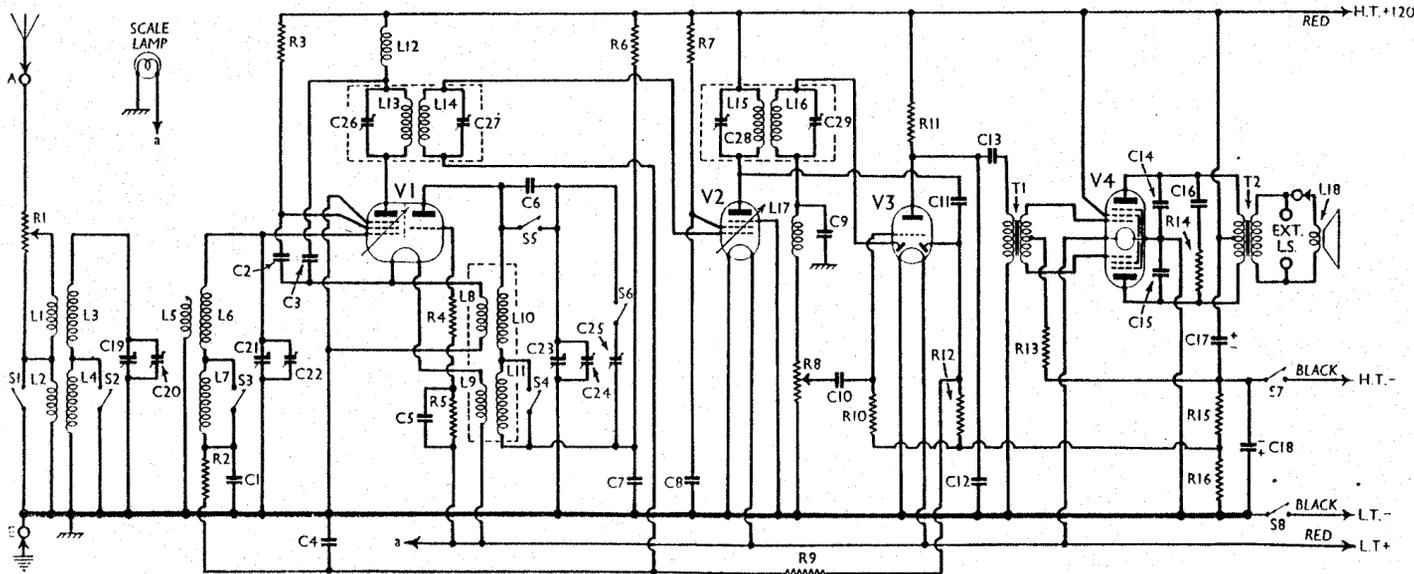


ULTRA - 103



Circuit diagram of the Ultra 103 4-valve battery superhet. Automatic grid bias is provided. L5 is a loading coil for L6.

COMPONENTS AND VALUES

CONDENSERS		Values (μF)
C1*	V1 pent. C.G. decoupling	0.05
C2	V1 pent. S.G. by-pass	0.1
C3	V1 pent. anode decoupling	0.1
C4	A.V.C. line decoupling	0.05
C5	V1 osc. C.G. condenser	0.0002
C6	Oscillator L.W. tracker	0.0003
C7	V1 osc. anode decoupling	0.1
C8	V2 S.G. by-pass	0.1
C9	L.F. by-pass	0.0001
C10	L.F. coupling to V3 triode	0.01
C11	Coupling to V3 A.V.C. diode	0.0002
C12	V3 triode anode I.F. by-pass	0.0001
C13	L.F. coupling to T1	0.15
C14	Tone correction condensers	0.002
C15		0.002
C16		0.004
C17*	H.T. supply reservoir	8.0
C18*	Auto G.B. circuit by-pass	50.0
C19†	Band-pass primary tuning	—
C20†	Band-pass primary trimmer	—
C21†	Band-pass secondary tuning	—
C22†	Band-pass secondary trimmer	—
C23†	Oscillator circuit tuning	—
C24†	Osc. circuit M.W. trimmer	—
C25†	Osc. circuit L.W. trimmer	—
C26†	1st I.F. trans. pri. tuning	—
C27†	1st I.F. trans. sec. tuning	—
C28†	2nd I.F. trans. pri. tuning	—
C29†	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

