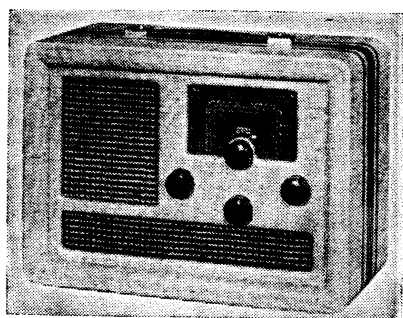


"TRADER" SERVICE SHEET

473

DOUBLE DECCA BM5B

WITH BM5A AND BM5C MODIFICATIONS



THE Double Decca receiver is a transportable 4-valve (plus valve rectifier) 3-band superhet, fitted with frame aeriels. The set, by the operation of a switch, will run from its internal dry LT and HT battery, or from AC/DC mains.

The original model BM5 (or MB5 in some Decca literature) was considerably different from the models with suffix letters A, B and C, and is not covered by this Service Sheet.

Our model was actually a BM5B, and the chief modifications for the A and C models are given at the end of the Sheet. The type number will be found on a label inside the cabinet, but if this is missing, clues to help in identification

are given at the end of the Sheet.
Release date: January, 1940.

CIRCUIT DESCRIPTION

On MW and LW, tuned frame aerial input L3 (MW) plus L4 (LW) tuned by C28 precedes heptode valve (V1, Brimar 1A7EG), which operates as frequency changer with electron coupling, and is not AVC controlled in the MB5/B model. Provision for connection of external aerial via isolating condenser C1 and coupling coil L1, and earth via isolating condenser C2.

On SW, the SW coupling coil L2 receives its input via L1 for external or frame aerial operation, and passes it to the SW tuning circuit L5, C28 and thus to V1.

V1 oscillator grid coils L6 (MW), L7 (LW) and L8 (SW) are tuned by C29; parallel trimming by C30 (MW), C6, C31 (LW) and C32 (SW); series tracking by C7 (MW), C8 (LW), and C9 (SW). Reaction by anode coils L9 (MW and LW) and L10 (SW).

Second valve (V2, Brimar 1N5EG) is a variable-mu RF pentode operating as intermediate frequency amplifier with iron-cored, tuned-secondary input and air-cored, tuned-primary, tuned-secondary transformer couplings L11, L12, C33 and C34, L13, L14, C35.

Intermediate frequency 382 KC/S.

Diode second detector is part of single diode triode valve (V3, Brimar 1H5G). Audio frequency component in rectified output is developed across manual volume control R7, which also operates as load resistance, and passed via AF coupling condenser C18 and CG resistance R8 to CG of triode section, which operates as AF amplifier.

