

Ultra 301 Three-band AC Four

Three valve, plus rectifier, three waveband table model superhet with manual tuning and push-button wave selection, suitable for 200-250 volt, 50-100 cycle AC supplies, price 8½ guineas.

CIRCUIT OUTLINE

AN interesting input network is used. The aerial contains an IF trap, which is taken by a selector switch to a normal SW input coil. On the MW and LW positions the aerial circuit contains a resistance-capacity network.

These circuits form the input of V1, a triode-hexode changer provided with AVC through a shunt circuit. Conventional oscillator circuits are used. In the anode circuit there is a trimmer tuned IF transformer, providing the input to V2, an HF pentode, again controlled by AVC. A further transformer works into V3.

This is a double-diode output pentode, one diode being used for signal demodulation and the other for AVC. A simple resistance-capacity filter is used between the top of the diode load and the volume control, which is connected through an isolating condenser.

Tone is controlled on the grid side of the valve, the anode circuit containing the usual output transformer. A low impedance extension speaker connection is provided.

For pick-up working the circuit makes use of the triode section of the frequency changer, the normal anode load acting as a resistance coupling. The amplified audio

potentials are taken through a stopper circuit to the top of the volume control.

Power is derived from V4, a full-wave rectifier, and the speaker field with electrolytic condensers forms the smoothing circuit.

SPECIAL NOTES

THERE should be little difficulty in identifying any of the components, as they are all easily seen and are accessible. In servicing the receiver several points require remembering.

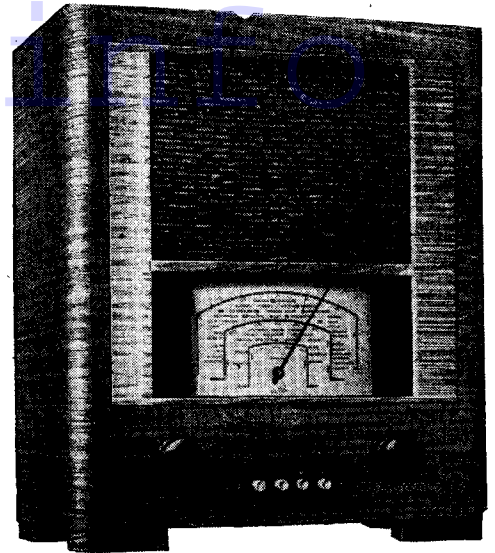
In the first place there is no padding operation on the medium band. The padding condenser is fixed and is of the silver mica type with an adjustment "window" through which the silver deposit can be scraped. It is very important not to disturb this condenser or in any way alter its capacity.

It should be observed that the pilot lamps are operated from a separate tap-

ping on the transformer, and are not run at the full four volts.

Wavechange Switches

The circuit diagram shows what appears to be a number of rotary selector switches. In the receiver switches of this type are not employed, all the switching being carried out by a four-button push switch.

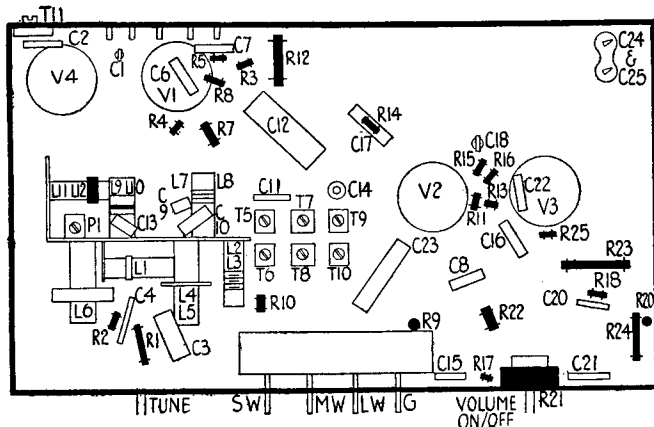
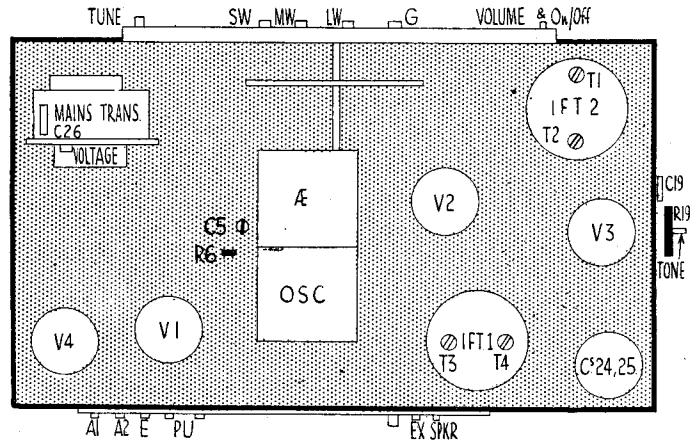


