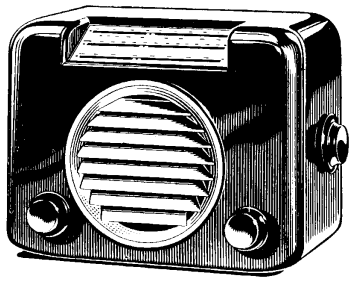
BUSH RADIO

Service Instructions

A.C. MODEL—A.C.91

A.C.-D.C. MODEL—D.A.C.91



Front view of Receiver

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SPECIFICATION

BASIC DESIGN.

The circuit is a five valve (including rectifier), three waveband superheterodyne with six tuned circuits. The A.C. Model (A.C.91) and the universal version (D.A.C.91) are similar except for the mains input circuits. The A.C.91 employs an auto-transformer with tappings to supply the scale lamp, valve heaters, and H.T. line. A ballast resistor replaces the auto-transformer in the D.A.C.91.

All valve heaters are connected in series, and in the D.A.C.91 the scale lamp is included in the heater chain.

A.V.C. is operative on the frequency changer and the I.F. amplifier. H.T. line smoothing is effected by resistor and capacitors, and a 6ins. permanent magnet speaker is used.

VALVES.

Mullard	CCH.35	... Heater	7.0 V., 0.2 A.
,,	EF.39	... ,,	6.3 V., 0.2 A.
,,	EBC.33	... ,,	6.3 V., 0.2 A.
,,	CL.33	... ,,	33.0 V., 0.2 A.
,,	CY.31	... ,,	20.0 V., 0.2 A.

All valves have International octal bases.

SCALE LAMP.

A.C.91 3.5 V., 0.3 A.
D.A.C.91 6.2 V., 0.3 A.

VOLTAGE RANGE.

A.C.91 100–120, 200–250 volts, A.C. 40–100 cycles.
D.A.C.91 200–250 volts, A.C. or D.C.

MAINS CONSUMPTION.

A.C.91 ... 32 watts approx.
D.A.C.91 ... 60 watts approx.

AUDIO OUTPUT.

1·5 watts approx.

INTERMEDIATE FREQUENCY.

465 Kc/s.

WAVEBAND RANGES.

Long 850–2000 metres (352·9 Kc/s.—150·0 Kc/s.)
Medium 170– 560 metres (1·76 Mc/s.—535·7 Kc/s.)
Short 16– 50 metres (18·75 Mc/s.— 6·0 Mc/s.)

CONTROLS.

Facing front of receiver, from left to right :—
On/Off switch and volume control.
Waveband switch.
Tuning—on side of cabinet.

AERIAL AND EARTH.

Two aerial sockets are provided. The top socket, marked " Max. Sensitivity," is the normal position for the aerial, but when interference from a local or powerful station is experienced, or where a large outdoor aerial is used better results will be obtained if the aerial is connected to the " Max. Selectivity " socket.

The third socket is for the earth connection and no direct earth should be made to any other part of the chassis.

CABINET DIMENSIONS.

Length 12⅝ ins. Height 9⅛ ins. Depth 7⅞ ins.

WEIGHT.

Approximately 10 lbs.

WARNING

When servicing this receiver remember that one side of the electricity supply is connected directly to the chassis and may, under certain conditions, be "live." Do not connect any earthed equipment or a direct earth to the chassis without first isolating it by a fixed capacitor of approximately ·005 mfd. Care should be taken to avoid handling the chassis.

CIRCUIT ALIGNMENT

The use of a reputable signal generator with variable and modulated output is essential for accurate alignment of the R.F. and I.F. circuits.

A suitable dummy aerial should be connected in series with the output lead and the signal generator for each waveband. The dummy aerial may consist of a 400 ohm non-inductive resistor for the short wavebands and a fixed capacitor of 200 mmfd. for the medium and long wavebands.

A sensitive output meter should be used as a visual indicator. To obtain the most accurate adjustment of the tuned circuits always use the lowest possible input to the receiver from the signal generator, with the volume control at maximum.

Check the position of the tuning pointer in relation to the ganged condenser ; when the vanes are fully meshed the centre of the pointer should coincide with the two points at the extreme right-hand side of the pulley mounting plate next to the waveband indicator.

INTERMEDIATE FREQUENCY CIRCUITS 465Kc/s.

Set the receiver to the medium waveband, with the tuning control at approximately 300 metres. Do not connect an aerial to the receiver.

Set the signal generator to 465 Kc/s. and connect it to V2 control grid (top cap). Adjust L16 and L15 in that order. Transfer the signal to V1 control grid (top cap) and adjust L14 and L13. With the signal still applied to V1 control grid make a finer adjustment of L16, L15, L14 and L13, and repeat in the reverse order for a final adjustment.

RADIO FREQUENCY CIRCUITS.

Short Waveband. 16 to 50 metres (18·75—6 Mc/s.)

1.—Set the generator to 25m. (12 Mc/s.) and connect via the dummy aerial to the sensitive aerial socket of the receiver.

2.—Tune the receiver to 25m.

3.—Adjust TC4 (oscillator) and TC1 (aerial) for maximum output.

4.—Check calibration on 50m. (6 Mc/s.)

Medium Waveband. 170–560 m. (1·76 M/cs.—535·7 Kc/s.)

1.—Set the signal generator to 200 m. (1500 K/cs.) and connect via the dummy aerial to the sensitive aerial socket.

