

As these layouts show the chassis design of the Lotus model 66 is orderly and straightforward.

the speaker transformer and chassis (mains voltage 225 volts A.C.) :-

- Left (1) Red, chassis.
- (2) Blue, 230 v., H.T. smoothed.
- (3) Blue, 216 v., V3 anode.
- (4) Yellow, 256 v., H.T. unsmoothed.

Note that as the primary of the transformer (2) and (3) is not connected to the speaker field, it is immaterial to which of the two middle tags the blue leads are connected.

Removing Chassis.—Remove the four holding screws. Remove the knobs (grub screw) and lift the chassis out.

General Notes.—The lay-out and wiring are particularly simple and require no description.

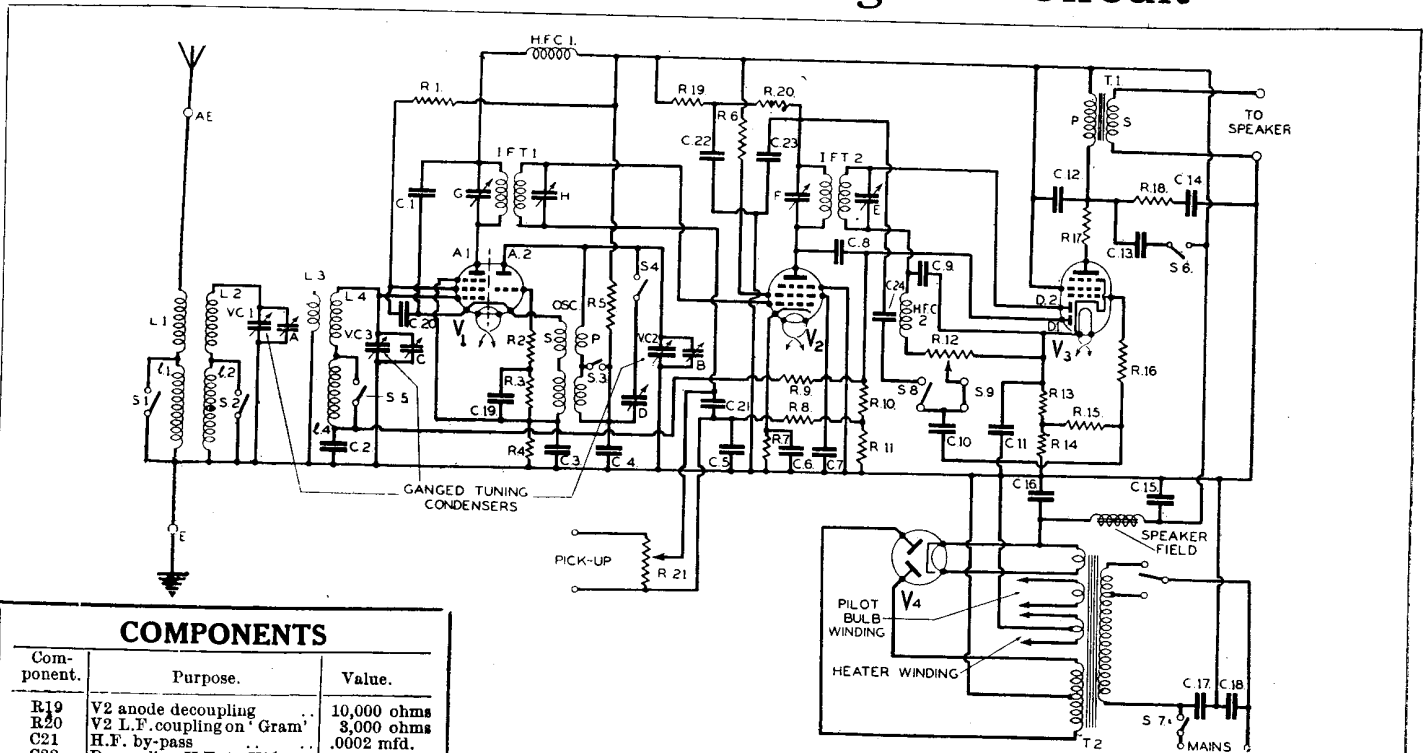
Replacing Chassis.—Lay the chassis

inside the cabinet, replace the holding screws and knobs.

