

Bush PB63 Push-button AC Six

Five valve, plus rectifier, three waveband table model superhet with pre-set push-button and also manual tuning. For 200-250 volt, 50-100 cycles, price 12½ gns.

CIRCUIT OUTLINE

THE aerial connection is taken either through a series condenser or a trap circuit to the coupled windings which on all three bands form the input to V1, a triode hexode. Automatic volume control is used on all bands, and the ranges are selected by a push-button switch. This switch also provides for six different pre-set coils.

A similar switch connects the corresponding oscillator coils to the triode section of V1, which are connected quite conventionally. In the anode circuit there is a special variable band-width transformer with an inductance-capacity network, controlled by a switch, which increases the acceptance for high-fidelity working.

The windings are permeability tuned and the secondary works into the grid circuit of V2, AVC being provided.

the negative lead. HT is derived from V6, a full-wave rectifier.

CONSTRUCTIONAL FEATURES

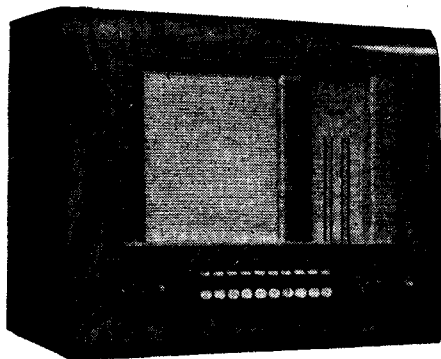
WITH the exception of some of the oscillator fixed trimmers, most of the components are very accessible. It will

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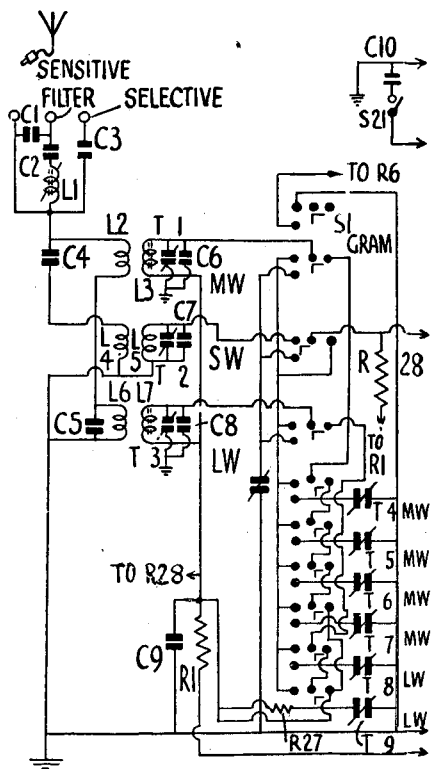
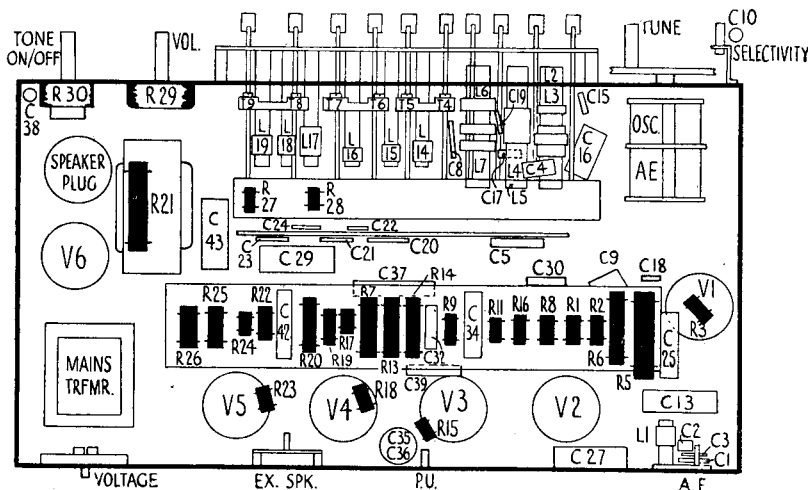
VALVE READINGS

V.	Type.	Anode.	Screen.	Cathode
1	TH4B	230	65	1
2	VP4B	185	85	—
3	TDD4	90	—	2.6
4	354V	143	—	3.5
5	ACO44	280	—	—
All Mullard				
6	43IU	—	—	300
Cosor				

Pilot lamps, Osram MES, 6.2 volts, .3 amp.



