"TRADER" SERVICE SHEET

968

EKCO "STROLLER"

Model MBP 99 : "A" and "B" Versions

THERE are two distinct versions of the Ekco MBP99, between which there are several circuit differences. Our sample receiver was of the later issue, designated "Circuit B" and this Service Sheet is based on that version, but it covers the "A" version completely, the differences between that version and ours being explained throughout as they arise.

As the differences are distributed throughout the circuit, two separate circuit diagrams are provided. A simple method of identifying a particular model is to inspect the frame aerials. If there are only two separate windings, it is an "A" version; in the "B" version there are three distinct windings.

The receiver is a 4-valve (plus rectifier) 3-band superhet designed to operate from self-contained all-dry batteries or from A.C. or D.C. mains of 200—250 V. The waveband ranges are 19.3—51.8 m, 194—550 m and 1,000—2,000 m.

Release date and original price: June, 1959; £16 7s. 11d. complete with batteries. Purchase tax extra.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L1, C30** (S.W.), **L2, C30** (M.W.) and **L2, L3, C30** (L.W.) precedes a heptode valve **(V1, Mullard DK91)** operating as frequency changer with electron coupling.

Provision is made for the connection of an external aerial via **C3** (S.W.), a tap on **L2** (M.W.) or a tap on **L3** (L.W.)

In earlier models (circuit "A"), the L.W. coil **L17** is no longer a frame winding, **L2** acting as its frame aerial. Choke **L15** is interposed in the external aerial lead to **L2**, while on L.W. inductive coupling is provided by **L16. C35** is connected across **L16**, giving image suppression on L.W.

Oscillator grid coils **L4** (S.W.), **L5** (M.W.) and **L6** (L.W.) are tuned by **C31.** Parallel trimming by **C32** (M.W.) and **C11, C33** (L.W.); series tracking by **C12** (S.W.), **C.13** (M.W.) and **C10** (L.W.) Inductive reaction coupling by **L7** (S.W.), **L8** (M.W.) and **L9** (L.W.), with additional coupling across the common impedance of **C12** (S.W.) and **C13** (M.W.)

Second valve **(V2, Mullard DF91)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C7, L10, L11, C8** and **C16, L12, L13, C17.**

Intermediate frequency 455 kc/s. (Southern England) or **460 kc/s.** (Northern England).

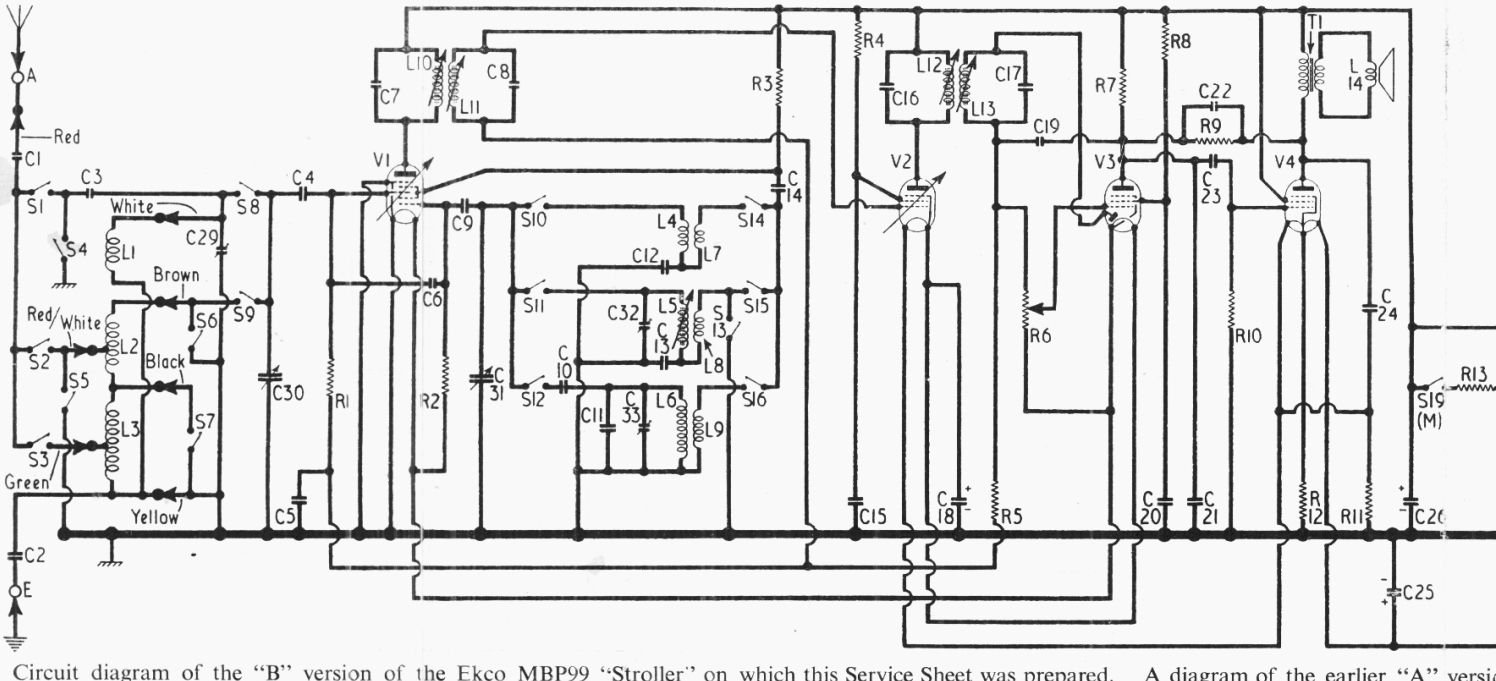
Diode signal detector is part of diode pentode valve **(V3, Mullard DAF91).** Audio frequency component in rectified output is developed across manual volume control **R6,** which is the load resistor, and is passed to C.G. of pentode section, which operates as A.F. amplifier. I.F. filtering by **C21** in anode circuit, and by stray circuit capacitances in the diode circuit. In the "B" version, negative feed-back is introduced by **C19.**

