'TRADER' SERVICE SHEET

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BUSH SW43, SUG43 AND SUG43G

A PARTICULARLY interesting point in the design of the Bush SW43 receiver is the use of a beam power output valve rated to give a maximum output of 8 W. The receiver is a 4-valve (plus rectifier) A.C. 3-band superhet with a short-wave range of 16·5-51 metres, and has provision for a gramophone pick-up and an extension speaker, a plug and socket arrangement allowing the internal speaker to be cut out of circuit.

In its standard form the receiver is suitable for mains of 200-250 V, 40-100 C/S, but a special model is made for 100-110 V.

An identical chassis is fitted in the SUG43 and SUG43G console receivers, and a slightly modified one in the RG43 A.C. radio-gramophone and automatic radio-gramophone, but this *Service Sheet* was prepared on an SW43 model.

CIRCUIT DESCRIPTION

Aerial input on M.W. and L.W. via coupling coils **L1** (M.W.) and **L2** (L.W.) to capacity coupled band-pass filter. Primary coils **L3, L4** are tuned by **C26**; secondaries **L7, L8** are tuned by **C30**; top coupling condensers **C2** (M.W.) and **C3** (L.W.); bottom coupling by **C1**. On S.W., input is via coupling coil **L5** to single tuned circuit **L6, C30.**

First valve (**V1, Cossor metallised 41STH**) is a triode-hexode operating as frequency changer with internal coupling. Oscillator grid coils **L9** (S.W.), **L11** (M.W.) and **L13** (L.W.) are tuned by **C31**; parallel trimming by **C34** (S.W.), **C35** (M.W.) and **C36** (L.W.); series tracking by **C6, C32** (M.W.) and **C33** (L.W.), oscillator anode reaction coils **L10** (S.W.), **L12** (M.W.) and **L14** (L.W.).

Second valve is a variable-mu R.F. pentode (**V2, Cossor metallised MVS/Pen/B**), operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C37, L15, L16, C38** and **C39, L17, L18, C40.**

Intermediate frequency 465 KC/S.

Diode second detector is part of double diode triode valve (**V3, Mullard metallised TDD4**). Audio frequency component in rectified output is developed across load resistance **R9** and passed via coupling condenser **C13,** manual volume control **R10** and I.F. stopper **R11** to C.G. of triode section, which operates as A.F. amplifier. I.F. filtering by **R8, C11,** and **R11.** Provision for connection of gramophone pick-up across **C13, R10.**

Second diode of **V3,** fed from **V2** anode via **C14,** provides D.C. potential which is developed across load resistance **R16** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along cathode resistance **R12.**

Resistance-capacity coupling by **R14, C21** and **R18** via I.F. stopper **R19** between **V3** triode and pentode output valve (**V4, Mullard PenB4**). Special variable feed-back tone control circuit by **C17, R17** and feed-back condenser **C18.** Fixed R.C. tone corrector **R21, C22** in anode circuit. On S.W., G.B. resistance in cathode circuit is by-passed by large capacity dry electrolytic condenser **C19** via **S19.**