2.—Tune the receiver to 200 m.

3.—Adjust TC5 (oscillator) for maximum output.

4.—Re-tune signal generator and receiver to 300 m. (1000 Kc/s.) and adjust TC2 (aerial) for maximum output.

5.—Check calibration on 500 m. (600 Kc/s.)

Long Waveband. 850–200 metres (352·9—150·0 Kc/s.)

1.—Set signal generator to 1000 m. (300 Kc/s.) and connect via the dummy aerial to the sensitive aerial socket.

2.—Tune receiver to 1000 m. (300 Kc/s.)

3.—Adjust TC6 (oscillator) and TC3 (aerial) for maximum output.

4.—Check calibration on 2000 m. (150 Kc/s.)

MAINS INPUT CIRCUITS

The mains input units of the A.C.91 and D.A.C.91 receivers are not interchangeable as may appear from the circuit diagram. Each receiver is made either for A.C. mains only. or for universal (A.C. and D.C.) operation.

DISMANTLING

Remove the tuning knob, the grub-screw of which is accessible from the inside of the cabinet.

Lay the receiver on its back and remove the waveband and volume control knobs by inserting a screwdriver through the large holes in the bottom of the cabinet and loosening the grub-screws.

Take out the two bolts which pass through the securing lugs at the extreme bottom corners of the chassis.

Withdraw the chassis from the cabinet.

NOTE.—When replacing the chassis ensure that the locating pins, projecting from the front of the chassis, are correctly positioned in the recessed cups in the cabinet and that each pin is fitted with its rubber pad.

The tuning scale can be taken out by unscrewing the two bolts holding the retaining clips. Note that rubber channels are fitted along the edges of the scale and also that there is a left and a right-hand retaining clip.

SERVICING NOTES

Before proceeding to locate a fault in the receiver it is important to ensure all valves are up to standard and are making good contact in their holders.

Voltage readings should be checked on all valves. The windings of the output transformer, mains transformer, and speaker speech coil should be checked for continuity, short-circuit, etc.

If these preliminary tests give satisfactory results apply an A.F. signal to the control grid of V3 to check stages V3 to V4. If there is little or no output check all the components from the anode resistor of V3 to the grid of V4, including the cathode circuits of both valves.

To check the R.F. section of the receiver commence with the I.F. stage V2. Inject a 465 Kc/s. signal (modulated) into the control grid of V2 (top cap) and if the output of the receiver is low check the 2nd. I.F. transformer, the decoupling components of V2, the A.V.C. components, and the detector and input circuits of V3.

To check the 1st. I.F. transformer transfer the 465 Kc/s. signal to the hexode anode of V1. No greater output should be expected than from the previous test. If it is greatly reduced check the 1st. I.F. transformer and the input circuit to V2.

Apply an R.F. (modulated) signal, within the limits of the particular waveband, to the grid of V1. If the signal can be tuned the oscillator circuits are correct, and the aerial circuits should be checked. If the circuit cannot be tuned inject into the oscillator grid of V1 an unmodulated signal which is 465 Kc/s. higher than the frequency of a station known to be transmitting. If this station can be tuned at its correct position on the tuning scale the oscillator circuits would appear to be at fault.

COMPONENTS AFFECTING CALIBRATION :—

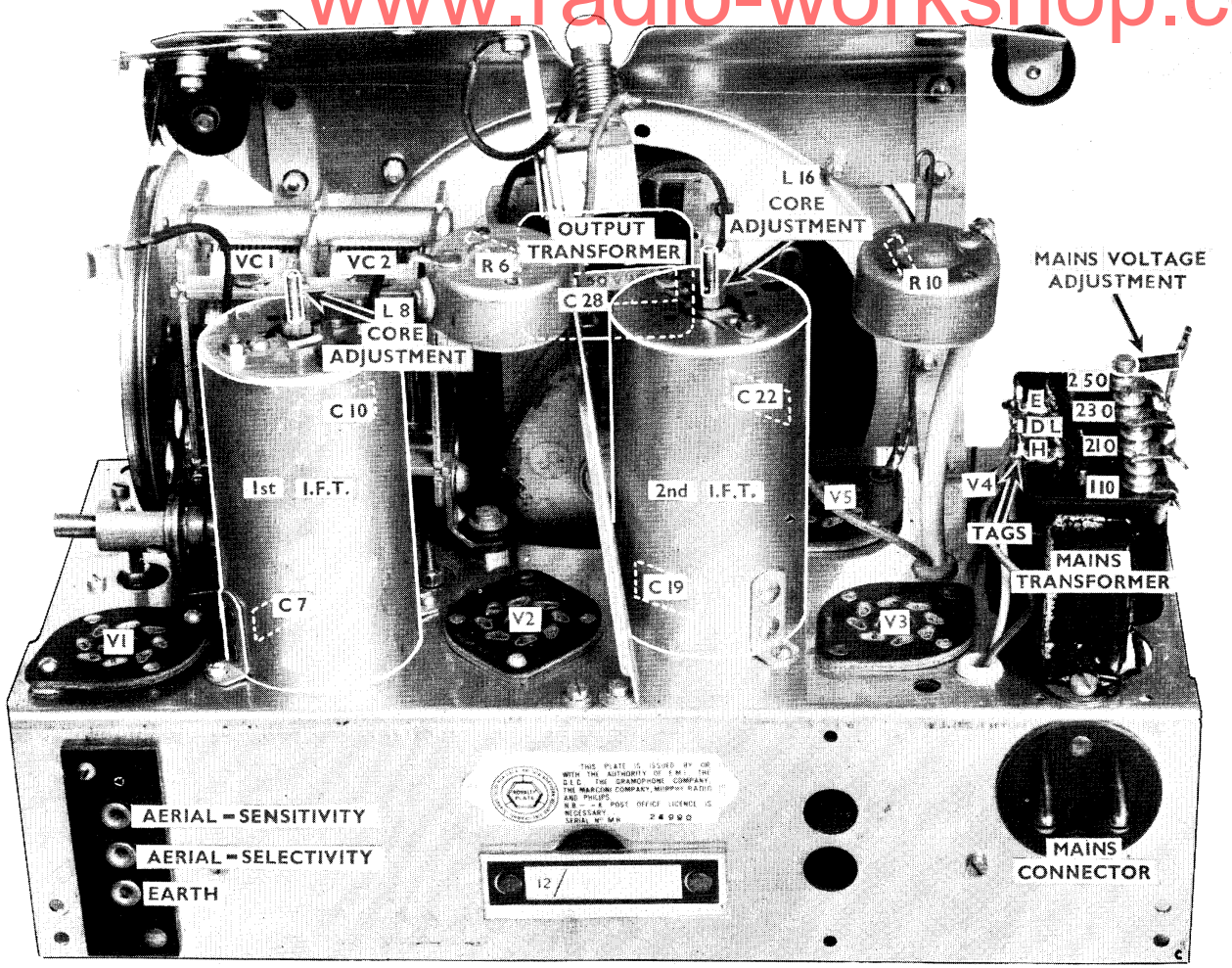
Long Waveband —TC6, L13, L14, C12, C13.
Medium Waveband—TC5, L11, L12, C14.
Short Waveband —TC4, L9, L10.

