Ferguson

MODEL 343 BU
MAINS - BATTERY
PORTABLE RECEIVER

SERVICE MANUAL

SPECIFICATION

Power Supplies

AC/DC mains 200-250 Volts, 50-60 c.p.s. or dry batteries.

Battery types :—

	Ever-ready	Drydex	Oldham
High Tension 90 V.	B126	526	KL26
Low Tension 7.5 V.	All-dry 38	H1187	K782

Power consumption (mains) 11.5 Watts

Waveranges

Medium - -	182 — 557 Metres.
Long - -	1090 — 1920 Metres.

Valves

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

Loudspeaker

4in., P.M. type, 3Ω speech coil.

Cabinet Dimensions

$9\frac{1}{4}$in. wide x $6\frac{3}{4}$in. high x $3\frac{1}{2}$in. deep.

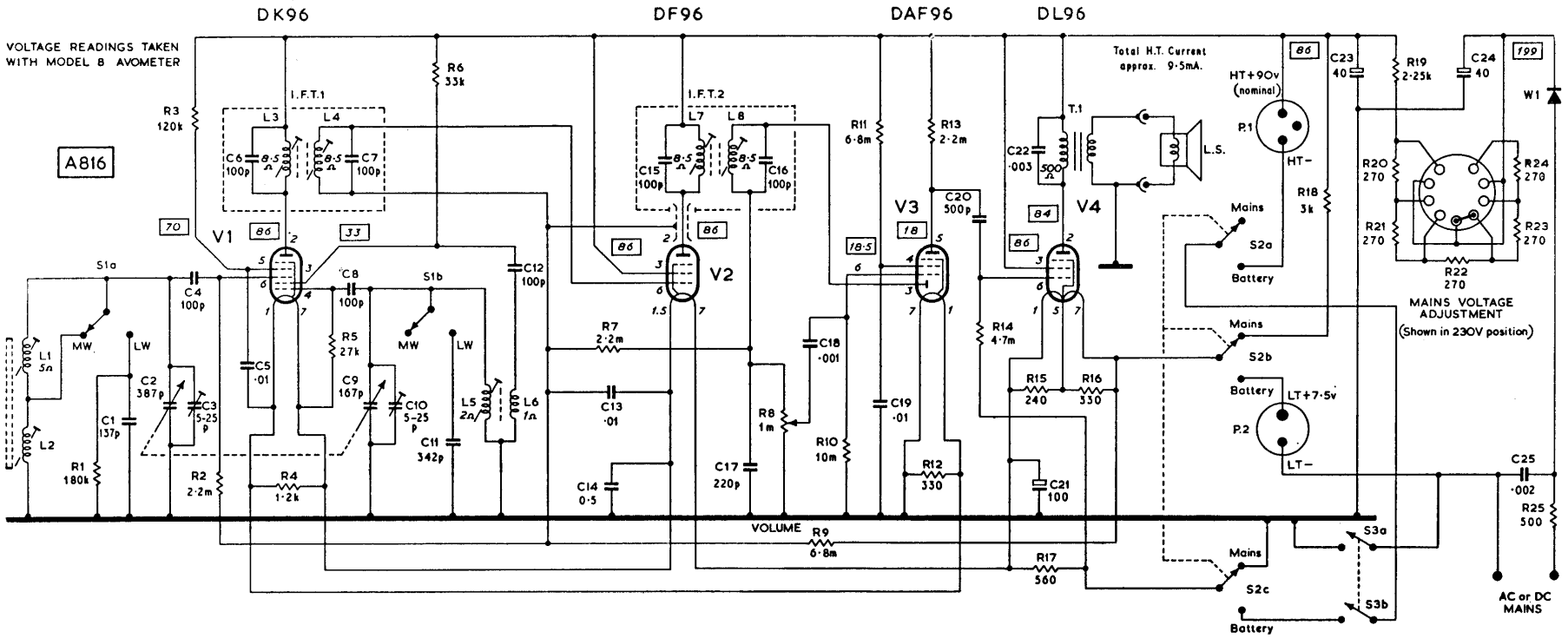

Fig. 1. Circuit diagram of model 343BU. Numbers adjacent to valve electrodes denote pin connections; voltage measurements are shown in rectangles.

