'TRADER' SERVICE SHEET 287

LISSEN 8318

3-BAND BATTERY SUPERHET

A SHORT-WAVE range of 19-50 m. is covered by the Lissen 8318 4-valve battery operated 3-band superhet, the valve arrangement comprising an octode frequency changer, a variable-mu hexode I.F. amplifier, a double-diode triode and a pentode output valve. Provision is made for both a gramophone pick-up and an extension speaker.

CIRCUIT DESCRIPTION

Two alternative aerial input sockets, **A1** via coupling coil **L1** to inductively coupled band-pass filter. Primary coils **L2** (M.W.) and **L3** (L.W.) are tuned by **C18**; secondary coils **L5** (M.W.) and **L6** (L.W.) are tuned by **C22.** On S.W. coupling is via condenser **C1** to single-tuned circuit **L4, C22.** From **A2** socket input is fed into same circuits via potentiometer **R1, R2** for the reception of powerful transmissions.

First valve (**V1, Ever Ready metallised K80B**) is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L7** (S.W.), **L9** (M.W.) and **L11** (L.W.) are tuned by **C23**; parallel trimming by **C24** (S.W.), **C25** (M.W.) and **C26** (L.W.); series tracking by **C27** (M.W.) and **C28** (L.W.). Reaction by coils **L8** (S.W.), **L10** (M.W.) and **L12** (L.W.).

Second valve (**V2, Ever Ready metallised K50N**) is a variable-mu hexode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C29, L13, L14, C30** and **C31, L15, L16, C32.**

Intermediate frequency 455KC/S.

Diode second detector is part of double diode triode valve (**V3, Ever Ready metallised K23B**). Audio frequency component in rectified output is developed across load resistance **R9** and passed via I.F. stopper **R10,** A.F. coupling condenser **C11** and manual volume control **R11** to C.G. of triode section, which operates as A.F. amplifier. Provision for connection of gramophone pick-up across **R11, C11.** I.F. filtering by **C9, C10, R10.**

Second diode of **V3,** fed via **C12** from **L16,** provides D.C. potentials which are developed across load resistances **R13, R14** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control.

Resistance-capacity coupling by **R12, C13** and **R16,** between **V3** triode and pentode output valve (**V4, Ever Ready K70B**). Fixed tone correction in anode circuit by **C14.** Provision for connection of external high impedance speaker across primary of internal speaker transformer **T1.**

R17 slowly discharges G.B. cells of H.T. battery at approximately the same rate as the H.T. section.

DISMANTLING THE SET

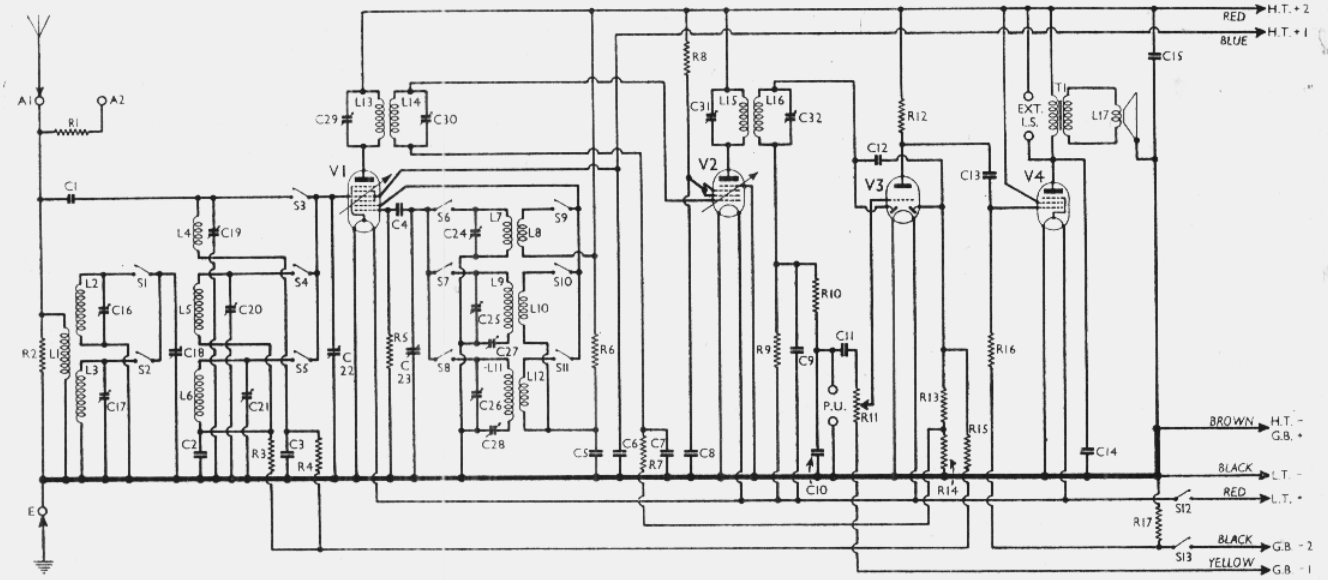
Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the three control knobs (pull off) and the four bolts (with washers) holding the chassis to the bottom of the cabinet. By tilting the back upwards slightly the chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes. *When replacing,* note that the knobs are marked so that they must be placed on the correct spindles.

