

"TRADER" SERVICE SHEET

685

# LISSEN 8109

## BATTERY SUPERHET

REVISED ISSUE OF  
SERVICE SHEET No. 113

FOUR valves are used in the Lissen 8109, a 2-band battery superhet with a band-pass input circuit. There is provision for a gramophone pick-up and an external speaker.

Release date and original price: 1935; £11 11s., complete with batteries.

### CIRCUIT DESCRIPTION

Alternative aerial input sockets A1 direct, and A2 via series condenser C1, are coupled via L1, C2 to inductively coupled band-pass filter. Primary coils L2, L3 are tuned by C16; secondaries L4, L5 by C18. Coupling by mutual inductance of primary and secondary windings.

First valve (V1, Ever Ready metallised K80A or Mullard FC2) is an octode operating as frequency changer with electron coupling. Oscillator grid coils L6, L7 are tuned by C20. Parallel trimming by C21 (MW) and C22 (LW). Tracking by specially shaped vanes of C20. Reaction coupling by L8.

Second valve, a variable-mu RF pentode (V2, Ever Ready K50M or Mullard VP2) operates as intermediate frequency ampli-

fier and passed via C10 to CG of triode section, which operates as AF amplifier. Tone control by variable condenser C27. Provision for connection of gramophone pick-up across R7. IF filtering by C8, R6, C9.

Second diode of V3, fed from V2 anode via C11, provides DC potential which is developed across load resistor R13 and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control.

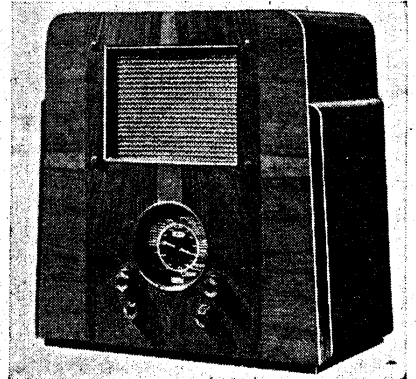
Sensitivity control by pre-set variable potentiometer R9 which varies AVC delay voltage and negative bias applied to V3 signal diode, thus giving a degree of inter-station noise suppression.

Resistance-capacity coupling between V3 triode and output pentode (V4, Ever Ready K70B or Mullard PM22A). Tone correction by R15, C15.

### VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 K80A	140	0.6	53	0.7
	140	0.7		
V2 K50M	140	1.0	84	0.3
V3 K23B	104	0.4	—	—
V4 K70B	133	5.6	140	1.4



The appearance of the Lissen 8109 table superhet.

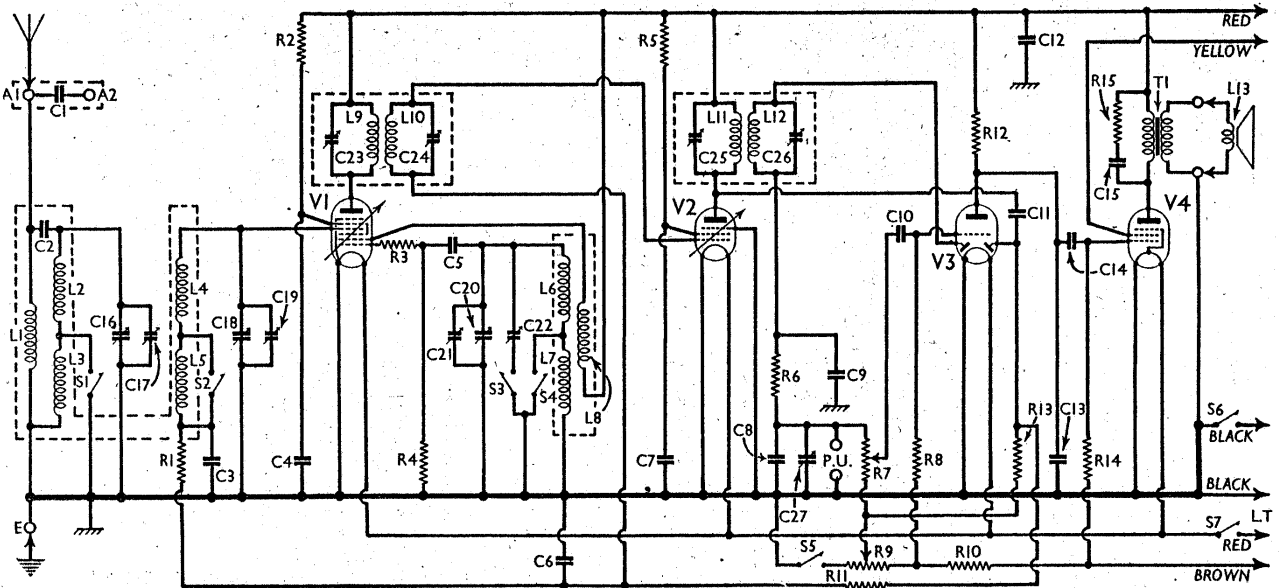
it was operating from a new battery reading 140 V on the HT section. Both the volume and sensitivity controls were at maximum, and the receiver was tuned to the lowest wavelength on the medium band, but there was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, with chassis as negative.

### DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (four round-head wood screws with washers) gives access to most of the under-chassis components.

Removing Chassis.—Remove the four control knobs (pull off);

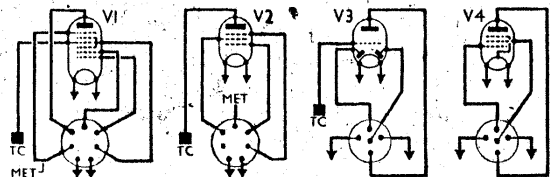


fier with tuned-primary tuned-secondary transformer couplings.

Intermediate frequency 127 kc/s.

Diode second detector forms part of double diode triode valve (V3, Ever Ready K23B or Mullard TDD2A). Audio-frequency component in rectified output is developed across manual volume control

Circuit diagram of the Lissen 8109 battery superhet. R9, R10 shunt the GB section of the HT battery.



free the speaker and battery leads from the cleat holding them to the side of the cabinet; withdraw the speaker plugs from their sockets at rear of chassis. remove the four bolts (with washers) holding chassis to base of cabinet. When replacing, the knobs should be fitted to the correct spindles, according to their markings. Removing Speaker.—Remove the nuts, spring washers and flat washers holding the speaker to the sub-baffle. When replacing, the transformer should be at the top.

**GENERAL NOTES**

**Switches.**—S1-S4 are the waveband switches, and S5-S7 the battery switches. All are ganged together in a single unit beneath the chassis. The table below gives the switch positions for the various control settings, a dash indicating open, and C, closed.

It should be noted that the set of contacts between S1 and S2 is not used, being shorted out and connected to chassis.

Switch	Off	MW	LW
S1	C	C	—
S2	C	C	—
S3	—	—	C
S4	C	—	C
S5	—	C	C
S6	—	C	C
S7	—	C	C

**Coils.**—All the coils are in four screened units on the chassis deck. The L1-L5 unit contains C2, the L6-L8 unit contains the oscillator LW trimmer C22, while the second IF unit, L11, L12, contains R6 and C9 in addition to its trimmers.

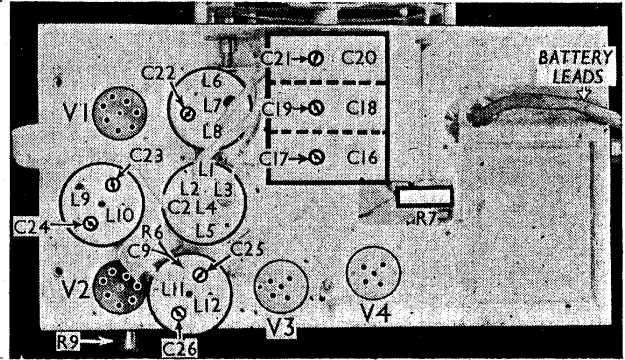
**External Speaker.**—This should be of the low resistance type (1.5-2.5 Ω), and may be connected to the sockets at the rear of the chassis, or to the socketed plugs of the internal speaker leads.

**Batteries.**—LT, Lissen 2V, 30 AH celluloid-cased cell, type LN88006. HT and GB, Lissen 132 V + 4.5 V battery, type LN3028.

**Battery Leads and Voltages.**—Black, spade tag, LT negative; Red, spade tag, LT positive 2 V; Black lead and plug, HT negative; Brown lead and plug, GB negative 4.5 V; Red lead and plug, HT positive 132 V; Yellow lead and plug, HT positive, according to letter marked on V4 output valve: A, 132 V; B, 124.5 V; C, 117 V; D, 109.5 V.

To find correct position of yellow plug for an unmarked K70B valve, remove all

Plan view of the chassis. C2 is inside the L2-L5 unit, and R6, C9 are in the L11-L12 unit. The accumulator tray is seen to the right of R7.



valves but this one, and connect a milliammeter in series with the red lead. Switch on the set, and adjust the yellow plug until the milliammeter reads 4.5 mA. Use a new battery for this adjustment.

**Chassis Divergencies.**—In late models there may be a 100 Ω resistor in series between R9 and S5. In this case the other side of S5 will be returned to LT positive, instead of chassis. Resistor R10 may be 300 Ω instead of 250 Ω.

