

ULTRA T402

Three-valve, plus rectifier, three waveband superhet for operation from AC mains of 200-260v, 40-100 cycles. Provision for PU and external speaker. Made by Ultra Electric, Ltd., Western Avenue, Acton, London. Production November, 1945. Retail price £17 17s. plus £3 16s. 9d. tax.

AERIAL input is via socket A1 or A2, which introduces C1 for optimum coupling. L1, T7, C4 constitute an IF rejector. C2 feeds the signal, via the switch, to the aerial coupling coils which are L2 on SW, L3 on MW, L4 on LW.

The tuned grid circuit consists of the main RF

tuning capacitor VC1 and its associated SW, MW, and LW circuits. LW circuit utilises L5 and trimmer T1; MW, L6 and trimmer T2; whilst LW uses L7 and trimmer T3. LW also has a fixed trimmer C8. AVC and bias are series fed by R7 and C9.

The oscillator portion of the triode-hexode frequency-changer obtains its HT via R2, the tuned anode being parallel fed by C25. VC2 is the main oscillator tuning capacitor. SW circuit employs L11, trimmer T4 and a fixed padder C17 which is common to both grid and anode circuits via C15.

MW utilises L12, trimmer T5 with a fixed padder C19 and variable padding by P1. Similarly LW uses L13, trimmer T6, fixed padder C23, variable padder P2 and an additional fixed trimmer C22.

Grid inductances are L8, L9, and L10 on SW, MW, and LW respectively. A grid stopper R4 was found necessary and a certain amount of automatic bias is obtained from C15, C17 and R5.

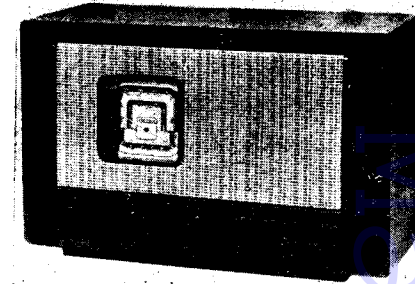
The pick-up uses this stage as a pre-amplifier matched by C14 and R6. The anode load R2

and C25 pass the amplified AF voltage to the volume control and hence to the output valve. The control grid circuits of V1 and V2 are effectively shorted to mute the radio. The screen supply is derived from a series resistor R1 decoupled by C11. R3 was found necessary to prevent parasitic oscillation.

A permeability-tuned IF transformer constituted by L14, C12 and L15, C13 forms the anode load of V1 and the grid circuit of V2. AVC bias is again applied by C28, R8. The screen and HT supply for this stage is obtained from a common resistor R9 decoupled by C27.

Another permeability tuned IF transformer L16, C29 and L17, C30, passes the signal to the detector diode whose load is R11 with R10, C32 and C33 providing IF filtering. C34 passes the rectified voltages to the volume control and hence to pentode control grid.

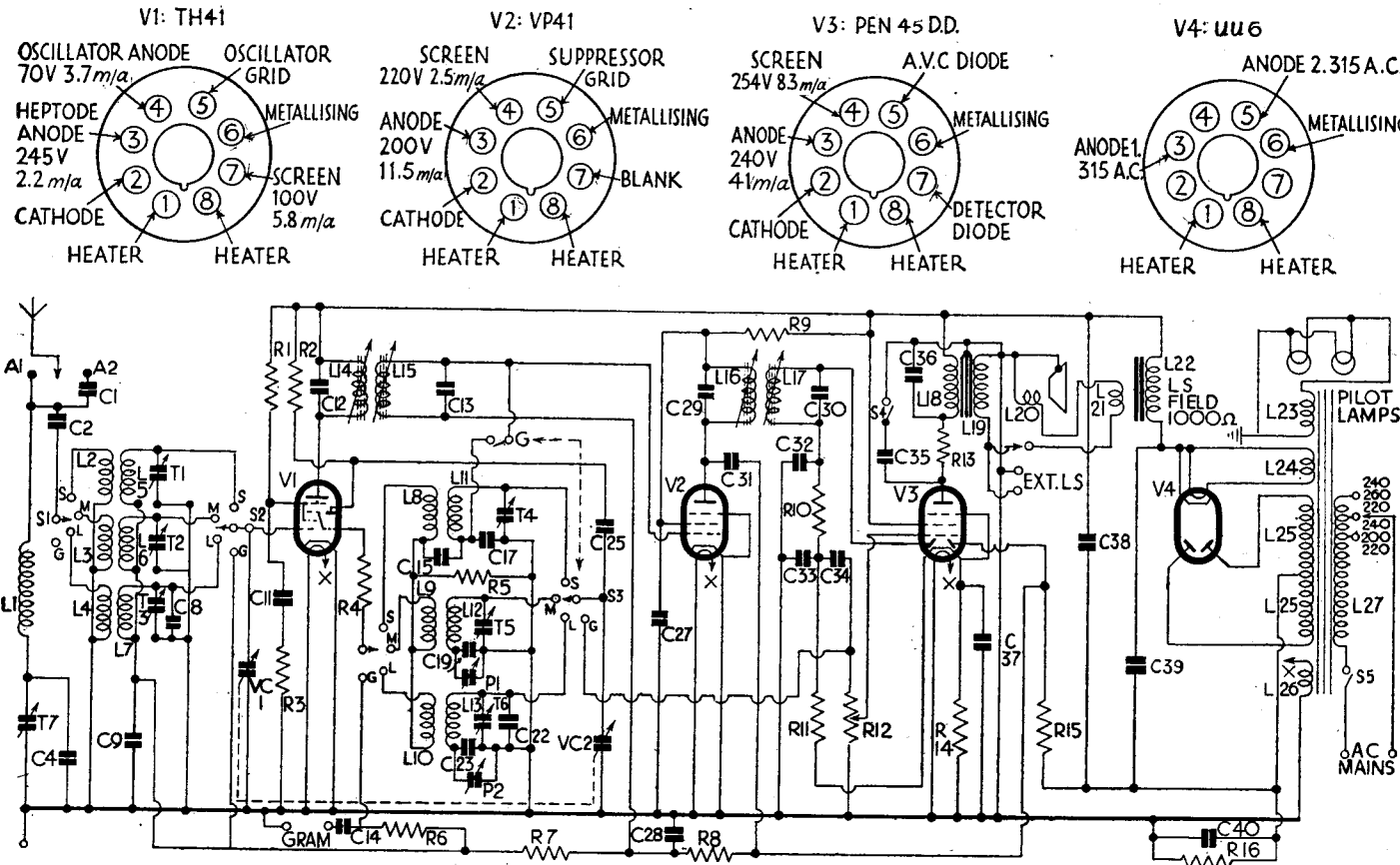
AVC diode obtains its drive from the IF valve anode by C31, its load being R15. A delay of approximately 11 volts is produced by R16 and R14 decoupled by C40 and C37 respectively. Standing bias for V1 and V2 is also provided by



