

BUSH AC71

Four-valve, plus rectifier, three-waveband superhet. Sockets are provided for a high resistance pick-up and a low impedance extra loud-speaker. Suitable for operation from AC mains, 200-250v, 40-100 cycles. Manufactured by Bush Radio, Ltd., Power Road, Chiswick, London, W4.

THE aerial input may be injected via either of two sockets, the selective socket feeding the input via C1 to the coupling coils L1 (SW), L3 (MW), and L5 (LW). An internal aerial may be employed by placing the red plug of the internal aerial into the maximum sensitivity socket and the black plug into the earth socket.

From the aerial coupling coils the signals are passed to the tuning coils L2, L4, and L6, which are tuned by VC1. The signal is fed direct to the grid of the frequency changer V1, which is biased by R3, decoupled by C7.

The oscillator section of the valve employs tuned grid circuits with

coils in the anode circuit, the combinations being L7, L8 (SW); L9, L10 (MW); L11, L12 (LW). The grid leak and condenser are R4 and C8, while the anode obtains its HT from the screen grid line which is fed from the HT supply via R1, decoupled by C6.

The IF transformer L13, L14, couples the IF signal from V1 to the grid of the IF amplifying valve V2, both valves having their grid circuits connected to the AVC line. V2 is biased by R9 decoupled by C20 and a second IF transformer L15, L16 hands on the signal to the signal diode of the double diode triode V3.

The LF load resistance is R11 with filtering by R10 and C23. The LF signal is coupled by C25 to the volume control VR1, from whence the signal is fed via a grid stopper R12 to the grid of the triode section of V3. Biasing is accomplished by R15, decoupled by C27.

The AVC diode of V3 is fed from a tapping on the primary, L15 of the second IF transformer, the coupling capacity being C21. The AVC load resistance is R16, from whence V1 and V2 grid circuits are fed via the usual decoupling components.

The anode circuit of V3 is resistance capacity coupled by R14, C30, and R17 to the grid of the pentode output valve V4. A tone correcting circuit comprising VR2

and C29 is provided across the anode by-pass condenser C28 of V3.

V4 is biased by R18, decoupled by C31 and the usual output transformer. L17, L18 couples the anode circuit of V4 to the energised moving coil loudspeaker, of which L19 is the speech coil and L20 the hum-bucking coil. An extra loud-speaker of low impedance may be connected across the secondary, L18, of the output transformer, and the internal speaker may be silenced by removing the plug in the INT LS socket.

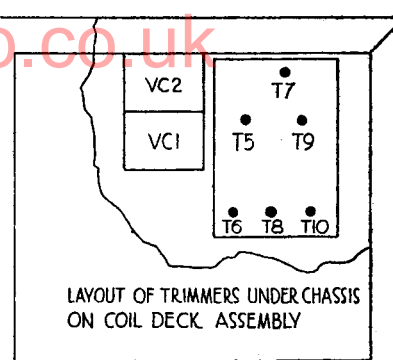
The HT circuit comprises the full-wave rectifying valve V5 with the field winding, L21, as a choke and smoothing condensers C33 and C34. The mains input is HF filtered by C35 and C36.

GANGING

IF Circuits.—Set volume control to maximum and tone control to low (anticlockwise). Check that the tuning pointer coincides with the top of the wavelength lines on the scale when the gang condenser is fully meshed. A damping circuit comprising a 30,000-ohm resistance in series with a .05 mfd condenser must be used where stated when adjusting the IF circuits.

Tune receiver to 300m and inject a 465 kc signal to the control grid of V2,

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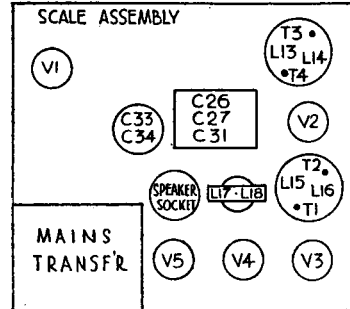


LAYOUT OF TRIMMERS UNDER CHASSIS ON COIL DECK ASSEMBLY

These two diagrams show the trimmer positions and identify the major components.