D.C. potential developed across **R6** is fed back as grid bias to the F.C. and I.F. valves giving automatic gain control. Fixed G.B. for **V1** and **V2** is obtained from **V3** filament via **R6.** In the "A" circuit, **V2** bias is adjusted critically by the potential divider formed by **R20, R19** and **R6.**

In the "B" version, G.B. for **V3** pentode is obtained from the D.C. potential developed across **R6,** and varies with the position of the slider. In the "A" version, the slider is isolated by **C39** and G.B. is obtained from the potential divider formed by **R21** and **R22** across the filament circuit.

Resistance-capacitance coupling by **R7, C23** and **R10** between **V3** pentode and pentode output valve **(V4, Mullard DL94).** Fixed tone correction in anode circuit by **C24.** Negative feed-back by **R9** in parallel with **C22** between **V4** anode and pentode anode of **V3.** In earlier models (circuit "A") negative feed-back circuit is formed by **R23, C22** and **R24.**

For battery operation, power supplies are carried by switches **S21 (B), S22 (B), S23 (B), S24 (B), S27 (B),**

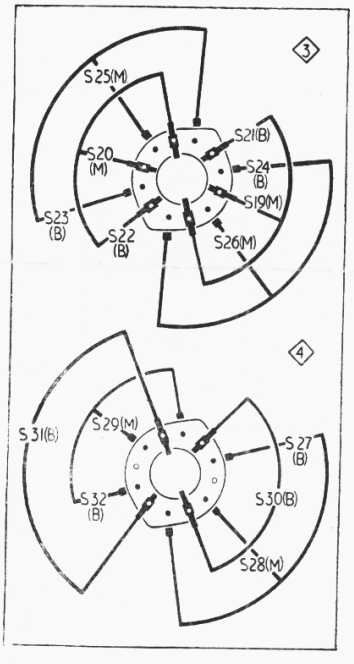


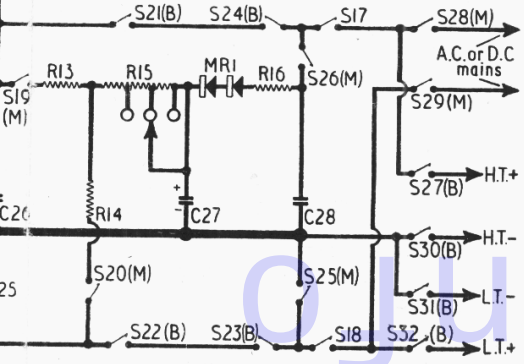
Circuit diagram of the "B" version of the Ekco MBP99 "Stroller" on which this Service Sheet was prepared. A diagram of the earlier "A" versio valve base diagrams. Inset at the top right-hand corner are the diagrams of the mains/battery change-over switch units, as seen from the remo are seen the same switches actually in the circuit. **(B)** switches close for battery operation, and **(M)** switches close

