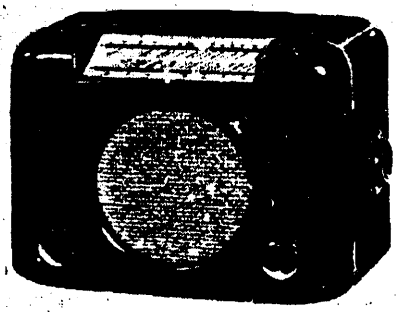
"TRADER" SERVICE SHEET

950

BUSH DAC90

A.C./D.C. Transportable 2-band Table Superhet



NO provision is made for the connection of an external aerial in the Bush DAC90, a small but efficient circular frame winding providing the necessary signal pick-up. The receiver is a 4-valve (plus rectifier) 2-band superhet designed to operate from A.C. or D.C. mains of 200-250 V. The waveband ranges are 190-560 and 900-2,000 m. This *Service Sheet* does not cover the DAC90A, which is different from the DAC90 in many ways.

Release date and original price: July, 1946, £11 11s, increased December, 1946, to £12 12s; and November, 1947, to £12 18s 9d; reduced April, 1948, to £12 11s 4d; and June, 1948, to £12 10s 9d. Cream finish extra. Purchase tax extra.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L1, C27** (M.W.) and **L1, L2, C27** (L.W.) precedes a triode hexode valve **(V1, Mullard CCH35)** operating as a frequency changer with internal coupling. **S1** closes to short-circuit **L2** on M.W. and opens to connect **L1** and **L2** in series on L.W.

Oscillator grid coils **L3** (M.W.) and **L4** (L.W.) are tuned by **C28.** Parallel trimming by **C29** (M.W.) and **C8, C30** (L.W.); series tracking by **C6** (M.W.) and **C7** (L.W.) Reaction coupling by anode coils **L5** (M.W.) and **L6** (L.W.).

Second valve **(V2, Mullard EF39)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C2, L7, L8, C3,** and **C13, L9, L10, C14.**

Intermediate frequency 465 kc/s

Diode second detector is part of double diode triode valve **(V3, Mullard EBC33).** Audio frequency component in rectified output is developed across manual volume control **R9,** which is also the signal diode load, and passed via **C18, R10** and **R11** to grid of triode section which operates as A.F. amplifier. I.F. filtering by **C15** in diode circuit, **R11** (in conjunction with the grid-cathode capacitance of **V3**) and **C19** in triode anode circuit.

Second diode of **V3,** fed from a tapping on **L9** via **C17,** provides a D.C. potential which is developed across **R14** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic gain control. Delay voltage, together with G.B. for **V2** and **V3,** is developed across **R13**

Resistance-capacitance coupling by **R12, C20, R15,** via grid stopper **R16,** between **V3** triode and pentode output valve **(V4, Mullard CL33).** Fixed tone correction by **C21** in anode circuit.

When the receiver is operated on A.C. mains, H.T. current is supplied by I.H.C. half-wave rectifying valve **(V5, Mullard CY31)** which, with D.C. mains behaves as a low resistance. Smoothing by resistor **R18** and electrolytic capacitors **C22, C23.**

Valve heaters, together with scale lamp and ballast resistor **R20,** are connected in series across the mains input circuit. Mains R.F. filtering by **C24.**