VALVE READINGS

Valve.	Type.	Anode.	Screen.	Cathode
1	<i>All Mazda.</i> AC/TH1A	240 117 (osc.)	126	2.8
2	VP41	290	135	1
3	PEN. 45DD	280	245	12
4	UU 6	—	—	360

Pilot lamp, Osram, MES, 4.5 volts, 300 m.a

On the right is the surface layout diagram identifying the valves and few other components on the top of the neat 301 chassis.



Orderly arrangement of parts is found below the chassis, most of the coils and trimmers being accessible grouped. Wave switching is also simple to follow.

This is of conventional type, with all the contacts in their logical positions in relation to the coils and trimmers. Identification is exceptionally easy, since the leads from the trimmers go to the coils and contacts which are seen to be in circuit consequent upon the depression of a button.

The unit naturally consists of two units ganged to the buttons, controlling respectively tuned and untuned or coupling windings.

Chassis Removal

First release the grub screws holding the three control knobs. Then remove the chassis retaining bolts.

The top of the scale is held in clips secured to the inside of the cabinet by two small wood screws, and these must be removed before the chassis can be withdrawn.

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10-MINUTE FAULT-FINDER

ULTRA 301

Power Test

Voltages: V4 cathode, 360; HT line, 290.

Resistance: L19, 1,000 ohms.

Total feed = $360 - 290 \div 1,000 = 70$ ma.

Output Stage, V3

Inject 2 volts AF at V3 grid. If defective, check:—

Voltages: Anode, 280; screen, 245; cathode, 12 (actual bias is 7 volts).

Resistances: Anode-HT, 480; screen-HT, 2,000 ohms.

Demodulation, V3

Inject modulated 470 kc. signal at V2

anode. Check T1 and T2. If defective, check:—

Resistances: L15, 8.7; L16, 8.7; diode-chassis, 500,000 ohms.

IF Stage, V2

Inject modulated 470 kc. signal V2 grid. If defective, check:—

Voltages: Anode, 290; screen, 135; cathode, 1.

Resistances: Grid-chassis, 1.75 meg-ohms.

Mixer, V1

Inject modulated 470 kc. signal at grid. If defective, check:—

Voltages: Anode, 240; screen, 126; cathode, 2.8.

Resistances: L13, 8.7; L14, 8.7; screen-HT, 10,000; grid-chassis, 2.75 meg.