RESISTANCES		
R.	Purpose.	Ohms.
1	Top part of V1 screen ptr.	50,000
2	Lower part of V1 screen ptr.	25,000
3	Var. bias resistance	10,000
4	Fixed part of bias resistance	400
5	V2 grid leak	.25 meg.
6	Voltage dropping to V2 screen	25,000
7	V2 anode decoupling	20,000
8	V2 anode L.F. coupling	50,000
9	V3 grid leak	.5 meg.
10	V3 grid stabiliser	50,000
11	Voltage dropping to V3 aux. grid	20,000
12	V3 cathode bias	400
—	Speaker field	10,000

CONDENSERS		
C.	Purpose.	Mfd.
1	Series aerial	.001
2	Series aerial	.0001
3	Series earth	.01
5	V1 screen by-pass	.1
6	V1 cathode by-pass	.1
9	V2 screen by-pass	.1
10	V2 anode decoupling	.1
11	V2 anode H.F. by-pass	.0003
12	L.F. coupling	.1
13	V3 aux-grid by-pass	.1
14	Tone compensating V3 anode	.02
15	V3 cathode by-pass	.25 (25 v.)
16	H.T. smoothing	.25 (350 v.)
17	H.T. smoothing	.8 (450 v.)
18	H.F. by-pass from mains	.1
19	V2 grid reservoir	.0001

Ultra Model 22 Radiogram Circuit



COMPONENTS		
Component.	Purpose.	Value.
R19	V2 anode decoupling	10,000 ohms
R20	V2 L.F. coupling on 'Gram'	3,000 ohms
C21	H.F. by-pass	.0002 mfd.
C22	Decoupling H.T. to V2*	.5 mfd.
C23	Decoupling H.T. to V2 (by-pass on Gram)	.002 mfd.
C24	L.F. coupling on 'Gram.'	.1 mfd.

*If bad hum is experienced a 2 mfd. electrolytic condenser part No. 44/0063 should be used.

The Ultra model 22 table receiver was dealt with on page 116 of the September, 1934, "Service Engineer." Here is the modified version of the circuit which is employed in the radiogram model of the receiver. Components of different value to those in the table model are given in the list on the left.

ULTRA "22" A.C. MAINS SUPERHET

Circuit.—The combined first detector oscillator valve A.C./T.P. met. (V1) is a triode pentode with a nine-pin base. The pentode section is preceded by a band-pass aerial tuner and bias is partly fixed by cathode resistance and partly obtained from the A.V.C. line.

The oscillator element is operated with the tuned coil in the anode lead coupled to a coil in the common cathode lead. The pentode section is coupled to the next valve by

a band-pass I.F. transformer (frequency 456 k.c.).

The I.F. valve A.C./VP1 (V2) (seven-pin) is biased by cathode resistance and from the A.V.C. line. Coupling to the next valve is by another band-pass I.F. transformer.

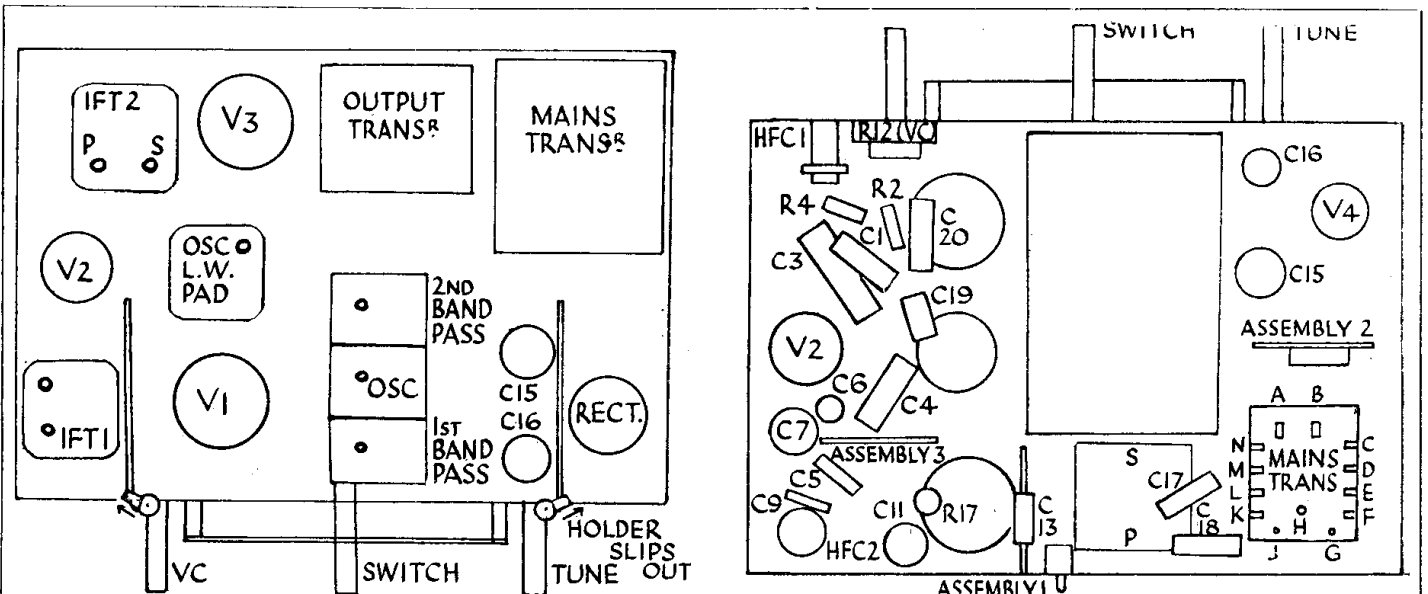
The combined second detector and pentode output valve A.C.2 Pen. D.D. (V3) (seven-pin) employs one diode anode for L.F. purposes and the other for A.V.C.

