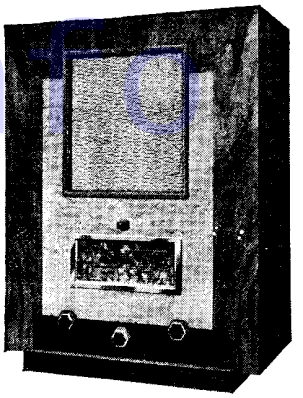
FERRANTI UNIVERSAL SUPERHET



The five-valve plus barretter universal receiver produced by Ferranti, Ltd.

Circuit.—The first detector oscillator valve, VHTS or X30 plain (V1), is preceded by a band-pass aerial tuner with suppressor coupling in the cathode lead. Oscillator tuning is in the grid circuit and coupling to the next valve is by band-pass I.F. transformer (frequency 125 kc.). Bias is by cathode resistance and A.V.C.

The I.F. valve, VPTS met. (V2), is also biased by A.V.C. and cathode resistance and is followed by a second band-pass I.F. transformer. The tuning meter is in the anode H.T. lead common to V1 and V2.

The second detector and L.F. amplifier, H.S.D. (V3), utilises one anode for L.F. purposes and the other, capacitatively coupled to the first, for A.V.C.

In the coupling to the triode, R6 is an H.F. stopper, R7 the load and C11 the coupling condenser. Volume is controlled by VR1, the variable grid-leak potentiometer.

A resistance capacity filter is used as L.F. coupling to the output valve. This, a P.T.S. (V4), is tone controlled by condenser and variable resistance between the anode and chassis.

Mains equipment consists of a by-pass condenser across the mains leads, Philips 1941 barretter, half-wave U30 rectifier and the L.S. field in the positive H.T. lead with two 16-mfd. electrolytic condensers for smoothing.

Special Notes.—Order of heater wiring: Barretter, dial lamp, rectifier, V4, V3, V2 and V1.

V1, V2 and V3 have 13-volt heaters, and V4 and rectifier 26-volt heaters.

The dial lamp is a special Ferranti type, the DLS, price 2s. 6d.

Quick Tests.—Remember the chassis may be live to real earth.

On 220-volt A.C. mains, the voltage between chassis and the following terminals on the speaker transformer, looking from the back and counting from the right, should be :—

(1) Black, earth of L.S.
(2) Red, H.T. smoothed, 221.
(3) Green, V4 anode, 210.
(4) Blue, H.T. unsmoothed, 260.

Blue and red are the ends of the 700 ohm speaker field.

Removing Chassis.—Pull off the knobs, remove four holding screws underneath the cabinet, pull the speaker leads from off their connectors, and lift the chassis out.

General Notes.—The dial lamp bracket is entirely insulated from the chassis and the mains should be switched off before attempting to replace it.

In the event of the valve heaters not working, disconnect the mains and check for continuity between the left hand (looking from the back) mains plug and chassis. The resistance (cold) should be approximately 125 ohms with the switch "on."

An open circuit shows that either one of the valves or the dial light is defective. These should be tested individually.

The switch is of a rotary type, in which silver studs on the rotating disc make contact between two contacts on the stationary section.

The resistances are R.M.A. colour coded and condensers are coded as follows .00005, 1 black spot; .00015, 1 brown spot;

(Continued on opposite page.)

VALVE READINGS

Valve.	Type.	Electrode.	Volts.	M.a.
1	VHTS plain (7) or X30 ..	anode ..	212	6.5
		aux. grid	80	2.5
		osc. anode	80	1.5
2	VPTS met. (7)	anode ..	212	5
		aux. grid	80	2
3	HSD met. (7)	anode ..	160	3
4	PTS (7) ..	anode ..	210	43
		aux. grid	220	6.5

