'TRADER' SERVICE SHEET NUMBER 159

LISSEN 8165

BATTERY ALL-WAVE RECEIVER

A SHORT-WAVE range of 18-54 metres is covered by the Lissen 8165 3-valve battery receiver. It has a pentode H.F. amplifier, a triode detector and a pentode output valve.

CIRCUIT DESCRIPTION

Two alternative aerial connections **A1** and **A2** to coupling coils **L2** (S.W.) and **L4** (M.W. and L.W.). **A1** connection is taken via Droitwich rejector circuit **L1, C1** (which can be short-circuited when not required) and series condenser **C2. A2** connection is taken via small fixed condenser **C3**.

Single-tuned input circuits comprising **L3, C12** (S.W.) and **L5, L6, C12** (M.W. and L.W.) precede variable-mu pentode H.F. amplifier (**V1, Ever Ready metallised K50M**). Gain control by variable potentiometer **R3** which varies G.B. applied.

Choke-fed tuned-grid coupling by **L7, C6, L8, C16** (S.W.), and **L7, C6, L11, L12, C16** (M.W. and L.W.) to triode detector valve (**V2, Ever Ready metallised K30C**), which operates on grid leak system with **C8** and **R6**. Reaction is applied from anode by coils **L9** (S.W.) and **L10** (M.W. and L.W.), and controlled by variable condensers **C14, C15,** which are in a dual unit. H.F. filtering by stopper **R7,** choke **L13** and condenser **C7** (M.W. and L.W.).

Series-fed transformer coupling by **T1** between detector valve and output pentode (**V3, Ever Ready K70D**). Tone correction in anode circuit by R.C. filter **R9, C10.** Two-point tone control by switch **S8** which short-circuits **R9.**

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 C.G. decoupling	110,000
R2	V1 S.G. H.T. feed	40,000
R3	V1 gain control	3,000
R4, R5	G.B. potential divider	430, 2,200
R6	V2 grid leak	2,100,000
R7	V2 anode H.F. stopper	5,000
R8	V2 anode decoupling	11,000
R9	Part of T.C. filter	31,000

	CONDENSERS	Values (μF)
C1	Droitwich rejector tuning	0·0003
C2, C3	Aerial series condensers	0·0003, Very low
C4	V1 C.G. decoupling	0·1
C5	V1 S.G. by-pass	0·1
C6	V1 to V2 H.F. coupling	0·00005
C7	V2 anode H.F. by-pass	0·0002
C8	V2 grid condenser	0·00005
C9	V2 anode decoupling	0·5
C10	Part of T.C. filter	0·01
C11‡	Aerial circuit S.W. trimmer	—
C12†	Aerial circuit tuning	—
C13‡	Aerial circuit M.W. trimmer	—
C14†	S.W. reaction control	—
C15†	M.W., L.W. reaction control	—
C16†	V2 grid circuit tuning	—
C17‡	V2 grid circuit M.W. trimmer	—

† Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Droitwich rejector coil	21·0
L2	Aerial S.W. coupling coil	0·7
L3	Aerial S.W. tuning coil	Very low
L4	Aerial M.W. and L.W. coupling	30·6
L5, L6	Aerial M.W. and L.W. tuning coils	2·5, 11·0
L7	V1 anode H.F. choke	560·0
L8	V2 C.G. circuit S.W. tuning coil	Very low
L9	S.W. reaction coil	0·6
L10	M.W. and L.W. reaction coil	0·7
L11, L12	V2 C.G. circuit M.W. and L.W. tuning coils	3·7, 12·5
L13	V2 anode H.F. choke	550·0
L14	Speaker speech coil	1·2
T1	Intervalve trans. Pri., Sec.	1,300·0, 14,000·0
T2	Output trans. Pri., Sec.	830·0, 0·3
S1-S7	Waveband switches	—
S8	Tone control switch	—
S9	H.T. circuit switch	—
S10	L.T. circuit switch	—
S11	G.B. circuit switch	—