The L.F. impulses from the first are fed

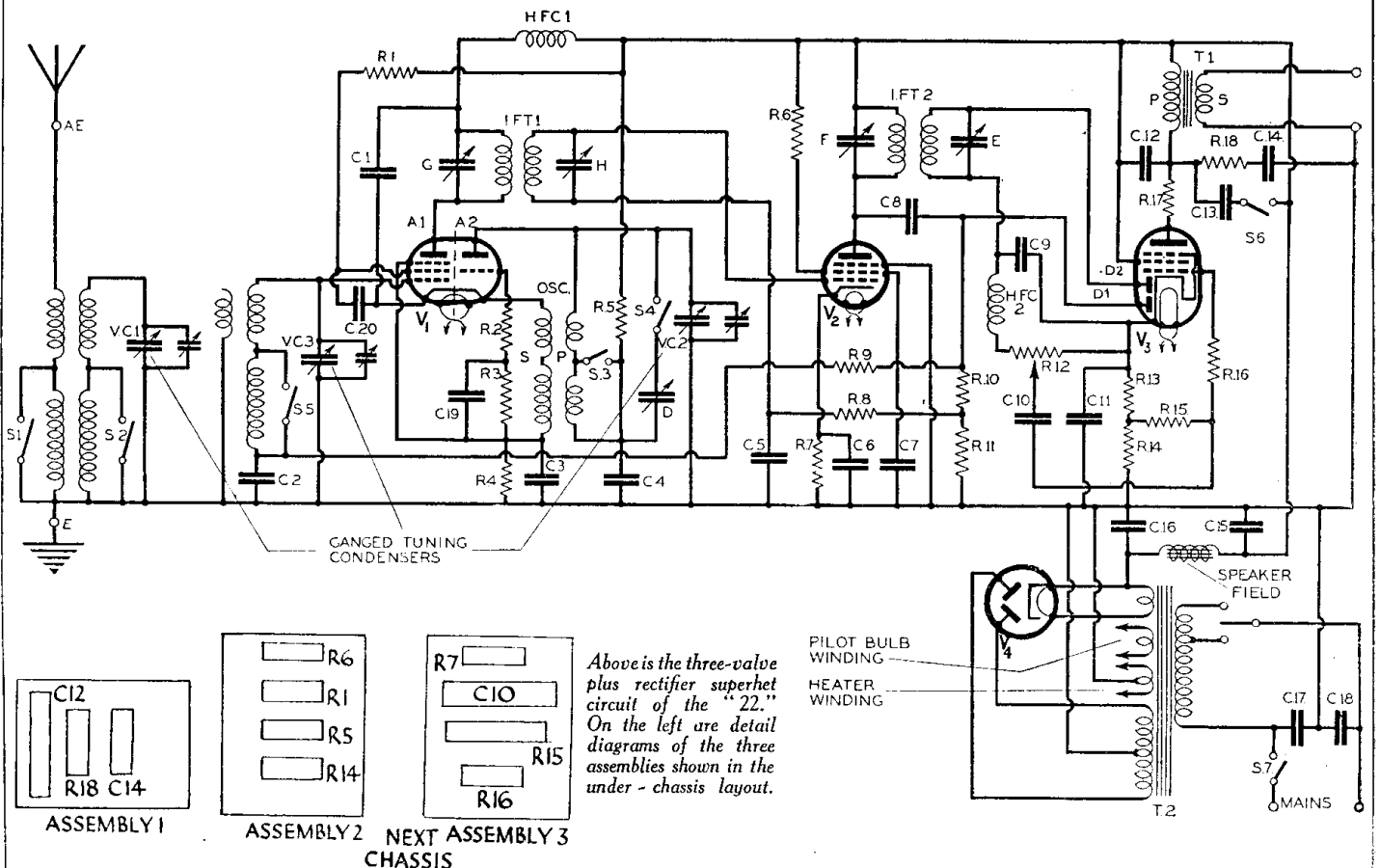
through an H.F. choke to the load resistance which forms the volume control. The feed to the grid is through an L.F. coupling condenser C10.

