



Intermediate frequency 456KC/S.

Note the method of using V3 as an amplifier on Gram. Extra switches, which we do not show, are fitted to short out the coils not in use.

COMPONENTS AND VALUES

RESISTANCES	Values (ohms)
R1 V1 C.G. resistance ..	500,000
R2 V1 fixed G.B. resistance ..	200
R3 V2 C.G. resistance ..	500,000
R4 V2 hex. C.G. decoupling ..	250,000
R5 V2 hex. C.G. stabiliser ..	50
R6 V2 S.G. H.T. feed ..	15,000
R7 V2 fixed G.B. resistance ..	200
R8 V2 osc. C.G. resistance ..	50,000
R9 Osc. circuit S.W.1 stabiliser ..	40
R10 Osc. circuit S.W.2 stabiliser ..	151
R11 V2 osc. anode H.T. feed ..	30,000
R12 Gram. pick-up shunt ..	50,000
R13 V3 fixed G.B. resistance ..	200
R14 V3 anode A.F. load (gram.) ..	5,000
R15 I.F. stopper ..	70,000
R16 V4 signal diode load ..	300,000
R17 V4 A.V.C. diode load resistance ..	500,000
R18 V4 A.V.C. diode load resistance ..	300,000
R19 A.V.C. line decoupling ..	300,000
R20 Manual volume control ..	500,000
R21 V5 G.B. and A.V.C. delay ..	105
R22 V5 voltage resistances ..	140
R23 V5 anode stabiliser ..	150
R24 Variable tone control ..	500,000

CONDENSERS (Continued)	Values (μF)
C17 Pick-up circuit R.F. by-pass ..	0.006
C18 V3 C.G. decoupling ..	0.02
C19 V3 anode R.F. by-pass ..	0.006
C20 V3 cathode by-pass ..	0.1
C21 I.F. by-passes ..	0.0001
C22 Coupling to V4 A.V.C. diode ..	0.0001
C23 A.F. coupling to V5 ..	0.0001
C24 V5 cathode by-pass ..	0.02
C25 Fixed tone corrector ..	50.0
C26 Part of variable tone control ..	0.006
C27 H.T. smoothing ..	0.02
C28* H.T. smoothing ..	8.0
C29* H.T. smoothing ..	16.0
C30 Mains circuit R.F. by-pass ..	0.006
C31 Aerial S.W.1 trimmer ..	—
C32 Aerial S.W.2 trimmer ..	—
C33 Aerial M.W. trimmer ..	—
C34 Aerial L.W. trimmer ..	—
C35 Aerial circuit tuning ..	—
C36 R.F. trans. S.W.1 trimmer ..	—
C37 R.F. trans. S.W.2 trimmer ..	—
C38 R.F. trans. M.W. trimmer ..	—
C39 R.F. trans. L.W. trimmer ..	—
C40 R.F. trans. sec. tuning ..	—
C41 Osc. circuit S.W.1 trimmer ..	—
C42 Osc. circuit S.W.2 trimmer ..	—
C43 Osc. circuit M.W. trimmer ..	—
C44 Osc. circuit L.W. trimmer ..	—
C45 Osc. circuit M.W. tracker ..	—
C46 Osc. circuit L.W. tracker ..	—
C47 Oscillator circuit tuning ..	—
C48 1st I.F. trans. pri. tuning ..	—
C49 1st I.F. trans. sec. tuning ..	—
C50 2nd I.F. trans. pri. tuning ..	—
C51 2nd I.F. trans. sec. tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.

CONDENSERS	Values (μF)
C1 V1 C.G. condenser ..	0.00005
C2 V1 C.G. decoupling ..	0.1
C3 V1 cathode by-pass ..	0.1
C4 H.T. circuit R.F. by-pass ..	0.5
C5 V2 hexode C.G. condenser ..	0.00005
C6 V2 hexode C.G. decoupling ..	0.1
C7 V2 S.G. decoupling ..	0.1
C8 V2 cathode by-pass ..	0.1
C9 V2 osc. C.G. condenser ..	0.0002
C10 A.V.C. line decoupling ..	0.02
C11 Osc. circuit S.W.1 tracker ..	0.005
C12 Osc. circuit S.W.2 tracker ..	0.002
C13 Osc. circ. M.W. fixed trimmer ..	0.00002
C14 Osc. circ. L.W. fixed trimmer ..	0.00005
C15 Osc. circ. M.W. fixed tracker ..	0.0003
C16 V2 osc. anode coupling ..	0.0001