A.V.C. LINE COMPONENTS :—

C5, C15, C24, R3, R5, R14.

DECOUPLING AND BIAS COMPONENTS :—

V1. Screen and Oscillator Anode—R1, C9.
Bias R2, C8.
V2. Anode—R9, C18. Screen—R7, C16. Bias—R8, C17.
V3. Bias—R13, C21.
V4. Bias—R17.



OUTPUT TRANSFORMER

Part No. S.12706.

D.C. resistance :—Primary 500 ohms. Secondary 0·75 ohms. Ratio : 40 : 1.

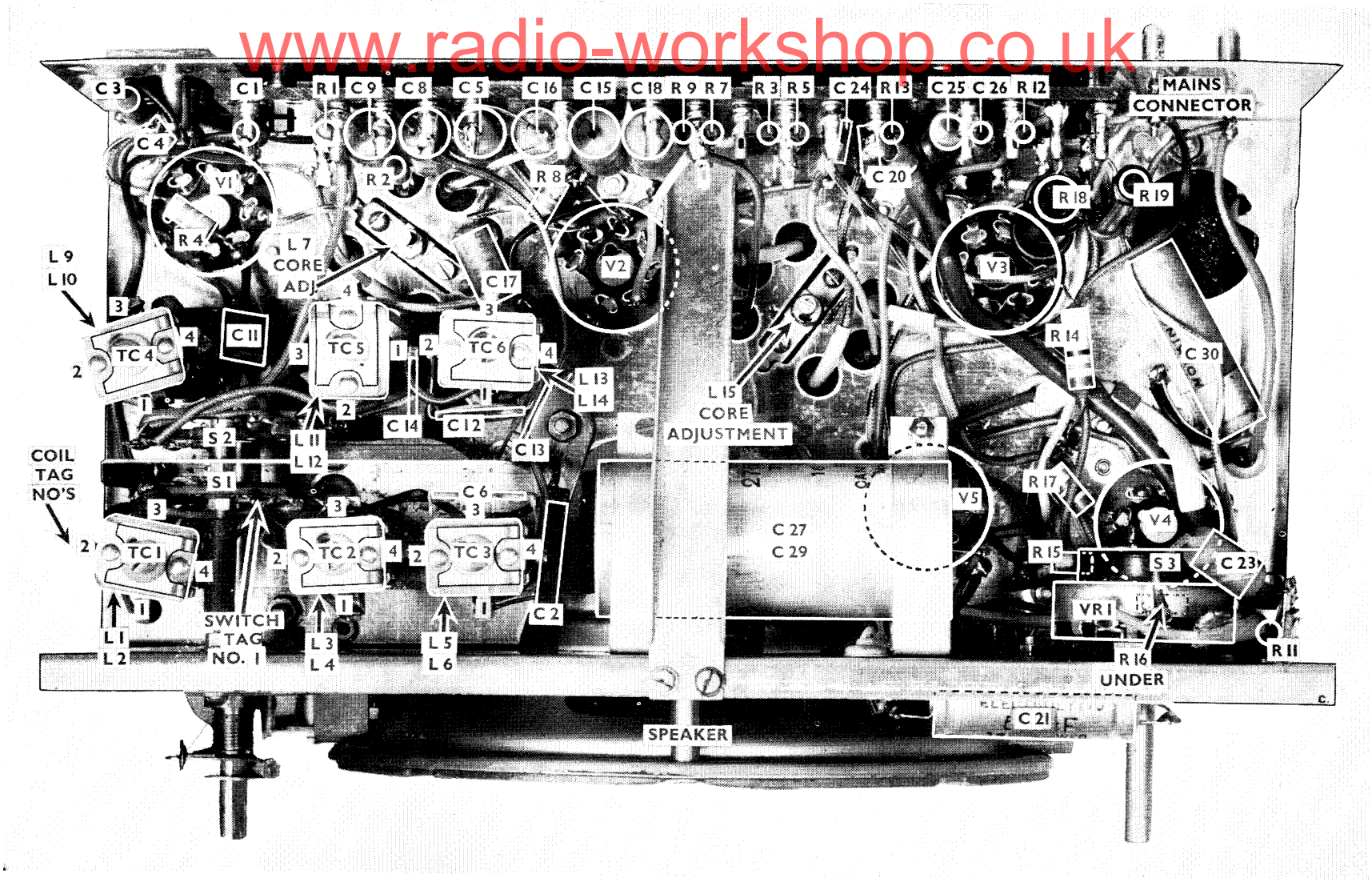
Inductance : Primary 6·4 henrys at 400 cycles 5 volts with 26 mA. D.C. flowing.

