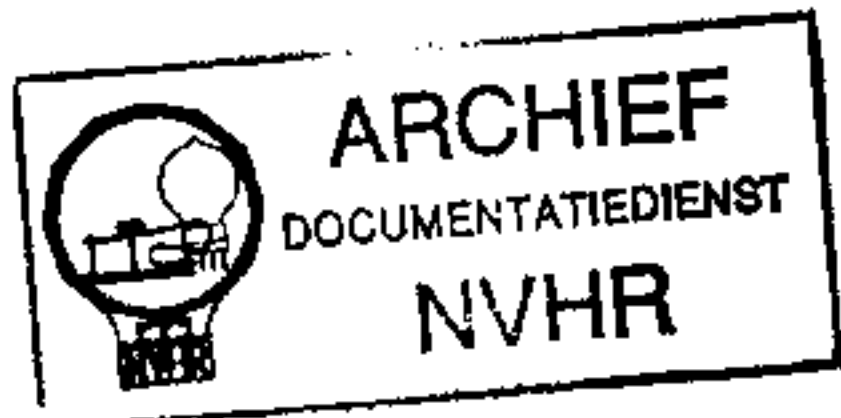


Ned. Ver. v. Historie v/d Radio



BUSH SB44

2-BAND BATTERY SUPERHET

THE Bush SB44 is a 4-valve battery 2-band superhet, with an octode frequency changer, a variable-mu pentode I.F. amplifier, a double-diode triode and a pentode output valve. Provision is made for a gramophone pick-up and an extension speaker, and there is a plug and socket arrangement for cutting out the internal speaker. No batteries are supplied with the receiver.

CIRCUIT DESCRIPTION

Aerial input via coupling coils **L1, L2** to inductively coupled band-pass filter. Primary coils **L3, L4** are tuned by **C16**; secondaries **L8, L9** by **C18**; coupling by coils **L5, L6**. **R1** across aerial circuit introduces damping when local-distant switch **S1** is closed to reduce sensitivity when receiving local transmissions.

First valve (**V1, Mullard metallised FC2**) is an octode operating as frequency changer with electron coupling. Oscillator grid coils **L10 (M.W.)** and **L11 (L.W.)** are tuned by **C20**; parallel trimming by **C21 (M.W.)** and **C22 (L.W.)**; tracking by specially shaped vanes of **C20** and, on L.W. only, series trackers **C5, C23**. Reaction by coils **L12 (M.W.)** and **L13 (L.W.)**.

Second valve (**V2, Mullard metallised VP2**) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C24, L14, L15, C25, and C26, L16, L17, C27**.

Intermediate frequency 123 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 load resistance **R8**, which also operates as manual volume control, and passed via A.F. coupling condenser **C11, C.G. resistance R10** and grid stopper **R9** to C.G. of triode section, which operates as A.F. amplifier.

Second diode of **V3**, fed from **V2** anode via **C8**, provides D.C. potential which is developed across load resistance **R13** and passed back through decoupling circuit as G.B. to F.C. and I.F. valves, giving automatic volume control.

Resistance-capacity coupling by **R12, C13** and **R15** via grid stopper **R17**, between **V3** triode and pentode output valve (**V4, Mullard PM22A**). Fixed tone correction in anode circuit by **C14**. Provision for connection of high impedance external speaker across primary of internal speaker input transformer **T1**. Internal speaker may be muted by removing plug from socket at rear of chassis which breaks the speech coil circuit.

G.B. potentials for **V3** triode and **V4** are obtained automatically from drop along **R18, R19** in H.T. negative lead to chassis.

DISMANTLING THE SET.

Removing Chassis.—To remove the chassis from the cabinet, remove the four control knobs (recessed grub screws) and the four bolts (with washers) holding the chassis to the bottom of the cabinet. Now free the speaker leads from the cleat holding them to the sub-baffle, when the chassis can be withdrawn to the extent of the leads, which is sufficient for normal purposes.

