'TRADER' SERVICE SHEET

243

LISSEN 8216

3-BAND A.C. RECEIVER

THE Lissen 8216 is a 3-valve (plus rectifier) A.C. 3-band receiver with a short wave range of 18.5-52 metres. There are two alternative aerial sockets, a tone control switch, and sockets for a gramophone pick-up and an extension speaker.

CIRCUIT DESCRIPTION

Two alternative aerial input sockets, **A1** via series condenser **C1** and **A2** via Droitwich rejector circuit **C2, L1** to coupling coils **L2** (S.W.) and **L3** (M.W. and L.W.). Single tuned circuit **L4, C20** (S.W.), **L5, C20** (M.W.) and **L6, C20** (L.W.), precede variable-mu pentode R.F. amplifier (**V1, Ever Ready metallised A50P**). Gain control by variable cathode resistance **R4** which varies G.B. applied and progressively shunts the aerial circuit on MW. and L.W.

Tuned anode coupling by **L7** (S.W.), **L8** (M.W.) and **L9** (L.W.) tuned by **C21,** between **V1** and R.F. pentode detector valve (**V2, Ever Ready metallised A50B**) which operates on the grid leak system with **C6** and **R6.** Reaction is applied from anode by coils **L10** (S.W.) and **L11** (M.W. and L.W.) and controlled by variable condenser **C23.** R.F. filtering in anode circuit by **C9, R11** and **C10.** Provision for connection of gramophone pick-up in grid circuit of **V2.**

Resistance-capacity coupling by **R10, C11,** and **R12,** via R.F. stopper **R13,** between **V2** and pentode output valve (**V3, Ever Ready A70D**). Tone correction in anode circuit by **C12** and high-note response control by condenser **C15** and two-position switch **S8.** Provision for connection of low impedance external speaker across secondary of output transformer **T1** by means of socketted internal speaker speech coil plugs at rear of chassis. If required these plugs may be removed and the external speaker plugs inserted in their place, thus muting the internal speaker.

H.T. current is supplied by an I.H.C. full-wave rectifying valve (**V4, Ever Ready A11D**). Smoothing is effected by speaker field coil **L14** and dry electrolytic condensers **C16** and **C17.**

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet (four round head wood screws).

Removing Chassis.—If it should prove necessary to remove the chassis from the cabinet, remove the four control knobs (pull off), taking care not to lose the springs and remove the cardboard washers covering the heads of the four bolts (with washers) holding the chassis to the bottom of the cabinet, and remove the bolts. Now remove the mains switch from the side of the cabinet (two round-head wood screws) and free the speaker field leads from the cleat holding them to the strip across the back of the cabinet.

The chassis can now be withdrawn to the extent of the speaker leads which should be sufficient for normal purposes. *When replacing,* do not forget the cardboard washers over the heads of the chassis fixing bolts.

To free the chassis entirely, unplug the speaker speech coil leads from the sockets at the back of the chassis and disconnect the field coil leads from the speaker (screw terminals). *When replacing,* connect the field coil leads to the two left-hand terminals.

