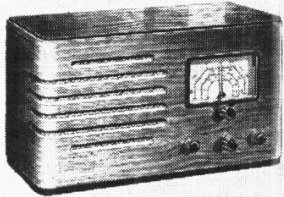


"TRADER" SERVICE SHEET

807

R.I. ARIA

A.C./D.C. SUPERHET



THE R.I. Aria is a 3-valve (plus rectifier) 3-band superhet designed to operate from A.C. or D.C. mains of 200-250 V, 40-100 c/s in the case of A.C.

Release date and original price: 1947; £16 16s., plus £3 12s. 3d. purchase tax.

CIRCUIT DESCRIPTION

Aerial input via isolating capacitor **C1** and coupling coils **L1** (S.W.), **L2** (M.W.) and **L4** (L.W.) to single-tuned circuits **L5**, **C24** (S.W.), **L6**, **C24** (M.W.) and **L7**, **C24** (L.W.) which precede a triode heptode valve (**V1**, Mazda metallized TH233) operating as frequency changer with inter-nal coupling.

Triode oscillator grid coils **L8** (S.W.), **L9** (M.W.) and **L10** (L.W.) are tuned by **C25**. Parallel trimming by **C26** (S.W.), **C27** (M.W.) and **C28** (L.W.). Series tracking by **C29** (M.W.) and **C30** (L.W.). Reaction coupling from anode by coils **L11** (S.W.), **L12** (M.W.) and **L13** (L.W.).

Second valve (**V2**, Mazda metallized VP133) is a variable-mu R.F. pentode

operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C31**, **L14**, **L15**, **C32** and **C33**, **L16**, **L17**, **C34**.

Intermediate frequency 455 kc/s.

Diode second detector is part of double diode beam tetrode output valve (**V3**, Mazda metallized PEN453DD). Audio frequency component in rectified output is developed across load resistor **R9**, and passed via A.F. coupling capacitor **C15** and manual volume control **R10** to C.G. of tetrode section. I.F. filtering by **C12**, **R8** and **C13** in diode circuit. Variable tone control by **C17**, **R13** in tetrode anode circuit and provision for the connection of a low-impedance external speaker across secondary of output transformer **T1**.

Second diode of **V3**, fed from **L17** via **C14**, provides D.C. potentials which are developed across load resistor **R12** and fed back through decoupling circuits as G.B. to F.C. (except on S.W.) and I.F. valves, giving automatic volume control. Delay voltage, together with G.B. for tetrode section, is obtained from the drop along **R11** in **V3** cathode lead to chassis.

When operating from A.C. mains, H.T. current is supplied by half-wave rectifying valve (**V4**, Mazda metallized U403) which, with D.C. mains, behaves as a low resistance. Smoothing by iron-cored choke **L19** and electrolytic capacitors **C18**, **C19**.

Valve heaters, together with scale lamps and adjustable ballast resistor **R14**, are connected in series across mains input. Mains R.F. filtering by **C20**, and earth isolation by **C2**.

