SERVICE MANUAL

mains/battery portable receiver

CONTENTS

ILLUSTRATIONS

MODEL 342BU

1. GENERAL SPECIFICATION

1.1. DESCRIPTION

Model 342 BU is a four valve portable receiver, with a built-in ferrite-rod aerial, covering the Medium and Long wavebands. It is designed for operation on A.C. or D.C. mains or with self-contained dry batteries. The battery/mains changeover is effected automatically when the mains lead is plugged into the receiver.

1.2. CONTROLS

The three controls are arranged concentrically on the front of the cabinet. From the centre outwards, they are as follows :—

Volume Control/On-Off Switch
Waverange Switch
Tuning Control.

1.3. WAVEBAND COVERAGE

M.W. 194 to 561 Metres.
L.W. 1088 to 1918 Metres.

1.4. VALVES (All Mullard types)

V1. DK96 Frequency Changer.
V2. DF96 I.F. Amplifier.
V3. DAF96 Detector and Audio Amplifier.
V4. DL96 Audio Output.

1.5. LOUDSPEAKER

Highly sensitive, 4 inch, permanent magnet.

1.6. POWER SUPPLY

A.C. or D.C. mains 200 to 250 Volts (40—100 cycles A.C.) or dry batteries, 90 Volt (H.T.) and 7.5 Volt (L.T.).

1.7. CABINET

Moulded plastic cabinet with carrying handle. Dimensions approximately $12\frac{1}{2}$ in. wide x $10\frac{1}{4}$ in. high x $5\frac{1}{2}$ in. deep.

2. INSTALLATION

2.1. MAINS VOLTAGE ADJUSTMENT

This is located in a compartment in the base of the cabinet covered by a sliding panel, part of which is hinged and may be opened to give access to the adjustment without removing the panel. Some early receivers do not incorporate this hinged flap and, in these cases, the complete panel must be removed. Also in this compartment is the mains lead and the socket into which it should be plugged for mains operation. Plugging in the mains lead automatically disconnects the batteries and makes the necessary circuit changes.

The mains voltage adjustment consists of a variable resistor calibrated in 10 Volt steps between 200 and 250 Volts.

It is most important that the adjustment should be set to the exact voltage of the supply on which the receiver is used.

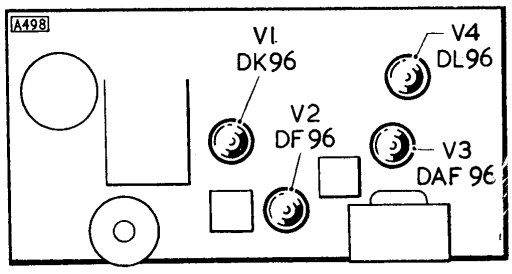


Fig. 1. Valve Locations

2.2. BATTERY TYPES

The battery compartment(also situated behind the sliding panel in the base of the cabinet) will accommodate the following types :—

	H.T. (90V)	L.T. (7.5V)
Ever Ready	B126	Alldry 38
Drydex	Drymax 526	H 1187
Oldham	KL26	K782

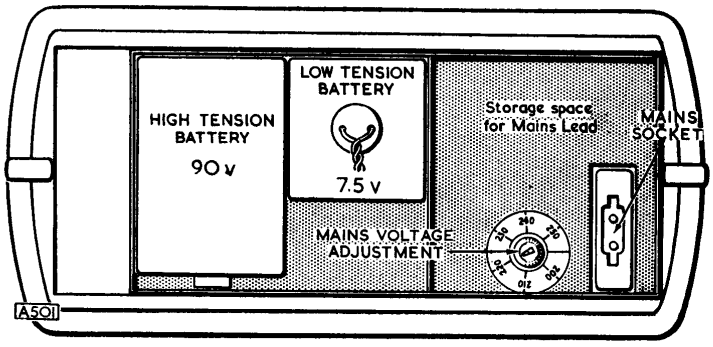


Fig. 2. Battery and mains lead compartments in base of cabinet.

3. THE CIRCUIT

The ferrite-rod aerial **L1, L2** is tuned by **C4** with trimmers **C1** on M.W. and **C2, C3** on L.W. with the parallel connected damping resistor **R1.** On M.W., the L.W. section of the ferrite-rod aerial coil, **L1,** is shunted by **L3.** The coils are switched by **S1A** and the appropriate trimmers selected by **S1B.**

Signal voltages developed across the aerial tuned circuit are coupled by **C5** to **G3** of the heptode Frequency Changer **V1(DK96).**

Grids 1 and 2 of **V1** are arranged as the grid and anode of a tuned grid oscillator. **L4** is the grid coil and **L5** the feedback coil, parallel fed from the oscillator anode, the low-potential ends of both coils being returned to chassis through **C15.** This capacitor performs the following functions.