To free the chassis entirely, unsolder the speaker leads, and *when replacing,* note that the black lead goes to the soldering tag on the bottom right-hand speaker fixing screw.

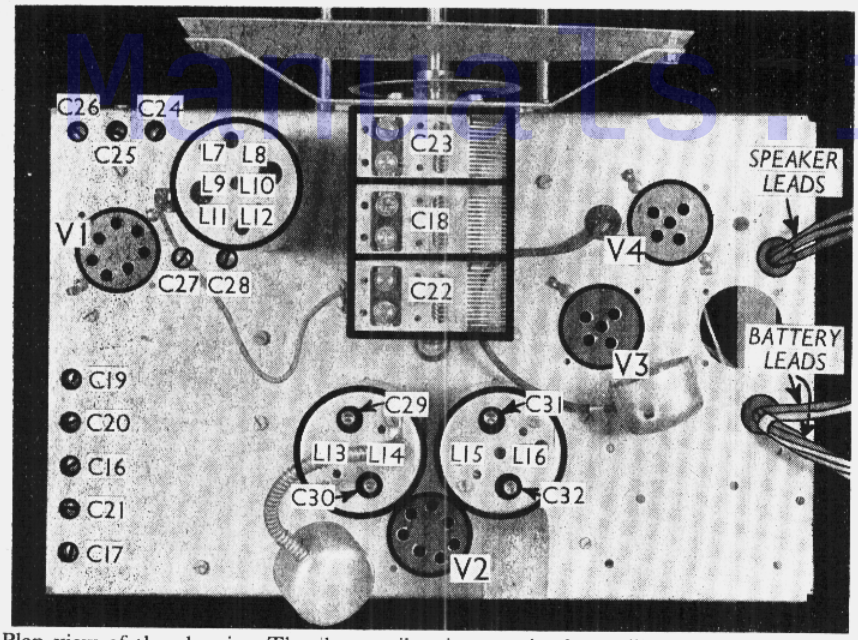
Removing Speaker.—To remove the speaker from the cabinet remove the nuts, lock washers and washers from the four screws holding it to the sub-baffle. *When replacing,* see that the transformer is at the bottom and do not forget to replace the earthing tag on the bottom right-hand screw.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	A2 aerial feed potentiometer	110,000
R2	A2 aerial feed potentiometer	11,000
R3	V1 pent. C.G. decoupling (M.W. and L.W.)	110,000
R4	V1 pent. C.G. decoupling (S.W.)	110,000
R5	V1 osc. C.G. resistance	16,000
R6	V1 osc. anode M.W. and L.W. H.T. feed	51,000
R7	V2 C.G. decoupling	110,000
R8	V2 S.G. H.T. feed	110,000
R9	V3 signal diode load	510,000
R10	I.F. stopper	51,000
R11	Manual volume control	500,000
R12	V3 triode anode load	51,000
R13	V3 A.V.C. diode load resistances	510,000
R14	V3 A.V.C. diode load resistances	260,000
R15	A.V.C. line decoupling	510,000
R16	V4 C.G. resistance	510,000
R17	G.B. battery discharge resistance	430



Circuit diagram of the Lissen 8318 3-band battery superhet. The arrangement used is quite straightforward. **R17** is a slow discharge resistance for the G.B. cells.



Plan view of the chassis. The three coil units contain the oscillator coils and the two I.F. transformers. Note the various trimmers adjustable through holes in the chassis deck.

