

Bush BA61 Battery Push-button Four

Four valve, three waveband, battery table model superhet with push buttons for three stations and waveband switching, price 9½ gns. complete or £8 19s. 6d. without batteries

CIRCUIT OUTLINE

THE first valve in this receiver is a triode hexode frequency changer, the input of which is provided by coupled aerial circuits for the three bands selected by a special switch. The SW position is arranged so that there is no AVC. The oscillator section is conventional and coupling to V2, the IF valve, is by a permeability tuned transformer.

Intermediate amplification is carried out by a screen pentode with AVC. A further permeability tuned transformer couples this to V3, a double diode triode. Both the diode load and the AVC connection are tapped down on the transformer windings.

The volume control for the triode section of V3 forms the diode load, and is preceded by a resistance capacity filter. For the AVC delay the tapped AVC load is returned to a series bias potentiometer, which is also used to provide bias for the output valve, V4, a pentode.

This is resistance capacity coupled from the anode of the triode section of V3. The output is taken by an ordinary transformer to the speaker, and there is a simple shunt condenser on the anode.

In the push-button position the oscillator has permeability tuned coils and the input circuits are trimmer tuned. The normal input coils are used for this purpose.

CONSTRUCTIONAL FEATURES

THIS receiver is conventional in arrangement and all the components are easy to locate. Condensers C9 and C10, as well as C21, C22 and C23, are located inside the IF cans. These, however, have

removable covers, and it is easy to test or remove these condensers if necessary.

In looking at the circuit it should be observed that the manufacturers do not show the tuned circuits in the normal order. The first tuned circuits are MW, which are then followed by the SW and LW, in that order.

This arrangement necessitates a little careful consideration of trimmer positions and their function. The special trimmer plate diagram, however, should make this quite clear. It will be observed that this plate carries variable inductance adjustments for the push-button positions.

The only other unusual feature is the switch arrangement.

Wave-change Switches.

All the switching is carried out by a multiple switch of the press-button type.

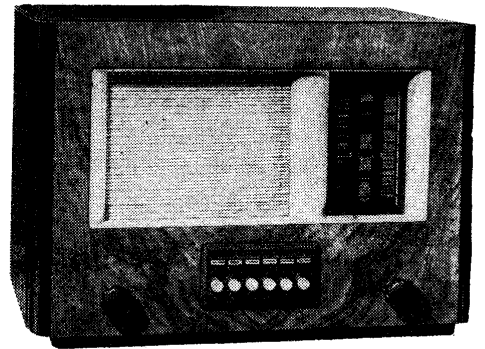
The top row of contacts is available from the underside of the chassis. Those below can only be exposed by removing the assembly as described under the heading of "Chassis Removal."

The switch is of a standard type with L-shaped moving contacts, which in the normal position join two fixed contacts and when depressed change over to join three contacts.

The action of the switch is obvious by inspection from the underside of the chassis, and the various sets of fixed and moving elements are aligned with the appropriate coils. Accordingly, identification is exceptionally simple.

Chassis Removal.

The chassis is held by four bolts, which are removed from the bottom of the cabinet. After unscrewing the two control



knobs on the front, the chassis can be withdrawn.

The speaker cable is sufficiently long to enable ordinary service work to be carried out without disconnecting it. There are three leads: red, brown and black. The black lead is the chassis earthing wire. The pilot lamps are held on an assembly secured by two special nuts.

The trimmers are reached by removing the escutcheon plate held by means of two fixing screws. To carry out a repair on the coil and switch assembly it should be removed in the following manner:—

Remove the nut from the insulating pillar, the three bolts and distance pieces, and finally the screw holding the supporting bracket. Particularly note that no wires need be removed.

Alignment Notes

I.F. Circuits (465 kcs.)

