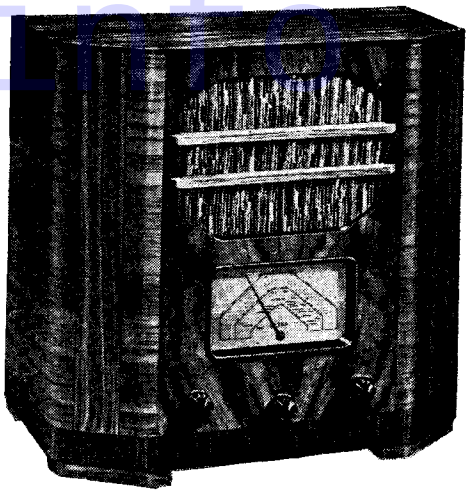
ULTRA 116 A.C.-D.C. THREE BAND



CIRCUIT.—The aerial is coupled to the grid of V1, a triode hexode frequency changer, via a set of iron-cored band-pass coils on the medium and long wave bands and via an H.F. aerial transformer on the short-wave band.

The signal, converted to the I.F. of 456 kc., passes via an iron-cored I.F. transformer to V2, an H.F. pentode and the I.F. amplifier of the receiver.

Another I.F. transformer of similar construction couples V2 to the demodulating diode of V3, a double-diode output pentode. The other diode of V3 is fed by a coupling condenser, C22, to give a rectified potential that is fed back to the two preceding stages for A.V.C.

Coupling arrangements to the grid of the triode section of V3 include a manual volume control that operates so as to vary the input to the grid of that valve. Output of V3 passes to the speaker via a matching transformer across the primary of which is connected a pentode compensator designed to effect a modification of the tone of the receiver.

Mains equipment consists of a mains adjustment (tapped resistance), a half-wave rectifying valve V4, electrolytic smoothing condensers and smoothing choke. Each mains supply lead is protected by fuses and led to a twin choke suppressor arrangement.

Chassis Removal.—Remove the back of the cabinet (held by six sliding clips) and the three control knobs.

Turn the chassis on its side so as to render the base accessible, and remove the four chassis securing bolts and washers. The chassis can then be withdrawn from the cabinet and is free to the extent of the speaker cable.

The speaker, secured by four bolted clips, can be removed if desired or, alternatively, the leads to the speaker panel can be unsoldered. From top to bottom of the panel the colours of the leads are red, black, green, black with white tracer, yellow.

Special Notes.—The mains voltage adjustment resistance on the chassis deck has tappings brought out to metal tags that are marked with the corresponding voltages.

The mains supply leads have fuses in each lead, located on the top of the smoothing choke. They are Bulgin fuses rated at 500 ma.

A pair of sockets at the rear of the chassis enable a pick-up to be connected. The receiver is designed to work with a piezo-electric type. If it is desired to use an electro-magnetic pick-up, then an 8:1 ratio transformer should be interposed between the pick-up and the set. When the wave selection switch is in the gram. position the coupling to the radio stages is removed.

Resistances R9, R10, R12 and R13 and condensers C20 and C21 are located inside the I.F.T.2 can and condensers C14 and C15 inside the I.F.T.1 can.

