'TRADER' SERVICE SHEET 278

ULTRA 115 AND 125 CONSOLE

SUITABLE for mains of 200-260 V, 40-100 C/S, the Ultra 115 is a 3-valve (plus rectifier) A.C. 3-band superhet with a short-wave range of 16.8-50 metres. It includes provision for a gramophone pick-up and an extension speaker and there is a plug and socket arrangement for cutting out the internal speaker.

An identical chassis is fitted in the 125 console receiver, but this *Service Sheet* was prepared on a 115.

CIRCUIT DESCRIPTION

Aerial input on M.W. and L.W. via coupling coils and condensers **L1, C1** (M.W.) and **L2, C2** (L.W.) to capacity coupled band-pass filter. Primary coils **L3** (M.W.) and **L4** (L.W.) are tuned by **C30**; secondaries **L7** (M.W.) and **L8** (L.W.), by **C34.** Bottom coupling by **C3** and top coupling by small capacity **C4.** On S.W. input is via coupling coil **L5** to single tuned circuit **L6, C34.**

First valve (**V1, Mazda metallised AC/TH1**) is a triode hexode operating as frequency changer with internal coupling. Triode anode coils **L12** (S.W.), **L13** (M.W.) and **L14** (L.W.) are tuned by **C40**; parallel trimming by **C35** (S.W.), **C36** (M.W.) and **C13, C37** (L.W.); series tracking by **C12** (S.W.), **C38** (M.W.) and **C39** (L.W.). Reaction by grid coils **L9** (S.W.), **L10** (M.W.) and **L11** (L.W.).

Second valve (**V2, Mazda metallised AC/VP2**) is variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary tuned secondary transformer couplings **C7, L15, L16, C8,** and **C18, L17, L18, C19.** **Intermediate frequency 456 KC/S.**

Diode second detector is part of double diode pentode output valve (**V3, Mazda AC2/Pen/DD**). Audio frequency component in rectified output is developed across load resistance **R14** and passed via switch **S22,** A.F. coupling condenser **C21,** I.F. stopper **R11,** manual volume control **R12** and grid stopper **R13** to C.G. of pentode section. Provision for connection of gramophone pick-up between **C21** and chassis, via **S21.** On gramophone position of wave-change control **S22** opens, muting radio, whilst on all other positions gramophone sockets are short-circuited by **S20.** Provision for connection of low impedance external speaker across secondary of transformer **T1,** whilst a plug and socket device permits the internal speaker to be muted. Fixed tone correction in anode circuit of **V3** by condenser **C24.**

Second diode of **V3,** fed via **C20** from **V2** anode, provides D.C. potentials which are developed across load resistances **R18, R19** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along resistances **R15, R16** in cathode circuit.

H.T. current is supplied by I.H.C. full-wave rectifying valve (**V4, Mazda UU4**). Smoothing by speaker field **L21** and dry electrolytic condensers **C25, C26.** H.T. circuit R.F. filtering by **C27.**

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, remove the three control knobs (pull off) and the four bolts (with washers) holding the chassis to the bottom of the cabinet. The chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

