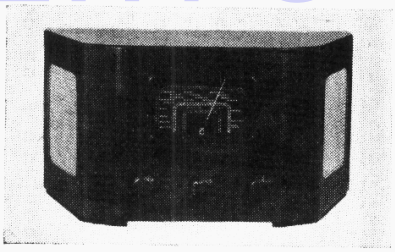
"TRADER" SERVICE SHEET

887

R.I. 491 (table) & 493 (table R.G.)

THE R.I. "Airflow" 491 is a 4-valve (plus rectifier) 3-band superhet designed to operate from A.C. mains of 200-250V, 40-100 c/s. The 493 is a table radiogram employing an identical chassis.

Release date, both models, September, 1948. Original prices: 491, £14 11s 9d; 493, £25, plus purchase tax.



COMPONENTS AND VALUES

	CAPACITORS	Values (μF)	Locations
C1	Aerial series ...	0·0001	H6
C2	I.F. filter time ...	0·00015	J3
C3	V1 Lex. C.G. decoup.	0·01	H3
C4	V1 cath. by-pass ...	0·1	D4
C5	V1 osc. C.G. ...	0·0001	F4
C6	Osc. S.W. tracker ...	0·0057	E3
C7	Osc. M.W. tracker	0·00053	E3
C8	Osc. L.W. tracker	0·00025	F3
C9	Osc. L.W. trim. ...	0·00005	F3
C10	Osc. anode coup. ...	0·0001	F4
C11	V2 C.G. decoup. ...	0·05	C2
C12	S.G's decoupling ...	0·1	D5
C13	V2 cathode by-passes	0·1	D5
C14*		25·0	D4
C15	A.G.C. decoup. ...	0·05	C2
C16	V2 anode capacitor	0·1	D6
C17	I.F. by-passes ...	0·0002	E6
C18		0·0001	E6
C19*	V3 cath. by-pass ...	50·0	F6
C20	A.F. coupling ...	0·01	E6
C21	A.G.C. coupling ...	0·00005	C2
C22	Part tone control ...	0·05	F6
C23*	H.T. smoothing capacitors ...	8·0	A1
C24*		16·0	A1
C25	Mains R.F. by-pass	0·01	J5
C26‡	Aerial trimmers ...	0·00005	G3
C27‡		0·00005	G3
C28‡		0·00008	G3
C29†	Aerial tuning ...	0·000487	B1
C30‡	Oscillator trimmers	0·00005	F3
C31‡		0·00005	F3
C32‡		0·00008	F3
C33†	Oscillator tuning ...	0·000487	B1
C34‡	1st I.F. transformer tuning	0·00025	C1
C35‡		0·00025	C1
C36‡	2nd I.F. transformer tuning	0·00025	C2
C37‡		0·00025	C2

*Electrolytic. † Variable. ‡ Pre-set.

CIRCUIT DESCRIPTION

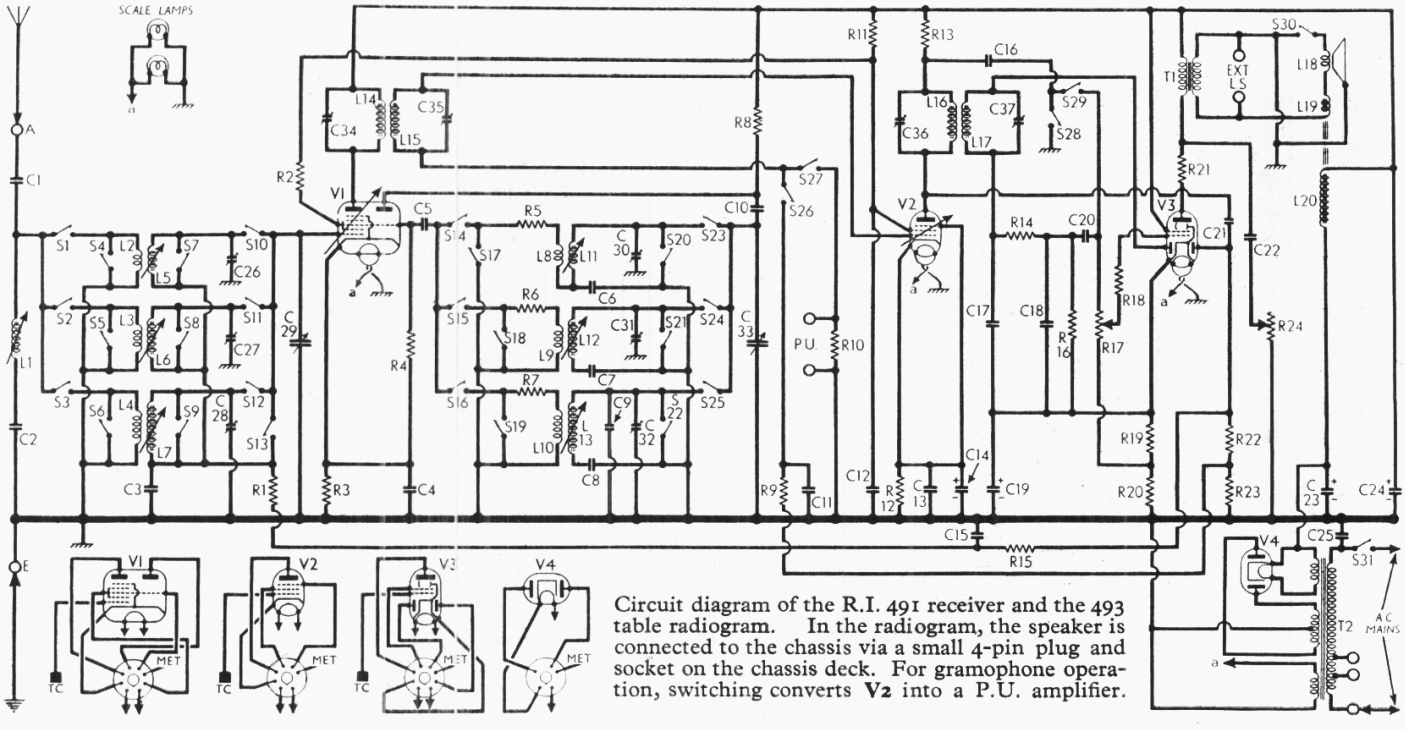
Aerial input is via isolating capacitor **C1** and coupling coils **L2** (S.W.), **L3** (M.W.) and **L4** (L.W.) to single-tuned circuits **L5**, **C29** (S.W.), **L6**, **C29** (M.W.) and **L7** **C29** (L.W.), which precede a triode-heptode valve **(V1, Mazda metallized TH41)** operating as frequency changer with internal coupling.

