SERVICE ENGINEER

LISSEN 8169 BATTERY FOUR SUPERHET

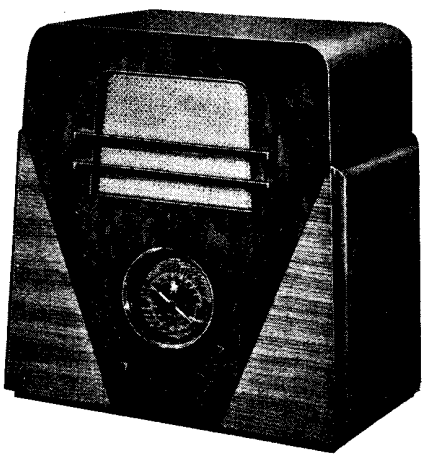
CIRCUIT.—A four-valve battery superhet for operation on the usual medium and long wavelengths.

Aerial signals are fed through an inductively coupled band-pass filter to the grid of V1, an octode frequency changer.

Coupling to V2, an H.F. pentode, is through an I.F. transformer tuned to 127 kc., and to V3, a double diode triode, through a second I.F. transformer.

One diode of V3 is used for demodulation and the other to supply A.V.C. bias to the preceding valves in the orthodox manner.

The L.F. output of V3 is passed to the



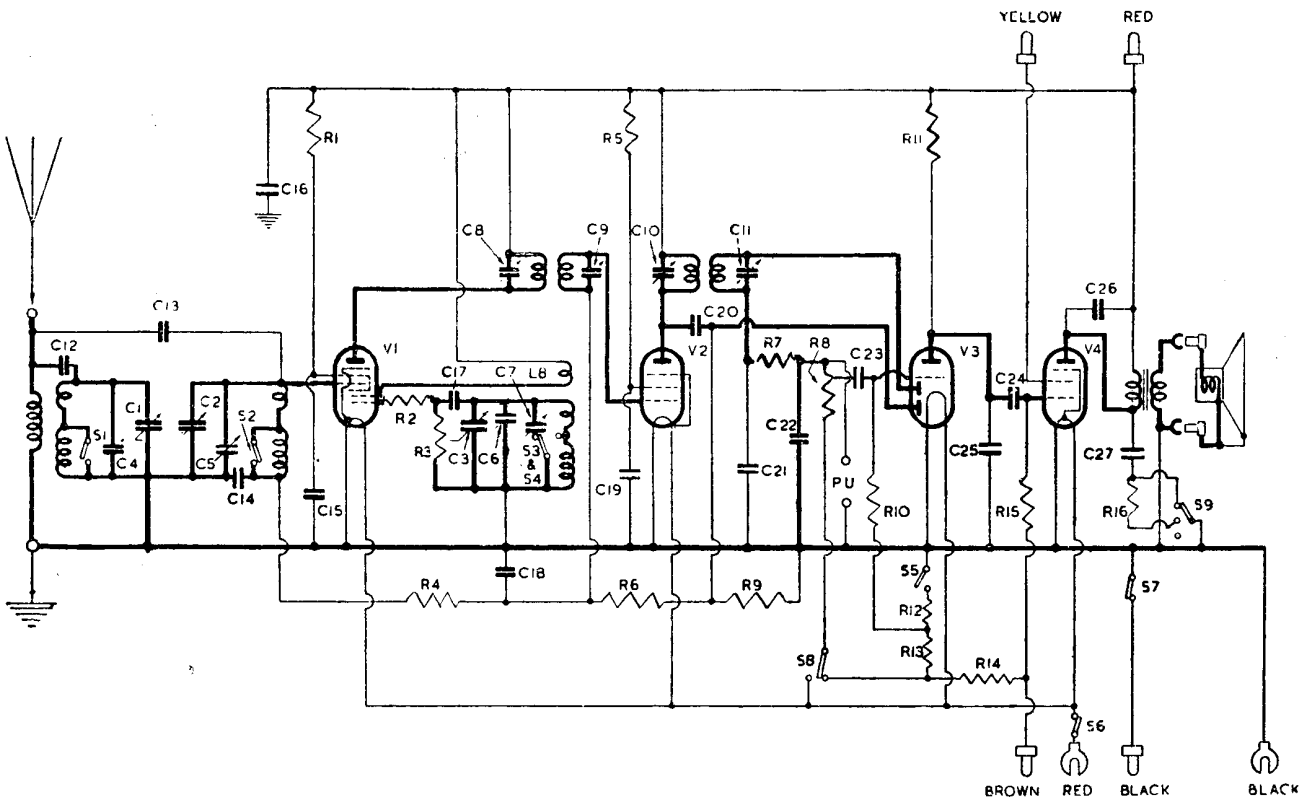
The Lissen Model 8169 four-valve battery superhet.