RESISTANCES		Values (ohms)
R1	Aerial input control	2,000
R2	V1 pent. C.G. decoupling	1,000,000
R3	V1 pent. S.G. H.T. feed	200,000
R4	V1 osc. harmonic suppressor	1,000
R5	V1 osc. C.G. resistance	250,000
R6	V1 osc. anode decoupling	2,000
R7	V2 S.G. H.T. feed	100,000
R8	V3 signal diode load	500,000
R9	A.V.C. line decoupling	1,000,000
R10	V3 triode C.G. resistance	2,000,000
R11	V3 triode anode resistance	50,000
R12	V3 A.V.C. diode load	1,000,000
R13	V4 C.G.'s stabiliser	150,000
R14	Tone correction resistance	30,000
R15	Auto G.B. resistances	685
R16		115

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial coupling coils	1.5
L2		48.5
L3		4.7
L4		11.3
L5	L6 loading coil	1.3
L6	Band-pass secondary coils	4.7
L7		11.3
L8	Oscillator coupling coils	Very low
L9		Very low
L10		8.5
L11	Valve tuning coils	4.0
L12	V1 pent. anode H.F. choke	55.0
L13	1st I.F. trans.	5.6
L14		5.6
L15	2nd I.F. trans.	5.6
L16		5.6
L17	I.F. filter choke	500.0
L18	Speaker speech coil	2.6
T1	Intervalve trans.	1,240.0
T2		2,480.0
S1-S6	Waveband switches	0.23
S7	H.T. circuit switch	—
S8	L.T. circuit switch	—

VALVE ANALYSIS

Valve voltages and currents, given in the table below, are those measured in our receiver when it was operating on a new H.T. battery reading 128 V. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TP23*	118	1.1	45	0.3
V2 VP210	118	2.1	60	0.6
V3 L21/DD	60	1.0	—	—
V4 QP230	118†	1.9†	118	0.9

* Oscillator anode, 110 V, 1.3 mA.

† Each anode.

H.F. and Oscillator Stages.—Feed in a 200 m. signal, switch set to M.W., and adjust pointer to 200 m. on the scale. Adjust C24, C20 and C22 for maximum output. If a heterodyne whistle is noticed just above London Regional, re-adjust C20 and C22 until it disappears.

Feed in a 1,500 m. signal, switch set to L.W., and adjust pointer to 1,500 m. on scale. Adjust C25 for maximum output.

GENERAL NOTES

Switches.—S1-S6 are the waveband switches, ganged together in a single unit beneath the chassis, and indicated in our under-chassis view. All the switches, with the exception of S6 are closed on the M.W. band, and open on the L.W. band. S6 is open on the M.W. band and closed on the L.W. band.

S7 and S8 are the H.T. and L.T. circuit switches, of the Q.M.B. type, ganged with the dual volume control R1, R8.

Coils.—L1-L7 are beneath the chassis, mounted on two tubular formers below the switch unit. The M.W. coils are on one former, and the L.W. ones on the other. L1 is wound over L3, and L5 over L6.

L8-L11, and the I.F. transformers L13, L14 and L15, L16 are in three screened units on the chassis deck, which contain the associated trimmers. The second I.F. transformer also contains C11, R2, R9 and R12.

L12 and L17 are two H.F. chokes, beneath the chassis.

Scale Lamp.—This is an Osram M.E.S. type, with a small bulb, and is rated at 3.5 V, 0.15 A.

External Speaker.—Two sockets are provided at the rear of the chassis for a low resistance (about 30) external speaker.

Batteries.—L.T., Exide CZH3 30 AH celluloid-cased 2 V cell. H.T., Drydex H1132 120 V H.T. battery. Automatic grid bias is employed.

Battery Leads and Voltages.—Black rubber lead, spade tag, L.T. negative; Red rubber lead, spade tag, L.T. positive 2 V; Black lead and plug, H.T. negative; Red lead and plug, H.T. positive 120 V.

Resistances R2, R9, R12.—These are all 1 MO resistances, and are included in the second I.F. transformer, with C11. If the coil can be removed, then looking from above the chassis, the horizontal resistance is R2, that vertically above it is R9, while R12 is also vertical, but below C11.

CIRCUIT ALIGNMENT

Set pointer to cover the horizontal line at the higher wavelength end of the scale, above the 2,000 m. mark when the gang condenser is at maximum. The pointer is a friction fit on the spindle.

I.F. Stages.—Feed in a 456 KC/S signal, and adjust C29, C28, C27 and C26 for maximum output, reducing the input progressively.