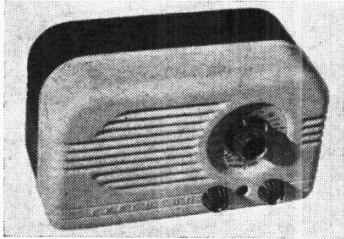


"TRADER" SERVICE SHEET

820

FERGUSON 203U

AND LOW-VOLTAGE MODEL 203ULL



A COMPACT receiver in a moulded casing that comes apart in two sections, the Ferguson 203U is a 4-valve (plus rectifier) 2-band super-het designed to operate from A.C. or D.C. mains of 200-250 V. The differences in the 203ULL, which operates from 100 V mains only, are described at the end of "General Notes" overleaf.

Release date and original price: June, 1947, £15 0s plus £3 4s 6d purchase tax (either model).

CIRCUIT DESCRIPTION

Aerial input via isolating capacitor **C1** and coupling coil **L1** to single tuned circuits **L2, C22** (M.W.) and **L3, C22** (L.W.), which precede a triode hexode valve (**V1, Brimar 12K8GT**) operating as frequency changer with electron coupling.

Triode oscillator grid coils **L4** (M.W.) and **L5** (L.W.) are tuned by **C23**. Parallel

trimming by **C24** (M.W.) and **C25** (L.W.); series tracking by **C5, C26** (M.W.) and **C6, C27** (L.W.). Reaction coupling from anode by coil **L6**.

Second valve (**V2, Brimar 12K7GT**) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned couplings **C28, L7, L8, C29**, which constitute an I.F. transformer, and a single-tuned circuit **C8, L9**.

Intermediate frequency 455 kc/s.

Diode second detector is part of double diode triode valve (**V3, Brimar 12Q7GT**), parallel-fed via **C10**. The second diode is strapped to cathode. Audio frequency component in rectified output is developed across manual volume control **R6**, which acts as diode load resistor, and passed via A.F. coupling capacitor **C11** and C.G. resistor **R7** to C.G. of triode section, which operates as A.F. amplifier. I.F. filtering by **R5, C9** in diode circuit, and **C12** in triode anode circuit.

D.C. potential developed across **R6** is tapped off and fed back via decoupling circuit as G.B. to F.C. and I.F. valves, giving automatic volume control.

Resistance-capacitance coupling by **R8, C13, R9** between **V3** triode and beam tetrode output valve (**V4, Brimar 35L6GT**). Fixed tone correction in anode circuit by **C15**.