The A.V.C. diode anode is coupled to the anode of V2 by a condenser and the bias potentiometer is formed by R10 and R11. Full A.V.C. potential is applied to V1 and only three-quarters to V2.

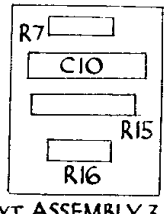
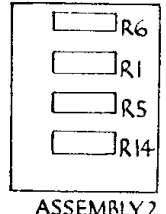
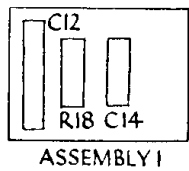
The pentode circuit has a grid stopper R16 and an anode stabilising resistance R17,



Left and right, respectively, are shown the above and below "deck" layouts of the "22" receiver by Ultra Electric, Ltd.

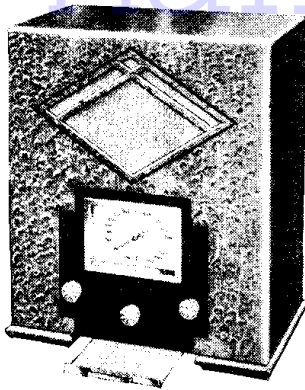


Above is the three-valve plus rectifier superhet circuit of the "22." On the left are detail diagrams of the three assemblies shown in the under-chassis layout.



PILOT BULB WINDING
HEATER WINDING

ULTRA "22" A.C. MAINS SUPERHET (Cont.)



"Clock-face" tuning and a three-valve superhet circuit are distinguishing characteristics of the model "22" produced by Ultra Electric, Ltd.

and is provided with optional tone control by means of a condenser in series with a resistance and a condenser across the resistance, the latter connected into the circuit by the switch.

Mains equipment consists of transformer, full wave indirectly heated rectifier UU60/250, with the L.S. field in the positive H.T. lead for smoothing in conjunction with a 16 mfd. and an 8 mfd. electrolytic condenser.

VALVE READINGS

V.	Type.	Electrode.	Volts.	M.A.
1	AC/TP met.	anode ...	274	7.5
		aux. grid ...	200	2
		osc. anode* ...	110	2
2	AC/VP1 ...	anode ...	274	10
		aux. grid ...	195	2.5
3	AC2PenDD	anode ...	260	38
		aux. grid ...	274	6

* Measured across C4.

The mains leads are fitted with H.F. by-pass condensers.

Special Notes.—The valve connections, looking from underneath and counting clockwise from the two filament pins which are close together at one end are:—

- Pentode grid at top.
- V1, nine-pin (triode pentode): H, H, cathode, osc. anode, osc. grid, metallising, aux. grid, pentode anode, suppressor grid.
- V2, seven-pin (H.F. pentode): H, H, cathode, aux. grid, metallising, grid, suppressor grid. Anode is at the top.
- V3, seven-pin: H, H, cathode, aux. grid, diode anode 2, pentode anode, diode anode 1. Grid is at top.

Removing the Chassis.—Undo the knobs (grub screws). Remove four holding screws underneath. Remove two screws from wooden block in top of cabinet and lift the chassis out.

Quick Tests.—Between the following terminals of panel on L.S. and chassis (looking from behind and counting from the left):—

- (1), red, H.T. + unsmoothed, 365 volts.
- (5), green with black tracer, H.T. smoothed 274 volts.

The output transformer terminals are inside the chassis.

CONDENSERS

C.	Purpose.	Mfd.
1	Decoupling V1 anode ...	.1
2	Decoupling V1 grid ...	.05
3	V1 cathode by-pass from osc. coil ...	.5
4	Decoupling V1 osc. anode ...	.1
5	Decoupling A.V.C. to V2 ...	.05
6	V2 cathode by-pass ...	.1
7	V2 aux. grid ...	.5
8	L.F. feed to A.V.C. diode anode ...	.0002
9	H.F. by-pass from diode ...	.0002
10	L.F. coupling diode anode to grid ...	.01
11	V3 cathode by-pass ...	50 el.
12	By-pass V3 anode to aux. grid ...	.001
13	Tone correction circuit ...	.01
14	Tone correction circuit ...	.01
15	H.T. smoothing ...	16 el.
16	H.T. smoothing ...	8 el.
17	H.F. by-pass from mains lead ...	.01
18	H.F. by-pass from mains lead ...	.01
19	V1 osc. grid condenser ...	.0002
20	V1 aux. grid ...	.1

General Notes.—The layout is easily followed except for the three resistance and condenser assemblies. These are given in the special diagram.