Triode oscillator anode coils **L11** (S.W.), **L12** (M.W.) and **L13** (L.W.) are tuned by **C33**, with parallel trimming by **C30** (S.W.), **C31** (M.W.) and

(Continued col. 1 overleaf)

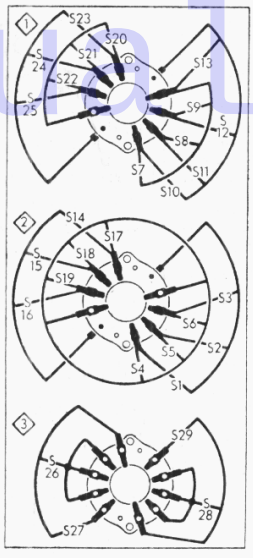
	RESISTORS	Values (ohms)	Locations
R1	V1 hept. C.G. decoup.	100,000	H4
R2	V1 S.G. stopper ...	10	E5
R3	V1 fixed G.B. ...	180	D4
R4	V1 osc. C.G. ...	47,000	F4
R5	Osc. stabilizing resistors ...	47	F4
R6		1,000	F4
R7		3,300	F4
R8	Osc. anode load ...	47,000	E4
R9	V2 C.G. decoup. ...	1,000,000	C2
R10	P.U. shunt ...	1,000,000	H6
R11	S.G's H.T. feed ...	15,000	D5
R12	V2 fixed G.B. ...	330	D4
R13	V2 anode load ...	15,000	D5
R14	I.F. stopper ...	47,000	E6
R15	V1 A.G.C. decoup.	2,200,000	C2
R16	Sig. diode load ...	500,000	E6
R17	Volume control ...	500,000	E5
R18	V3 grid stopper ...	47,000	C2
R19	V3 G.B., A.G.C. delay resistors ...	180	F6
R20		180	E6
R21	V3 anode stopper ...	47	F6
R22	A.G.C. diode load resistors ...	470,000	C2
R23		470,000	C2
R24	Tone control ...	25,000	G6

