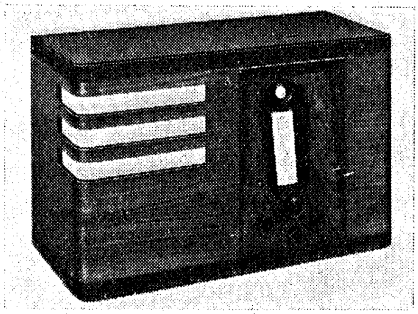
'TRADER' SERVICE SHEET

309

LISSEN 8319

4-VALVE AC SUPERHET



A TRIODE output valve and a cathode-ray tuning indicator are employed in the Lissen 8319 4-valve (plus rectifier) AC 3-band superhet, which is suitable for mains of 200-250 V, 40-100 C/S. Provision is made for the connection of both a gramophone pick-up and an extension speaker, and there are two alternative aerial sockets. The short-wave range covered by the receiver is 19-50 m.

A feature of the construction of the set is that there is a separate tuning scale for each band, and the operation of the wave-change switch automatically brings the appropriate scale into position behind the escutcheon.

CIRCUIT DESCRIPTION

Two alternative aerial input sockets **A1, A2.** Input from **A1** on MW and LW is via coupling coil **L1** to inductively coupled band-pass filter. Primary coils **L2, L3** are tuned by **C24**; secondaries **L5, L6** by **C28.** On SW, input from **A1** is via coupling condenser **C1** to single-tuned circuit **L4, C28.** From **A2** socket, input is fed into same circuits via potential divider **R1, R2** for the reception of local transmissions.

First valve (**V1, Ever Ready metallised A36B**) is a triode hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L7** (SW), **L8** (MW) and **L9** (LW) are tuned by **C29**; parallel trimming by **C30** (SW), **C31** (MW) and **C32** (LW); series tracking by **C33** (MW) and **C34** (LW). Reaction by coils **L10** (SW), **L11** (MW) and **L12** (LW).

Second valve (**V2, Ever Ready metallised A50P**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C35, L13, L14, C36,** and **C37, L15, L16, C38.** **Intermediate frequency 455KC/S.**

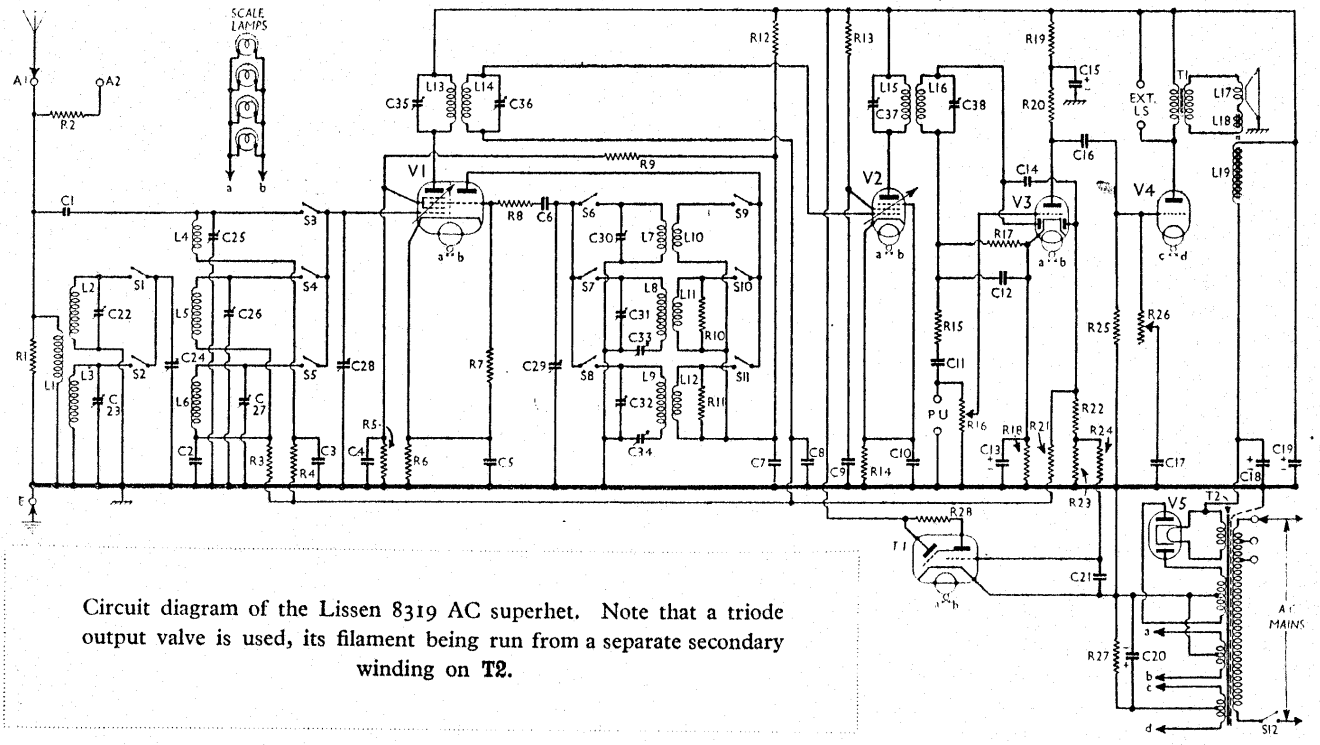
Diode second detector is part of double-diode triode valve (**V3, Ever Ready metallised A23A**). Audio frequency component in rectified output is developed across load resistance **R17** and passed via IF stopper **R15,** AF coupling condenser **C11** and manual volume control **R16** to CG of triode section, which operates as AF amplifier. Provision for connection of gramophone PU across **R16.**