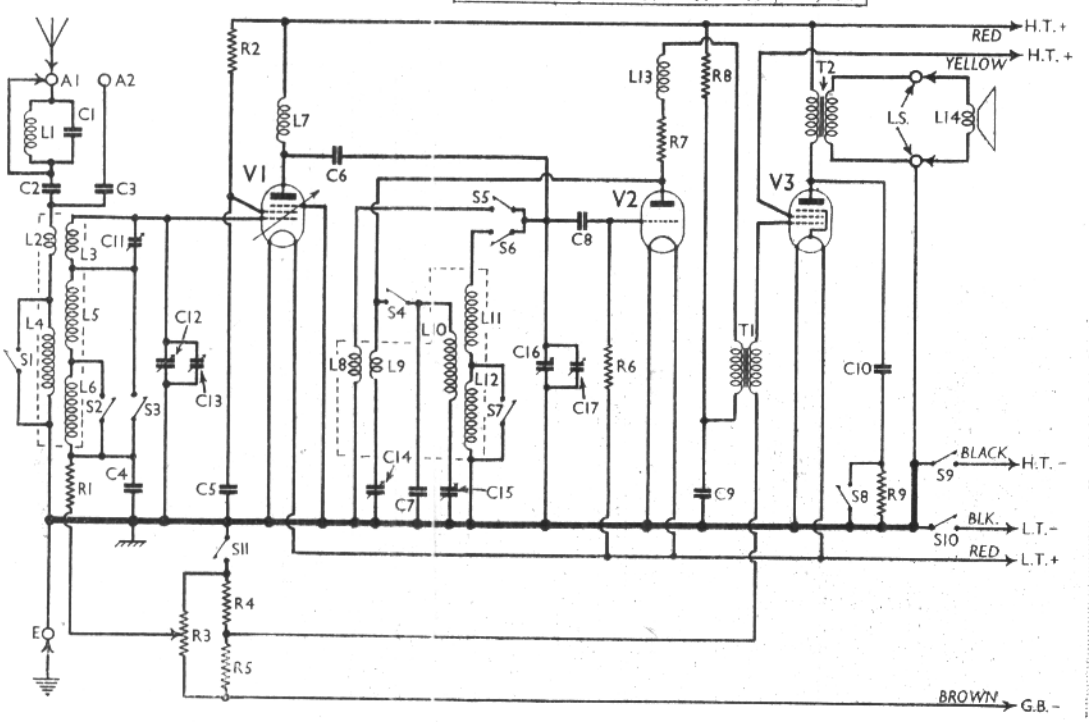
DISMANTLING THE SET

The cabinet is fitted with a detachable bottom, upon the removal of which (four round-head wood screws) access can be gained to most of the under-chassis components.

Removing Chassis.—If it is necessary to remove the chassis from the cabinet, remove the four knobs (pull off) and free the battery leads from the cleats on the side of the cabinet. Next remove the battery switch from the cabinet (two round-head wood screws) and the four bolts (with washers) holding the chassis to the bottom of the cabinet. The chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free the chassis entirely, unplug the speaker leads.

Removing Speaker.—To remove the speaker from the cabinet, remove the four screws (with spring washers and washers) holding it to the sub-baffle.

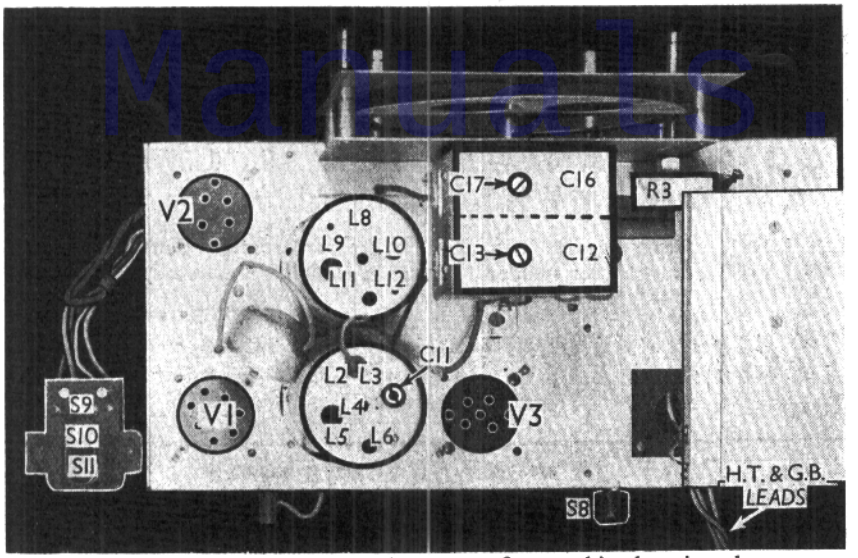


VALVE ANALYSIS

Valve voltages and currents given in the table (p. III). are those measured in our receiver when it was operating on a new H.T. battery reading 146 V. The volume control was at maximum, but the reaction control was at minimum, and there was no signal input.

Voltages were measured on the 1,200 V

By means of two sockets and a plug the aerial can be connected to the coupling coils in three different ways.



The components above the chassis are very few, as this plan view shows.

scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 K50M	130	1·9	110	0·5
V2 K30C	82	2·6	—	—
V3 K70D	125	5·6	130	0·9

GENERAL NOTES

Switches.—S1-S7 are the waveband switches, in a single unit beneath the chassis. One of the switches in the unit is blank. The table below gives the switch position for the various control settings, O indicating open, and C closed.

Switch	S.W.	M.W.	L.W.
S1	C	O	O
S2	C	C	O
S3	C	O	O
S4	O	C	C
S5	C	O	O
S6	O	C	C
S7	C	C	O

S8 is the rotary tone control switch at the rear of the chassis, closed when the knob is rotated anti-clockwise.