RESISTANCES

R.	Purpose.	Ohms.
1	V1 screen decoupling ..	110,000
2	V1 osc. grid potr.	1,100
3	V1 osc. grid potr.	110,000
4	V1 A.V.C. decoupling ..	1,100
5	V2 screen decoupling ..	110,000
6	V2 A.V.C. decoupling ..	1.1 meg
7	H.F. filter	100,000
8	Volume control	.5 meg
9	A.V.C. diode load	1.1 meg
10	V3 grid leak	1.1 meg
11	V3 anode load	.51,000
12	Bias pot.	100
13	Bias pot.	150
14	Bias pot.	250
15	V4 grid leak	510,000
16	Tone control	21,000

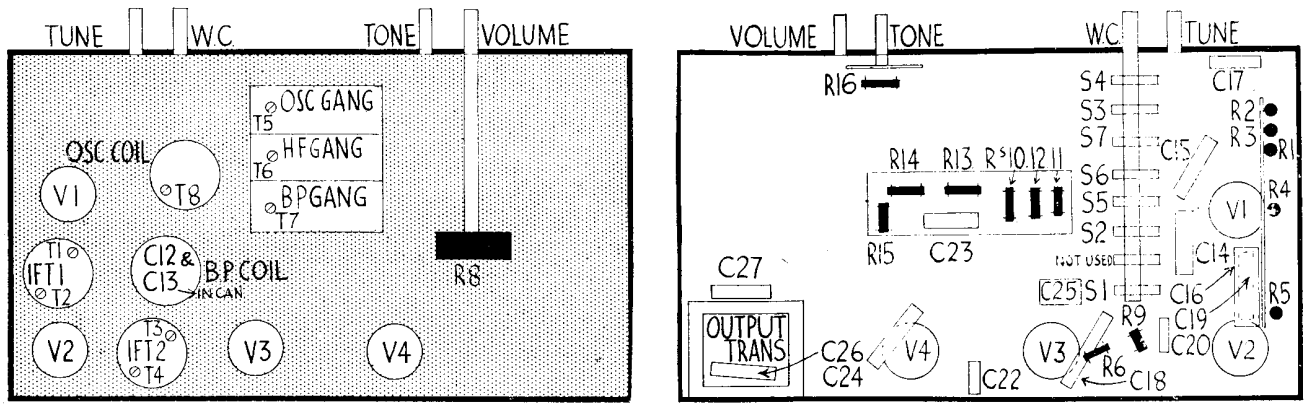
CONDENSERS

C.	Purpose.	Mfd.
12	Aerial coupling	—
13	Second channel	—
14	V1 A.V.C. decoupling ..	.1
15	V1 screen decoupling ..	.1
16	H.T. shunt	.25
17	V1 osc. grid	.0001
18	V2 A.V.C. decoupling ..	.1
19	V2 screen decoupling ..	.1
20	H.F. coupling..	.0001
21	H.F. by-pass	.0001
22	H.F. by-pass	.0001
23	V3 grid	.01
24	L.F. coupling	.01
25	H.F. by-pass	.0005
26	Pentode compensating ..	.001
27	Tone control	.01



An octode frequency changer, an I.F. amplifier, a double diode triode and an output pentode are utilised in the 8169. A quieting bias may be applied to the demodulation diode of V3 and is switch-controlled.

LISSEN 8169 BATTERY SUPERHET FOUR (Cont.)



Resistors are in solid black and condensers in outline in these chassis diagrams of the 8169. That on the left shows the top and that on the right the underside.

output pentode, V4, through a coupling condenser, C24, and to the permanent-magnet speaker through a matching transformer. V4 is tone controlled by C27 and R16.

A quieting bias is applied to the demodulator diode of V3, and this may be removed by means of a switch situated on the back of the chassis.