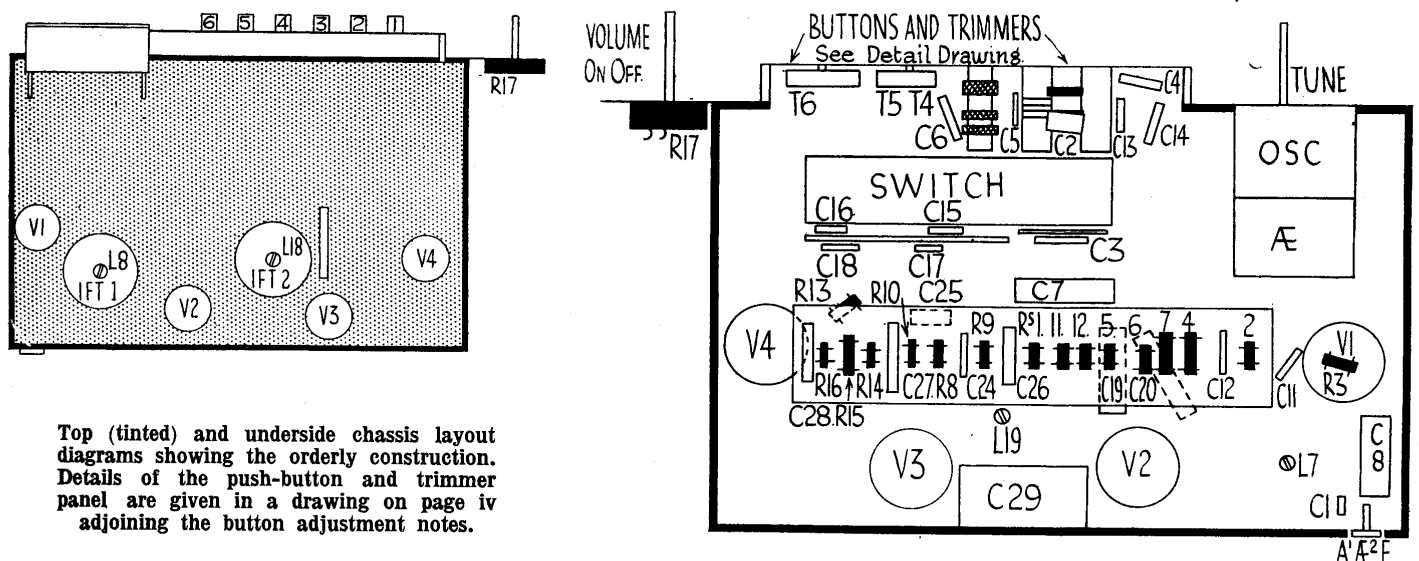
Connect output meter to set and generator to grid of V2 and inject a modulated signal of 465 kcs.

Damp the anode circuit of the valve with 30,000 ohms in series with .05 mfd. by connecting it between anode and chassis. Adjust L19 for maximum.

Connect the damping circuit between pin 5 of V3 and chassis and adjust L18 for maximum. Use, in both cases, an input below the AVC valve.

Connect the generator to the grid of V1 and adjust L9 and L8 for maximum.

(Continued on page iv.)



Top (tinted) and underside chassis layout diagrams showing the orderly construction. Details of the push-button and trimmer panel are given in a drawing on page iv adjoining the button adjustment notes.

10-MINUTE FAULT-FINDER

BUSH BA61

Power Test.

Total H.T. feed : 9.5 m.a. ; L.T., 0.81 amp.

Output Stage, V4.

Inject 2 volts AF V4 grid. If defective, check :—

Voltages : Anode, 140; screen, 144.
Resistances : Anode—H.T., 800; grid—chassis, 600,000 ohms.

AF Stage, V3.

Inject .5 volt AF V3 grid. If defective, check :—

Voltage : Anode 65.
Resistances : Anode—H.T., 100,000

ohms; grid—chassis, 5 megohms.

Demodulation.

Inject modulated 465 kcs. signal V2 anode. If defective, check :—

Resistances : L18 4; L19 4; diode—chassis, 550,000 ohms.

IF Stage, V2.

Inject modulated 465 kcs. signal V2 grid. If defective, check :—

Voltages : Anode, 100; screen, 30.

Mixer Stage, V1.

Inject modulated 465 kcs. signal V1 anode. If defective, check :—

Resistance : V2 grid-chassis, 2 megohms;

L8, 4; L7, 4 ohms.

Inject modulated 465 kcs. signal V1 grid. If defective, check :—

Voltages : Anode, 144; screen, 35.
Resistance : Screen—HT, 15,000 ohms.