Mains transformer connections (see layout diagram):—

- A and B: Pilot lamp winding (blue with black).
- C and N: Rectifier heater (green).
- D: To mains lead (yellow).
- E: 200-220 mains tap (pink).
- F: 230-250 mains tap (dark green).
- G and J: Set heaters.
- H: Centre taps to chassis.
- K (yellow) and M (blue): Rectifier anodes.
- L: Chassis.

To reach the switch and the band-pass coils it is necessary to remove the screen cover by undoing the four screws on the flanges.

The following components are inside the case of the second I.F. transformer: R8, R9, R10, R11, and C8.

Replacing the Chassis.—Lay chassis inside cabinet, replace wooden block above speaker and insert the four holding screws. Replace the knobs.

RESISTANCES

R.	Purpose.	Ohms.
1	Voltage dropping to V1 aux. grid ...	25,000
2	Harmonic suppressor in osc. grid ...	1,000
3	Osc. grid leak ...	50,000
4	V1 cathode bias ...	480
5	Voltage dropping to osc. anode ...	80,000
6	Voltage dropping to V2 aux. grid ...	30,000
7	V2 cathode bias ...	165
8	Decoupling A.V.C. to V2 ...	1 meg.
9	Decoupling A.V.C. to V1 ...	1 meg.
10	A.V.C. potentiometer ...	250,000
11	A.V.C. potentiometer ...	750,000
12	Diode load, var. V.C. ...	500,000
13	V3 cathode bias ...	138
14	Part of A.V.C. delay fr. ...	138
15	V3 grid return bias resistance ...	1 meg.
16	V3 grid stopper ...	1,000
17	V3 anode stabiliser ...	60
18	Tone correction circuit V3 anode ...	15,000
—	L.S. field ...	1,500
—	P. of output transformer ...	400

LANCASTRIA SUPERHET BY FERRANTI



The 1934-5 model Lancastria by Ferranti, Ltd., is a three-valve A.C. superhet utilising a heptode and a combined double-diode pentode.

Circuit.—The combined detector oscillator, VHT4 met. (V1), a heptode, is preceded by a band-pass aerial tuner with second channel suppressor circuit. Switching for local reception connects the resistance, R1, across the aerial input. Bias for the detector section

is partly fixed by cathode resistance and partly controlled from the A.V.C. line.

The oscillator operates with the tuned coil in the grid circuit. Coupling to the I.F. valve is by band-pass I.F. transformer (frequency 125 K.C.).

The I.F. valve, VPT4 met. (V2), is biased also by cathode resistance and by A.V.C. The tuning indicator is connected in to the H.T. lead to the anode and coupling to the second detector is by another band-pass I.F. transformer.

In the combined second detector and pentode output valve, a PT4D (or Mazda AC2Pen DD) (V3) there is one diode anode for rectification and L.F. purposes. This is coupled to the grid of the pentode section by resistance-capacity filter with the grid leak forming the manual volume control.

VALVE READINGS

Valve	Type.	Electrode.	Volts.	Ma.
1	V.H.T4	anode ...	200	3
		screen ...	100	
		osc. anode ...	100	1.5
2	V.P.T4	anode ...	200	5
		aux. grid ...	100	
3	P.T.4D	anode ...	240	28
		OR A.C.2 Pen D.D.	aux. grid ...	250	8

The other diode anode is used for A.V.C., a delay being obtained by the initial bias on V1 and V2.

The pentode anode circuit has a stabilising resistance, R13, and tone control is provided by a condenser in series with a variable resistance. As usual, the internal speaker is provided with a switch so that the speech coil can be disconnected when an external speaker is needed.

Mains equipment consists of transformer, full wave rectifier and the L.S. field in the negative lead for smoothing, with two 8 mfd. electrolytic condensers.

Special Notes.—The indicators for tone, volume and wave-change switch are operated by cords, attached at one end to collars which are fixed to the spindles by grub screws, and passing once round the spindle to the lever arm of their respective pointers.

Before placing the chassis inside the cabinet again it is advisable to see that the pointers are in their correct positions.

The grid connection of the double diode pentode is at the top of the bulb. The base connections (counting clockwise from the two heater pins which are close together at one end and looking from underneath) are:— H, H, cathode, aux. grid, diode anode 1, anode diode anode 2.

The heptode valve connections are H. H.

(Continued on pages 118-119.)