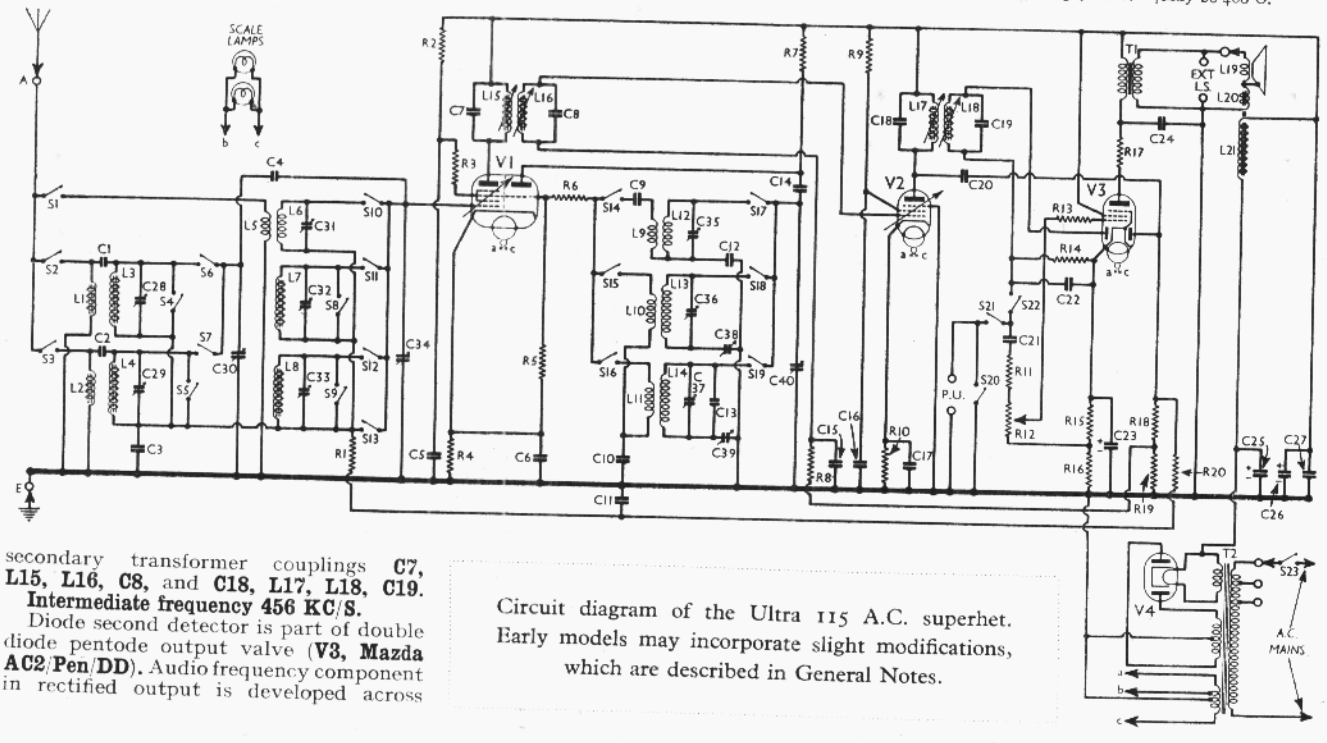
To free the chassis entirely, unsolder the speaker leads and *when replacing*, connect them as follows, numbering the tags from bottom to top:—1, yellow; 2, red; 3, green; 4, black/white; 5, blue; 6, black; 7, no external connection.

Removing Speaker.—If it is desired to remove the speaker from the cabinet, remove two of the clamps holding it to the sub-baffle (nuts and spring washers) and slacken the other. *When replacing*, see that the transformer is on the left.

