"TRADER" SERVICE SHEET

1100

ULTRA MODEL R786

"Coronation Twin"

DESIGNED to operate from A.C. or D.C. mains of 200-250 V, or from self-contained dry batteries, the Ultra "Coronation Twin" Model R786 is a 4-valve (plus metal rectifier) 2-band portable superhet. The mains/battery change-over switch is automatically operated upon inserting the mains connector in its chassis socket. Waveband ranges are 190-550 m and 1,160-2,000 m.

Release date and original price: April 1953; £13 10s 4d. Batteries and purchase tax extra.

COMPONENTS AND VALUES

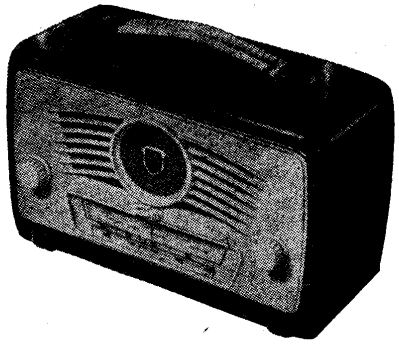
	CAPACITORS	Values	Locations
C1	L.W. aerial trim. ...	210pF	G2
C2	V1 C.G.	500pF	G3
C3	V1 S.G. decoupling	0·04μF	F3
C4	1st I.F. trans. tun.	100pF	A1
C5	1st I.F. trans. tun.	100pF	A1
C6*	Filament by-pass...	50μF	A1
C7	V1 osc. C.G. ...	100pF	G2
C8	Osc. tracker ...	650pF	G2
C9	L.W. osc. trim. ...	510pF	A1
C10	A.G.C. decoupling	0·004μF	F2
C11	Osc. anode decoup.	0·04μF	F2
C12	V2 neutralizer ...	4pF	F3
C13	2nd I.F. trans. tun.	100pF	A1
C14	2nd I.F. trans. tun.	180pF	A1
C15	I.F. by-pass ...	100pF	F2
C16	A.F. coupling ...	0·01μF	F2
C17	A.F. coupling ...	0·01μF	E2
C18	H.T. decoupling ...	0·04μF	F2
C19	V3 S.G. decoupling	0·04μF	E3
C20	A.F. coupling ...	0·001μF	E3
C21*	Filament by-pass...	50μF	A1
C22	Tone corrector ...	0·005μF	E3
C23*	H.T. smoothing ...	50μF	B1
C24*	H.T. smoothing ...	50μF	B1
C25	Mains R.F. by-pass	0·1μF	C1
C26†	Aerial tuning ...	520pF	A1
C27‡	M.W. aerial trim.	30pF	G3
C28†	Oscillator tuning ...	520pF	A1
C29‡	M.W. osc. trim. ...	60pF	G2
C30‡	L.W. osc. trim. ...	60pF	G2

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values	Locations
R1	V1 C.G.	1MΩ	G3
R2	V1 S.G. feed ...	180kΩ	F3
R3	V1 osc. C.G. ...	27kΩ	G3
R4	Osc. reaction shunt	4·7kΩ	F2
R5	Osc. anode feed ...	18kΩ	F2
R6	Fil. H.T. by-pass...	1·2kΩ	G3
R7	Diode load ...	470kΩ	F3
R8	A.G.C. decoupling	1·5MΩ	F3
R9	I.F. stopper ...	27kΩ	F2
R10	V1, V2 G.B. ...	5·6MΩ	E3
R11	Volume control ...	1MΩ	D2
R12	V3 C.G.	10MΩ	F3
R13	V3 anode load ...	820kΩ	F2
R14	H.T. decoupling ...	10kΩ	E2
R15	V3 S.G. feed ...	4·7MΩ	F3
R16	V4 C.G.	1MΩ	F3
R17	V4 C.G. stopper ...	470kΩ	E3
R18	Fil. H.T. by-passes	820Ω	E3
R19	Fil. H.T. by-passes	1kΩ	E3
R20	Filament ballast ...	1,690Ω	C1
R21	H.T. smoothing ...	1,450Ω	C1
R22	Voltage adj. ...	*975Ω	C1

* Tapped at 195Ω+410Ω+370Ω from MR1.