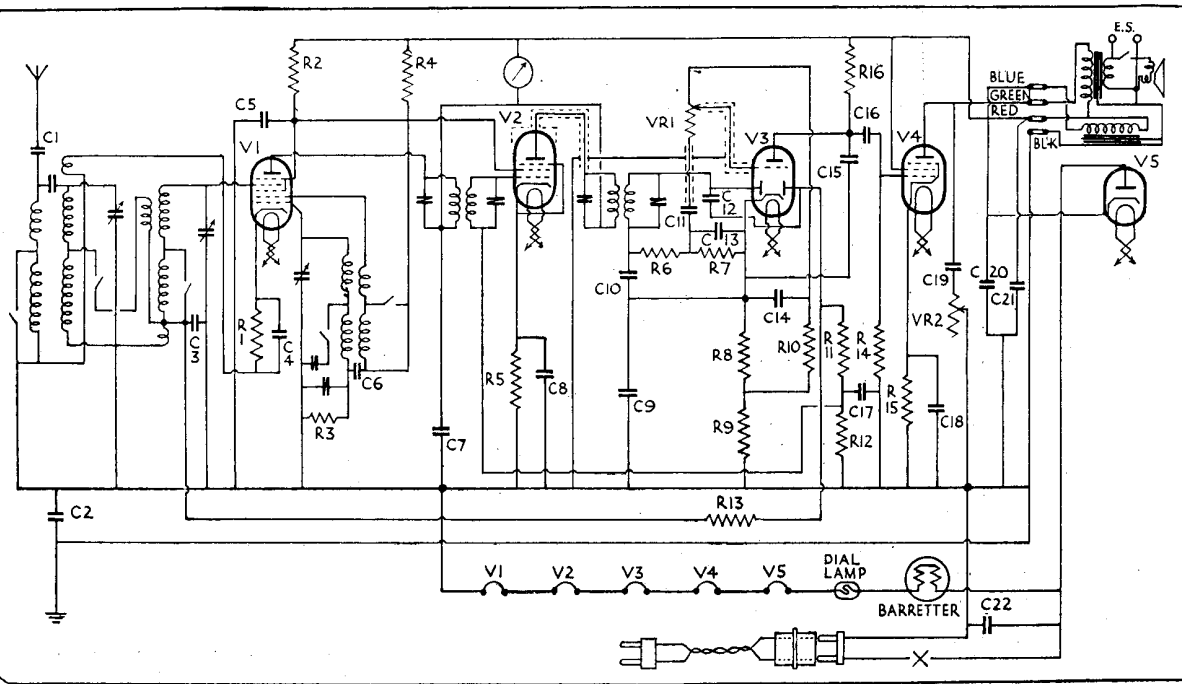
RESISTANCES

R.	Purpose.	Ohms.
1	V1 cathode bias	300
2	Voltage dropping to V1 aux. grid	30,000
3	Across osc. padding condenser (2 watt).	50,000
4	V1 osc. anode decoupling ..	100,000
5	V2 cathode bias	450
6	H.F. stopper from diode	100,000
7	Diode load	500,000
8	V3 grid bias (cathode)	1,000
9	Delay bias for A.V.C. (cathode)	2,000
10	Decoupling V3 grid	100,000
11	A.V.C. diode ptr.	4 meg.
12	A.V.C. diode ptr.	1 meg.
13	Decoupling A.V.C. to V1 ..	1 meg.
14	V4 grid leak	.5 meg.
15	V4 cathode bias	320
16	V3 anode L.F. coupling	18,000
	Speaker field	700