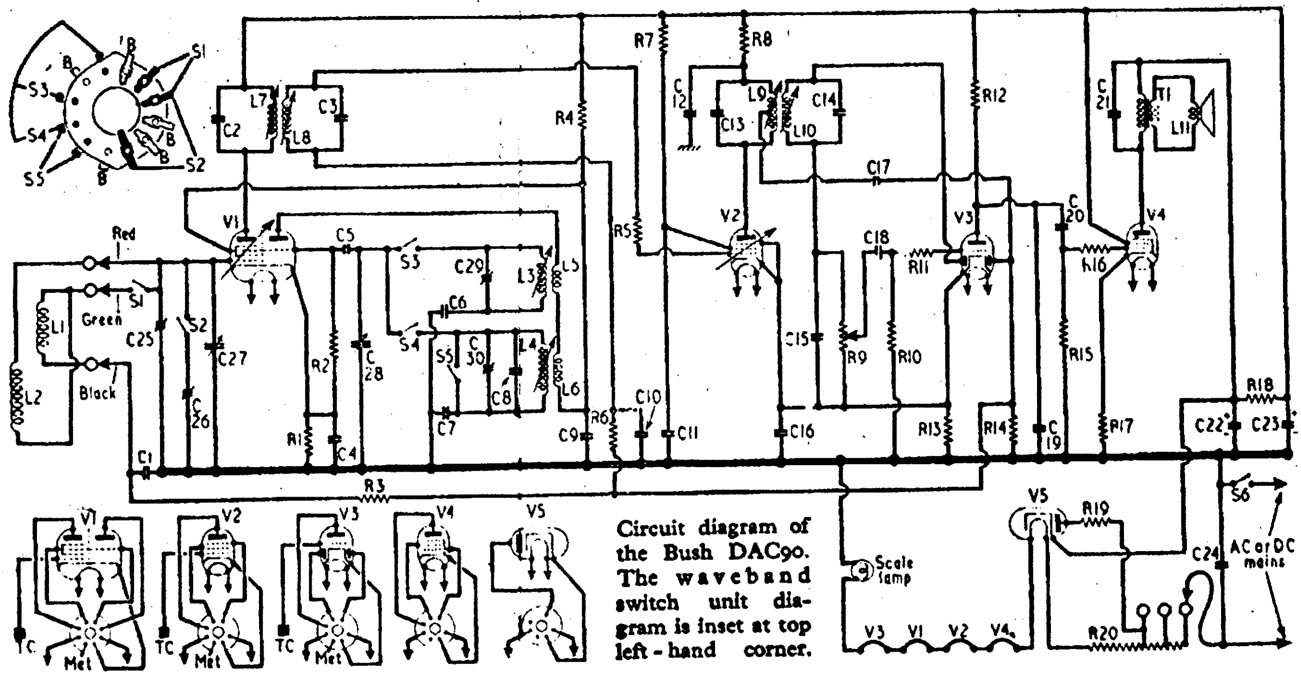
COMPONENTS AND VALUES

	RESISTORS	Values	Locations
R1	V1 fixed G.B. ...	100Ω	G4
R2	V1 osc. C.G. ...	33kΩ	H4
R3	A.G.C. decoup. ...	1MΩ	E4
R4	H.T. feed resistor	15kΩ	G4
R5	Grid stopper ...	220Ω	A2
R6	A.G.C. decoup. ...	1MΩ	E4
R7	V2 S.G. H.T. feed	47kΩ	E4
R8	V2 anode decoup.	10kΩ	F4
R9	Volume control ...	0·5MΩ	C3
R10	V3 C.G. resistor ...	2·2MΩ	C3
R11	I.F. stopper ...	100kΩ	B2
R12	V3 anode load ...	68kΩ	D4
R13	V2, V3 fixed G.B....	470Ω	F4
R14	A.G.C. diode load...	1MΩ	D4
R15	V4 C.G. resistor ...	470kΩ	D3
R16	V4 grid stopper ...	47kΩ	C3
R17	V4 G.B.	150Ω	C3
R18	H.T. smoothing ...	10kΩ	D4
R19	Surge limiter ...	150Ω	C4
R20	Heater ballast ...	800Ω†	B2

† tapped at 600Ω + 100Ω + 100Ω from V5 cathode

	CAPACITORS	Values	Locations
C1	A.G.C. decoupling	0·05μF	G4
C2	1st I.F. transformer tuning	110pF	A2
C3		110pF	A2
C4	V1 cathode by-pass	0·05μF	G4
C5	V1 osc. C.G. ...	50pF	G3
C6	Osc. M.W. tracker	605pF	H4
C7	Osc. L.W. tracker	390pF	H3
C8	L.W. fixed trim. ...	180pF	H3
C9	H.T. feed decoup.	0·05μF	G4
C10	A.G.C. decoup. ...	0·05μF	F4
C11	V2 S.G. decoup. ...	0·05μF	F4
C12	V2 anode decoup.	0·05μF	F4
C13	2nd I.F. transformer tuning	110pF	B2
C14		110pF	B2
C15	I.F. by-pass ...	100pF	E4
C16	V1, V2 cath. by-pass	0·05μF	F4
C17	A.G.C. coupling ...	50pF	E4
C18	A.F. coupling ...	0·01μF	C3
C19	I.F. by-pass ...	0·005μF	D4
C20	A.F. coupling ...	0·01μF	D4
C21	Tone corrector ...	0·01μF	B1
C22*	H.T. smoothing ...	32μF	E3
C23*		16μF	E3
C24	Mains R.F. by-pass	0·1μF	C4
C25‡	Aerial M.W. trim.	40pF	H4
C26‡	Aerial L.W. trim.	40pF	H4
C27†	Aerial tuning ...	—	A1
C28†	Oscillator tuning...	—	A1
C29‡	Osc. M.W. trim. ...	40pF	H3
C30‡	Osc. L.W. trim. ...	40pF	H3

* Electrolytic. † Variable. ‡ Pre-set.