THE CIRCUIT

With the receiver switched to M.W., S short circuits the L.W. coil (**L1**) on the ferrite-rod aerial and the M.W. coil **L2** is tuned by **C2** and trimmer **C3.** On L.W., the two series connected aerial coils are shunted by a fixed trimmer **C1** and damping resistor **R1. C4** couples the signal to the frequency changer **V1** (DK96). The oscillator grid coil **L5** is tuned by **C9/C10** on M.W. To tune the L.W. band, **C11** is switched across the circuit by **S1B.** No series padders are employed, tracking being maintained by the use of a special tuning capacitor.

V2 (DF96) is the I.F. amplifier and **V3** (DAF96) the signal detector and audio amplifier. The volume control **R8** forms the detector load and the D.C. potential developed across it provides the A.G.C. control voltage for **V1** and **V2.** Since the diode load is returned to chassis and the filaments of the controlled valves are above chassis potential, correct standing bias conditions are maintained by the inclusion of **R9** which, with **R7** and **R8,** forms a potential divider across the L.T. supply. The pentode section of **V3** is R.C. coupled to the output valve **V4** (DL94).

Changeover from battery to mains operation is effected by **S2A, B** and **C.** During battery operation, H.T. negative is connected via **R17** to the low potential side of **V4** filament instead of to chassis. This ensures that the screen and anode currents of **V4** do not flow in the filament circuits of the earlier valves. The voltage drop across **R17** provides grid bias for **V4.** In mains operation, one side of the mains is connected direct to chassis and **V4** grid bias is provided by the voltage drop across the earlier valve filaments which are then shunted by **R17** to bypass **V4** screen and anode currents. **R4,** shunting **V1** filament, bypasses **V2** anode and screen currents and **R12** shunting **V3** filament bypasses anode and screen currents of **V1** in addition to **V2.**

For mains operation, the 7.5 V. filament supply is taken from the smoothed H.T. line through dropping resistor **R18.**

COMPONENT LOCATIONS

R1	A1	R22	C2	C18	B2
R2	A2	R23	C2	C19	B2
R3	A2	R24	C2	C20	B2
R4	A2	R25	C2	C21	C2
R5	A2	C1	A1	C22	C2
R6	A2	C2	B1	C23	B2
R7	B2	C3	B2	C24	B2
R8	B1	C4	A2	C25	C2
R9	B2	C5	A2	L1	A1
R10	C2	C6	A1	L2	B1
R11	B2	C7	A1	L3	A1
R12	B2	C8	A2	L4	A1
R13	C2	C9	B1	L5	A1
R14	C2	C10	B2	L6	A1
R15	C2	C11	A1	L7	B1
R16	B2	C12	A2	L8	B1
R17	C2	C13	A2	T1	B1
R18	C1	C14	A1	S1A & B	A1
R19	C1	C15	B1	S2A-C	C2
R20	C2	C16	B1	S3A & B	B1
R21	C2	C17	B2	W1	C2

VOLTAGE AND CURRENT MEASUREMENTS

The following voltage and current readings were taken on a receiver operating on 230 V. A.C. mains with the voltage adjustment set to the 230 V. tap. The figures given also approximate to those obtained during battery operation, but with new batteries some readings will be slightly higher. The voltage across **C24** was measured on the 250 V. range of a model 8 Avometer and all other voltages on the 100 V. range, with the exception of the bias voltage for **V4** which was taken on the 10 V. range.

GENERAL MEASUREMENTS

H.T. Voltage (across **C24**)	199 V.
H.T. Voltage (smoothed)	86 V.
H.T. Current	9.5 mA.
Bias (across **R17**)	5.6 V.

VALVE MEASUREMENTS

Ref.	Valve Type	Anode Volts	Anode mA	Screen Volts	Screen mA
V1	DK96	86	0.5	(G4) 70	0.1
				(G2) 32	1.6
V2	DF96	86	1.1	86	0.4
V3	DAF96	18*	†	18.5*	†
V4	DL96	84	4.4	86	0.8

*Subject to wide variation.
†Very small.