(a) D.C. isolation of the oscillator coils.

(b) In series with **C10** it provides the correct padding value.

(c) As an oscillator coupling capacitor, it maintains the oscillator voltage at the low frequency end of each band.

The grid coil is tuned by **C11** with the parallel-connected M.W. trimmer **C12** and the padder **C10** is connected in the high-potential side of the tuned circuit. Coupling to the oscillator grid is via **C9.** On M.W., the switch **S1C** connects **R7** effectively between oscillator grid and anode to maintain constancy of oscillator voltage and on L.W., additional capacitance **C13, C14** (the latter is the L.W. oscillator trimmer) is connected across **L4.**

V1 anode is transformer coupled by **C7, L6, L7, C8,** to the control grid of the pentode I.F. Amplifier **V2 (DF96).** A further I.F. transformer **C17, L8, L9, C18** provides the coupling to the diode-pentode Detector and Audio Amplifier **V3 (DAF96).** Signal rectification takes place in the normal manner, the diode load being provided by **R9** the volume control. The D.C. component of the rectified signal voltage is fed, via the decoupling circuit **R8, C19,** as A.G.C. bias to **V1 and V2.** The A.G.C. line is connected through **R18** to L.T. positive to maintain suitable standing bias conditions for the controlled valves.

Audio frequency signal voltages developed across **R9** are applied via **C21** to **V3** control grid. **V3** is resistance-capacitance coupled by **R12, C24** and **R15** to the control grid of the pentode Audio Output Valve **V4 (DL96).** Coupling to the loudspeaker is by the output transformer **T1** with the tone correction capacitor **C25** connected across its primary.

During battery operation, H.T. negative is connected via **R14** to the low-potential side of **V4** filament instead of to chassis. With this method of connection, the screen and anode currents of **V4** do not flow in the filament circuits of the earlier valves. The voltage drop across **R14** provides grid bias for **V4.** In mains operation, the neutral or negative main is connected directly to chassis and **V4** grid bias is provided by the voltage drop across the earlier valve filaments which are then shunted by **R14** to bypass **V4** screen and anode currents. In both battery and mains operation, **V3** filament shunt resistor **R11** bypasses the screen and anode currents of **V1** and **V2** while **R5,** shunting **V1** filament, bypasses the screen and anode currents of **V2. R16** and **R17** are suitably proportioned to maintain the correct voltage and current distribution in both halves of **V4** filament. **C16** and **C23** are, respectively, filament I.F. and audio bypass capacitors. Filament current during mains operation is obtained, through the series resistor **R19,** from the rectifier and smoothing system **R22, W1** (Westinghouse 18RA —1—1—16—1), **R21** (mains voltage adjustment), **R20, C27** and **C26. C28** is a mains R.F. bypass capacitor, **S2A & B** is the automatic battery/mains changeover switch and **S3A & B** is the on-off switch ganged with the volume control.