	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	Frame aerial ...	1·2	—
L2	L.W. loading coil...	7·5	A1
L3	M.W. loading coil...	0·8	A1
L4	Osc. tuning coil ...	1·3	F2
L5	Osc. reaction coil...	1·1	F2
L6	1st I.F. trans. Pri.	6·5	A1
L7	1st I.F. trans. Sec.	6·5	A1
L8	2nd I.F. trans. Pri.	6·5	A1
L9	2nd I.F. trans. Sec.	4·5	A1
L10	Speech coil ...	2·6	E2
T1	O.P. trans. Pri. ...	510·0	E3
	O.P. trans. Sec.	0·5	
S1-S6	Waveband switches	—	F2
S7, S8	Power sw., g'd R11	—	D2
S9(B)-S14(B)	Mains/batt. sw. ...	—	D2
MR1	SenTerCel RM2 ...	—	C1



CIRCUIT DESCRIPTION

Tuned frame aerial input **L1**, loading coil **L3** and **C26** (M.W.) or **L1**, loading coils **L2, L3** and **C26** (L.W.), precedes heptode valve **(V1, Mazda 1C2)** operating as frequency changer with electron coupling. No provision is made for the connection of an external aerial or earth.

Oscillator grid coil **L4** is tuned by **C28** for M.W. operation, with parallel trimming by **C29** and series tracking by **C8**. For L.W. coverage, the same circuit is used, shunted by **C9, C30**. Reaction coupling from oscillator anode by **L5** (M.W. and L.W.). On M.W. **R4** is shunted across the reaction coil to limit the oscillator volts.

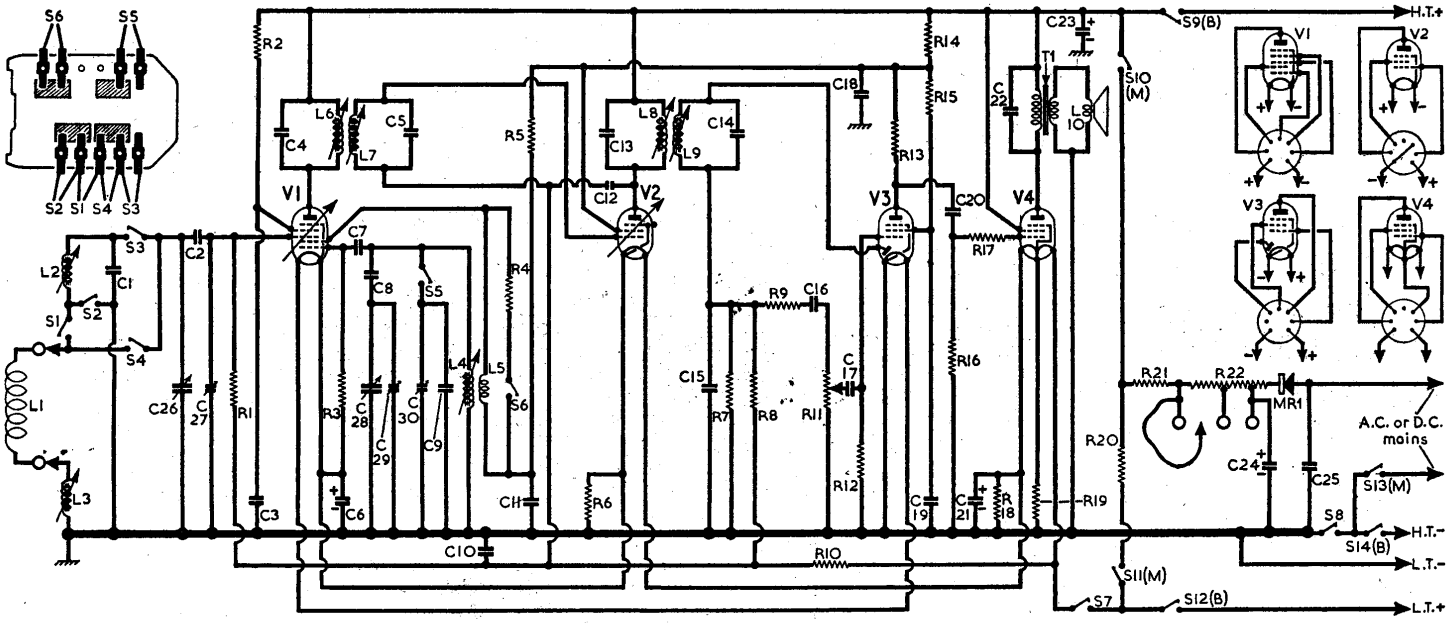
Second valve **(V2, Mazda 1F3)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C4, L6, L7, C5** and **C13, L8, L9, C14**. Unwanted feed-back coupling between the anode and grid of **V2** is neutralized by **C12**.