COMPONENTS AND VALUES

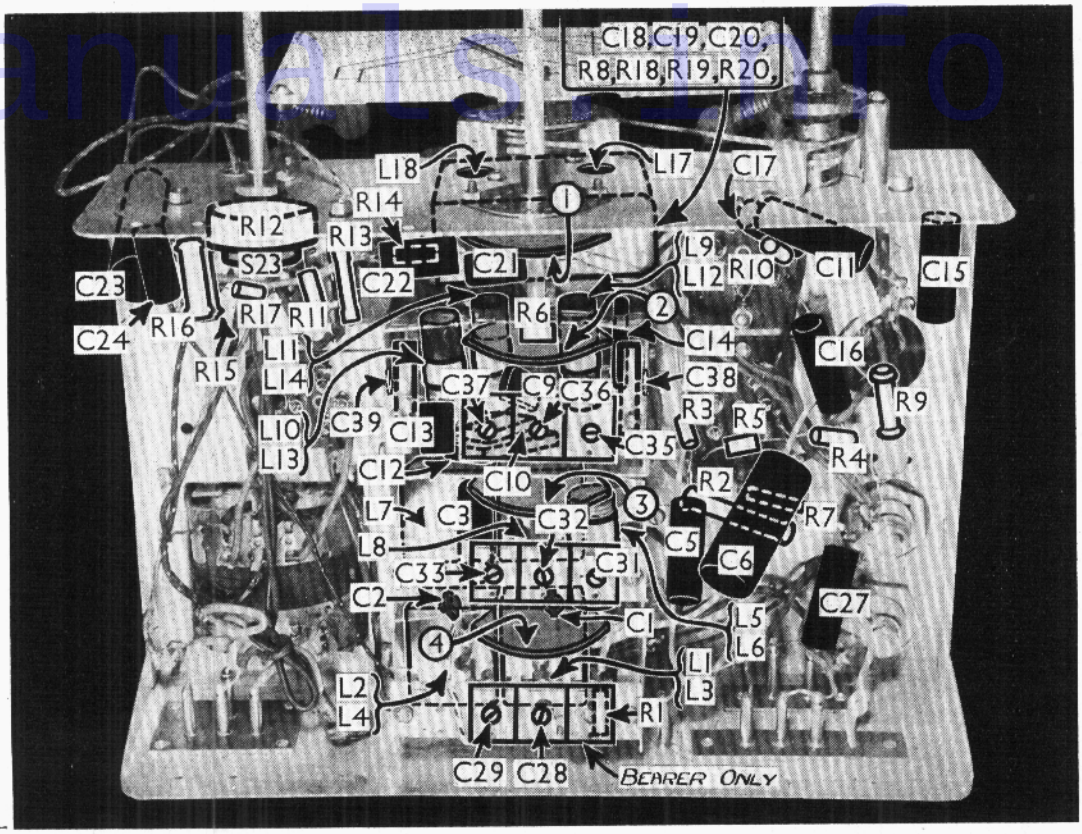
	RESISTANCES	Values (ohms)
R1	V1 hexode C.G. decoupling	25,000
R2	V1 S.G. H.T. feed	20,000*
R3	V1 S.G. anti-parasitic resistance	60
R4	V1 fixed G.B. resistance	165†
R5	V1 osc. C.G. resistance	25,000
R6	V1 osc. reaction stabiliser	60
R7	V1 osc. anode H.T. feed	40,000
R8	V2 C.G. decoupling	1,000,000
R9	V2 S.G. H.T. feed	3,000
R10	V2 fixed G.B. resistance	30
R11	I.F. stopper	10,000
R12	Manual volume control	1,000,000
R13	V3 pent. C.G. R.F. stopper	1,000
R14	V3 signal diode load	500,000
R15	V3 pent. G.B. and A.V.C. delay voltage resistances	138
R16		138
R17	V3 pent. anode R.F. stopper	60
R18	V3 A.V.C. diode load resistances	250,000
R19		750,000
R20	A.V.C. line decoupling	1,000,000

*May be 30,000 Ω. †May be 480 Ω.



Circuit diagram of the Ultra 115 A.C. superhet. Early models may incorporate slight modifications, which are described in General Notes.

Under - chassis view. Many of the components are hidden from view, but are indicated as clearly as possible by arrows. Some cannot be reached without removing the coil and switch units.