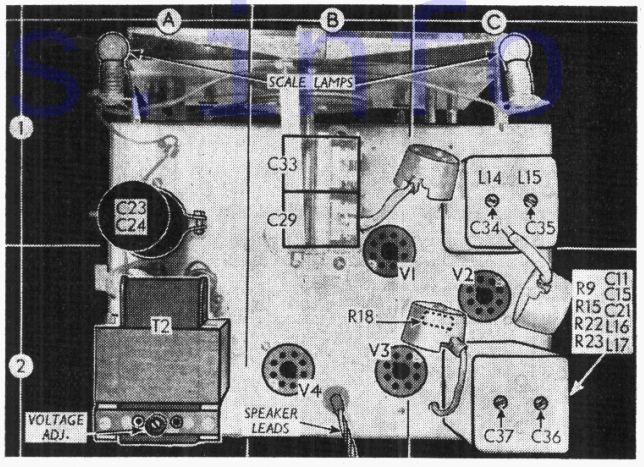
	OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	I.F. filter coil ...		12·8	J4
L2	Aerial coupling coils		0·1	H3
L3			18·5	H3
L4			50·0	H3
L5	Aerial tuning coils		Very low	H3
L6			1·9	H3
L7			19·0	H3
L8	Oscillator reaction coils		4·5	F3
L9			0·8	F3
L10			1·5	F3
L11	Oscillator tuning coils		Very low	F3
L12			3·0	F3
L13			6·5	F3
L14	1st I.F. trans.	Pri.	3·5	C1
L15		Sec.	3·5	C1
L16	2nd I.F. trans	Pri.	3·5	C2
L17		Sec.	3·5	C2
L18	Speech coil ...		2·0	—
L19	Hum neut. coil ...		Very low	—
L20	Field Coil		1,000·0	—
T1	Speaker trans	Pri.	230·0	—
		Sec.	0·4	—
T2	Mains trans.	Pri., total	35·0	A2
		Heat. sec.	0·1	A2
		Rect. heat. sec. ...	0·1	A2
		H.T. sec., total	700·0	A2
S1—S29	W/band and Gram. Switches ...		—	G3
S30	Int. speaker sw. ...		—	—
S31	Mains sw., g'd S1-S29		—	G4



Circuit diagram of the R.I. 491 receiver and the 493 table radiogram. In the radiogram, the speaker is connected to the chassis via a small 4-pin plug and socket on the chassis deck. For gramophone operation, switching converts **V2** into a P.U. amplifier.

Switch	OFF	S.W.	M.W.	L.W.	Gram.
S1	—	C	—	—	—
S2	—	—	C	—	—
S3	—	—	—	C	—
S4	C	—	C	C	—
S5	C	C	—	C	C
S6	—	C	C	—	C
S7	—	—	C	C	—
S8	—	C	—	C	C
S9	—	C	C	—	C
S10	—	C	—	—	—
S11	—	—	C	—	—
S12	—	—	—	C	—
S13	—	—	—	—	C
S14	—	C	—	—	—
S15	—	—	C	—	—
S16	—	—	—	C	—
S17	C	—	C	—	—
S18	C	C	—	C	C
S19	—	C	C	—	C
S20	—	—	C	C	—
S21	—	C	—	C	C
S22	—	C	C	—	C
S23	—	C	—	—	—
S24	—	—	C	—	—
S25	—	—	—	C	—
S26	—	C	C	C	—
S27	—	—	—	—	C
S28	—	C	C	C	—
S29	—	—	—	—	C





Above : Plan view of the 491 chassis. In the 493 R.G., the gang is moved a little to the left. *Left :* Diagrams of the waveband switch units, seen from rear of inverted chassis.

Circuit Description—*continued*

C9, C32 (L.W.), and series tracking by **C6** (S.W.), **C7** (M.W.) and **C8** (L.W.). Inductive reaction coupling to grid by coils **L8** (S.W.), **L9** (M.W.) and **L10** (L.W.).

Second valve **(V2, Mazda metallized VP41)**, is a variable-mu R.F. pentode operating as I.F. amplifier with tuned-transformer couplings.

Intermediate frequency 450 kc/s.

Diode second detector is part of double diode beam tetrode output valve **(V3, Mazda metallized PEN 45 DD).** The A.F. component in the rectified output is developed across load resistor **R16** and passed, via volume control **R17**, to C.G. of tetrode section.

Second diode of **V3** provides D.C. potential, which is developed across **R22, R23** in series and fed back through decoupling circuits as G.B. to **V1** and **V2,** giving A.G.C.

For "gram" operation **V2** is converted to an A.F. amplifier. The pick-up is connected in its C.G. circuit, via **S27,** and the amplified signal developed across anode load **R13** is fed, via **C16** and **S29,** to **V3** C.G. circuit.

GENERAL NOTES

Switches.—**S1-S25** are the waveband switches, and **S26-S29** are the radio/gram change-over switches, ganged in three rotary units beneath the chassis. These are indicated in our under chassis view, and shown in detail in the diagrams inset beside our plan view, where they are drawn as seen from the rear of an inverted chassis. The table (Col. 1) gives the switch positions for the five control settings, starting from the fully anti-clockwise (off) position of the control knob. A dash indicates open, and **C,** closed.

Scale Lamps.—These are rated at 6v, 0.3A, and have large, clear, spherical bulbs.

External Speaker.—Two sockets are fitted on the rear of the cabinet for a low impedance (3Ω) external speaker. One of the plugs, when pushed right home, opens **S30** to mute the internal speaker.

