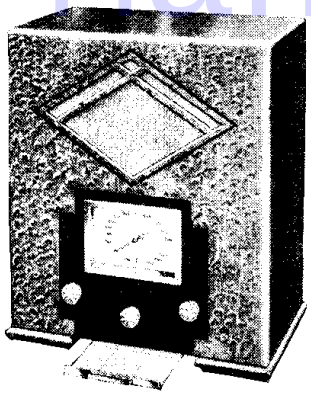
ULTRA "22" A.C. MAINS SUPERHET (Cont.)



"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	I.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 ftr. ...	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

No signal.

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 or A.C.2 Pen D.D.	anode ..	240	28
		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.)

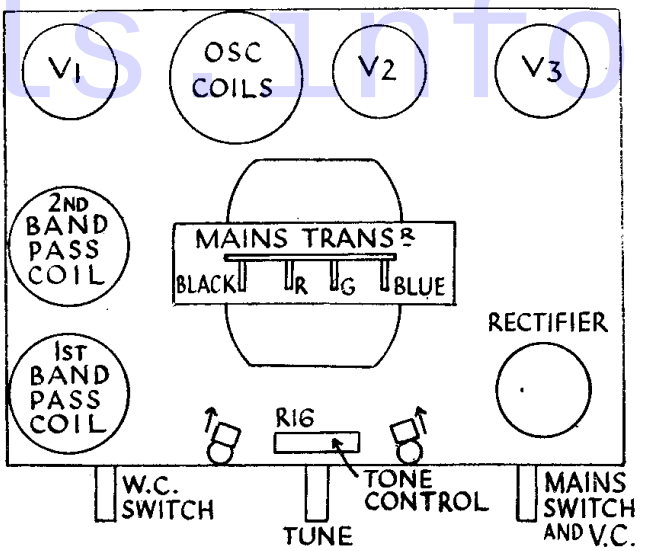
FERRANTI LANCASTRIA SUPERHET (Cont.)

CONDENSERS

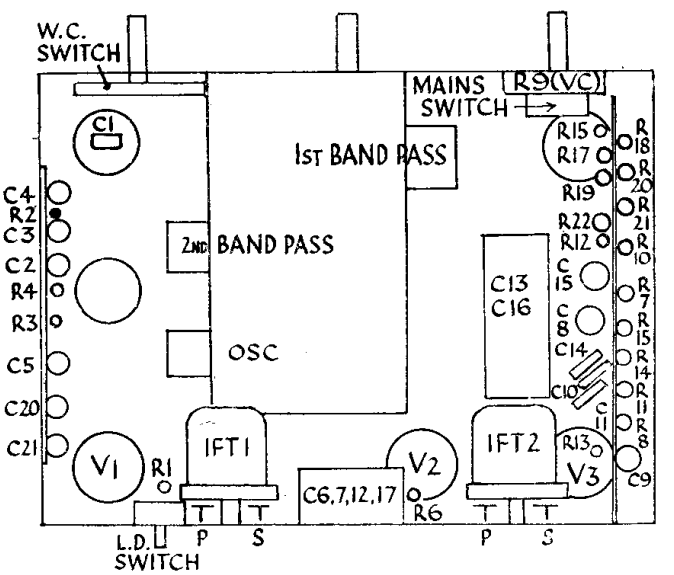
C.	Purpose.	Mfd.
1	Coupling aerial coil to first band-pass	.000018
2	Decoupling A.V.C. to V1 and band-pass coupling	.05
3	Second channel suppressor circuit	.02
4	V1 cathode	.02
5	Decoupling V1 osc. anode circuit	.01
6	V2 cathode	.1
7	Decoupling tuning meter, anode V2	.1
8	Decoupling A.V.C. to V2	.05
9	L.F. coupling diode to grid of V3	.02
10	H.F. diode load	.00015
11	H.F. by-pass from diode	.00015
12	Decoupling V3 grid	.25
13	V3 cathode	4
14	I.F. feed to A.V.C. diode anode	.0005
15	Tone control circuit	.05
16	Decoupling H.T. to V1 and V2 anodes	4
17	Decoupling H.T. to V1 and V2 screens	.1
18	H.T. smoothing	8 el.
19	H.T. smoothing	8 el.
20	H.F. by-pass from mains	.002
21	Mains aerial	.002

