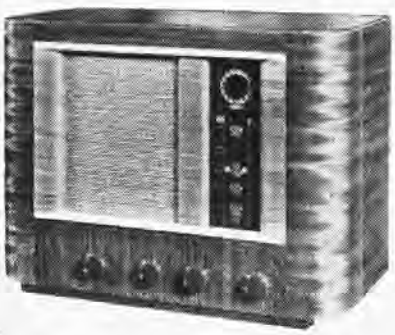
'TRADER' SERVICE SHEET

316

BUSH BA53

3-BAND BATTERY SUPERHET



A SHORT-WAVE range of 16-31 m is covered by the Bush BA53 4-valve battery-operated superhet, a feature of which is the inclusion of the firm's Telefile dial to facilitate logging short-wave stations.

There is also a local-distant switch, operated by a push-pull motion of the volume control spindle.

CIRCUIT DESCRIPTION

Two alternative aerial input sockets; **A1** direct on all bands and **A2** direct on SW, but via series resistances **R1** and **R2** on MW and LW respectively to coupling coils **L1** (SW), **L2** (MW), **L3** (LW), and single tuned circuits **L4, C27** (SW), **L5, C27** (MW) and **L6, C27** (LW). Local-distant switch **S29** connects damping resistance **R4** across tuned circuits when closed ("Local" position).

First valve (**V1, Mazda metallised TP23**) is a triode-pentode operating as frequency changer with internal coupling. Triode anode coils **L10** (SW), **L11** (MW) and **L12** (LW) are tuned by **C31**; parallel trimming by **C28** (SW), **C29** (MW) and **C6, C30** (LW); series tracking by **C7** (MW) and **C8** (LW). Grid reaction by coils **L7** (SW), **L8** (MW) and **L9** (LW).

Second valve (**V2, Mazda metallised VP210**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C32, C3, L13, L14, C4, C33** and **C34, C13, L15, L16, C14, C35.**

Intermediate frequency 465 KC/S.

Diode second detector is part of double diode triode valve (**V3, Mullard metallised TDD2A**). Audio frequency component in rectified output is developed across manual volume control **R12,** which also operates as load resistance, and passed via AF coupling condenser **C18** and CG resistance **R13** to CG of triode section, which operates as AF amplifier. IF filtering by **C16, R11, C17.** Provision for gramophone PU across **R12.**

Second diode of **V3,** fed from **V2** anode via **C15,** provides DC potential, which is developed across load resistance **R15** and fed back through decoupling circuits as GB to FC (except on SW) and IF valves, giving automatic volume control.

Parallel-fed transformer coupling by **R14, C19** and **T1** between **V3** triode and quiescent push-pull output valve (**V4, Mazda QP230**). Fixed tone correction by **C21,** and variable tone control by **C22, R17,** between anodes. Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T2.** Plug and socket device permits speech coil circuit to be broken, thus muting internal speaker if desired.

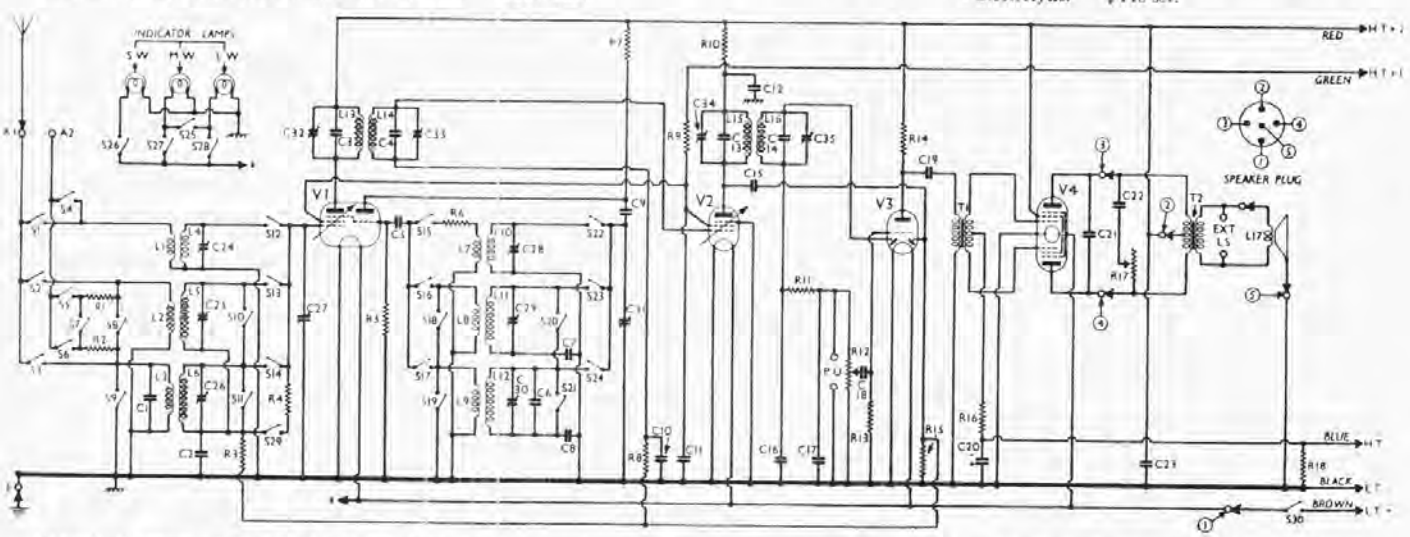
GB potential for **V4** is obtained automatically from drop along **R18** in HT negative lead and decoupled by **R16, C20.**

