	—
		TOTAL FEED ..	..	67.65
2 pilot lamps.	Ever Ready		6.2 ..	300
1 ditto	Osram tubular.		6.2 ..	300



Right, the circuit, shown divided solely for presentation reasons. Single coils are used for the oscillator.

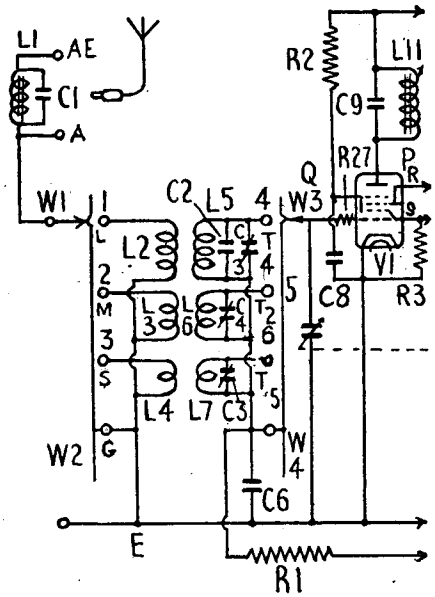


Left, the underchassis layout diagram, and, below, the top "deck" view. I.F. trimming is by adjustable coil cores.

CONSTRUCTIONAL FEATURES

IN the chassis examined there were no divergencies from the maker's specification. There are one or two unusual points which require mention.

The smoothing system employs both the speaker field and a separate smoothing



CONDENSERS

		Mfds.
1 ..	Trap filter	.0001
2 ..	L.W. aerial fixed trimmer ..	.000064
6 ..	V1 A.V.C. decouple	.05
8 ..	V1 screen decouple	0.5
9 ..	I.F. T.1 primary tune	.00015
11 ..	I.F. T.1 secondary tune ..	.00015
12 ..	L.W. fixed trimmer	.000148
15 ..	L.W. fixed padder	.000208
17 ..	M.W. fixed padder	.000355
19 ..	S.W. fixed padder	.005
20 ..	V2 A.V.C. decouple	.05
21 ..	H.T. smoothing	8
22 ..	V2 screen decouple	.05
23 ..	I.F. T.2 primary tune	.00015
24 ..	I.F. T.2 secondary tune ..	.00015
25 ..	H.F. filter	.000125
26 ..	L.F. coupling	.01
27 ..	V3 bias decouple	.5
28 ..	Tone	.0004
29 ..	A.V.C. decouple	.05
30 ..	V3 anode shunt	.0005
31 ..	L.P. coupling	.05
32 ..	A.V.C. coupling	.00005
33 ..	V4 bias shunt	25
34 ..	V4 anode shunt	.005
35 ..	Across L17..	1
36 ..	Series bias shunt	50
37 ..	H.T. smoothing	24
38 ..	H.T. smoothing	8
39 ..	Mains filter	.002

10-MINUTE FAULT-FINDER — TRUPHONIC MA5

Power Test.—In this receiver a four-pin plug and socket connect the power and speaker supplies. Points *A* and *B*, referred to below (see also the circuit diagram), are accessible at pins 3 and 4 (the "filament" pins), which should be partly withdrawn for the tests, unless the chassis is withdrawn and fully accessible.

Voltages : *A-E*, 350; *B-E*, 240.
Resistance : *A-B*, 1,600 ohms.
Total feed = 350-240 ÷ 1,600 = 68 ma.

If defective by more than approximately 20 per cent., apply reasoning described under "Power Tests" in article on page v. When readings are correct, proceed to :—

Output Stage, V4.—Inject 2 volts audio frequency from modulated oscillator or mains transformer (see article on page 27) between V4 grid and *E*. If defective, check :—

Voltages : *C-E*, 220; *D-E*, 360.
Resistances : *B-C*, 700; *G-E*, 550,000; *F-E*, 150 ohms.

Only when this stage is correct (the speaker may have to be examined), proceed to :—

A.F. Stage, V3 (triode section).—Inject approximately .5 volt between *H* and *E*. If defective, check :—

Voltage : *I-E*, 120.
Resistances : *B-I*, 50,000; *H-E*, 1 megohm; *K-E*, 15 ohms.

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

Resistances : L14, 11 ohms; *L-K*, 250,000 ohms; L13, 11 ohms.

I.F. Stage, V2.—Inject 465 kcs. between V2 grid and *E*. If defective, check :—

Voltages : *M-E*, 240; *N-E*, 240.

Hexode Section, V1.—Inject 465 kcs. signal between V1 anode and *E*. If defective, check :—

Resistances : L12, 11 ohms; L11, 11 ohms; *O-E*, 1.25 megohms.

