

LISSEN 8402 THREE-BAND SIX



The Lissen 8402 is a five-valve, plus rectifier, manually tuned superhet covering three bands. A feature is the large "aeroplane" type dial.

CIRCUIT.—Coupled aerial circuits, selected by two switch wafers controlling tuned and untuned windings, precede the first valve, V1, an H.F. pentode. A.V.C. is provided on all bands through the usual decoupling network.

Transformers with tuned secondaries and untuned primaries couple V1 to V2, a triode-hexode. A.V.C. is again provided on all bands. The transformer network has a number of modifying resistances in both primary and secondary circuits.

The oscillator circuit of V2 utilizes a tuned grid and untuned reaction arrangement. Another pair of switch wipers select the various windings. The regeneration voltages are modified by parallel and series damping resistances.

Trimmer tuned I.F. transformers lead to V3, another H.F. pentode, and to V4, a double diode triode. One diode is used for demodulation with a standard network. The other is used for the A.V.C., the load having two tapings to give suitable control for the various stages.

The grid circuit of the triode portion of V4 comprises the volume control, which is

fed through a coupling condenser from the diode load. Resistance coupling is used between this valve and V5, the output pentode. Negative feedback is provided by a high resistance connected between the anodes of V4 and V5.

The last valve, V6, is a full-wave rectifier, and a separate smoothing choke is employed.

Chassis Removal.—The chassis is released by withdrawing the four retaining bolts from the bottom and removing the knobs. The knobs are anchored by a special spring clip and pull off. The retaining bolts have washers and work in conjunction with large rubber grommets, acting as a spring suspension, fixed in the bottom of the cabinet.

The tuning scale assembly comes away with the chassis, but for complete removal of the chassis from the cabinet the speaker leads must be disconnected. These leads go to the tags on the speaker transformer and choke, which are mounted on the plat-

form at the side of the speaker. The earthing lead is soldered to a tag on the speaker chassis. Numbers are used on

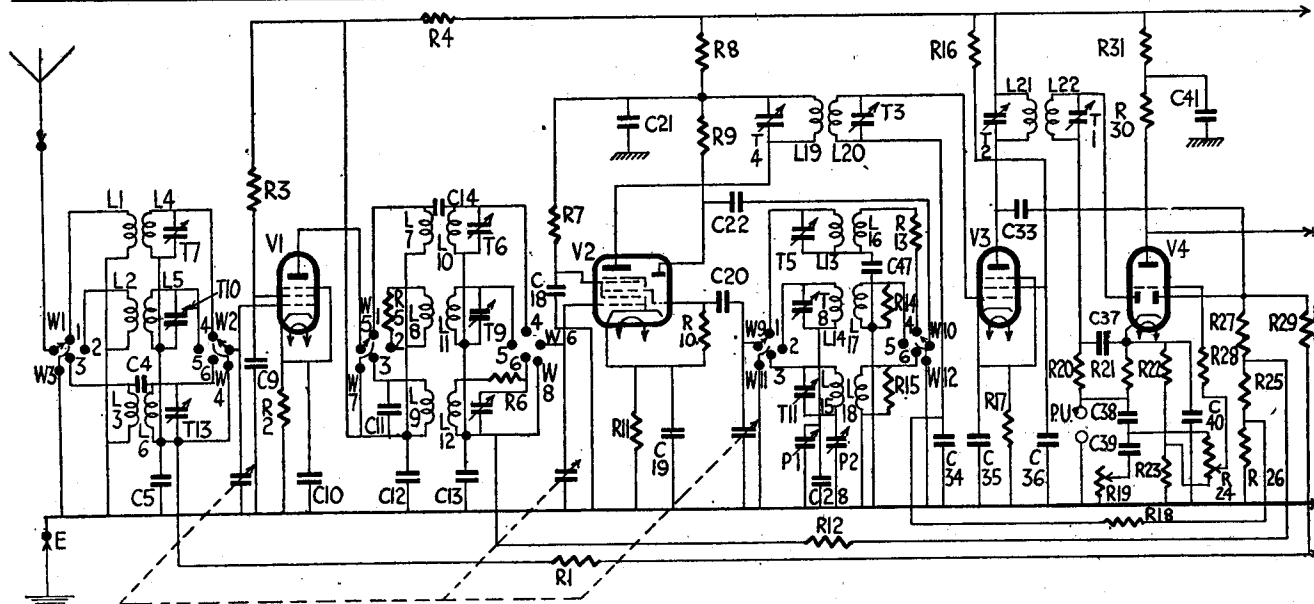
VALVE READINGS

No signal. Volume maximum. M.W. min. cap. 200 volt A.C. mains.