If it is desired to free the chassis entirely, unsolder the speaker leads, and

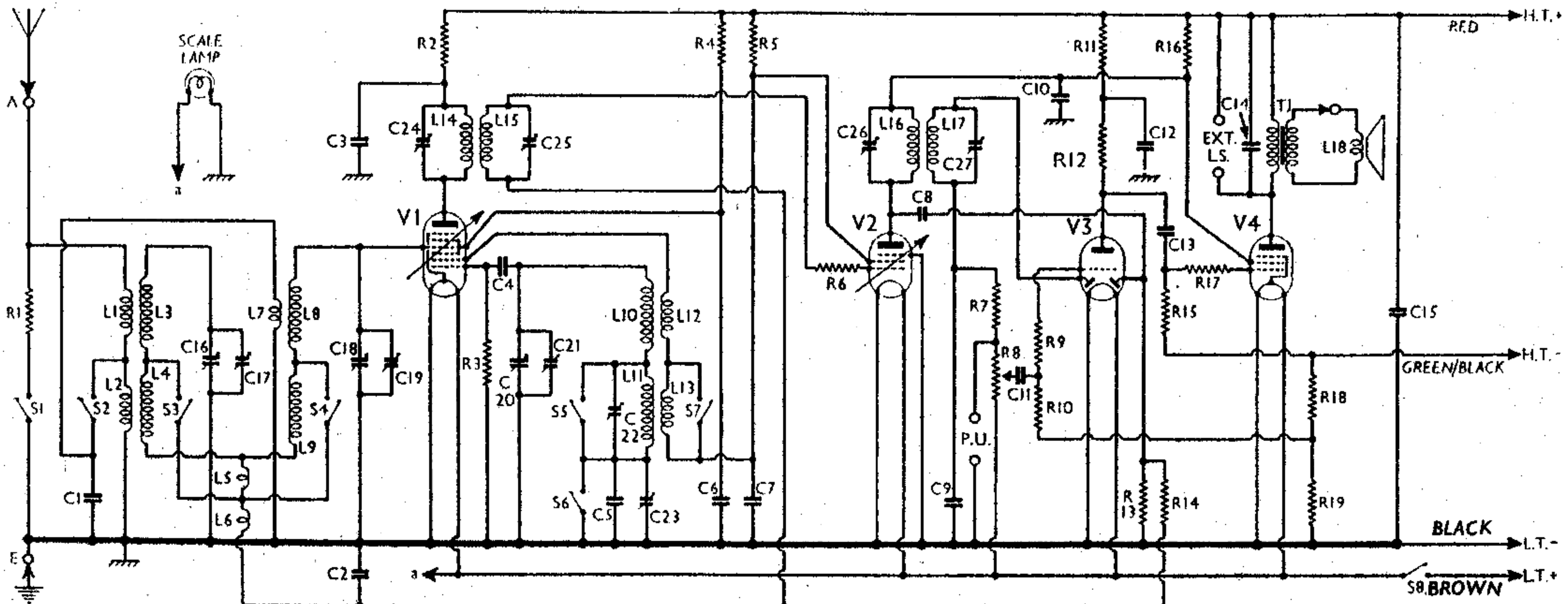
when replacing connect them as follows numbering the tags from left to right:— 1, red; 2, black; 3, no external connection; 4, green; 5, yellow.

Removing Speaker.—To remove the speaker from the cabinet, remove the nuts and washers from the four screws holding it to the sub-baffle. When replacing, see that the transformer is at the bottom and connect the leads as above.