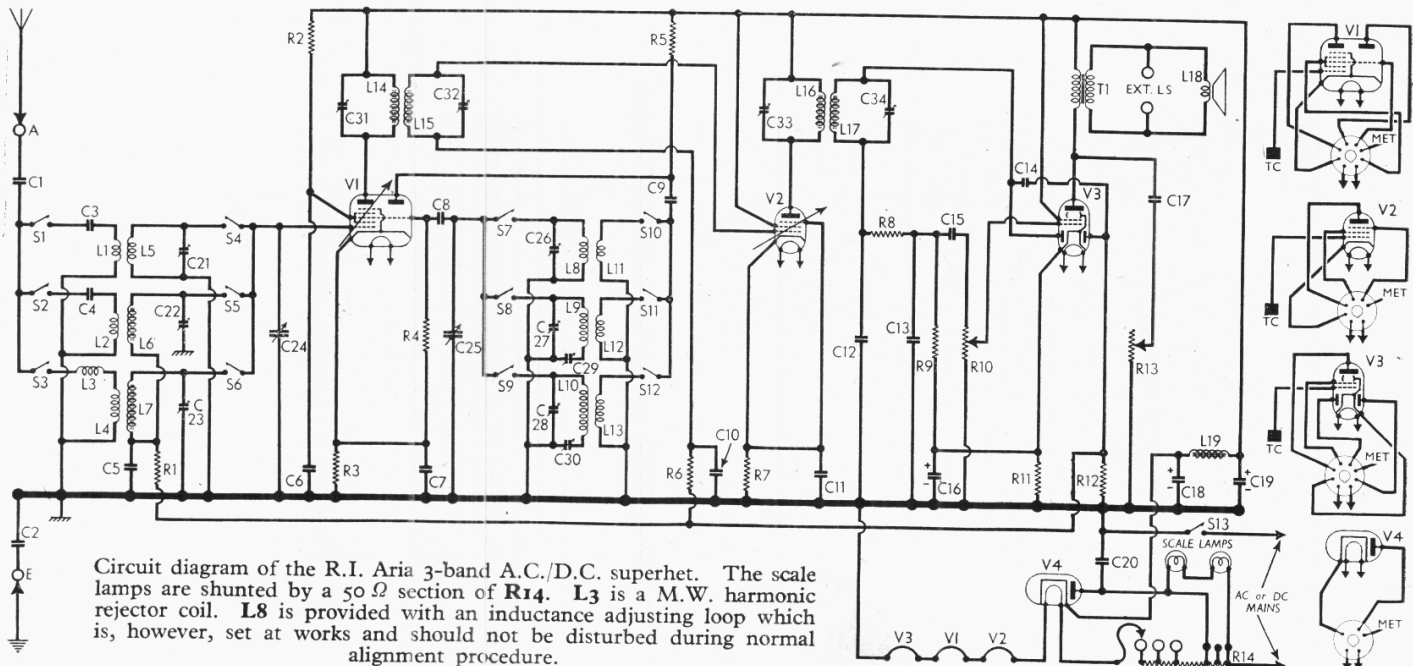
COMPONENTS AND VALUES

RESISTORS		Values (ohms)
R1	V1 hept. C.G. decoupling	500,000
R2	V1 S.G. H.T. feed	15,000
R3	V1 fixed G.B. resistor	100
R4	V1 osc. C.G. resistor	10,000
R5	V1 osc. anode H.T. feed	25,000
R6	V2 C.G. decoupling	500,000
R7	V2 fixed G.B. resistor	200
R8	I.F. stopper	100,000
R9	V3 signal diode load	500,000
R10	Manual volume control	1,000,000
R11	V3 G.B. and A.V.C. delay	150
R12	A.V.C. diode load	500,000
R13	Variable tone control	100,000
R14	Heater ballast resistor	635*

* Tapped at 100Ω + 100Ω + 38.5Ω + 15Ω + 35Ω from V4 heater.

CAPACITORS		Values (μF)
C1	Aerial isolator	0.001
C2	Earth isolator	0.01
C3	Aerial series coupling cap.	0.0001
C4	acitors	0.0001
C5	V1 hept. C.G. decoupling	0.1
C6	V1 S.G. decoupling	0.1
C7	V1 cathode by-pass	0.1
C8	V1 osc. C.G. capacitor	0.0001
C9	V1 osc. anode coupling	0.01
C10	V2 C.G. decoupling	0.05
C11	V2 cathode by-pass	0.1
C12	I.F. by-pass capacitors	0.0002
C13		0.0001
C14	V3 A.V.C. diode coupling	0.00005
C15	A.F. coupling to V3 tet.	0.01
C16*	V3 cathode by-pass	25.0
C17	Part variable tone control	0.05
C18*	H.T. smoothing capacitors	8.0
C19*		16.0
C20	Mains R.F. by-pass	0.01
C21‡	Aerial circ. S.W. trimmer	0.00005
C22‡	Aerial circ. M.W. trimmer	0.0001
C23‡	Aerial circ. L.W. trimmer	0.0001
C24‡	Aerial circuit tuning	0.00055
C25‡	Oscillator circuit tuning	0.00055
C26‡	Osc. circ. S.W. trimmer	0.00005
C27‡	Osc. circ. M.W. trimmer	0.00012
C28‡	Osc. circ. L.W. trimmer	0.00012
C29‡	Osc. circ. M.W. tracker	0.00082
C30‡	Osc. circ. L.W. tracker	0.00025
C31‡	1st I.F. trans. pri. tuning	0.00025
C32‡	1st I.F. trans. sec. tuning	0.00025
C33‡	2nd I.F. trans. pri. tuning	0.00025
C34‡	2nd I.F. trans. sec. tuning	0.00025

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the R.I. Aria 3-band A.C./D.C. superhet. The scale lamps are shunted by a 50 Ω section of **R14**. **L3** is a M.W. harmonic rejector coil. **L8** is provided with an inductance adjusting loop which is, however, set at works and should not be disturbed during normal alignment procedure.

