

COMPONENTS AND VALUES

RESISTANCES	Values (ohms)
R1	V1 CG resistance 500,000
R2	V1 SG HT feed 30,000
R3	V1 fixed GB resistance 300
R4	V1 injector grid resistance 50,000
R5	V2 CG resistance 50,000
R6	V2 anode load 5,000
R7	V3 CG decoupling 100,000
R8	V3 SG HT feed 50,000
R9	V3 fixed GB resistance 250
R10	Part V4 signal diode load 250,000
R11	IF stopper 50,000
R12	Manual volume control 500,000
R13	Part V4 signal diode load 250,000
R14	V4 GB resistance 2,000
R15	V4 triode anode load 100,000
R16	V4 AVC diode load resistances 1,000,000
R17	V4 AVC line decoupling 500,000
R18	AVC line decoupling 1,000,000
R19	V1, V2, V3 and T.L. HT feed 1,500
R20	Variable tone control 250,000
R21	V5 CG input potential divider 250,000
R22	resistances 20,000
R23	V5 GB resistance 2,500
R24	V4, V5 anodes HT feed 20,000
R25	V5 anode load 50,000
R26	V6 CG resistance 250,000
R27	V6, V7 GB resistance 200
R28	T.L. anode HT feed 1,000,000

CONDENSERS	Values (μF)
C1	V1 CG condenser 0.0001
C2	V1 SG decoupling 0.1
C3	1st IF trans. fixed trimmers 0.0001
C4	V1 to V2 osc. coupling 0.0001
C5	V1 cathode by-pass 0.1
C6	Osc. circuit SW1 tracker 0.009
C7	Osc. circuit MW fixed tracker 0.0005
C8	Osc. circuit LW fixed tracker 0.00015
C9	Osc. circuit LW fixed trimmer 0.00001
C10	HT circuit RF by-pass 0.25
C11	V2 CG condenser 0.0001
C12	AVC line decoupling 0.05
C13	V3 CG decoupling 0.05
C14	V3 SG decoupling 0.1
C15	AVC line decoupling 0.05
C16	2nd IF trans. fixed trimmers 0.00008
C17	V3 cathode by-pass 0.1
C18	Base-boost AF coupling 0.02
C19	Treble-boost AF coupling 0.0005
C20	IF by-pass condensers 0.0001
C21	Coupling to V4 AVC diode 0.0001
C22	V4 cathode by-pass 25.0
C23	V4 anode IF by-pass 0.0005
C24	V4 triode and V5 anodes decoupling 4.0
C25	Part of variable tone control 0.01
C26	AF coupling to V5 and V7 0.1
C27	V5 cathode by-pass 25.0
C28	V5 to V6 AF coupling 0.1
C29	8.0
C30	HT smoothing condensers 16.0
C31	Mains RF by-pass 0.01
C32	Aerial circuit SW1 trimmer
C33	Aerial circuit SW2 trimmer
C34	Aerial circuit MW trimmer
C35	Aerial circuit LW trimmer
C36	Aerial circuit tuning
C37	Osc. circuit SW2 tracker
C38	Osc. circuit MW tracker
C39	Osc. circuit LW tracker
C40	Osc. circuit SW1 trimmer
C41	Osc. circuit SW2 trimmer
C42	Osc. circuit MW trimmer
C43	Osc. circuit LW trimmer
C44	Oscillator circuit tuning
C45	1st IF trans. pri. tuning
C46	1st IF trans. sec. tuning
C47	2nd IF trans. pri. tuning
C48	2nd IF trans. sec. tuning

OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial SW1 coupling coil 0.6
L2	Aerial SW2 coupling coil 0.4
L3	Aerial MW coupling coil 1.25
L4	Aerial LW coupling coil 90.0
L5	Aerial SW1 tuning coil 0.05
L6	Aerial SW2 tuning coil 0.35
L7	Aerial MW tuning coil 2.0
L8	Aerial LW tuning coil 9.0
L9	Oscillator SW1 reaction coil 0.45
L10	Oscillator SW2 reaction coil 43.0
L11	Oscillator MW reaction coil 60.0
L12	Oscillator LW reaction coil 1.5
L13	Osc. circuit SW1 tuning coil 0.05
L14	Osc. circuit SW2 tuning coil 0.3
L15	Osc. circuit MW tuning coil 5.6
L16	Osc. circuit LW tuning coil 4.6
L17	1st IF trans. (Pri. 4.8
L18	1st IF trans. (Sec. 4.8
L19	2nd IF trans. (Pri. 4.8
L20	2nd IF trans. (Sec., total 4.8
L21	Speaker speech coil 2.6
L22	HT smoothing choke 200.0
L23	Speaker input (Pri., total 220.0
L24	Speaker input (Sec. 0.3
L25	Mains (Pri., total 13.5
L26	Heater sec. 0.05
L27	Rect. heat. sec. 0.1
L28	HT sec., total 130.0
S1	Waveband switches
S2	Gramophone pick-up switch
S3	Bass-treble boost switch
S4	Mains switch, ganged R12