Second diode of **V3,** fed from **L16** via **C14,** provides DC potentials which are developed across load resistances **R22, R23** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control.

Potential at junction of **R22, R23** is fed via decoupling circuit **R24, C21** to CG of tuning indicator (**TI, Ever Ready A39A**) to provide operating potential.

Resistance-capacity coupling by **R20, C16** and **R25** between **V3** triode and directly-heated triode output valve (**V4, Ever Ready S30D**). Variable tone control by **R26, C17** in grid circuit. Provision for connection of high impedance external speaker across primary of internal speaker input transformer **T1.** GB potential is obtained from drop along resistance **R27** between centre-tap of separate heater secondary winding on mains transformer **T2,** and chassis.

HT current is supplied by IHC full-wave rectifying valve (**V5, Ever Ready A11D**). Smoothing by speaker field **L19** and dry electrolytic condensers **C18, C19.**



Circuit diagram of the Lissen 8319 AC superhet. Note that a triode output valve is used, its filament being run from a separate secondary winding on **T2.**

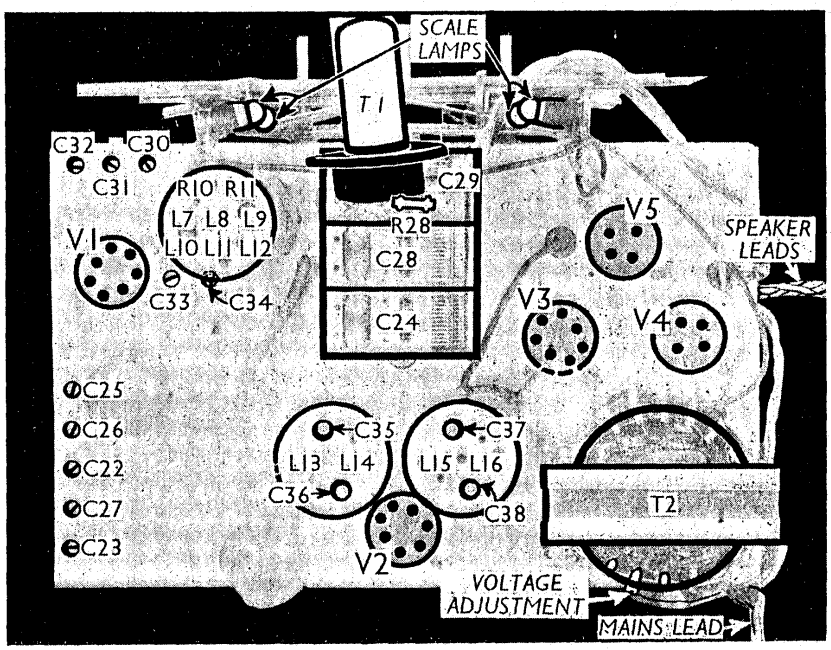
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	A2 aerial feed potentiometer	11,000
R2	A2 aerial feed potentiometer	110,000
R3	V1 hexode CG decoupling (MW and LW)	110,000
R4	V1 hex. CG decoupling (SW)	110,000
R5	Part V1 SG HT pot.	20,000
R6	V1 fixed GB resistance	150
R7	V1 osc. CG resistance	26,000
R8	V1 osc. CG stabiliser	200
R9	Part V1 SG HT pot.	5,000
R10	Osc. reaction MW damping	1,000
R11	Osc. reaction LW damping	2,000
R12	V1 SG and osc. anode HT feed	10,000
R13	V2 SG HT feed	25,000
R14	V2 fixed GB resistance	100
R15	IF stopper	110,000
R16	Manual volume control	500,000
R17	V3 signal diode load	510,000
R18	V3 GB and AVC delay res.	2,100
R19	V3 triode anode decoupling	5,100
R20	V3 triode anode load	50,000
R21	AVC line decoupling	110,000
R22	V3 AVC diode load resistances	110,000
R23	V3 AVC diode load resistances	510,000
R24	T1 CG feed resistance	510,000
R25	V4 CG resistance	260,000
R26	Variable tone control	250,000
R27	V4 GB resistance	600
R28	T1 anode HT feed	2,100,000