OTHER COMPONENTS	Approx. Values (ohms)
L1 Aerial S.W.1 coupling ..	0.45
L2 Aerial S.W.2 coupling ..	0.6
L3 Aerial M.W. coupling ..	14.5
L4 Aerial L.W. coupling ..	75.0
L5 Aerial S.W.1 tuning coil ..	0.1
L6 Aerial S.W.2 tuning coil ..	0.2
L7 Aerial M.W. tuning coil ..	3.0
L8 Aerial L.W. tuning coil ..	16.0
L9 R.F. trans. S.W.1 primary ..	0.4

OTHER COMPONENTS (Continued)	Approx. Values (ohms)
L10 R.F. trans. S.W.2 primary ..	1.2
L11 R.F. trans. M.W. primary ..	0.6
L12 R.F. trans. L.W. primary ..	2.7
L13 R.F. trans. S.W.1 secondary ..	Very low
L14 R.F. trans. S.W.2 secondary ..	0.1
L15 R.F. trans. M.W. secondary ..	3.0
L16 R.F. trans. L.W. secondary ..	15.5
L17 Oscillator S.W.1 grid reaction ..	0.3
L18 Oscillator S.W.2 grid reaction ..	0.7
L19 Oscillator M.W. grid reaction ..	0.6
L20 Oscillator L.W. grid reaction ..	7.2
L21 Oscillator S.W.1 tuning coil ..	Very low
L22 Oscillator S.W.2 tuning coil ..	0.1
L23 Oscillator M.W. tuning coil ..	2.0
L24 Oscillator L.W. tuning coil ..	4.8
L25 1st I.F. trans. Pri. ..	7.0
L26 1st I.F. trans. Sec. ..	7.0
L27 2nd I.F. trans. Pri. ..	7.0
L28 2nd I.F. trans. Sec., total ..	7.0
L29 Speaker speech coil ..	1.5
L30 Hum neutralising coil ..	0.3
L31 Speaker field coil ..	1,500.0
T1 Speaker input trans. Pri. ..	400.0
T1 Speaker input trans. Sec. ..	0.5
T2 Mains trans. Pri., total ..	30.0
T2 Mains trans. Heater sec. ..	0.1
T2 Mains trans. Rect. heat. sec. ..	0.15
T2 Mains trans. H.T. sec., total ..	525.0
F1 Mains circuit fuse ..	—
S1-28 Waveband switches ..	—
S29-30 Radio-gram. change switches ..	—
S31-34 Scale lamp switches ..	—
S35 Mains switch, ganged R24 ..	—

VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 VP4B	200	7.4	200	2.6
V2 AC/TH1	200	6.6	93	2.5
V3 VP4B	160	5.9	200	2.6
V4 2D4A	—	—	—	—
V5 AC/4Pen	170	47.0	200	9.3
V6 1W4/350	320†	—	—	—

† Each anode, A.C.

Valve voltages and currents given in the table above are those measured in our receiver when it was operating on mains of 220 V, using the 220 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 400 V scale of a model 7 Universal Avometer, chassis being negative.

If V2 should become unstable, as in our case, when its anode current is being measured, it can be stabilised by connecting a non-inductive condenser of about 0.1 μF from grid (top cap) to chassis.

GENERAL NOTES

Switches.—S1-S34 are the waveband, pick-up and scale lamp switches, which are in five ganged rotary units beneath the chassis. In addition to these thirty-four switches, which appear on the sides of the units seen looking from the rear of the underside of the chassis, there are about twenty further switches, mounted on the reverse sides of the units, which we do not show, either in the switch diagrams on this page, which are as seen looking from the rear of the chassis, or in the circuit diagram.

The extra switches are not fundamental ones, and are merely used to short circuit the coils not in use.

The table (col. 2) gives the switch positions for the five control settings, starting from fully anti-clockwise. A dash indicates open, and C closed.

S35 is the Q.M.B. mains switch, ganged with the tone control R24.