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	A2 MW aerial series	1,000
R2	A2 LW aerial series	10,000
R3	V1 pentode CG decoupling	1,000,000
R4	Aerial circuit "Local" damping resistance	10,000
R5	V1 osc. CG resistance	40,000
R6	Osc. circuit SW stabiliser	50
R7	V1 osc. anode HT feed	40,000
R8	V2 CG decoupling	1,000,000
R9	V1, V2 SG's HT feed	2,000
R10	V2 anode HT feed	5,000
R11	IF stopper	50,000
R12	V3 signal diode load; manual volume control	500,000
R13	V3 triode CG resistance	5,000,000
R14	V3 triode anode load	100,000
R15	V3 AVC diode load	1,000,000
R16	V4 CG's decoupling	100,000
R17	Variable tone control	100,000
R18	V4 auto GB resistance	1,200

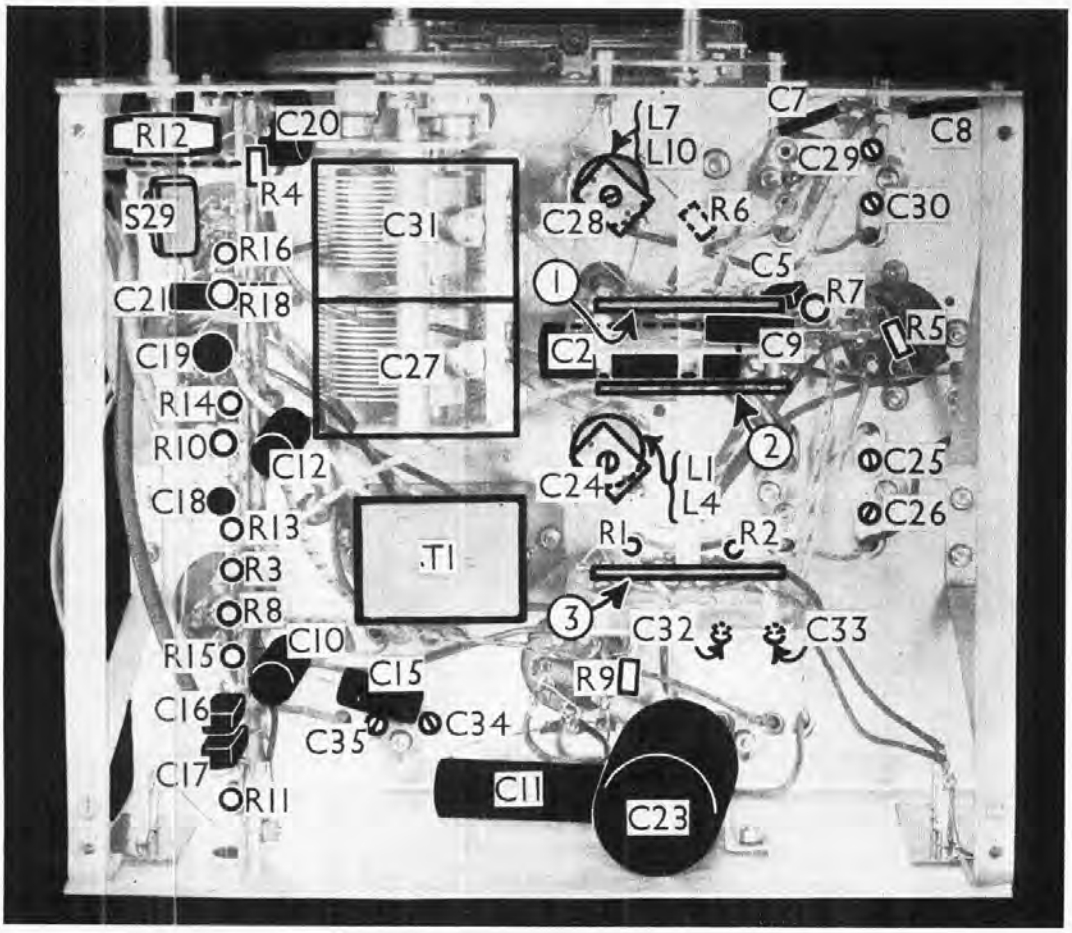
	CONDENSERS	Values (μF)
C1	Aerial circuit LW shunt	0·0008
C2	V1 pentode CG decoupling	0·5
C3	1st IF trans. pri. trimmer	0·00018
C4	1st IF trans. sec. trimmer	0·00018
C5	V1 osc. CG condenser	0·0005
C6	Osc. circuit LW fixed trimmer	0·0001
C7	Osc. circuit MW tracker	0·000556
C8	Osc. circuit LW tracker	0·000316
C9	V1 osc. anode coupling	0·0001
C10	V2 CG decoupling	0·1
C11	V1, V2 SG's decoupling	0·5
C12	V2 anode decoupling	0·1
C13	2nd IF trans. pri. trimmer	0·00018
C14	2nd IF trans. sec. trimmer	0·00018
C15	Coupling to V3 AVC diode	0·0001
C16	IF by-pass condensers	0·0001
C17		0·0001
C18	AF coupling to V3 triode	0·001
C19	AF coupling to T1	0·1
C20*	V4 auto GB by-pass	100·0
C21	Fixed tone corrector	0·001
C22	Part of variable tone control	0·01
C23	HT circuit reservoir	2·0
C24‡	Aerial circuit SW trimmer	0·00003
C25‡	Aerial circuit MW trimmer	0·00006
C26‡	Aerial circuit LW trimmer	0·00006

