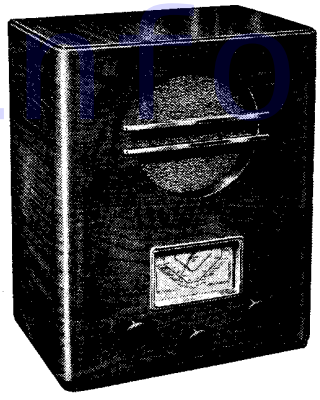
ULTRA 103 BATTERY SUPERHET FOUR



Ultra Electric's model 103 is a four-valve battery-operated superhet functioning on medium and long wave-bands. It sells at 11½ guineas.

CIRCUIT.—An inductively coupled, band-pass filter constitutes the aerial input circuit to V1, a triode-hexode frequency changer. An image rejector coil is incorporated; this takes the form of a few turns of wire open at one end with the other end connected to earth and inductively coupled to the medium-wave wind of the H.F. section of the band-pass assembly.

The actual aerial coupling is through a potentiometer, R1, which is ganged with the L.F. volume control, and this varies the strength of the signal applied to the grid of V1.

The oscillator circuit is unusual and should be noted; tuning is in the anode circuit, an additional capacity being placed in series with the tuning condenser on long waves. Cathode injection is employed to the mixer section, in this case the filament circuit being the cathode and the remaining sections of the oscillator coils being connected in series with each filament lead.

Coupling to V2, an H.F. pentode, is by an I.F. transformer tuned to 456 kc. Attention is drawn to the H.F. choke, which decouples the anode circuit of V1.

A second I.F. transformer provides the coupling to V3, a double-diode triode, one diode of which is used for demodulation; the other is coupled to the anode of V2 by C10, and supplies A.V.C. bias to the preceding valves in the orthodox manner.

Notice that the diode load R10 is taken to a tap on the grid bias potentiometer.

The rectified output of the demodulator diode is taken to the grid of the triode section through an H.F. choke and a resistance and capacity stage incorporating the volume control.

The amplified L.F. output of V3 is transformer coupled to V4, the Q.P.P. output pentode, and after further amplification through a transformer to the permanent-magnet moving-coil speaker.

H.T. is obtained from a Drydex H1132-120-volt battery, and L.T. from an Exide CZH3 2-volt accumulator.

Special Notes.—The pilot light is rated at 3.5 volts, .15 amp., and is secured by a spring clip to the chassis. To remove it take off the false bottom of the cabinet. This will disclose the holder. The bulb may be permanently removed if it is desired to economise in L.T. consumption.

Sockets on the back of the chassis provide connections for a low impedance external speaker, the Ultra models 30 and 45 being particularly recommended.

A further socket and flying lead are provided by the side of the extension speaker sockets, so that the internal speaker may be silenced if desired; this is done by removing the plug from its socket and leaving it free.

Removing Chassis.—Practically all the work necessary on this receiver may be done without removing the chassis by taking off the false bottom of the cabinet. This is held in place by four screws.

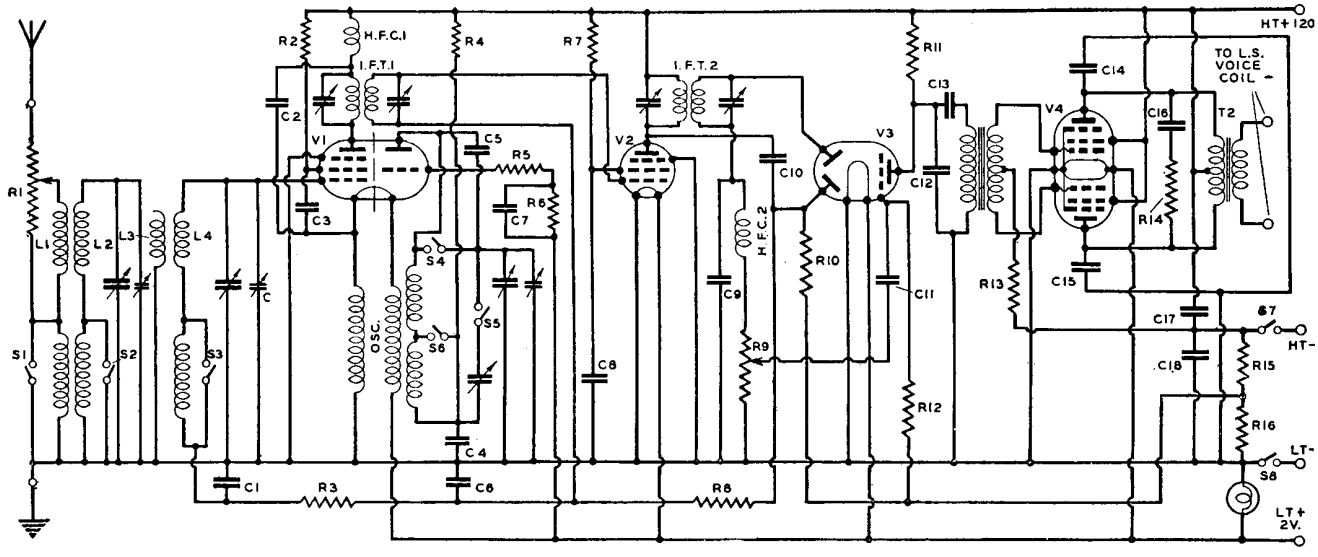
Should it be considered necessary to completely remove the chassis, procedure is as follows :—