SPEAKER

Part No. P12498. Speech coil D.C. resistance 2·5 ohms.

← TOP VIEW OF A.C.91 RECEIVER.

The D.A.C.91 receiver has a mains ballast resistor in place of the mains transformer shown in this photograph. The disposition of other components remains the same.



Under chassis view of A.C.91 receiver

CAPACITORS.

Ref.	Value mfd.	Value mmfd.	Type	Working Voltage D.C.	Tolerance ± %	Part Nos.	Function in circuit
C. 1	·005	—	Tubular	500	20	P3767 or P12725	Aerial isolating capacitor.
C. 2	—	800	M. Mica	350	20	P3776	L.W. aerial shunt.
C. 3	·005	—	Tubular	500	20	P3767 or P12725	True earth isolating capacitor.
C. 4	—	50	Silver Mica	350	10	P12524	Series aerial capacity on selective tap.
C. 5	·05	—	Tubular	350	20	P3770 or P12363	V1 A.V.C. decoupling.
C. 6	—	30	Silver Mica	350	10	P3778	L6 fixed trimming.
C. 7	—	110	,, ,,	350	2	P3729	1st I.F.T. primary capacity.
C. 8	·05	—	Tubular	350	20	P3770 or P12363	V1 cathode decoupling.
C. 9	·05	—	,,	350	20	P3770 or P12363	V1 screen and oscillating anode decoupling.
C.10	—	110	Silver Mica	350	2	P3729	1st I.F.T. secondary capacity.
C.11	—	50	M. Mica	350	20	P3774	V1 oscillator grid capacity.
C.12	—	180	Silver Mica	350	2	AP13329	L.W. oscillator coil fixed trimming.
C.13	—	390	,, ,,	350	1	P12961	L.W. fixed padding.
C.14	—	556	,, ,,	350	1	P2034	M.W. fixed padding.
C.15	·05	—	Tubular	350	20	P3770 or P12363	V2 A.V.C. decoupling.
C.16	·05	—	,,	350	20	P3770 or P12363	V2 screen decoupling.
C.17	·01	—	,,	350	25	P3769 or P12364	V2 cathode decoupling.
C.18	·05	—	,,	350	20	P3770 or P12363	V2 anode decoupling.
C.19	—	110	Silver Mica	350	2	P3729	2nd I.F.T. primary capacity.
C.20	—	100	M. Mica	350	20	P3775	I.F. filter.
C.21	50	—	Electrolytic	12	—	P12662	V3 cathode decoupling.
C.22	—	110	Silver Mica	350	2	P3729	2nd I.F.T. secondary capacity.
C.23	·01	—	Tubular	350	20	P3769 or P12364	Coupling to V3 control grid.
C.24	—	50	M. Mica	350	20	P3774	Coupling to A.V.C. diode.
C.25	·006	—	Tubular	350	20	P12776 or P12987	Fixed tone correction.
C.26	·01	—	,,	350	20	P3769 or P12364	Coupling to V4 control grid.
C.27	16	—	Electrolytic	275	—	P12444 or P12788	H.T. line smoothing.
C.28	·01	—	Tubular	350	20	P3769 or P12364	Fixed tone correction.
C.29	32	—	Electrolytic	275	—	P12444 or P12788	H.T. line smoothing.
C.30	0·1	—	Tubular	500	20	P8998 or P12988	Mains R.F. by pass.

All tubular capacitors are non-inductive.
C27, C29 are in one container.

RESISTORS.

Ref.	Value in Ohms.	Rating in Watts.	Part No.	Function in circuit.
R. 1	15,000	¼	P6652	V1 Screen and oscillator anode decoupling.
R. 2	100	¼	P6107	V1 Cathode bias.
R. 3	1 meg.	¼	P7115	V1 Grid A.V.C. decoupling.
R. 4	33,000	¼	P6737	V1 Oscillator grid-cathode return.
R. 5	2·2 meg.	¼	P7199	V2 Grid A.V.C. decoupling.
R. 6	220	¼	P6191	V2 Grid stabiliser.
R. 7	47,000	¼	P6779	V2 Screen feed and decoupling.
R. 8	220	¼	P6191	V2 Cathode bias.
R. 9	10,000	¼	P6611	V2 Anode decoupling.
R.10	100,000	¼	P6863	V3 Grid stabiliser.
R.11	2·2 meg.	¼	P7199	V3 Grid return.
R.12	68,000	¼	P6821	V3 Triode anode load.
R.13	1,000	¼	P6359	V3 Cathode bias.
R.14	1 meg.	¼	P7115	V3 A.V.C. diode anode load.
R.15	470,000	¼	P7031	V4 Grid return.
R.16	47,000	¼	P6779	V4 Grid stabiliser.
R.17	150	¼	P6155	V4 Cathode bias.
R.18	10,000	2	P6608	H.T. Line smoothing.
R.19	150	1	P6147	V5 Surge current limiter.
R.20	DAC.91 only 600 | 100 | 100	30	P3764	Heater circuit ballast.
VR.1	500,000	—	P12408 or P12413	Volume control.

