TRADER SERVICE SHEETS

RECEIVER SERIES (NUMBER ELEVEN)

BUSH MODEL SBI

BATTERY SUPERHET

MODEL SB1 in the Bush 1933-4 range of receivers is a battery-operated superhet employing an unconventional 3-valve circuit. It is notable for the fact that it utilises a form of quiet A.V.C. obtained by means of a metal rectifier second detector, which also provides a rectified voltage used in a special battery economy system applied to the output valve.

CIRCUIT DESCRIPTION

Aerial connection to coupling coils **L1, L2** by way of potentiometer volume control **R1** and fixed condenser **C1.** Inductively-coupled band-pass filter preceding H.F. pentode frequency-changer (**V1, Mullard metallised SP2**). Primary **L3, L4** tuned by **C17**; secondary **L7, L8** tuned by **C18**; coupling coils **L5, L6.** Image rejection by means of condensers **C3** and **C4.** Oscillator coils **L11, L12** tuned by **C22**; coupling coils **L9, L10** in filament circuit. One variable-mu pentode intermediate frequency amplifier (**V2, Mullard metallised VP2**) with transformer couplings **L13, L14** and **L15, L16. I.F.123 KC/s. Westector** second detector giving linear rectification and providing voltage used to obtain A.V.C. and H.T. battery economy. Rectified output is fed directly into pentode output valve (**V3, Mullard PM22A**), which has usual tone compensating condenser **C14** in its plate circuit. Automatic G.B. resistance **R11** in H.T. negative lead works in conjunction with 9 V section of H.T. battery to provide bias for **V2** and **V3.**

When no carrier signal is present in the aerial circuit, **V3** is considerably over-biased to reduce its anode current, and the I.F. valve **V2** is biased for maximum sensitivity. As soon as a station is tuned in, the **Westector** applies a positive potential to the grid of **V3,** with the result that the effective negative bias is reduced to the correct amount for normal working. The corresponding increase in anode current through **R11** increases the negative G.B. applied to **V2** and thus A.V.C. is achieved. Owing to the over-biasing of **V3** between stations a measure of Q.A.V.C. is obtained.

Speaker is a P.M. M.C. model with input transformer **T1** mounted on its chassis.

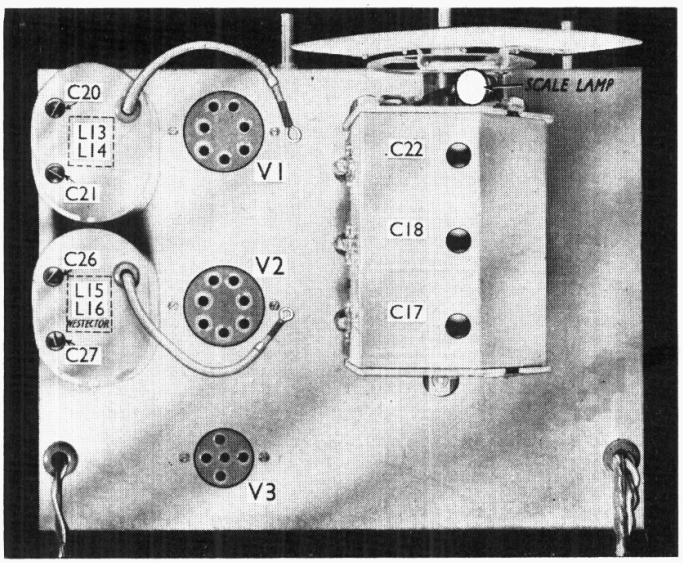


Fig. 2.—Plan view of the chassis. The valves have been removed. The trimmers of the tuning condensers are situated below the chassis, inside the band-pass and oscillator coils.

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (set screws). Unsolder speaker leads from speaker terminal panel. Remove four bolts at underside of cabinet holding chassis. Chassis can now be removed, after unclipping speaker leads from side of cabinet. Any tests under operating conditions should, of course, be made with the speaker reconnected.

When replacing speaker leads, note that they connect to the second and fourth tag from the top of the terminal panel.

When replacing knobs, that on the left has the indication " V," that in the centre is blank, and that on the right has the indication " LW—MW."

Removing Speaker.—This is held by four nuts and bolts passing through front of cabinet. When replacing, see that input transformer is to the *left,* looking into back of cabinet.