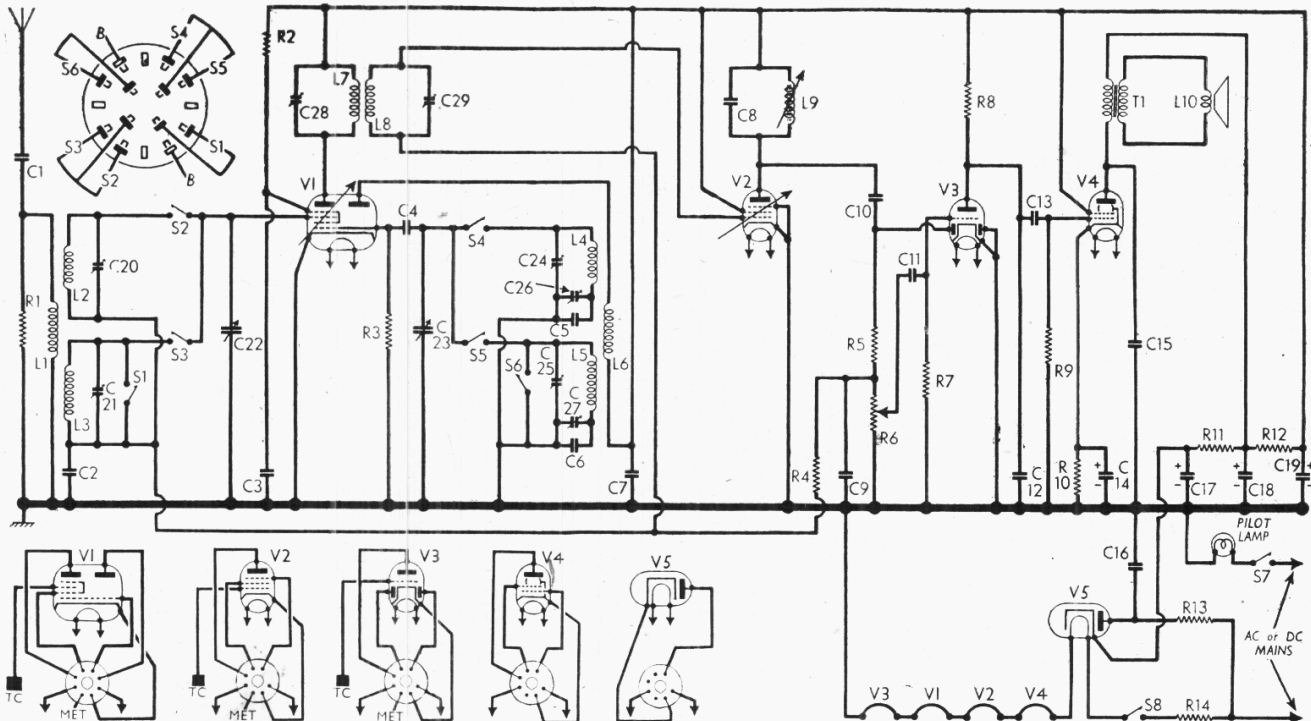
When the receiver is operated from A.C. mains, H.T. current is supplied by half-wave rectifying valve (**V5, Brimar**

35Z4GT) which, with D.C. mains, behaves as a low resistance. Smoothing by resistors **R11, R12** and electrolytic capacitors **C17, C18** and **C19**. H.T. circuit R.F. filtering by **C7**.

COMPONENTS AND VALUES

CAPACITORS		Values (μF)
C1	Aerial isolator ...	0-0001
C2	A.V.C. line decoupling ...	0-02
C3	V1 S.G. decoupling ...	0-02
C4	V1 osc. C.G. capacitor ...	0-0001
C5	Osc. M.W. fixed tracker ...	0-0004
C6	Osc. L.W. fixed tracker ...	0-0001
C7	H.T. circuit R.F. by-pass ...	0-02
C8	V2 anode circuit tuning ...	0-0001
C9	I.F. by-pass capacitor ...	0-0001
C10	V3 diode coupling ...	0-0001
C11	A.F. coupling to V3 C.G. ...	0-05
C12	I.F. by-pass capacitor ...	0-0001
C13	A.F. coupling to V4 C.G. ...	0-05
C14*	V4 cathode by-pass ...	25-0
C15	Fixed tone corrector ...	0-005
C16	Mains R.F. by-pass ...	0-02
C17*	H.T. smoothing capacitors {	16-0
C18*		16-0
C19*		4-0
C20†	Aerial circ. M.W. trimmer ...	0-00004
C21†	Aerial circ. L.W. trimmer ...	0-00004
C22†	Aerial circuit tuning ...	0-00054
C23†	Oscillator circuit tuning ...	0-00054
C24†	Osc. circ. M.W. trimmer ...	0-00004
C25†	Osc. circ. L.W. trimmer ...	0-00004
C26†	Osc. circ. M.W. tracker ...	0-00008
C27†	Osc. circ. L.W. tracker ...	0-00008
C28†	I.F. trans. pri. tuning ...	0-00018
C29†	I.F. trans. sec. tuning ...	0-00018

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Ferguson 203U. The differences in the 203ULL, which is designed for 100 V mains only, are described overleaf.