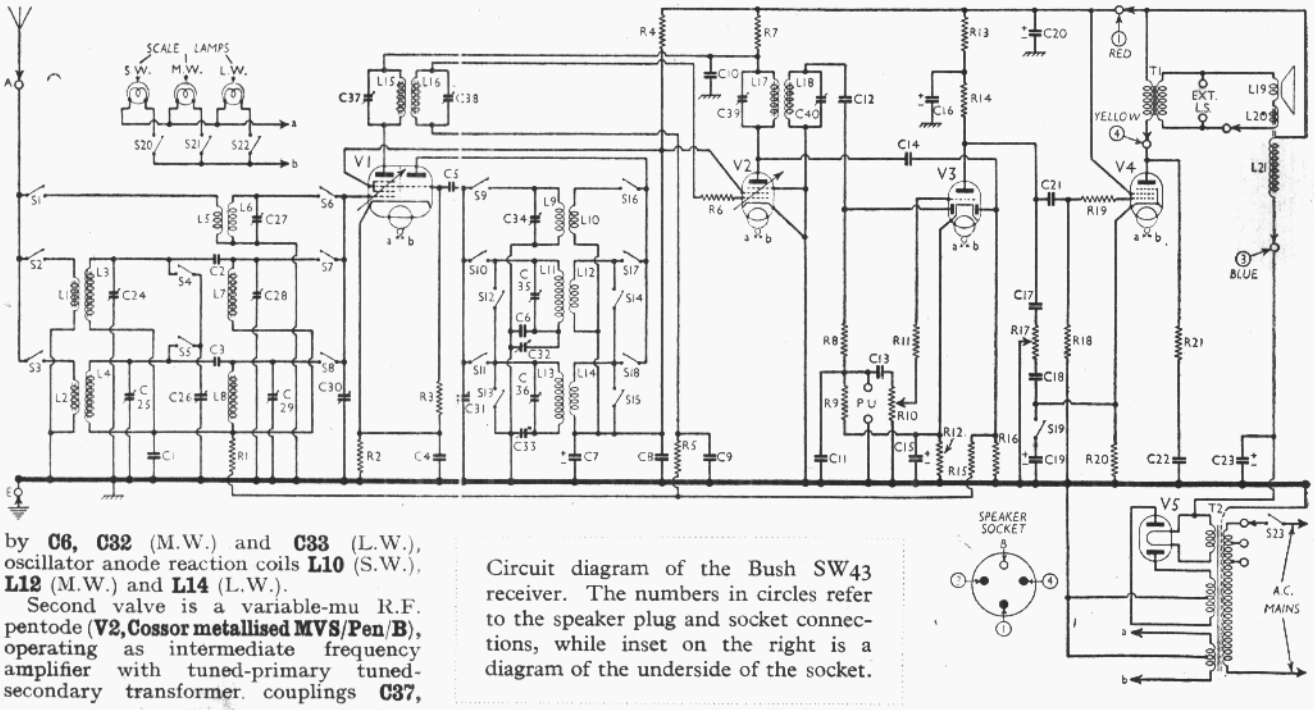
Provision for connection of a low impedance external speaker across secondary of internal speaker input transformer **T1.** A plug and socket device permits the internal speaker to be muted by breaking the speech coil circuit.

H.T. current is supplied by full-wave rectifying valve (**V5, Mullard DW4/350**). Smoothing by speaker field and large capacity dry electrolytic condensers **C20, C23.**

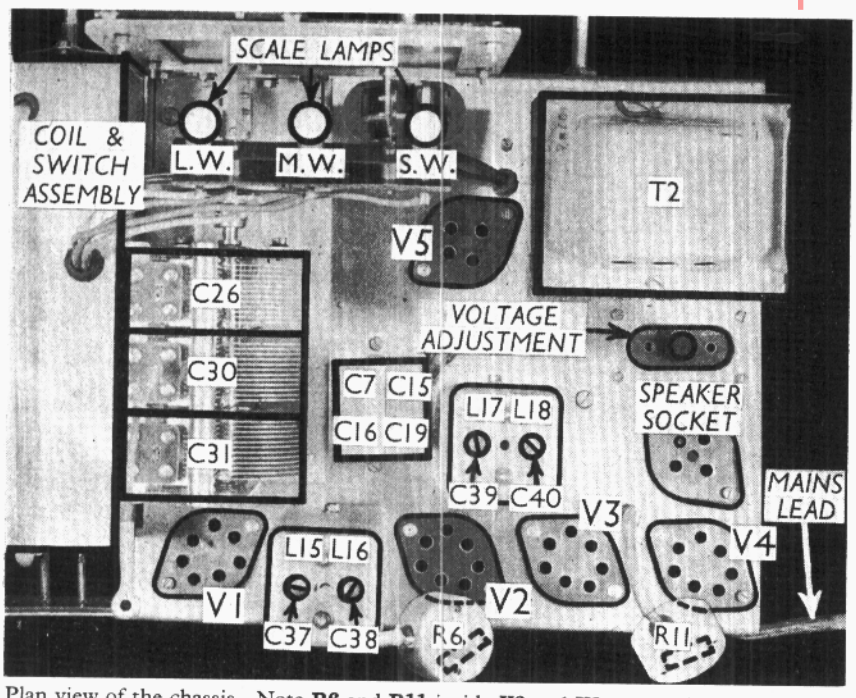
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 hexode C.G. decoupling	1,000,000
R2	V1 fixed G.B. resistance	100
R3	V1 osc. C.G. resistance	30,000
R4	V1, V2 S.G. and V1 osc. anode H.T. feed	20,000
R5	V2 C.G. decoupling	5,000,000
R6	V2 C.G. stabiliser	250
R7	V1 hex., V2 anodes decoupling	5,000
R8	I.F. stopper	250,000
R9	V3 signal diode load	1,000,000
R10	Manual volume control	500,000
R11	V3 C.G. I.F. stopper	100,000
R12	V3 G.B. resistance; A.V.C. delay	1,000
R13	V3 triode anode decoupling	10,000
R14	V3 triode anode load	50,000
R15	A.V.C. line decoupling	1,000,000
R16	V3 A.V.C. diode load	1,000,000
R17	Variable tone control	100,000
R18	V4 C.G. resistance	500,000
R19	V4 C.G. I.F. stopper	100,000
R20	V4 G.B. resistance	150
R21	Part of fixed T.C. circuit	10,000