CIRCUIT DETAILS

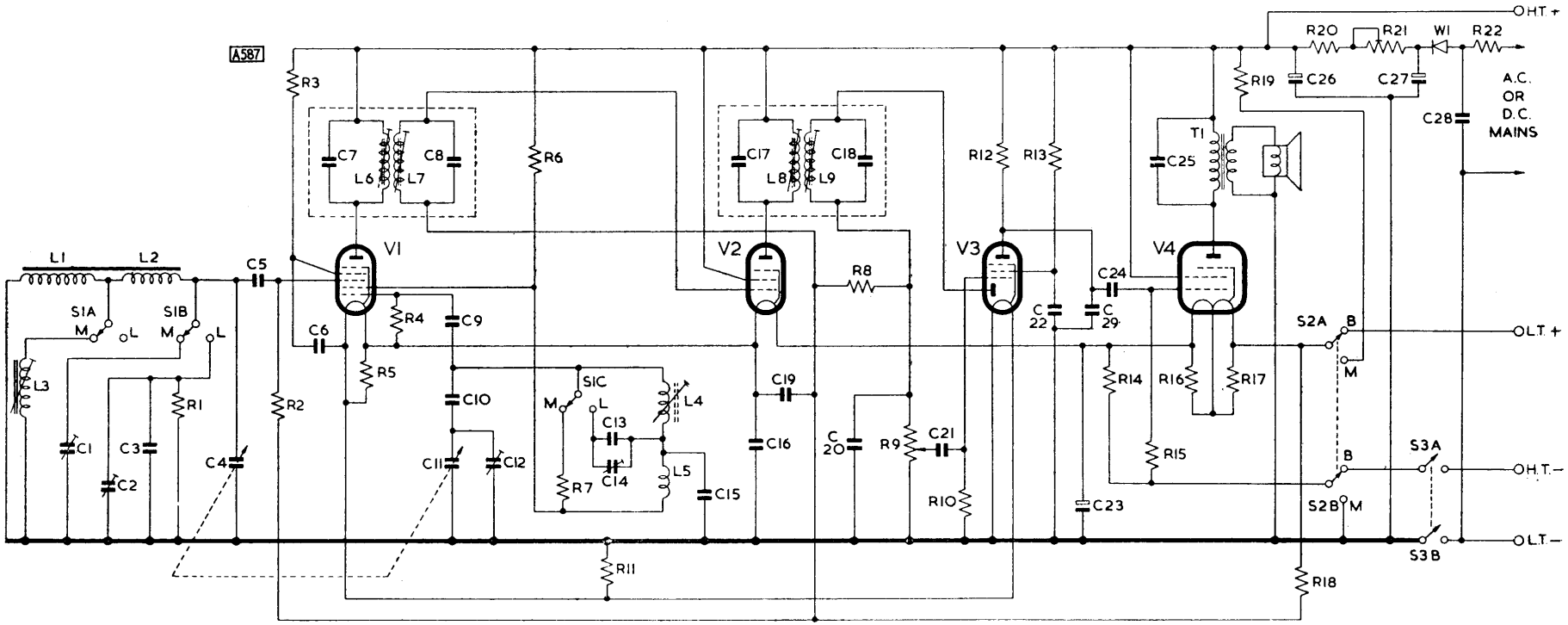


Fig. 3. Circuit diagram of Model 342BU. The values of all components are given in the tables below.

CAPACITORS

(20% tolerance, 150V. working unless otherwise stated.)

Ref.	Value	Rating	Function	Location
C 1	3-50 pF	Pre-set	M.W. aerial trimmer	F1
C 2	3-50 pF	Pre-set	L.W. aerial trimmer	F1
C 3	160 pF 2%			
C 4	528 pF†		Aerial tuning	B2
C 5	100 pF		V1 C.G. coupling	F1
C 6	0.01 uF		V1 S.G. bypass	G2
C 7	200 pF‡ 2%		1st I.F.T. tuning	B2
C 8	200 pF‡ 2%			
C 9	100 pF		Oscillator C.G. coupling	F1
C10	660 pF 1%		Oscillator padder	C1
C11	528 pF†		Oscillator tuning	B1
C12	3-50 pF	Pre-set	M.W. osc. trimmer	F1
C13	460 pF 2%		L.W. osc. trimmer	C1
C14	3-50 pF	Pre-set		G1
C15	0.005 uF 10%		See Circuit Description	B2
C16	0.5 uF		Filament bypass (I.F.)	F2
C17	200 pF‡ 2%		2nd I.F.T. tuning	C2
C18	200 pF‡ 2%			
C19	0.01 uF		A.G.C. decoupling	F2
C20	100 pF		I.F. bypass	E2
C21	0.001 uF		V3 C.G. coupling	F1
C22	0.01 uF		V3 S.G. bypass	E2
C23	100 uF*	12V.	Filament bypass (audio)	E1
C24	0.0005 uF		V4 C.G. coupling	E1
C25	0.003 uF	350V.	Tone correction	F1
C26	50 uF*	275V.	H.T. Smoothing	A1
C27	50 uF*	275V.	H.T. reservoir	A1
C28	0.002 uF	300V. A.C.	Mains R.F. bypass	A2
C29	30 pF		V3 anode bypass	E2

† Swing Value (i.e. minimum to maximum).

* Electrolytic.

‡ 125 pF in some early receivers

INDUCTORS & TRANSFORMERS

(D.C. resistance not given if less than 1 ohm.)

