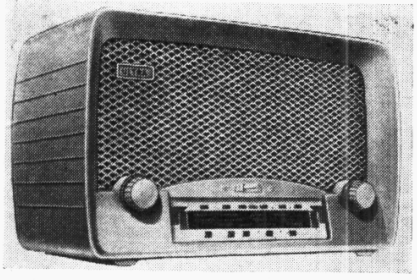
"TRADER" SERVICE SHEET

1038

ULTRA U696 "Troubadour"



The appearance of the 1952 Ultra "Troubadour" transportable.

DESIGNED to operate from A.C. or D.C. mains of 200-250 V, 25-100 c-s, without an external aerial, the Ultra U696 is a new "Troubadour" to succeed the earlier receiver of that name, the U626, which is covered by our Service Sheet 945. The waveband ranges are 190-550 m and 1,200-2,000 m. Provision is made for the connection of an external aerial.

By tapping off the anode feed to the mains rectifier from the lowest voltage tapping, and by selecting the correct value for what is usually termed the surge limiting resistor, the makers claim that consistent gain and sensitivity are achieved irrespective of the kind of mains supply, whether it is A.C. or D.C., and whether it is 200 V or 250 V.

Release date and original price: March 1951; £12 5s 2d, plus purchase tax.

CIRCUIT DESCRIPTION

Frame aerial **L1**, in series with loading coil **L3** (M.W.) or loading coils **L2** and **L3** (L.W.), is tuned by **C24**. Provision is made for the connection of an external aerial via **C1**. First valve **(V1, Mazda 10C1)** is a triode pentode operating as frequency changer with internal coupling.

Single oscillator anode coil **L5**, tuned by **C27**, is used for both wavebands. Parallel trimming by **C25** (M.W.) and **C8, C26** (L.W.); series tracking by **C10** (M.W. and L.W.). Reaction coupling from grid by **L4**. Oscillator stabilization on M.W. by **R3**.

Second valve **(V2, Mazda 10F9)** is a variable-mu R.F. pentode, operating as intermediate

(Continued in col. 1 overleaf)

COMPONENTS AND VALUES

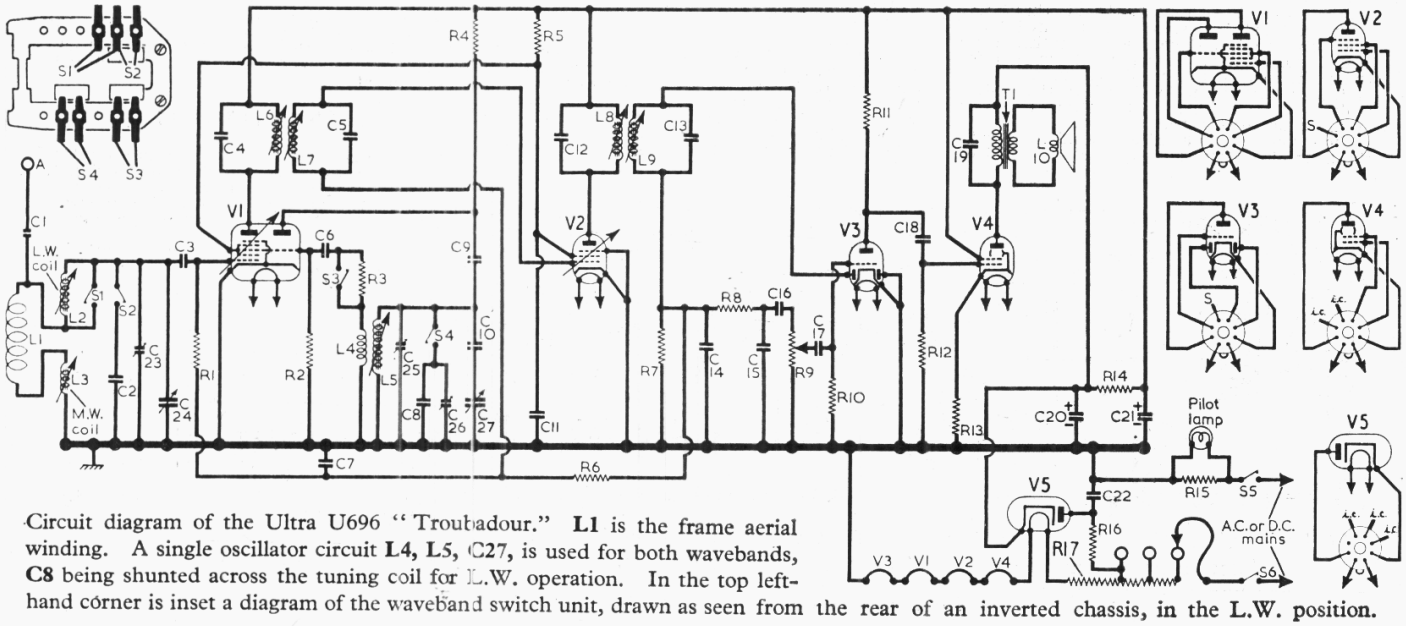
	CAPACITORS	Value	Locations
C1	Aerial series ...	15pF	—
C2	L.W. trimmer ...	220pF	F2
C3	V1 C.G.	500pF	F3
C4	1st I.F. trans. tuning ...	120pF	A1
C5	1st I.F. trans. tuning ...	120pF	A1
C6	V1 osc. C.G. ...	100pF	F2
C7	A.G.C. decoupling	0·04μF	F3
C8	L.W. trimmer ...	640pF	E2
C9	Osc. anode coup. ...	100pF	A1
C10	Osc. tracker ...	680pF	F2
C11	S.G. decoupling ...	0·04μF	F3
C12	2nd I.F. trans. tuning	120pF	B1
C13	2nd I.F. trans. tuning	120pF	B1
C14	I.F. by-passes ...	100pF	E2
C15	I.F. by-passes ...	300pF	E2
C16	A.F. coupling ...	0·01μF	D2
C17	A.F. coupling ...	0·01μF	D2
C18	A.F. coupling ...	0·01μF	E3
C19	Tone corrector ...	0·01μF	C1
C20*	H.T. smoothing ...	32μF	B1
C21*	H.T. smoothing ...	32μF	B1
C22	Mains R.F. filtering	0·05μF	D3
C23‡	M.W. aerial trim....	30pF	A1
C24†	Aerial tuning ...	§528pF	A1
C25‡	M.W. osc. trim. ...	60pF	E2
C26‡	L.W. osc. trim. ...	60pF	E2
C27†	Oscillator tuning ...	§528pF	A1