	CONDENSERS	Values (μF)
C1	Aerial SW coupling	0·00001
C2	V1 hexode CG decoupling (MW and LW)	0·1
C3	Aerial circuit SW tracker	0·01
C4	V1 SG decoupling	0·1
C5	V1 cathode by-pass	0·1
C6	V1 osc. CG condenser	0·0001
C7	V1 osc. anode decoupling	0·1
C8	V2 CG decoupling	0·1
C9	V2 SG decoupling	0·1
C10	V2 cathode by-pass	0·1
C11	AF coupling to V3 triode	0·05
C12	IF by-pass	0·0001
C13*	V3 cathode by-pass	50·0
C14	Coupling V3 AVC diode	0·00001
C15*	V3 triode anode decoupling	2·0
C16	V3 triode to V4 AF coupling	0·05
C17	Part of variable tone control	0·025
C18*	HT smoothing	8·0
C19*	HT smoothing	8·0
C20*	V4 cathode by-pass	20·0
C21	T1 CG decoupling	0·1
C22‡	Band-pass pri. MW trimmer	0·00004
C23‡	Band-pass pri. LW trimmer	0·0001
C24†	Band-pass primary tuning	0·00054
C25‡	Aerial circuit SW trimmer	0·00004
C26‡	Band-pass sec. MW trimmer	0·00004
C27‡	Band-pass sec. LW trimmer	0·0001
C28†	Band-pass secondary and SW aerial tuning	0·00054
C29†	Oscillator circuit tuning	0·00054
C30‡	Osc. circuit SW trimmer	0·00004
C31‡	Osc. circuit MW trimmer	0·00004
C32‡	Osc. circuit LW trimmer	0·0001
C33‡	Osc. circuit MW tracker	0·0006
C34‡	Osc. circuit LW tracker	0·0004
C35‡	1st IF trans. pri. tuning	—
C36‡	1st IF trans. sec. tuning	—
C37‡	2nd IF trans. pri. tuning	—
C38‡	2nd IF trans. sec. tuning	—

*Electrolytic. †Variable. ‡Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial MW and LW coupling	11·0
L2	Band-pass primary coils	2·6
L3	Band-pass primary coils	11·0
L4	Aerial SW tuning coil	Very low
L5	Band-pass secondary coils	2·5
L6	Band-pass secondary coils	11·0
L7	Osc. circuit SW tuning coil	Very low
L8	Osc. circuit MW tuning coil	1·8
L9	Osc. circuit LW tuning coil	5·0
L10	Oscillator SW reaction	0·3
L11	Oscillator MW reaction	6·25
L12	Oscillator LW reaction	8·3
L13	1st IF trans. Pri.	6·5
L14	1st IF trans. Sec.	6·5