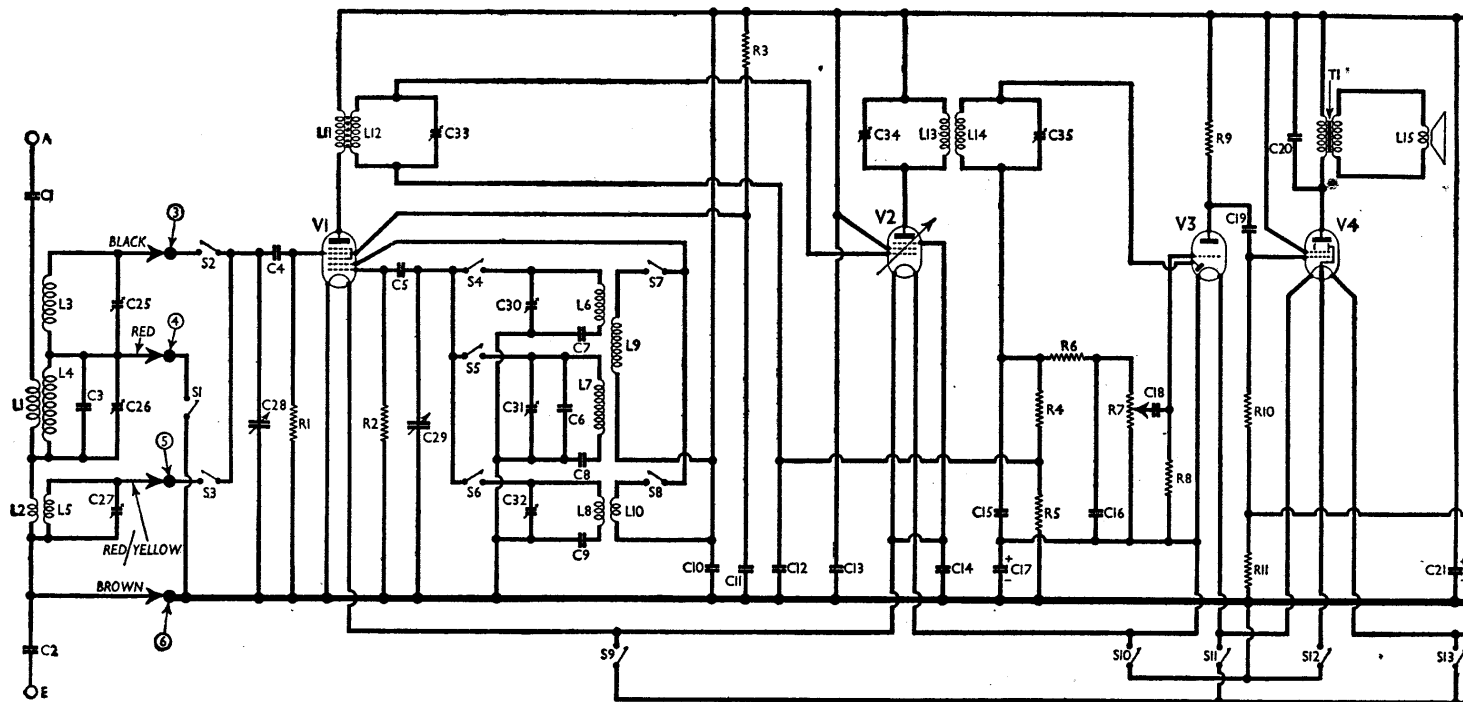
DC potential developed across R6, R7, appears also across R4, R5 and the potential at the junction of R4 and R5 is fed back to the grid circuit of V2 to give automatic volume control.

Resistance-capacity coupling by R9, C19 and R10 between V3 triode and pentode output valve (V4, Raytheon 3Q5GT). Fixed tone correction by C20 in anode circuit.

POWER SUPPLY

The change-over from mains to battery operation or vice-versa is controlled by a manually operated two-position switch unit comprising switches S9 to S17.

When the control knob is turned to the battery position, switches S9, S10, S11, S12, S13, S15 and S17 all close; S18 and S19, which are ganged with the volume control R7, close when the receiver is switched on, whether for mains or battery operation; the combined dry HT and LT battery unit is left permanently connected to the receiver via its connecting plug.



Circuit diagram of the Double Decca model BM5B. Mains input modifications for models BM5A and BM5C are overleaf. Note that as drawn are, from top to bottom, MW, LW and SW. A diagram of the battery plug is inset on the right

The HT positive lead is now connected via S15 and S18 directly to the HT positive line of the receiver. The HT negative lead is connected directly to the junction of R10 and R11, and the current flowing through R11 to chassis produces a voltage drop which is used as GB for V4.

The LT negative lead is connected via S17 and S19 to chassis. The LT positive lead is connected via switches S9, S11 and S13 to one end of each of V1, V2 and V3 heaters and both ends of V4 heater, which is twice as long as the former three heaters and is centre-tapped.