S30 (B), S31 (B) and **S32 (B),** which close in the battery position as indicated by the suffix **(B).** The valve filaments are connected in series for mains or battery operation.

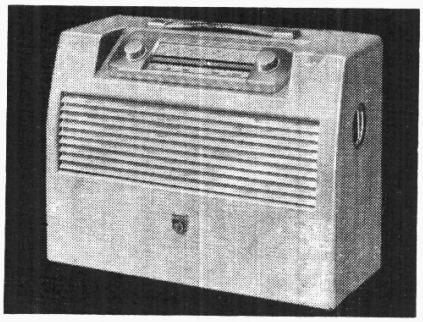
For mains operation, **S19 (M), S20 (M), S25 (M), S26 (M), S28 (M)** and **S29 (M)** close. **S17** and **S18** are the normal on/off switches. H.T. current is supplied by half-wave metal rectifier **(MR1, SenTerCel RM1),** comprising two small elements connected in series to accommodate high voltage mains adequately. In the "A" circuit a single-section high voltage element was used **(MR2, SenTerCel RD18/9/1).**

Smoothing is effected by **R13** and electrolytic capacitors **C26, C27.** Filament current also is taken from the H.T. circuit, the series-connected filaments being fed via **R14. C25** and **C18** ensure a smooth D.C. supply to the filaments which are shunted by **R11** and **R12** to by-pass the H.T. current.





A" version appears overleaf, and with it are the he remote end of the chassis deck. Below them es close for mains.



COMPONENTS AND VALUES

	CAPACITORS	Values	Locations
C1	Aerial coupling	50pF	A2
C2	Chassis isolator	0.01μF	—
C3	S.W. coupling	5pF	G5
C4	V1 C.G.	300pF	F5
C5	A.G.C. decoupling	0.01μF	F4
C6	S.W. neutralising	6.8pF	F5
C7	1st I.F. trans. tuning	56pF	B2
C8		56pF	B2
C9	V.1. osc. C.G.	100μF	F4
C10	L.W. osc. tracker	420pF	G3
C11	L.W. osc. trim.	180pF	G3
C12	S.W. osc. tracker	0.0032μF	F3
C13	M.W. osc. tracker	710pF	G3
C14	Osc. anode coup.	0.001μF	F4
C15	V2 S.G. decoup.	0.1μF	F5
C16	2nd I.F. trans. tuning	100pF	B2
C17		100pF	B2
C18*	Filament by-pass	50μF	F4
C19	Neg. feed-back	10pF	E5
C20	V3 S.G. decoup.	0.1μF	E4
C21	I.F. filtering	300pF	E5
C22	Neg. feed-back	8pF	E4
C23	A.F. coupling	300pF	E5
C24	Tone corrector	0.002μF	D4
C25*	Flmt. smoothing	100μF	B1
C26*	H.T. smoothing	32μF	B1
C27*		32μF	B1
C28	R.F. by-pass	0.05μF	C2
C29‡	S.W. aerial trim.	—	F5
C30‡	Aerial tuning	—	A2
C31‡	Oscillator tuning	—	A1
C32‡	M.W. osc. trim.	—	F5
C33‡	L.W. osc. trim.	—	F5
C34	Aerial coupling	0.001μF	—
C35	L.W. aerial shunt	0.001μF	F3
C36‡	M.W. aerial trim.	—	A2
C37‡	L.W. aerial trim.	—	A1
C38	A.G.C. decoupling	0.02μF	F5
C39	A.F. coupling	500pF	E5

* Electrolytic. ‡Pre set. ‡Variable.

