BUSH SB4

Four-valve, two-waveband battery superhet with band-pass aerial tuning circuits. Sockets are provided for a pick-up and external loud-speaker. Marketed by Bush Radio, Ltd., Power Road, Chiswick, London, W4.

THE aerial input is to L1(MW) and L2(LW), the aerial coupling coils for the inductively coupled band-pass circuit in which L3 and L7 are the MW coils and L4, L8 the LW coils, tuned by VC1, VC2 of the ganged condenser. L5 and L6 are the band-pass coupling coils.

On MW, L9 gives image suppression and switch S2 brings R1 into circuit for local-distance signal strength control. The wave-change S1 contacts A, B, C, D, E, F and F are ganged.

From the band-pass circuit the signal is applied to the control grid of the octode frequency changer V1. The grid circuit is returned to the automatic volume control line for biasing.

The oscillator circuit employs tuned grid coils L10(MW), L11(LW) tuned by VC3 section of the ganged condenser, with reaction coils L12, L13 in the oscillator anode circuit. These are fed from the high tension line through R3, which also feeds the screening grid of V2. C5 is the decoupling condenser for R3, and R2, C2 form the oscillator grid leak and condenser.

The intermediate frequency transformer L14, L15 passes the signal through the grid stopper R18 to the grid of V2, which is also AVC controlled.

The anode potential of V2 is supplied through R6, decoupled by C8, and a second IF transformer L16, L17 feeds the signal diode of the double-diode-triode V3. The secondary transformer circuit incorporates two resistances R7 and VR1, decoupled by C11. R7 and C11 are IF filter components, and VR1 the load resistance and volume control.

The audio frequency signal is coupled *via* the slider of the volume control and C13 to the grid of

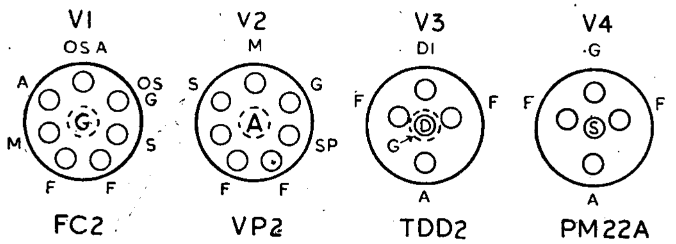
Continued overleaf

VALVE READINGS

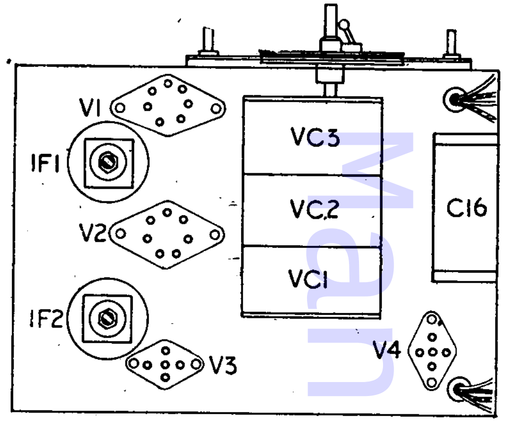
No signal input and measured with a 1,000 o-p-voltmeter.

V.	*Type.*	*Electrode.*	*Volts.*	*Ma.*
1	Mullard FC2	Anode	130	.6
		Screen	50	.8
		Osc. anode	120	.45
2	Mullard VP2	Anode	105	2.15
		Screen	120	1.4
3	Mullard TDD2	Anode	100	1.9
4	Mullard PM22A	Anode	140	2.1
		Screen	80	.45

