



Intermediate frequency 456 KC/S.

## COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	V1 C.G. decoupling	1,000,000
R2	V1 S.G. H.T. feed	30,000
R3	V1 fixed G.B. potentiometer	138
R4	and S.W. sensitivity resistances	6,900
R5		80,900
R6	V1 anode H.T. feed	4,00
R7	V2 hexode C.G. resistance	1,000,000
R8	V2 S.G. H.T. feed	30,000
R9	V2 fixed G.B. resistance	200
R10	V2 osc. C.G. resistance	25,000
R11	V2 osc. C.G. circuit stabiliser	60
R12	V2 osc. anode H.T. feed	40,000
R13	V3 C.G. decoupling	1,000,000
R14	V3 fixed G.B. resistance	30
R15	Manual volume control	1,000,000
R16	V4 signal diode load	500,000
R17	V4 C.G. I.F. stopper	1,000
R18	V4 G.B. and A.V.C. delay	138
R19	voltage resistances	138
R20	V4 anode circuit stabiliser	60
R21	V4 A.V.C. diode load	250,000
R22	resistances	750,000
R23	V1, V2 A.V.C. line decoupling	1,000,000

CONDENSERS		Values (μF)
C1	V1 C.G. decoupling	0.05
C2	V1 S.G. decoupling	0.5
C3	V1 cathode by-pass	0.1
C4	V1 anode R.F. by-pass	0.01
C5	V1 anode decoupling	0.1
C6	V2 hexode C.G. condenser	0.0001
C7	V2 hexode C.G. decoupling	0.05
C8	V2 S.G. decoupling	0.1
C9	V2 cathode by-pass	0.5
C10	V2 osc. S.W. C.G. condenser	0.0001
C11	V2 osc. M.W. and L.W. R.F. by-pass	0.001
C12	Oscillator circuit S.W. tracker	0.004
C13	Oscillator circuit L.W. fixed trimmer	0.0001
C14	V2 osc. anode coupling	0.0001
C15	V3 C.G. decoupling	0.05
C16	V3 cathode by-pass	0.1
C17	A.F. coupling to V4	0.01
C18	V4 A.V.C. diode coupling	0.0001
C19	I.F. by-pass	0.00
C20	V4 anode tone corrector	0.01
C21*	V4 cathode by-pass	50.0
C22*		8.0
C23*	H.T. smoothing	32.0
C24†	Aerial circuit S.W. trimmer	—
C25†	Aerial circuit M.W. trimmer	—
C26†	Aerial circuit L.W. trimmer	—
C27†	Aerial circuit tuning	—
C28†	V1 anode circuit S.W. trimmer	—
C29†	V1 anode circuit M.W. trimmer	—
C30†	V1 anode circuit L.W. trimmer	—
C31†	V1 anode circuit tuning	—
C32†	Osc. circuit S.W. trimmer	—
C33†	Osc. circuit M.W. trimmer	—
C34†	Osc. circuit L.W. trimmer	—
C35†	Osc. circuit M.W. tracker	0.0006
C36†	Osc. circuit L.W. tracker	0.0003
C37†	Osc. circuit tuning	—
C38†	1st I.F. trans. pri. tuning	—
C39†	1st I.F. trans. sec. tuning	—
C40†	2nd I.F. trans. pri. tuning	—
C41†	2nd I.F. trans. sec. tuning	—

\* Electrolytic. † Variable. ‡ Pre-set.