	RESISTORS	Values (ohms)	Locations
R1	V1 C.G.	1M	F5
R2	V1 osc. C.G.	150k	F5
R3	Osc. anode feed	68k	F4
R4	V2 S.G. feed	68k	F4
R5	A.G.C. decoupling	6.8M	F4
R6	Volume Control	1M	C1
R7	V3 pentode load	1M	E4
R8	V3 S.G. feed	4.7M	E4
R9	Neg. feed-back	6.8M	E5
R10	V4 C.G.	2.2M	E5
R11	Filament shunts	680	D5
R12		1k	E4
R13	H.T. smoothing	4k	C1
R14	Filament ballast	2.6k	C1
R15	H.T. smoothing	†1310	D5
R16	Surge limiter	200	C1
R17	M.W. Aerial shunt	47k	A2
R18	A.G.C. decoupling	6.8M	F4
R19	V2 G.B. potential divider	3.3M	F5
R20		3.3M	F5
R21	V3 G.B. potential divider	6.8M	E5
R22		10M	E5
R23	Neg. Feed-back	3.3M	E4
R24		3.3M	E5
R25	Filament shunt	680	E5
R26	H.T. smoothing	2.5k	C1
R27	Filament ballast	2.3k	C1

† Tapped at 690+310+310 ohms from R13

	OTHER COMPONENTS	Approx. values (ohms)	Locations
L1	Frame aerial windings	Very low	—
L2		0.7	
L3		6.3	
L4	Oscillator tuning coils	Very low	G3
L5		2.5	G3
L6		6.5	G3
L7	Oscillator reaction coils	8.0	G3
L8		1.5	G3
L9		3.2	G3
L10	1st I.F. trans. Pri.	34.0	B2
L11	Sec.	34.0	B2
L12	2nd I.F trans. Pri.	14.5	B2
L13	Sec.	14.5	B2
L14	Speech coil	2.3	
L15	Coupling Choke	19.0	A2
L16	L.W. coupling	31.0	G3
L17	L.W. loading coil	20.0	G3
T1	O.P. trans. Pri.	700.0	C2
	Sec.	Very low	
S1-S16	Waveband switches	—	G5
S17,S18	Power sw. g'd. R6	—	C1
S19-S32	Mains batt. sw.	—	C1

GENERAL NOTES

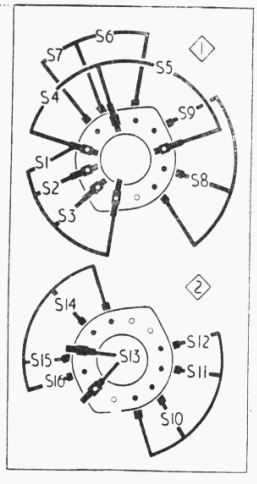
Switches.—S1—S16 are the waveband switches, ganged in two rotary units beneath the chassis. These are indicated by the numbers **1** and **2** in diamonds in our under-chassis view and shown in detail in the diagrams in this column, where they are drawn as seen when viewed in the direction of the arrow in our photograph.

positions for the three control settings. The table (this column) gives the switch starting from the fully anti-clockwise position of the control knob. A dash indicates open, and C, closed.

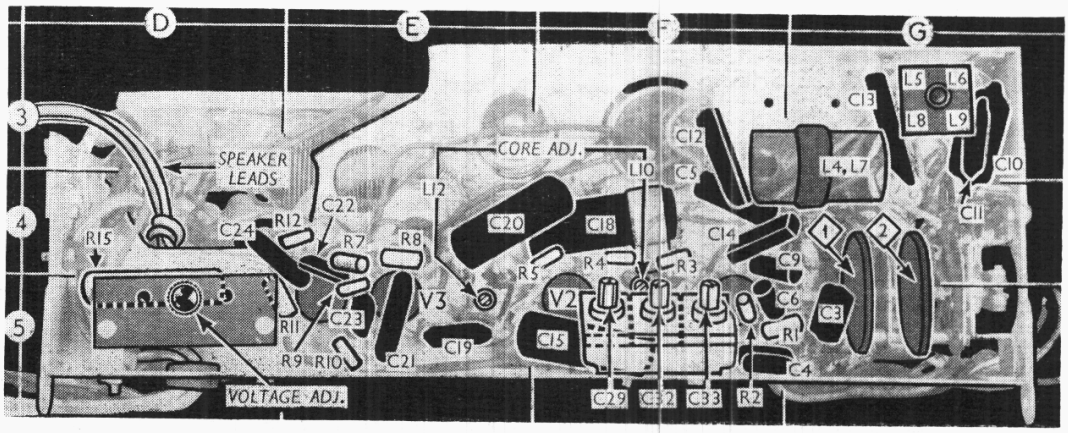
S17, S18 are the Q.M.B. "on/off" switches, common to mains and battery circuits. They are ganged with the volume control **R6.**