RESISTANCES

R	Ohms	R	Ohms
1	30,000	11	500,000
2	1 meg	12	100,000
3	200	13	10,000
4	30,000	14	50,000
5	50	15	1,000
6	1 meg	16	1 meg.
7	100,000	17	500,000
8	10,000	18	200
9	300	VR1	500,000
10	250,000	VR2	250,000



VALVE READINGS

V	Type	Electrode	Volts	Ma
1	ECH33 (Met)	Anode	265	1.6
		Osc anode	75	.4
		Screen	75	2.6
2	EF39 (Met)	Cathode	1.5	—
		Anode	200	5
		Screen	75	1.6
3	EBC33 (Met)	Cathode	2	—
		Anode	110	2.2
		Screen	2.2	—
4	EL33	Anode	245	30
		Screen	265	.4
		Cathode	6.5	—
5	DW4/350	Cathode	375	51

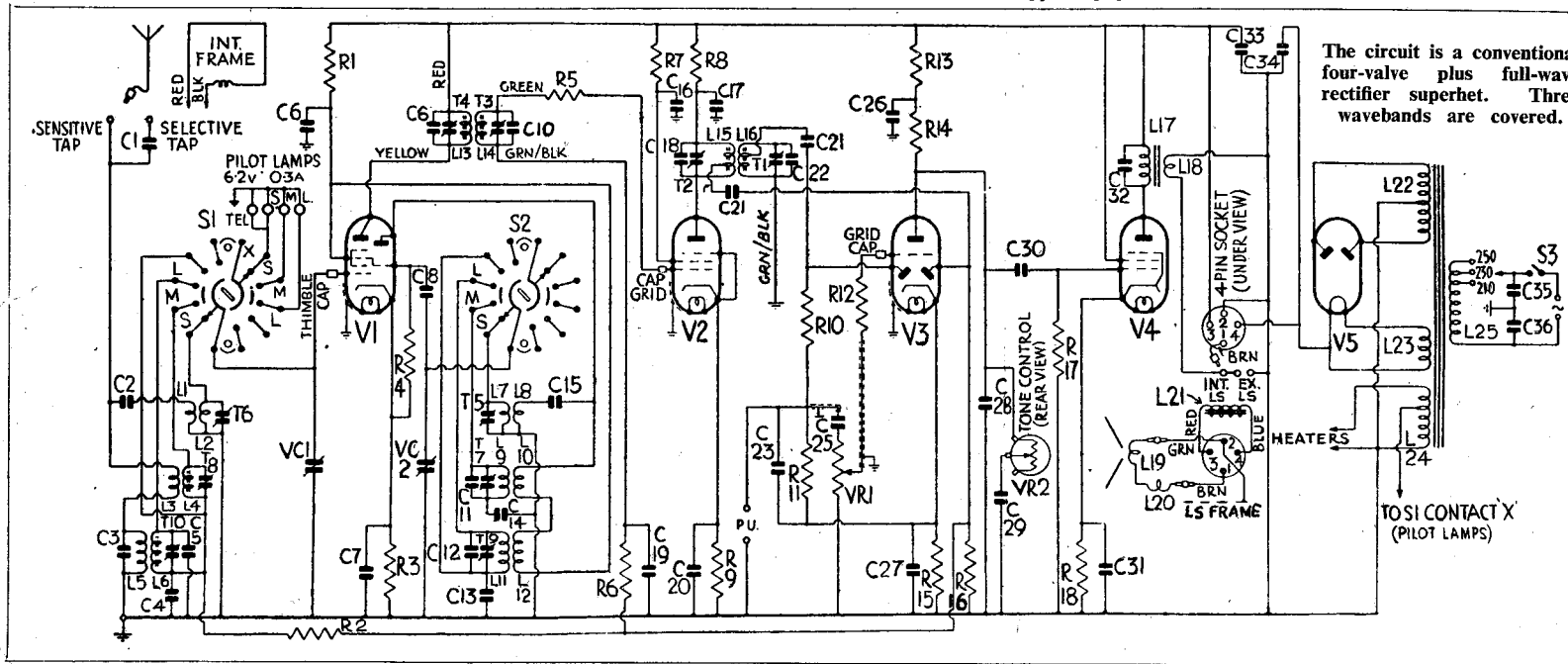
Voltage readings taken with a 1,000 ohm meter, set tuned to 300m, no signal input. Pilot lamps 6.2v, .3 amp MES.

CONDENSERS

C	Mfids	C	Mfids
1	50 mmfd	19	.05
2	50 mmfd	20	.05
3	.0008	21	50 mmfd
4	.5	22	.0001
5	30 mmfd	23	.0001
6	.05	24	.0001
7	.05	25	.01
8	30 mmfd	26	2
9	.0001	27	50 mmfd
10	.0001	28	.001
11	20 mmfd	29	.02
12	.00013	30	.01
13	316 mmfd	31	50 mmfd
14	556 mmfd	32	.003
15	50 mmfd	33	16
16	.05	34	8
17	.05	35	.01
18	.0001	36	.01

WINDINGS

L	Ohms	L	Ohms
1	.1	14	3.8
2	Very low	15	3.8
3	.6	16	3.8
4	1.8	17	700
5	30	18	3
6	15	19	2
7	Very low	20	2
8	.1	21	2,000
9	1.7	22	700 (total)
10	1	23	.1
11	2.7	24	.1
12	2.1	25	.1
13	3.8		43 + 5 + 5



The circuit is a conventional four-valve plus full-wave rectifier superhet. Three wavebands are covered.