Owing to supply difficulties it may be found that the colour coding of some resistors does not correspond with the values shown in the above table. The measured value of the component fitted, however, will come within the tolerance of the specified resistance. The tolerance is ± 20% except for R.17, which is ± 10%.

VARIABLE CAPACITORS.

Ref.	Value mmfd.	Type	Part No.	Description
V.C.1	533	Ganged	P12422	Aerial circuit tuning.
V.C.2	533	Ganged	P12422	Oscillator circuit tuning.
T.C.1	3–40	" Postage Stamp "	P2937A	S.W. Aerial coil trimmer.
T.C.2	3–40	,,	,,	M.W. Aerial coil trimmer.
T.C.3	3–40	,,	,,	L.W. Aerial coil trimmer.
T.C.4	3–40	,,	,,	S.W. Oscillator coil trimmer.
T.C.5	3–40	,,	,,	M.W. Oscillator coil trimmer.
T.C.6	3–40	,,	,,	L.W. Oscillator coil trimmer.

COIL DATA.

Ref.	Approx. D.C. Resistance	Part No.	Description
L. 1	Under ½ ohm.	S12733	S.W. Aerial coupling.
L. 2	" " "		S.W. Aerial tuning.
L. 3	0·6	S12737	M.W. Aerial coupling.
L. 4	4·0		M.W. Aerial tuning.
L. 5	32·0	S12739	L.W. Aerial coupling.
L. 6	16·0		L.W. Aerial tuning.
L. 7	5·0	S12680	1st I.F.T. primary.
L. 8	5·0		1st I.F.T. secondary.
L. 9	Under ½ ohm.	S12733	S.W. Oscillator coupling.
L.10	" " "		S.W. Oscillator tuning.
L.11	0·6	S12738	M.W. Oscillator coupling.
L.12	3·2		M.W. Oscillator tuning.
L.13	1/5	S12740	L.W. Oscillator coupling.
L.14	4·0		L.W. Oscillator tuning.
L.15	5·0	S12683	2nd I.F.T. primary.
L.16	5·0		2nd I.F.T. secondary.

MAINS TRANSFORMER.

A.C. 91 only

Part No. S12708.
Input 230 volts 50 cycles. Mains adjusting lead in 230V. position.

Winding	Tag	Approx. D.C. Resistance	A.C. Voltage No load	A.C. Voltage On load
Start of winding to :—	E		—	
3·5 V. tap	DL	2·2 ohms.	3·2	2·7
Heater tap	H	59·0 "	83	72
110 V. tap	110	87·0 "	112	110
210 V. tap	210	165·0 "	215	210
230 V. tap	230	180·0 "	230	230
250 V. tap	250	200·0 "	252	250

Current on full load measured with meter between 230 V. tap and adjustable lead—150 mA.

VALVE DATA

A.C. 91

Input 230 volts A.C. 50 cycles.
Receiver set to medium waveband with no signal input.

All measurements taken on an Avometer Model 7 with chassis negative ; 1,000 volt range for H.T. and 10 volt (or appropriate) range for cathode measurements.

Valve	Electrode	Pin No.	Voltage	Current
V.1	Hexode Anode	3	115	
	Oscillator Anode	6	50	
	Screens	4	50	
	Cathode	8	0·5	4·9 mA.
V.2	Anode	3	80	
	Screen	4	65	
	Cathode	8	1·0	5·5 mA.
V.3	Triode Anode	3	50	
	Cathode	8	1·0	1·0 mA.
V.4	Anode	3	245	
	Screen	4	115	
	Cathode	8	4·0	30·0 mA.
V.5	Anode	5	220 A.C.	
	Cathode	8	260	45·0 mA.

DAC.91 : Voltages on the DAC.91 receiver on A.C. mains will be approximately the same as the A.C.91 but slightly less on the equivalent D.C. Mains.

Three-quarter view showing wire drives

FITTING WIRE DRIVES

Part Numbers :—

Wire and anchor for tuning drive	S12717
Drive pressure spring	P8240
Wire and eyelets for waveband indicator ...	S12721

The wire drive for tuning is 32 ins. long, and after clenching in the anchor 30$\frac{5}{8}$ ins.

When replacing a wire drive remove the screw holding the rear scale frame support.

Detach the pointer from the old drive by easing over the two small clips on the back of the pointer.

Turn the variable condenser until the vanes are fully open. With the anchor of the new wire attached to the spring pass the wire round the drive wheel clockwise, bringing it over the vertically mounted pulley at the back of the scale assembly on the right-hand side. Bring the wire behind the scale to the pulley at the left-hand side and back across the top of the scale to the horizontally mounted pulley. From there pass the wire over the top of the drive wheel. Turn the drive wheel once or twice to ensure that the wire is travelling properly.