V.	Type.	Electrode.	Volts.	Ma.
1	A50P	(All Ever Ready)		
		Anode	150	4.8
		Screen	120	1.7
2	A36B	Anode	170	1.2
		Screen	65	3
		Osc. anode	75	4.5
3	A50P	Anode	225	5.2
		Screen	145	1.8
		Anode	140	2
4	A23A	Anode	212	27
		Screen	225	4
		Heater	250	—
6	A11D	Ever Ready	5.5	300
		MES.		

RESISTANCES

R.	Purpose.	Ohms.	R.	Purpose.	Ohms.
1	V1 A.V.C. decoupling	110,000	19	Tone control	2 meg.
2	V1 cathode bias	100	20	Demodulating diode load (part)	510,000
3	V1 screen decoupling	25,000	21	Demodulating diode load (part)	260,000
4	V1 anode decoupling	10,000	22	V4 cathode bias (part)	800
5	M.W. H.F. primary damping	2,100	23	V4 cathode bias (part)	1,500
6	L.W. H.F. secondary decoupling	100	24	Volume control	500,000
7	V2 screen decoupling	41,000	25	A.V.C. diode load (part)	260,000
8	V2 anode and osc. anode decoupling	5,000	26	A.V.C. diode load (part)	510,000
9	V2 osc. anode load	20,000	27	A.V.C. diode load (part)	260,000
10	V2 osc. grid leak	51,000	28	V4 grid stopper	111,000
11	V2 cathode bias	200	29	A.V.C. decoupling	510,000
12	V2 A.V.C. decoupling	260,000	30	V4 anode load	41,000
13	S.W. regeneration modifier	200	31	V4 anode decoupling	11,000
14	M.W. regeneration modifier	1,500	32	Feed back coupling	250,000
15	L.W. regeneration modifier	5,100	33	V5 grid stopper	51,000
16	V3 screen decoupling	30,000	34	V5 grid leak	510,000
17	V3 cathode bias	250	35	V5 bias	150
18	V3 A.V.C. decoupling	260,000			



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the tags, embossed on the paxolin strip, and the order of colours is as follows: light brown, tag 1; red, tag 2; blue, tag 3. Tag 4 is blank.

Special Notes.—R17, the cathode resistance on V3 in our receiver, had a value of 450 ohms instead of 250 ohms.

A number of components in the list will not be found in the diagram, as these are located inside the coil cans. These include C11 and C14, and the four damping resistances R5, R6, R14 and R15. It should also be observed that R28, the V4 grid stopper, is located inside the grid cap of that valve.

Certain of the resistance values of the windings are those of the coil and the associated resistance which is inside the can.

Wavechange Switches.—The switching system is very simple and is provided by three wafers, each having a similar arrangement of wiper and contacts. The tuned and untuned windings corresponding to each wafer are respectively connected to two wiper, and, in addition, there are two further wiper which short circuit the unused coils.

On the oscillator bank W11 and W12 are joined together and earthed. On the aerial and high-frequency banks, however, the shorting wiper go to the bottom of the coil and not to the earth, with the exception of W3. The diagram shows the switch wafers as they appear when looked at from an angle with the click plate to the left.

Alignment Notes

I.F. Circuits.—Short circuit the oscillator section of V2, connect an output meter to the extension speaker sockets and a signal generator to grid circuit of V2 through a .1-mfd. condenser.

Inject at 473 kc. and, using a low input, adjust T1 and T2, and then T3 and T4. Tune these for a single peak and recheck the adjustment of T1, T2, T3 and T4 in that order. Keep the signal below the A.V.C. value.

Short Waves.—Connect the generator to the aerial and earth sockets of the receiver and set the wave switch to the short wave position. See that the pointer registers (Continued on page 17)

Lissen 8402 on Test

MODEL 8402.—For A.C. mains operation, 200-250 volts, 40-100 cycles. Price, £11 19s. 6d.

DESCRIPTION.—Five-valve, plus rectifier, three-band manually tuned table model superhet.