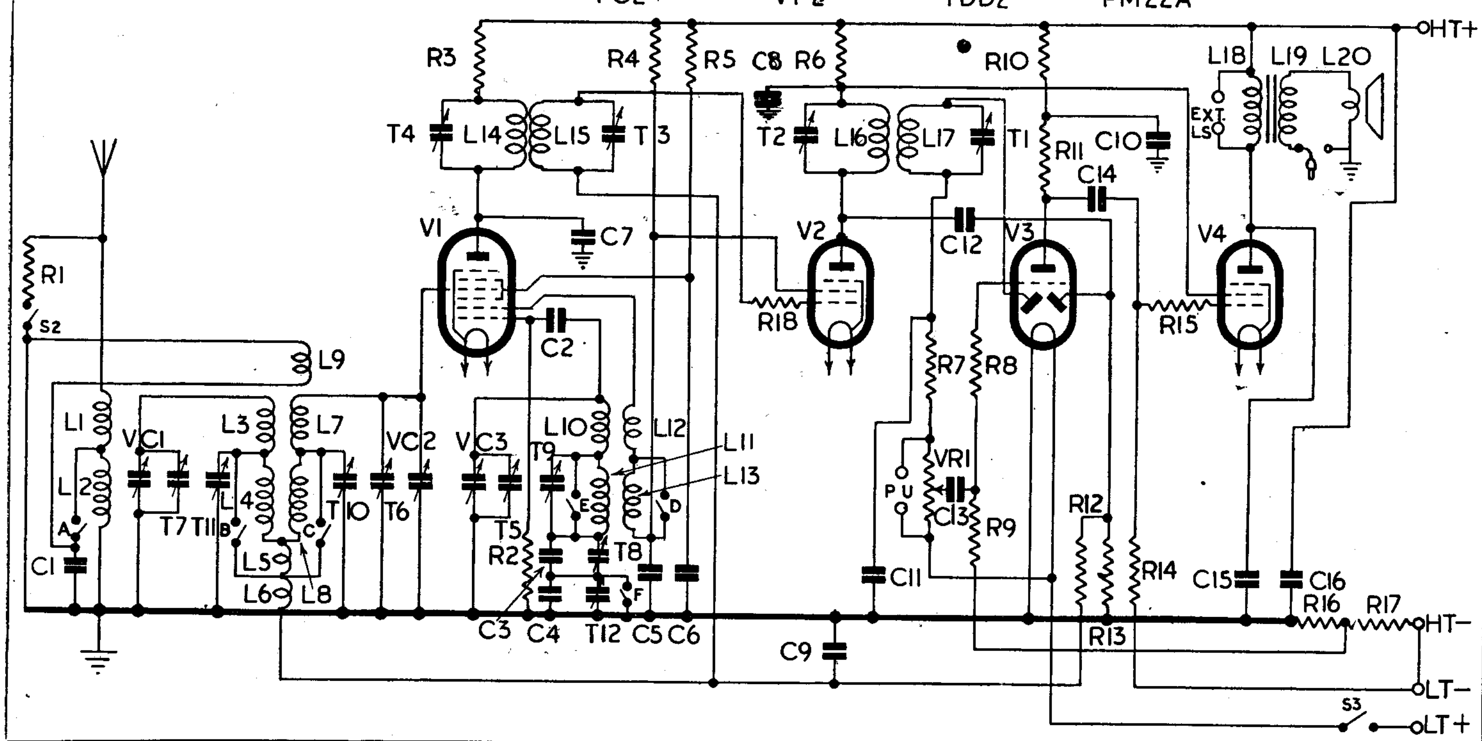
Bias volts between HT negative and chassis = 6.



Left: Valve electrode connection diagram. The central circles in broken line represent top caps. Below: The circuit of this simple but carefully designed battery superhet.



Top of chassis layout diagram of the Bush SB4. A four-valve battery superhet, the receiver is constructed on conventional lines, the plan view showing a logical design.



CONDENSERS

C.		*Mfds.*	*C.*		*Mfds.*
1	.. ..	.01	9	Condenser block	.1
2	.. ..	.0005	10	,, ,,	.1
3	.. ..	.0022	11	.. ..	.0001
4	.. ..	.0011	12	.. ..	.00005
5	Condenser block	.1	13	.. ..	.01
6	,, ,,	.1	14	.. ..	.03
7	,, ,,	.1	15	.. ..	.003
8	,, ,,	.1	16	.. ..	2,0

RESISTANCES

R.	*Ohms.*	*R.*	*Ohms.*
1	50	11	10,000
2*	70,000	12	1 meg.
3	10,000	13	1 meg.
4	100,000	14	500,000
5	10,000	15	100,000
6	10,000	16	350
7	50,000	17	250
8	500,000	18*	500,000
9	5 meg.	VR1	500,000
10	10,000		

* When Cossor 210PG valve is used in lieu of Mullard FC2, R2 is 40,000 ohms. R18 value 10,000 ohms is inserted in series with IFT1, and switch contact D is omitted.

WINDINGS

L.	*Ohms.*	*L.*	*Ohms.*
1	1.5	11	8.5
2	8.0	12	2.0
3	3.0	13	25.0
4	12.0	14	55.0
5	3.0	15	55.0
6	.5	16	30.0
7	3.0	17	30.0
8	12.0	18	—
9	—	19	—
10	4.0	20	—

BUSH SB4

—Continued—

V3, which is biased through HF stopper R8 and grid leak R9 from the junction of R16, R17 in the negative HT line.