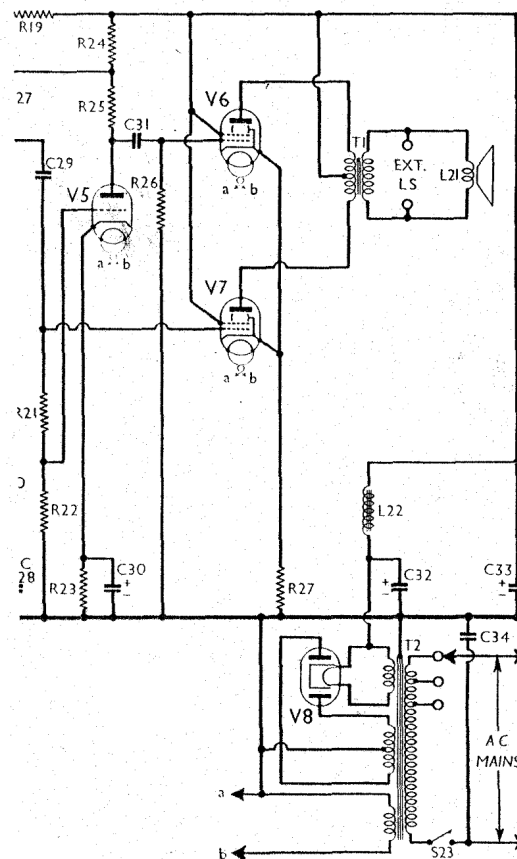
VALVE ANALYSIS

Valve voltages and currents given in the table (col. 3) are those measured in our receiver when it was operating on mains of 226 V, using the 230 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.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 6L7G	237	2.0	88	4.0
V2 6J5G	172	11.0	—	—
V3 6K7G	237	9.8	110	2.2
V4 6Q7G	100	0.8	—	—
V5 6J5G	105	1.9	—	—
V6 6L6G	276	43.0	282	2.2
V7 6L6G	276	48.0	282	2.2
V8 5Z4G	305†	—	—	—
T.L. 6G5	20	0.2	—	—
	Target	2.8	—	—
	237	—	—	—

† Each anode, AC.



GENERAL NOTES

Switches.—**S1-S20** are the waveband switches, and **S21** the pick-up switch, ganged in three rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in col. 6, where they are as seen from the *front* of the underside of the chassis.

In addition to the twenty wave change switches shown, the backs of the first and second switch units (the sides seen from the *rear* of the underside of the chassis) carry a number of shorting switches, which are not shown in our circuit diagram, as they might prove rather confusing. In all, there are sixteen of these extra switches.

Actually, there is one shorting switch across each coil, so arranged that all coils not actually in use are shorted. On any waveband, four of the switches (across the coils in use) are open, and the other twelve closed. On gram, all the sixteen switches are closed.

The table (col. 5) shows the positions of **S1-S21** for the five control settings, starting from fully anti-clockwise. A dash indicates *open*, and **C** closed.

S22 is the bass/treble boost switch, behind the front member of the chassis. It is open in the anti-clockwise position of the control.

S23 is the QMB mains switch, ganged with the volume control **R12**.

Coils.—**L1, L5 ; L2, L6 ; L9, L13** and **L10, L14** are in four unscreened tubular units beneath the chassis. They are mounted vertically close to the switch units.

L3, L4, L7, L8 ; L11, L12, L15, L16 and the IF transformers **L17, L18** and **L19, L20** are in four screened units on the chassis deck. Each unit contains two associated trimmers, while the oscillator unit also contains **C10**, and the IF units contain **C3, C4** and **C17, C18** respectively.

The HT smoothing choke **L22** is mounted on the chassis deck.

Scale Lamps.—These are two Tre-Vita MES types, rated at 6.5 V, 0.5 A each.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (about 3 Ω) external speaker.