COMPONENTS AND VALUES

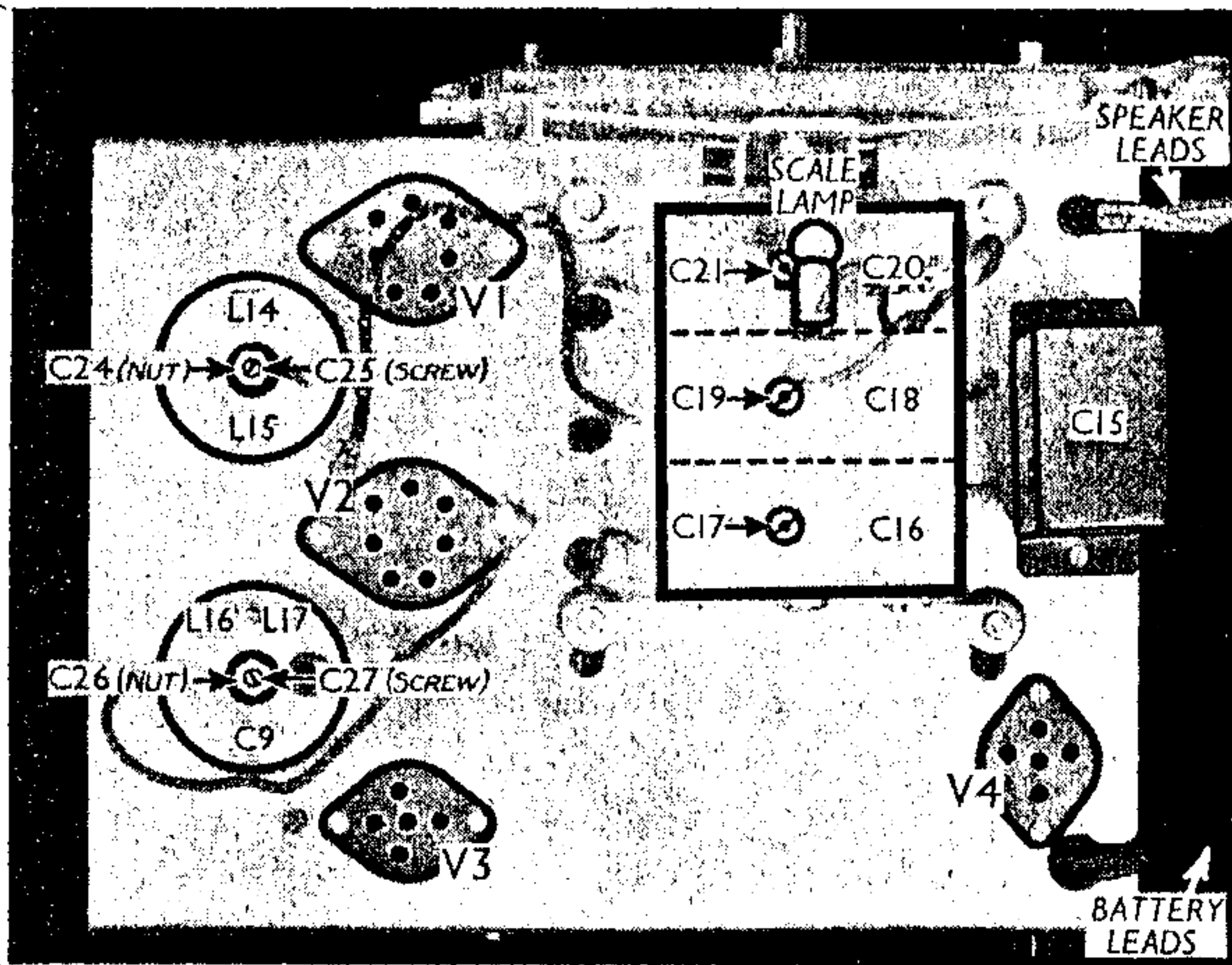
CONDENSERS		Values (μF)
C1	Part of image suppression circuit	0.01
C2	A.V.C. line decoupling	0.1
C3	V1 pentode anode decoupling	0.1
C4	V1 osc. C.G. condenser	0.0005
C5	Osc. circuit L.W. fixed tracker	0.0011
C6	V1 S.G. decoupling	0.1
C7	V1 osc. anode and V2 S.G. decoupling	0.1
C8	Coupling to V3 A.V.C. diode	0.00005
C9	I.F. by-pass	0.0001
C10	V2 anode and V4 S.G. decoupling	0.1
C11	A.F. coupling to V3 triode	0.01
C12	V3 triode anode decoupling	0.1
C13	V3 triode to V4 A.F. coupling	0.03
C14	Fixed tone corrector	0.003
C15	H.T. circuit reservoir	2.0
C16†	Band-pass primary tuning	—
C17†	Band-pass pri. M.W. trimmer	—
C18†	Band-pass secondary tuning	—
C19†	Band-pass sec. M.W. trimmer	—
C20†	Oscillator circuit tuning	—
C21†	Osc. circuit M.W. trimmer	—
C22†	Osc. circuit L.W. trimmer	0.00004
C23†	Osc. circuit L.W. tracker	0.00025
C24†	1st I.F. trans. pri. tuning	0.00012
C25†	1st I.F. trans. sec. tuning	0.00012
C26†	2nd I.F. trans. pri. tuning	0.00025
C27†	2nd I.F. trans. sec. tuning	0.00025

† Variable. ‡ Pre-set.



Circuit diagram of the Bush SB44 2-band battery superhet. S1 is the local-distant switch.

Plan view of the chassis. The I.F. transformers have dual trimmers for adjustment. C9 is inside the second unit.



GENERAL NOTES

Switches.—S1 is the local-distant switch, located at the front of the chassis, and having a knob marked 1 and 2. In position 1, S1 is open ("distant"), and in position 2 it is closed, switching R1 into circuit for local reception.

S2-S7 are the waveband switches, ganged in a single unit beneath the chassis. They are individually indicated in our under-chassis view, and are all closed on M.W. and open on L.W.

S8 is the Q.M.B. L.T. circuit switch, ganged with the volume control R8.