Push-buttons are provided for six stations and there are also buttons for the three wavebands and gramophone. For top-of-chassis layout diagram see page 22.



RESISTANCES

	Ohms.
1	V1 AVC decouple .. 1 meg.
2	V1 cathode bias .. 100
3	Osc. grid leak .. 30,000
4	V2 grid stopper .. 50
5	Osc. anode decouple .. 20,000
6	V2 screen feed .. 100,000
7	V2 anode decouple .. 10,000
8	V2 AVC decouple .. 2 meg.
9	Signal diode load (part) .. 250,000
10	Signal diode load (part) .. 250,000
11	Signal diode load (part) .. 250,000
12	V3 grid stopper .. 100,000
13	V3 anode decouple .. 50,000
14	V3 anode load .. 5,000
15	V3 cathode bias .. 1,000
16	AVC diode load .. 1 meg.
17	V4 grid leak .. 500,000
18	V4 grid stopper .. 100,000
19	V4 cathode bias .. 2,000
20	V4 anode load .. 50,000
21	HT smoothing .. 4,000
22	V5 grid leak .. 250,000

Resistances (continued)

23	V5 grid stopper .. 10,000
24	Bias decouple .. 500,000
25	Bias pot. (part) .. 700,000
26	Bias pot. (part) .. 100,000
27	LW press button input shunt .. 50,000
28	Input shunt .. 5 meg.
29	Volume control .. 500,000
30	Tone control .. 250,000

CONDENSERS

	Mfds.
1	Filter tune (part) .. .001
2	Filter tune (part) .. .00045
3	Aerial series .. .00005
4	MW aerial couple .. .00005
5	LW aerial shunt .. .0008
8	LW input fixed tune .. .00003
9	V1 AVC decouple .. 5
10	IFT1 selectivity network (part) .. .003

Coupling between V2 and V3, a double-diode triode, is by means of another permeability-tuned transformer, with tapings on both primary and secondary windings. Both the diodes of V3 are capacity connected to the transformer.

The diode and AVC load circuits are normal and call for no comment. The triode portion of V3 is fed from the volume control, capacity coupled from a tapping on the diode load.

Between V3 and V4, a triode, there is ordinary resistance-capacity coupling. Resistance coupling again is used between V4 and V5, a large output triode. Bias for the output triode is derived from a network across the speaker field resistance.

For smoothing, electrolytic condensers are used in conjunction with a resistance on the positive side, and the speaker field in

10-MINUTE FAULT-FINDER

BUSH PB63

Routine Tests.

Voltages : V6 cathode, 300; C40, 230 volts.
Resistance : R21, 400 ohms.
Feed current to valves V1 to V4 is 300-230 ÷ 400 ohms = 17.5 ma.

Output Stage, V5.

Inject 10 volts AF at V5 grid. If defective, check :-
Voltage : Anode, 280.
Resistances : Anode-HT, 250; grid-chassis, 360,000 ohms.

Second AF Stage, V4

Inject 2 volts at V4 grid. If defective, check :-
Voltages : Anode, 143; cathode, 3.5.
Resistances : Anode-HT, 50,000; grid-

chassis, 600,000; cathode-chassis, 2,000 ohms.

First AF Stage, V3.

Inject 5 volt at V3 grid. If defective, check :-
Voltages : Anode, 90; cathode, 2.6.
Resistances : Anode - HT, 55,000; cathode-chassis; 1,000; grid - chassis, 600,000 ohms.

Demodulation, V3.

Inject modulated 465 kc. signal at V2 anode. If defective, check :-
Resistances : Diode-chassis, 751,000; L22, 4; L23, 4 ohms.

IF Stage, V2.

Inject modulated 465 kc. signal at V2 grid. If defective, check :-
Voltages : Anode, 185; screen, 85.