RESISTORS		Values (ohms)
R1	Aerial circuit shunt	220,000
R2	V1 S.G. H.T. feed	33,000
R3	V1 osc. C.G. resistor	47,000
R4	A.V.C. line decoupling	2,200,000
R5	I.F. stopper	100,000
R6	Manual volume control	500,000
R7	V3 triode C.G. resistor	3,800,000
R8	V3 triode anode load	470,000
R9	V4 C.G. resistor	470,000
R10	V4 G.B. resistor	220
R11	H.T. smoothing resistors	1,200
R12		4,700
R13	V5 anode surge limiter	100
R14	Heater circuit ballast	800†

† Line cord.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial coupling coil	18.5
L2	Aerial M.W. tuning coil	3.0
L3	Aerial L.W. tuning coil	14.5
L4	Osc. M.W. tuning coil	2.4
L5	Osc. L.W. tuning coil	6.0
L6	Oscillator reaction coil	2.6
L7	I.F. trans. { Pri.	8.0
L8		Sec.
L9	V2 anode tuning coil	7.0
L10	Speaker speech coil	2.5
T1	Output trans. { Pri.	0.6
	Sec.	430.0
S1-S6	Waveband switches	—
S7,S8	Mains switches, ganged R6	—

VALVE ANALYSIS

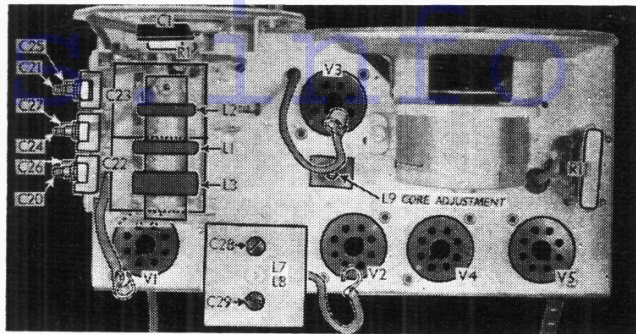
Valve voltages and currents given in the table below are those measured in our receiver when it was operating on A.C. mains of 231 V.

Voltages were measured on the 400 V scale of a model 7 Avometer, chassis being the negative connection.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 12K8GT	95	0.3	35	1.5
	Oscillator			
V2 12K7GT	95	2.5	95	2.2
	V3 12Q7GT			
V3 12Q7GT	95	8.1	95	1.4
	V4 35L6GT			
V4 35L6GT	23	0.14	95	1.4
	V5			
V5 35Z4GT†	—	—	—	—

† Cathode to chassis, 242 V, D.C.

Plan view of the chassis. The six pre-set capacitor adjustments are seen on the left, and the single I.F. core adjustment in the centre. The two I.F. transformer trimmers, C28, C29, are seen at the top of the can.



GENERAL NOTES

Switches.—S1-S6 are the waveband switches, ganged in a single rotary unit beneath the chassis. The unit is indicated in our under-chassis view, and shown in detail in the diagram inset in the top left-hand corner of the circuit diagram overleaf, where it is drawn as seen from the rear of an inverted chassis. S1, S2, S4 and S6 close on M.W. only (control knob clockwise) and S3, S5 close on L.W. only (knob anti-clockwise).

S7, S8 are the double-pole Q.M.B. mains switches, ganged with the volume control R6. S8, it will be observed, is at the receiver end of R14, owing to the location of R14 in the mains lead.

Pilot Lamp.—This is an Osram M.E.S. type lamp, with a small clear spherical bulb, rated at 6.5 V, 0.3 A. Access to it for replacement purposes may be obtained upon removal of the front section only of the cabinet moulding.

Capacitors C17, C18, C19.—C17 and C18 are two dry electrolytics in a single tubular metal container beneath the chassis. They are rated at 16 µF, 350 V working each. The positive connections are brought out to two tags at one end, and the case forms the common negative connection. In our sample, the red-spotted tag went to V5 cathode. C19 is a cardboard tubular dry electrolytic unit rated at 4 µF, 350 V working.

Resistors R11, R14.—R11 is a wire-wound vitreous enamelled resistor, rated at 6 W, mounted on a small tag panel on the chassis deck. R14 is a "line cord" element, incorporated in the mains lead. The series heater current is 0.15 A.