	CONDENSERS	Values (μF)
C1	Aerial S.W. coupling condenser	0·00001
C2	V1 pent. C.G. decoupling (M.W. and L.W.)	0·1
C3	Aerial circuit S.W. tracker	0·01
C4	V1 osc. C.G. condenser	0·0001
C5	V1 osc. anode M.W. and L.W. R.F. by-pass	0·1
C6	V1 S.G. decoupling	0·1
C7	V2 C.G. decoupling	0·1
C8	V2 S.G. decoupling	0·1
C9	I.F. by-pass condensers	0·0002
C10		0·0001
C11	A.F. coupling to V3 triode	0·05
C12	Coupling to V3 A.V.C. diode	0·00001
C13	V3 triode to V4 A.F. coupling	0·05
C14	Fixed tone corrector	0·005
C15	H.T. reservoir condenser	2·0
C16‡	Band-pass pri. M.W. trimmer	0·00004
C17‡	Band-pass pri. L.W. trimmer	0·0001
C18†	Band-pass pri. tuning	0·00054
C19‡	Aerial circuit S.W. trimmer	0·00004
C20‡	Band-pass sec. M.W. trimmer	0·00004
C21‡	Band-pass sec. L.W. trimmer	0·0001
C22†	Band-pass sec. and S.W. aerial tuning	0·00054
C23†	Oscillator circuit tuning	0·00054
C24‡	Osc. circuit S.W. trimmer	0·00004
C25‡	Osc. circuit M.W. trimmer	0·00004
C26‡	Osc. circuit L.W. trimmer	0·0001
C27‡	Osc. circuit M.W. tracker	0·0006
C28‡	Osc. circuit L.W. tracker	0·0004
C29‡	1st I.F. trans. pri. tuning	—
C30‡	1st I.F. trans. sec. tuning	—
C31‡	2nd I.F. trans. pri. tuning	—
C32‡	2nd I.F. trans. sec. tuning	—

† Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial M.W. and L.W. coupling	12·0
L2	Band-pass primary coils	2·5
L3		12·0
L4	Aerial S.W. tuning coil	Very low
L5	Band-pass secondary coils	2·5
L6		12·0
L7	Osc. circuit S.W. tuning coil	Very low
L8	Oscillator S.W. reaction	0·35
L9	Osc. circuit M.W. tuning coil	1·8
L10	Oscillator M.W. reaction	7·5
L11	Osc. circuit L.W. tuning coil	5·3
L12	Oscillator L.W. reaction	17·5
L13	1st I.F. trans. Pri.	6·5
L14	Sec.	6·5

	OTHER COMPONENTS (Continued)	Approx. Values (ohms)
L15	2nd I.F. trans. Pri.	6·5
L16	Sec.	6·5
L17	Speaker speech coil	1·6
T1	Speaker input trans. Pri.	650·0
	Sec.	0·2
S1-S11	Waveband switches	—
S12	L.T. circuit switch	—
S13	G.B. circuit switch	—

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 3) are those measured in our receiver when it was operating with a new H.T. battery reading 139 V overall, on load. 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 K80B	134	0·6	48	2·1
	Oscillator			
	50	1·4		
V2 K50N	134	1·6	35	0·5
V3 K23B	85	0·8	—	—
V4 K70B	128	6·2	134	1·0

GENERAL NOTES

Switches.—**S1-S11** are the waveband switches, and **S12, S13** the battery circuit switches, ganged in two rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams on page IV, where they are as seen looking from the rear of the underside of the chassis.

The table (p. IV) gives the switch positions for the four control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

Coils.—**L1-L6** are in a tubular unscreened unit beneath the chassis, while **L7-L12** are in a screened unit on the chassis deck.

The I.F. transformers **L13, L14** and **L15, L16** are in two further screened units on the chassis deck, with their associated trimmers.

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (16,000 Ω) external speaker.

Trimmers and Trackers.—With the exception of those of the I.F. transformers, all the trimmers and trackers are adjustable through holes in the chassis deck. There are ten of these in all.

