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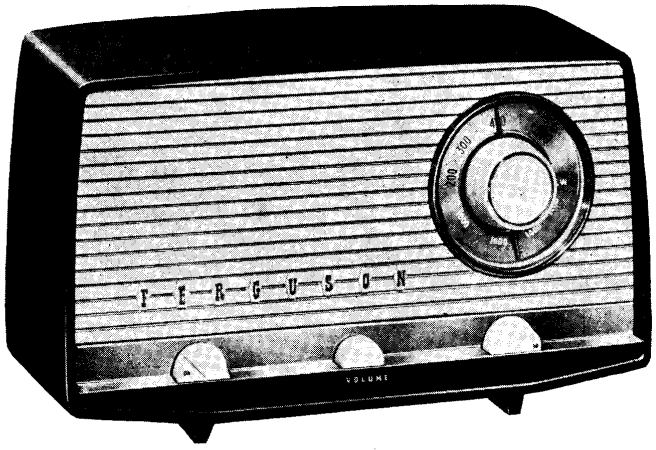
Ferguson

MODEL 354 U
AC/DC TABLE
RADIO RECEIVER

SERVICE MANUAL



SPECIFICATION

Power Supply

A.C. or D.C. mains 200-250 Volts (50-60 c.p.s. A.C.).

Power consumption approximately 40 Watts.

Waveranges

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

Valves

V1 ... UCH81 ... Frequency Changer.
V2 ... UBF89 ... I.F. Amplifier and Detector.
V3 ... UCL83 ... Audio Amplifier and Output
V4 ... UY85 ... H.T. Rectifier.

Loudspeaker

P.M. type, 5 ins. diameter, 3Ω speech coil.

Cabinet Dimensions

$14\frac{1}{2}$ ins. wide x $8\frac{1}{2}$ ins. high x 6 ins. deep.