Ref.	Function		Approx. D.C. ohms.	Location
L 1	L.W. Aerial Coil		—	D1
L 2	M.W. Aerial Coil		—	A1
L 3	M.W. Loading Coil		—	C1
L 4	Oscillator tuning coil		2	C2
L 5	Oscillator feedback coil		—	C2
L 6	1st I.F. Transformer	Pri.	8	B2
L 7		Sec.	8	
L 8	2nd I.F. Transformer	Pri.	8	C2
L 9		Sec.	8	
T 1	Audio Output Transformer 13000/3 ohm	Pri.	600	D2
		Sec.	—	

MISCELLANEOUS

Ref.	Function and Description	Location
S1A & B	Aerial Circuit Switch	C1
S1C	Oscillator Circuit Switch	C1
S2A & B	Battery/Mains Switch	H2
S3A & B	On/Off Switch (ganged with R9)	C1
W1	H.T. Rectifier (Westinghouse 18 RA-1-1-16-1)	B1

RESISTORS

(20% tolerance ¼ Watt carbon unless otherwise stated.)

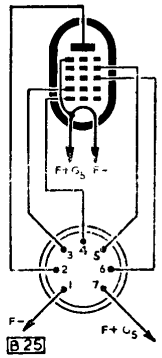
Ref.	Value ohms.		Rating	Function	Location
R 1	100 K			L.W. ae. damping	F1
R 2	2.2 M	10%		V1 grid leak	F2
R 3	100 K			V1 S.G. H.T. feed	F2
R 4	27 K			V1 osc. grid leak	G1
R 5	1 K	10%		V1 filament shunt	G1
R 6	33 K			Oscillator H.T. feed	G2
R 7	100 K			M.W. osc. limiter	C1
R 8	2.2M	10%		A.G.C. decoupling	F2
R 9	1 M		Carbon Pot.	Volume Control	C1
R10	10 M			V3 grid leak	E2
R11	330	10%		V3 filament shunt	E1
R12	2.2 M	10%		V3 anode load	E1
R13	6.8 M	10%		V3 S.G. H.T. feed	F2
R14	560	5%	½W	V4 grid bias	E1
R15	2.2 M	10%		V4 grid leak	E1
R16	240	5%		V4 filament shunt	E1
R17	330	10%			
R18	6.8 M	10%		Part V2 bias pot.	E1
R19	3 K	2%	3W.(W.W.)	Filament ballast	B2
R20	2.25 K	2%	3W.(W.W.)	H.T. smoothing	B2
R21	1.5 K		Var.(W.W.)	Mains voltage adj.	G2
R22	500	2%	3W.(W.W.)	Rect. current limiter	A2

VALVES

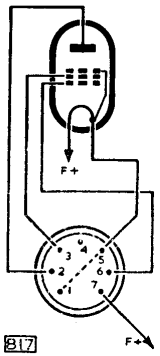
(All Mullard Types)

Ref.	Type	Function	Location
V1	DK96	Frequency Changer	B1
V2	DF96	I.F. Amplifier	C2
V3	DAF96	Det., A.G.C. and Audio Amp.	D2
V4	DL96	Audio Output	D1