RESISTANCES

R.	Purpose.	Ohms.
1	Volume control (aerial section)	2,000
2	V1 screen decoupling	200,000
3	V1 A.V.C. decoupling	1 meg.
4	V1 osc. anode decoupling	2,000
5	V1 osc. grid harmonic suppressor	1,000
6	V1 osc. grid	250,000
7	V2 screen decoupling	100,000
8	V2 A.V.C. decoupling	1 meg.
9	Volume control (L.F. section)	500,000
10	A.V.C. diode load	1 meg.
11	V3 anode load	50,000
12	V3 grid bias	2 meg.
13	V4 grid bias	150,000
14	Pentode compensating	30,000
15	Grid bias potr	685
16	Grid bias potr.	145

CONDENSERS

C.	Purpose.	Mfds.
1	V1 A.V.C. decoupling	.05
2	V1 anode decoupling	.1
3	V1 screen decoupling	.1
4	V1 osc. anode decoupling	.1
5	Oscillator padding (l.w.)	.0003
6	V1 A.V.C. decoupling	.05
7	V1 osc. grid	.0002
8	V2 screen decoupling	.1
9	H.F. filter	.0001
10	A.V.C. diode coupling	.0002
11	L.F. coupling	.01
12	H.F. filter	.0001
13	L.F. coupling	.15
14	Pentode compensating	.002
15	Pentode compensating	.002
16	Pentode compensating	.004
17	H.T. shunt	8
18	Grid bias by-pass	50



An unusual oscillator circuit is used in the Ultra 103 battery superhet. Tuning is in the anode circuit, with additional capacity, C5, in series with the tuning condenser on long waves. Cathode (filament) injection is employed with sections of the oscillator coils in series with each filament lead. Valves following the frequency changer are an H.F. pentode, a double-diode-triode and a double-pentode Q.P.P. output valve.

Remove the control knobs (grub screws), remove the battery shelf and unsolder the speaker leads. Take out the three bolts from underneath the cabinet. The chassis may then be removed.

Circuit Alignment Notes

I.F. Circuits.—Connect a modulated oscillator tuned to 456 kc. to the grid cap of V1 and an output meter across the external speaker terminals, remembering that these are on the secondary of the output transformer.

Trim T1, T2, T3 and T4 for maximum output, reducing the output from the oscillator progressively as the circuits come into line so as to escape bringing the A.V.C. into operation.

Medium Waves.—Tune the receiver to 200 metres (1,500 kc.) and inject a signal of this wavelength from the oscillator to the aerial and earth terminals via a dummy aerial.

Adjust T5, T6 and T7 for maximum output.

If a heterodyne whistle is discovered after adjusting these trimmers, just above the London Regional station, T6 and T7 should be readjusted until it disappears.

Long Waves.—Tune the receiver and the oscillator to 1,500 metres (200 kc.) and adjust T8 for maximum reading.

Repeat the medium and long-wave adjustments until the best possible results are obtained.

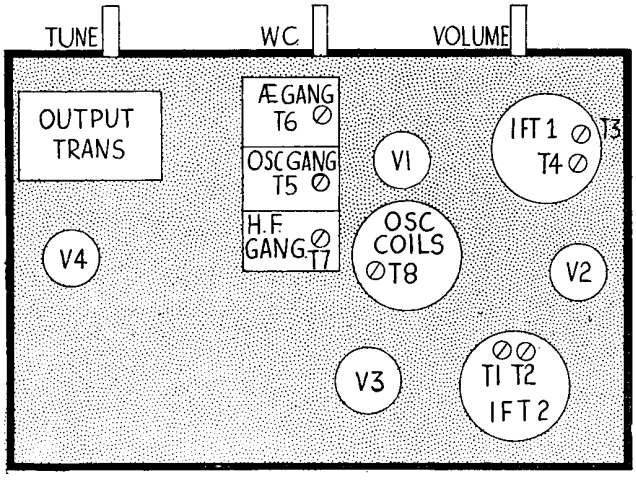
Exact replacement units for two condensers in the Ultra Model 103 battery superhet four are made by A. H. Hunt, Ltd., of Garratt Lane, Wandsworth, London, S.W.18.