The AVC diode of V3 is fed from the anode of V2 through C12, the load resistance being R13 with R12 and C9 decoupling the AVC line.

From V3 the AF signals are resistance-capacity coupled by R11, C14 and R14 to the grid of the output pentode V4 *via* the grid stopper R15. Biasing is provided by connecting R14 to the negative end of R17 in the negative HT line.

V4 is coupled to the permanent-magnet moving-coil loudspeaker by an output transformer L18 and L19, the speech coil being L20. An extra loudspeaker may be connected to the sockets provided across L18 and a plug and socket arrangement on the secondary side enables the internal speaker to be silenced.

Permanent tone correction is provided by C15, while C16 decouples the high tension supply.

GANGING

IF Circuits.—Inject a 123 kc signal into the control grid of V1 and adjust T1, T2, T3 and T4 for maximum output, keeping the input low.

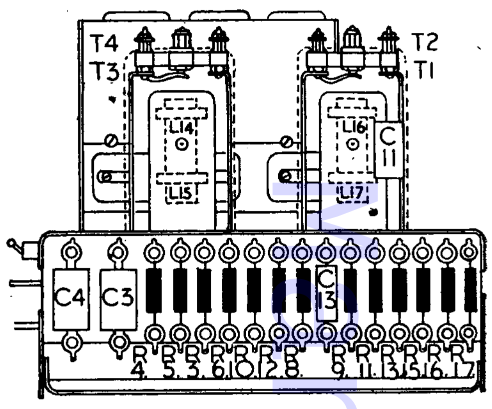
MW Band.—Switch the receiver to MW and tune to 200m.

Inject a 200m signal into the A and E sockets and adjust T5, T6 and T7 for maximum output.

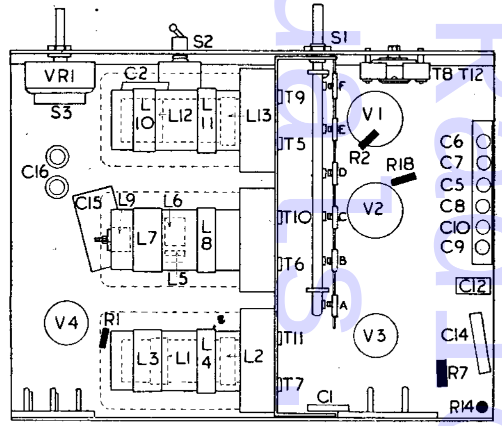
Inject and tune in a 500m signal and adjust T8 for maximum output whilst rocking gang.

LW Band.—Switch to LW and tune to 1,000m.

Inject a 1,000m signal into A and E sockets and adjust T9, T10 and T11 for maximum output. Inject and tune in a 1,900m signal and adjust T12 for maximum output whilst rocking gang.



Above: Sectional view showing components strip and the IF transformers. Below: The clear under-chassis layout.



Jottings in the Service Man's Notebook

HIGH-TENSION panels are useful for showing up defective condensers. Sometimes a leaking condenser will drop the voltage in a receiver, but not enough to produce a short circuit.

If the normal rectifier is removed and a high-tension tapping of the correct voltage from the panel substituted it will usually be found that the defective condenser will quickly show up. This is due to the panel being able to supply larger currents without appreciable voltage drop.

The increase of voltage across the defective component will either cause it to break down completely or heat up noticeably.

* * *

ONE of the best volume controls made is in the Pye model T20. It is very easy to service and is a good component. When the back cap is removed the moving contact is held to the central spindle by a nut. Removal of this nut releases the moving contact and leaves the spindle free also. The element can then be easily cleaned and inspected.

* * *

A FAULT which occurred in a radiogram was very puzzling. When a record was being played the volume would cut up and down regularly.

The pick-up and leads were tested for continuity and appeared perfect. Then the screened lead was tested for shorts and gave none. The fault continued after this, but not so badly.

Trying another pick-up gave perfect results, so it was decided to change the leads in case these were at fault. When this was done, the fault was cleared.

As we were still puzzled as to where we had failed in testing, it was decided to check the leads again. Continuity was perfect, but when the lead was twisted near where it turned inside the pick-up arm it gave a short between one of the inside wires and the outer shielding.—F.D.L.