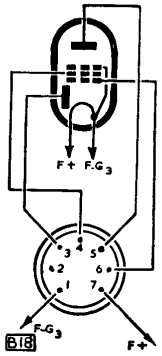
VALVE BASE CONNECTIONS



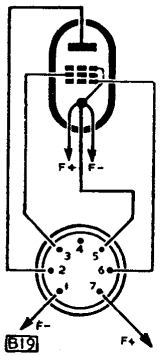
DK 96



DF 96



DAF 96



DL 96

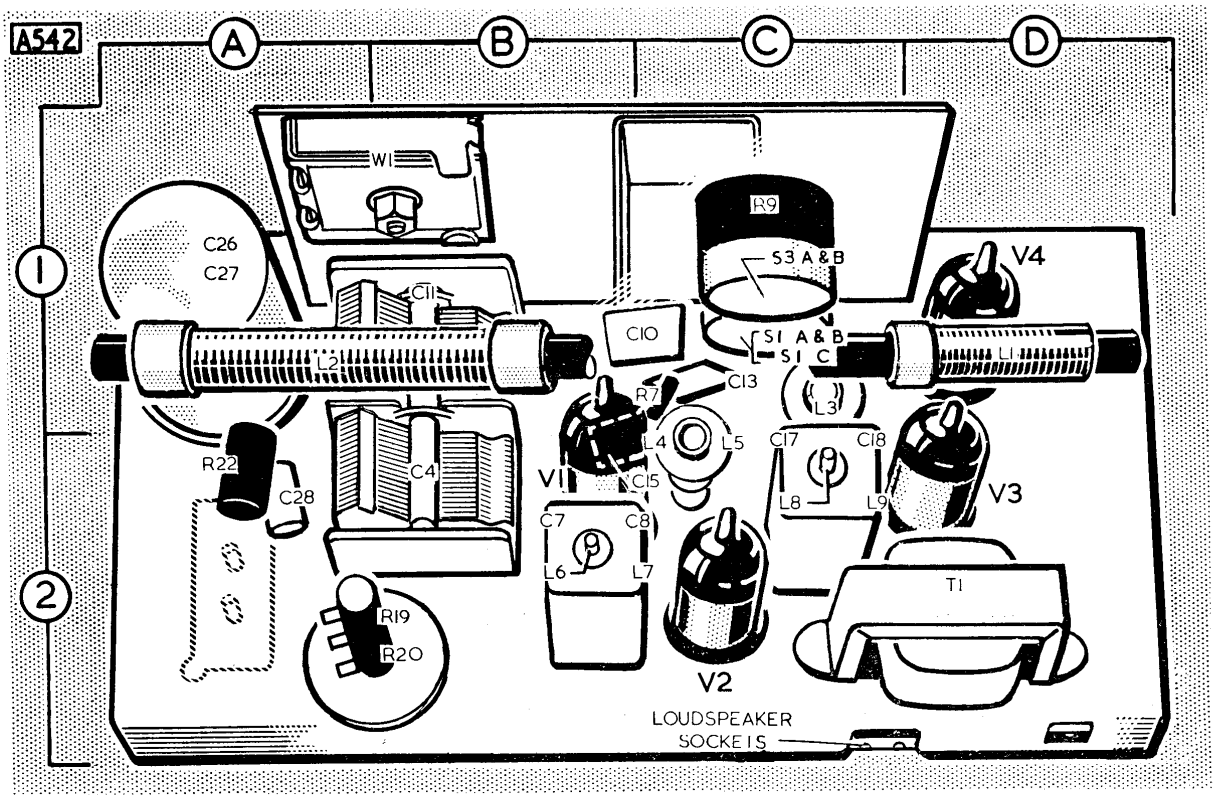


Fig. 4. The locations of components above chassis.