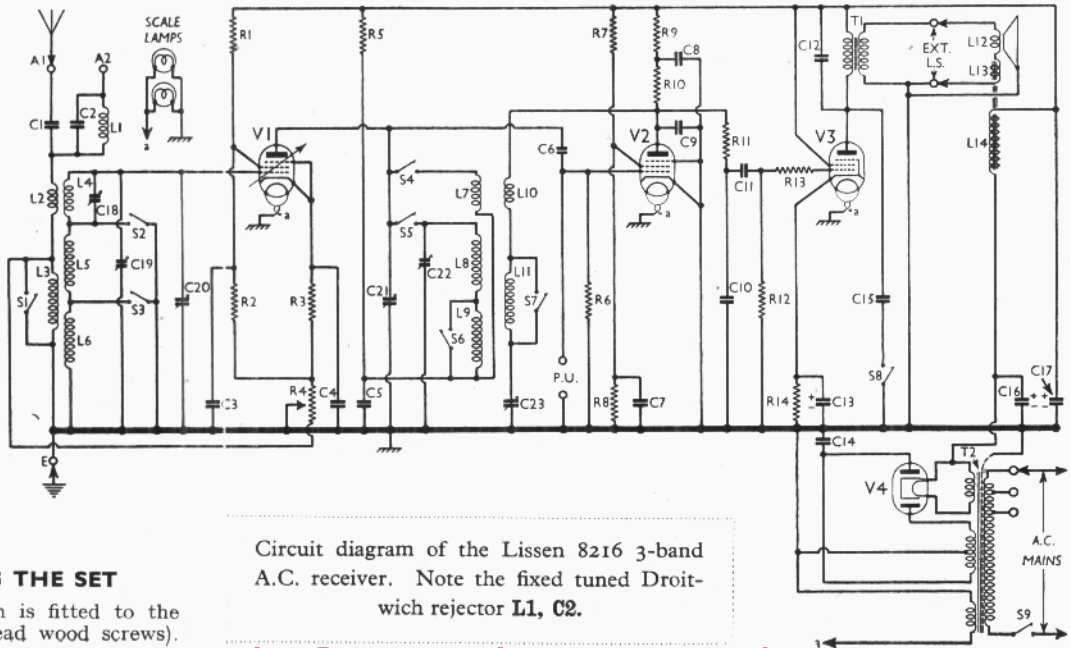
Removing Speaker.—To remove the speaker from the cabinet, remove the four cheese-head screws (with washers and lock washers) holding it to the sub-baffle. *When replacing,* see that the terminal panel is at the bottom and if the speech coil leads have been disconnected, connect the black lead to terminal 3 (numbering from left to right) and the red lead to the tag on the cleat holding the leads to the speaker frame.

COMPONENTS AND VALUES

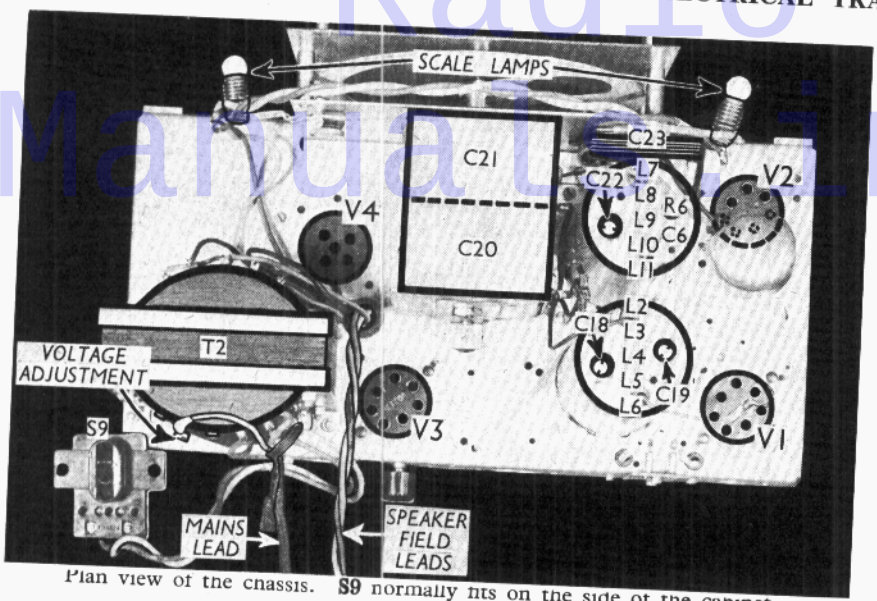
	RESISTANCES	Values (ohms)
R1	V1 S.G. H.T. potential divider	10,000
R2	V1 S.G. H.T. potential divider	110,000
R3	V1 fixed G.B. resistance	200
R4	V1 gain control	21,000
R5	V1 anode H.T. feed	5,000
R6	V2 grid leak	510,000
R7	V2 S.G. H.T. potential	50,000
R8	divider	30,000
R9	V2 anode decoupling	20,000
R10	V2 anode load resistance	40,000
R11	V2 anode R.F. stopper	21,000
R12	V3 C.G. resistance	260,000
R13	V3 C.G. R.F. stopper	26,000
R14	V3 G.B. resistance	200