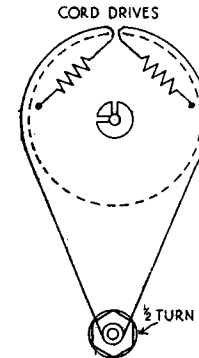
the volts drop across R16 (3V) and is applied via the AVC line.

Full HT is used on the screen of the output stage and cathode bias for the pentode portion is obtained from R14 by-passed by C37. The anode circuit has the usual output transformer feeding a mains energised speaker via a hum coil L21. Provision is made for a low-impedance external speaker by a wander plug arrangement at the rear. An anode stopper R13 is used and tone correction

Continued overleaf.



One of the first post-war productions of Ultra, the T402 is a three-band AC superhet. Valve voltages and currents are given against the pins in the basing diagram.



RESISTORS

R	Watts	Tolerance %	Ohms
1	.5	10	27,000
2	1	10	39,000
3	.25	20	68
4	.25	20	100
5	.25	20	47,000
6	.25	20	330,000
7	.25	20	100,000
8	.25	20	1 meg
9	.25	20	2,200
10	.25	20	100,000
11	.25	20	470,000
12	1	—	1 meg
13	.25	20	68
14	.5	10	180
15	.25	20	470,000
16	.25	10	47

CAPACITORS

C	Type	Tolerance %	Mfds
1	Silver-mica	20	22 pf
2	Silver-mica	5	470 pf
4	Silver-mica	5	180 pf
8	Silver-mica	20	47 pf
9	Paper	..	.05 mfd
11	Paper	..	.1 mfd
12	Silver-mica	5	120 pf
13	Silver-mica	5	120 pf
14	Paper	..	.1 mfd
15	Silver-mica	5	180 pf
17	Silver-mica	5	5000 pf
19	Silver-mica	2	500 pf
22	Silver-mica	10	100 pf
23	Silver-mica	5	180 pf
25	Paper	..	.005 mfd
27	Paper	..	.1 mfd
28	Paper	..	.05 mfd
29	Silver-mica	5	120 pf
30	Silver-mica	5	120 pf
31	Silver-mica	10	10 pf
32	Silver-mica	10	100 pf
33	Silver-mica	10	100 pf
34	Paper	..	.005 mfd
35	Paper	..	.02 mfd
36	Paper	..	.01 mfd
37	Electrolytic	12v	.50 mfd
38	Electrolytic	450v	24 mfd
39	Electrolytic	450v	16 mfd
40	Electrolytic	6v	100 mfd

INDUCTORS

L	Ohms
1	7.6
2	.25
3	1.8
4	10.3
5	Very low
6	2.3
7	13
8	.2
9	.8
10	3
11	Very low
12	3
13	7.4
14	7.5
15	7.5
16	7.5
17	7.5
18	280
19	.2
20	1.5
21	.25
22	1,000
23	.6
24	.2
25	375-375
26	.05
27	34 max