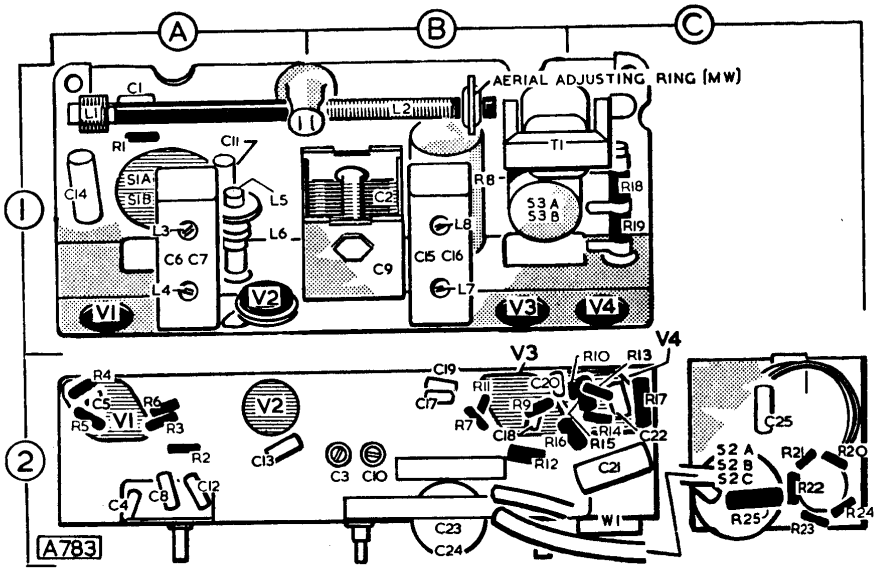

Fig. 2. Views of chassis showing component locations.

CIRCUIT ALIGNMENT

I.F. Alignment

Switch receiver to M.W., turn gang to minimum capacitance position and volume control to maximum. Inject a 470 Kc/s modulated signal through a 0.1 μF capacitor at the control grid of **V1** (pin 6).

Adjust **L8, L7, L4** and **L3** 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

To re-align the R.F. stages, first remove the chassis from its cabinet as described in "Mechanical Details," and re-fit the tuning dial and knob. Close the gang and line up the gang max marker on the dial with the printed adhesive tape "cursor" on the electrolytic capacitor underneath.

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. Do not make a direct connection.

The Medium waveband must be aligned first.

1. Switch to M.W. and turn the tuning knob until the calibration marker at the edge of the scale, between 200 and 300 Metres, is over the cursor line. Inject 1300 Kc/s signal and adjust **C10** for maximum output.
2. Turn to the calibration marker at 500 Metres and inject 600 Kc/s signal. Adjust **L5** for maximum output.
3. Repeat 1 and 2 until no further improvement results.
4. Set tuning gang to the high frequency calibration marker, inject 1300 Kc/s and adjust **C3** for maximum output.
5. With tuning dial set to the 500 Metre marker and with a 600 Kc/s signal, alter the position of the adjusting ring on the ferrite-rod aerial to give maximum output.
6. Switch to L.W., inject 210 Kc/s and rotate the tuning knob until the signal is received. Adjust the position of the L.W. coil on the ferrite-rod aerial for maximum output.

MECHANICAL DETAILS

Removing the Chassis

Withdraw the two small control knobs by means of a thin cord slipped behind the knob, or by gripping firmly with a pair of pliers, using slips of paper round the knobs to prevent damage. Take off the cabinet back panel and remove the batteries. Withdraw the two screws at the top corners of the chassis and, holding the chassis firmly, gently ease it out of the cabinet. The tuning knob and dial will thus be drawn off at the same time. The loudspeaker connections should then be unplugged.

The small sub-chassis is secured to the loudspeaker magnet by a metal clamp which is locked in position by a 2 B.A. screw and nut. These need only be loosened to allow the sub-chassis to be withdrawn from the cabinet.

MECHANICAL SPARES

Part Description	Part No.
Aerial Mounting (ferrite-rod)	Y10787
Cabinet Assembly :—	
Cabinet Moulding	V10687
Cabinet Back	N10832
Cabinet Back Retaining Screw	Z10828
Cursor Disc	Y10702
Decorative " Wing " Motif	Z10699
Handle Assembly	Y10705
Nameplate	X10703
Control Knobs :—	
Tuning	N10834
Tuning Clip	45929
Volume and Wavechange	N10835
Volume and Wavechange Clip	37309
I.F. Transformer Clip	Z10689
Mains Lead and Connector	N10816
Mains Plug Shutter	Y10709
Tuning Dial	Y10706
Tuning Dial Clip	37309
Tuning Dial Spacer	Z10826

