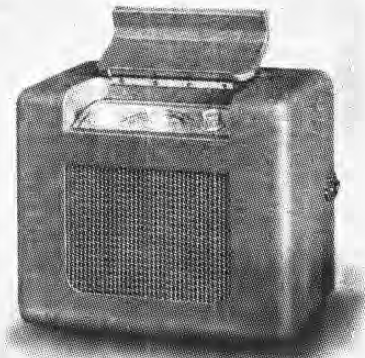


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"TRADER" SERVICE SHEET
1127

BUSH BAC31

All-dry Battery Portable



Appearance of the Bush BAC31

THE Bush BAC31 is a 4-valve all-dry battery portable superhet covering 187-560 m and 1,071-1,898 m.

A separate mains unit is designed for use with the BAC31 which enables it to operate from 200-250 V A.C. mains of 40-100 c/s.

Release date, August 1953. Original prices: BAC31, £13 4s 4d, plus purchase tax and batteries; Mains Unit, £3.

CIRCUIT DESCRIPTION

Tuned frame aerial input by **L1, C30** (M.W.) and **L1, L2, C30** (L.W.) to heptode valve (**V1, Mullard DK92**), which operates as frequency changer with electron coupling. When the receiver is operated in conjunction with the specially designed mains unit (see end of "Circuit Description") the extra chassis surface involved acts as a short-circuit turn on the frame aerials, reducing their inductance. This effect is particularly marked on L.W., and to offset it a L.W. loading coil **L3** is inserted in series with the frame aerials. This coil is only brought into operation where a mains unit is fitted, and is otherwise short-circuited as indicated in the circuit diagram.

Second valve (**V2, Mullard DF91**) is a variable- μ R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C4, L6, L7, C5** and **C12, L8, L9, C13**.

Intermediate frequency 470 kc/s.

Diode signal detector is part of diode pentode valve (**V3, Mullard DAF91**). Audio frequency component in rectified output is developed across volume control

R11, which acts as diode load, and is passed via **C17** to control grid of pentode section. I.F. filtering by **C15, R9, C16** and **C21**.

Resistance-capacitance coupling via **R14, C22** and **R17** between **V3** and pentode output valve (**V4, Mullard DL94**). Tone correction in anode circuit by **C23**. Grid bias voltage for **V4** is developed across **R17** in the H.T. negative lead.

The receiver, which is designed primarily for operation from all-dry batteries, may be powered from an A.C. mains supply by means of a separate add-on mains unit. When in use this mains unit is bolted into the cabinet beneath the main receiver chassis, H.T. and L.T. connections between the two being made by means of the 4-pin plugs and sockets **A, B, C** and **D**. Details of the plug and socket connections are given under

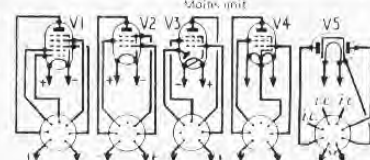
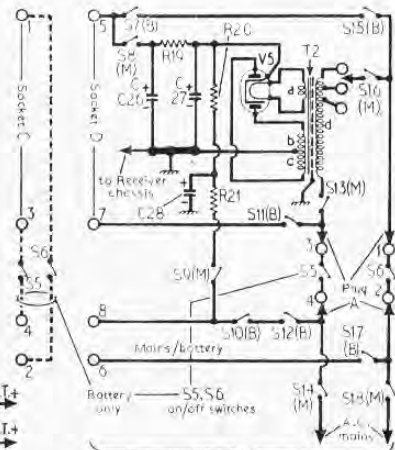
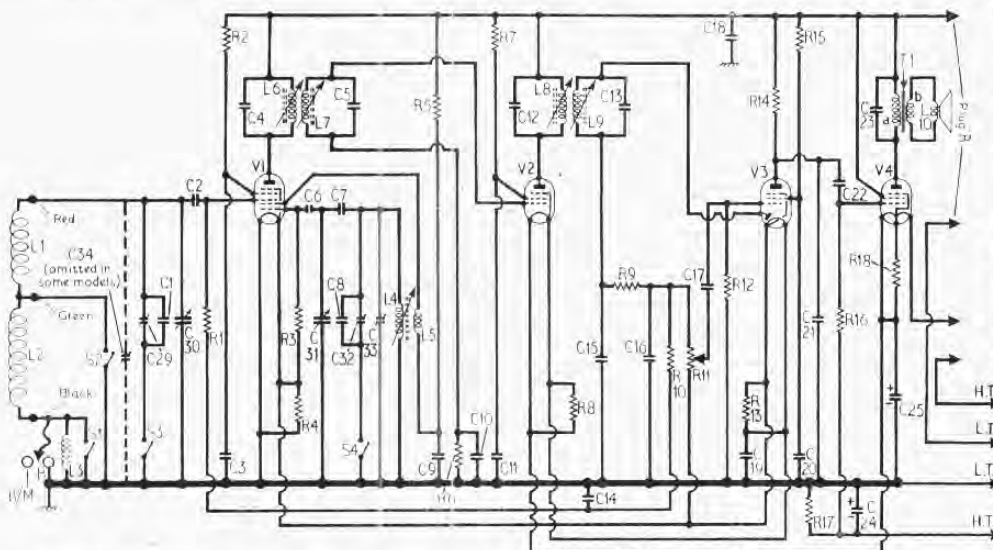
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COMPONENTS AND VALUES