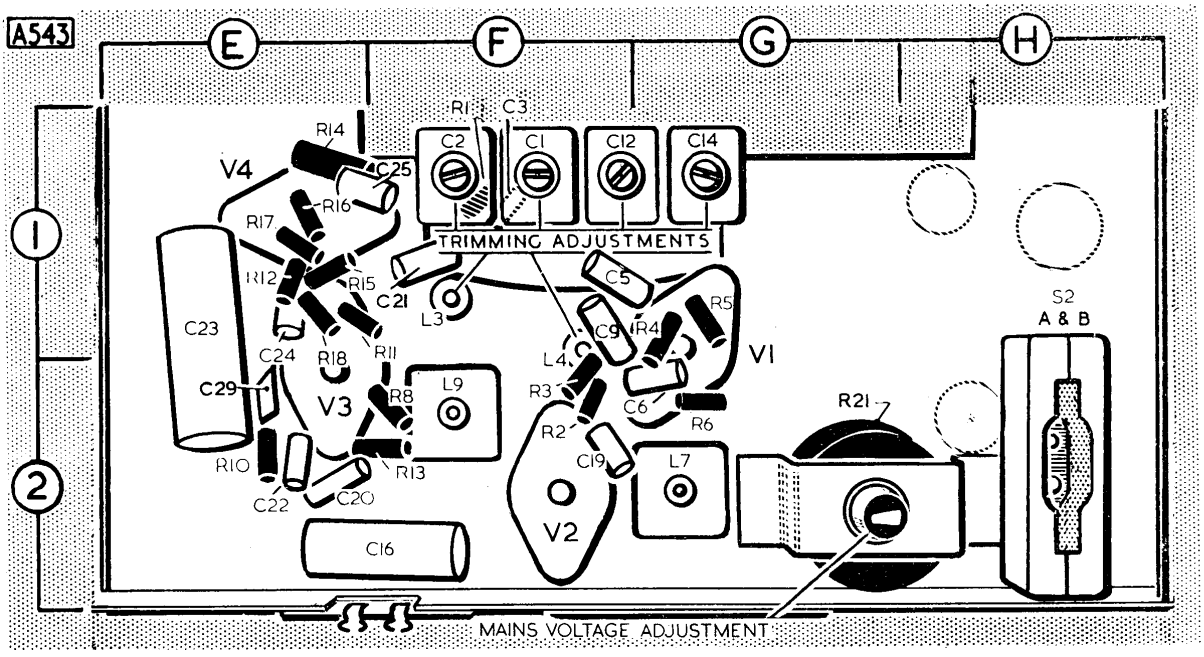


Fig. 5. The locations of components below chassis.

4. CIRCUIT ALIGNMENT

Note : R.F. alignment and calibration should be carried out with the chassis in the cabinet; all trimming adjustments are accessible when the cabinet bottom and battery box are removed. For I.F. alignment, however, the chassis should be removed from the cabinet (see section 6.1).

I.F. ALIGNMENT

Connect the signal generator output between the junction of **C4 and C5** (a convenient point of connection is the rear section of the gang) via blocking capacitors of 0.01μF and of adequate working voltage. Connect an output meter to the loudspeaker sockets. Switch the receiver to M.W. close the gang and turn the volume control to maximum.

Inject a signal of 470Kc/s and adjust the cores of **L9, L8, L7** and **L6** in that order for maximum output, reducing the input voltage as each circuit is brought to resonance in order to avoid A.G.C. action.

R.F. ALIGNMENT

With the chassis secured in the cabinet, check that the dial is correctly positioned as follows:—

When the tuning control is turned fully clockwise, the cursor line should coincide with the brown dot at the extreme right-hand end of the tuning scale.

Sufficient signal voltage for alignment purposes can be induced in the ferrite-rod aerial if the output lead of the signal generator is terminated in a closed loop in close proximity to the receiver.

The Medium waveband must be aligned first.

1. Switch to M.W. and rotate gang in anti-clockwise direction until cursor line is opposite left-hand end brown dot. Inject 1540 Kc/s signal and adjust **C12** for maximum output.
2. Rotate gang fully clockwise. Inject 535 Kc/s and adjust **L4** for maximum output.
3. Repeat 1 and 2 until no further improvement results.
4. Inject 1400 Kc/s signal, tune receiver and adjust **C1** for maximum output.
5. Inject 535 Kc/s signal, tune receiver and adjust **L3** for maximum output.
6. Repeat 4 and 5 until no further improvement results.
7. Switch to L.W. and set cursor to red dot marked 1400. Inject 214.3 Kc/s and adjust **C14** and **C2** for maximum output.

5. VOLTAGE AND CURRENT MEASUREMENTS

The following voltage and current readings were taken on a receiver operating on A.C. mains. With the mains adjustment correctly set, there will be no significant change in these readings at any mains voltage within the range covered. The figures given also approximate to those obtained during battery operation, but with new batteries some readings will, of course, be slightly higher. Voltages were measured on the 250 V. range of a Model 8 Avometer, chassis being the negative connection, with the exception of the Bias voltage for which the 10 V. range was used.

General Measurements

H.T. voltage (across C26)	85 V
H.T. current	10 mA
L.T. voltage	6.7 V
L.T. current	25 mA
Bias (across R14)	—4.1 V

Valve Measurements

Ref.	Type	Anode Volts	Anode mA	Screen Volts	Screen mA
V1	DK 96	85	0.6	(g4) 70	*
				(g2) 30	1.6
V2	DF 96	85	1.2	85	0.5
V3	DAF 96	17	*	18.5	*
V4	DL 96	81.5	4.8	85	0.9

* Less than 0.5 mA

6. MECHANICAL DETAILS

6.1. REMOVING THE CHASSIS

Place cabinet on its back and remove sliding panel in base. Next, remove the battery case. Two types of battery case are used. The earlier type is secured with two self-tapping screws into the front of the cabinet moulding and a third screw into a spring fixing on the chassis. The later type locks under the rim of the cabinet moulding; no fixing screws are used. To remove this type of battery case, pull the front of the inner compartment outwards and swing it aside. Lift the rear flange of the battery case until it is clear of the cabinet rim. The case may then be withdrawn.

When replacing, insert the front flange of the battery case first and hold it in position. Then press the rear flange inwards.