With the vanes of the variable condenser fully meshed, place the pointer on the scale so that the black line coincides with the two points at the extreme right-hand side of the scale next to the waveband indicator.

Tighten the clips of the pointer on to the wire.

The wire drive for the waveband indicator is 7$\frac{1}{4}$ ins. measured between the centres of the eyelets.

Turn waveband switch fully anti-clockwise hook the wire on to the indicator lever and adjust the arm on the switch spindle until the wire is taut without pulling the indicator.

COIL CONNECTIONS

Coil Tag Numbering.—Looking at the trimmer end of the coil with the hinge of the moving plate on the left tag No. 1 is at the top and tags Nos. 2, 3 and 4 follow in a clockwise direction.

Switch Tag Numbering.—Switch tags are numbered in a clockwise direction when viewed from the front of the chassis, tag No. 1 being on the right-hand side of the mounting screw nearest the bottom edge of the chassis.

S.W. Aerial Coil :—

Tag No. 1 to S1 tag No. 8.
„ „ 2 to S1 tag No. 2, and TC1 fixed plates.
„ „ 3 to L2 tag No. 4.
„ „ 4 to L1 tag No. 3, and TC1 moving plates.

M.W. Aerial Coil :—

Tag No. 1 to S1 tag No. 9.
„ „ 2 to S1 tag No. 3, and TC2 fixed plates.
„ „ 3 to L5 tag No. 3.
„ „ 4 to S1 tag No. 5, L6 tag No. 4, and TC2 moving plates.

L.W. Aerial Coil :—

Tag No. 1 to S1 tag No. 10, and C2.
„ „ 2 to S1 tag No. 4, C6, and TC3 fixed plates.
„ „ 3 to L3 tag No. 3, and chassis.
„ „ 4 to L4 tag No. 4, C5, C6, and TC3 moving plates.

S.W. Oscillator Coil :—

Tag No. 1 to S2 tag No. 11.
„ „ 2 to S2 tag No. 2, and TC4 fixed plates.
„ „ 3 to S2 tag No. 8.
„ „ 4 to chassis, and TC4 moving plates.

M.W. Oscillator Coil :—

Tag No. 1 to S2 tag No. 11, and L13 tag No. 1.
„ „ 2 to S2 tag No. 3, and TC5 fixed plates.
„ „ 3 to S2 tag No. 9.
„ „ 4 to C14, and TC5 moving plates.

L.W. Oscillator Coil :—

Tag No. 1 to L11 tag No. 1.
„ „ 2 to S2 tag No. 4, C12, and TC6 fixed plates.
„ „ 3 to S2 tag No. 10.
„ „ 4 to C12, C13, and TC6 moving plates.

LIST OF PART NUMBERS

The following part numbers are not shown elsewhere in this manual.

When ordering replacements or spare components please quote :—

(a) Type and serial number of receiver.
(b) Part number and description of item.
(c) Quantity required.

Cabinet	P12400
Cabinet back	AP13112
Cabinet grille, moulded	P12779
Knob, large	P12405
Knobs, small	P12406
Pointer	S12714
Pulley mounting plate, assembly	S12985
Scale clip, left-hand	P12482
Scale clip, right-hand	P12843
Scale lamp holder	S12984
Tuning scale	P12778
Waveband switch wafer	P12787
Waveband indicator	P12796

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OF

BUSH RADIO LTD.