Coils.—All the coils, except the I.F. transformers, are in three screened units beneath the chassis. Note that the L10-L13 unit also contains the condenser C4. In the centre unit L7 is arranged for variable coupling to L8, L9 by a screwed rod and nut projecting through the top of the can. One of its connections goes to the screen.

The I.F. transformers L14, L15 and L16, L17 are in two screened units on the chassis deck, each having a dual concentric type of trimmer unit, of which the nut adjusts the primary and the central screw the secondary. The second unit also contains C9.

Scale Lamp.—This is an Osram M.E.S. type, rated at 3.5 V, 0.15 A.

External Speaker.—Two sockets are provided at the rear of the chassis for a high resistance (16,000Ω) external speaker. A plug and socket device disconnects the speech coil of the internal speaker, if desired.

Condenser Block.—Six 0.1 μF paper condensers are contained in a flat metal-cased unit beneath the chassis. The case forms one common connection for each condenser, the other connections being brought out to tags. The condensers are identified in our under-chassis view.

Continued overleaf

wavelength on the medium band and both the volume control and local-distant switch were at maximum (the latter in position 1), but there was no signal input.

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

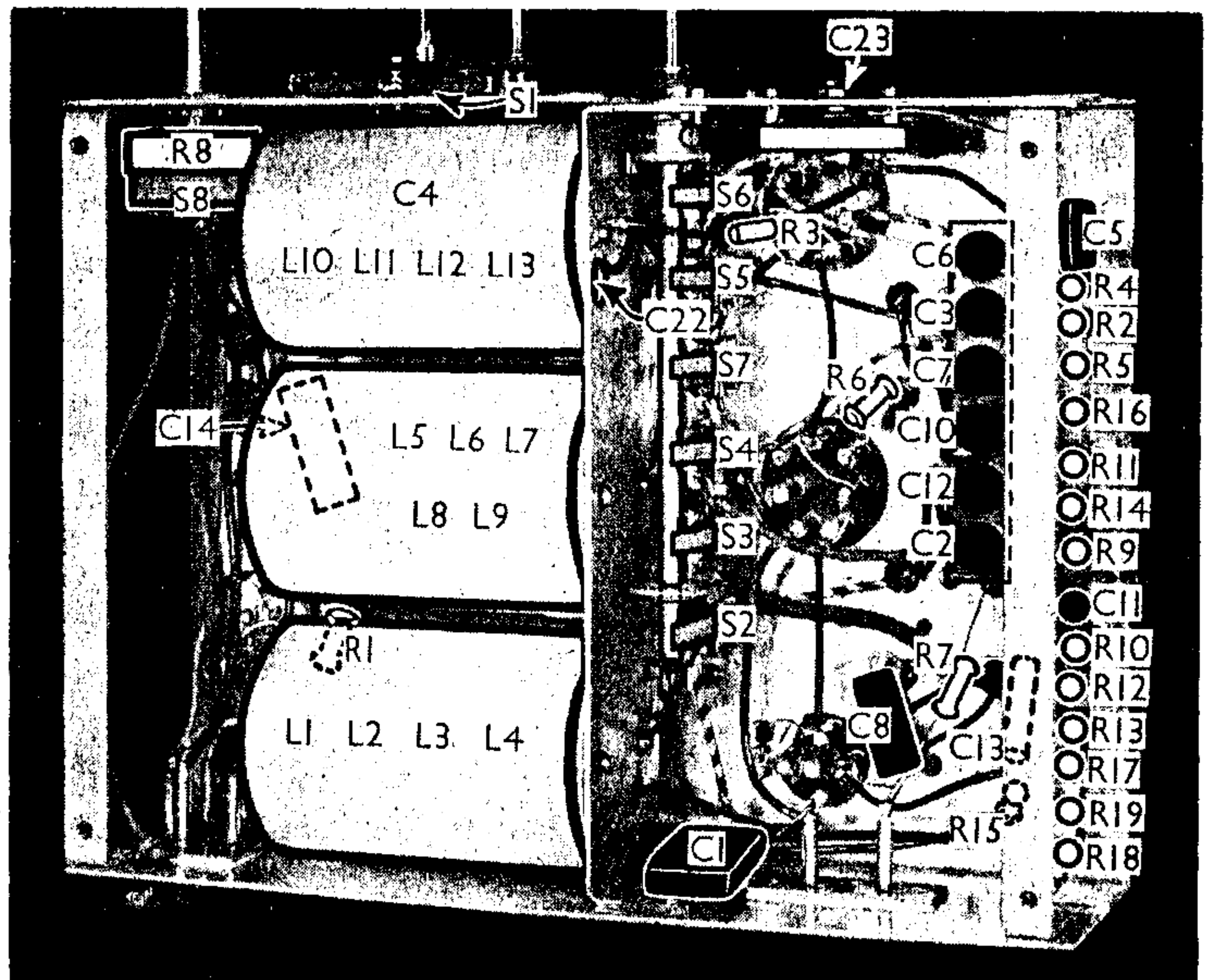
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 FC2	{ 130 Oscillator 117	{ 0.2 1.4	43	0.9
V2 VP2	110	1.6	117	0.4
V3 1DD2A	114	0.8	—	—
V4 PM22A	137	4.0	110	0.6