203ULL Modifications.—This model is a 203U modified to operate from 100 V A.C. or D.C. mains. It must not be connected to 200 V mains.

A 5H (50Ω) smoothing choke replaces R11, and C17 and C18 both become 32µF. R12, C19 and the line cord R14 are omitted altogether. These models are made to special order only.

DISMANTLING THE SET

Removing Chassis.—Remove the two small control knobs only, by completely withdrawing their self-threading retaining screws;

remove the two long bolts (with washers) located in recesses at the top left and right corners of the rear cabinet moulding.

remove the four padded feet (pull off) from the base of the cabinet;

remove the four double-ended chassis retaining screws (with lock washers) from the underside of the cabinet, and draw apart the two sections of the cabinet to expose the chassis.

When replacing, note that the longer threaded sections of the double-ended chassis retaining screws are used to secure the chassis to the base of the cabinet, and that a lock-washer fits under each head. The shorter ends of these screws take specially shaped transit caps which hold a protective wooden cross-batten across the base of the casing, which should be replaced if the set is to be transported. In use, these caps are replaced by felt-padded push-on feet.

One felt washer should be placed between each control knob and the front of the cabinet, and the retaining screws must be covered with a suitable insulating compound.

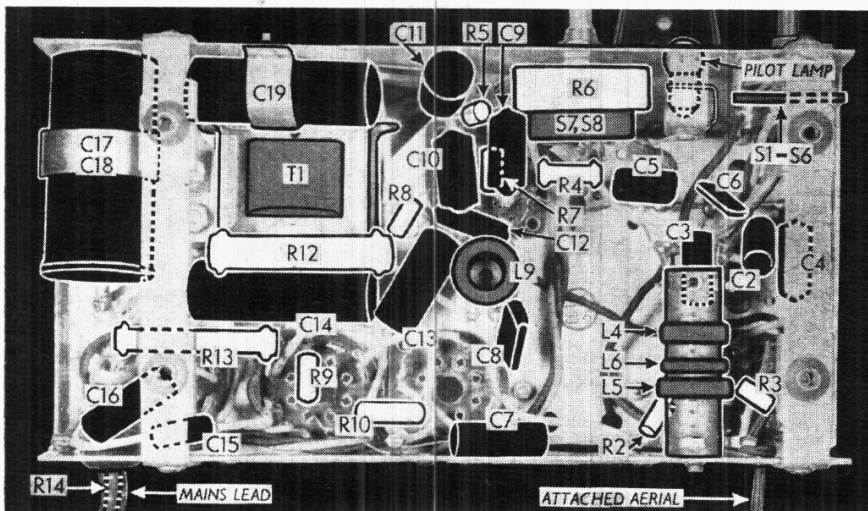
CIRCUIT ALIGNMENT

I.F. Stages.—Remove existing control grid (top cap) connector of V1 and connect signal generator leads, with a 100,000 Ω resistor in parallel, to control grid and chassis. Switch set to L.W., and turn gang and volume control to maximum. Feed in a 455 kc/s (659.3 m) signal and adjust C28, C29 and the core of L9 for maximum output. Remove signal generator leads and replace top cap connector.

R.F. and Oscillator Stages.—With the gang at maximum capacitance the pointer should be vertical. Transfer signal generator leads to aerial and chassis via a suitable dummy aerial.

M.W.—Switch set to M.W., tune to 214 m on scale, feed in a 214 m (1,400 kc/s) signal, and adjust C24 and C20 for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust C26 for maximum output. Repeat the 214 m and 500 m adjustments until no improvement results.

L.W.—Switch set to L.W., tune to 750 m (spot on scale), feed in a 750 m (400 kc/s) signal, and adjust C25 and C21 for maximum output. Tune to 2,000 m on scale, feed in a 2,000 m (150 kc/s) signal, and adjust C27 for maximum output. Repeat the 750 m and 2,000 m adjustments until no improvement results.



Under-chassis view. A diagram of the switch unit S1-S6 is inset in the circuit diagram overleaf.