RESISTORS		Values	Locations
R1	V1 C.G. ...	2.2M Ω	G3
R2	V1 S.G. feed ...	180k Ω	F3
R3	V1 osc. C.G. ...	47k Ω	G4
R4	fil. H.T. by-pass ...	150 Ω	G4
R5	Osc. H.T. feed ...	33k Ω	F3
R6	V2 C.G. ...	4.7M Ω	F3
R7	V2 S.G. feed ...	50k Ω	F3
R8	fil. H.T. by-pass ...	220 Ω	F4
R9	I.F. stopper ...	47k Ω	E4
R10	A.G.C. decoupling ...	2.2M Ω	E3
R11	Volume control ...	500k Ω	E3
R12	V3 C.G. ...	4.7M Ω	E3
R13	fil. H.T. by-pass ...	180 Ω	E3
R14	V3 anode load ...	470k Ω	E4
R15	V3 S.G. feed ...	2.2M Ω	D4
R16	V4 C.G. ...	1M Ω	D3
R17	V4 G.B. ...	150 Ω	D3
R18	fil. H.T. by-pass ...	470 Ω	D3
R19	H.T. smoothing ...	2.7k Ω	F4
R20	} Fil. smoothing	1.5k Ω	D4
R21			

CAPACITORS	Values	Locations
C1	L.W. aerial trim. ...	140pF G3
C2	V1 C.G. ...	100pF G3
C3	V1 S.G. decoup. ...	0.05 μ F F4
C4	} 1st I.F. trans. tun. {	110pF A1
C5		110pF A1
C6	V1 osc. C.G. ...	80pF G8
C7	Osc. tracker ...	605pF F3
C8	L.W. osc. trim. ...	515pF F3
C9	Osc. anode decoup. ...	0.05 μ F F3
C10	V2 C.G. ...	0.01 μ F F3
C11	V2 S.G. decoup. ...	0.05 μ F F3
C12	} 2nd I.F. trans. tun. {	110pF B1
C13		110pF B1
C14	A.G.C. decoupling ...	0.05 μ F E3
C15	} I.F. by-passes {	500pF E3
C16		100pF E4
C17	A.F. coupling ...	500pF E3
C18	H.T. by-pass ...	0.5 μ F B1
C19	Filament by-pass ...	0.05 μ F E3
C20	V3 S.G. decoup. ...	0.05 μ F D4
C21	I.F. by-pass ...	100pF E4
C22	A.F. coupling ...	0.005 μ F E3
C23	Tone corrector ...	0.001 μ F
C24*	V4 G.B. by-pass ...	50 μ F B1
C25*	Filament by-pass ...	200 μ F D8
C26*	} H.T. smoothing {	32 μ F A2
C27*		32 μ F A2
C28*	Filament smoothing ...	25 μ F D4
C29†	L.W. aerial trim. ...	40pF G3
C30†	Aerial tuning ...	528pF F3
C31†	Oscillator tuning ...	528pF F3
C32†	L.W. osc. trim. ...	40pF G3
C33†	M.W. osc. trim. ...	40pF G3
C34†	M.W. aerial trimmer ...	40pF G3

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Bush BAC31. On/off switches **S5, S6** are either connected directly to the receiver, as shown by the socket C connections **1, 2, 3, 4** in broken line, or directly to the mains unit, shown on the extreme right.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	M.W. frame aerial	2-0	—
L2	L.W. frame aerial	7-5	—
L3	L.W. loading coil	3-9	F3
L4	Osc. tuning coil	1-0	F3
L5	Osc. reaction coil	2-4	F3
L6	1st I.F. trans.	Pri. 11-0	A1
L7		Sec. 11-0	A1
L8	2nd I.F. trans.	Pri. 11-0	B1
L9		Sec. 11-0	B1
L10	Speech coil	2-0	—
T1	O.P. trans.	540-0	—
T2	Mains trans.	a	A2
		b	
		c	
		d, total	
S1-S4	Waveband switches	—	F3
S5, S6	Power sw., g'd R11	—	F3
S7(B)	Mains/battery switches	—	E4
S18(M)			

Circuit Description—continued

"Mains Unit" in "General Notes." Mains/battery change-over switches **S7(B)**, **S10(B)**, **S11(B)**, **S12(B)** and **S17(B)** close for battery operation as indicated by the suffix **(B)**. Switches **S8(M)**, **S9(M)**, **S13(M)**, **S14(M)**, **S16(M)** and **S18(M)** close for mains operation.

For mains operation H.T. current is supplied by full-wave H.T. rectifying valve **V5**, Mullard **EZ41**. Smoothing valve **R19** and capacitors **C26**, **C27**.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturers' information. Readings for **V1-V4** were measured on a receiver operating from new batteries. Those obtained when it was operating from the mains unit were about 10 per cent lower. Readings for **V5** were measured on a mains unit that was operating from A.C. mains of 230 V, the voltage adjustment being set to the 220-230 V tapping.