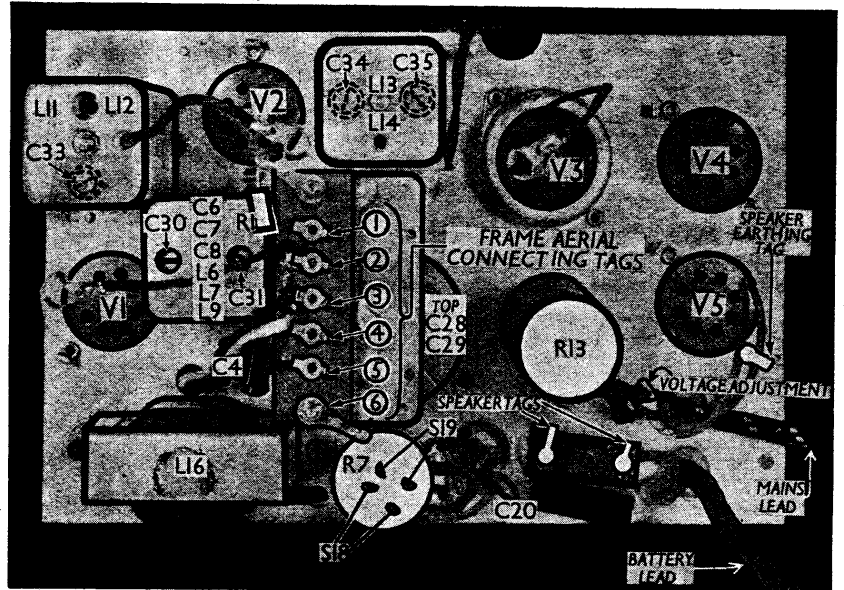
The remaining end of V1 heater is connected directly to chassis, those of V2 and V3, via S10 to chassis, and the centre-tap of V4 via S12 to chassis, so that the first three heaters and the two halves of V4 heater are all connected in parallel.

For mains operation, when the change-over control is turned to the mains position the previously mentioned switches, excepting S18 and S19, open, and S14 and S16 close.

Under these conditions the mains are connected across R13 and the heater of the IHC half-wave rectifying valve (V5, Mullard UY31) via chassis, S19, S16 and the scale lamp. V5 heater warms up, and current flows from the cathode via L16, R12 and V1-V4 heaters, which are now connected in series with one another, back to chassis.

Since S18 and S14 are closed, HT current now flows from the junction of L16 and R12.

The low potential ends of the components comprised in the signal diode circuit, and V3 CG resistance, are connected directly to the negative end of V3 heater, so that they maintain the same potential relative to the heater on



View of the gang condenser side of the chassis. Note the frame aerial connecting tags. In A and C models R13 is replaced by a line cord resistance; a voltage adjustment panel is fitted; and a double electrolytic condenser (C21, C23) occupies the position of R13.

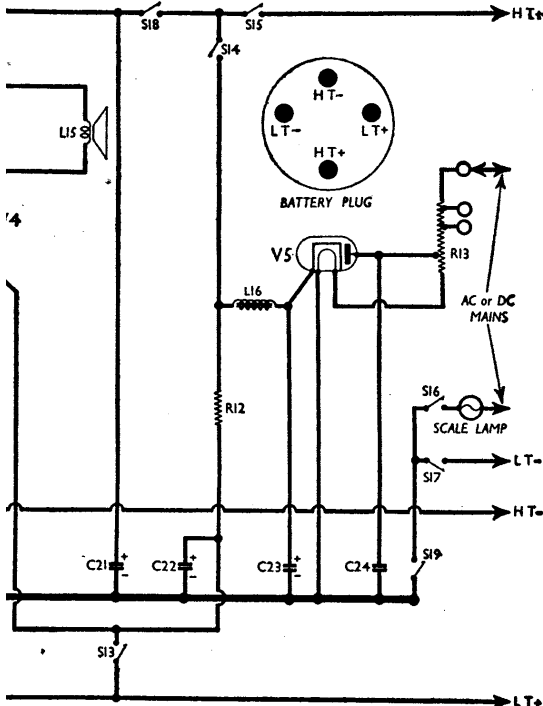
either method of operation. During mains operation, the AC component at this point is maintained at chassis potential via C17, while GB for V4 is obtained by virtue of the fact that its heater is positive with respect to chassis, while its grid circuit is at chassis potential.

Since the scale lamp is included in the mains lead to chassis, it glows only when the receiver is mains operated, and thus serves as an indicator of the source of power.

COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	V1 pentode CG resistance...	3,300,000
R2	V1 osc. CG resistance ...	250,000
R3	V1 SG HT feed ...	80,000
R4	AVC feed potential divider	3,300,000
R5	resistances	3,300,000
R6	IF stopper ...	25,000
R7	Manual volume control ...	500,000
R8	V3 triode CG resistance ...	6,800,000
R9	V3 triode anode load ...	1,000,000
R10	V4 CG resistance ...	2,500,000
R11	V4 (Battery) auto GB ...	400
R12	V1-V4 heater ballast ...	2,000
R13	V5 heater ballast ...	1,180*

* Tapped at 600 Ω + 400 Ω + 90 Ω + 90 Ω from V5 heater.



f. Note that the wavebands in the circuit are on the right.

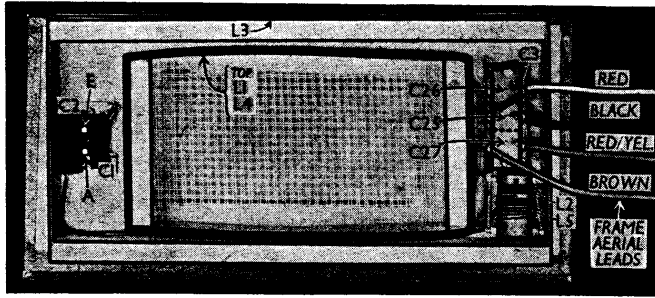
CONDENSERS		Values (μF)
C1	Aerial isolating condenser	0-001
C2	Earth isolating condenser...	0-01
C3	Aerial LW fixed trimmer ...	0-0001
C4	V1 pentode CG condenser ...	0-0001
C5	V1 osc. CG condenser ...	0-0001
C6	Osc. circ. LW fixed trimmer ...	0-00022
C7	Osc. circuit MW tracker ...	0-000821
C8	Osc. circuit LW tracker ...	0-0003855
C9	Osc. circuit SW tracker ...	0-005
C10	V1 osc. anode decoupling ...	0-01
C11	V1 SG decoupling ...	0-01
C12	V2 CG decoupling ...	0-01
C13	HT circuit RF by-pass ...	0-01
C14	V1, V2 heaters RF by-pass	0-02
C15	IF by-pass condensers ...	0-0001
C16	V3 heater decoupling ...	50-0
C17*	AF coupling to V3 triode ...	0-001
C18	V3 triode to V4 AF coupling	0-01
C19	Osc. circuit LW tuning coil ...	5-25
C20	Fixed tone corrector ...	0-001
C21*	HT smoothing condenser ...	32-0
C22*	V1-V4 heaters smoothing ...	50-0
C23*	HT and LT smoothing condenser ...	16-0
C24	Mains RF by-pass ...	0-01
C25†	MW frame aerial trimmer ...	—
C26†	LW frame aerial trimmer ...	—
C27†	Aerial circuit SW trimmer ...	—
C28†	Aerial circuit tuning ...	—
C29†	Oscillator circuit tuning ...	—
C30†	Osc. circuit MW trimmer ...	—
C31†	Osc. circuit LW trimmer ...	—
C32†	Osc. circuit SW trimmer ...	—
C33†	1st IF trans. sec. tuning ...	—
C34†	2nd IF trans. pri. tuning ...	—
C35†	2nd IF trans. sec. tuning ...	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Ext. aerial coupling ...	0-3
L2	Aerial SW coupling coil ...	2-0
L3	Frame aerial windings ...	2-0
L4	Frame aerial windings ...	4-75
L5	Aerial SW tuning coil ...	Very low
L6	Osc. circuit MW tuning coil ...	2-4
L7	Osc. circuit LW tuning coil ...	5-25
L8	Osc. circuit SW tuning coil ...	Very low
L9	MW and LW reaction coil ...	6-25
L10	SW reaction coil ...	0-3
L11	1st IF trans. Pri. ...	18-5
L12	1st IF trans. Sec. ...	5-5
L13	2nd IF trans. Pri. ...	13-0
L14	2nd IF trans. Sec. ...	13-0
L15	Speaker speech coil ...	2-5
L16	HT and LT smoothing choke	350-0
T1	Speaker input Pri. ...	650-0
T1	Speaker input Sec. ...	0-4
S1-S8	Waveband switches ...	—
S9-S17	Mains / battery change switches ...	—
S18	HT circuit switch ...	Ganged
S19	On/off switch ...	R7

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws); remove the two large flat hexagon nuts (with lock-washers) sunk into the front of the case behind the left-hand



View of the frame aerial assembly on back of the receiver. Note the three trimmers and other components.