* Electrolytic. † Variable. ‡ Pre-set.
§ "Swing" value, min. to max.

	RESISTORS	Values	Locations
R1	V1 C.G.	1MΩ	F3
R2	V1 osc. C.G. ...	47kΩ	F3
R3	Osc. stabiliser ...	3·3kΩ	F2
R4	Osc. anode feed ...	68kΩ	F3
R5	S.G. feed	27kΩ	E3
R6	A.G.C. decoupling	1MΩ	E2
R7	Diode load ...	470kΩ	E2
R8	I.F. stopper ...	100kΩ	E2
R9	Volume control ...	1MΩ	D2
R10	V3 C.G.	10MΩ	E2
R11	V3 anode load ...	100kΩ	E3
R12	V4 C.G.	470kΩ	E3
R13	V4 G.B.	300Ω	E3
R14	H.T. smoothing ...	1·8kΩ	C1
R15	Scale lamp shunt...	39Ω	D2
R16	V5 surge limiter ...	120Ω	C1
R17	Ballast resistor ...	*910Ω	C1

* Tapped at 700Ω + 120Ω + 90Ω from V5 heater.

	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	Frame aerial ...	1·2	—
L2	L.W. loading coil...	9·0	F2
L3	M.W. loading coil...	0·5	F2
L4	Osc. reaction coil ...	1·7	F2
L5	Osc. tuning coil ...	4·6	F2
L6	1st I.F. trans. Pri.	8·5	A1
L7	1st I.F. trans. Sec.	8·5	A1
L8	2nd I.F. trans. Pri.	8·5	B1
L9	2nd I.F. trans. Sec.	8·5	B1
L10	Speech coil ...	2·6	—
T1	O.P. trans. Pri. ...	270·0	C1
	O.P. trans. Sec. ...	—	
S1-S4	Waveband switches	—	F2
S5, S6	Mains sw., g'd R9	—	D2



Circuit diagram of the Ultra U696 "Troubadour." **L1** is the frame aerial winding. A single oscillator circuit **L4, L5, C27,** is used for both wavebands, **C8** being shunted across the tuning coil for L.W. operation. In the top left-hand corner is inset a diagram of the waveband switch unit, drawn as seen from the rear of an inverted chassis, in the **L.W.** position.

Circuit Description—*(continued)*

frequency amplifier with tuned transformer couplings **C4, L6, L7, C5** and **C12, L8, L9, C13.**

Intermediate frequency 471 kc/s.