Intermediate frequency 471 kc/s.

Diode signal detector is part of diode pentode valve **(V3, Mazda 1FD9)**. Audio frequency component in rectified output is developed across diode load **R7** and passed via **R9, C16**, volume control **R11** and **C17** to pentode section, which operates as A.F. amplifier.

Resistance-capacitance coupling by **R13, C20** and **R16** between **V3** pentode and pentode out-

(Continued col. 1 overleaf)



Circuit diagram of the Ultra "Coronation Twin" Model R786. The mains/battery switch is operated by the mains connector.

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Supplement to Wireless & Electrical Trader, July 4, 1953

Circuit Description—*Continued.*

put valve **(V4, Mazda 1P11).** Tone correction by **C22** in anode circuit.

For battery operation, power supplies are carried by switches **S9(B), S12(B)** and **S14(B),** which close in that position, as indicated by the suffix **(B).** For mains operation **S10(M), S11(M)** and **S13(M)** close. **S7** and **S8** are the normal "on/off" switches.

H.T. current is supplied by half wave metal rectifier **(MR1, SenTerCel RM2)** consisting of two units in series for 250 V mains coverage. Smoothing by **R21,** voltage adjustment resistor **R22** and electrolytic capacitors **C23, C24.** Filament current also is taken from the H.T. circuit, the filaments being connected in series and fed via **R20.**

The filaments remain series connected for battery operation, bias being obtained from points of appropriate potential in the filament chain. **R6, R18** and **R19** by-pass the H.T. current drawn by the valves past the filaments. **C25** operates as a mains R.F. by-pass.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured on our receiver, which was operating from 230 V A.C. mains. The receiver was switched to M.W. and tuned to a point at the high wavelength end of the band where there was no signal pick-up.

Voltages were measured with an Avo Electronic TestMeter, and as this instrument has a high internal resistance allowance should be made for the current drawn by other types of meter. The voltage measured across **C24** was 215 V. Chassis was the negative connection in every case.

Valves		Anode		Screen	
		V	mA	V	mA
V1	1C2 ...	84 (Oscillator) 35	0·6 1·6	62	1·4
V2	1F3 ...	84	1·6	61	0·5
V3	1FD9 ...	11	50μA	18	18μA
V4	1PII ...	81	5·5	81	1·5

GENERAL NOTES

Switches.—**S1-S6** are the waveband switches, ganged in a slide-type switch unit indicated in our under-chassis view and shown in detail in the top left-hand corner of our circuit diagram overleaf, where it is viewed from the rear of an inverted chassis. **S2, S4** and **S6** close for M.W. operation; **S1, S3** and **S5** close for L.W. operation.