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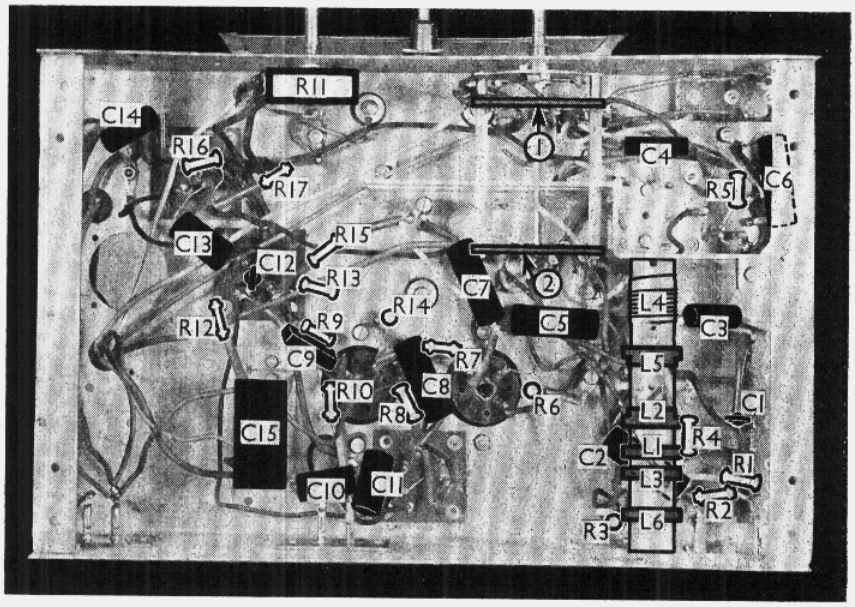


Under-chassis view. The coils **L1-L6** are in an unscreened tubular unit.

LISSEN 8318—*Continued*

Batteries.—L.T., Lissen 2V 24AH glass-cased cell, type LN2002. H.T. and G.B., Lissen super 136·5 V H.T. battery, type LN3049, tapped in 1·5 V steps from negative upwards to 12 V positive for G.B.

Battery Leads and Voltages.—The makers have marked the H.T. and G.B. plugs to indicate the sockets into which they have to be plugged. Thus that marked H.T.— (black) is actually the G.B.—2 tapping.

Black lead, spade tag, L.T. negative; red lead, spade tag, L.T. positive 2 V; black lead and plug, marked H.T.—(G.B.—2), in H.T. negative socket; yellow lead and plug, marked +3V (G.B.—1), in H.T. positive 3 V socket; brown lead and plug, marked +4½ V (H.T.—, G.B.+), in H.T. positive 4·5 V socket; blue lead and plug, marked +52 V (H.T.+1), in H.T. positive 52 V socket; red lead and plug, marked +136 V (H.T.+2), in H.T. positive 136·5 V socket.

CIRCUIT ALIGNMENT

I.F. Stages.—Short circuit **C23,** then connect signal generator to control grid (top cap) of **V1** and chassis and feed in a 455 KC/S signal. Adjust **C32, C31, C30** and **C29** in that order for maximum output. Re-check these settings, then remove short from **C23.**

R.F. and Oscillator Stages.—With gang at maximum, pointer should register with the horizontal line at the right-hand side of the scale. Connect signal generator to **A1** and **E** sockets.

M.W.—Set **C27** about two-thirds in and tune to 214 m. on scale. Feed in a 214 m. (1,400 KC/S) signal, and adjust **C25,** then **C20** and **C16,** for maximum output.

Tune to 500 m. on scale, feed in a 500 m. (600 KC/S) signal, and adjust **C27** for maximum output. Repeat adjustments on 214 m., then return to 500 m. and see that pointer is on 500 m. mark when receiving the signal; if it is not, re-adjust **C27** slightly. Check calibration at 214 m., 300 m. and 500 m.

L.W.—Set **C28** about one-third in, and tune to 1,200 m. on scale. Feed in a 1,200 m. (250 KC/S) signal and adjust **C26,** then **C21** and **C17,** for maximum output.

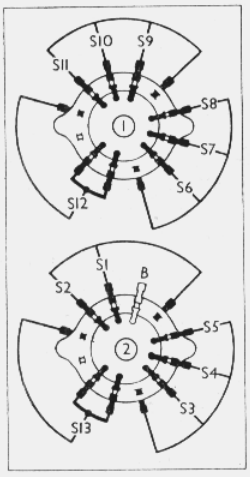
Tune to 1,700 m. on scale, feed in a 1,700 m. (176 KC/S) signal, and adjust **C28** for maximum output. Repeat adjustments at 1,200 m., then return to 1,700 m. and see that pointer is on 1,700 m. mark when receiving the signal; if it is not, re-adjust **C28** slightly. Check calibration at 1,200 m. and 1,700 m.