Diode signal detector is part of double diode triode valve **(V3, Mazda 10LD11).** Audio frequency component in rectified output is developed across diode load resistor **R7** and passed via **C16,** volume control **R9** and **C17** to grid of triode section, which operates as A.F. amplifier. G.B. for triode section of **V3** is obtained from "Contact" potential resulting from the use of a very high value for grid resistor **R10,** I.F. filtering by **C14, R8** and **C15.**

D.C. potential developed across **R7** is fed back as bias via decoupling circuit **R6, C7** to F.C. and I.F. stages, giving A.G.C.

Resistance-capacitance coupling via **R11, C18** and **R12** between **V3** triode anode and control grid of beam pentode output valve **(V4, Mazda 10P13).** Tone correction by **C19** in anode circuit and by the negative feed-back voltage developed across cathode resistor **R13.**

H.T. current is supplied by I.H.C. half-wave rectifying valve **(V5, Mazda U404).** Smoothing by **R14** and electrolytic capacitors **C20, C21.** The valve heaters, together with ballast resistor **R17,** scale lamp and **R15,** are connected in series across the mains input. **R15** protects the scale lamp, and **R16** the rectifying valve, from current surges. Mains R.F. filtering by **C22.**

GENERAL NOTES

Switches.—**S1-S4** are the waveband switches, ganged in a slide-type switch unit mounted on the inside of the front chassis member. This is indicated in our underside view of the chassis, and it is shown in detail in the diagram inset in the top left-hand corner of our circuit diagram overleaf, where it is drawn as seen from the rear of an inverted chassis.

The slider is operated by a slide-bar on the front of the chassis, permitting the switch to be mounted near the end of the chassis while the control knob is central. In the M.W. position (control knob to the left) **S1** closes; in the L.W. position, **S2, S3, S4** close.

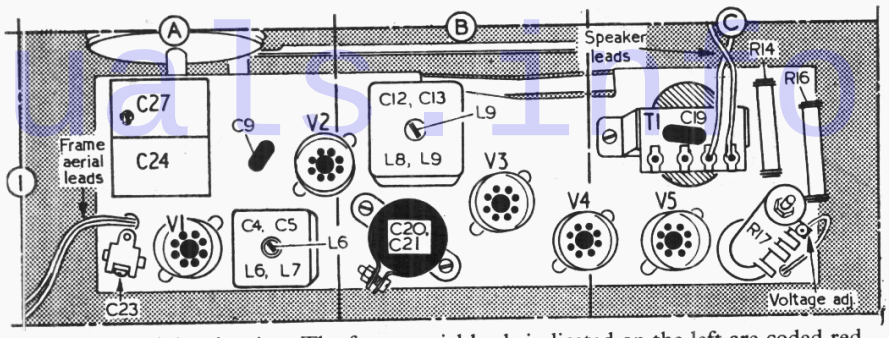
S5, S6 are the Q.M.B. mains switches, ganged with the volume control **R9.**

Pilot Lamp.—This has a small clear spherical bulb and an M.E.S. base; it is rated at 3.5 V, 0.15 A. As it is normally fitted to a socket in the cabinet, behind the "Ultra" motif, it swings loose on its leads when the chassis is withdrawn, and to protect it from damage a parking socket is provided for it in the front chassis pressing, just above the volume control spindle.

Frame Winding.—**L1** is wound on the back cover of the receiver, and is terminated at two small sockets on a small terminal strip which also carries the external aerial socket. A third small socket is used as an anchorage for the isolating capacitor **C1,** and is joined to the upper of these two small sockets which are coded red (upper) and white (lower) to agree with their connecting leads from the chassis.

Drive Cord Replacement.—About three feet of nylon braided glass yarn is required for a new drive cord, although a few inches more would provide a more comfortable margin for tying off. The cord should be run as shown in the accompanying sketch, where the system is drawn as seen from the front with the gang at minimum capacitance.

The cursor can be fitted afterwards, and with the gang at maximum capacitance it should be slid along the cord until it covers the short vertical line at the right-hand end of the scale backing plate, which is the correct position of alignment.

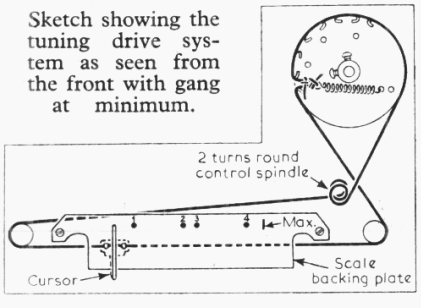


Plan view of the chassis. The frame aerial leads indicated on the left are coded red and white. **L6** is an I.F. transformer primary, and **L9** is a secondary.