COMPONENTS AND VALUES

	Resistances	Value (Ohms)
R1	Manual volume control ..	75,000
R2	V1 grid resistance	500,000
R3	V1 S.G. feed resistance ..	8,000
R4	V1 anode decoupling	8,000
R5	A.V.C. circuit decoupling ..	2,000,000
R6	V2 S.G. feed resistance ..	30,000
R7	V2 anode decoupling	8,000
R8	Westector load	250,000
R9	V3 grid H.F. stopper	150,000
R10	V3 grid decoupling	250,000
R11	Automatic G.B. resistance ..	1,500

(*Continued overleaf*)

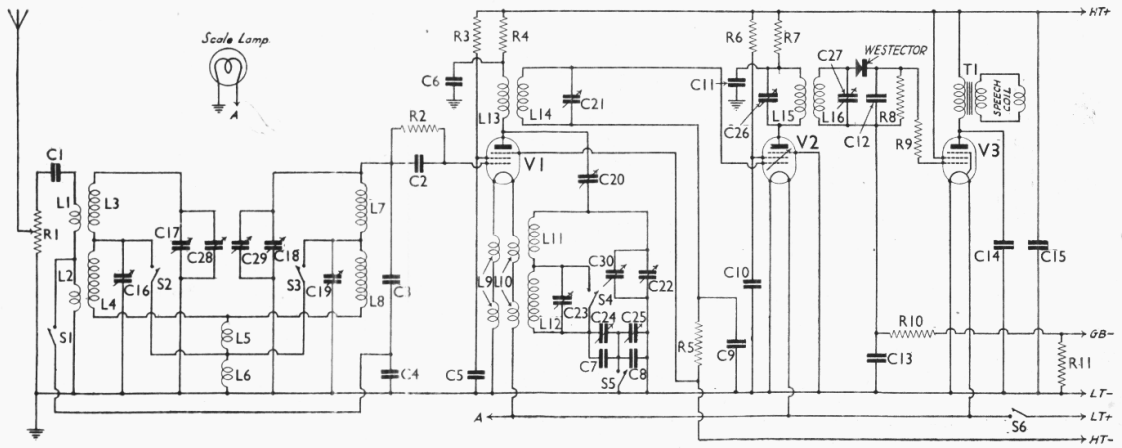


Fig. 1. — The circuit diagram of the Bush SB1. A special combined H.T. and G.B. battery is employed, so that H.T.— and G.B.+ are common.

C 1

BUSH SBI SUPERHET (contd.)

	Condensers	Value (μF)
C1	Aerial series condenser	0·0005
C2	V1 grid condenser	0·0005
C3, C4	Image suppressing condensers	Small, 0·0005
C5*	V1 S.G. by-pass	0·1
C6*	V1 anode decoupling	0·1
C7, C8	Oscillator padding condensers, fixed	0·0022, 0·0011
C9*	A.V.C. circuit decoupling	0·1
C10*	V2 S.G. by-pass	0·1
C11*	V2 anode decoupling	0·1
C12	Westector reservoir	0·0001
C13	V3 grid decoupling	0·25
C14	V3 anode tone compensator	0·003
C15	H.T. battery reservoir	2·0
C16	Band-pass pri. L.W. trimmer	—
C17	Band-pass pri. tuning	—
C18	Band-pass sec. tuning	—
C19	Band-pass sec. L.W. trimmer	—
C20	Oscillator coupling (anode)	—
C21	1st I.F. sec. tuning, pre-set	—
C22	Oscillator tuning	—
C23	Oscillator L.W. trimmer	—
C24, C25	Oscillator padding condensers, pre-set	—
C26	2nd I.F. pri. tuning, pre-set	—
C27	2nd I.F. sec. tuning, pre-set	—
C28	Band-pass pri. trimmer, pre-set	—
C29	Band-pass sec. trimmer, pre-set	—
C30	Oscillator trimmer, pre-set	—

* In condenser block.

	Other Components	Value (Ohms)
L1	Aerial coupling coils	3·25
L2	Aerial coupling coils	14·5
L3	Band-pass pri. coils	3·25
L4	Band-pass pri. coils	14·5
L5	Band-pass coupling coils	3·5
L6	Band-pass coupling coils	0·5
L7	Band-pass sec. coils	3·25
L8	Band-pass sec. coils	14·5
L9	Oscillator coupling coils	0·1
L10	Oscillator coupling coils	0·1
L11	Oscillator tuning coils	3·75
L12	Oscillator tuning coils	9·5
L13	1st I.F. transformer Pri.	70·0
L14	1st I.F. transformer Sec.	70·0

	Other Components (contd.)	Value (Ohms)
L15	2nd I.F. transformer Pri.	70·0
L16	2nd I.F. transformer Sec.	70·0
T1	Speaker input transformer Pri.	600·0
	Speaker input transformer Sec.	0·2
S1-S5	Waveband switches (ganged)	—
S6	Filament switch (with R1)	—

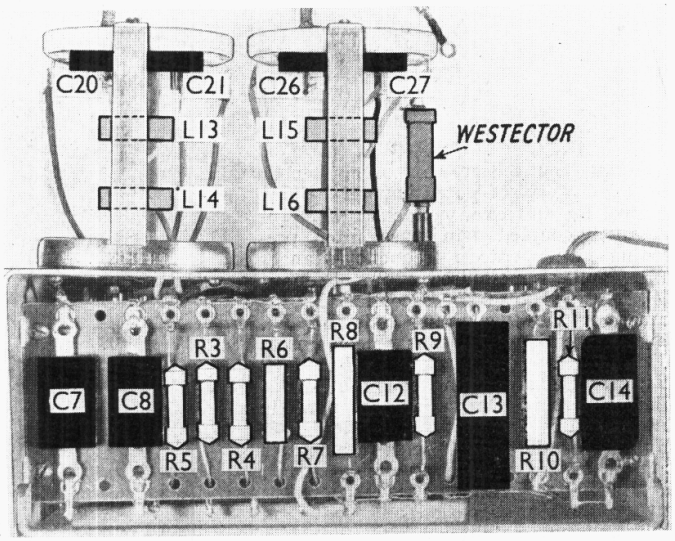


Fig. 4.—End view of chassis showing resistance and condenser panel and the I.F. coils with their screens removed.