Circuit diagram of the Ultra 50 3-band A.C. superhet. The scale lamps are run from a tapping on the heater secondary of T2. S5 is a sensitivity switch which is included in the wavechange units, and closes on S.W. only.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial M.W. and L.W. coupling	15.0
L2	Aerial circuit S.W. tuning coil (total)	0.1
L3	Aerial circuit M.W. tuning coil	4.1
L4	Aerial circuit L.W. tuning coil	12.0
L5	V1 anode S.W. tuning coil	0.1
L6	V1 anode M.W. tuning coil	4.1
L7	V1 anode L.W. tuning coil	12.0
L8	Oscillator grid S.W. reaction	12.0
L9	Osc. anode S.W. tuning coil	0.1
L10	Oscillator grid M.W. reaction	1.5
L11	Osc. anode M.W. tuning coil	3.7
L12	Oscillator grid L.W. reaction	2.0
L13	Osc. anode L.W. tuning coil	11.0
L14	1st I.F. trans. Pri.	5.75
L15	1st I.F. trans. Sec.	5.75
L16	2nd I.F. trans. Pri.	5.75
L17	2nd I.F. trans. Sec.	5.75
L18	Speaker speech coil	2.0
L19	Hum neutralising coil	0.1
L20	Speaker field coil	930.0
T1	Output trans. Pri.	325.0
	Output trans. Sec.	0.18
T2	Mains Heater sec. (total)	24.0
	Rect. heat. sec.	0.1
	H.T. sec. (total)	500.0
S1-S16	Waveband switches	—
S17	Mains switch, ganged R15	—

## VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 235 V, using the 230-250 V tapping on the mains transformer. 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 AC/VP1	250	0.3	225	0.1
V2 AC/TH1*	260	2.1	85	6.4
V3 AC/VP1	260	19.0	260	4.7
V4 AC/2Pen/DP	245	34.0	260	7.2
V5 UU4	310†	—	—	—

\* Oscillator anode 80 V, 3.5 mA.

† Each anode, A.C.

## GENERAL NOTES

**Switches.**—S1-S16 are the wave-change switches, ganged in three rotary units beneath the chassis, and indicated in our under-chassis view. The arrows show the directions in which the units are seen in the diagrams on page VIII. Note that some of the tags are blank, and there is a fourth setting of the control knob.

The fourth position of the control closes S11 and mutes radio.

signal, and tune to 17.1 m. on scale. Screw up C32 fully, then unscrew it slowly until a second peak (ie capacity) is reached. Adjust accurately on this peak. Then adjust C38 and C24 for maximum output. Fixed tracking is employed on this band. Check calibration against actual stations.

S12 and S13 are formed by a metal plate on the rotor of the third unit. In the L.W. and the fourth position, this plate moves over to the other side of the unit, connecting one side of S11 to S14, and (in the fourth position) one side of S14 to S15. For the sake of clarity, the extra switches so formed, which are merely incidental, are not shown in the circuit diagram.

The table (page VIII) gives the switch positions for the three control settings, starting from fully anti-clockwise. O indicates open, and C closed.

S17 is the Q.M.B. mains switch, ganged with the volume control R15.

## SWITCH TABLE

Switch	S.W.	M.W.	L.W.
S1	C	O	O
S2	C	O	O
S3	C	O	O
S4	C	O	O
S5	C	O	O
S6	C	O	O
S7	C	O	O
S8	C	O	O
S9	C	O	O
S10	C	O	O
S11*	C	O	O
S12	C	O	O
S13	C	O	O
S14	O	C	O
S15	O	C	O
S16	O	O	C

\* Closed in fourth position.

## CIRCUIT ALIGNMENT

With the gang condenser at maximum, pointer should coincide with top, left-hand white line of scale.

**I.F. Stages.**—Turn gang condenser to maximum. Connect a signal generator to A and E sockets, and an output meter to the external L.S. sockets, and feed in a 456 KC/S signal. Adjust C40, C41, C39, C38 in that order for maximum output, reducing input progressively as the circuits come into line.

**R.F. and Oscillator Circuits.**—M.W.—Feed in a 200 m. signal, tune to 200 m. on the scale, and adjust C34 for maximum output, then C29 and C25.

Feed in a 500 m. signal, tune to 500 m. on scale and adjust C35 for maximum output, rocking the gang meanwhile for optimum results. Calibration should be accurate to plus or minus 7 metres.

**L.W.**—Feed in a 1,000 m. signal, tune to 950 m. on scale, and adjust C34 for maximum output. Then adjust C30 and C26. Feed in a 1,700 m. signal, tune to 1,700 m. on scale, and adjust C36 for maximum output, rocking the gang meanwhile for optimum results.

**S.W.**—Feed in a 17.1 m. (17.55 MC/S)