**COMPONENTS AND VALUES**

CONDENSERS		Values (μF)
C1	Aerial series condenser...	0.000015
C2	Series aerial coupling ...	0.000005
C3	V1 pent. CG decoupling ...	0.1
C4	V1 SG decoupling ...	0.1
C5	V1 osc. CG condenser ...	0.0001
C6	AVC line decoupling ...	0.1
C7	V2 SG decoupling ...	0.1
C8	} IF by-pass condensers ... {	0.0001
C9		0.0001
C10		0.1
C11	AF coupling to V3 ...	0.1
C12	V3 AVC diode coupling ...	0.0001
C13	HT circuit by-pass ...	0.01
C14	IF by-pass condenser ...	0.0005
C15	AF coupling to V4 ...	0.01
C16	Fart tone corrector ...	0.0025
C17	Band-pass pri. tuning ...	—
C18	B-P pri. MW trimmer ...	—
C19	Band-pass sec. tuning ...	—
C20	B-P sec. MW trimmer ...	—
C21	Oscillator tuning ...	—
C22	Oscillator MW trimmer ...	—
C23	Oscillator LW trimmer ...	—
C24	1st IF trans. pri. tuning ...	—
C25	1st IF trans. sec. tuning ...	—
C26	2nd IF trans. pri. tuning ...	—
C27	2nd IF trans. sec. tuning ...	—
	Variable tone control ...	—

RESISTORS		Values (ohms)
R1	V1 pent. CG decoupling	66,000
R2	V1 SG's HT feed	110,000
R3	V1 oscillator stabiliser ...	1,100
R4	V1 osc. CG resistor ...	110,000
R5	V2 SG HT feed ...	110,000
R6	IF stopper ...	110,000
R7	V3 signal diode load; manual volume control	500,000
R8	V3 triode CG resistor ...	1,100,000
R9	Sensitivity control ...	280
R10	Part GB pot. divider ...	250*
R11	ABC line decoupling ...	1,100,000
R12	V3 anode load ...	51,000
R13	V3 AVC diode load ...	1,100,000
R14	V4 CG resistor ...	610,000
R15	Impedance limiter ...	16,000

\* May be 300 Ω.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial coupling coil ...	24.0
L2	} Band-pass primary coils {	2.3
L3		15.0
L4		2.3
L5	} Band-pass secondary coils {	15.0
L6		2.9
L7	Oscillator tuning coils ...	3.3
L8	Oscillator reaction coil ...	45.0
L9	} 1st IF trans. {	93.0
L10		93.0
L11	} 2nd IF trans. {	42.0
L12		42.0
L13	Speaker speech coil ...	1.2
T1	Output trans. { Pri. ...	850.0
	} Sec. ...	0.3
S1-S4	Waveband switches ...	—
S5	GB circuit switch ...	—
S6	HT circuit switch ...	—
S7	LT circuit switch ...	—

**CIRCUIT ALIGNMENT**

**IF Stages.**—When adjusting a primary trimmer, a 50,000 Ω resistor should be connected across the associated secondary, and when adjusting the secondary, the resistor should be connected across the primary.

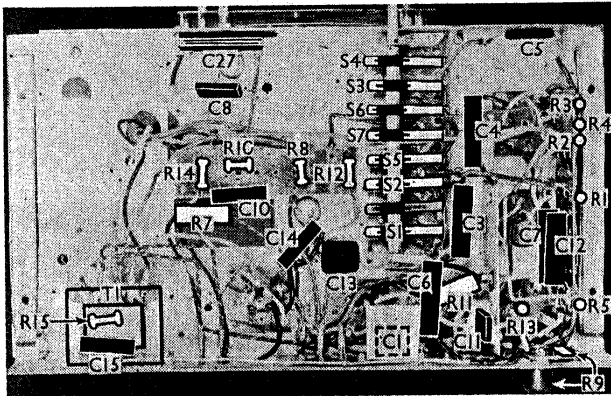
Connect signal generator leads via a 0.002 μF condenser to control grid (top cap) of V1 and chassis, removing existing cap connector, and connect a 500,000 Ω resistor between the control grid and chassis. Feed in a 127 kc/s (2,362.2 m) signal, and adjust C26, C25, C24 and C23 in that order for maximum output.

**RF and Oscillator Circuits.**—With the gang at maximum, the pointer should coincide with the two dotted index marks at top and bottom of the scale. Transfer signal generator leads to A1 and E sockets via a suitable dummy aerial.

**MW.**—Switch set to MW, and turn the gang to minimum. Feed in a 196 m (1,530 kc/s) signal, and adjust C21, C19 and C17 for maximum output.

**LW.**—Switch set to LW, tune to 1,300 m on scale, feed in a 1,300 m (231 kc/s) signal, and adjust C22 for maximum output.

The calibration should then be checked at several points on each band.



Under-chassis view. C1 is inside a screening box. R7 is seen, but it is actually mounted on the chassis deck.