S.W.—Tune to 15 MC/S (20 m.) on scale and feed in a 15 MC/S signal. Screw **C24** fully in, then carefully unscrew until the *first* peak is reached (with **C24** at the higher capacity). Then adjust **C19** for maximum output.

Feed in a 7·5 MC/S (40 m.) signal, tune it in, and adjust end turn of **L4** to give maximum output. Return to 15 MC/S, and re-adjust **C24** and **C19** carefully.

SWITCH TABLE AND DIAGRAM

Switch	Off	S.W.	M.W.	L.W.
S1	—	—	C	—
S2	—	—	—	C
S3	—	C	—	—
S4	—	—	C	—
S5	—	—	—	C
S6	—	C	—	—
S7	—	—	C	—
S8	—	—	—	C
S9	—	C	—	—
S10	—	—	C	—
S11	—	—	—	C
S12	—	C	C	C
S13	—	C	C	C



Diagrams of the two switch units, as seen looking from the rear of the underside of the chassis. They include the battery switches (**S12, S13**).

SERVICE AS A CAREER

"Alter Ego" Replies

I ADMIRE the optimism that prompts my friend Mr. Hogben to draw from his premises exactly the opposite conclusion to mine about this service career business. He says (leaving out No. 2 about a service man being educated beyond the *mechanic* stage, on which we are agreed):—

1. The public have to be educated to pay fair prices for good guaranteed work.
3. The dealer has to be educated to sell service like any other commodity.

That's what I said many years ago. But after about 200,000 contacts with the general public, after having written articles, booklets, leaflets, tens of thousands of letters, and also mentioning the matter in one independent book, I had to give up my ideals and throw aside a cause that was hopeless.

In the higher spheres of the radio industry there are men who have worked, and do work, voluntarily in its cause; they can do so because they already *have* a career. Whether such men would consider the radio industry a sufficiently worthy cause to suffer martyrdom in its interests is a debatable matter.

If Mr. Hogben feels an inward prompting to the high calling of educating the public into paying for service, and the dealer in selling service, then far be it from me to dissuade him from a life of martyrdom and tears!

Turn now to Mr. Loader (January 15) who says: "there has not yet been suggested a satisfactory answer to the vexed question of the service engineer's status in the trade."

Satisfactory to whom? Presumably to the service engineer. There has been an *answer,* but certainly not a satisfactory one for him because, as I have said, there isn't any status. Even the Editor commented on two advertisements that appeared at the end of the *Wireless & Electrical Trader* two or three months ago. The first was for representatives, salary £300 per annum, *plus* commission, *plus* car allowance, *plus* expenses. Immediately underneath, the same firm advertised for a service engineer at a flat salary of £3 10s. a week. As the Editor said: "Comment is superfluous," and that, I suggest, is the status of the service engineer and an answer to Mr. Loader.

He also says that the service engineer can prove his worth to his employer by passing examinations. I have already said that the competent radio engineer shuns service like the plague because he knows that if he is competent then service will not pay him. A Doctor of Science, late Professor of Radio Technology in the University of Wigan (or somewhere) would get no more money as a service engineer because the public will not pay, or cannot afford to pay, for service.

Lastly, in this reply, the word *career* does not, I suggest, fit the case. The dictionary says that it means an occupation or a mode of living, but by usage it implies its second meaning—a *successful* profession; something that goes forward, careers onwards, widens and ends in security, the prize of effort and achievement, and that is not the fate of the radio service man. His is the dictionary career: a job of work; a living, and that is all.

Leaving Mr. Loader with his examinations, and Mr. Hogben with seeds that will germinate, maybe generations hence, let us get down to the present narrow issue.

You have to make the public *want* service, and *want* to pay for it. That can only be done by large bodies consistently advertising. But no large undertakings have any interest in service; they want to sell *new* sets, not service old ones, so we come back to my original article, which please see.

If any young man says to me: "I want to be a radio service engineer," I do him more good by putting him off. Three such men already have a career. One is a bank manager, the second in a well-known police force abroad, and the third in the force at home. The last was a very good service man, but he's better where he is.

ALTER EGO.