* Electrolytic. ‡ Pre-set.



Circuit diagram of the Bush BA53. Note the alternative aerial arrangements. Inset on the right is an underneath view of the speaker plug, which also connects LT positive.

Under - chassis view. **S29** is operated by a push-pull action of the spindle of **R12.** There are eight trimmers at the bases of the coil units on the chassis deck, which are adjustable by screws beneath the chassis, and these screws are all identified in this illustration.



CONDENSERS (*Continued*)		Values (μF)
C27†	Aerial circuit tuning	—
C28‡	Osc. circuit SW trimmer ..	0·00003
C29‡	Osc. circuit MW trimmer ..	0·00006
C30‡	Osc. circuit LW trimmer ..	0·00006
C31†	Oscillator circuit tuning ..	—
C32‡	1st IF trans. pri. tuning ..	0·00006
C33‡	1st IF trans. sec. tuning ..	0·00006
C34‡	2nd IF trans. pri. tuning ..	0·00006
C35‡	2nd IF trans. sec. tuning ..	0·00006

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS			Approx. Values (ohms)
L1	Aerial SW coupling coil ..		0·2
L2	Aerial MW coupling coil ..		1·7
L3	Aerial LW coupling coil ..		32·0
L4	Aerial SW tuning coil. .		0·05
L5	Aerial MW tuning coil ..		1·4
L6	Aerial LW tuning coil ..		11·0
L7	Osc. SW grid reaction coil ..		0·2
L8	Osc. MW grid reaction coil ..		2·7
L9	Osc. LW grid reaction coil ..		6·0
L10	Osc. circuit SW tuning coil ..		0·05
L11	Osc. circuit MW tuning coil ..		1·7
L12	Osc. circuit LW tuning coil ..		3·0
L13	1st IF trans.	Pri. ..	4·0
L14		Sec. ..	4·0
L15	2nd IF trans.	Pri. ..	4·0
L16		Sec. ..	4·0
L17	Speaker speech coil		1·7
T1	Intervalve trans.	Pri. ..	360·0
		Sec., total	6,000·0
T2	Speaker input trans.	Pri., total	80·0
		Sec. ..	0·2
S1-S24	Waveband switches		
S25-28	Scale lamp switches		
S29	Local-distant switch, ganged R12		
S30	LT circuit switch, ganged R17		

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (six round-head wood screws) gives access to most of the components which are beneath the chassis.