TO S1 CONTACT X (PILOT LAMPS)

HMV 459MC MARCONIPHONE 255MC

Six-valve, two-waveband battery portable superhet with permanent magnet moving coil loudspeaker. Aerial and earth terminals are provided for additional sensitivity. Terminals are available for pickup and high resistance loudspeaker, but a low resistance speaker may easily be connected across the internal speaker's speech coil. Marketed 1933 by Gramophone and Marconi-Phone Companies, Hayes, Middx.

ALTHOUGH these models are basically similar to the earlier versions (Models 459 and 255 reviewed on page v), there are sufficient differences in the circuit arrangements to cause confusion if the service data for one type of model is

used when servicing a model of the other type, hence this separate review in which the various differences are specifically dealt with.

The first part of the circuit is quite straightforward, but it will be noted that the volume control, VR1, is an HT potentiometer connected in series with R4 between HT positive and chassis. The slider is connected to the screen grids of V1, V3 and V4.

Unlike the earlier models, therefore, control of sensitivity is obtained by controlling the screen grid voltages and not by applying a variable grid bias.

The IF circuits are similar to the earlier version, but the IF choke, L9, is tapped, and there is no local-distance switch across the grid leak R6.

The intervalve transformer L10, L11, is resistance capacity coupled by R7 and C11 to the anode circuit of V5, while the anode by-pass condenser, C10, is of a rather high value, .002 mfd. There is no tone correction condenser between the anode of V6 and chassis.

V3 and V6 grid circuits are taken to the grid bias negative line, which should be given a negative voltage of 3.

The output from V6 is transformer-coupled to the moving coil loudspeaker, of which the speech coil is L14. It will be

noted that the speech coil is connected across only a part of the secondary—i.e., terminals 1 and 2.

The extra loudspeaker sockets are in the anode circuit of V6, and any extra loudspeakers must be of the high resistance type. If desired, however, a low resistance 4-ohm speaker may be connected to terminals 1 and 2 or a slightly higher resistance speaker, say about 8 ohms, may be connected across terminals 1 and 3.

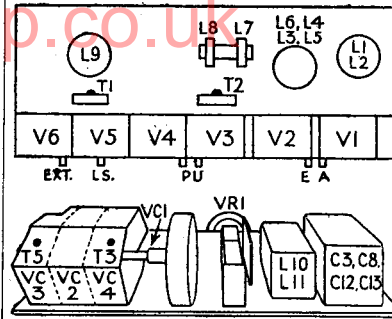
GANGING

Ganging is carried out as for the Models 255 and 459, except that it should be noted that T3 and T5 are the trimmers for the medium band and T4 for the long waveband (front of chassis, near L9).