Voltages were measured on the 10 V and 400 V ranges of a Model 7 Avometer, chassis being the negative connection. The negative bias measured across **R17** was 1.3 V, when the receiver was operating from batteries.

Valve	Anode		Screen	
	V	mA	V	mA
V1 DK92	90	1.3	62	0.2
	Oscillator			
	42	1.9		
V2 DF91	90	1.2	62	0.4
V3 1A F91	42	0.12	22	0.02
V4 DL94	85	4.2	97	0.8
V5 RZ41	125*	—	—	—

* A.C., each anode. Cathode voltage, 106V.

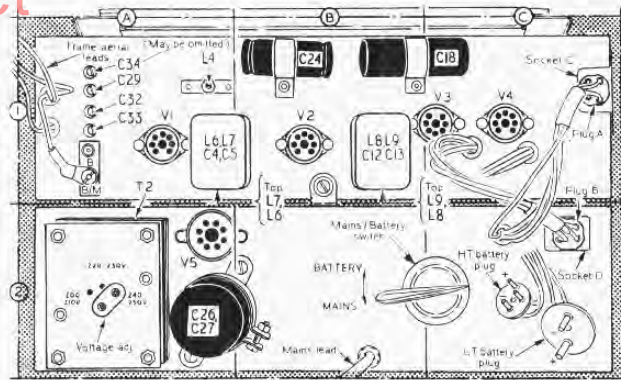
GENERAL NOTES

Switches.—**S1-S4** are the waveband switches, ganged in a single rotary unit beneath the chassis. The unit is shown in detail in our front view of the chassis, switches **S1** and **S2** closing for M.W. operation, and **S3**, **S4** for L.W. operation.

S5, S6 are the Q.M.B. on/off switches ganged with the volume control **R11**. The switch connections terminate in a 4-pin socket (labelled "C" in the chassis picture and circuit diagram) which allows it to be used as a battery on/off switch when the receiver is operated from batteries only, or as a power on/off switch when the receiver is operated in conjunction with the mains unit.

S7(B)-S18(M) are the mains/battery change-over switches, ganged in a single rotary unit under the chassis. The unit is

Rear view of the BAC31 chassis (top) with the mains unit chassis attached (below). Trimmer **C34** in location A1, is omitted in some receivers.



indicated in the front view of the chassis and shown in detail in the diagram below. The **(M)** switches close for mains operation (control fully anti-clockwise) and the **(B)** switches for battery operation.

Mains Unit.—When in use this unit is secured to the carrying case by means of two 2BA screws and is anchored to the receiver chassis by means of a third 2BA screw. The receiver plug, labelled B in the rear chassis illustration and in the circuit diagram, is inserted in socket D

on the mains unit. The mains unit plug A is inserted in the receiver socket C, and the lead from the loading coil **L3** is anchored under terminal B/M (location reference A1). If the mains unit is subsequently removed, the receiver plug B should be inserted in socket C, and the loading coil lead should be anchored under the "B" terminal.

Batteries.—Those recommended by the manufacturers are, L.T., Ever Ready AD31, rated at 7.5V; H.T., Ever Ready Batrymax B107, rated at 90V.

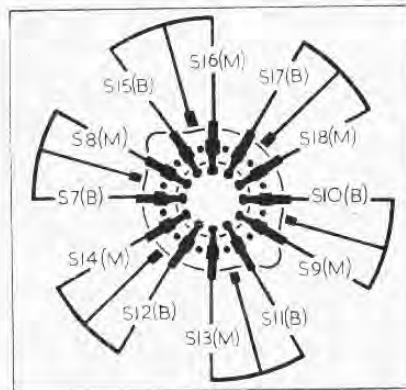
CIRCUIT ALIGNMENT

I.F. Stages.—Connect output of signal generator to junction of **L1**, **C2** (red frame aerial lead) and to chassis. Switch receiver to M.W. and turn gang to minimum capacitance. Feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L9** (location reference B1), **L8** (B1), **L7** (A1) and **L6** (A1) for maximum output. Repeat these adjustments until no further improvement results.

R.F. and Oscillator Stages.—With the chassis in position in the carrying case and the gang at maximum capacitance, check that the cursor coincides with the high wavelength ends of the tuning scales. Connect output of signal generator to a loop consisting of three turns of wire of 8in diameter and place the loop parallel to and about 3-4ft from the frame aerials.

M.W.—Switch receiver to M.W., tune to 500 m, feed in a 500 m (600 kc/s) signal and adjust the core of **L4** (A1) for maximum output. Tune receiver to 200 m, feed in a 200 m (1,500 kc/s) signal and adjust **C33** (A1) and **C34** (A1), where fitted, for maximum output. Repeat these adjustments until no further improvement results.

L.W.—Switch receiver to L.W., tune to 1,402 m, feed in a 1,402 m (214 kc/s) signal and adjust **C32** (A1) and **C29** (A1) for maximum output. Repeat these adjustments.



Above: Mains/battery switches, as viewed in chassis illustration below.

Below: Front view of the BAC31 chassis with the mains unit attached.