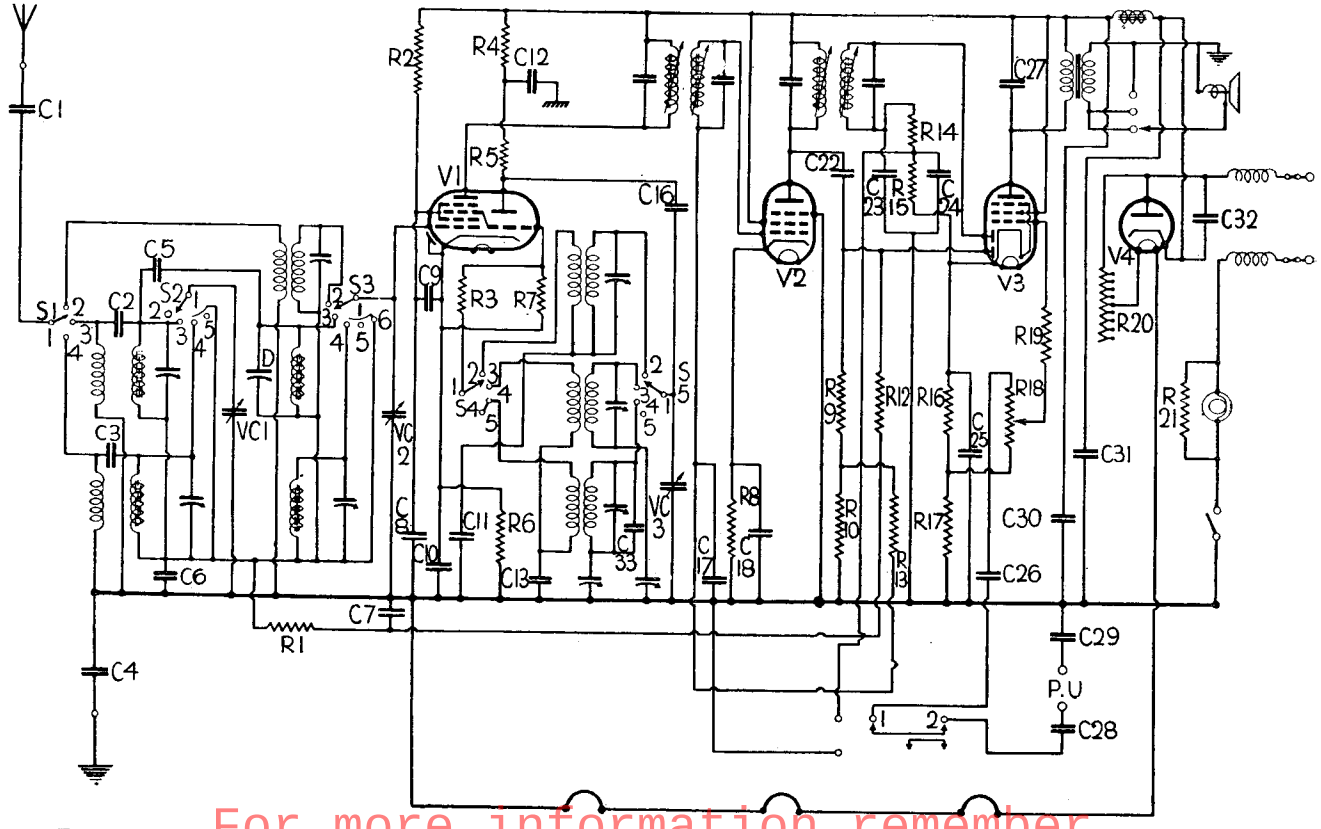
There are two dial lights, located one each side of the dial assembly, mounted in screw-in holders that are clamped to the supporting brackets. They are Osram bulbs rated at 4.5 volts .3 amp., and are frosted to obviate glare.

A pair of sockets at the rear of the chassis enable an external speaker to be operated. This should be of the P.M. moving coil type, with a low impedance.

QUICK TESTS

Quick tests are available from the leads to the speaker transformer. Volts measured between these and the chassis should be:—

Red lead	180
Black and white	162



Each mains supply lead in the Ultra 116 A.C.-D.C. all-wave three is fuse protected and is led to a twin choke suppressor arrangement.

Alignment Notes

I.F. Circuits.—Connect a service oscillator between the grid top cap of V1 and chassis *via* a fixed condenser. Connect an output meter across the primary of the speaker transformer in the usual manner. Switch the set to medium waves and fully interleave the vanes of the gang condenser. Turn the volume control to the maximum position.

Turn the oscillator to 456 kc., and adjust the cores of the I.F. transformers (starting with the second transformer) for maximum response, reducing the input from the service oscillator as the circuits come into line to render the A.V.C. inoperative. A non-metallic trimming tool should be used.