Resistances : Anode - HT, 10,000; screen-HT, 100,000 ohms; grid-chassis, 3 megohms.

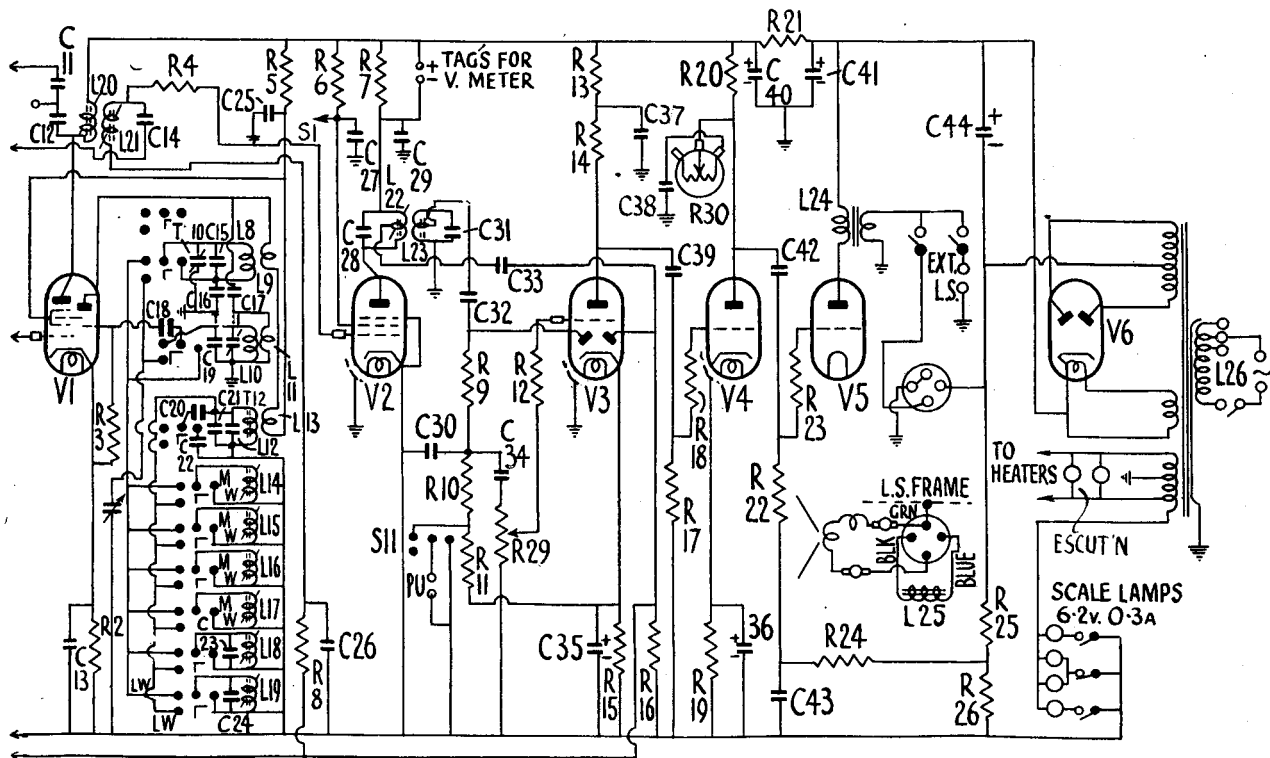
Mixer Hexode, V1.

Inject modulated 465 kc. signal at V2 grid. If defective, check :-
Voltages : Anode, 230; screen, 65; cathode, 1.

Resistances : Screen - HT, 20,000; cathode-chassis, 100 ohms; grid-chassis, 7 megohms; L20, 4; L21, 4 ohms.

Oscillator Test, V1.

Tune to local station and inject that frequency plus 465 kc. If defective, check :-
Voltage : Osc. anode, 65.
Resistances : Grid-chassis, 30,000; osc. anode-HT, 20,000 ohms.
If still defective, check oscillator and pre-selector coils and switches.