(suite)

Coils.—All the coils, except those forming the I.F. transformers, are in twelve units beneath the chassis, each unit comprising a tubular or cylindrical former carrying two coils, with a trimmer at its end.

The I.F. transformers **L25, L26** and **L27, L28** are in two screened units on the chassis deck, with their trimmers.

Scale Lamps.—There are six of these in all, two of which light on both S.W. bands, two for M.W., one for L.W. and one for gram. They are switched by

S31-S34 in the ganged switch assembly. All the lamps are M.E.S. types, rated at 6.0 V, 0.3 A.

Fuse F1.—This is a plug-in type, and is used as a mains voltage adjusting link. The wire fuse itself is replaceable, and should be rated at 1 or 2 A.

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (9,000 Ω) external speaker.

Condensers C28, C29.—These are two dry electrolytics in a single carton beneath the chassis, having a common negative (black) lead. The yellow lead is the positive of **C28** (8 μ F) and the red the positive connection of **C29** (16 μ F).

CIRCUIT ALIGNMENT

I.F. Stages.—Short **C47** (front section of gang) to chassis. Connect signal generator to control grid (top cap) of **V2** and chassis, and feed in a 456 KC/S signal. Turn volume control of receiver to maximum and, keeping input low to avoid A.V.C. action, adjust **C51, C50, C49** and **C48** in turn for maximum output. Remove short from **C47**.

R.F. and Oscillator Stages.—M.W.—Connect signal generator to **A** and **E** sockets, with a dummy aerial or 0.0002 μ fixed condenser in series with aerial lead. Switch set to M.W., and tune to 200 m. on scale. Feed in a 200 m. (1,500 KC/S) signal, and adjust **C43**, then **C38** and **C33**, for maximum output. Feed in a 550 m. (544 KC/S) signal, tune it in, and adjust **C45** for maximum output, while rocking the gang for optimum results. Repeat the 200 m. and 550 m. adjustments.

L.W.—Switch set to L.W., tune to 1,000 m. on scale, and feed in a 1,000 m. (300 KC/S) signal. Adjust **C44**, then **C39** and **C34**, for maximum output. Feed in a 2,000 m. (150 KC/S) signal, tune it in, and adjust **C46** for maximum output, while rocking the gang. Repeat the 1,000 m. and 2,000 m. adjustments.

S.W.2.—Switch set to S.W.2 (35-100 m.), tune to 36 m. on scale, and feed in a 36 m. (8.33 MC/S) signal. Adjust **C42**, then **C37** and **C32** for maximum output. Now, while rocking the gang slightly, make final adjustments to these trimmers to ensure maximum gain.

S.W.1.—Switch set to S.W.1 (12-35 m.), tune to 12.5 m. on scale, and feed in a 12.5 m. (24 MC/S) signal. Adjust **C41**, then **C36** and **C31** for maximum output. Finally, while rocking the gang slightly, make final adjustments of these trimmers to ensure maximum gain.

TABLE AND DIAGRAM OF SWITCH UNITS

Switch	Gram.	L.W.	M.W.	S.W.2	S.W.1
S1	—	—	—	—	C
S2	—	—	—	C	—
S3	—	—	C	—	—
S4	—	C	—	—	—
S5	—	—	—	—	C
S6	—	—	—	C	—
S7	—	—	C	—	—
S8	—	C	—	—	—
S9	C	—	—	—	—
S10	—	—	—	—	C
S11	—	—	—	C	—
S12	—	—	C	—	—
S13	—	C	—	—	—
S14	C	—	—	—	C
S15	—	—	—	—	—
S16	—	—	—	C	—
S17	—	C	—	—	—
S18	—	C	—	—	—
S19	C	—	—	—	C
S20	—	—	—	—	—
S21	—	—	—	C	—
S22	—	—	C	—	—
S23	—	C	—	—	—
S24	—	—	—	—	C
S25	—	—	—	C	—
S26	—	—	C	—	—
S27	—	C	—	—	—
S28	C	—	—	—	—
S29	—	C	—	C	C
S30	C	—	—	—	—
S31	—	—	—	C	C
S32	—	—	C	—	—
S33	—	C	—	—	—
S34	C	—	—	—	—