Signal Circuits.—Leave the output meter connected as before, but connect the service oscillator to the aerial and earth sockets through either a dummy aerial or a fixed condenser. Feed only sufficient input from the service oscillator to obtain definite peaks in the output meter so as to render the A.V.C. inoperative.

Medium Waves.—Tune set and oscillator to 200 metres (1,500 kc.) and adjust first T1 and then T2 and T3 for maximum. Tune the set and oscillator to 500 metres (600 kc.) and adjust P1 for maximum, simultaneously rocking the gang to ensure optimum results. Repeat the operations until no further improvement is noticed.

Long Waves.—Tune set and oscillator to 1,000 metres (300 kc.) and adjust first T4 and then T5 and T6 for maximum response. Tune the set and oscillator to 1,700 metres (176 kc.) and adjust P2 for maximum, simultaneously rocking the gang to ensure optimum results. Repeat the operations until no further improvement is noticed.

Short Waves.—Tune set and oscillator to 17 metres (17,647 kc.) and adjust first T8 and then T9 for maximum response, taking care that the image is received at about 18 metres. The short-wave padding is fixed, but check the calibration by injecting signals of various wavelengths throughout the range.

CONDENSERS

C.	Purpose.	Mfds.
1	Series aerial	.004
2	M.W. aerial coupling	.000005
3	L.W. aerial coupling	.00001
4	Chassis-earth isolating	.1
5	M.W. top band-pass coupling	—
6	Bottom band-pass coupling	.025
7	V1 A.V.C. decoupling	.025
8	V1 screen decoupling (part)	2.
9	V1 screen decoupling (part)	.1
10	V1 cathode shunt	.1
11	S.W. fixed osc. padder	.004
12	Osc. anode decoupling	2.
13	M.W. and L.W. regeneration return.	.001
14	I.F.T.1 primary fixed trimmer.	.00015
15	I.F.T.1 secondary ditto	.00015
16	Osc. anode decoupling	.0001
17	V2 A.V.C. decoupling	.025
18	V2 cathode shunt	.1
20	I.F.T.2 primary fixed trimmer.	.00015
21	I.F.T.2 secondary do.	.00015
22	A.V.C. diode coupling	.0002
23	H.F. bypass	.00006
24	H.F. bypass	.0001
25	V3 cathode shunt	50
26	L.F. coupling	.01
27	Pentode compensator	.004
28	P.U. coupling	.1
29	P.U. coupling	.1
30	H.T. smoothing	32
31	H.T. smoothing	8
32	H.F. bypass	.1
33	L.W. osc. fixed trimmer	.00006

Replacement Condensers

Replacement condensers available from A. H. Hunt, Ltd., are: For either C8 or C12, unit 2964, 1s. 10d.; for C30, unit 3058, 9s. 6d.; for C31, unit 3055, 6s.; and for C25, unit 3531, 1s. 10d.

RESISTANCES

R.	Purpose.	Ohms.
1	V1 A.V.C. decoupling (part)	500,000
2	V1 screen decoupling	15,000
3	Harmonic suppressor	60
4	Osc. anode decoupling	4,000
5	Osc. anode load	25,000
6	V1 cathode bias	138
7	Osc. grid leak.	25,000
8	V2 cathode bias	60
9	A.V.C. diode load (part)	250,000
10	A.V.C. load (part)	750,000
12	V1 A.V.C. decoupling	1 meg.
13	V2 A.V.C. decoupling	1 meg.
14	H.F. filter	25,000
15	Demodulating diode load	500,000
16	V3 cathode bias (part)	138
17	V3 cathode bias (part)	138
18	Volume control	1 meg.
19	V4 grid stopper	1,000
20	Mains voltage adjustment	575
21	Pilot lamp shunt	80
	Smoothing choke	490

Ultra 116 on Test

MODEL 116.—For A.C. or D.C. operation, 195-255 volts. Price, 11½ gns.

DESCRIPTION. — Three-waveband, three-valve and series-connected rectifier, table superhet.

FEATURES. — Full-vision scale, three controls, fixed tone, sockets for pick-up and extra speaker.

LOADING.—62 watts.