	CONDENSERS	Values (μF)
C1	Band-pass bottom coupling	0·06
C2	Band-pass M.W. top coupling	0·0000014
C3§	Band-pass L.W. top coupling	0·0000024
C4	V1 cathode by-pass	0·1
C5	V1 osc. C.G. condenser	0·00005
C6	Osc. circuit M.W. fixed tracker	0·0004
C7*	Osc. anode, V1, V2 S.G.'s decoupling	2·0
C8	Osc. anode, V1, V2 S.G's R.F. by-pass	0·1
C9	V2 C.G. decoupling	0·1
C10	V1 hex. and V2 anodes decoupling	0·1



Circuit diagram of the Bush SW43 receiver. The numbers in circles refer to the speaker plug and socket connections, while inset on the right is a diagram of the underside of the socket.



Plan view of the chassis. Note **R6** and **R11** inside **V2** and **V3** screened top connectors.

	CONDENSERS (*Continued*)	Values (μF)
C11	I.F. by-pass	0·0001
C12	V_3 signal diode coupling	0·0001
C13	A.F. coupling to V_3 triode	0·005
C14	V_3 A.V.C. diode coupling	0·0001
C15*	V_3 cathode by-pass	50·0
C16*	V_3 triode anode decoupling	2·0
C17	Part of variable T.C. circuit	0·02
C18	Feed-back tone corrector	0·5
C19*	V_4 cathode by-pass (S.W. only)	50·0
C20*	H.T. smoothing	8·0
C21	V_3 to V_4 A.F. coupling	0·03
C22	Part of fixed tone corrector	0·02
C23*	H.T. smoothing	16·0
C24‡	Band-pass pri. M.W. trimmer	0·00004
C25‡	Band-pass pri L.W. trimmer	0·00007
C26†	Band-pass primary tuning	—
C27‡	Aerial circuit S.W. trimmer	0·00004
C28‡	Band-pass sec. M.W. trimmer	0·00004
C29‡	Band-pass sec. L.W. trimmer	0·00007
C30†	Band-pass sec. and S.W. aerial tuning	—
C31†	Oscillator circuit tuning	—
C32‡	Osc. circuit M.W. tracker	0·0003
C33‡	Osc. circuit L.W. tracker	0·0003
C34‡	Osc. circuit S.W. trimmer	0·00004
C35‡	Osc. circuit M.W. trimmer	0·00009
C36‡	Osc. circuit L.W. trimmer	0·000275
C37‡	1st I.F. trans. pri. tuning	0·0003
C38‡	1st I.F. trans. sec. tuning	0·0003
C39‡	2nd I.F. trans. pri. tuning	0·0003
C40‡	2nd I.F. trans. sec. tuning	0·0003