FEATURES.—Full-vision scale with an aeroplane type pointer with calibrations in names and wavelengths. Separate controls for tuning, range, tone, and volume combined with switching. Sockets for aerial and earth, pick-up and high impedance extension speaker.

LOADING.—64 watts.

Sensitivity and Selectivity

SHORT WAVES (18-52 metres).—Very good gain and selectivity, with well maintained sensitivity. No drift trouble and easy handling.

MEDIUM WAVES (197-575 metres).—Good gain and selectivity, with local station spread on adjacent channels only. A clean background.

LONG WAVES (860-1,900 metres).—Excellent gain and selectivity, with very little interference on Deutschlandsender. Very clean background and well maintained sensitivity.

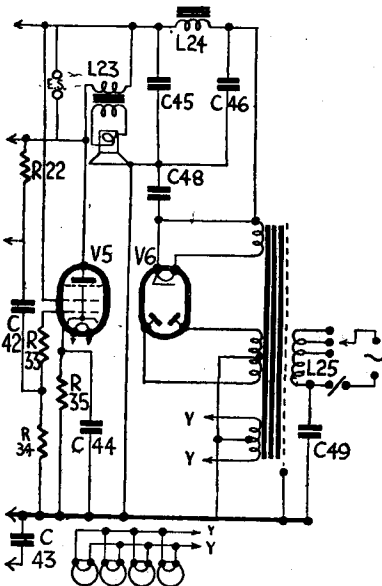
Acoustic Output

Ample volume for an ordinary room without overloading. The tone control is not too vigorous in action and in the minimum position there is good attack and crispness. Musical balance is pleasing.

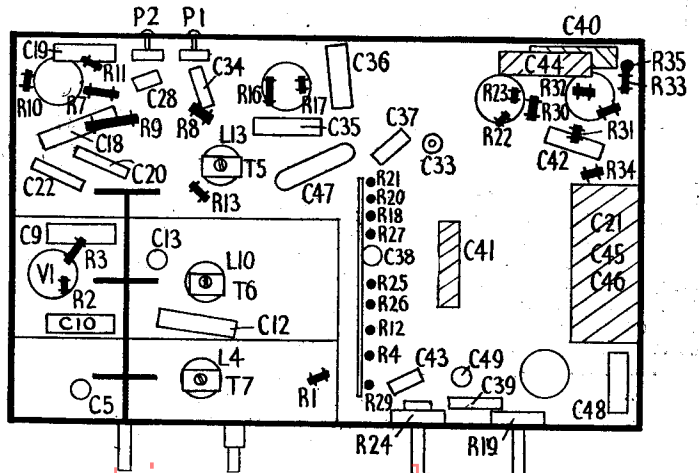
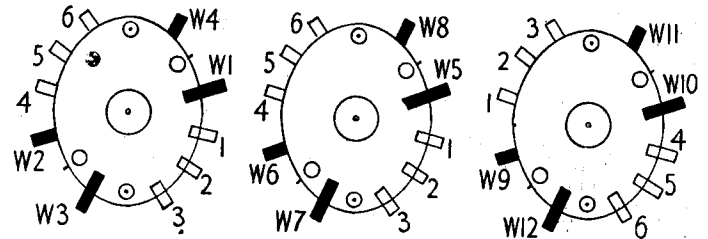
CONDENSERS

C.	Purpose.	Mfds.	C.	Purpose.	Mfds.
4	L.W. aerial top coupling	.000005	35	V3 cathode bias shunt	.1
5	V1 A.V.C. decoupling	.05	36	V3 screen decoupling	.1
9	V1 screen decoupling	.1	37	H.F. bypass	.00005
10	V1 cathode bias shunt	.1	38	L.F. coupling	.05
11	H.F. L.W. primary tune	.0002	39	Tone control	.002
12	V1 anode decoupling	.1	40	V4 cathode bias shunt	.50
13	V2 A.V.C. decoupling	.05	41	V4 anode decoupling	2
14	H.F. S.W. coupling	.000005	42	L.F. coupling	.05
18	V2 screen decoupling	.1	43	A.V.C. decoupling	.025
19	V2 cathode bias shunt	.1	44	V5 cathode bias shunt	0
20	V2 osc. grid	.0001	45	H.T. smoothing	8
21	V2 anode and osc. anode	8	46	H.T. smoothing	8
22	V2 osc. anode coupling	.0003	47	S.W. osc. fixed paddler	.0033
28	M.W. fixed paddler	.0004	48	H.T. line H.F. bypass	.005
33	A.V.C. coupling	.00001	49	Mains filter	.005
34	V3 A.V.C. decoupling	.1			

Right, the switch banks, lettered as in the circuit. See also description under "Wave-change Switches."