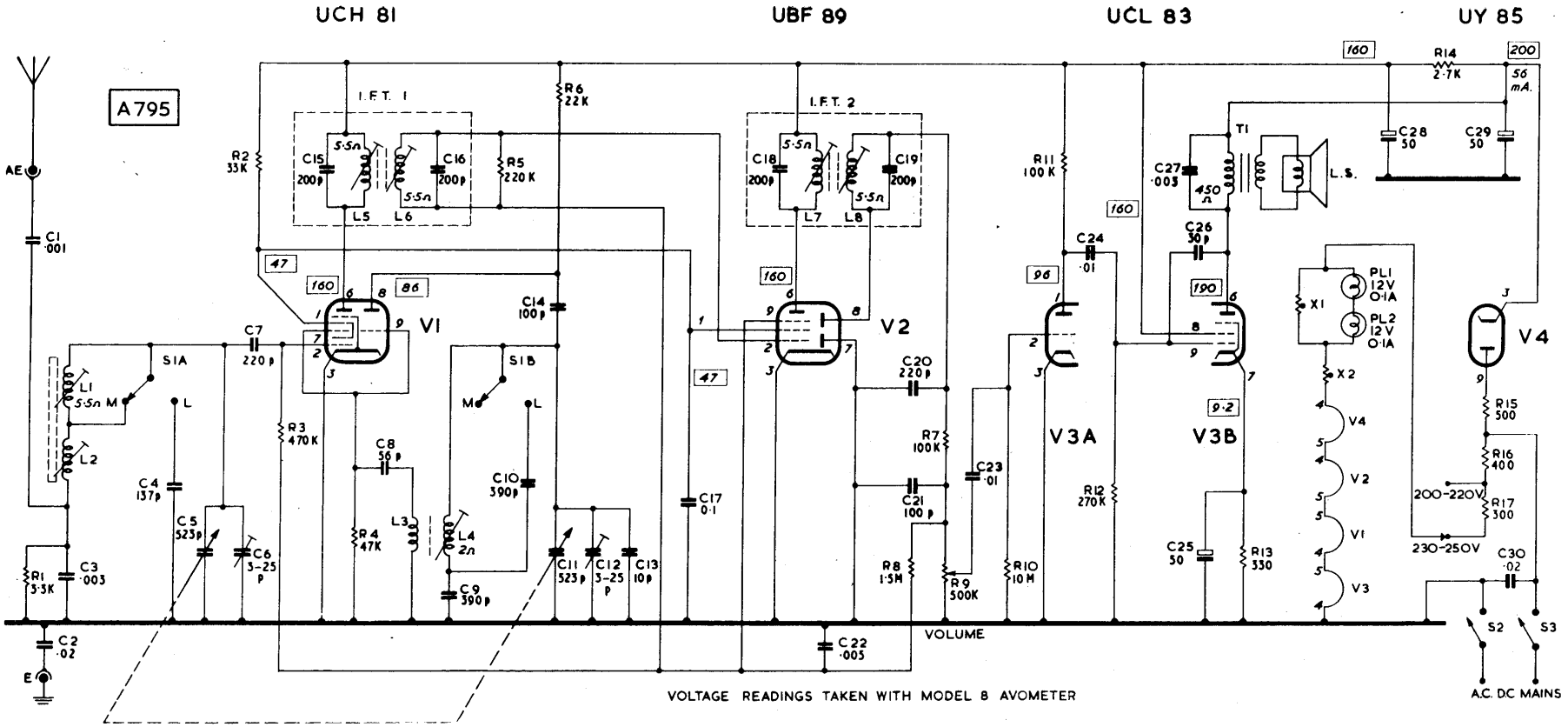


Fig. 1. Circuit diagram of Model 354U. Figures in rectangles are voltage readings taken with a 20,000Ω/Volt meter.

THE CIRCUIT

With the receiver switched to M.W., **S1A** short circuits the long wave winding **L1** on the ferrite-rod aerial and the medium wave winding **L2** is tuned by **C5** with trimmer **C6.** To tune the L.W. band, both aerial windings are series connected and **C4** is connected across the circuit by **S1A: C7** couples the signal to the grid circuit of **V1** (UCH81) the frequency changer. When an external aerial is used, the signal is developed across **C3** which is shunted by **R1** to limit the grid circuit impedance of **V1** at low frequencies. The oscillator is anode tuned, with **L4** the anode coil and **L3** the feedback coupling to the oscillator grid circuit. On M.W., **L4** is tuned by **C11** with trimmers **C12** and **C13**; on L.W., **C10** is connected across **L4** by **S1B.**

V2 (UBF89) functions as the I.F. amplifier and sound detector. The audio output is developed across the volume control **R9** and coupled by **C23** to the audio amplifier **V3A** (triode section UCL83). The D.C. voltage across **R9** produced by the rectified signal is decoupled by **R8** and **C22** and fed as A.G.C. bias to the grid circuits of **V1** and **V2.** The anode circuit of **V3A** is R.C. coupled to **V3B** (pentode section UCL83) the output stage. Tone correction is effected by **C27** across **T1** primary and by the inclusion of **C26** between **V3B** anode and control grid to provide a measure of high frequency negative feedback.

MECHANICAL DETAILS

Removing the Chassis

Take off the cabinet back panel and withdraw the tuning knob, using a thin cord round the neck of the knob. Next, remove the cover glass and bezel to allow the pointer assembly to be withdrawn. The bezel is secured by lugs fitting in four slots round the tuning dial and may easily be removed after straightening out the ends of the lugs (accessible from inside the cabinet). The positions of the three chassis fixing screws are shown in Fig. 2.

When reassembling, do not omit to fit the spacer and washer to the gang spindle before replacing the pointer assembly.