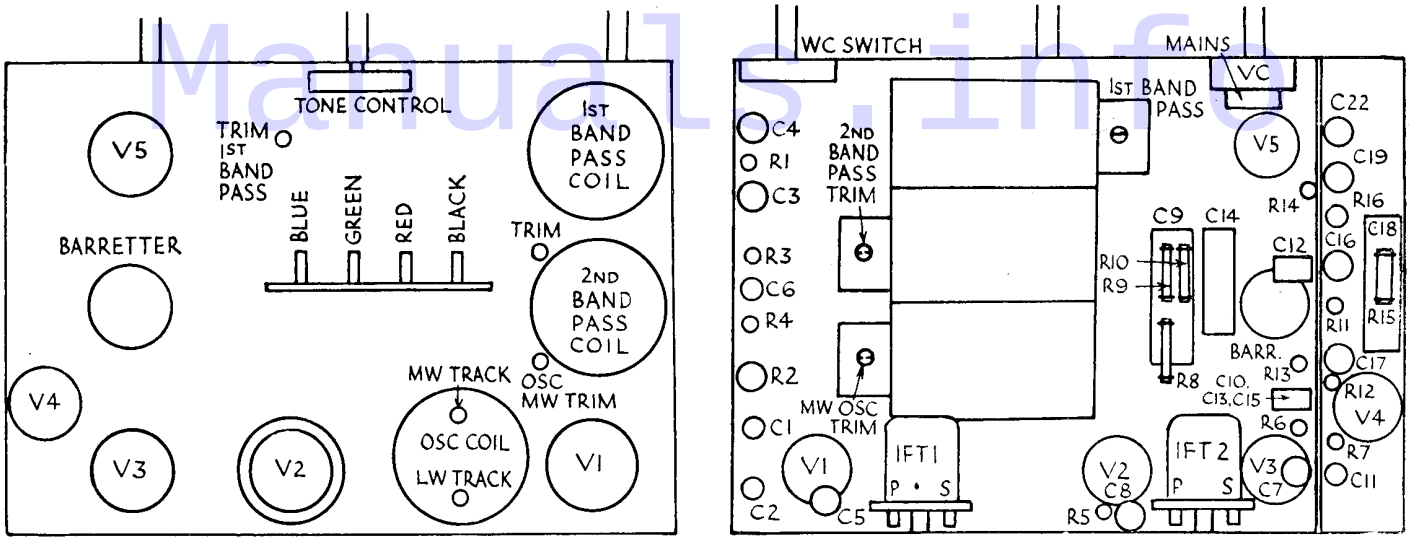
CONDENSERS

C.	Purpose.	Mfd.
1	Series with aerial lead	.002
2	Series with earth lead	.002
3	Decoupling V1 grid	.05
4	V1 cathode bias by-pass	.05
5	V1 aux. grid by-pass	.1
6	Decoupling V1 osc. anode ..	.01
7	Decoupling V1 anode	.05
8	V2 cathode by-pass	.1
9	V3 cathode by-pass	1 (50) el.
10	H.F. by-pass from diode	.00015
11	L.F. coupling to V3 grid	.01
12	L.F. coupling to A.V.C. diode ..	.0005
13	H.F. by-pass	.00015
14	Decoupling VC grid	.1
15	V3 anode by-pass	.0003
16	V3, V4 L.F. coupling	.02
17	V2 grid decoupling	.05
18	V4 cathode by-pass	25 (25)el.
19	V4 tone control circuit	.05
20	H.T. smoothing	16 (400) el.
21	H.T. smoothing	16 (400) el.
22	Mains by-pass (1,500 v. test) ..	.02

(Bracketed figures are voltages).



An orthodox four-valve circuit utilising a heptode frequency changer is used in the Ferranti receiver. A rectifier acts as a simple resistance on D.C. supplies.



Left, how the parts are situated on the top of the Ferranti universal chassis. Right, the underneath layout. The condenser block on the right of the chassis—it is not shown—contains C20 & C21.

(*Continued from opposite page.*)

.002, 1 red spot; .0003, 1 yellow spot; .0003, 2 yellow spots; .0004, 2 red spots; .0005, 1 green and 1 yellow spot; .0006, green and 1 red spot; .001, 1 green spot; .0016, 2 blue spots; .00175 1 blue spot; .002, 1 brown band; .01, 1 green band; .02, 1 yellow band; .05, 1 red band; .1, 1 grey band; .01, 2 green bands; .05, 2 red bands; .1, 2 grey bands.

Replacing Chassis.—Lay chassis inside cabinet, replace holding screws and control knobs.

Connect the speaker leads to their corresponding plugs.

PHILIPS TWENTY-WATT AMPLIFIER

Circuit.—The input to the first valve, F4160 (V1), is through a condenser to the grid and direct to the cathode.

Cathode bias is used and the input is properly decoupled.

The output circuit of this valve is coupled to the transformer by links, which allow the output valve to be used alone with a set or other amplifier. To form an independent H.T. feed for the output valve of the preceding set the choke L11 is connected across the input, and the transformer is condenser fed.

The output valve, MC 1/60 (V2), is a directly heated valve and a special form of hum neutralising is obtained by feeding the A.C. from R5 (across the heater winding), through C6 to the choke L8, which forms part of the L.F. coupling to the grid.

The output transformer has a multi-tapped secondary, and a safety neon cartridge is connected across the full winding.

Special Notes.—Everything accessible from the outside is labelled, and the various combinations of connections for speakers are easily understood.

The lettered connections should be connected by links as follows :—

For gram : A to B and C to D.

For radio : A to C and use C and D as input terminals.