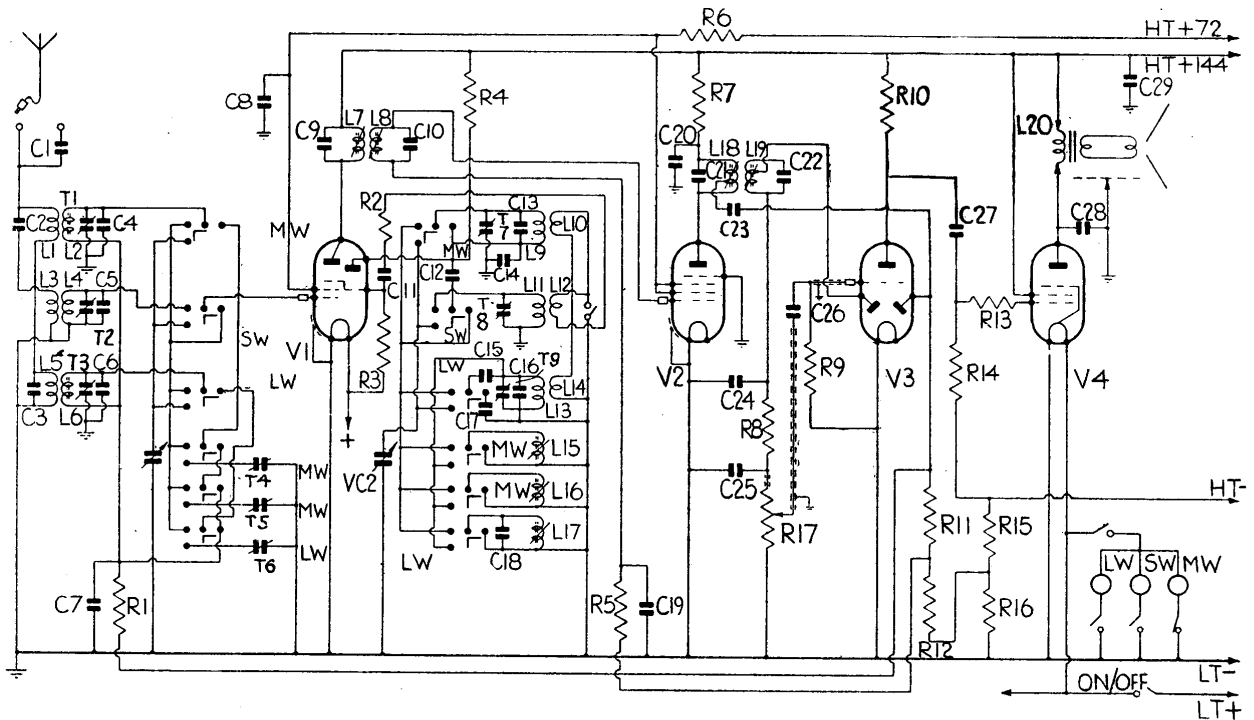
Oscillator Test.

If no signals, tune to local station and inject that frequency plus 465 kcs. at osc. grid. If defective, check :—

Voltage : Osc. anode, 35.
Resistance : Osc. grid-chassis, 40,000 ohms.

If still no signals, test pre-selector and oscillator coils and switching.

Six push-buttons provide for three stations and wave-band switching. The switches are easily identified on the chassis and no special details are necessary (see Switch Notes).



VALVE READINGS

V.	Type.	Electrode.	Volts.	Ma.
1	TP23 (Mazda)	Anode	144	.5
		Screen	35	.7
		Osc. anode	35	2
2	VP2B (Mullard)	Anode	100	1.3
		Screen	30	.3
3	TDD2A (Mullard)	Anode	65	.5
4	PM22A (Mullard)	Anode	140	3.5
		Screen	144	.7
Total H.T. feed			9.5	
Total L.T. feed			.81	amp.
Pilot lamps			2.5	300

Windings (continued)

15	Low	Chassis and switch busbar.
16	Low	Chassis and switch busbar.
17	Low	Chassis and switch busbar.
18	4	V2 anode and R7.
19	4	Across leads in coil can.
20	800 or 850	On tags red and yellow.

Condensers (continued)

18	LW fixed tune	.000316
19	V2 AVC decouple	.1
20	V2 anode decouple	.1
21	IFT2 primary shunt	.00015
22	IFT2 secondary shunt	.00016
23	AVC couple	.00005
24	HF filter	.0001
25	HF filter	.0001
26	LF couple	.001
27	LF couple	.03
28	Tone control	.003
29	HT shunt	2

WINDINGS

L.	Ohms.	Range.	Where measured.
1	.5	—	Tags 2 and 3.
2	1	—	Tags 1 and 4.
3	Low	—	Tags 2 and 3.
4	Low	—	Tags 2 and 4.
5	30	—	Tags 2 and 3.
6	5	—	Tags 1 and 4.
7	4	—	V1 anode and HT positive.
8	4	—	V2 grid and C19.
9	1.5	—	Tags 2 and 4.
10	1	—	Tags 1 and 3.
11	Low	—	Tags 2 and 4.
12	Low	—	Tags 3 and 4.
13	3	—	Tags 2 and 4.
14	5	—	Tags 1 and 3.

CONDENSERS

	Mfds.
1	.000005
2	.00005
3	.008
4	.000005
5	.000005
6	.00003
7	.05
8	.05
9	.00015
10	.00015
11	.0005
12	.0001
13	.000005
14	.000556
15	.000316
16	.000125
17	.000340

RESISTANCES

	Ohms.
1	1 meg.
2	25
3	40,000
4	40,000
5	1 meg.
6	15,000
7	7,000
8	50,000
9	5 meg.
10	100,000
11	1 meg.
12	1 meg.
13	100,000
14	500,000
15	400
16	100
17	500,000

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(Continued from page ii.)

No damping circuit is necessary for these adjustments. Both adjustments are best made with the receiver tuned to about 300 metres.

