"TRADER" SERVICE SHEET

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 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-mu 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

BUSH BAC31

All-dry Battery Portable

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.

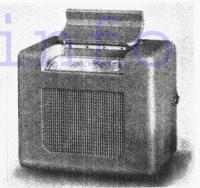
Resistance-capacitance coupling R14, C22 and R17 between V3 and pentode output valve (V4, Mullard DL94). Tone correction in anode circuit by C23. Grid bias voltage for V4 is developed across R17 in the H.T. negative lead.

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

(Continued col. 1 overleaf)

COMPONENTS AND VALUES

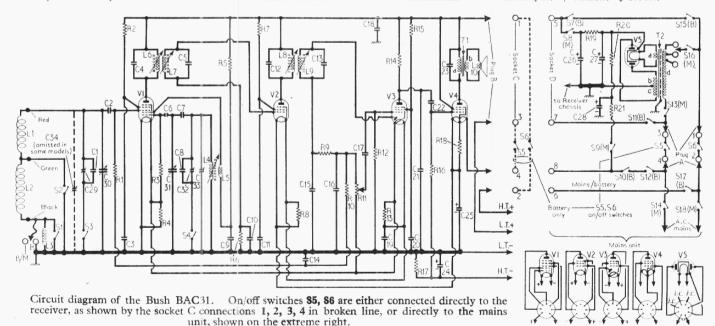
RESISTORS		Values	Loca- tions
R1	V1 C.G	2·2MΩ	G3
R2	V1 S.G. feed	$180 \text{k}\Omega$	F3
R3	V1 osc. C.G	$47k\Omega$	G4
R4	Fil. H.T. by-pass	150Ω	G4
R5	Osc. H.T. feed	$33k\Omega$	F3
R6	V2 C.G	$4.7M\Omega$	F3
R7	V2 S.G. feed	$56 k\Omega$	F3
R8	Fil. H.T. by-pass	220Ω	F4
R9	I.F. stopper	$47k\Omega$	E4
R10	A.G.C. decoupling	$2 \cdot 2 M \Omega$	E3
R11	Volume control	$500 \mathrm{k}\Omega$	E3
R12	V3 C.G	$4.7M\Omega$	E3
R13	Fil. H.T. by-pass	180Ω	E3
R14	V3 anode load	$470 \text{k}\Omega$	E4
R15	V3 S.G. feed	$2 \cdot 2M\Omega$	D4
R16	V4 C.G	$1M\Omega$	D3
R17	V4 G.B	150Ω	D3
R18	Fil. H.T. by-pass	470Ω	D_3
R19	H.T. smoothing	$2 \cdot 7 k\Omega$	F4
R20	•	1.5kΩ	D4
R21	Fil. smoothing	700Ω	$\widetilde{\mathrm{D}4}$



Appearance of the Bush BAC31

	CAPACITORS	Values	Loca- tions
C1	L.W. aerial trim	140pF	G3
C2	V1 C.G	$100 \mathrm{pF}$	G3
C3	V1 S.G. decoup	$0.05 \mu F$	F4
C4	} 1st I,F, trans, tun, {	110 pF	A1
C5		110pF	A1
C6	V1 osc. C.G	80 pF	G3
C7	Osc. tracker	605pF	F3
C8	L.W. osc. trim	515pF	F3
C9	Osc. anode decoup.	$0.05 \mu F$	F3
C10	V2 C.G	$0.01 \mu F$	F3
C11	V2 S.G. decoup	$0.05 \mu F$	F3
C12	2nd I.F. trans. tun.	110pF	B1
C13		110 pF	B1
C14	A.G.C. decoupling	$0.05 \mu F$	E3
C15	I.F. by-passes {	500 pF	E3
C16)	100pF	E4
C17	A.F. coupling	500pF	E3
C18 C19	H.T. by-pass	$0.5\mu F$	B1 E3
C20	Filament by-pass V3 S.G. decoup	$0.05 \mu F$ $0.05 \mu F$	D4
C21		$100 \mathrm{pF}$	E4
C22	I.F. by-pass		E3
C23	A.F. coupling Tone corrector	$0.005 \mu F$ $0.001 \mu F$	Eo
C24*	ATT COLUMN A	$50\mu F$	B1
C25*	V4 G.B. by-pass Filament by-pass	$200 \mu F$	D3
C26*)	$32\mu F$	A2
C27*	{ H.T. smoothing }	$32\mu F$	A2
C28*	Filamentsmoothing	$25\mu F$	D4
C291	L.W. aerial trim	40pF	63
G30+	Aerial tuning	528pF	F3
C31†	Oscillator tuning	528pF	F3
C321	L.W. osc, trim	40pF	G3
C33±	M.W. osc. trim.	40pF	G3
C34±	M.W. aerial trimmer	40pF	G3