The circuit, left, is shown divided only for presentation reasons. Right, the underside of the chassis. The top layout diagram is on page 17.



Lissen 8402 Three-Band

with the 180-degree line with the gang at maximum.

Tune set to 15 mc.

Inject a signal of 15 megacycles, previously having unscrewed T5 to the minimum. Slowly screw up T5 until a signal is heard.

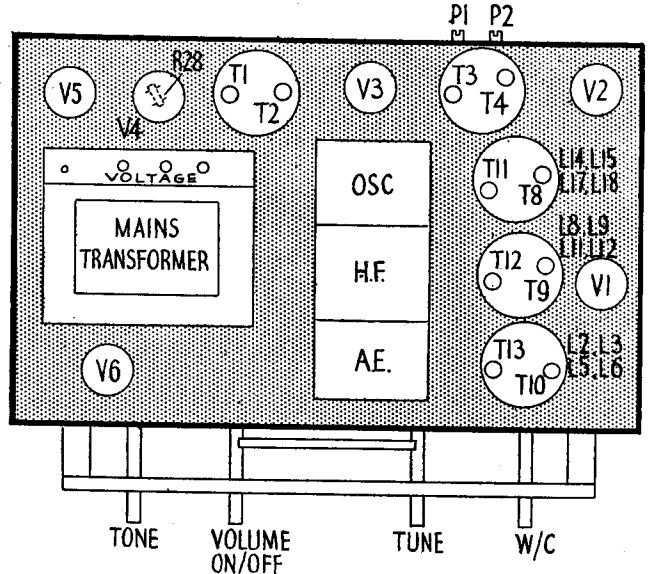
Two positions will give a signal, and the one at the minimum capacity is correct.

Then adjust T6 and T7 for maximum.

The padding operation is carried out by altering the inductance of L13. Tune the set and oscillator to 6 mc. and adjust the position of the

(Continued from page 5.)

Top "deck" chassis layout diagram of the 8402 showing valve, trimmer and coil positions.



WINDINGS (D.C. RESISTANCES)

L.	Ohms.	Range.	Where measured.
1	2.2	S.W.	Aerial and chassis.
2	12	M.W.	Aerial and chassis.
3	140	L.W.	Aerial and chassis.
4	very low	S.W.	V1 grid and C5+R1.
5	2.6	M.W.	V1 grid and C5+R1.
6	46	L.W.	V1 grid and C5+R1.
7	8.9	S.W.	V1 anode and C12+R4.
8	2,100	M.W.	V1 anode and C12+R4.
9	142	L.W.	V1 anode and C12+R4.
10	very low	S.W.	V2 grid and C13+R12.
11	2.2	M.W.	V2 grid and C13+R12.
12	100	L.W.	V2 grid and C13+R12.
13	very low	S.W.	W9 and C47+T5.
14	1.6	M.W.	W9 and P1.
15	4.7	L.W.	W9 and P2.
16	200	S.W.	W10 and C47.
17	3	M.W.	W10 and chassis.
18	9.3	L.W.	W10 and chassis.
19	7	—	V2 anode and C21+R8.
20	7	—	V3 grid and C34 and R18.
21	7	—	V3 anode and H.T. positive.
22	7	—	V4 demodulating diode and C37+R20.
23	615	—	On tags.
24	235	—	On tags.
25	16	—	Mains plug.

end turn of L13, simultaneously rocking the gang for maximum.

Then retune the set and the oscillator to 15 megacycles and check.

Any slight inaccuracy of the correct tuning setting should be adjusted by making a slight alteration to the position of the movable turn on L13 if incorrect at 6 megacycles.

Medium Waves.—Tune set to medium-wave position and adjust P1 to about two-thirds of maximum capacity. Tune set and oscillator to 214 metres and adjust T8, T9 and T10.

Tune set and oscillator to 500 metres and adjust P1. Retune set and oscillator to 214 metres and readjust T8, T9 and T10.

Recheck padding. If there is any inaccuracy make a further slight adjustment to P1.