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (recessed grub screws) and unsolder the three leads and screening braid connecting chassis to speaker at tags on the speaker transformer;

unscrew the two chassis retaining bolts (with metal washers, and retaining nuts inside cabinet) and lift out the chassis.

When replacing, reconnect the speaker leads from the chassis as follows, numbering the six tags on the speaker transformer connecting panel from left to right when viewed from the rear: 1, green; 3, blue; 6, red. Tags 2, 4 and 5 have no external connections.

The screening braid should be soldered to the right-hand tag of the small strip carrying three leads to the extension speaker sockets, and to a rivet head on the speaker transformer fixing clamp.

CIRCUIT ALIGNMENT

I.F. Stages.—Short-circuit **C33** (location reference B1) and switch set to M.W. Connect signal generator, via an 0.1μF capacitor in the "live" lead, to control grid (top cap) of **V1** and chassis, removing the original top cap connector but connecting a 500,000-ohm resistor between the top cap of the valve and chassis. Feed in a 450 kc/s (666.7m) signal and adjust **C37, C36, C35, C34** (C2, C1), in that order, for maximum output. Replace **V1** top cap connector and remove short-circuit from **C33.**

R.F. and Oscillator Stages.—With the gang at maximum the pointer should indicate 550m on scale. Transfer "live" signal generator lead to **A** socket, via a suitable dummy aerial.

S.W.—Switch set to S.W., tune to 18m on scale, feed in an 18m (16.67 Mc/s) signal, and adjust **C30** (F3) and **C26** (G3) for maximum output. Tune to 47m on scale, feed in a 47m (6.38 Mc/s) signal, and adjust the cores of **L11** (F3) and **L5** (H3) for maximum output. Repeat these operations.

M.W.—Switch set to M.W., tune to 230m on scale, feed in a 230m (1,304 kc/s) signal, and adjust **C31** (F3) and **C27** (G3) for maximum output. Tune to 510m on scale, feed in a 510m (588.1 kc/s) signal, and adjust the cores of **L12** (F3) and **L6** (H3) for maximum output. Repeat these operations.

L.W.—Switch set to L.W., tune to 850m on scale, feed in an 850m (352.9 kc/s) signal, and adjust **C32** (F3) and **C28** (G3) for maximum output. Tune to 1,850m on scale, feed in a 1,850m (162 kc/s) signal, and adjust the cores of **L13** (F3) and **L7** (H3) for maximum output. Repeat these operations.

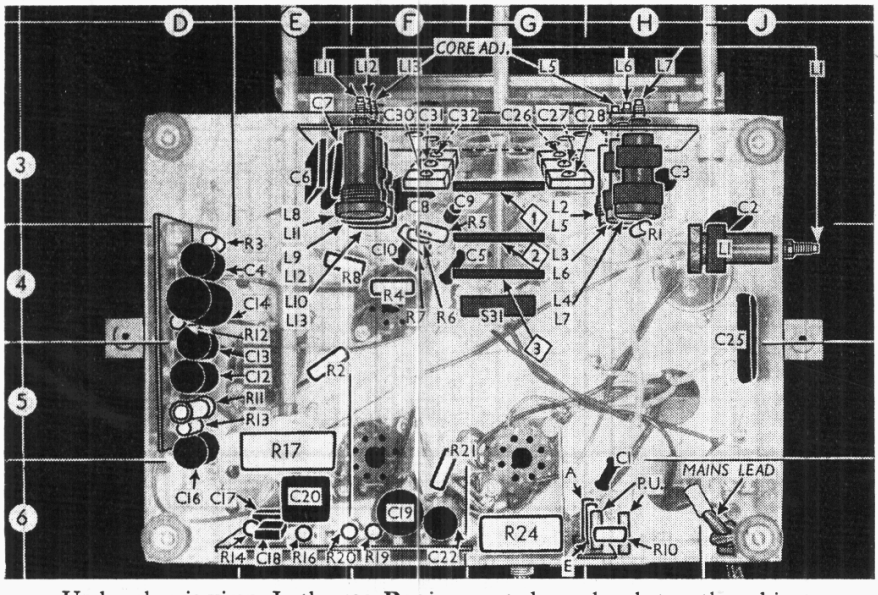
I.F. Filter.—Switch set to M.W., tune to 550m on scale, feed in a 450 kc/s signal, and adjust the core of **L1** (J4) for maximum output

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on 223v mains, using the 230v mains transformer tapping. Readings were taken under no signal conditions, with the receiver tuned to 200 m. Voltages were measured on the 400v 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 TH41	50	3·5	102	8·1
	Oscillator			
	72	3·3		
V2 VP41	190	3·0	102	0·8
V3 PEN-45DD	238	41·0	250	8·0
V4 UU6	302†	—	—	—

† Each anode, A.C.



Under-chassis view. In the 493, **R24** is mounted on a bracket on the cabinet.

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