* Electrolytic. † Variable. ‡ Pre-set.



отн	ER COMPONENTS	Approx. Values (ohms)	Loca- tions
L1 L2	M.W. frame aerial L.W. frame aerial	2·0 7·5	
L3	L.W. loading coil	3.8	F3
L4	Osc, tuning coil	1.5	F3
L5	Osc. reaction coil	2·0 11·0	F3
L6 L7	1st I.F. trans. Sec.	11:0	A1
L8) Special	11.0	Bi
L9	2nd I.F. trans. Sec.	11.0	Bi
L10	Speech coil	2.5	
T 1	O.P. trans. \{ \bar{a} \ \dots \dots \dots \}	540.0	
T2	$\mathbf{Mainstrans.} \begin{cases} \mathbf{a} & \dots \\ \mathbf{b} & \dots \\ \mathbf{c} \end{cases}$	300.0	A2
1.2	d, total	300·0 280·0	
S1-S4	Waveband switches		F3
S5, S6 S7(B)-	Power sw., g'd R11	-	E3
S18(M)	Mains/battery switches		E4

Circuit Description-continued

"Mains Unit" in "General Notes." Mains/battery change-over switches S7(B), S10(B), S11(B), S12(B) and \$17(B) close for battery operation as indicated by the suffix (B). Switches \$8(M), \$9(M), \$13(M), \$14(M), \$16(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 by 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 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.

37 - 1		Anode		Screen	
Valve		V	mA	V	mA
V1 DK92		{ 90 Oscill 42	$ \begin{bmatrix} 1 \cdot 3 \\ ator \\ 1 \cdot 9 \end{bmatrix} $	62	0.2
V2 DF91		90	1.2	62	0.4
V3 DAF91		42	0.12	22	0.02
V4 DL94		85	4.2	90	0.8
V5 EZ41		125*			

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

GENERAL NOTES

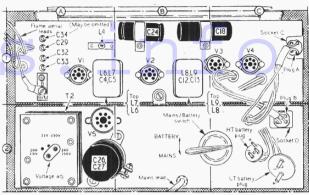
Switches.-S1-S4 are the waveband switches, ganged in a single rotary unit beneath the chassis. The unit is shown in detail in our front view of the chassis, switches S1 and S2 closing for M.W. operation, and S3, S4 for L.W. operation. S5, S6 are the Q.M.B. on/off switches

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 conjunc-

tion with the mains unit.

\$7(B)-\$18(M) are the mains/battery change-over switches, ganged in a single rotary unit under the chassis. The unit is

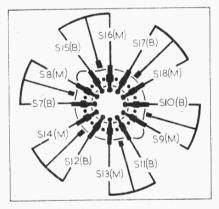
Rear view of the BAC31 chassis (top) with the mains unit chassis attached (below). Trimmer **G34** in location A1, is omitted in some receivers.



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



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

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

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

1.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.

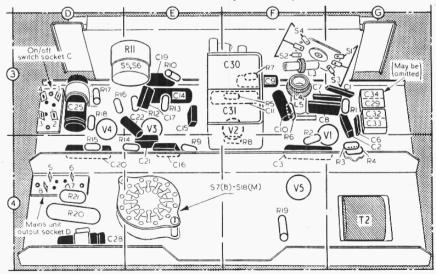
adjustments until no further improvement results.

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 Sin 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 the Core of L4 (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 C39 (A1) for maximium output. Repeat these adjustments.

Repeat these adjustments.



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