CIRCUIT ALIGNMENT

The chassis should be withdrawn from the cabinet for the following alignment adjustments and with the frame aerial still connected, the back cover should be placed in its normal position relative to the chassis. The output of the signal generator should be connected to a coil consisting of 14 turns of 18 s.w.g. enamelled copper wire wound on a $\frac{1}{4}$in former to a length of $1\frac{1}{4}$in, and placed about 6in from the frame aerial.

Sketch showing the tuning drive system as seen from the front with gang at minimum.



I.F. Stages.—Switch receiver to M.W. and turn gang to maximum. Feed in a 471 kc/s (637 m) signal and adjust the cores of **L9** (location reference B1), **L8** (E2), **L7** (F3) and **L6** (A1) for maximum output.

R.F. and Oscillator Stages.—Check that with the gang at maximum capacitance the cursor coincides with the vertical mark at the right-hand end of the red scale backing plate. As the tuning scale remains fixed in the cabinet when the chassis is removed, reference is made during alignment to numbered calibration points along the top edge of the scale backing plate, and these numbers are given in brackets after each alignment frequency. Two tuning positions will be found when adjusting coil cores, the correct one being the "furthest out" setting of the core. If any adjustment is made to the M.W. trimmers or to the oscillator core then the L.W. band must be realigned.

M.W.—With the receiver switched to M.W., tune to 500 m (4 on scale), feed in a 500 m (600 kc/s) signal and adjust the cores of **L5** (F2) and **L3** (F2) for maximum output. If a signal generator with an accuracy within ±1 kc/s is not available for the above adjustment of **L5,** the receiver should be tuned to calibration mark 4 and **L5** should be adjusted while rocking the tuning control of the signal generator about 500 m for maximum output.

The calibration of the receiver should then be checked on a station of known wavelength near 500 m, and if the cursor is to the right of the correct position the core of **L3** should be screwed in by one turn, and if to the left the core should be screwed out by one turn, and the above procedure repeated. Tune receiver to 200 m (1 on scale), feed in a 200 m (1,500 kc/s) signal and adjust **C25** (E2) and **C23** (A1) for maximum output. Repeat these adjustments.

L.W.—Switch receiver to L.W., tune to 1,429 m (2 on scale), feed in a 1,429 m (210 kc/s) signal and adjust **C26** (E2) and the core of **L2** (F3) for maximum output.

DISMANTLING THE SET

Removing Chassis.—Remove two control knobs, and switch knob (pull off);
remove back-cover (four self-tapping screws) and withdraw from the sockets on its inside edge the two frame aerial plugs;
withdraw plugs from sockets on speaker and remove four self-tapping screws holding ends of front and rear chassis flanges to cabinet;
unclip pilot lamp from its housing on right of speaker and withdraw chassis.

When replacing, the red and white frame aerial leads plug into the two sockets on the back cover which are coded with blobs of red and white paint.

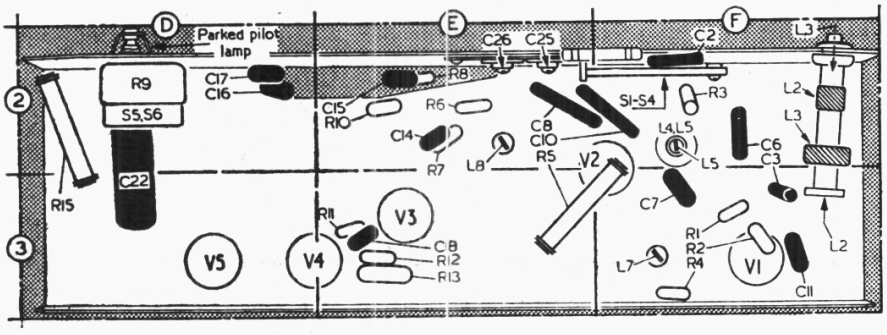
VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturers' information and were measured in a receiver operating from 230 V A.C. mains. The receiver was switched to M.W., but there was no signal input.

Voltage readings were measured with a Model 7 Avometer, chassis being the negative connection.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 10C1	175	1·3	40	4·0	—
	Oscillator 24	1·8			
V2 10F9	175	3·5	40	1·0	—
V3 10LD11	33	1·4	—	—	—
V4 10P13	202	25·0	175	5·0	8·5
V5 U404	†202	—	—	—	210·0

† Each anode, A.C.



Underside view of the chassis. A diagram of the waveband switch unit **S1-S4** is inset in the top left-hand corner of the circuit diagram overleaf.

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