Oscillator Section, V1

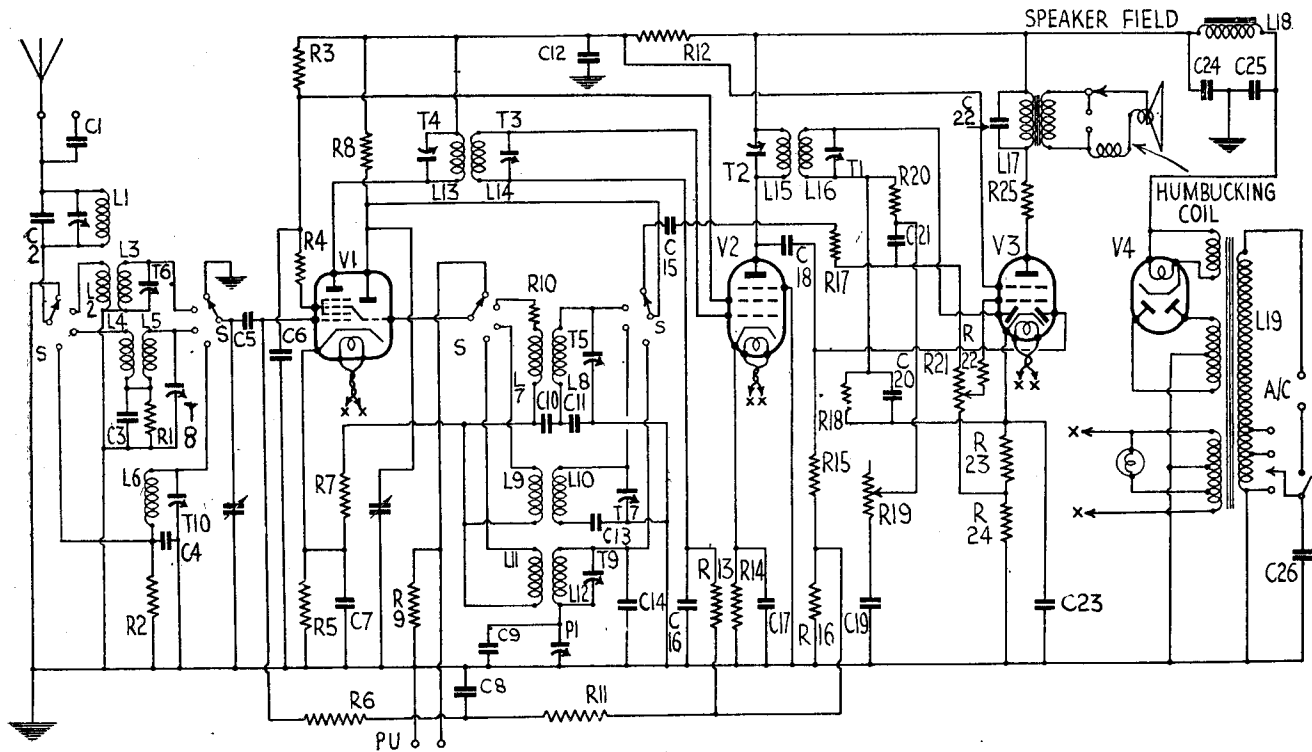
Inject local frequency plus 470 kc. at oscillator grid and tune to local station.

If no signal, check:—

Voltage (on MW band): Oscillator anode, 117.

Resistances: Oscillator anode-HT, 40,000; oscillator grid-chassis, 25,200 ohms.

If signals are still absent, check pre-selector and oscillator coils and switches.



WINDINGS (D.C. Resistances)

L.	Ohms.	Range.	Where measured.
1	4.2	—	Across T11.
2	V. low	SW	C2 and chassis.
3	V. low	SW	Aerial gang and chassis.
4	V. low	MW	C2 and C3.
5	2.8	MW	C3 and aerial gang.
6	21.3	LW	C4 and aerial gang.
7	30	SW	C10 and osc. grid.
8	Low	SW	C11 and osc. gang.
9	.5	MW	R7 and osc. grid.
10	5.4	MW	C13 and osc. gang.
11	.5	LW	R7 and osc. grid.
12	15	LW	P1 and osc. gang.
13	8.7	—	V1 anode and sub HT line.
14	8.7	—	V2 grid and C16.
15	8.7	—	V2 anode and HT line.
16	8.7	—	Signal diode and C20.
17	420	—	On tags.
18	1,000	—	On tags.
19	35	—	Mains plug.

Resistances (continued)

5	V1 cathode bias	200
6	V1 grid return	1 meg.
7	Osc. grid leak	25,000
8	Osc. anode load	40,000
9	Pick-up shunt	25,000
10	SW net volt control	30
11	Sub HT line decouple	1 meg.
12	Sub HT line decouple	2,000
13	V2 AVC decouple	1 meg.
14	V2 cathode bias	200
15	AVC diode load (part)	250,000
16	AVC diode load (part)	750,000
17	V3 pick-up circuit grid stopper	100,000
18	Signal diode load	500,000
19	Tone control	2 meg.
20	HF filter	100,000
21	Volume control	1 meg.
22	V3 grid stopper	500
23	V3 cathode bias (part)	140
24	V3 cathode bias (part)	115
25	V3 anode stabiliser	60

Condensers (continued)