Short Waves (16.5 to 51 metres).

Connect generator to aerial and earth through dummy aerial and tune set and generator to 18 metres.

Adjust T8 and T2 for maximum.

Check the calibration at 50 metres.

Medium Waves (198 to 560 metres).

Tune set and generator to 300 metres and adjust T7 and T1 for maximum.

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

Long Waves (850 to 2,000 metres).

Tune set and generator to 1,500 metres and adjust T9 and T3 for maximum.

There is no padding operation, but check the calibration at 1,900 metres.

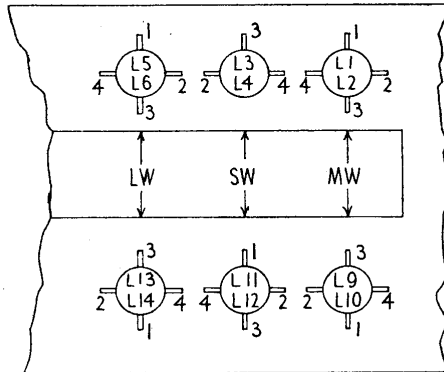
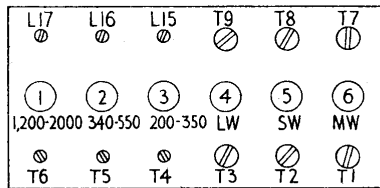
Press Buttons

Provision is made for one long-wave station and two medium waves as follows:—

Button 1, 1,200-2,000 metres; Button 2, 340-450 metres; Button 3, 200-350 metres.

The oscillator controls, L15, L16 and L17, have approximately calibrated scales showing the position of the adjusting screw for any particular wavelength.

The oscillator adjustments, selection buttons and pre-selector trimmers are



Details of the push-button trimmer panel and the coil assembly are given in these diagrams. The coil connections are numbered for reference in conjunction with the Windings table on page iii.

arranged in vertical lines as shown on the diagram.

The desired button is set up by depressing it, adjusting the corresponding oscillator inductance and then the pre-selector coil trimmer. It is important to note that adjustment of the LW oscillator trimmer, T9, will affect the push-button settings, and if this trimmer is moved the push-button adjustments must be readjusted.

Similarly, adjustment of T1 may affect T4 and T5, while adjustment of T3 may affect T6.

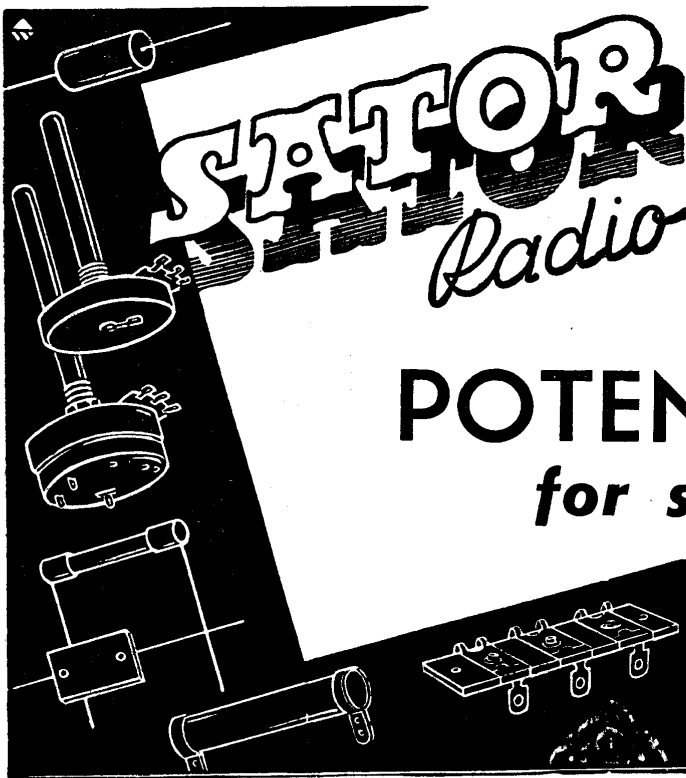
PICK-UPS ON AC-DC

INSTALLING pick-ups for use on AC-DC receivers sometimes involves certain difficulties, as the possibility of shocks exists where a direct connection is made to one side of the mains supply.

A moulded bakelite pick-up and tone-arm is preferable to a metal one in such cases. A fixed condenser should be inserted in series with each pick-up lead, if they are not already fitted on the chassis.

Where a screened cable is used to reduce hum, it will generally be found that the hum is actually increased when the screening is connected direct to earth. The only satisfactory way in most cases is to connect the screening to the chassis.

If the cable has to be installed in such a position where the user can come into contact with the screening, a cable which has a layer of insulation over the outer metal screening should be used.—M.B.



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