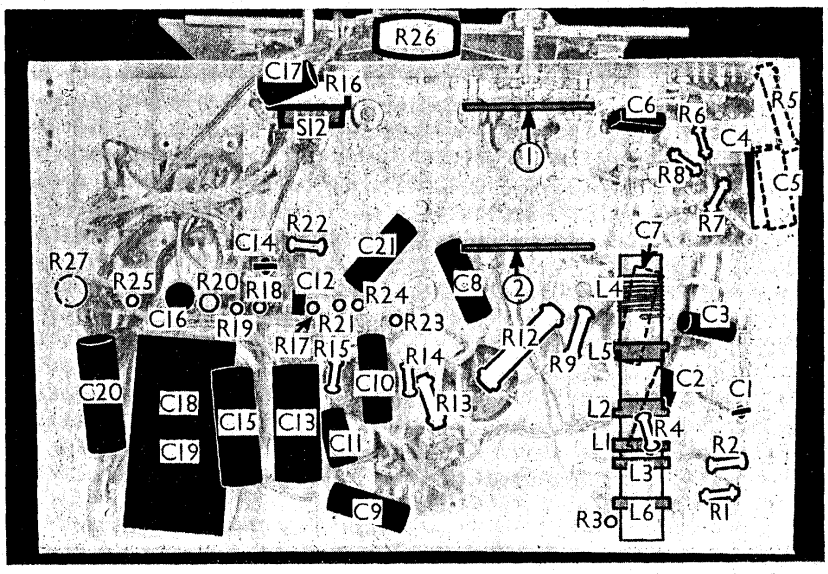
Plan view of the chassis. Note the various trimmers, many of which are reached through holes in the chassis.

	OTHER COMPONENTS (*Continued*)	Approx. Values (ohms)
L15	2nd IF trans. Pri.	6·5
L16	2nd IF trans. Sec.	6·5
L17	Speaker speech coil	2·0
L18	Hum neutralising coil	0·15
L19	Speaker field coil	1,500·0
T1	Speaker input trans. Pri.	210·0
T1	Speaker input trans. Sec.	0·4
T2	Mains Trans. Pri., total	24·0
T2	Mains Trans. V1-V3 heat. sec., total	0·1
T2	Mains Trans. V4 heat. sec., total	0·1
T2	Mains Trans. Rect. heat. sec., total	0·15
T2	Mains Trans. HT sec., total	350·0
S1-S11	Waveband switches	—
S12	Mains switch, ganged R16	—

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, first remove the four control knobs (pull off), taking care not to lose the springs, and the four bolts (with washers) holding the chassis to the bottom of the cabinet. Now remove the two round-head wood screws (with washers) holding the top of the scale assembly to the front of the cabinet, when by tilting the back upwards slightly, the chassis can be withdrawn to the extent of the tuning indicator and speaker leads, which is sufficient for normal purposes.

Continued overleaf



Under-chassis view. **L1-L6** are in a single unscreened unit, using a tubular former.

LISSEN 8319—*Continued*

When replacing, see that there is a washer on each of the chassis fixing bolts between the chassis and the rubber cushions and do not forget to replace the cleat for the tuning indicator leads on the right-hand screw holding the scale assembly.

If it is desired to free the chassis entirely, remove the tuning indicator (two nuts) and unsolder the speaker leads. *When replacing*, connect the speaker leads as follows, numbering the tags from left to right:—1, brown; 2, blue; 3 and 4 joined, red. The black lead goes to the tag on the bottom right-hand speaker fixing screw.

Removing Speaker.—To remove the speaker from the cabinet, remove the nuts from the four screws holding it to the sub-baffle. *When replacing*, see that the transformer is at the bottom, replace the soldering tag on the bottom right-hand fixing screw and connect the leads as above.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 232 V, using the 216-235 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 A36B	270 (Oscillator)	2·1	78	3·3
	115 (Oscillator)	7·5		
V2 A50P	270	9·2	180	3·3
V3 A23A	140	2·0	—	—
V4 S30D	258	50·0	—	—
V5 A11D	360†	—	—	—
T1 A39A	17 (Target)	0·1	—	—
	270 (Target)	0·4		

† Each anode, AC.

GENERAL NOTES

Switches.—S1-S11 are the wavechange switches, ganged in two rotary units beneath the chassis. The units are indicated in our under-chassis view, and shown in detail in the diagrams in col. 3. The table (col 2) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

S12 is the QMB mains switch, ganged with the volume control **R16.**

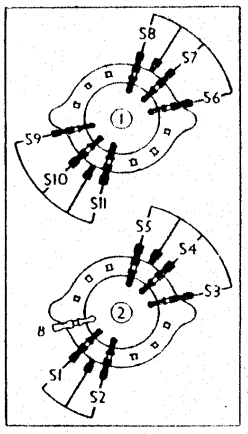
Coils.—**L1-L6** are in a tabular unscreened unit beneath the chassis. **L7-L12** and the IF transformers **L13, L14** and **L15, L16** are in three screened units on the chassis deck. Note that the **L7-L12** unit also contains the resistances **R10** and **R11.**

Scale Lamps.—These are four Ever Ready MES types rated at 4·5 V 0·3 A.