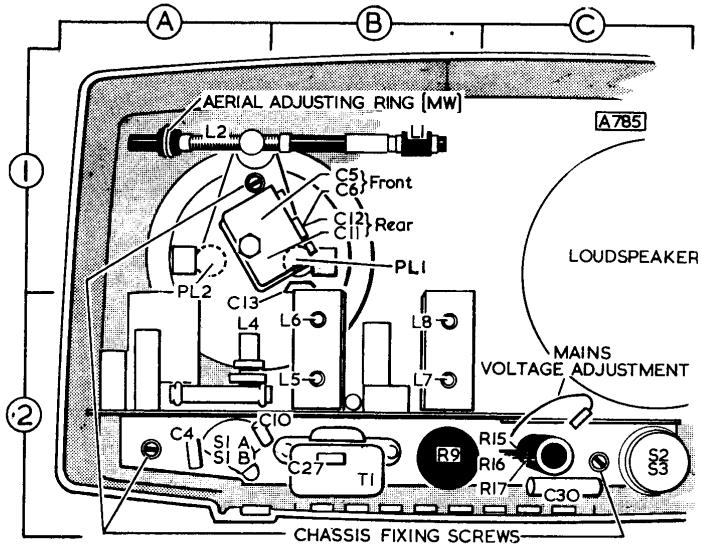


Fig. 2. Rear view of receiver showing the locations of trimming adjustments and components not mounted on the printed board.

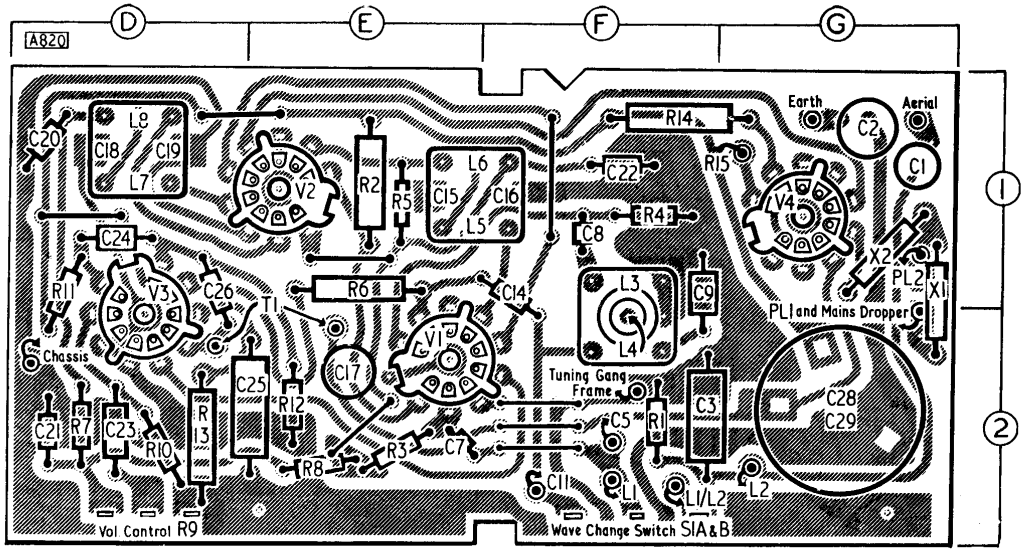


Fig. 3. The printed board viewed from components side.

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 0.1μF capacitor at the control grid of **V1** (pin 2).

Adjust **L8, L7, L6** and **L5** 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

Calibration markers are provided on the scale and, with the exception of the oscillator tuning coil **L4,** all trimming adjustments are easily accessible without removing the chassis from the cabinet. **L4** also may be adjusted in the cabinet by use of the flexible nylon trimming tool (Z21524), as supplied for television alignment. These tools are available from Service Department.

If **L4** requires adjustment, and a suitable tool is not available, the chassis should be removed from the cabinet as described in "Mechanical Details".

Since the scale is attached to the cabinet, a calibrated knob must be fitted to the tuning gang spindle. An instrument type knob with a scale calibrated in degrees is suitable and should be used in conjunction with the marker line provided on the tuning gang support bracket.

With the tuning gang fully closed, ensure that the pointer registers with the "gang max" marker on the scale or, if a calibrated knob is used, the zero point should be set to the marker line.

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. Alternatively, the generator may be connected directly to the aerial socket through a 30–100pF series capacitor.

The medium waveband must be aligned first.