They are as follows: For C17, 8 mfd. H.T. shunt, list No. 1956, price 1s. 9d.; for C18, 50 mfd. grid-bias by-pass, list No. 2915, price 1s. 9d.

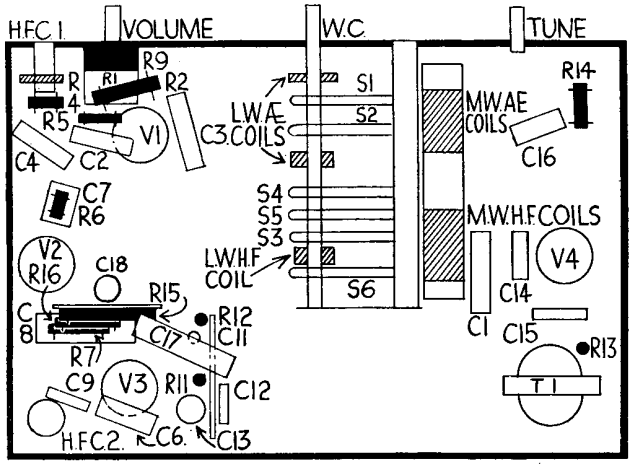
VALVE READINGS

No signal. Volume maximum. New batteries.

V.	Type.	Electrode.	Volts.	Ma.
1	(All Mazda) TP22 met. (9)	Anode	120	.85
		Screen	48	.3
		Osc.anode	115	3.1
2	VP210 met. (7)	Anode	120	1.35
		Screen	65	..
3	L21DD met. (5)	Anode	95	.9
4	QP230 (7)	Anode (1)	118	3.6
		Screen	120	1.4
		Anode (2)	118	3.6



A plan-view diagram of the 103 chassis, showing the layout of components on the top. Sockets on the back provide for a low-impedance extension speaker. Also on the back is a flying lead with plug and its socket; this cuts the internal speaker out when removed.



The underside of the chassis. To get at it the chassis need not be removed from the cabinet; it is made accessible by removing the false bottom, held in place by four screws. The pilot lamp is also accessible by this means.

Ultra 103 on Test

MODEL 103.—Standard model for battery operation, using Drydex H1132 H.T. battery, and an Exide CZH3 2-volt accumulator. Price 11½ gns.

DESCRIPTION.—Table model four-valve superhet with triode-hexode frequency changer and Q.P.P. output.

FEATURES. — Permanent-magnet speaker, characteristic Ultra dial tuning, wave switch and volume controls.

Sensitivity and Selectivity

MEDIUM WAVES (195-575 metres). —The gain is very good, enabling ample room strength to be obtained from a large number of stations. Selectivity is sufficient for most purposes, with noticeable spread only on local stations.

LONG WAVES (850-2,100 metres).—Selectivity and sensitivity both excellent. Deutschlandsender received with almost complete freedom from interference.

Acoustic Output

Very good quality for a battery output, with little colouration and pleasant balance.

"—Never Come Singly"

AN A.C. superhet was brought in with the complaint that results had been inferior for some time, and now the set had developed a terrible noise.

The mains transformer falling under suspicion, it was removed, and tests revealed a leak between H.T. secondary and a heater winding—sufficient to account for the noise.

A new transformer was fitted, but now the set had a bad hum. This was traced to a defective smoothing condenser.

Testing with the lead to this condenser disconnected, it was found that noise was caused when this lead was moved. This third trouble was traced to a tubular suspended in this wiring, which had an intermittent connection in a wire end.

New smoothing and tubular condensers were fitted, but still there was intermittent noise. The frequency-changer was found to be responsible.

Replacing it, calibration was found to be out. Retrimming corrected this, and at last the set worked well.—W. G. GOUGH, Worcester.

A.C.-D.C. Set Hum.

Receivers using A.C./D.C. valves sometimes develop hum troubles in the heater circuit. Where a barretter lamp is used, the lamp can be temporarily removed from its socket after the set has become thoroughly warmed up. The receiver will continue operating for some seconds while the heaters are still warm, but if heater hum trouble is present this will cease when the filament circuit is broken. The faulty valve can be traced by a process of elimination. Care should be taken while doing this, owing to the probability of a live chassis.—M. B.