	CONDENSERS	Values (μF)
C1	Aerial series condenser	0·0002
C2	Droitwich rejector tuning	0·0003
C3	V1 S.G. decoupling	0·1
C4	V1 cathode by-pass	0·1
C5	V1 anode decoupling	0·1
C6	V2 C.G. condenser	0·00005
C7	V2 S.G. decoupling	0·1
C8	V2 anode decoupling	0·5
C9	V2 anode R.F. by-passes	0·0002
C10		0·0005
C11	V2 to V3 A.F. coupling	0·1
C12	Fixed tone corrector	0·0025
C13*	V3 cathode by-pass	50·0
C14	V4 anode R.F. by-pass	0·01
C15	Tone control condenser	0·01
C16*	H.T. smoothing	8·0
C17*		16·0
C18‡	Aerial circuit S.W. trimmer	—
C19‡	Aerial circuit M.W. trimmer	—
C20†	Aerial circuit tuning	—
C21†	Anode circuit tuning	—
C22‡	Anode circuit M.W. trimmer	—
C23†	Reaction control	—

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Lissen 8216 3-band A.C. receiver. Note the fixed tuned Droitwich rejector **L1, C2.**



Plan view of the chassis. **S9** normally fits on the side of the cabinet.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Droitwich rejector coil	21·0
L2	Aerial S.W. coupling coil	0·8
L3	Aerial M.W. and L.W. coupling coil	39·2
L4	Aerial S.W. tuning coil	0·05
L5	Aerial M.W. tuning coil	2·15
L6	Aerial L.W. tuning coil	10·35
L7	Anode circuit S.W. tuning coil	Very low
L8	Anode circuit M.W. tuning coil	2·6
L9	Anode circuit L.W. tuning coil	12·5
L10	S.W. reaction coil	0·3
L11	M.W. and L.W. reaction coil	4·7
L12	Speaker speech coil	1·85
L13	Hum neutralising coil	0·25
L14	Speaker field coil	3,000·0
T1	Output trans. Pri.	780·0
	Output trans. Sec.	0·5
T2	Mains trans. Pri. total	48·0
	Mains trans. Heater sec.	0·12
	Mains trans. Rect. heat. sec.	0·3
	Mains trans. H.T. sec. total	365·0
S1-S7	Waveband switches	—
S8	Tone control switch	—
S9	Mains switch	—

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 3) are those measured in our receiver when it was operating on mains of 230 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 the reaction control was at minimum. There was no signal input.

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

If **V2** becomes unstable when measurements are being made in its anode circuit, as in our case, it can be stabilised by temporarily connecting a non-inductive condenser of about 0·1 μF from that electrode to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 A50P	200	9·1	195	3·7
V2 A50B	165	1·6	80	0·6
V3 A70D	225	31·0	250	5·1
V4 A11D	370†	—	—	—

† Each anode, A.C.

GENERAL NOTES

Switches.—**S1-S7** are the wavechange switches, ganged in a single unit beneath the chassis. All the switches are clearly marked in our under-chassis view. Note that one set of contacts is not used. The table below gives the switch positions for the three control settings, starting with S.W., and proceeding in a clockwise direction. A dash indicates open, and **C** closed.

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

S8 is a 2-position switch at the rear of the chassis for tone control. In the anti-clockwise position it is closed, and brings **C15** into circuit.