CONDENSERS		Values (μF)
C1	Aerial M.W. top coupling	0·000005
C2	Aerial L.W. top coupling	0·00001
C3	Band-pass bottom coupling	0·025
C4	Small coupling	Very low
C5	V1 S.G. decoupling	0·1
C6	V1 cathode by-pass	0·5
C7	1st I.F. trans. pri. fixed trimmer	0·00015
C8	1st I.F. trans. sec. fixed trimmer	0·00015
C9	V1 osc. S.W. C.G. condenser	0·0001
C10	V1 osc. M.W. and L.W. coupling	0·001
C11	A.V.C. line decoupling	0·05
C12	Osc. circuit S.W. tracker	0·004
C13	Osc. circuit L.W. fixed trimmer	0·00006
C14	V1 osc. anode coupling	0·0001
C15	V2 C.G. decoupling	0·05
C16	V2 S.G. decoupling	0·1
C17	V2 cathode by-pass	0·1
C18	2nd I.F. trans. pri. fixed trimmer	0·00015
C19	2nd I.F. trans. sec. fixed trimmer	0·00015
C20	Coupling to V3 A.V.C. diode	0·0002
C21	A.F. coupling to V3 pentode	0·01
C22	I.F. by-pass	0·0002
C23*	V3 cathode by-pass	50·0
C24	Fixed tone corrector	0·004
C25*, C26*	H.T. smoothing	8·0, 16·0
C27	H.T. circuit R.F. by-pass	0·1
C28‡	Band-pass pri. M.W. trimmer	—
C29‡	Band-pass pri. L.W. trimmer	—
C30†	Band-pass pri. tuning	—
C31‡	Aerial circuit S.W. trimmer	—
C32‡	Band-pass sec. M.W. trimmer	—
C33‡	Band-pass sec. L.W. trimmer	—
C34†	Band-pass sec. and S.W. aerial tuning	—
C35‡	Osc. circuit S.W. trimmer	—
C36‡	Osc. circuit M.W. trimmer	—
C37‡	Osc. circuit L.W. trimmer	—
C38‡	Osc. circuit M.W. tracker	—
C39‡	Osc. circuit L.W. tracker	—
C40†	Oscillator circuit tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial M.W. coupling coil	15·0
L2	Aerial L.W. coupling coil	70·0
L3, L4	Band-pass primary coils	1·5, 19·0
L5	Aerial S.W. coupling coil	0·25
L6	Aerial S.W. tuning coil	0·05
L7, L8	Band-pass secondary coils	1·6, 18·0
L9	Oscillator grid S.W. reaction	7·0
L10	Oscillator grid M.W. reaction	1·0
L11	Oscillator grid L.W. reaction	1·2
L12	Osc. circuit S.W. tuning coil	0·05
L13	Osc. circuit M.W. tuning coil	5·5
L14	Osc. circuit L.W. tuning coil	9·5
L15, L16	1st I.F. trans. Pri. / Sec.	4·0, 4·0
L17, L18	2nd I.F. trans. Pri. / Sec.	4·0, 4·0
L19	Speaker speech coil	2·0
L20	Hum neutralising coil	0·05
L21	Speaker field coil	1,400·0
T1	Speaker input trans. Pri. / Sec.	462·0, 0·3
T2	Mains trans. Pri., total	28·0
	Heater sec., total	0·07
	Rect. heat. sec.	0·12
	H.T. sec., total	565·0
S1-S19	Waveband switches	—
S20-22	Radio-gram. change switches	—
S23	Mains switch, ganged R12	—

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 3) are those measured in our receiver when it was operating on mains of 228 V, using the 220-240 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

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

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 AC/TH1	260	3·1	87	8·3
	Oscillator anode			
	83	4·0	—	—
V2 AC/VP2	260	18·0	245	4·8
V3 AC/2Pen/DD	242	29·0	260	6·3
V4 UU4	353†	—	—	—

† Each anode, A.C.

GENERAL NOTES

Switches.—**S1-S19** are the waveband, and **S20-S22** the radio to gram. switches, ganged in four rotary units beneath the chassis. The units are indicated in our under-chassis view, and are shown in detail in the diagrams on page VIII, where they are drawn as seen looking from (p. VIII) the rear of the chassis in the case of the first unit, and from the front of the chassis in the case of the other three units.

The table (p. VIII) gives the switch positions for the four control settings, starting from fully anti-clockwise. A dash indicates open and **C** closed.