H.T. and grid bias are obtained from a combined 136.5-volt battery, and L.T. from an accumulator.

Special Notes.—The speaker supplied with the receiver has a speech coil impedance of 1.2 ohms, so that if it is desired to operate an extension speaker, this should have a similar speech coil impedance and should be connected on the secondary of the output transformer.

Exposing Chassis.—A false bottom is fitted to this cabinet, held in place by four wood screws, so that to obtain access to the underside of the chassis it is only necessary to remove the plate.

This plate is of metal and forms part of the screening, so that when replacing it care should be taken to see that the bare metal corners are uppermost and make good contact with the copper strip at one corner of the cabinet base.

To completely remove the chassis, procedure is as follows. Remove the four knobs from the front of the cabinet (spring clips), four bolts from underneath the cabinet, and free the speaker leads from the sockets on the back of the chassis; the chassis will then be free.

ALIGNMENT NOTES

I.F. Circuits.—Connect a modulated oscillator tuned to 127 kc. to the grid of V1 through a .002-mfd. condenser and to the chassis; the grid lead is first removed and in its place a .5-meg. resistance is connected, the free end of the resistor going to the chassis. Connect an output meter across the speaker terminals and trim T4, T3 T2 and T1 for maximum reading.

During these adjustments a 2-mfd. condenser should be connected between the oscillator anode and the chassis to stop the valve from oscillating. While adjusting the one winding of either transformers a 50,000-ohm resistance should be connected across the other winding.

Medium Waves.—Inject and tune in a signal of 196 metres and trim T5, T6 and T7 for maximum reading on meter.

Long Waves.—Inject and tune in a signal of 1,300 metres and trim T8 for maximum reading.

VALVE READINGS

No signal. Noise suppressor switch in. New batteries.

V.	Type.	Electrode.	Volts.	M/a.
	All Ever Ready.			
1	K80A (7) Met.	Anode ..	132	.3
		Screen ..	55	.6
		Osc. anode	132	1.
2	K50M (7) Met.	Anode ..	132	1.
		Screen ..	95	.3
3	K23B (5) Met.	Anode ..	92	.8
4	K70B (5) ..	Anode ..	132	4.
		Screen ..		1.2

Some Probable Causes of Weak Signals

IF a receiver provides only weak signals and yet all voltages have been found to be normal, what are the possible causes for which an engineer should search?

When signals are weak over only a part of a tuning range, it is fairly safe to say that the reason is that either the H.F. or oscillator circuits are out of trim. This fault may also result in a falling off of quality with signal strength.

Blind Spots

Other possible causes do exist, and if the alignment has been checked these must be considered. The aerial system may be "blind" to certain frequencies, or the oscillator circuit may be functioning less effectively at these wavelengths. Provided the set has worked satisfactorily in the past, changing the oscillator or mixer valve should remedy the latter defect. It should be ascertained that any aerial trimmers or filters are properly adjusted.

It may be that the gang condenser has developed a defect which comes into effect at certain positions of the rotor.

Misalignment

When a set gives poor signals on certain wavebands (and not parts of wavebands), the trouble is most probably due to either misalignment on the particular waveband or to faulty or dirty wave-change switch contacts. Defective coupling coils brought into circuit on that waveband will have the same effect.

If the trouble occurs on short waves, it should be noted whether the image suppressor circuits are shunted out, as—in most cases—they should be. Again, defective by-pass condensers become more evident at high frequencies.

SMOOTH REACTION

IN short-wave receivers of the straight type smooth control of reaction is essential for the reception of distant stations. One factor having considerable effect on reaction is the detector valve. As a rule, control is smoothest with a valve which has only average amplification working with a fairly low anode voltage.

A high impedance high-slope valve with high anode voltage, of course, gives greater L.F. amplification, but this gain is more than off-set if the reaction is sudden and "ploppy."

Threshold howl, which sometimes occurs just before the set is adjusted to the proper reaction point, is most common when there is an inductive load such as a transformer in the anode circuit of the detector. A remedy to try is the connection of a resistance of about 15,000 ohms across the primary.

Another point affecting reaction is that H.F. currents should be kept out of the L.F. circuits. Proper H.F. filtering in the detector anode circuit is therefore advisable.