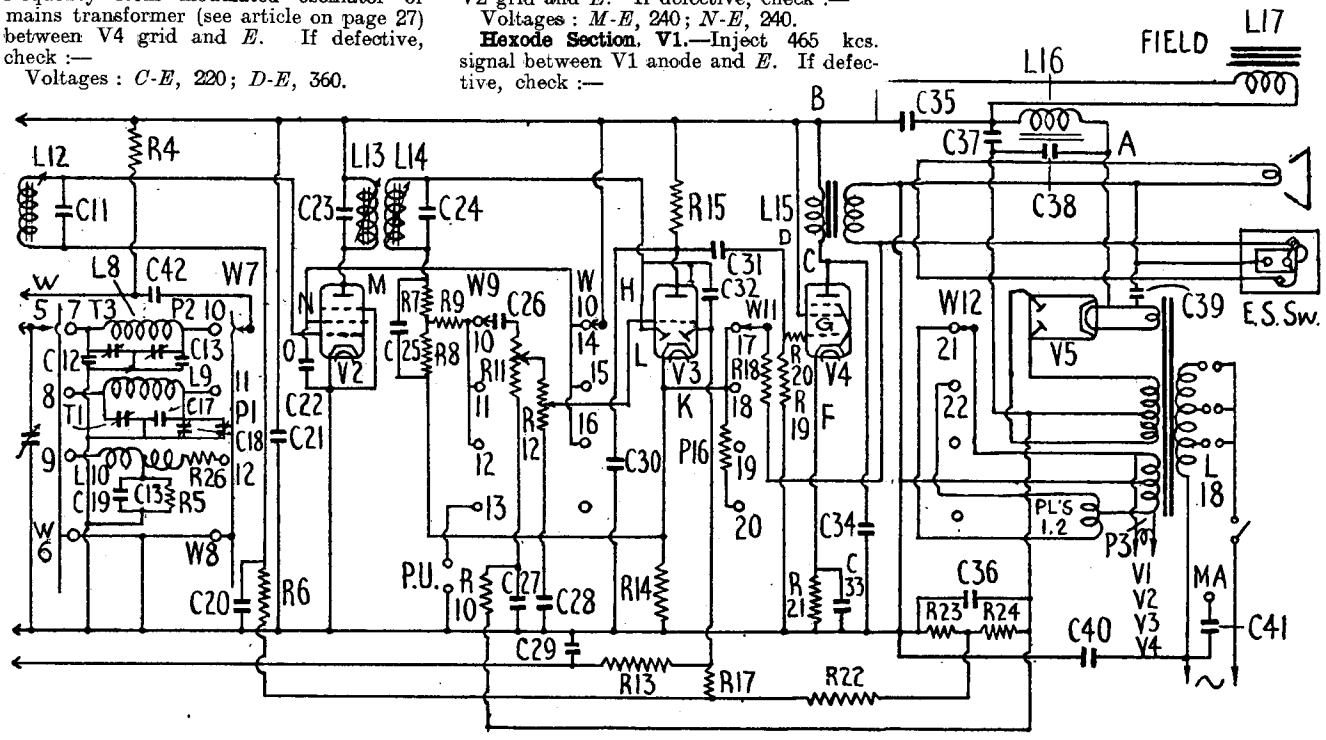
Inject 465 kcs. between grid of V2 and *E*. If defective, check :—

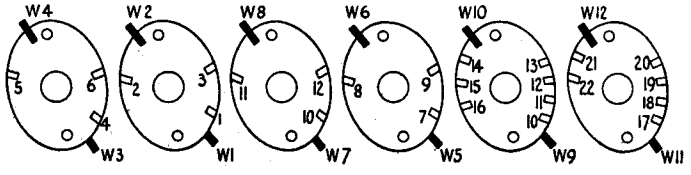
Voltages : *P-E*, 240; *Q-E*, 80.
Resistance : *Q-E*, 25,000 ohms.

Oscillator Section, V1.—Check :—

Voltage : *R-E*, 90.
Resistances : *R-B*, 25,000; *S-E*, 50,000 ohms.

Input Circuits.—Inject local station frequency plus 465 kcs. between oscillator grid, V1, and *E*. Tune receiver to local station. If no signals are received, check coil-winding resistances and switches in circuits between aerial and V1 signal grid.





Left, close to the circuit to aid reference, are the switch diagrams (see also text matter).

Condensers (continued)

40	Mains filter	.. .. ..	.01
41	Mains aerial	.. .. ..	.0005
42	Osc. anode coupling	.. ..	.003

WINDINGS

L.	Ohms.	Range.	Where measured.
1	7.5	—	A socket and Æ socket.
2	87.0	L.W.	A and earth.
3	19.0	M.W.	A and earth.
4	Very low	S.W.	A and earth.
5	15.0	L.W.	Aerial gang and C6.
6	4.5	M.W.	Aerial gang and C6.
7	Very low	S.W.	Aerial gang and C6.
8	4.0	L.W.	Osc. anode to grid.
9	2.0	M.W.	Osc. anode to grid.
10	(100)	S.W.	Osc. anode to grid.

Windings (continued)

11	11.0	—	V1 anode and H.T.+
12	11.0	—	V2 grid and C20 + R6.
13	11.0	—	V2 anode and H.T.+
14	11.0	—	V3 signal diode and C25 + R7.
15	700.0	—	V4 anode and H.T.+
16	600.0	—	On tags.
17	1,000.0	—	Sockets 3 and 4 on speaker socket.
18	21	—	Mains plug.