§ 0·0000025 in our chassis.
* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS (*Continued*)	Approx. Values (ohms)
L19	Speaker speech coil	1·8
L20	Hum neutralising coil	0·17
L21	Speaker field coil	600·0
T1	Speaker input trans. Pri.	250·0
	Speaker input trans. Sec.	0·4
T2	Mains trans. Pri. total	18·0
	Mains trans. Heat. sec. total	0·1
	Mains trans. Rect. heat. sec.	0·1
	Mains trans. H.T. sec. total	225·0
S1-S19	Waveband switches	—
S20-22	Scale lamp switches	—
S23	Mains switch, ganged R10	—

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial M.W. coupling coil	0·8
L2	Aerial L.W. coupling coil	48·0
L3	Band-pass primary coils	2·2
L4	Band-pass primary coils	16·0
L5	Aerial S.W. coupling coil	0·25
L6	Aerial circuit S.W. tuning coil	0·05
L7	Band-pass secondary coils	2·2
L8	Band-pass secondary coils	16·0
L9	Osc. circuit S.W. tuning coil	0·05
L10	Osc. anode S.W. reaction	0·3
L11	Osc. circuit M.W. tuning coil	1·5
L12	Osc. anode M.W. reaction	1·3
L13	Osc. circuit L.W. tuning coil	2·5
L14	Osc. anode L.W. reaction	2·0
L15	1st I.F. trans. Pri.	2·3
L16	1st I.F. trans. Sec.	2·3
L17	2nd I.F. trans. Pri.	2·3
L18	2nd I.F. trans. Sec.	2·3

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, first remove the four control knobs (pull off) and the four bolts (with washers) holding it to the bottom of the cabinet. Now free the speaker leads from the cleats on the side of the cabinet. By tilting the back upwards, the chassis can now be withdrawn to the extent of the speaker leads, which should be sufficient for normal purposes.

When replacing, note that the large control knobs go on the spindles of the tuning and volume controls.

To free the chassis entirely, remove the speaker plug from the socket on the chassis.

Removing Speaker.—If it is desired to remove the speaker from the cabinet, unsolder the leads and remove the nuts and washers from the four screws holding it to the sub-baffle. *When replacing*, see that the transformer is on the right and connect the leads from the chassis and the extension speaker panel as follows, numbering the tags from bottom to top :—1, red ; 2, yellow ; 3, green ; 4, brown ; 5, black ; 6, blue.

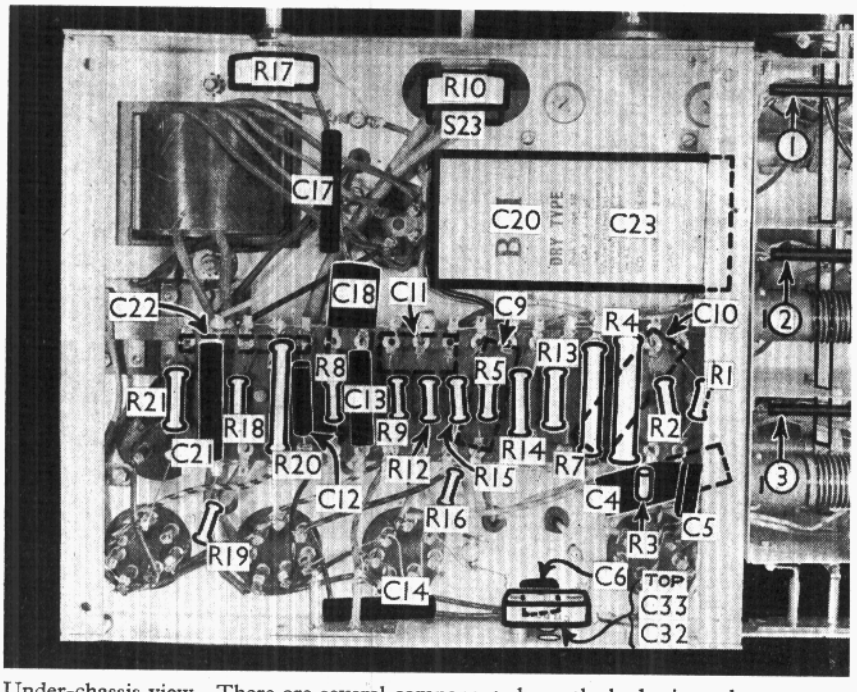
VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 230 V, using the 230 V tapping on the mains transformer. The receiver

Continued overleaf

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 41STH*	230	2·0	70	4·5
V2 MVS/Pen/B	230	3·4	70	1·1
V3 TDD4	103	2·6	—	—
V4 PenB4	245	68·0	265	9·3
V5 DW4/350	308†	—	—	—

* Oscillator anode 70 V, 3·7 mA.
† Each anode, A.C.