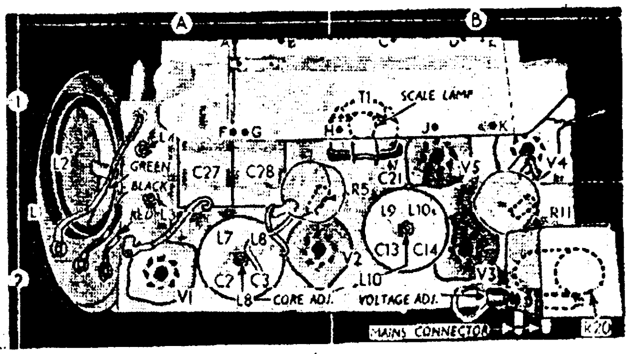


Circuit diagram of the Bush DAC90. The waveband switch unit diagram is inset at top left-hand corner.

Supplement to The Wireless & Electrical Trader, April 1, 1950

OTHER COMPONENTS		Approx. values (ohms)	Locations
L1	M.W. frame aerial	3·0	A2
L2	L.W. frame aerial...	4·5	A2
L3	Oscillator tuning coils ...	1·6	H3
L4		2·7	H3
L5	Osc. reaction coupling coils ...	1·1	H3
L6		2·2	H3
L7	1st I.F. trans. Pri.	5·0	A2
L8	Sec.	5·0	A2
L9	2nd I.F. trans. Pri.	5·0	B2
L10	Sec.	5·0	B2
L11	Speech coil ...	2·6	—
T1	Output trans. Pri.	500·0	B1
	Sec.	0·75	B1
S1-S5	W/band switches ...	—	H3
S6	Mains switch, g'd.R9	—	C3

Plan view of the chassis. The letters on the scale backing plate identify the calibration spots used in the early models. The frame aerial assembly is seen on the left of the chassis.



VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the manufacturers, whose receiver was operating from A.C. mains of 230 V. A similar set of readings taken on D.C. mains of the same voltage were approximately 12 per cent lower than the corresponding A.C. voltages.

The receiver was tuned to the lowest wavelength on the M.W. band and the volume control was set to minimum. Except for cathode readings, all voltages were measured on the 1,000 V range of a model 7 Avometer, chassis being the negative connection.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 CCH35...	105 Oscillator 50	1·1 1·9	50	1·7	0·5
V2 EF39 ...	75	2·7	70	0·8	1·7
V3 EBC33	60	0·7	—	—	1·7
V4 CL33 ...	215	25·0	105	1·8	4·0
V5 CY31 ...	200†	—	—	—	230·0

† A.C.

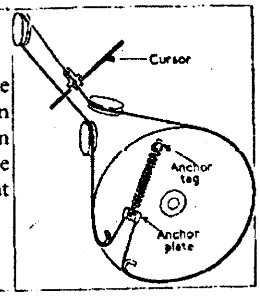
CIRCUIT ALIGNMENT

If only the aerial and oscillator circuits require adjustment the chassis need not be removed from the cabinet. Access to the oscillator trimmers is obtained through holes in the bottom of the cabinet.

I.F. Stages.—Connect signal generator (via suitable isolating capacitors in each lead) to control grid (top cap) of **V2** and chassis. Switch set to M.W., turn gang and volume controls to maximum. Feed in a 465 kc/s (645.16 m) signal and adjust **L9** (E3) and **L10** (B2) for maximum output. Transfer "live" signal generator lead to control grid (top cap) of **V1**, feed in a 465 kc/s signal and adjust **L7** (G4) and **L8** (A2). Repeat all adjustments with signal generator connected to **V1** control grid.

R.F. and Oscillator Stages.—If the receiver is to be aligned out of its cabinet, use may be made of the alignment points on the scale backing plate (these are shown in our plan view of the chassis). For early models the respective alignment dot code letter has been quoted against each relevant frequency in the instructions below. Later models have the alignment dots already calibrated in frequency along the lower edge of the backing plate. Early models were fitted with air-cored oscillator coils, while later models having iron-cored ones necessitate different alignment procedures, which are given below.

Tuning drive system as seen from the drum end when the gang is at maximum.



At maximum capacitance of the gang the cursor should be coincident with points **A** and **F** in the early models, or with point "**Max**" in the later models. It may be adjusted in position by slackening the two drive drum boss grub screws and rotating the drum on its spindle. The signal generator should be coupled to the receiver via a single loop of wire about the same size as the frame aerial, and placed 6 to 12 inches away from it. The M.W. alignment should always be carried out first as **C26** is common to both wavebands.