RESISTANCES

R.	Purpose.	Ohms.
1	Across aerial coil for local reception	1,000
2	V1 cathode bias	300
3	Across osc. tracking condenser	50,000
4	Decoupling A.V.C. to V1	250,000
5	Decoupling H.T. to osc. anode	100,000
6	V2 cathode bias	450
7	Decoupling A.V.C. to V1 and V2	1 meg.
8	H.F. stopper from Diode	100,000
9	V3 grid leak (var. ptr. V.C.)	1 meg.
10	Decoupling V3 grid	100,000
11	Diode load	.5 meg.
12	V3 cathode bias	140
13	V3 anode stabiliser	140
14	A.V.C. Diode load	2 meg.
15	A.V.C. Diode load	2 meg.
16	Var. tone control	50,000
17, 18	Part of H.T. ptr. (parallel)	6,000
19, 20	Part of H.T. ptr. (parallel)	18,000
21	Part of H.T. ptr. (parallel)	12,400
22	Part of H.T. ptr. (parallel)	450
	L.S. field	1,600
	P. of output trans.	250



The chassis of the Ferranti 1934–5 Lancastria is very small, and the components on top are grouped round the mains transformer.



Assembly construction simplifies examination of the Lancastria, and the I.F. transformer trimmers are accessibly placed at the rear.

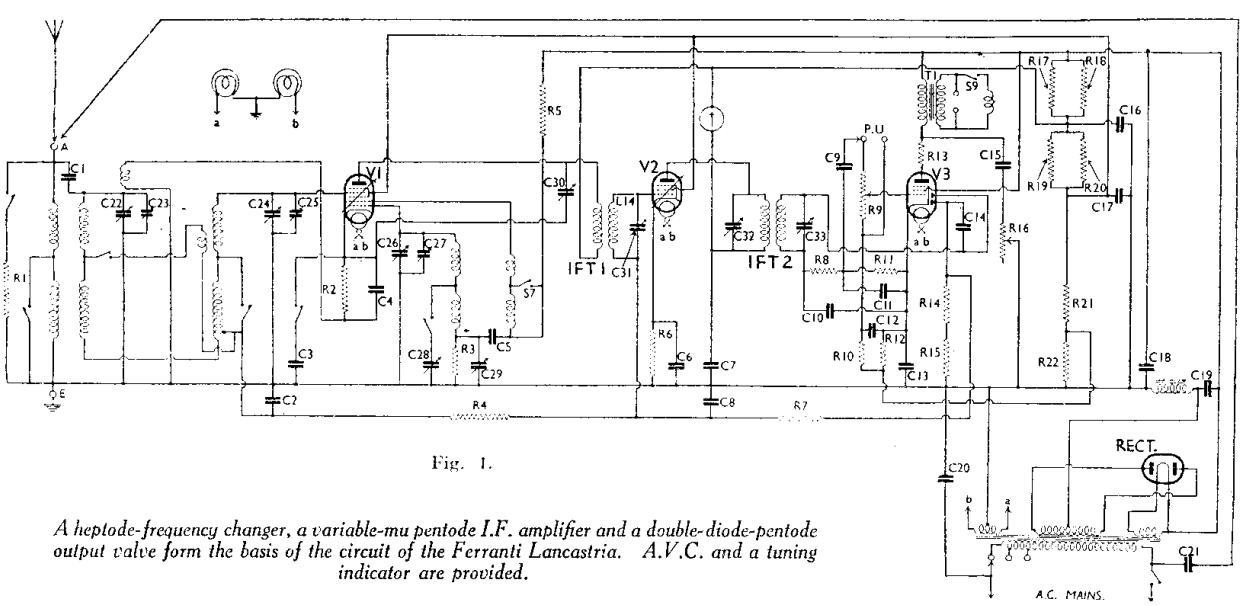


Fig. 1.