RESISTANCES

		Ohms.
1	V1 A.V.C. decouple	100,000
2	V1 screen feed	25,000
3	Osc. grid leak	50,000
4	Osc. anode load	25,000
5	S.W. het. volt control	6,000

Resistances (continued)

6	V2 A.V.C. decouple	1 meg
7	Signal diode load (part)	125,000
8	Signal diode load (part)	125,000
9	H.F. filter	200,000
10	V3 bias decouple	500,000
11	Volume control	500,000
12	Tone control	500,000
13	A.V.C. decouple	2 meg.
14	V3 cathode bias	15
15	V3 anode load	50,000
16	Feed back injection	50
17	A.V.C. diode load (part)	250,000
18	Feed back control	50
19	V4 grid leak	500,000
20	V4 grid stopper	50,000
21	V4 cathode bias	150
22	A.V.C. diode load (part)	250,000
23	Series bias (part)	30
24	Series bias (part)	30
27	V1 grid stopper	50

Replacement Condensers

Exact replacement electrolytics are available from A. H. Hunt, Ltd. The original units are Hunt's. For C21 or C38, there is unit 3625, 3s. 6d.; for C27, 4163, 6s. 9d.; C35, 3631, 1s. 6d.; C33, 2918, 1s. 9d.; and for C36, 1918, 1s. 9d.

Marconiphone 859 Five

(*Continued from page* 48)

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.

TRUPHONIC MA5

(*Continued from page* 36)

active contacts are marked on our diagram for each of the four wafers.

The next wafer controls the pick-up and carries wipes W9 and W10. Finally there is the sixth wafer, which carries wipes for feedback and the pilot lamps.

Chassis Removal

Remove the four control knobs from the front of the panel; two are held by grub screws and two by spring clips. Pull out the six press button levers.

Withdraw the aerial and earth plugs and the multiple speaker plug from their appropriate sockets. Unscrew the extension speaker strip or unsolder the wires to it. Release the chassis retaining bolts.

Alignment

I.F. Circuits (frequency, 465 kcs.).

Connect output meter to the set, short circuit the oscillator gang and inject on the grid of V1 a signal of 465 kcs. from the generator. Progressively adjust the trimming cores of L14 to L11 in that order, using a low input.

Medium Waves (200 to 580 metres).

Connect the generator to the aerial socket through a dummy aerial, turn the gang to minimum and inject a signal of 1,500 kcs. and adjust T1 for maximum.

Tune set and generator to 1,400 kcs. and adjust T2 for maximum.

Tune set and generator to 550 kcs. and adjust P1 for maximum, simultaneously rocking the gang. Retune to 1,500 kcs. and check T1, and repeat the ganging process until no further adjustment is necessary. Check the cover from 1,500 to 525 kcs.

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

First adjust T3 with the gang at minimum on 300 kcs. Adjust T4 when tuned to 290 kcs., and P2 at 160 kcs., rocking the gang as before.

Check the cover from 300 to 152 kcs.

Short Waves (15 to 50 metres).

Turn the condenser into mesh about 5 degrees and swing the generator round 17.6 mcs. This will give two signals.

Set the generator on the lowest frequency signal and adjust T5 for maximum output. Check at 6.5 mcs. and retrim.

The cover should be M.8 to 6 mcs.

Press Buttons

SLACKEN the cam release bolt on the end of the shaft adjacent to the bakelite drive wheel. This should release the cams. If it does not do so, the cams are sticking owing to the spring being tight. Slacken the spring by inserting a thin screwdriver between the cam affected and the spring.

Tune in the desired station manually and press down the lever on which it is desired to obtain the station.

See that the roller is in the dead centre part of the heart-shaped cam. Then tighten the locking-screw on the end of the shaft.

Should the cams fail to release, it may be due to the grub screws which hold the drum for the indicator operating cord being too tight on the shaft. This, however, is very rare. If it is necessary to alter them it will mean setting up the indicator again.

KOLSTER BRANDES 735

(*Continued from page* 34)

Tune generator and set to 1,400 kcs. (214 metres). The receiver setting is indicated by a small dot on the scale. Trim T5 and T2 for maximum output.

Tune set and generator to 600 kcs. (500 metres) and adjust P1.

Recheck the trimming at 214 metres.

Long Waves (740-2,050 metres).

Tune set and generator to 300 kcs. (1,000 metres), and adjust T6 and T3 for maximum.

Tune set and generator to 175 kcs. (1,714 metres) and adjust P2. The 175 kcs. setting is denoted by another dot on the tuning scale.

Repeat the operations until the calibration is correct over the scale.

Short Waves (16.5-52 metres).

Tune set and generator to 17 mcs. (17.6 metres), where a dot will be found on the scale, and adjust T4 for resonance.

Two positions will be found, the correct one being that nearer to the *minimum* capacity of T4.

Finally adjust T1 for maximum at the same time giving the main tuning a minute fractional adjustment. There is no padding operation.