Under-chassis view. There are several components beneath the horizontal component panel.

BUSH SW43—*Continued*

was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

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

GENERAL NOTES

Switches.—**S1-S19** and **S20-S22** are the wavechange and scale lamp switches, ganged in three rotary units beneath the chassis. The units are indicated in our under-chassis view, and are shown in detail in the diagrams on the right, as seen looking at the underside of the chassis, from the rear.

The table below gives the switch positions for the three control settings, starting from fully anti-clockwise. O indicates open, and **C** closed.

Switch	S.W.	M.W.	L.W.
S1	**C**	O	O
S2	O	**C**	O
S3	O	O	**C**
S4	O	**C**	O
S5	O	O	**C**
S6	**C**	O	O
S7	O	**C**	O
S8	O	O	**C**
S9	**C**	O	O
S10	O	**C**	O
S11	O	O	**C**
S12	**C**	O	O
S13	O	**C**	O
S14	**C**	O	O
S15	O	**C**	O
S16	**C**	O	O
S17	O	**C**	O
S18	O	O	**C**
S19	**C**	O	O
S20	**C**	O	O
S21	O	**C**	O
S22	O	O	**C**

S23 is the Q.M.B. mains switch, ganged with the volume control **R10.**

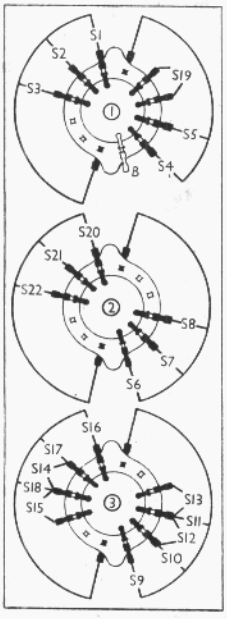
Coils.—The signal frequency and oscillator coils are in a partitioned screened unit, with the wavechange switches, and several other components. This unit projects above and below the chassis deck. The coils and trimmers are indicated in detail in our side-chassis view, the metal side plate of the unit having been removed. In all there are eight coil formers, each carrying one or two coils, and six of them having trimmers at their ends.

The I.F. transformers **L15, L16** and **L17, L18** are in two screened units on the chassis deck, with their associated trimmers.

Scale Lamps.—These are three Ever Ready M.E.S. types, rated at 6·2 V, 0·3 A. They are switched by **S20-S22.**

External Speaker.—Provision is made, by a panel at the top of the back of the cabinet, for the use of a low impedance (2O) external speaker. The internal speaker speech coil may be disconnected by a plug and socket device, also on the panel.

The external speaker impedance is the same for the SUG43, but for the SUG43G and the RG43 it should be 10O, since a different internal speaker is used in these models.



Switch diagrams, looking from the rear of the underside of the chassis. The positions of the units are shown by numbers in circles and arrows in our under-chassis view on page VII.

Condensers C7, C15, C16, C19.—These are two 2 μF and two 50 μF dry electrolytics in a single carton on the chassis deck. The black lead is the common negative of **C7** and **C16** (2μF) and the brown the common negative of **C15** and **C19.** The red lead to **V2** valve-holder is the positive of **C7,** and the red lead to the junction of **R13, R14** is the positive of **C16.** The yellow lead to the junction of **R9** and **R12** is the positive of **C15,** and the yellow lead to **S19** on the first switch unit is the positive of **C19.**

Condensers C20, C23.—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 **C20** (8 μF) and the red the positive of **C23** (16 μF).