RESISTANCES		Values (ohms)
R1	Aerial circuit sensitivity shunt	50
R2	V1 pentode anode H.T. feed	10,000
R3	V1 osc. C.G. resistance	30,000
R4	V1 S.G. H.T. feed	100,000
R5	V1 osc. anode and V2 S.G. H.T. feed	10,000
R6	V2 C.G. anti-parasitic resistance	10,000
R7	I.F. stopper	50,000
R8	V3 signal diode load and manual Volume control	500,000
R9	V3 triode grid stopper	500,000
R10	V3 triode C.G. resistance	5,000,000
R11	V3 triode anode decoupling	10,000
R12	V3 triode anode load	10,000
R13	V3 A.V.C. diode load	1,000,000
R14	A.V.C. line decoupling	1,000,000
R15	V4 C.G. resistance	500,000
R16	V2 anode and V4 S.G. H.T. feed	10,000
R17	V4 grid stopper	100,000
R18	Automatic G.B. resistances	150
R19		250

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial coupling coils	1.2
L2		6.5
L3		3.0
L4		13.0
L5		3.5
L6	Band-pass coupling coils	0.5
L7		0.05
L8	Image suppression coil	3.0
L9		13.0
L10		3.5
L11	Osc. circuit M.W. tuning coil	8.5
L12	Osc. circuit L.W. tuning coil	2.2
L13	Oscillator M.W. reaction coil	2.5
L14	1st I.F. trans.	107.0
L15		107.0
L16	2nd I.F. trans.	66.0
L17		66.0
L18	Speaker speech coil	1.7
T1	Speaker input trans.	600.0
S1	Local-distant switch	—
S2-S7	Waveband switches	—
S8	L.T. circuit switch, ganged R8	—

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 2) are those measured in our receiver when it was operating with an H.T. battery reading 144 V, on load. The receiver was tuned to the lowest



Under-chassis view. All the switches are clearly indicated.

BUSH SB 44—Continued

Trimmer C22.—This is adjusted through a hole beneath the case of the **L10-L13** unit.

Tracker C23.—This is adjusted from the front of the chassis, a hexagonal nut forming the adjustment. The central screw is not used.

Chassis Divergencies.—**C13** is $0.03 \mu\text{F}$ in our chassis, but is given as $0.3 \mu\text{F}$ in the makers' component table. **R3** is 30,000 Ω in our chassis, not 50,000 Ω . **C14** is connected between anode of **V4** and H.T. positive line, not chassis.

Batteries.—L.T., 2 V L.T. cell; H.T., 144 V dry H.T. battery, such as Drydex type S54. No intermediate tappings are necessary. G.B. is automatic.

Battery Leads and Voltages.—Black lead, spade tag, L.T. negative; brown lead, spade tag, L.T. positive 2 V; green/black lead and plug, H.T. negative; red lead and plug, H.T. positive 144 V.

CIRCUIT ALIGNMENT

I.F. Stages.—Connect signal generator to control grid (top cap) of **V1** and chassis. Turn gang to maximum and switch to M.W. Feed in a 123 KC/S signal and adjust **C27** (screw), **C26** (nut), **C25** (screw) and **C24** (nut) in turn for maximum output.

R.F. and Oscillator Stages.—With gang at maximum, pointer should read 550 m. on the scale. Connect signal generator to **A** and **E** sockets.

M.W.—Switch to M.W., feed in a 300 m. (1,000 KC/S) signal, tune to 300 m. on scale, and adjust **C21**, **C19** and **C17**, in that order, for maximum output.

Feed in a 500 m. (600 KC/S) signal, tune to 500 m. on scale, and check settings of **C19** and **C17**. No M.W. tracker is used (apart from the shaped condenser vanes).

L.W.—Switch to L.W., feed in a 1,200 m. (250 KC/S) signal, tune to 1,200 m. on scale, and adjust **C22** for maximum output. Feed in an 1,800 m. (167 KC/S) signal, tune it in, and adjust **C23** for maximum output, while rocking the gang for optimum results. Check at 1,500 m.