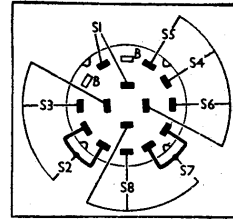


Diagram of the S1-S8 unit, looking at the side facing the chassis deck.

S1 - S8 Table

Switch	SW	MW	LW
S1	—	—	—
S2	—	—	—
S3	—	—	—
S4	—	—	—
S5	—	—	—
S6	—	—	—
S7	—	—	—
S8	—	—	—

and right-hand control knobs; remove the back cover (four round-head wood screws in the corners of the un-hinged portion) on which are mounted the frame windings; unsolder from the vertical connecting strip on the gang assembly the four leads connecting the frame assembly to the chassis; remove the two countersunk-head wood screws holding the upper edge of the chassis to the mounting blocks at the top of the case, when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free the chassis entirely, free the mains lead from the cleat (two round-head wood screws) on the side of the case;

unsolder from the small connecting panel below the mains resistance the two speaker leads, and from the tag beside V5 the speaker earthing lead.

Before certain of the components beneath the chassis can be reached, the scale backing plate must be removed by prising up the four press-studs, care being taken that they do not fly off and become lost.

When replacing, refit the scale backing plate with its dull side outwards.

Connect the green speaker lead to the right-hand tag on the connecting panel;

connect the brown lead to the left-hand tag;

connect the black earthing lead to the chassis tag beside V5.

The frame aerial leads should be connected as follows, numbering the tags on the vertical connecting strip on the chassis from top to bottom:

1 and 2, no external connection:

3, black;

4, red;

5, red or blue lead, with yellow tracer. The brown lead goes to the tag under the bottom fixing nut on the strip.

Do not forget to replace the felt washers, one going on each control spindle between the knob and the cabinet.

Removing Speaker.—Unsolder the two connecting leads from the panel on the chassis;

remove the three nuts (with lock-washers) holding the speaker to the sub-baffle.

When replacing, the transformer should point towards the bottom right-hand corner of the case, and the tag of the black earthing lead from chassis should be fitted under the right-hand fixing nut.

The two leads from the input transformer should be connected as indicated above.

VALVE ANALYSIS

Valve voltages and currents given in the tables below are those measured in our receiver when it was operating on (a) a new battery, the HT section of which was reading 96V on load (battery table); (b) AC mains of 236V (mains table) using the second tapping (220-240V) on the mains resistance.

The receiver was tuned to the lowest wavelength on the MW band, and the volume control was at maximum. The frame windings were disconnected so that there should be no signal input.

Voltages were measured on the 400V scale of a model 7 Universal Avometer, chassis being negative.

Battery Operation

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 1A7EG	91	0.25	45	0.8
	{ Oscil. lator } 91	1.0		
V2 1N5EG	91	1.3	91	0.3
V3 1H5G	15	0.03	—	—
V4 3Q5GT	85	8.2	91	0.95

Mains Operation

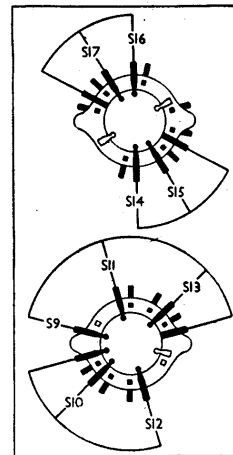
Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 1A7E	91	0.25	45	0.8
	{ Oscil. lator } 91	1.0		
V2 1N5EG	91	1.1	91	0.3
V3 1H5G	15	0.03	—	—
V4 3Q5GT	85	7.0	91	0.8
V5 UY31	112†	—	—	—

† Cathode to chassis, DC.