1. Switch to M.W. and tune to the calibration marker at approximately 500 Metres (or 30°). Inject 500 Kc/s signal and adjust **L4** and the rod aerial adjusting ring for maximum output.
2. Tune to the calibration marker at approximately 200 Metres (163°). Inject 1400 Kc/s signal and adjust **C12** and **C6** for maximum output.
3. Repeat 1 and 2 until no further improvement results.
4. 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. The signal should tune in at the high frequency end of the "Light Programme" marker (or between 110° and 120° rotation).

COMPONENT LOCATIONS

Ref.	Loc.	Ref.	Loc.
R 1	F2	C18	D1
R 2	E1	C19	D1
R 3	E2	C20	D1
R 4	F1	C21	D2
R 5	E1	C22	F1
R 6	E1	C23	D2
R 7	D2	C24	D1
R 8	E2	C25	E2
R 9	B2	C26	D1
R10	D2	C27	B2
R11	D1	C28	G2
R12	E2	C29	G2
R13	D2	C30	C2
R14	F1		
R15	C2	V1	E2
R16	C2	V2	E1
R17	C2	V3	D2
C 1	G1	V4	G1
C 2	G1	L1	B1
C 3	F2	L2	A1
C 4	A2	L3	F1
C 5	B1	L4	F2
C 6	B1	L5	B2
C 7	E2	L6	B2
C 8	F1	L7	B2
C 9	F1	L8	B2
C10	B2	T1	B2
C11	B1	PL1	B1
C12	B1	PL2	A1
C13	B1	S1 A & B	A2
C14	F1	S2	C2
C15	E1	S3	C2
C16	F1	X1	G1
C17	E2	X2	G1

SERVICE NOTES

When servicing is necessary on the printed circuit panel, it must be remembered that excessive heat can loosen the bond between the copper conducting circuits and the insulating board ; consequently, particular care is necessary if any connections must be soldered to the 'wiring' side of the panel. For this reason, when replacing a resistor or capacitor, cut out the faulty component so that as much as possible of the original lead-out wires remain for connecting the new component, soldering to the ends of the wires instead of to the printed conductors. Use a small low-consumption iron and do not apply the bit for longer than is necessary to produce a sound joint.

The heavier components are secured on the board by clip lugs which also make electrical connections to the panel. To remove these, use a heavier type iron and apply heat and pressure to the lug—not the printed circuit—so that when the solder melts, the lug is pressed clear of the connecting point. In some cases a small stiff-haired brush will assist in breaking the connection.

If a section of printed conductor is damaged or fused, scrape off the damaged portion and restore the connection with a jumper wire on the component side of the panel. Should it become necessary, however, to solder directly to a printed conductor, use a 60/40 resin cored solder and, with a low-consumption iron, make the joint quickly to avoid overheating. **Do not use a corrosive type flux.**

RESISTORS

(All ¼ Watt carbon, 20% tolerance unless otherwise stated)

Ref.	Value	Rating	Function
R 1	3.3KΩ		External aerial shunt
R 2	33KΩ	½ W.	V1 S.G. H.T. feed
R 3	470KΩ		V1 (heptode) grid leak
R 4	47KΩ		V1 (triode) grid leak
R 5	220KΩ	10%	I.F.T. damping
R 6	22KΩ	½ W.	Oscillator H.T. feed
R 7	100KΩ		I.F. filter
R 8	1.5MΩ		A.G.C. decoupling
R 9	500KΩ*	(carbon pot. log.)	Volume control
R10	10MΩ		V3A grid leak
R11	100KΩ		V3A anode load
R12	270KΩ		V3B grid leak
R13	330Ω	10% ½ W.	V3B cathode bias
R14	2.7KΩ	10% 1 W.	H.T. smoothing
R15	500Ω		
R16	400Ω	(wire wound)†	V4 current limiter and mains dropper
R17	300Ω		

* Part No. Y13060.
† Part No. Z10854

INDUCTORS AND TRANSFORMERS

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

Ref.	Function	Resistance		Part No.
L1	Ferrite-Rod	L.W. Coil	5.5Ω	Y10782
L2	Aerial	M.W. Coil	—	
L3	Oscillator Feedback		—	Y10876
L4	Oscillator Tuning		2Ω	
L5	1st I.F.	Pri.	5.5Ω	N10900
L6	Transformer	Sec.	5.5Ω	
L7	2nd I.F.	Pri.	5.5Ω	N10899
L8	Transformer	Sec.	5.5Ω	
T1	Output Transformer	Pri.	450Ω	Z10763
		Sec.	—	