E and F should be strapped together, except when a milliammeter is connected between them.

A pilot lamp of 4 v. .35 amp. can be connected between G and H.

The voltage between terminal A and chassis should be between 270 and 330 volts.

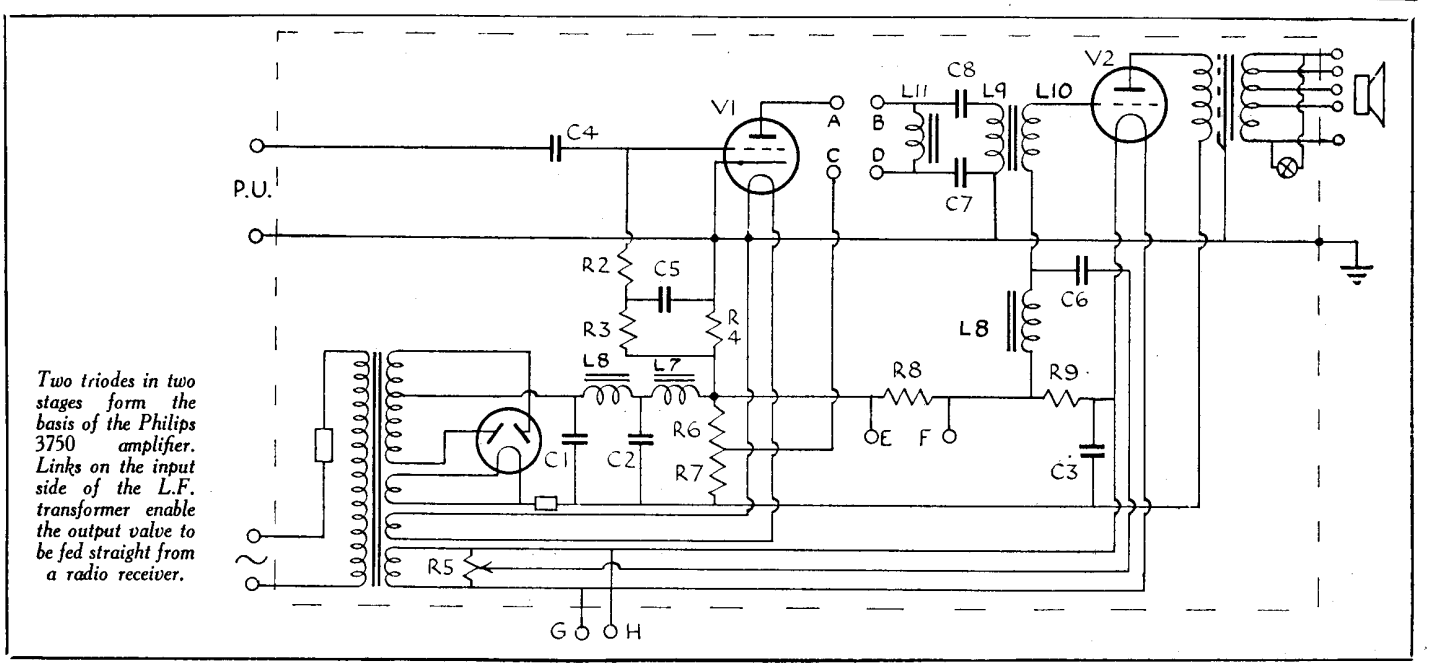
Revealing Chassis.—Remove two screws from front of perforated cover and three

RESISTANCES

R.	Purpose.	Ohms.
2	V1 grid leak	.2 meg.
3	V1 grid decoupling	.32 meg.
4	V1 cathode bias	250
5	Artificial centre of V2 filament	45
6	Part of H.T. ptr.	50,000
7	Part of H.T. ptr.	50,000
8	Part of V2 bias ptr.	100
9	Part of V2 bias ptr.	1,350

CONDENSERS

C.	Purpose.	Mfd.
1	H.T. smoothing	2
2	H.T. smoothing	2
3	V2 bias decoupling	2
4	Input to V1 grid	.1
5	V1 grid decoupling	2
6	Series with hum adjustment ..	2
7	Filter to L.F. transformer ..	2
8	Filter to L.F. transformer ..	.125



Two triodes in two stages form the basis of the Philips 3750 amplifier. Links on the input side of the L.F. transformer enable the output valve to be fed straight from a radio receiver.