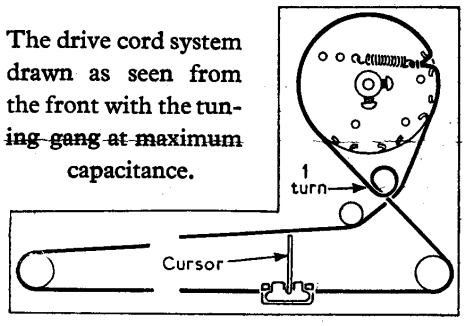
S7, S8 are the Q.M.B. "on/off" switches, ganged with the volume control **R11.**

S9(B)-S13(M), S14(B) are the mains/battery change-over switches, ganged in a spring-loaded slide-type switch unit, mounted on the underside of the chassis deck. This is indicated in our under-chassis view, where the tags are identified. In the normal position (mains connector out) the receiver is switched to battery operation, and all the switches with the suffix **(B)** closed. When the mains connector is plugged into the receiver, it pushes forward the spring-loaded lever and causes the **(M)** switches to close for mains operation.

Frame Aerial.—The frame aerial winding **L1** is cemented inside the back cover of the carrying case. Connection to the chassis is made via two coloured leads which plug into sockets on the back cover, the sockets being coded with corresponding colours. The top connection is for the red lead and the lower one for the green lead.

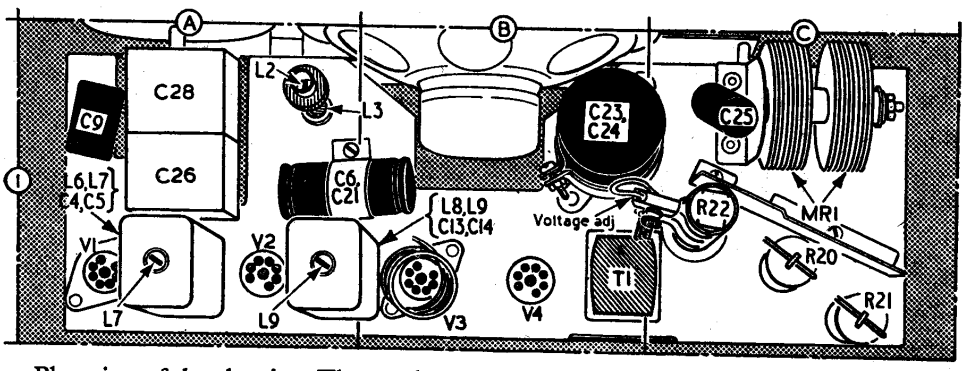
Batteries.—The L.T. battery recommended is Drydex 41186 or Ever Ready AD39, rated at 7.5 V. It has a standard 2-pin connector. The H.T. battery recommended is Drydex 529 or Ever Ready B129, rated at 85 V. This has a 3-pin connector, the two opposite pins being the live ones.

Drive Cord Replacement.—Thirty-six inches of nylon braided glass yarn is required for the drive cord, which should be run as shown in the sketch above where the chassis is viewed from the front with the gang at maximum capacitance.



The drive cord system drawn as seen from the front with the tuning gang at maximum capacitance.

Tie one end of the cord to the spring and anchor the spring in the third from the left of the six holes above the drive drum bush. Run the cord down clockwise round the drum, pulling against the gang stop, and under the tuning spindle, laying the cord in the groove furthest from the control knob end. Carry on as indicated in sketch, finally tying off the other end of the cord to the spring.



Plan view of the chassis. The speaker terminals are accessible beneath the chassis.