Removing Chassis.—Should it be necessary to remove the chassis, first remove the knobs (recessed screws) and felt washers from the three right-hand spindles. Unplug the speaker and tone control leads from the socket on the chassis, free the battery leads from the cleat on the top of the accumulator compartment (round-head wood screw) and then remove the four bolts (with washers) holding the chassis to the bottom of the cabinet.

The chassis can now be withdrawn from the cabinet and *when replacing*, do not forget to replace the felt washers on the control spindles before fixing the knobs.

Removing Speaker.—To remove the speaker, unsolder the leads and remove the nuts (and washers) from the four screws holding the speaker to the sub-baffle.

When replacing, make sure that the transformer is at the top and connect the leads as follows, numbering the tags from left to right:—Bottom row, 1, green to extension speaker panel; 2, black to speaker panel; 3, yellow to chassis; 4, yellow to chassis. Top row, 1, brown to speaker panel; 2, red to chassis.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver, when it was operating with a new HT battery reading 148 V, on load. The receiver was tuned to the lowest wavelength on the medium band and both the volume and local-distant controls were at maximum (the latter pushed in), but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TP23	135 (Oscillator)	0·4	46	0·8
	52	1·8		
V2 VP210	123	1·4	46	0·4
V3 TDD2A	46	0·8	—	—
V4 QP230	133†	1·8†	135	0·9

† Each anode.

GENERAL NOTES

Switches.—S1-S24 are the waveband switches, and **S25-S28** the scale lamp switches, ganged together in three rotary units beneath the chassis. They are indicated in our under-chassis view, and shown in detail in the diagrams on page VIII. The table (page VIII) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates *open*, and **C** *closed*.

Continued overleaf

BUSH BA53—*Continued*

S29 is the QMB local-distant switch, operated by a push-pull movement of the volume control (**R12**) spindle. With the spindle in (distant), **S29** is *open*, and with it out (local), **S29** is *closed*.

S30 is the QMB LT circuit switch, ganged with the tone control **R17,** which is fitted to a bracket on the floor of the cabinet. These two components are not shown in our chassis illustrations.

Coils.—**L1, L4** and **L7, L10** are in two unscreened tubular units beneath the chassis, the thick wire windings being **L4** and **L10** respectively. **L2, L3, L5, L6; L8, L9, L11, L12** and the IF transformers **L13, L14** and **L15, L16** are in four screened units on the chassis deck. These units also contain their associated trimmers (adjustable by screws beneath the chassis) and several other condensers.

Scale Lamps.—These are three Osram MES types, rated at 3·5 V, 0·15 A. They are switched by **S25-S28.** Actually **S25** is an "accidental" switch, and is not really necessary.

External Speaker.—Two sockets are provided on a panel at the rear of the cabinet for a low impedance (2O) external speaker. A plug and socket arrangement permits the internal speaker speech coil to be disconnected when desired.

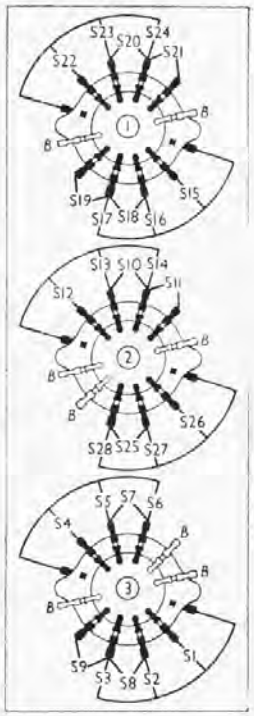
Speaker Plug and Socket.—A 5-pin plug and socket arrangement is used for connecting the speaker and **LT+** lead, via **S30,** to the chassis. The socket is mounted on the chassis deck. The individual connections are indicated by numbered arrows and circles in the circuit diagram, and an underneath view of the connector, with the individual sockets numbered, is inset to the right of the diagram.

Condenser C22.—This, being associated with **R17** and **S30,** is not seen in the chassis illustrations.

Aerial Sockets.—**A1** in our diagram gives maximum sensitivity, and **A2,** maximum selectivity, and they are thus indicated by the makers on the back of the receiver. They both have the same effect on SW, however.

TABLE AND DIAGRAMS OF THE SWITCH UNITS

Switch	LW	MW	SW
S1	—	—	C
S2	—	C	—
S3	C	—	—
S4	—	—	C
S5	—	C	—
S6	C	—	—
S7	—	—	C
S8	—	—	C
S9	—	C	—
S10	—	—	C
S11	—	C	—
S12	—	—	C
S13	—	C	—
S14	C	—	—
S15	—	—	C
S16	—	C	—
S17	C	—	—
S18	—	—	C
S19	—	C	—
S20	—	—	C
S21	—	C	—
S22	—	—	C
S23	—	C	—
S24	C	—	—
S25	—	—	C
S26	—	—	C
S27	—	C	—
S28	C	—	—



Diagrams of the wave-band and scale lamp switches, as seen from the rear of the underside of the chassis.