MISCELLANEOUS

Ref.	Function and Description	Part No.
PL1 PL2	Pilot lamps, 12 V. 0.1 A. M.E.S.	33774
S1A&B	Wavechange switch	Z10852
S2 S3	On-Off switch	Z10853
X1	Thermistor type CZ 2	Z4558/2
X2	Thermistor type CZ 2	Z4558/2

VOLTAGE AND CURRENT MEASUREMENTS

The following readings were taken with a model 8 Avometer, voltages being measured on the 250 V. or 10 V. ranges as applicable. The gang was fully open with no signal input, the mains adjustment set for 230–250 Volts with a 230 Volt 50 c.p.s. supply.

General Measurements

Total H.T. current	56mA
H.T. Voltage unsmoothed	200V
H.T. Voltage smoothed	160V

Valve Measurements

Ref.	Valve Type	Anode Volts	Anode mA	Screen Volts	Screen mA	Cathode Volts
V1	UCH81 (heptode)	160	1.5	47	2.8	—
	(triode)	86	3.5	—	—	—
V2	UBF89	160	3	47	0.8	—
V3A	UCL83 (triode)	96	0.5	—	—	—
V3B	UCL83 (pentode)	190	24	160	4	9.2

MECHANICAL SPARES

Part Description	Part No.
Aerial Mounting (ferrite-rod)	Y10787
Cabinet	V10715
Cabinet Back	W10875
Cabinet Trim (knob backing strip)	Y10756
Control Knobs :—	
Tuning	X10718
On-Off	Y10716/1
Volume	Y10717
Wavechange	Y10716
Control Knob Retaining Clip	45931
Lampholder (scale lamp)	Z13305/2
Scale	X10719
Scale Bezel	Y10720
Scale Glass	Z10841
Scale Pointer	Z10874
Scale Pointer Clip	37309

CAPACITORS

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

Ref.	Value	Rating		Function
C 1	0.001uF		350 V. AC.	Aerial isolating
C 2	0.02uF		350 V. AC.	Earth isolating
C 3	0.003uF	5%		External aerial coupling
C 4	137pF*	2%		L.W. fixed aerial trimmer
C 5	523pF†	(variable)		Aerial tuning
C 6	3-25pF	(pre-set)		M.W. aerial trimmer
C 7	220pF			V1 C.G. coupling
C 8	56pF			V1 osc. grid coupling
C 9	390pF**	2%		Oscillator padder
C10	390pF**	2%		L.W. fixed osc. trimmer
C11	523pF†	(variable)		Oscillator tuning
C12	3-25pF	(pre-set)		M.W. osc. trimmer
C13	10pF	5%		
C14	100pF			V1 osc. anode coupling
C15	200pF	2½%	125 V.	L5 tuning
C16	200pF	2½%	125 V.	L6 tuning
C17	0.1uF			V1/V2 S.G. decoupling
C18	200pF	2½%	125 V.	L7 tuning
C19	200pF	2½%	125 V.	L8 tuning
C20	220pF			I.F. filter
C21	100pF			
C22	0.005uF			A.G.C. decoupling
C23	0.01uF			V3A C.G. coupling
C24	0.01uF			V3B C.G. coupling
C25	50uF	(electrolytic)	12 V.	V3B cathode bypass
C26	30pF			V3B neg. feedback
C27	0.003uF		600 V.	Tone compensation
C28	50uF††	(electrolytic)	275 V.	H.T. smoothing
C29	50uF††	(electrolytic)	275 V.	H.T. reservoir
C30	0.02uF		350 V. AC.	Mains R.F. bypass

* Part No. 45755.
† Swing value. Part No. Z10851.
** Part No. Y391R35.
†† Part No. Z13200.

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