S9, S10, S11 are the H.T., L.T. and G.B. circuit switches, in a single unit mounted on the side of the cabinet. The mauve lead goes to the common contact (chassis). The thin black lead belongs to **S9,** the thick black lead to **S10** and the brown lead to **S11.**

Coils.—L1 is in two sections on a tubular former beneath the chassis. **L2-L6** and **L8-L12** are in two screened units on the chassis deck. The latter also contains the trimmer **C11. L7** and **L13** are two H.F. chokes beneath the chassis, **L7** being wound in five sections.

External Speaker.—A low resistance external speaker (1·5-2·5 O) may be connected at the rear of the chassis either alone, or, plugged into the socketed plugs of the internal speaker, in combination with the latter.

Batteries.—L.T., Lissen LN2014 2 V 20AH celluloid cased cell. H.T. and G.B., Lissen Super LN3049, 136·5 V (including G.B.).

Battery Leads and Voltages.—Black lead, spade tag, L.T. negative; red lead, spade tag, L.T. positive 2 V; black lead and plug, H.T. negative, in 12 V positive socket of battery; red lead and plug, H.T. positive 136·5 V; yellow lead and plug, H.T. positive, according to letter on **V3.** A, 135 V; B, 127·5 V; C, 120 V; D, 112·5 V. Brown lead and plug, G.B. negative, in negative socket of battery.

Condenser C3.—This consists of two twisted insulated wires, and has a very low capacity.

Aerial Arrangements.—Early models may not contain the Droitwich rejector **L1, C1,** or the red socketed plug emerging at the rear of the chassis near the aerial sockets. In this case the **A1** socket connects direct to **C2.** In the later models, with the rejector, the use of the **A1** socket brings into use the rejector, the socketed plug hanging loose. To cut out the rejector, plug the red socketed plug into **A1,** and the aerial connection into the socket in the plug. The **A2** socket is used normally.

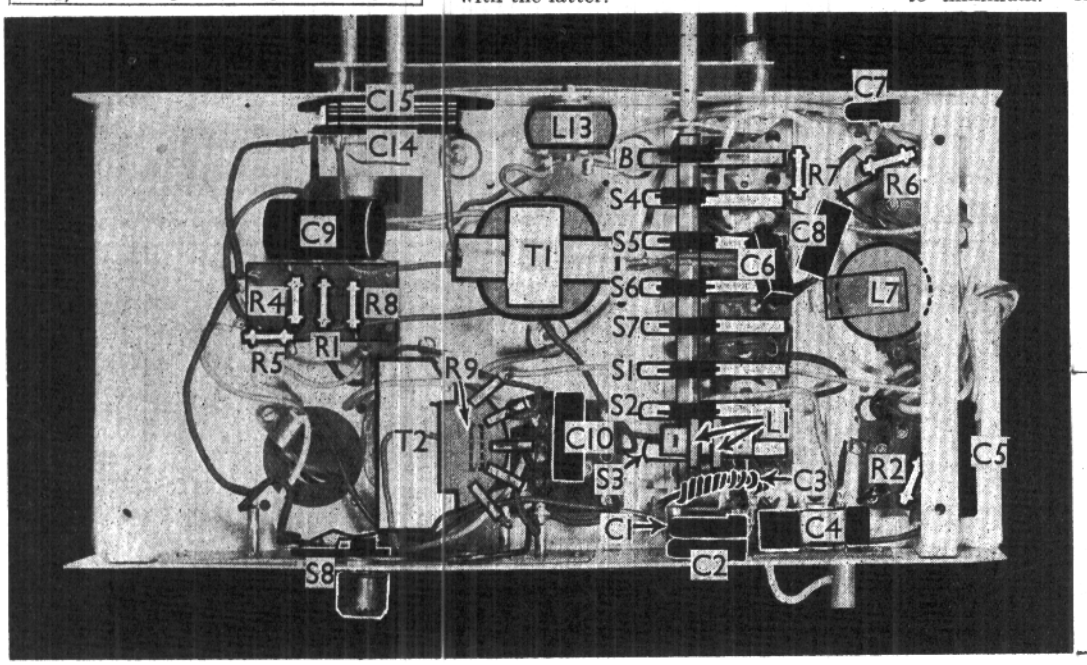
Reaction Condenser.—This is a dual unit, comprising **C14** and **C15, C14** alone being used on the S.W. band.

CIRCUIT ALIGNMENT

Rotate the gang until the pointers are at the higher wavelength ends of the scales. Push a rod through the hole in the side of the gang cover and against the vanes, and rock the gang until it can be felt that the rotors are fully in mesh. If the pointers do not coincide with the horizontal line, release the centre fixing screw, and adjust them to this position.

For alignment use the **A1** aerial socket. Rotate the gang until the pointers are at the lower wavelength ends of the scales. Switch receiver to M.W., turn volume control to maximum and reaction to minimum. Apply a 202 m. signal, and adjust **C13** and **C17** for maximum output.

Switch the receiver to S.W., apply an 18·2 m. signal, adjust reaction condenser until receiver is just short of oscillation, then adjust **C11** for maximum output. If necessary, re-adjust reaction condenser to keep the receiver below the oscillation point.



The various waveband switches are clearly marked in this view of the underside of the chassis. Note that one switch is not used.