6	V1 screen decouple	.1
7	V1 cathode shunt	.1
8	V1 AVC decouple	.05
9	LW fixed padder	.00006
10	SW osc. couple	.0002
11	SW padder	.004
12	Sub HT line decouple	.4
13	MW padder	.000318
14	LW osc. trimmer	.00001
15	Pick-up couple	.004
16	V2 AVC decouple	.05
17	V2 cathode shunt	.1
18	AVC couple	.00001
19	Tone control	.002
20	HF filter	.0002
21	LF couple	.01
22	V3 anode shunt	.004
23	V3 cathode shunt	.50
24	HT smoothing	.16
25	HT smoothing	.8
26	Mains filter	.004

RESISTANCES

	Ohms.	
1	MW input network	1,000
2	LW input network	10,000
3	V1 and V2 screen decouple	10,000
4	V1 screen stabiliser	60

CONDENSERS

	Mfd.s.	
1	Aerial series	.00005
2	IF trap tune	.002
3	MW input network	.004
4	LW input network	.004
5	V1 grid couple	.00005

Replacement Condensers.—Exact replacement electrolytics are available from A. H. Hunt, Ltd., Garratt Lane, Wands-worth, London, S.W.18. For C24 and 25, there is unit 1014, 9s.; for C23, 2839, 2s. 6d.; and for C12, 2546, 2s. 3d.

10-MINUTE FAULT-FINDER

LITTLE MAESTRO

Power Test

Voltages : V5 cathode, 188; H.T line, 148.

Resistance : L13, 700 ohms.
Current is $188 - 148 \div 700 = 57$ ma.

Output Stage, V4

Inject 2 volts A.F. at V4 grid. If defective, check :—

Voltages : V4 anode, 135; screen, 148.
Resistances : Anode-H.T., 220; grid-chassis, 470,000 ohms.

A.F. Stage, V3

Inject .5-volt A.F. V3 grid. If defective, check :—

Voltages : Anode, 60.
Resistances : Anode-H.T., 270,000 ohms; grid-chassis, 9.5 megohms.

Demodulation

Inject modulated 451 kcs. signal V2 anode. If defective, check :—

Resistances : L10, 30; L11, 30; diode-chassis, 250,000 ohms.

I.F. Stage, V2

Inject modulated 451 kcs. signal V2 grid. If defective, check :—

Voltages : Anode, 148; screen, 55.
Resistances : Grid-chassis, 1.25 megohms.

Mixer, V1

Inject modulated 451 kcs. signal V1 grid.

If defective, check :—

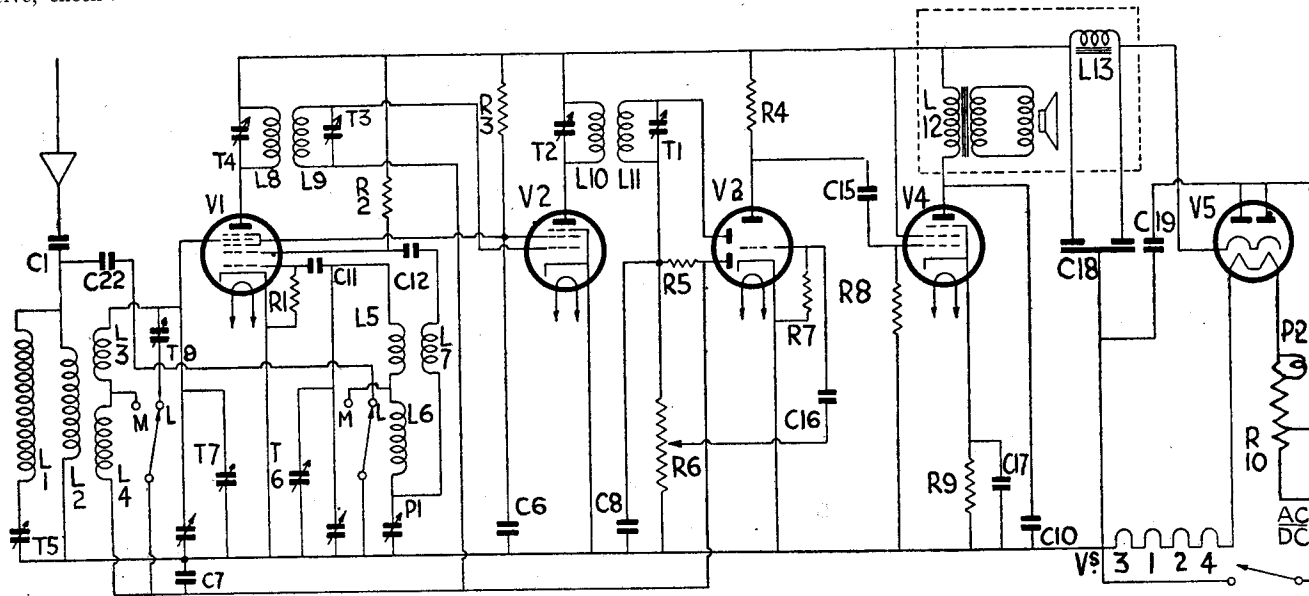
Voltages : Anode, 148; screen, 55.
Resistances : L8, 7 L9, 7; screen-H.T., 22,000 ohms.