M.W. (early model).—With the set still switched to M.W., tune to 300 m (C on scale), feed in a 300 m (1,000 kc/s) signal, and adjust **C25** (H4) and **C29** (H4) for maximum output. Tune to 200 m (D on scale), feed in a 200 m (1,500 kc/s) signal and check calibration. Tune to 500 m (B on scale), feed in a 500 m (600 kc/s) signal and check calibration.

M.W. (later model).—With the set still switched to M.W., tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal and adjust **C29** (H4) for maximum output. Tune to 300 m on scale, feed in a 300 m (1,000 kc/s) signal, and adjust **C25** (H4) for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal and check calibration. If correct tracking is not obtainable within the limits of the above adjustments **L3** may be adjusted slightly with each adjustment (A1). Otherwise, the cores should not be moved.

L.W. (both models).—Switch set to L.W., tune to 1,500 m (H on scale), feed in a 1,500 m (200 kc/s) signal and adjust **C26** (H4) and **C30** (H3) for maximum output. Tune to 1,000 m (J on scale), feed in a 1,000 m (300 kc/s) signal and check for calibration. Tune to 2,000 m (G on scale), feed in a 2,000 m (150 kc/s) signal and check calibration. **L4** (A1) should not be touched unless it is essential.

GENERAL NOTES

Switches.—**S1-S5** are the waveband switches, ganged in a single rotary unit beneath the chassis. It is indicated in our under-chassis view, and shown in detail in the diagram inset in the top left-hand corner of the circuit diagram overleaf, as seen from the rear of an inverted chassis. In the M.W. position (control knob anti-clockwise) **S1**, **S3** and **S5** close; in the L.W. position, **S2** and **S4** close.

Scale Lamp.—This is rated at 6.2 V, 0.3 A, and has a large clear spherical bulb and an M.E.S. base.

Tuning Drive Wire Replacement.—The tuning drive system is quite simple, and its course is shown in the sketch (col. 2) which is drawn in three-quarter perspective as viewed from the same end as the gang drum, with the gang at maximum. It is helpful if the strut supporting the rear edge of the scale assembly is removed during the process.

Take 3ft of drive wire, which can be obtained from Bush Radio, Ltd., Power Road, London, W.4, and clamp and solder the ends into the anchor plate to form a loop 30¾in in circumference. Run the wire as shown, then fit the cursor carriage and adjust it as explained under "Circuit Alignment."

DISMANTLING THE SET

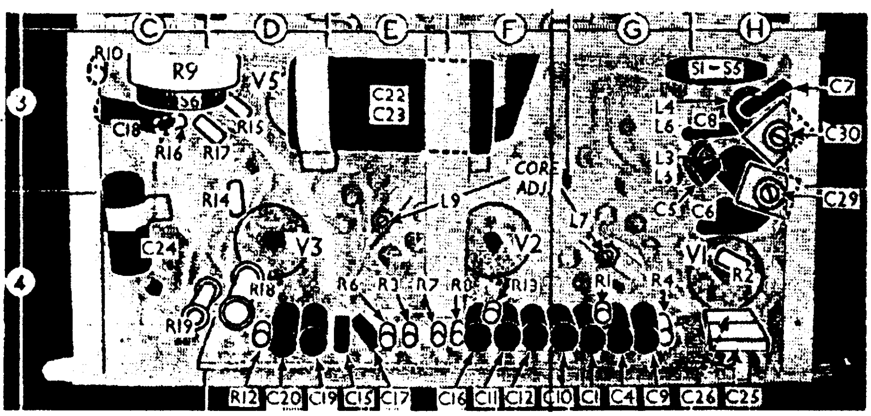
Removing Chassis.—Remove the tuning knob from the side of the cabinet by loosening the spindle screw inside the back of the receiver. (When free of the control spindle this screw may have to to be screwed up into the knob spindle to clear the hole in the cabinet wall);

remove the two front control knobs by loosening the two spindle screws (access may be made to these through holes in the cabinet bottom);

free frame aerial assembly (4BA nut and bolt) from the side of the cabinet;

remove two chassis retaining bolts from the lower two rear corners of the chassis, when the chassis, complete with speaker and frame aerial, may be withdrawn.

When replacing, the two projections on the front chassis member should engage with the two holes provided at the front of the cabinet. The frame aerial connections are indicated in our plan view of the chassis.



Under-chassis view. A detailed diagram of the waveband switch unit S1-S5 is inset in the top left-hand corner of the circuit diagram overleaf.

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