S23 is the Q.M.B. mains switch, ganged with the volume control **R12.**

Coils.—All the coils, with the exception of the first I.F. transformer, are beneath the chassis, and are in small screened and unscreened units inside three box-like assemblies which carry the trimmers and the switch units, and also contain many of the other components. Some of these are difficult to indicate in a two dimensional view, but by following the arrows in our under-chassis view, it should be possible to identify all components.

Continued overleaf

ULTRA 115—*Continued*

It will be almost impossible to reach some of the coils unless the assembly in which they are situated is first removed from the chassis.

The second I.F. transformer, **L17, L18,** is beneath the chassis, behind the front member, and the inductance trimmers (iron cores) can be reached for adjustment through holes in the front of the chassis.

The first I.F. transformer, **L15, L16,** is on the chassis deck, and its inductance trimmers are reached through holes in the side of the can.

Scale Lamps.—These are two Osram M.E.S. types, rated at 4.5 V, 0.3 A.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (2-4 O) external speaker. A plug and socket device enables the internal speaker to be muted, if desired.

Bearer Trimmer.—It will be noticed in the under chassis view that the trimmer next to **C28, C29** is marked "Bearer Only." It serves as a convenient fixing for **R1,** which is wired across it, but it is not shown in the circuit diagram or lists of components, since its capacity serves no useful purpose.

Chassis Divergencies. — On early receivers an additional iron-cored coil and 0·001 μF fixed condenser in parallel are fitted between the aerial socket and the common connection of **S1, S2** and **S3,** forming a 456 KC/S rejector.

On these models the suppressor grid of **V2** was not connected to chassis, but was joined, via a 1·5 MO resistance to the junction of **L18** and **R14,** while a 0·05 μF condenser was connected from suppressor grid of **V2** to chassis. This gave a measure of inter-station noise suppression. Connections were made to switches in the upper section of our third switch unit, so that the noise suppression was cut out on S.W., leaving the circuit as in the later models.

In the early models **R9** and **C16** were not present, the screen of **V2** going direct to the H.T. line; an additional band-pass coupling condenser, (0·075 μF), is switched into circuit across **C3** by switches in the upper half of unit 3.

The console model 125 is virtually the same as the later table models.

Resistances R2, R4.—**R2** may be 30,000 O in some chassis, and **R4** may be 480 O.

CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator to control grid (top cap) of **V1,** and chassis, feed in a 456 KC/S signal, and adjust iron cores of **L18, L17, L16** and **L15,** in that order, for maximum output.

In early models, where the I.F. rejector is used, feed the 456 KC/S signal into **A** and **E** sockets, and adjust core of the filter coil for *minimum* output.

R.F. and Oscillator Stages.—Connect signal generator to **A** and **E** sockets. Switch set to M.W., tune to 200 m. on scale, feed in a 200 m. signal and adjust **C36,** then **C32** and **C28,** for maximum output. Feed in a 500 m. signal, tune it in, and adjust **C38** for maximum output, rocking the gang for optimum results. Repeat these adjustments.

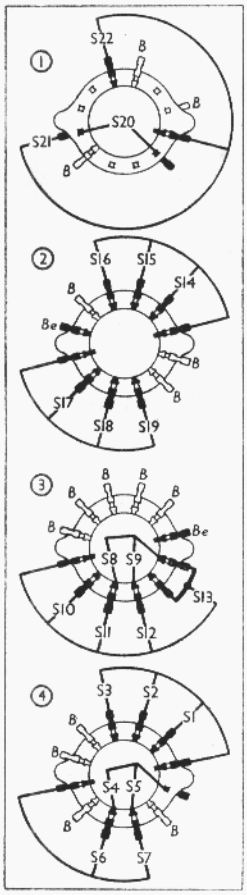
Switch set to L.W., tune to 1,500 m. on scale, feed in a 1,500 m. signal and adjust **C37,** then **C33** and **C29,** for maximum output. Feed in a 1,700 m. signal, tune it in, and adjust **C39** for maximum output, while rocking the gang. Repeat these L.W. adjustments.