Oscillator Test

Tune to local frequency and inject that frequency plus 451 kcs at osc. grid. If no signals, check :—

Voltages : Osc. anode, 80.
Resistances : Osc. anode-H.T., 22,000; osc. grid-chassis, 39,000 ohms.

If still no signals, check oscillator and preselector coils and switching.



Condensers (continued)

16	..	LF coupling	..	..	.005
17	..	V4 cathode bias shunt	..	..	10
18	..	HT smoothing	..	..	20-20
19	..	Mains filter	..	..	.025
22	..	LW aerial primary shunt	..	..	.00015

WINDINGS

L.	Ohms.	Range.	Where measured.
1	..	24	.. C1 and T5.
2	..	12	.. C1 and chassis.
3	..	2.8	.. MW .. V1 grid and C7.
3+4	..	19	.. LW .. V1 grid and C7.
5	..	2.4	.. MW .. Osc. gang and chassis.
5+6	..	10	.. LW .. Osc. gang and P1.
7	..	93	.. C12 and P1.
8	..	7	.. V1 anode and HT positive.
9	..	7	.. V2 grid and R5.
10	..	30	.. V2 anode and HT positive.
11	..	30	.. Signal diode and R6.
12	..	220	.. V4 anode and HT positive.
13	..	700	.. V5 cathode and HT positive.

Replacement Condensers.—Exact replacement condensers available from A. H. Hunt, Ltd., are : For C17, No. 3723, at 1s. 6d.; and for C18, No. 1576, at 9s.

VALVE READINGS

V.	Type.	Electrode.	Volts.
<i>All Brimar.</i>			
1	..	6A8G .. Anode ..	148
		.. Screen ..	55
		.. Osc. anode ..	80
		.. Cathode ..	—
2	..	6K7G .. Anode ..	148
		.. Screen ..	55
		.. Cathode ..	—
3	..	6Q7G .. Anode ..	60
		.. Cathode ..	—
4	..	25A6G .. Anode ..	135
		.. Screen ..	148
		.. Cathode ..	18
5	..	25Z6G .. Anode ..	175
		.. Cathode ..	188

Ultra Model 301

(Continued from page 32.)

The speaker is held both by clips and two screws.

Should it at any time be necessary to remove the speaker there is a terminal plate with six coloured coded leads. Reading from left to right the colours are : Black, green, white, blue, red and yellow.

Alignment

IF Circuits (470 kc.)

Connect the generator to the grid of V1 and an-output meter to the set. Adjust the generator to 470 kc., and tune

An interesting feature of the Pilot Little Maestro circuit is the running of the double diode triode without a cathode bias resistor. Resistance coupling is used between V3 and V4.

T1, T2, T3 and T4 for maximum, using an input always below the AVC level.

Short Waves (16.5 to 50 metres)

Connect the generator to the aerial and earth and tune set and generator to 19 mc., adjusting T5 and T6 for maximum.

Check the calibration at 30 and 50 metres. If there is a slight error advance or retard the gang slightly and retrim at 19 mc.

Medium Waves (200 to 550 metres)

Tune set and generator to 200 metres and adjust T7 and T8 for maximum.

Long Waves (900 to 2,100 metres)

Tune set and generator to 1,000 metres and adjust T9 and T10 for maximum.

Tune set and generator to 1,700 metres and adjust P1, simultaneously rocking the gang.

Aerial Trap

Connect the generator to the aerial and earth terminals and inject a powerful 470 kc. modulated signal.

Adjust T11 for minimum response.