POWER ROAD, LONDON, W.4

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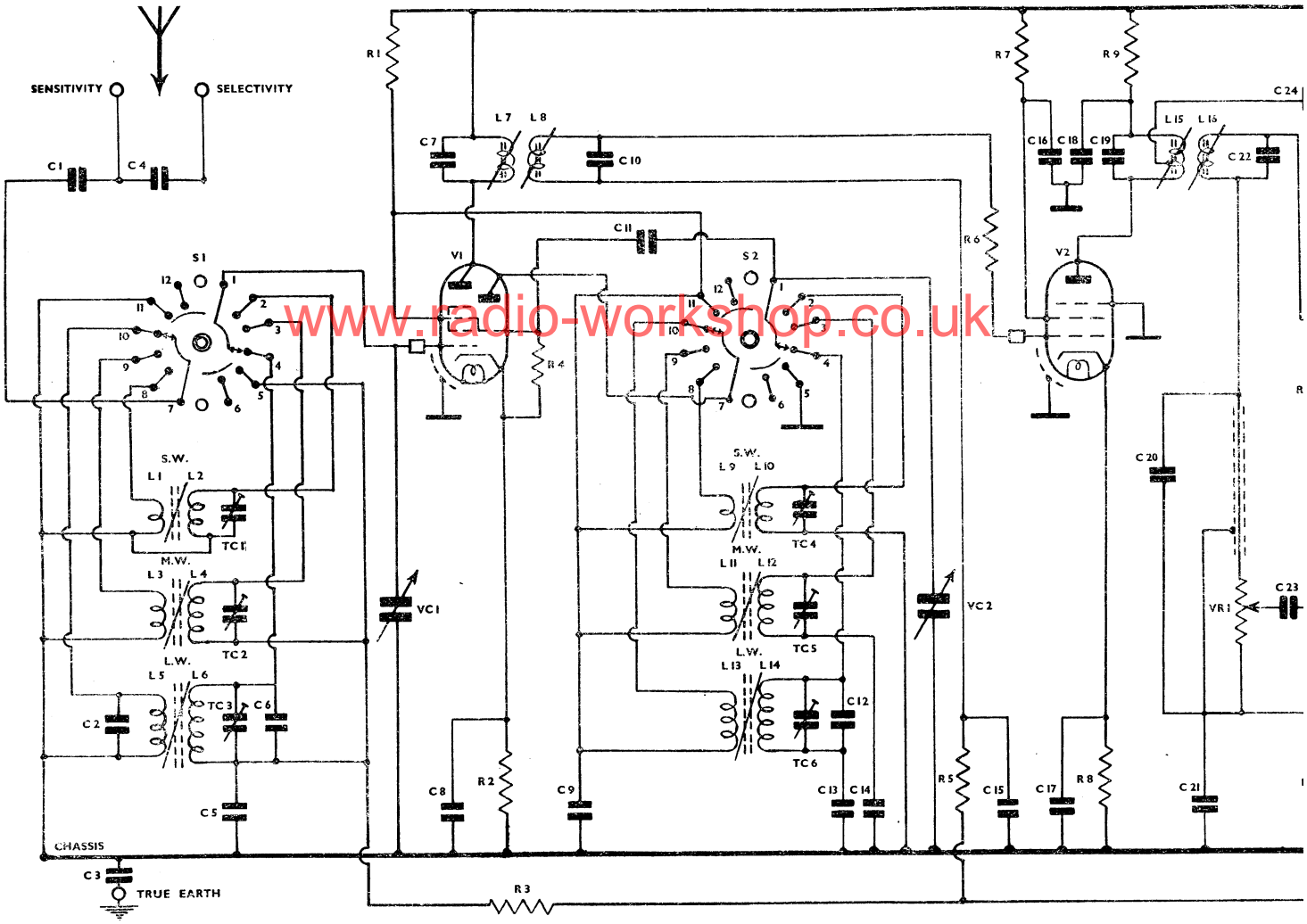
CIRCUIT DIAGRAM A.C.



QUICK REFERENCE TABLE FOR COMPONENT VALUES AND VALVE VOLTAGES

RESISTORS
(in ohms.)

R.1	...	15,000
R.2	...	100
R.3	...	1 meg.
R.4	...	33,000
R.5	...	2.2 meg.
R.6	...	220
R.7	...	47,000
R.8	...	220
R.9	...	10,000
R.10	...	100,000
R.11	...	2.2 meg.
R.12	...	68,000
R.13	...	1,000
R.14	...	1 meg.
R.15	...	470,000
R.16	...	47,000
R.17	...	... 150
R.18	...	10,000
R.19	...	... 150
R.20	D.A.C. 91 only	600+100+100
V.R.I.	...	500,000

CAPACITORS.

C.1	...	.005 mfd.	C.16	...	.05 mfd.
C.2	...	800 mmfd.	C.17	...	.01 mfd.
C.3	...	.005 mfd.	C.18	...	.05 mfd.
C.4	...	50 mmfd.	C.19	...	110 mmfd.
C.5	...	.05 mfd.	C.20	...	100 mmfd.
C.6	...	30 mmfd.	C.21	...	50 mfd.
C.7	...	110 mmfd.	C.22	...	110 mmfd.
C.8	...	.05 mfd.	C.23	...	.01 mfd.
C.9	...	.05 mfd.	C.24	...	50 mmfd.
C.10	...	110 mmfd.	C.25	...	.006 mfd.
C.11	...	50 mmfd.	C.26	...	.01 mfd.
C.12	...	180 mmfd.	C.27	...	16 mfd.
C.13	...	390 mmfd.	C.28	...	.01 mfd.
C.14	...	556 mmfd.	C.29	...	32 mfd.
C.15	...	.05 mfd.	C.30	...	0.1 mfd.

V.C.1 ... 533 mmfd. } ganged.
V.C.2 ... 533 mmfd. }

T.C.1—T.C.6 ... 3–40 mmfd.

COILS
(Values in ohms)

L.1	...	Under ½ ohm
L.2	...	Under ½ ohm
L.3	... ...	0.6
L.4	... ...	4.0
L.5	... ...	32.0
L.6	... ...	16.0
L.7	... ...	5.0
L.8	... ...	5.0
L.9	...	Under ½ ohm
L.10	...	Under ½ ohm
L.11	... ...	0.6
L.12	... ...	3.2
L.13	... ...	1.5
L.14	... ...	4.0
L.15	... ...	5.0
L.16	... ...	5.0

OUTPUT TRANSFORMER
Primary D.C. resistance 500 ohms.
Secondary ,, 0.75 ohms.

SPEAKER
Speech coil D.C. resistance 2.5 ohms.

MAINS TRANSFORMER
Total D.C. resistance 210 ohms.

VALVE HEATER VOLTAGES
V.1 ... CCH35 ... 7.0v.
V.2 ... EF39 ... 6.3v.
V.3 ... EBC33 ... 6.3v.
V.4 ... CL33 ... 33.0v.
V.5 ... CY31 ... 20.0v.
Heater current 0.2A.

SCALE LAMP
A.C.91 ... 3.5v. 0.3A.
D.A.C.91 ... 6.2v. 0.3A.