Long Waves.—Inject a signal of 1,000 metres. Screw P2 to two-thirds of the maximum capacity and adjust T11 for maximum. Then adjust T12 and T13.

Tune the set and oscillator to 1,700 metres and adjust P2. Recheck the trimming at 1,000 metres and then recheck the padding.

If there is any inaccuracy between the dial position and the actual tuning position at 1,700 metres, readjust P2.

Replacement Condensers.—Electrolytics by A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18, are used in the 8402. Replacements are: For C40 or C44, unit 2915, 1s. 9d.; C.41, 2964, 1s. 10d.; and for the block C21, 45 and 46, unit 4167, 7s. 6d.

Lissen 8453 Alignment Notes

(Continued from page 11)

I.F. Circuits.—Short circuit the gang condenser across the oscillator section (front section) and connect output meter to set. Switch to the M.W. position and apply a signal of 452 kc. through a condenser of 0.1-mfd. capacity across the signal grid and chassis of the frequency-changer valve V1.

Trim T1, T2, T3 and T4, in that order.

The circuits should be trimmed to a single peak, using an input always below A.V.C. level.

Check by going over the trimmers in the same order again.

Long Waves.—See that the pointer registers with the 180-degree line on the scale with the gang at maximum capacity. Set P2 approximately three-quarters in.

Set the pointer against the 1,200-metres mark on the scale. Apply a modulated signal of 1,200 metres to the A. and E. sockets of the receiver and adjust T10 to

receive this signal. Then adjust T11 and T12 to give maximum output.

Set the pointer to the 1,700-metre mark on the scale and apply a signal of 1,700 metres and adjust P2 for maximum.

Reset receiver and oscillator to 1,200 metres and readjust.

Check again at 1,700 metres and see that the pointer is at the 1,700-metre mark. If it is not, make a slight adjustment to P2.

Medium Waves.—See that the pointer registers with the 180-degree line on the scale with the gang at maximum capacity. Set P1 approximately two-thirds in.

Set receiver and oscillator to 214 metres and apply the signal to the A. and E. sockets. Adjust T7, T8 and T9 to give maximum output.

Set the pointer and oscillator to 500 metres and adjust P1 for maximum.

Readjust T7, T8 and T9 at 214 metres. Check again at 500 metres and see that the pointer is at the 500-metre mark. If it is not, make a slight adjustment to P1.

Short Waves.—See that the pointer

registers with the 180-degree line with the gang at maximum. Set the pointer against the 15-mc. mark on the scale.

Screw in fully the S.W. oscillator trimmer T5, and apply a signal of 15 mc. to the A. and E. sockets. Slowly unscrew the S.W. oscillator trimmer until this signal is heard.

Care should be taken that the right peak is selected. Two peaks will be found on this trimmer; the correct one is the one with the trimmer at the higher capacity; that is, the first one heard when unscrewing the trimmer. Having selected the correct peak, adjust the S.W. signal frequency trimmer T6 to give maximum output.

Apply a signal of 7.5 mc. and tune the receiver to this signal. Adjust the top turn of the S.W. oscillator coil (L7) and the gang simultaneously to give maximum output on this signal.

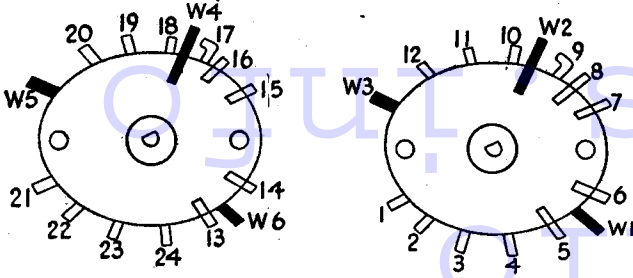
Reset the pointer to the 15-mc. mark and readjust T5 and T6.

Three Unusual Faults

HERE are three out-of-the-ordinary points. A five-valve superhet gave low signals only below London National. Fitting a new earth remedied this.

In this area (Finchley) bad hum can often be eliminated by reversing the mains plug. The supply is A.C.

Thirdly, a set came back because of a loud crackle. The set proved O.K. and, on going to the house, I found it normally stood on a table-runner embroidered with fine wire. This was intermittently making contact with an under-chassis screw.—A. Rose, London, N.16.



The two switch banks of the 8453 with the one nearer the "click" plate on the left. Contacts and wiper are numbered in the circuit on page 10.