CIRCUIT ALIGNMENT

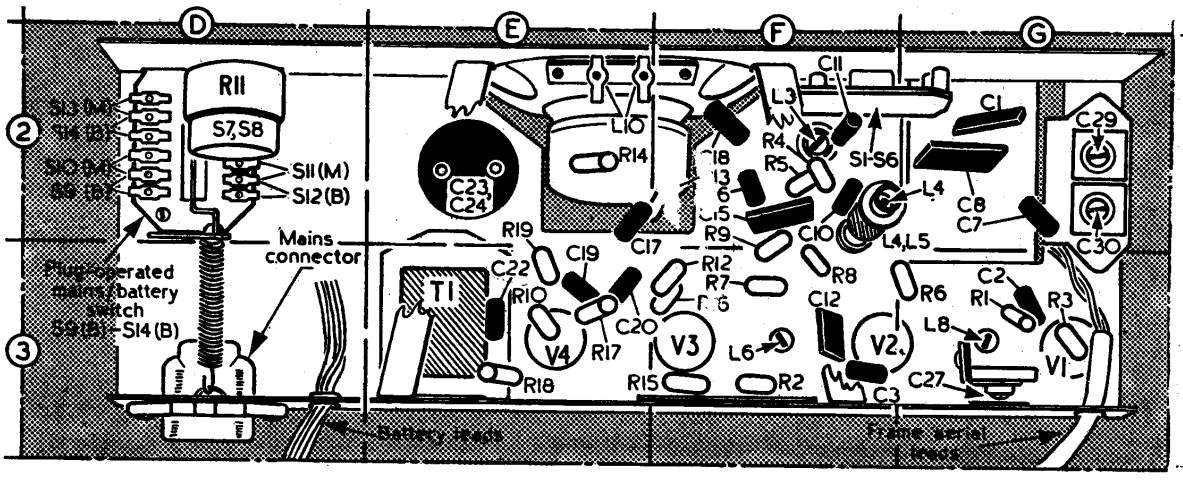
I.F. Stages.—Remove chassis from cabinet and stand it on the bench resting on its metal rectifier end. Position the carrying case beside it so that the frame aerial is in its normal position relative to the chassis. The signal generator output should be coupled to the receiver via a coil of wire consisting of 14 turns of 18 S.W.G. enamelled copper wound on a ¾in diameter former to a length along the former of 1¼in. This coil should be placed about 6in from the frame aerial. Switch receiver to M.W. and turn gang to maximum capacitance. Feed in a 471 kc/s (637 m) signal and adjust the cores of **L9** (location reference A1), **L8** (G3), **L7** (A1) and **L6** (F3) for maximum output, reducing the input as the circuits come into line to avoid A.G.C. action. Repeat these adjustments until no further improvement results.

R.F. and Oscillator Stages.—With the signal generator output coupled to the receiver as for I.F. alignment, check that the cursor coincides with the vertical calibration mark at the top of the high wavelength end of the scale when the gang is at maximum capacitance. Calibration dots numbered 1 to 4 are provided at the top edge of the tuning scale and are referred to in the following alignment adjustments.

M.W. Oscillator.—Switch receiver to M.W., tune to calibration mark 4, feed in a 500 m (600 kc/s) signal and adjust the core of **L4** (F2) for maximum output. Tune receiver to calibration mark 1, feed in a 200 m (1,500 kc/s) signal and adjust **C29** (G2) for maximum output. Repeat these adjustments until no further improvement results.

L.W.—Switch receiver to L.W., tune to calibration mark 3, feed in a 1,429 m (210 kc/s) signal and adjust **C30** (G2) and the core of **L2** (A1) for maximum output. Repeat these adjustments.

M.W. Aerial.—Replace chassis in carrying case and close back cover. The following adjustments are accessible through holes in the base and back of the carrying case. Tune receiver to calibration mark 4, feed in a 500 m (600 kc/s) signal and adjust the core of **L3** (F2) for maximum output. Tune receiver to calibration mark 1, feed in a 200 m (1,500 kc/s) signal and adjust **C27** (G3) for maximum output. Repeat these adjustments until no further improvement results.



Under-chassis view. The mains / battery switches are all identified here in the unit at top left. The waveband switch unit is also identified, a detailed drawing of it being inset in the circuit diagram overleaf.

Printed in England by Cornwall Press Ltd., Paris Garden, London, S.E.1.