Condensers C27, C32, C33.—These are three dry electrolytics (350 V peak working) in a single carton beneath the chassis, having a common negative (black) lead. The green lead is the positive of **C27** (4 μF), the yellow lead is the positive of **C32** (8 μF) and the red lead the positive of **C33** (16 μF).

TABLE AND DIAGRAMS OF THE SWITCH UNITS

Switch	Gram	SW1	SW2	MW	LW
S1	---	C	---	---	---
S2	---	---	C	---	---
S3	---	---	---	C	---
S4	C	---	---	---	C
S5	---	C	---	---	---
S6	---	---	C	---	---
S7	---	---	---	C	---
S8	---	---	---	---	C
S9	---	---	---	---	---
S10	C	---	---	---	---
S11	---	C	---	---	---
S12	---	---	C	---	---
S13	---	---	---	C	---
S14	---	---	---	---	C
S15	C	---	---	---	---
S16	---	C	---	---	---
S17	---	---	C	---	---
S18	---	---	---	C	---
S19	---	---	---	---	C
S20	C	---	---	---	---
S21	C	---	---	---	---

RADIOGRAM 303 MODIFICATIONS

The main difference in the radiogram model (apart from the addition of a pick-up and motor) is that the pick-up is connected in a different manner. Across the pick-up sockets is connected a 100,000 Ω potentiometer. One pick-up socket goes to chassis, while the slider of the potentiometer goes, via **S21**, to the top of the radio volume control **R12**.

The extra potentiometer is mounted at the rear of the chassis, and is intended to be pre-set for gramophone gain. Volume control is adjusted normally by **R12**.

Note that in the model 303 the bass/treble boost control works on radio only; in the 290 it will work on radio and gramophone, though it is not meant to be used for the latter.

CIRCUIT ALIGNMENT

IF Stages.—Short-circuit **C47**, and connect a 250,000 Ω resistance between control grid (top cap) of **V1** and chassis. Connect signal generator across this resistance, and feed in a 473 KC/S signal.

Adjust **C51, C50, C49** and **C48**, in that order, for maximum output. Re-check, then remove the short from **C47** and the 250,000 Ω resistance.

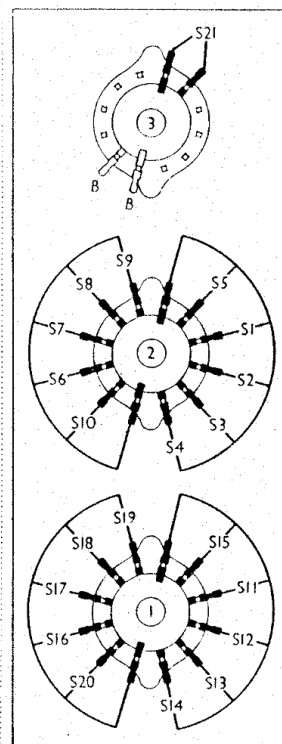
RF and Oscillator Stages.—With gang at maximum, pointer should cover the horizontal lines on the scale. Connect

Tracker C40.—This consists of a double pre-set condenser unit, the two sections being wired in parallel.

Resistance R27.—This is a 3 W 200 Ω wire-wound resistor.

Resistance R5.—This is returned to cathode of **V2** in our receiver, and not to chassis, as in the makers' diagram.

Switch diagrams, as seen from the front of the underside of the chassis. The extra shorting switches, on the backs of the units, are omitted for clarity. See under "Switches."



signal generator to **A** and **E** sockets via a suitable dummy aerial.

LW.—Switch set to LW, tune to 750 m on scale and feed in a 750 m (400 KC/S) signal. Adjust **C46**, then **C38**, for maximum output. Feed in a 2,000 m (150 KC/S) signal, tune it in, and adjust **C42** for maximum output, while rocking the gang for optimum results. Repeat the 750 m adjustments, then the 2,000 m adjustment until no further improvement results.

MW.—Switch set to MW, then adopt same procedure as for LW, but adjust **C45** and **C37** at 200 m (1,500 KC/S) and **C41** at 550 m (545 KC/S).

SW2.—Switch set to SW2, then adopt same procedure, but adjust **C44** and **C36** at 50 m (6 MC/S) and **C40** at 170 m (1.765 MC/S).

SW1.—Switch set to SW1, then adopt same procedure, but adjust **C43** and **C35** at 13.5 m (22.2 MC/S). Tracking is fixed on this band. When adjusting **C43**, use the peak involving least trimmer capacity.