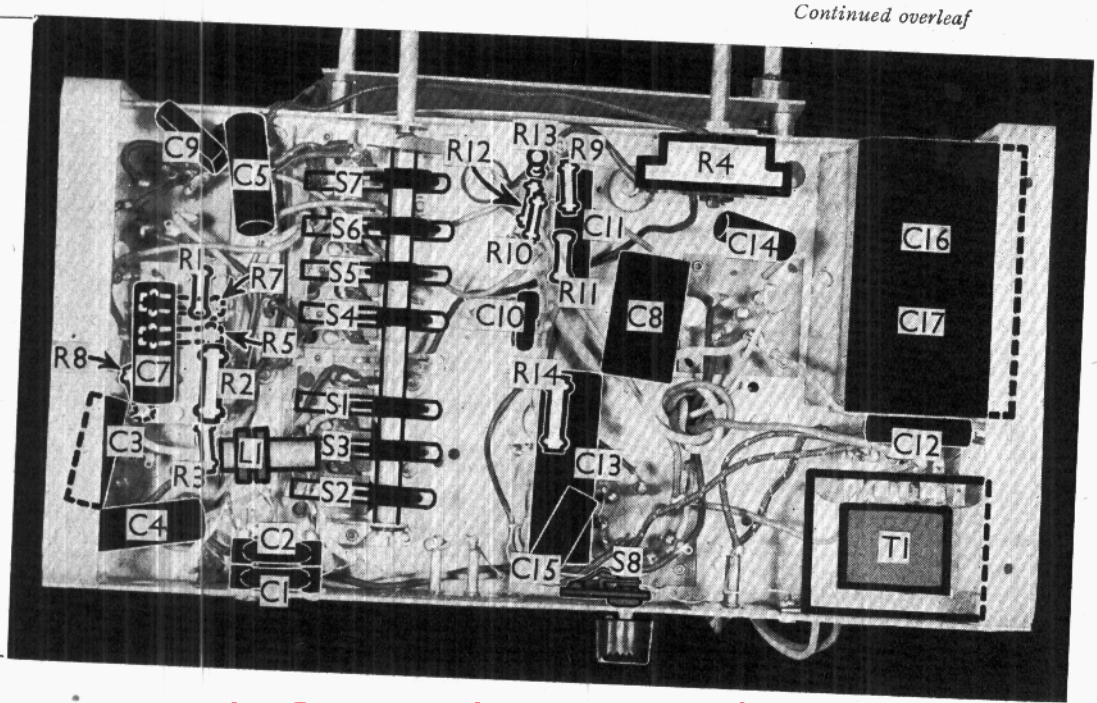
S9 is the Q.M.B. mains switch, in a moulded unit fitted to the side of the cabinet.

Coils.—**L1** is in two sections on a tubular former beneath the chassis. **L2-L6** and **L7-L11** are in two screened units on the chassis deck. The first of these contains the trimmers **C18, C19,** while the second contains, besides the trimmer **C22,** the components **C6** and **R6.**

Scale Lamps.—These are two Ever Ready M.E.S. types rated at 6.2 V, 0.3 A.

External Speaker.—Provision is made at the rear of the chassis for a low resistance (1·5-2·5 Ω) external speaker. For use with

Continued overleaf



Under-chassis view. All the switches are clearly marked. **S8** is used for tone control.

MAINTENANCE PROBLEMS

Hints Contributed by Service Engineers

Rattle Due to Output Valve

I WAS recently called in to service a McMichael 135 twin-speaker superhet, the complaint being that there was a rather bad speaker rattle. After examining and adjusting both speakers the fault continued and was still noticed on an extension speaker.

Ultimately the fault was traced to the AC/2Pen output valve which appeared to be gassy and to have secondary emission from the screening grid. A new valve completely cured the trouble.

Since this case I have had other sets with the same peculiar rattle which could be cured by replacing the output pentode. I certainly shall not start re-centring the speaker next time I experience this fault until I have checked the output valve. —J. WALL, YORK.

Two Speaker Faults in Philips 580A

TWO simultaneous faults in a Philips 580A receiver made location rather difficult. The speaker seemed dead, and investigation found all voltages present in the output stage, but no signals could be forced through with the service oscillator. Further tests of the speaker showed that the speech coil was o/c, which was located to a dry point between the coil and one of the leading out wires.

Upon reassembly, the set worked for a few seconds and then stopped dead, when again the speaker was deadly silent. This time the speech coil passed O.K. on test, but the voltage on the pentode anode seemed a few volts high, suggesting an s/c of the primary of the output transformer. An ohm-meter test gave a momentary reading of zero ohms which suddenly jumped up to 700 O, but no noticeable reason seemed evident for this at the time, when it was concluded that the test prods might have been accidently short circuited.

The set was again tested, and this time worked, but with sharp percussions accompanying the programme, and at the same time, a slight "flashing across" could be seen on a portion of the bobbin of the output transformer. Close scrutiny showed that one turn of the primary had strayed from position and was laying over one of the leading out strips. Evidently the wire occasionally made a complete s/c, thus completely blotting out all signals, while at other times was in such close proximity to the other end of the winding, that large peaks were able to bridge the minute gap, causing the severe crashes in the speaker.—R. A. COATES, WHITBY.

Instability in McMichael 135

A McMICHAEL 135 A.C. was brought in for service, and the customer complained that sometimes, especially on loud bass passages, the set would burst into a violent howl. All valves were replaced and all joints resoldered, while all points connected to chassis were checked for high resistance, but it was all of no avail. Almost in despair I tried again, and quite by accident I shorted out the R.F. choke which is wound over the V1 pentode anode decoupling condenser.