Batteries.—LT, Exide CZH3 2V 30AH celluloid cased cell. HT, Drydex 144 V dry battery, tapped at 60 V, type S54. GB is automatic.

Battery Leads and Voltages.—Black lead, spade tag, LT negative; brown lead, spade tag, LT positive 2 V; blue lead, black plug, HT negative; green lead and plug, HT positive 1, +60 V; red lead and plug, HT positive 2, +144V.

CIRCUIT ALIGNMENT

When aligning, the volume control must be at maximum, and the tone control at "low."

IF Stages.—A damping circuit of a 30,000 O resistor in series with a 0·1 μF condenser must be used where indicated. Switch set to MW, and turn gang to 300 m.

Connect signal generator between control grid of **V2** and chassis, and damping circuit from AVC diode of **V3** to chassis. Feed in a 465 KC/S signal, and adjust **C35** for maximum output. Connect damping circuit to signal diode of **V3** (pin to which is connected the green lead from second IF transformer) and chassis. Adjust **C34** for maximum output.

Connect signal generator to control grid (top cap) of **V1** and chassis, connect damping circuit from anode of **V1** to chassis. Feed in a 465 KC/S signal, and adjust **C33** for maximum output. Connect damping circuit from control grid of **V2** to chassis, and adjust **C32** for maximum output.

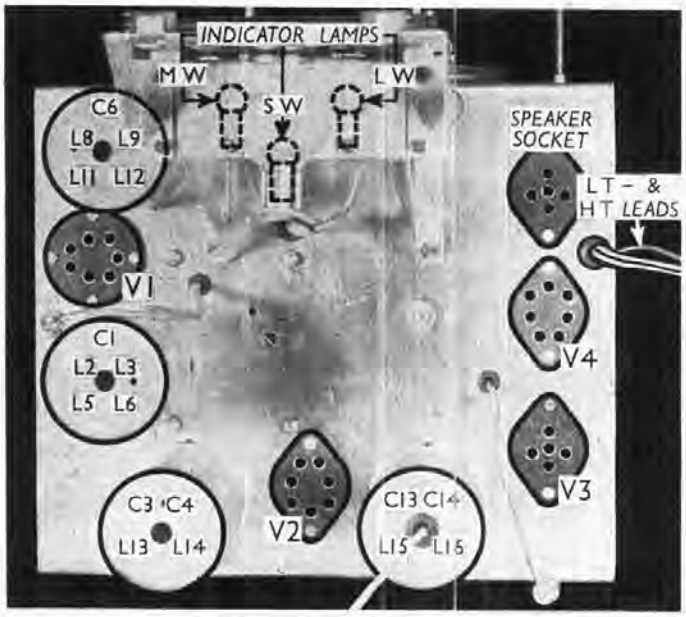
RF and Oscillator Stages.—With the gang fully meshed, the black line on the pointer should coincide with the top lines of the wavelength scales.

SW.—Connect signal generator to **A1** and **E** sockets, and switch set to SW. Tune to 18 m on scale, feed in an 18 m (16·67 MC/S) signal, and adjust **C28,** then **C24** for maximum output. Check calibration at 50 m.

MW.—When adjusting on MW and LW, connect a 1 MO damping resistance between LT+ and the junction of **R8, C10,** and a similar resistance between LT+ and the junction of **R11** and **C17.**

Connect signal generator to control grid (top cap) of **V1** and **E,** switch set to MW, tune to 300 m on scale, and feed in a 300 m (1,000 KC/S) signal. Adjust **C29** for maximum output. Transfer generator to **A1** socket, via a dummy aerial, and adjust **C25,** also at 300 m. Check calibration at 500 m.

LW.—Connect generator to top cap of **V1** and **E** again, switch set to LW, and tune to 1,400 m on scale. Feed in a 1,400 m (214 KC/S) signal, and adjust **C30** for maximum output. Transfer generator to **A1** socket (via dummy aerial), and adjust **C26** for maximum output, at 1,400 m. Check calibration at 1,900 m.



Plan view of the chassis. Note the socket which takes the speaker plug. The trimmers are reached from beneath the chassis, and hence are not indicated on the coil units.

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