S19 (M)—S32 (B) are the mains/battery change-over switches, ganged in two further rotary units mounted on one of the vertical chassis side-members. These are indicated by numbers **3** and **4** in diamonds in our plan view of the chassis, where arrows show the

Diagrams of the waveband switch units, as seen in the direction of the arrows in our under-chassis view overleaf. The associated table is below.



Switch	S.W.	M.W.	L.W.
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	—	—	C
S5	C	—	—
S6	C	—	—
S7	—	C	—
S8	C	—	—
S9	—	C	C
S10	C	—	—
S11	—	C	—
S12	—	—	C
S13	C	—	—
S14	C	—	—
S15	—	C	—
S16	—	—	C



Under-chassis view of the "B" version. In the "A" version the trimmers are grouped round the gang unit on the chassis deck. There is also an additional coil unit **L16, L17** mounted in the space above **L4, L7** in this illustration.

on the bench, and the tuning scale remains fixed in the carrying case, the following procedure should be adopted:—Replace the chassis temporarily in the carrying case and check that with the gang at maximum capacitance, the cursor coincides with the high wavelength end of the scales. This can be adjusted by sliding the cursor along the drive cord.

Set the cursor to the following alignment points on the tuning scale and make a pencil mark on the scale backing plate against the right-hand edge of the cursor carriage at each setting:—21.43 m, 250 m, 500 m and 1,200 m.

Remove the chassis from the carrying case and place frame aerial in its normal position relative to the chassis. Transfer "live" signal generator lead to **A** socket.

S.W.—Switch set to S.W., tune to 21.43 m. mask, feed in a 21.43 m. (14 M c/s.) signal, and adjust **C29** (F5 in "B" version, A2 in "A" version) for maximum output.

M.W.—Switch set to M.W., tune to 250 m mark, feed 250 m. (1,200 kc/s.) signal, and adjust **C32** (F5 in "B" version, A2 in "A" version) and **C36** (A2 in "A" version only) for maximum output. Tune to 500 m. mark, feed in a 500 m. (600 kc/s.) signal, and adjust the core of **L5** (A1) for maximum output.

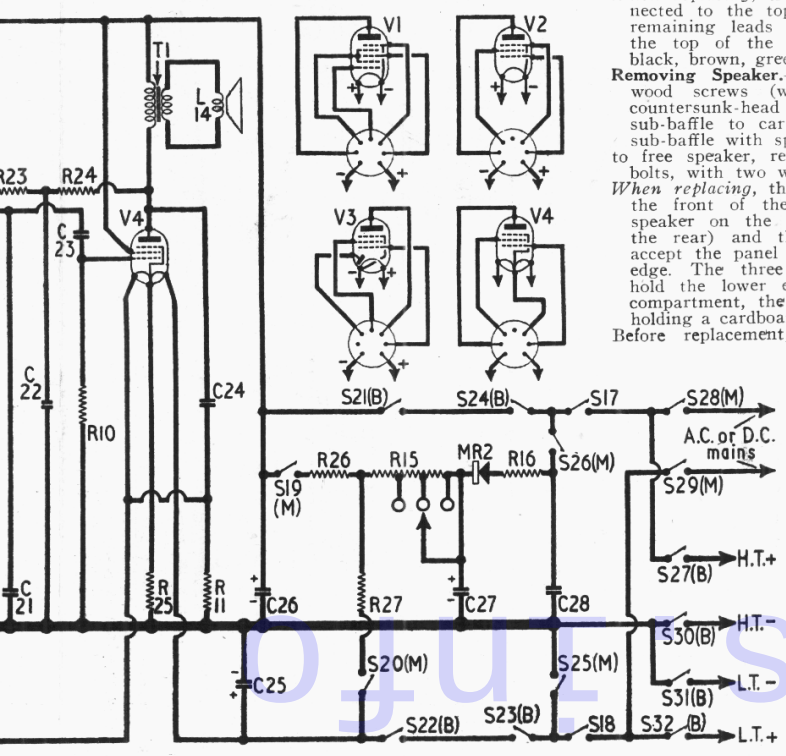
L.W.—Switch set to L.W., tune to 1,200 m. mark, feed in a 1,200 m. (250 kc/s.) signal, and adjust **C33** (F5 in "B" version, A1 in "A" version) and **C37** (A1 in "A" version only) for maximum output.