Condensers C32, C33.—These two pre-set trackers are mounted at the rear of the chassis, and are adjustable through two holes. **C32** is nearer the chassis deck.

Speaker Plug and Socket.—The speaker is connected to the receiver by a 4-pin plug, with a socket on the chassis. Only three of the pins are used. The connections and a diagram of the underside of the socket are included in our circuit diagram. The "grid" pin of the plug (pin 2 in our diagram) is blank. The red wire from the speaker goes to the "anode" pin (pin 1), the blue wire to pin 3, and the yellow wire to pin 4.

Chassis Divergency.—The makers' circuit diagram shows a 0·1 μF tubular condenser connected across the speaker field. This is not present in our chassis, and is not shown in our circuit diagram.

CIRCUIT ALIGNMENT

I.F. Stages.—When adjusting a primary winding, connect a 15,000 O resistance and a 0·1 μF condenser in series between the grid end of the secondary to earth, and when adjusting a secondary connect them from the anode end of the primary to earth.

Switch set to M.W., and tune to about 300 m. Connect signal generator to control grid (top cap) of **V2** and chassis. Feed in a 465 KC/S signal and adjust **C40** and **C39** for maximum output.

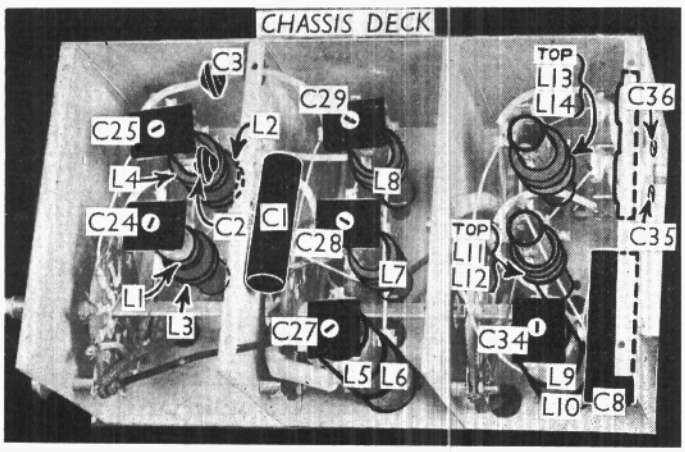
Transfer generator to top cap of **V1** and chassis, and adjust **C38** and **C37** for maximum output. Re-check all adjustments.

R.F. and Oscillator Stages.—S.W.—Connect generator to **A** and **E** sockets, switch set to S.W., tune to 18 m. on scale, and feed in an 18 m. (16·67 MC/S) signal. Adjust **C34** for maximum output, using the peak which requires the lesser trimmer capacity. Adjust **C27** for maximum output. Check calibration at 50 m.

M.W.—Switch set to M.W., tune to 200 m. on scale, feed in a 200 m. (1,500 KC/S) signal, and adjust **C35** for maximum output on the peak requiring the lesser trimmer capacity. Tune to 300 m. on scale, feed in a 300 m. (1,000 KC/S) signal, and adjust **C28** and **C24** for maximum output.

Feed in a 500 m. (600 KC/S) signal, tune it in, and adjust **C32** for maximum output, rocking the gang for optimum results. Re-check at 300 m.

L.W.—Switch set to L.W., tune to 1,300 m. on scale, feed in a 1,300 m. (230·7 KC/S) signal, and adjust **C36** for maximum output. Tune to 1,500 m. on scale, feed in a 1,500 m. (200 KC/S) signal and adjust **C29** and **C25** for maximum output. Feed in an 1,800 m. (166·7 KC/S) signal, tune it in, and adjust **C33** for maximum output, rocking the gang for optimum results. Re-check at 1,300 m.



A side view of the chassis, with the cover plate over the coil units removed. Note the positions of the various trimmers.

Printed in Great Britain as a supplement to *The Wireless & Electrical Trader* for the proprietors and publishers, *The Trader Publishing Co., Ltd.*, Dorset House, Stamford Street, London, S.E.1, by Sanders Phillips & Co., Ltd., The Baynard Press, Chryssell Road, London, S.W.9. Every Saturday.