VALVE ANALYSIS

Valve	Anode Volts	Anode Curr. (mA)	Screen Volts	Screen Curr. (mA)
V1. SP2	110	1·15	125	0·35
V2. VP2	105	2·43	105	0·63
V3. PM22A	133	0·85	134	0·2

The voltage readings above were taken with a meter having a resistance of 1,000 Ω per V. The H.T. and G.B. battery was reading its full rated voltage. All voltage readings are to chassis.

The measurements were made without an aerial connected, i.e., with no signal.

Measurement of the anode and screen currents, particularly of **V1**, should be made with the meter inserted in circuit at the low H.F. potential end.

The total no signal current is about 5·6 mA, rising to a steady 9 or 10 mA with the output valve fully loaded.

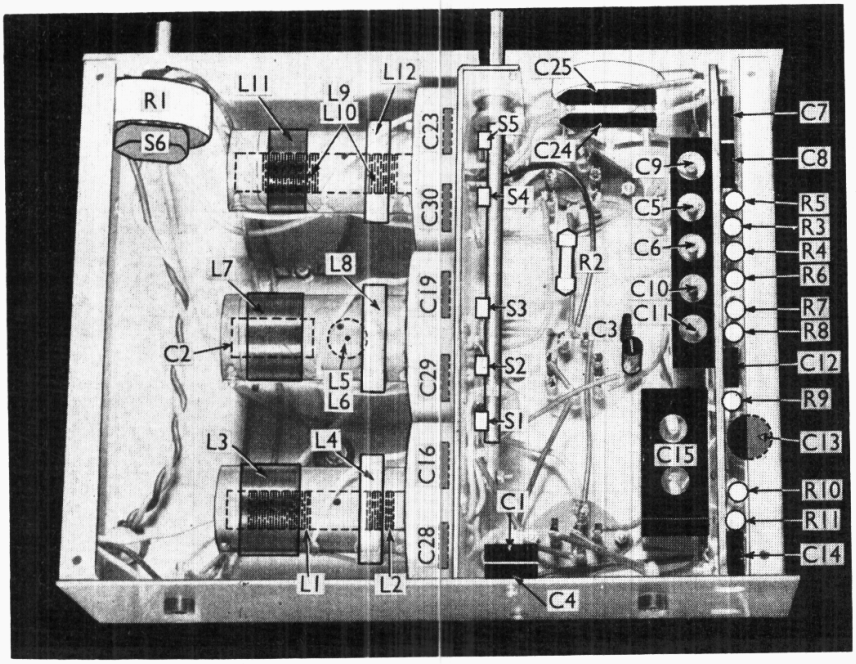
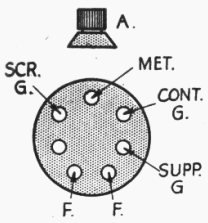


Fig. 3.—Under-chassis view. The screens of the band-pass and oscillator coils have been removed. C2 is below the centre coil.

GENERAL NOTES

Switches.—The five switches, **S1** to **S5,** perform the wavechange operations, and they are mounted in one unit on a bar attached to a partition passing across the chassis. All the switches are *closed* on M.W. and *open* on L.W.

Band-pass and Oscillator Coils.—These are mounted on the other side of the partition mentioned above. They have metal screens fitted with bayonet catches. The centre one is easily detachable, but removal of the other two involve first of all the removal of the volume control and switch, and the aerial and earth sockets. The wires to these components need not be unsoldered. For any serious work on the coils it will be best to remove the partition carrying them.



Underside connections of V1 and V2 valve-holders.

Condenser C3.—This is a very small fixed condenser formed from a central electrode of 16-gauge wire, covered with insulated sleeving, on which a coil of 20-gauge wire is wound, forming the other electrode.

Condensers C28, C29, C30.—These are the trimmers for the tuning condensers, and are at the base of the band-pass and oscillator coils, inside the screens.

Condensers C5, C6, C9, C10, C11.—These have a capacity of 0·1 μF each, and are contained in a single flat block. The common terminal of each is earthed to the metal case of the block.

H.T. and G.B. Battery.—The battery fitted is a Drydex Yellow Triangle, type H 1073, 135 V H.T. + 9 V G.B.

L.T. Cell.—Exide LCA3, 2V 25 A.H., free acid non-spill.

Scale Lamp.—Osram 3·5 V 0·15 A.