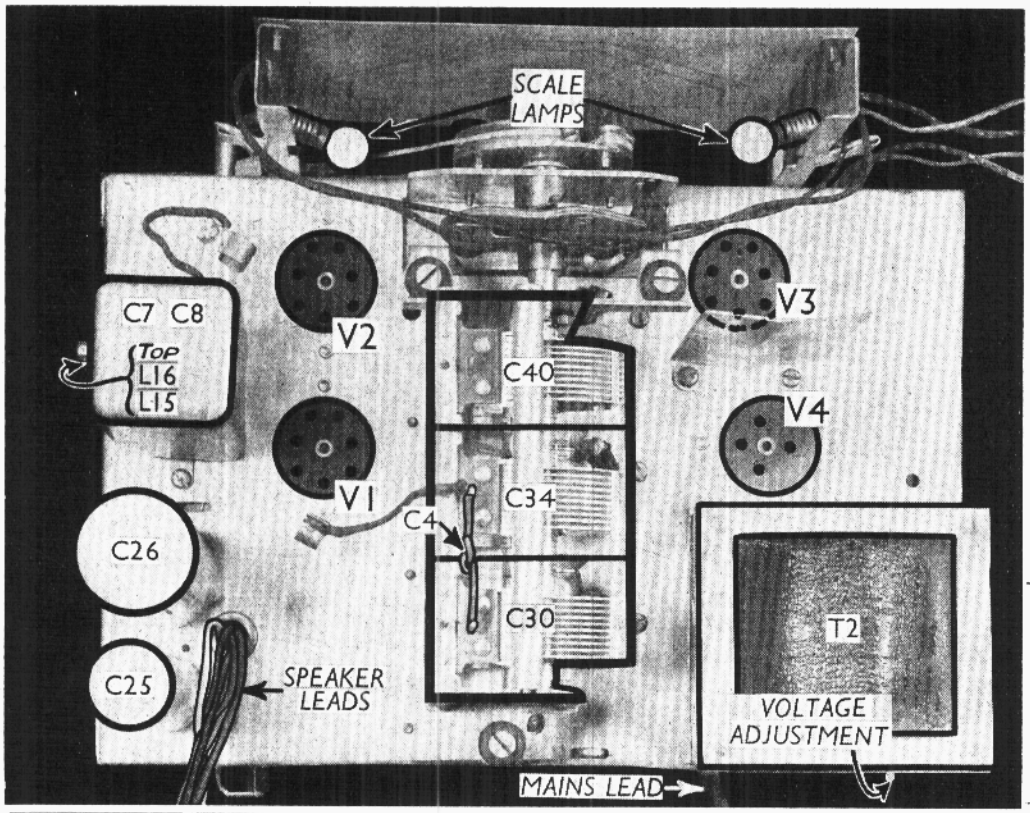
Switch set to S.W., tune to 17 m. on scale, feed in a 17 m. signal, and adjust **C35,** then **C31,** for maximum output. Check at 30 m. and 51 m.

SWITCH TABLE AND DIAGRAM

Switch	Gram.	L.W.	M.W.	S.W.
S1	—	—	—	C
S2	—	—	C	—
S3	—	C	—	—
S4	—	—	—	C
S5	—	—	C	C
S6	—	—	C	—
S7	—	C	—	—
S8	—	—	—	C
S9	—	—	C	C
S10	—	—	—	C
S11	—	—	C	—
S12	—	C	—	—
S13	C	—	—	—
S14	—	—	—	C
S15	—	—	C	—
S16	—	C	—	—
S17	—	—	—	C
S18	—	—	C	—
S19	—	C	—	—
S20	—	C	C	C
S21	C	—	—	—
S22	—	C	C	C

Switch diagrams, looking from the underside of the chassis in the directions of the arrows in the under-chassis view.





Plan view of the chassis. The second I.F. transformer is beneath the chassis. Both are adjusted by screw-type iron cores.

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