Unplug the loudspeaker leads and remove the control knobs. The two outer discs are held in position by the volume control knob which is provided with a spring fixing. By inserting the end of a screwdriver under the bushes of the control knobs, from the inside of the cabinet, and bearing against the front edge of the chassis, the knobs can be prised off.

The chassis is secured by one 6BA screw to the front of the cabinet and four self-tapping screws to lugs moulded on the inside. When these are removed, the chassis may be withdrawn.

When replacing the tuning and waverange controls, ensure that they correctly engage the pins on the tuning drive and waverange switch arms.

6.2. THE TUNING DRIVE

Nylon braided cord is used in the drive; for ease of handling when re-stringing, a length of 24 inches should be allowed.

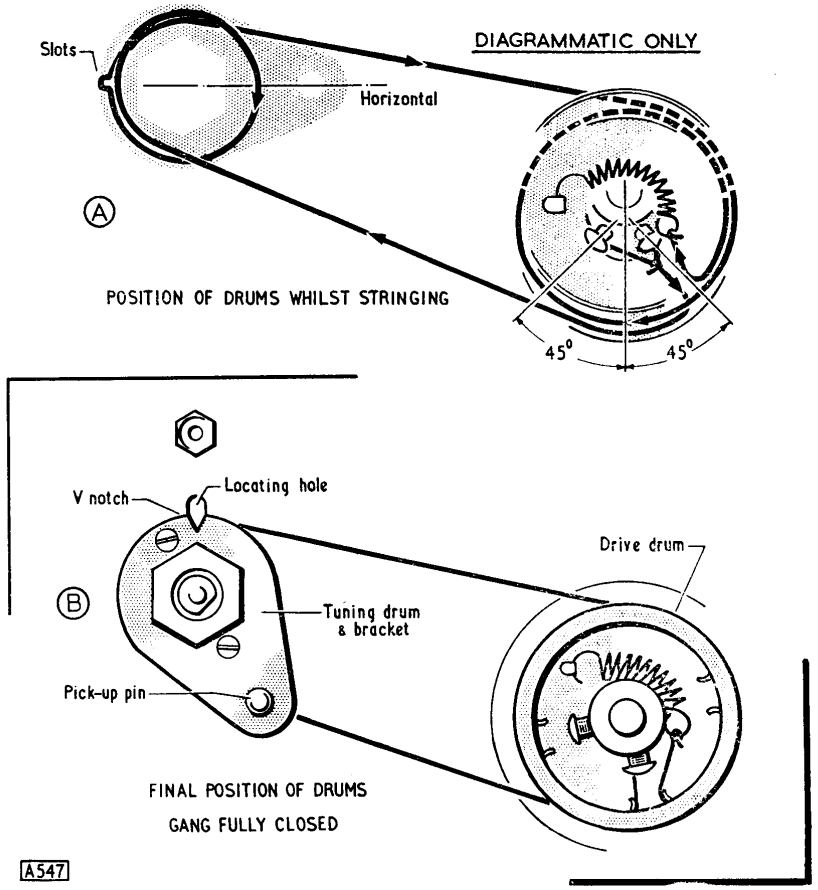


Fig. 6. The tuning drive cord. The upper diagram 'A' shows the arrangement of the cord and the positions of the two drums for restringing the drive. The lower diagram 'B' illustrates the final drum positions with the gang fully closed.

Set the tuning drum and bracket assembly so that the pick-up pin lies in the horizontal plane to the right of the volume control spindle. Close the gang and position the drive drum with its fixing screws at 45° to vertical at the bottom (see Fig. 6a). Tie the end of the cord to the drive drum bush and lead it out through the bottom righthand aperture. Take the cord in the direction indicated and make one complete turn round the tuning drum before anchoring the cord by looping it into the slots at the rear of the drum. From the top of the tuning drum, take the cord over the top of the drive drum and make $1\frac{1}{4}$ turns, then feed the end of the cord through the bottom right-hand hole.

Attach the spring as close as possible to the inside rim of the drum and hook the free end of the spring on to the tag, diametrically opposite on the drum face. Lightly press down the pick-up pin to enable the spring to take up any slackness in the cord.

Finally, slacken the drive drum fixing screws and rotate the tuning bracket in a clockwise direction until the 'V' notch lines up with the locating hole (see Fig 6b). Check that the gang is closed and tighten the drive drum fixing screws.