RESISTORS

(All ¼ Watt carbon unless otherwise stated)

Ref.	Value	Rating		Function
R 1	180KΩ	10%		L.W. aerial shunt
R 2	2.2MΩ	10%		V1 grid leak
R 3	120KΩ	10%		V1 S. G. feed
R 4	1.2KΩ	10%		V1 filament shunt
R 5	27KΩ	10%		Oscillator grid leak
R 6	33KΩ	20%		Oscillator H.T. feed
R 7	2.2MΩ	10%		A.G.C. decoupling
R 8	1MΩ*	(carbon pot. log.)		Volume Control
R 9	6.8MΩ	10%		A.G.C. standing bias
R10	10MΩ	20%		V3 grid leak
R11	6.8MΩ	10%		V3 S G. H.T. feed
R12	330Ω	10%		V3 filament shunt
R13	2.2MΩ	10%		V3 anode load
R14	4.7MΩ	10%		V4 grid leak
R15	240Ω	5%	}	V4 filament shunt
R16	330Ω	10%	}	
R17	560Ω	20%	½W.	V4 grid bias
R18	3KΩ†	2%	3W. W/W.	Filament ballast
R19	2.25KΩ†	2%	3W. W/W.	H.T. smoothing
R20	270Ω	20%		Mains voltage adjustment
R21	270Ω	20%		
R22	270Ω	20%		
R23	270Ω	20%		
R24	270Ω	20%		
R25	500Ω**	2%	3W. W/W.	Rectifier current limiter

*Part No. Z13053
†Part No. Z10156
**Part No. 501RW03

INDUCTORS AND TRANSFORMERS

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

Ref.	Function		Approx. D.C. resistance	Part No.
L1	Ferrite-rod Aerial	L.W. Coil	5Ω	Y10782
L2		M.W. Coil	—	
L3	1st I.F. Transformer	Pri.	8.5Ω	N10635
L4		Sec.	8.5Ω	
L5	Oscillator Tuning		2Ω	Y10783
L6	Oscillator Feedback		1Ω	
L7	2nd I.F. Transformer	Pri.	8.5Ω	N10635
L8		Sec.	8.5Ω	
T1	Output Transformer	Pri.	500Ω	Z10765
		Sec.	—	

CAPACITORS

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

Ref.	Value	Rating		Function
C 1	137pF*	2%		L.W. fixed aerial trimmer
C 2	387pF**	Variable		Aerial tuning
C 3	5-25pF	Pre-set		M.W. aerial trimmer
C 4	100pF		750V.	V1 C.G.coupling
C 5	0.01uF		150V.	V1 S.G. decoupling
C 6	100pF	2%		L3 tuning
C 7	100pF	2%		L4 tuning
C 8	100pF		750V.	Oscillator C.G. coupling
C 9	167pF**	Variable		Oscillator tuning
C10	5-25pF	Pre-set		M.W. oscillator trimmer
C11	347pF†	2%		L.W. fixed oscillator trimmer
C12	100pF			Oscillator feedback coupling
C13	0.01uF		150V.	A.G C. decoupling
C14	0.5uF		150V.	Filament I.F. bypass
C15	100pF	2%		L7 tuning
C16	100pF	2%		L8 tuning
C17	220pF			I.F. bypass
C18	0.001uF		400V.	V3 C.G. coupling
C19	0.01uF		150V.	V3 S.G. decoupling
C20	500pF			V4 C.G. coupling
C21	100uF	Electrolytic	6V.	Filament A.F.bypass
C22	0.003uF		400V.	Tone correction
C23	40uF†	Electrolytic	150V.	H.T. smoothing
C24	40uF†	Electrolytic	275V.	H.T. reservoir
C25	0.002uF		300V. AC.	Mains R.F. bypass

*Part No. 45755
**Swing value. Part No. Y10753/1
†Part No. 45754
††Part No.Y13237/2

MISCELLANEOUS

Ref.	Function and Description	Part. No.
L.S.	4 in. P.M., 3Ω speech coil	Y16000/1
P1	H.T. battery plug	Z7554
P2	L.T. battery plug	Z7553
S1A&B	Wavechange switch	Z10785
S2A&C	Battery/Mains Switch	Z10794
S3A&B	On/Off switch (ganged with R8)	Z13053
W1	Metal Rectifier	Z10810