This brought the set back to normal, but as soon as the choke was put into circuit again, back came the trouble. By experiment I found that by separating the choke from the condenser the set became normal again. After replacing the condenser the set has been normal in every way. But I still have found no solution to this problem, as the condenser in question has been used as a replacement in another set and is working perfectly. —F. J. KETLER, ILFORD.

[NOTE.—Possibly the original condenser was sufficiently inductive to produce coupling effects, or it may have been a non-inductive type with its outer foil connected to the high potential end of the circuit instead of to cathode of V1. —TECH. ED.]

Filter Condenser Fault

AFTER having a Pye Q/AC3 for about three weeks a customer complained that volume had dropped by about 50 per cent. and that the set was slightly distorted on local stations.

All voltages and currents were normal, all valves were checked and found O.K., except the output valve, which was slightly below standard. Replacing this improved matters very little.

On re-checking all components a very high resistance leak was discovered across the condenser forming part of the heterodyne filter across the speaker transformer primary. This condenser was replaced and that brought the set back to normal.—F. J. KETLER, ILFORD.

Faulty Soldering

A MARCONI 346 was brought in for service with complaints that it "whistled on all stations."

When put on test it was found that sensitivity was very low on M.W. and L.W., and all signals were accompanied by continuous oscillation. The S.W. bands were violently unstable and no signals could be obtained. Valves, voltages and currents, and trimming were found to be O.K., and it was only after a long period of checking that the fault was found. The control grid of the MHD4 is taken to H.T. negative via a resistor which is mounted on a panel at the rear of the chassis.

The common connection from this panel is formed by passing the lead from an A.V.C. decoupling condenser through a lug on the chassis. The wire had been passed through this and soldered. The joint looked satisfactory, but actually did not make a good connection. When this joint was re-made the set regained its old performance. The queer part of it was that the operating conditions of the MHD4 were almost unaffected.—A. BLAKELEY, DEWSBURY.

Shorting G.B. Lead

A call was made to a Marconi 3-valve set which was only a few weeks old. A check-up showed that the H.T. battery was run-down. The cause was found to be a short between the pentode G.B. lead and chassis, and when the chassis was removed it was found that the short had cleared. The G.B. lead had been trapped, and the insulation scraped off by the chassis bolt. This fault had evidently been caused in the factory and had passed out as O.K. What the customer said about factory tests, when he found the battery must be renewed, was *not* complimentary.—A. BLAKELEY, DEWSBURY.

LISSEN 8216—*Continued*

the internal speaker, it should be plugged into the socketed plugs of the latter; for use alone, the internal speaker plugs should be removed, and those of the external speaker substituted.

Condensers C16, C17.—These are two dry electrolytics in a single carton beneath the chassis, with a common negative (black) lead. The yellow lead is the positive of **C16** (8 μF) and the red the positive of **C17** (16 μF).

Aerial Connections.—There are two aerial sockets, and the use of **A2** brings into action the fixed-tuned Droitwich rejector, **L1, C2.**

Mains Transformer T2.—This has an extra winding which is not used in this set. The two tags belonging to it (next to those of the heater winding) are blank.

CIRCUIT ALIGNMENT

Rotate the gang until the pointers are at the higher wavelength ends of the scales. Push a flat ended rod against the vanes, which are accessible from the open side of the gang, at the same time rocking the vanes of the rotor until it can be felt that they are fully in mesh. If the pointers do not coincide with the horizontal line dividing the scale, release the centre fixing screw, and adjust them to this position.

Rotate the gang until the pointers are at the lower wavelength ends of the scales, and switch the set to M.W. Turn the volume control to maximum, and reaction to minimum. Set the pointer to minimum wavelength.

Connect signal generator to **A1** and **E** sockets, feed in a 202 m. signal and adjust **C19** and **C22** in turn for maximum output.

Switch the receiver to S.W., set pointer to 16 MC/S on the scale, feed in a 16 MC/S signal, and adjust reaction until the receiver is just short of oscillation, with the volume control at maximum. Now adjust **C18** for maximum output, rocking the gang slightly for optimum results, and if necessary re-adjusting reaction to keep the receiver just short of oscillation.