OTHER COMPONENTS		Approx. Values ohms
L1	Aerial S.W. coupling coil ...	0.4
L2	Aerial M.W. coupling coil ...	1.9
L3	M.W. harmonic rejector ...	27.0
L4	Aerial L.W. coupling coil ...	5.2
L5	Aerial S.W. tuning coil ...	Very low
L6	Aerial M.W. tuning coil ...	1.3
L7	Aerial L.W. tuning coil ...	18.3
L8	Osc. S.W. tuning coil ...	Very low
L9	Osc. M.W. tuning coil ...	1.2
L10	Osc. L.W. tuning coil ...	18.0
L11	Osc. S.W. reaction coil ...	0.4
L12	Osc. M.W. reaction coil ...	2.6
L13	Osc. L.W. reaction coil ...	6.5
L14	1st I.F. trans. { Pri. ...	3.0
L15		Sec. ...
L16	2nd I.F. trans. { Pri. ...	3.0
L17		Sec. ...
L18	Speaker speech coil ...	2.5
L19	H.T. smoothing choke ...	220.0
T1	Output trans. { Pri. ...	150.0
	Sec. ...	0.5
S1-S12	Waveband switches	—
S13	Mains switch, ganged R10 ...	—

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the manufacturers, who give the unsmoothed H.T. voltage as 225 v. Readings were taken with the volume control at maximum, but there was no signal input, and the receiver was operating on A.C. mains of 230 v. Voltages were measured with a 1,000 ohms-per-volt meter, chassis being the negative connection.

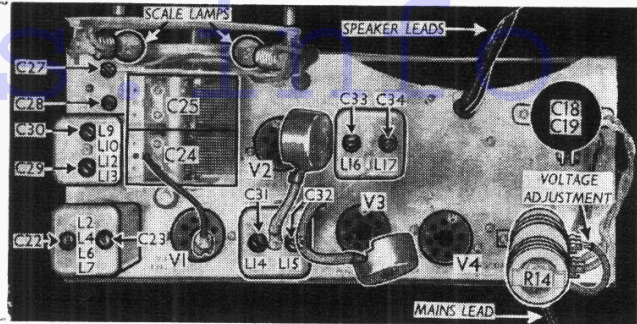
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TH233	{ 200 Oscillator 50	{ 4.2 5.0	90	7.2
V2 YP133	200	11.5	200	2.5
V3 PEN453DD	190	48.0	200	10.0
V4 U403*	—	—	—	—

* Cathode to chassis, 225 V, D.C.

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws); from the underside of the cabinet remove the four countersunk-head wood screws securing the rubber feet; lift off the wooden footing piece and remove the four cheese-head screws (with washers) securing the chassis to the base of the cabinet; the chassis may now be withdrawn from the cabinet to the extent of the speaker leads, which is sufficient for normal purposes. To free the chassis entirely, unsolder the two leads from the speaker connecting panel, and the black earthing lead from the speaker frame.

Plan view of the chassis. The external lead round the speaker cable is the speaker earthing lead. All trimmer adjustments are indicated here, except those for S.W.



When replacing, connect the red and black rubber-covered leads to the panel on the speaker, and the black cotton-covered lead to the earthing tag under the upper speaker fixing bolt.

Removing Speaker.—Remove chassis and unsolder speaker leads, as previously described; remove the four countersunk-head wood screws securing the paxolin sub-baffle to the cabinet, and lift out the speaker and sub-baffle complete.

When replacing, the connecting panel should point toward the upper left-hand corner of the cabinet, and the leads should be resoldered as previously described.

GENERAL NOTES

Switches.—S1-S12 are the waveband switches, ganged in two rotary units beneath the chassis. These are indicated by numbers in circles and arrows in our under-chassis view, and shown in detail in the diagrams beside it, where they are viewed from the rear of an inverted chassis. The table below gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and C closed.

Switch	S.W.	M.W.	L.W.
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	C	—	—
S5	—	C	—
S6	—	—	C
S7	C	—	—
S8	—	C	—
S9	—	—	C
S10	C	—	—
S11	—	C	—
S12	—	—	C

S13 is the Q.M.B. mains switch, ganged with the volume control R10.