GENERAL NOTES

Switches.—S1-S8 are the waveband switches, in a rotary unit mounted on the right-hand bracket on the control panel side of the chassis, which is indicated in our illustration of this side. A diagram of the switch unit is in Col. 3, but this is drawn as seen looking from the chassis deck side of the unit. It is rather difficult to see the unit from this side, but by removing the bracket fixing screws, and rotating the bracket slightly, the switching can be checked. The upper table (Col. 3) gives the S1-S8 switch positions in the three control settings, starting from the fully anti-clockwise position of the switch knob. A dash indicating open, and C, closed.

S9-S17 are the mains to battery changeover switches in a double-sided



Diagrams of both sides of the S9-S17 unit. Above, the side nearest the control panel; below, the side facing the chassis deck.

S9 - S17 Table

Switch	Battery	Mains
S9	—	—
S10	—	—
S11	—	—
S12	—	—
S13	—	—
S14	—	—
S15	—	—
S16	—	—
S17	—	—

unit mounted on the left-hand bracket on the control panel side of the chassis indicated in our illustration of this side of the chassis. Diagrams of each side of this unit are above, the upper one being the side seen from the control panel side of the chassis, and the lower one the side facing the chassis deck. The lower table (above) gives the switch positions for the two control settings, a dash indicating open, and C, closed.

S18 is the HT positive, and S19 the on-off switch, in a QMB double unit, ganged with the volume control R7. The tags of these switches are indicated in our view of the gang condenser side of the chassis.

Coils.—L1-L3 are the external aerial coupling and frame aerial windings, mounted on the back of the receiver, and shown in a separate illustration. This

also shows the connecting leads colour-coded to agree with the circuit diagram. The L2, L5 unit, and condensers C1, C2, C3, C25, C26, C27, are also included in this assembly.

L8, L10 are in an unscreened tubular unit on the right of the wavechange switch unit. L6, L7, L9 and the IF transformers L11, L12 and L13, L14 are in three screened units on the gang condenser side of the chassis. Each unit contains its associated trimmers, while the first also contains C6, C7 and C8. The choke L16 is on the same side of the chassis.

Scale Lamp.—This is an Osram MES type, rated at 8V, 1.6W (0.2A).

Battery.—This is a combined 1.5V LT and 90V HT dry battery (Ever Ready All-Dry No. 3). It is fitted with a built-in socket for connections, the battery lead from the receiver terminating in a 4-pin plug to fit. A diagram of the plug, looking at the free ends of the pins, is inset in the circuit diagram.

The colour-coding of the connections to the plug is: LT negative, black; LT positive, blue; HT negative, yellow; HT positive, red.

Resistance R13.—In model B this is a tapped vitreous enamelled resistor, mounted on the chassis deck. It has a total resistance of 1,180 O, and is tapped from the chassis end (V5 heater) at 600 O, 1,000 O, 1,090 O, and 1,180 O.

Valve Bases.—The base connections of V1, V2 and V3 were given in a table at the end of Service Sheet 460 (April 13, 1940). The connections of V4, using the normal pin numbering are: 1, blank; 2, filament; 3, anode; 4, screen grid; 5, control grid; 6, no pin; 7, heater; 8, filament centre tap (and beam electrode). The valve has a 2.8V filament. The connections of V5 are: 1, blank; 2, heater; 3, blank; 4, no pin; 5, anode; 6, no pin; 7, heater; 8, cathode.

Trimmers.—Apart from the three IF trimmers in their respective cans, there are three aerial trimmers in the frame aerial assembly, two in the screened oscillator coil unit, and one by the side of the wavechange switch unit.