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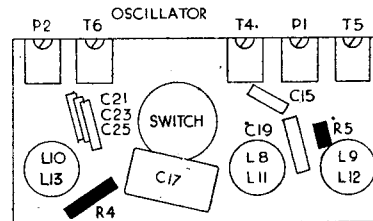
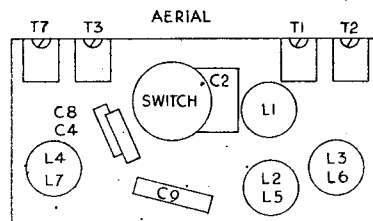
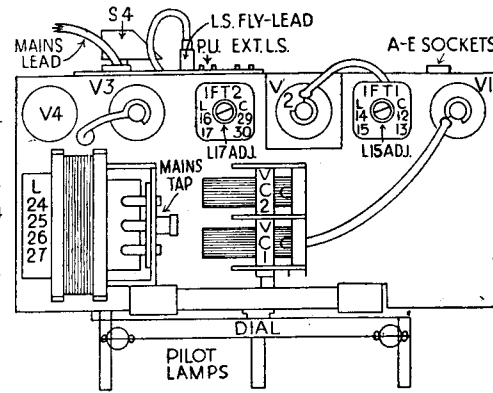
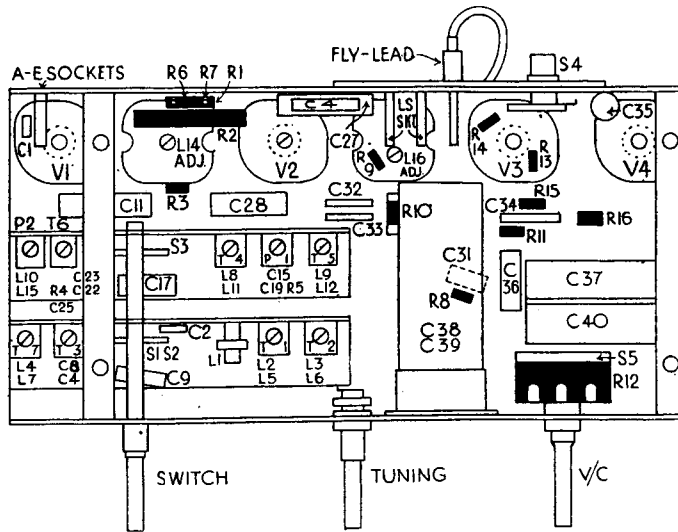
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uses C36 (fixed) and C35 by a switch.

The power unit has provision for 200 - 220, 220-240, 240-260V AC mains of 40-100 cycles. A separate winding L23 is provided for the pilot lights which are of the 6.5V / 3AMES type. One end of the 4V heater winding L26 is earthed. The centre tap of the HT winding L25 is returned to earth by R16 decoupled by C40 to provide standing bias for V1 and V2.

Full-wave rectifier, V4, provides HT; smoothing being accomplished by C39, speaker field L22, and C38.

A double dial cord drive is used for additional strength and length of life.



Top to bottom: Under chassis and top chassis layouts and details of the coil unit.

ALIGNMENT INSTRUCTIONS

Apply Signal as Below.	Tune Receiver to.	Adjust in order stated for Max. Output.
(1) 470 KC to top cap of V1 leaving existing lead connected.	MW 500 metres	L17, L16, L15, L14
(2) 470 KC between aerial and earth via .0002 condenser.	MW 500 metres	T7 for Minimum
(3) 1,500 KC as in (2)	MW 200 metres	T5, T2
(4) 600 KC as in (2)	MW 500 metres	P1
(5) 15 MC via 400 ohm resistor to aerial socket.	SW 20 metres	Screw T4 fully in and unscrew until second peak is received. Trim for max about this point. Adj T1 for max.
(6) 6 MC as in (5)	SW 50 metres	Check calibration as compared with (5).
(7) 300 KC as in (2)	LW 1,000 metres	T6, T3
(8) 150 KC as in (2)	LW 2,000 metres	P2

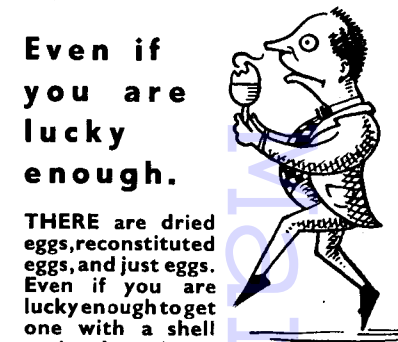
ULTRA U405 CORRECTION

In the Service Chart of the Ultra Model U405 in the March issue, it was stated, owing to a typing error, that the mains consumption was 100 watts. Care has been taken in the design of this receiver to keep the consumption low and the figure is 56 watts approximately.

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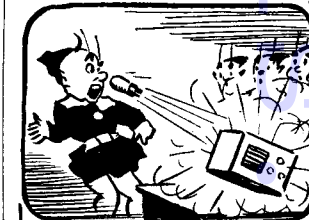
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