Condensers (continued)

11	IFT1 selectivity network (part)	.003
12	IFT1 primary tune	.00015
13	V1 cathode shunt	.05
14	IFT1 secondary tune	.00015
15	MW oscillator trimmer	.00001
16	MW padder	.000556
17	SW anode couple	.00005
18	Osc. grid	.00003
19	SW osc. trimmer	.000015
20	LW osc. tracking	.000316
21	LW osc. trimmer	.00013
22	LW osc. tracking	.00034
23	LW preset osc. (trimmer)	.000316
24	LW preset osc. (trimmer)	.000316
25	Osc. anode decouple	.05
26	V2 AVC decouple	.05
27	V2 screen decouple	.05
28	IFT2 primary tune	.00015
29	V2 anode decouple	.05
30	IF filter	.0001
31	IFT2 secondary tune	.00010
32	Signal diode couple	.0001

Condensers (continued)

33	AVC diode couple	.00005
34	LF couple	.005
35	V3 cathode shunt	.50
36	V4 cathode shunt	.50
37	V3 anode decouple	.1
38	Tone control	.03
39	V4 grid couple	.01
40	HT smoothing	.8
41	HT smoothing	.16
42	V5 grid couple	.01
43	Bias decouple	.5
44	HT smoothing	.8

Windings (continued)

5	Low	SW	Tags 2 and 4.
6	.30	LW	Tags 2 and 3.
7	.14	LW	Tags 1 and 4.
8	1.5	MW	Tags 2 and 4.
9	.1	MW	Tags 1 and 3.
10	Low	SW	Tags 2 and 4.
11	Low	SW	Tags 3 and 4.
12	2.7	LW	Tags 3 and 4.
13	2.3	LW	Tags 1 and 3.
14	.2	PB	Osc. gang and chassis.
15	.2	PB	Osc. gang and chassis.
16	2.3	PB	Osc. gang and chassis.
17	2.3	PB	Osc. gang and chassis.
18	.4	PB	Osc. gang and chassis.
19	.4	PB	Osc. gang and chassis.
20	.4	---	V1 anode and HT line.
21	.4	---	Tag and C26.
22	.4	---	V2 anode and C20.
23	.4	---	Tag and chassis.
24	2.50	---	V5 anode and HT.
25	1,000	---	On plug blue and black.
26	.17	---	Mains plug.

WINDINGS

(D.C. Resistances)

L.	Ohms.	Range.	Where measured.
2	.5	MW	Tags 2 and 3.
3	1	MW	Tags 1 and 4.
4	Low	SW	Tags 2 and 3.

Bush PB63 AC Six

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be observed, however, that some are inside the IF cans, and these are clearly shown on the drawings.

Attention is drawn to the fact that there is no DC connection between the secondary of the second IFT and the diode circuit.

It should also be observed that part of the smoothing is by means of the speaker field in the negative lead and part by a resistance-capacity network which lowers the main HT rail. The HT for the output valve, however, is on the full voltage point.

When trimming the set it should be observed that the adjustments for the two intermediate transformers are at opposite ends of the cans. The trimmers for the pre-selector and oscillator circuits are immediately below and above the respective press-button switches, and in order to trim the set the escutcheon must be removed.

Chassis Removal

Removal of the chassis in this receiver is very simple. First, take off all the control knobs on the front and withdraw the speaker plug.

Then release the four chassis retaining bolts from the bottom and the chassis can be completely removed.

The press-buttons clear the escutcheon, and there is no need to remove this plate.

Alignment

IF Circuits (465 kc.).

Connect output meter to the set and generator to grid of V1 and chassis.

Adjust the generator to 465 kc. and tune for maximum output on the set by varying the permeability cores of the two transformers.

This adjustment must be made with the selectivity position at normal. It is also recommended that a damping network be used across the winding of the transformer not being adjusted. This may consist of a 30,000 ohm resistance in series with .05 mfd. Inject as low a signal as possible.

Medium Waves (195-550 metres).

Connect the generator to the set through a dummy aerial and tune set and generator to 300 metres (1,000 kc.) and adjust T10 and T1 for maximum.