TABLE AND DIAGRAMS OF THE SWITCH UNITS

Switch	SW	MW	LW
S1	—	C	—
S2	—	—	C
S3	C	—	—
S4	—	C	—
S5	—	—	C
S6	C	—	—
S7	—	C	—
S8	—	—	C
S9	C	—	—
S10	—	C	—
S11	—	—	C

Switch diagrams, looking from the rear of the underside of the chassis.



External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (3,000 Ω) external speaker.

Condensers C18, C19.—These are two 8 μF dry electrolytics, in a single carton beneath the chassis. The black lead is the common negative. The yellow lead is the positive of **C18** and the red lead the positive of **C19.**

Trimmers.—All the trimmers except those of the IF transformers are adjusted through holes in the chassis deck.

V4 Heater Supply.—Note that the directly-heated triode (**V4**) has a filament run from a separate secondary on **T2,** lettered c, d on our circuit diagram.

CIRCUIT ALIGNMENT

IF Stages.—Short circuit the oscillator tuning coils by a wire across **C29.** Feed in a 455 KC/S signal between control grid (top cap) of **V1** and chassis, and adjust **C38, C37, C36** and **C35** in turn for maximum output, in the order given. Re-check adjustments, then remove the short on **C29.**

RF and Oscillator Stages.—With gang at maximum, pointer should cover the horizontal lines at the bottoms of the scales. Set **C33** approximately two-thirds in.

Switch set to MW, tune to 214 m on scale, feed a 214 m (1,400 KC/S) signal into the **A1** and **E** sockets, and adjust **C31, C26** and **C22** for maximum output.

Tune to 500 m on scale, feed in a 500 m (600 KC/S) signal and adjust **C33** for maximum output.

Return to 214 m and re-adjust **C31, C26** and **C22,** then return to 500 m, and if the pointer does not indicate 500 m when the signal is accurately tuned, re-adjust **C33** until it does. Check calibration at 214, 300 and 500 m.

Switch set to LW and set **C34** about one-third in. Tune to 1,200 m on scale, feed in a 1,200 m (250 KC/S) signal, and adjust **C32,** then **C27** and **C23,** for maximum output. Tune to 1,700 m on scale, feed in a 1,700 m (176·5 KC/S) signal, and adjust **C34** for maximum output. Return to 1,200 m and re-adjust **C32, C27** and **C23,** then re-adjust **C34** until the 1,700 m signal is accurately tuned at 1,700 m on the scale.

Switch set to SW and tune to 15 MC/S on scale. Screw **C30** right in, feed in a 15 MC/S (20 m) signal, and slowly unscrew **C30** until the *first* output peak is reached. It is important that the second peak is *not* used. Next adjust **C25** for maximum output.

Feed in a 7·5 MC/S (40 m) signal, tune it in, and adjust the end turn of **L4** (nearest the end of the coil former) for maximum output. Return to 15 MC/S, and re-adjust **C30** and **C25.**

MAINTENANCE PROBLEMS

A Switch Fault

A MURPHY B4 portable came in with the complaint that occasionally long waves were absolutely dead. The chassis was removed and the resistance of the frame aerial circuit was tested, which proved normal on both positions of the wave-change switch.

Upon testing the tuned RF circuit it was discovered that the long-wave coil was shorted out in both waveband positions of the switch. Close scrutiny of the switch unit revealed that one of the springy leaf contacts had cracked just where it was held by the ebonite insulation, the contacts thereby being in the S/C position all the time. A new leaf was fitted and all was well again.—R. A. COATES, WHITBY.

Incorrect Wiring

A MARCONI 561 receiver direct from the makers when tested was found to be weak on all wavebands, particularly SW2 and SW3.

The chassis—both radio and output—were removed, and the usual voltage tests, RF tests, etc., were carried out, but these proved more or less satisfactory.

After a great deal more testing, principally in the RF circuits, where I thought the fault really lay, I decided to check over the output stage, more or less for experience in this particular model. It was then, to my amazement, I found that the rectifier heater winding in the mains transformer, instead of going to the rectifier, was wired to the heater of the output valve, and the main heater winding wired to the rectifier.

After reversing these leads, the set was tested, and performance was quite up to standard.—R. NELSON, BELFAST.

Correction: In *Service Sheet* 307 (McMichael SMC) published last week, under the heading Dismantling the Set, page 111, col. 1, line 9, for "red," read "green," and line 11, for "green" read "red."