A heptode-frequency changer, a variable-mu pentode I.F. amplifier and a double-diode-pentode output valve form the basis of the circuit of the Ferranti Lancastria. A.V.C. and a tuning indicator are provided.

FERRANTI LANCASTRIA SUPERHET (Cont.)

cathode, anode, oscillator anode, osc. grid, screens. The grid terminal is at the top.

Quick Tests.—Undo the cover over the speaker to reach the terminals on the speaker transformer.

Voltages between these and chassis (looking from the back and from left to right) are :—

(1) Black to C19, blue to set (H.T. −), 105 v. negative.

(2) Green to set (V3 anode), 240 v. positive.

(3) Red to C18, C19 and set (H.T.+ smoothed, 250 v. positive).

(1) and chassis are L.S. field, (2) and (3) are primary of output transformer.

Note that the smoothing condenser connections are : two red to (3); one black to L.S. frame and chassis; the other black to (1).

Both condensers are the same value, and if either has to be replaced it is immaterial which is connected to either point.

Removing Chassis.—Pull off the knobs, remove four screws underneath, pull off the connectors to the speaker from the panel on top of the mains transformer and lift out the chassis.

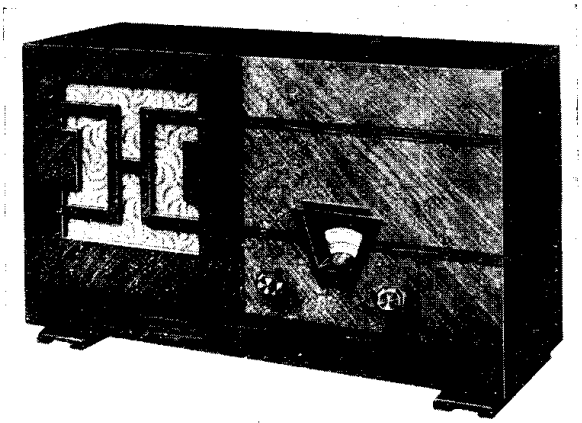
General Notes.—The operation of the tuning indicator when the set is tuned to the local station or to an oscillator is a sure indication that V1, V2, and the diode section of V3 are working.

The resistances R7, 15, 14, 11 and 8 are enclosed in metallised containers which are earthed.

The Ferranti condenser colour code is used : Brown, .002 mfd.; green, .01 mfd.; yellow, .02 and red, .05 mfd.

Replacing Chassis.—Lay chassis inside cabinet, replace holding screws and knobs and connect the L.S. leads.

MULLARD "M.B. 3" BATTERY SET



The "M.B.3" receiver, with which the Mullard Wireless Service Co., Ltd., have entered the complete set market, is a "straight" three without a reaction control.

Circuit.—The H.F. valve VP2 (V1) is preceded by a tuned secondary aerial transformer, the aerial circuit of which contains a special loading coil to maintain constant sensitivity over both wavebands.

Volume is controlled by a potentiometer (across a 9-volt G.B. section of the H.T. battery) to vary the bias on the grid, and, at the same time, to damp the aerial input. Coupling to the next valve is by tuned secondary transformer.

The detector valve SP2 (V2), an H.F. pentode, acts as a leaky grid detector with the grid leak returned to the positive L.T. The anode circuit contains an H.F. filter and is coupled to the output valve by the resistance-capacity method.

The output pentode, PM22A (V3) has H.F. stopping and stabilising resistances in its grid circuit, and is tone-compensated by means of a resistance and condenser in series across the primary of the output transformer.

The speaker is a permanent-magnet type.

Special Notes.—The battery connections (Siemens' Full o' Power, 135 v.) are :—

Plug + B in 135-v. H.T. socket.
" − B in − H.T. + G.B. socket.
" − C1 in − 6-v.
" − C2 in − 9-v.

Note.—After the H.T. battery voltage has dropped the − C1 plug should be inserted into the − 4½-v. socket.

Quick Tests.—These are best carried out while making the usual valve tests and noting the strength of the "plops" produced in the speaker.