Scale Lamps.—These are two Mazda M.E.S. types, with large spherical bulbs, rated at 8 V, 1.6 W.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low-impedance (about 3 Ω) external speaker.

Capacitors C18, C19.—These are two dry electrolytics in a tubular metal container mounted on the chassis deck. The red tag on the base is the positive of C18, rated at 8 μF, 450 V D.C. working, surge proof; the yellow tag is the positive of C19, rated at 16 μF, 450 V D.C. working, 500 V peak; the plain tag is the common negative connection. Our unit was a Hunts List No. K10.

CIRCUIT ALIGNMENT

I.F. Stages.—Remove existing control grid (top cap) connector of V1 and connect signal generator, via a 0.01 μF series capacitor and 100,000 Ω parallel resistor, to top cap and chassis. Turn volume control to maximum and short-circuit C25. Feed in a 455 kc/s (659.3 m) signal, and adjust C34, C33, C32 and C31, in that order, for maximum output. Remove shunt and replace top cap connector.

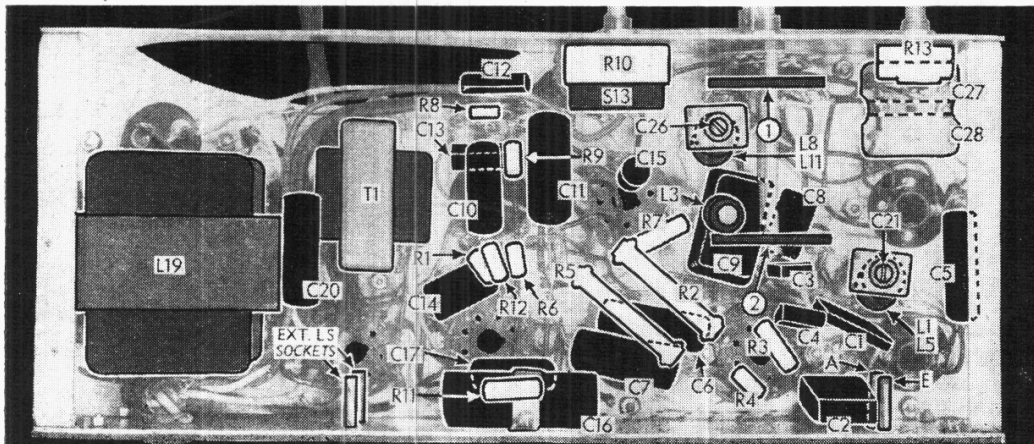
R.F. and Oscillator Stages.—With the gang at minimum the pointer should be horizontal at the left-hand side of the scale.

Transfer signal generator leads to A and E sockets via a dummy aerial.

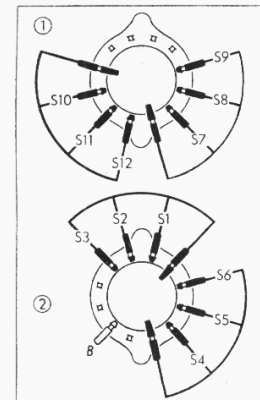
S.W.—Switch set to S.W., tune to 20 m on scale, feed in a 20 m (15 Mc/s) signal, and adjust C26, then C21, for maximum output.

M.W.—Switch set to M.W., tune to 250 m on scale, feed in a 250 m (1,200 kc/s) signal, and adjust C27 for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust C29 for maximum output. Repeat the 250 m and 500 m adjustments until accurate calibration is achieved. Then tune to 231 m on scale, feed in a 231 m (1,299 kc/s) signal, and adjust C22 for maximum output.

L.W.—Switch set to L.W., tune to 1,000 m on scale, feed in a 1,000 m (300 kc/s) signal, and adjust C28 for maximum output. Tune to 1,800 m on scale, feed in an 1,800 m (167 kc/s) signal, and adjust C30 for maximum output. Repeat the 1,000 m and 1,800 m adjustments until accurate calibration is achieved. Then tune to 882 m on scale, feed in a 882 m (340 kc/s) signal, and adjust C23 for maximum output.



Under-chassis view. The S.W. trimmers C21 and C26 are seen to the right of the illustration, near the waveband switch units (marked 1 and 2 in circles).



Diagrams showing the waveband switch units, as seen from the rear of an inverted chassis.