There is no padding, but check the adjustment at 500 metres.

Long Waves (850-2,000 metres).

Tune set and generator to 1,500 metres (200 kc.) and adjust T12 and T3 for maximum.

Although there is no padding adjustment, check at 1,900 metres.

Short waves (16.5-51 metres).

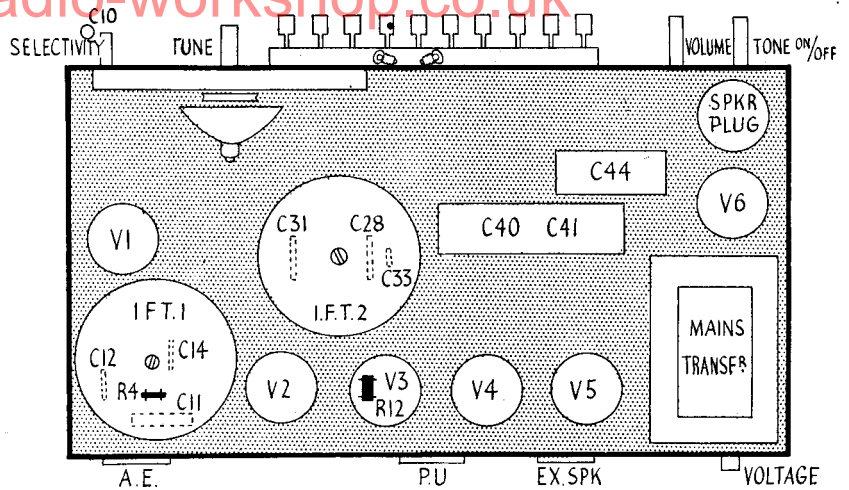
Tune set and generator to 18 metres (16.65 mcs.) and adjust T11 and T2 for maximum.

Check the calibration at 50 metres.

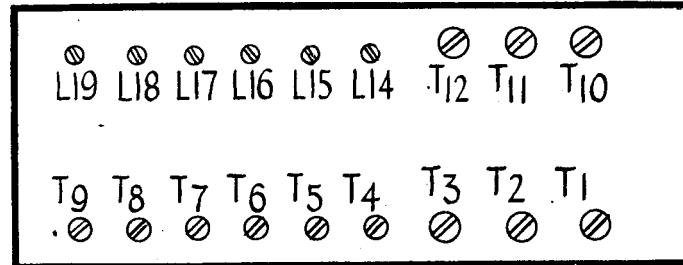
Replacement Condensers.

EXACT replacement electrolytic condensers are available from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18.

For the C40 + 41 block there is unit list number 1931A, price 8s. 6d.; for C44, unit 2867A, 3s. 6d.; and for the C35 + 36 tubular. 3824. 4s.



Above, the top-of-chassis layout diagram, and, right, the arrangement of push-button trimmers on a special assembly.



PUSH-BUTTONS

THE adjustable cores of the pre-set oscillator coils are fitted with approximate wavelength indicator plates. Press in the button immediately below the coil on which the desired wavelength can be obtained, and make an approximate adjustment of the core.

Turn the volume to maximum and adjust the corresponding aerial trimmer condenser below the coil until maximum sensitivity is obtained as the circuit comes into resonance, which will be noticed by the increase of background noise.

Then make a final adjustment to the core and trimmer for exact resonance.

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dummy aerial, and tune set and generator to 1,400 kc. (214 metres). Adjust T3 and T1 for maximum.

Disconnect oscillator gang by unsoldering its lead, and substitute an external variable condenser.

From the external oscillator inject a frequency of 600 kc. (500 metres), and adjust tuning control of set and external condenser for maximum.

Re-connect the oscillator gang, and

without altering the set tuning control adjust P1 for maximum.

Check the trimming at 1,400 kc.

Long Waves (1,000 to 2,000 metres).

Tune set and generator to 300 kc. (1,000 metres), and adjust T4 and T2 for maximum.

Pad the receiver by the same method as that used on the MW band, injecting a frequency of 165 kc. (1,818 metres).

Check the trimming at 300 kc.