VALVE READINGS

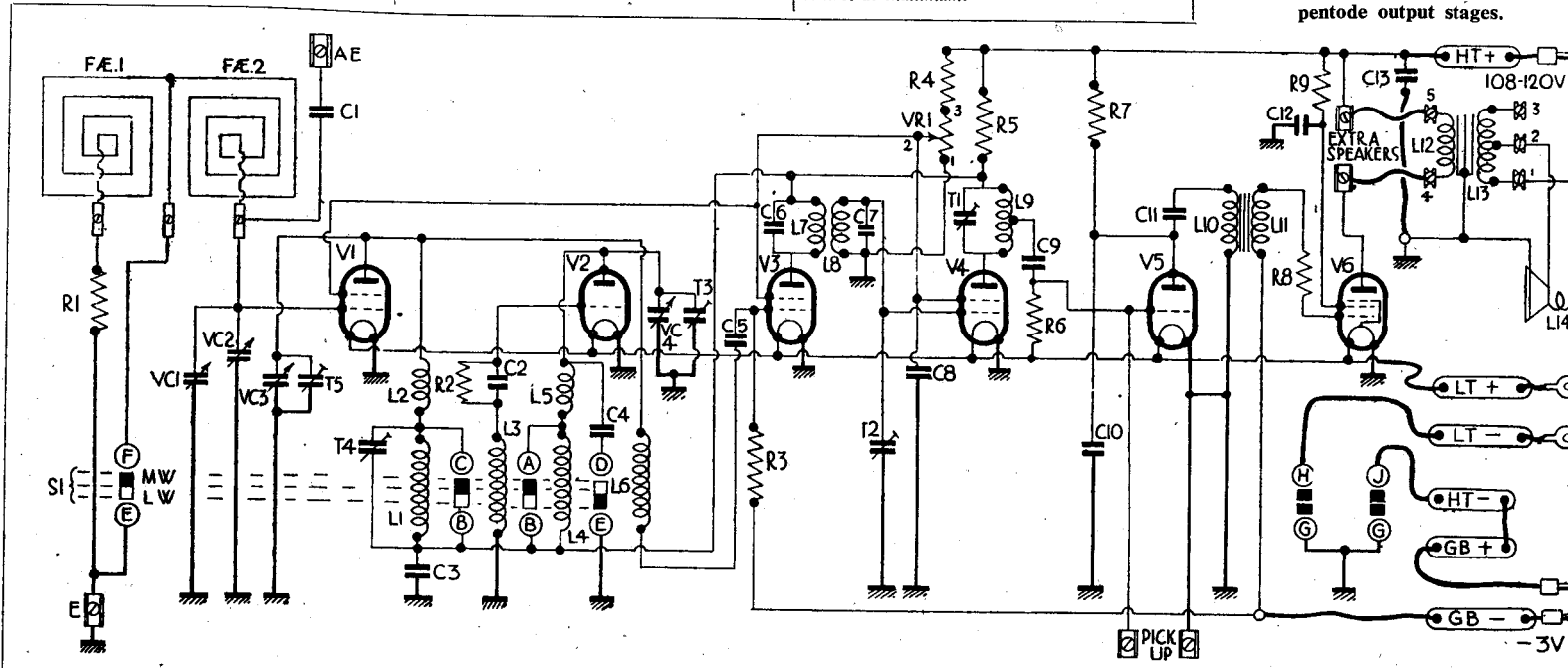
V	Type	Electrode	Volts	Ma
1	S21 (Met)	Anode Screen	76 40	1.6 1.2
2	HL2 (Met)	Anode	74	1.5
3	S21 (Met)	Anode Screen	76 40	.8 .2
4	S21 (Met)	Anode Screen	76 40	.7 .9
5	HL2 (Met)	Anode	25	1
6	PT2	Anode Screen	110 80	3.5 —

Readings taken with 114v HT battery, volume control at maximum.



Two views of the chassis of the HMV model 459MC and the Marconiphone 255MC. The upper drawing shows the underside and indicates the valve positions and some of the coils and trimmers. Below is seen the view of the top of the chassis which carries the drum-driven gang condenser.

Below, the circuit of the MC models, which are early battery-driven superhet portables. The first valve is a screen-grid HF amplifier and V2 is the triode oscillator. V3 is the mixer and V4 the IF amplifier. There are triode detector and pentode output stages.



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with the damping circuit between anode of V2 and chassis.

Adjust T1 for maximum output, keeping the input low.

With signal injected as before, connect the damping circuit between signal diode of V3 and chassis. Adjust T2 for maximum output.

Inject signal into control grid of V1 and connect damping circuit between hexode anode of V1 and chassis. Adjust T3 for maximum output.

With signal input as above connect damping circuit between control grid of V2 and chassis. Adjust T4 for maximum output.

SW Band.—Inject an 18m signal into the sensitive aerial socket via suitable dummy aerial. Switch to SW and tune receiver to 18m. Adjust T5 and T6 for maximum output. Check calibration at 50m.

MW Band.—Switch to MW, tune receiver to 300m and inject a 300m signal into the sensitive aerial socket. Adjust T7 and T8 for maximum output. Check calibration at 500m.

LW Band.—Switch to LW, tune receiver to 1,500m and inject a 1,500m signal into the sensitive aerial socket. Adjust T9 and T10 for maximum output. Check calibration at 1,900m.

CONDENSERS

C	Mfds	C	Mfds
1	.00005	8	.5
2	.0002	9	.0001
3	.5	10	.002
4	.0002	11	.1
5	.0001	12	.1
6	.0005	13	.2
7	.0003		

RESISTANCES

R	Ohms	R	Ohms
1	100	6	230,000
2	50,000	7	50,000
3	1 meg	8	500,000
4	20,000	9	5,000
5	5,000	VR1	100,000

WINDINGS

L	Ohms	L	Ohms
1	13	8	25
2	4	9	50
3	2.5	10	.320
4	6	11	2,700
5	4	12	950
6	2.5	13	2.5+1
7	25	14	4
F AE1	15	F AE2	2