Removing Chassis.—Remove knobs (grub screws). Remove batteries and free L.S. leads from cleats. Remove four screws underneath and lift chassis out.

The L.S. leads are sufficiently long to allow the chassis to be examined without disconnection.

General Notes.—There is no reaction applied to the detector, and as the sensitivity depends on the accurate ganging of the tuned circuits, the cylindrical trimmers should not be disturbed. Adjusting these is a laboratory job.

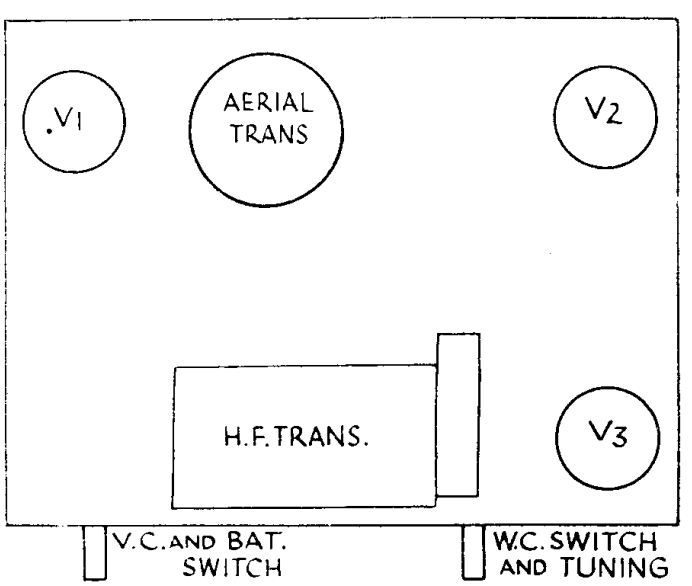
The wavechange switch is on the same spindle as the tuning knob, and the contacts are of the wiping type. The contact makers can be cleaned by using a piece of rag wrapped round a thin screwdriver. Only one set can be reached in each waveband position ("out" for L.W., "in" for M.W.).

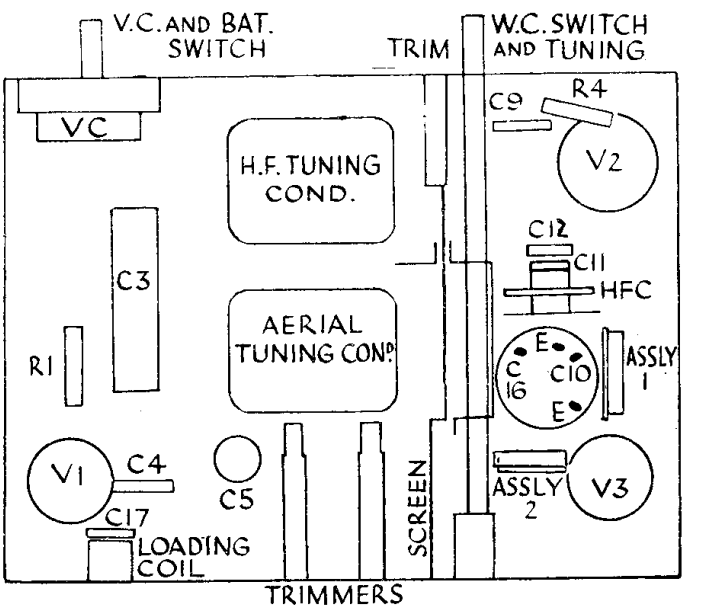
The condenser and resistances are mounted conveniently on two small panels. Should any of these components require replacement, the identical type should be obtained from the set manufacturers.

The lay-out and construction are straightforward, and, with the help of the lay-out diagram, the components can be recognised immediately.

Replacing Chassis.—See that rubber supports are in position, lay chassis inside cabinet, replace holding screws, clip the L.S. leads and replace the knobs.

(Tables and Circuit on next page.)





Complete screening and the use of highly efficient coils are points of note in the "M.B.3." Here are the top (left) and underneath (right) layouts of the chassis. For details of assemblies see next page.