Selectivity and Sensitivity

SHORT WAVES (16.8-50 metres).—Good gain, selectivity well maintained. Quite easy handling.

MEDIUM WAVES (200-550 metres).—Representative gain and selectivity for valve combination used. Local station spread on adjacent channels. Good background.

LONG WAVES (900-2,000 metres).—Very good gain and selectivity. All main stations easily received. Some interference on Deutschlandsender.

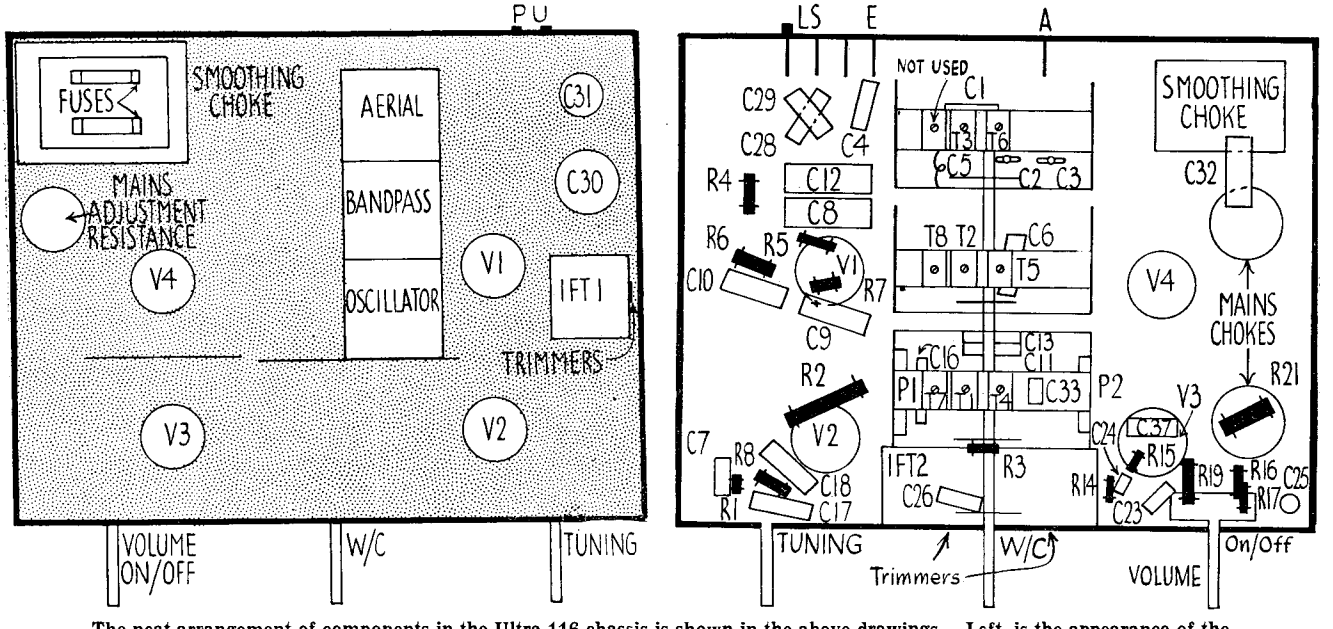
Acoustic Output

Full tone with appreciable top response. Ample volume for ordinary room without overloading. Only very slight coloration on speech and general pleasing balance on orchestral music.

VALVE READINGS

No Signal. Volume Maximum. M.W. Band. 200 volts A.C. 1,000 ohms/volt meter.

V.	Type.	Electrode.	Volts.	MA.
	All Mazda.			
1	T.H. 2320	Anode	172	3.5
	met. (7)	Screen	80	7.6
		Osc. Anode	60	4.1
2	V.P. 1322	Anode	180	5.7
	met. (7)	Screen	178	2
3	Pen DD 4020	Anode	162	27.
	(7)	Screen	175	6.5
4	U 4020 (5)	Filament	162	—



The neat arrangement of components in the Ultra 116 chassis is shown in the above drawings. Left, is the appearance of the top of the chassis, and right the underside view.