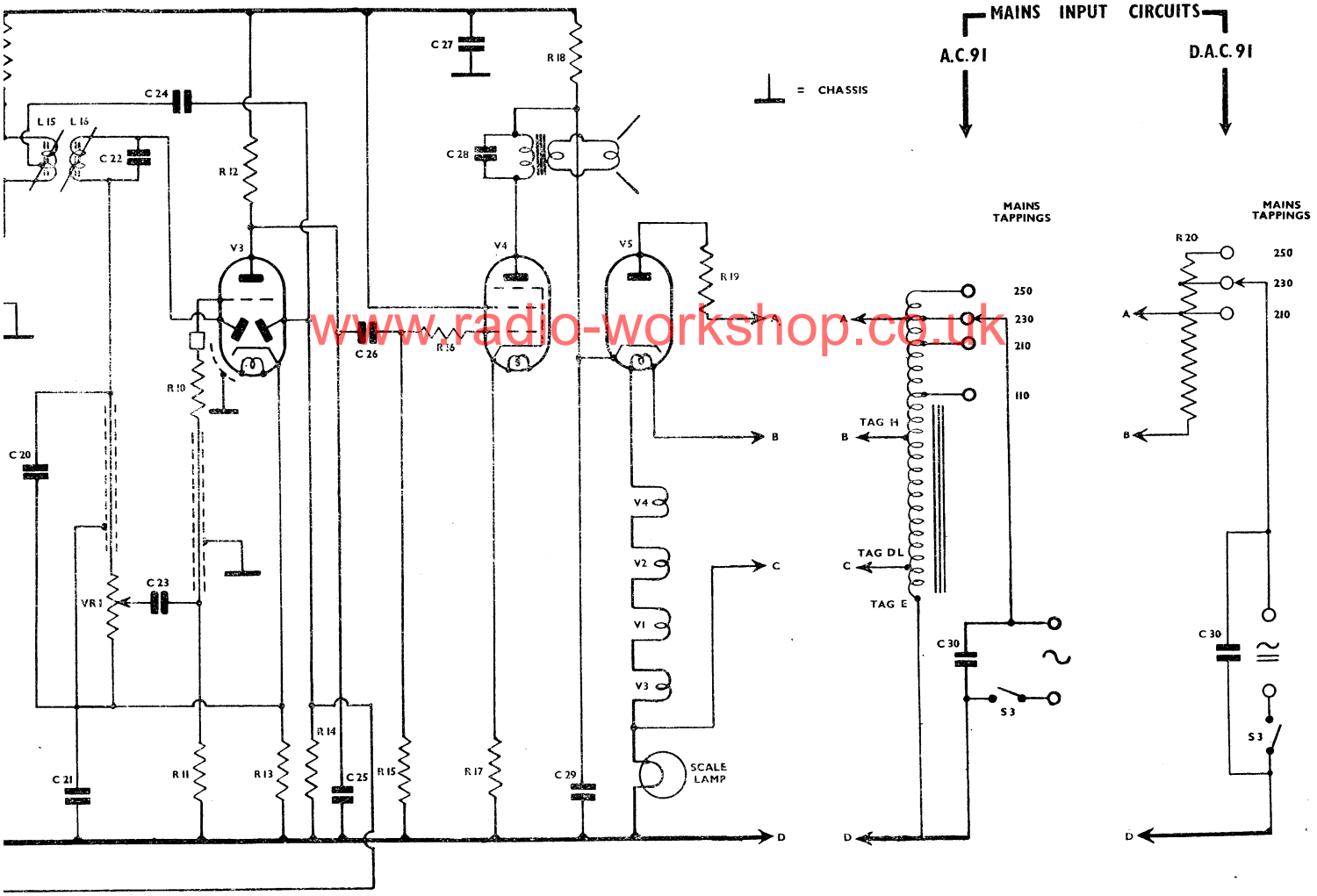
VALVE VOLTA
(All values appr

A.C.91 ... 230 volts input.
V.1 ... A–110, G2 and G4 K–0.5
V.2 ... A–65, G2–50, K–1.
V.3 ... A–45, K–0.7
V.4 ... A–260, G2–110, K-
V.5 ... A–225, K–275

D.A.C.91.

Voltages on the D.A.C. A.C. mains will be approxir as the A.C.91 but slightly mains.

GRAM A.C.91 AND D.A.C.91



ES

VALVE VOLTAGES

(All values approx.)

A.C.91 ... 230 volts input.

V.1 ... A–110, G2 and G4–55, Osc.A–55, K–0.5

V.2 ... A–65, G2–50, K–1.0

V.3 ... A–45, K–0.7

V.4 ... A–260, G2–110, K–3.8

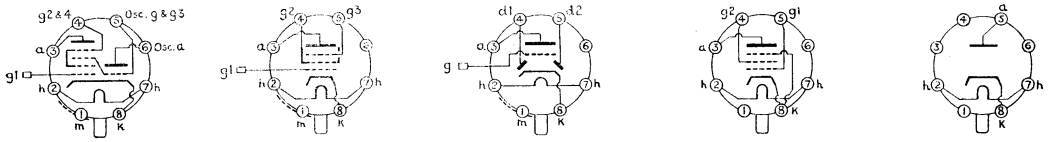
V.5 ... A–225, K–275

D.A.C.91.

Voltages on the D.A.C.91 receiver on A.C. mains will be approximately the same as the A.C.91 but slightly less on D.C. mains.

VALVE BASE CONNECTIONS

The pin connections are shown as they would appear when the base or its holder is viewed from the underside of the chassis.



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