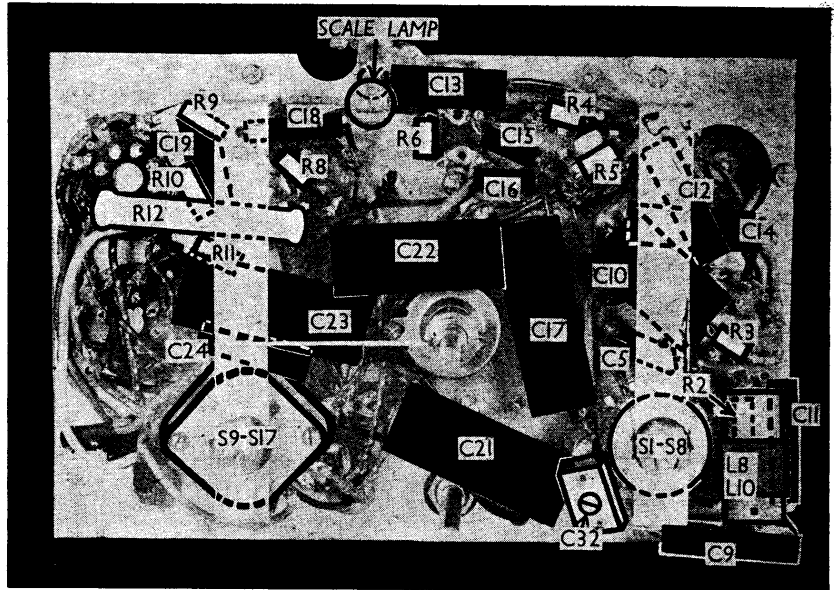
Model BM5B Divergencies.—The following differences were found in our chassis, compared with the makers' BM5B circuit. R1, R4 and R5 were all 3.3 megohms (not 3 megohms); R3 was 60,000 O (not 75,000 O); R8 was 6.8 megohms (not 10 megohms); R10 was 2.5 megohms (not 2 megohms); C14 was 0.02 μF (not 0.1 μF); C15 and C16 were returned to filament of V3, not to chassis.

CIRCUIT ALIGNMENT

IF Stages.—Remove back of receiver, remove connection to tag 5 on frame aerial connection strip, and connect signal generator to this tag and the E socket. Switch set to SW, feed in a 382 KC/S signal, and adjust C35, C34 and C33 for maximum output. Remove signal generator and replace frame lead on tag 5.

RF and Oscillator Stages.—With gang at maximum, pointer should be horizontal. Connect signal generator to external A and E sockets.

MW.—Switch set to MW, tune to 200m on scale, feed in a 200m. (1,500 KC/S) signal, and adjust C30, then C25, for maximum output.



View of the switch unit side of the B type chassis. In A and C models C21 and C23 are in a single block on the other side of the chassis.

LW.—Switch set to LW, tune to 1,200m on scale, feed in a 1,200m (250 KC/S) signal, and adjust C31, then C26, for maximum output.

SW.—Switch set to SW, tune to 16m on scale, feed in a 16m (18.75 MC/S) signal, and adjust C32, then C27, for maximum output.

Finally, replace back of set, and adjust C25, C26 and C27 accurately for maximum sensitivity on their respective bands.

MODELS BM5 A, B AND C MODIFICATIONS

The differences between the models with suffixes A, B and C are somewhat complicated, but the main divergencies are given below. The early model BM5 (without suffix) is so much different that this Sheet will not cover it.

In the first place, the circuit and details given above refer to the B model, which is identified primarily by the fact that R13 is a vitreous enamelled resistor, with voltage tapings on it, V5 is a UY31, and the scale lamp is in series with one mains lead, and has a current rating of 0.2 A.

Model A uses a special line cord resistance in place of the resistor R13, and V5 is a 25Z6, with its two anodes connected together. The scale lamp is

in series with V5 heater and chassis, and has a current rating of 0.3A.

Model C also uses a line cord resistance (but of different value) in place of resistor R13, while V5 is a UY31, and the scale lamp is in series with one mains lead, and has a current rating of 0.2A as in the B model.

In the models using a line cord resistance, the input arrangement and voltage adjustment panel is as shown in a separate diagram on this page. A voltage adjustment panel is fitted on the chassis, and in place of the vitreous resistor, the electrolytics C21 and C23 are in a single block on the chassis deck.

To obtain voltage adjustment the two resistors shown beneath the two lower sockets on the panel are used. These have a value of 50 O each in the A model, and 100 O each in the C model. Voltage adjustment is carried out by bridging pairs of sockets on the panel by a small 2-pin fuse plug. The positions of the plug for various voltages are indicated by dotted lines on the panel.

The mains cord resistance, it will be seen, has five leads emerging from the receiver end, and its internal connections are indicated. The resistance is centre tapped, and has a total value of 490 O in the A model, and 1,000 O in the C model.