DISMANTLING THE SET

Removing Chassis.—Unplug H.T. and L.T. battery connectors, and remove batteries; release upper back cover by removing two 6 B.A. bolts (with washers) from its lower corners, (it remains connected to chassis by the frame aerial leads);
remove two side control knobs (recessed grub screws, accessible from inside carrying case), and two front control knobs (recessed grub screws);
pull out cardboard shelf from beneath chassis;
remove two 4 BA round-head bolts with washers from top edge of scale backing plate;
remove two 4 BA cheese head bolts with washers securing brackets at lower rear edge of chassis to carrying case;
withdraw chassis to extent of speaker leads and unsolder them.
When replacing, the yellow speaker lead should be connected to the top speech coil tag.

Removing Frame Aerial.—Unsolder seven coloured leads from aerial socket and tag strip on back cover.
When replacing, the red lead should be connected to the top (aerial) socket, and the remaining leads as follows, starting from the top of the tag strip; yellow, white. black, brown, green and red/white.

Removing Speaker.—Remove five round-head wood screws (with washers) and three countersunk-head wood screws holding the sub-baffle to carrying case, and withdraw sub-baffle with speaker;
to free speaker, remove four 4BA nuts and bolts, with two washers each.
When replacing, the sub-baffle is screwed to the front of the carrying case with the speaker on the right (when viewed from the rear) and the three indentations (to accept the panel fixing pegs) on its upper edge. The three countersunk-head screws hold the lower edge in the H.T. battery compartment, the two right-hand ones also holding a cardboard flap beneath the speaker. Before replacement, the speaker should be mounted on the sub-baffle, its speech coil tags facing the adjacent right-hand end.
Each fixing bolt has two washers, a D-shaped one going behind the speaker flange and a circular one going in front of it.



Circuit diagram of the "A" version, which has only a S.W. and a M.W. frame aerial. The M.W. frame acts as an aerial for the L.W. loading coil **L17**. The waveband and mains/battery switches are the same in both versions.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those quoted by the manufacturers for an average receiver when tuned to 300 m. on M.W. with no signal input, and while operating on D.C. mains of 230 V. Voltages were measured with a 1,000 ohms-per-volt meter whose negative lead was connected to chassis.

Valve	Anode		Screen	
	V	mA	V	mA
V1 DK91	88	0.4	22.3	0.8
V2 DF91	88	0.75	31.5	0.5
V3 DAF91	*	0.05	*	0.05
V4 DL94	84	7.9	88.0	1.65

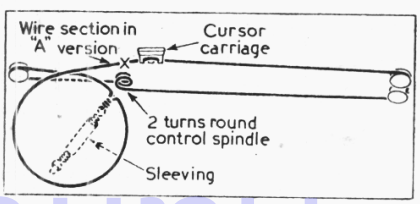
* No appreciable reading

DRIVE CORD REPLACEMENT

About four feet of high quality plaited and waxed fishing line is required for a new drive cord in the "B" version chassis. In the "A" version, a 12-inch length of wire (type number B33563/8) is added to one end, and the length of the cord is then only a little under 30 inches.

The sketch below shows the complete system as seen from the rear of the chassis when the gang is at maximum capacitance. Here both ends of the cord are tied to the tension spring, but in the "A" version the wire is held by the anchor tag on the drive drum at the other end of the spring.

It then passes out through the groove slot and goes clockwise round the drum to the point which we mark "X," just short of the cursor. There the cord is tied to it to continue the course shown in our sketch, finally tying off at the outer end of the spring. As the fitting should start with the wire, it should be done with the gang at minimum, so that the cord can be pulled against the gang stop to hold it in position.



Sketch of the tuning drive system, seen from the rear. A small length of wire is is used in the "A" version.

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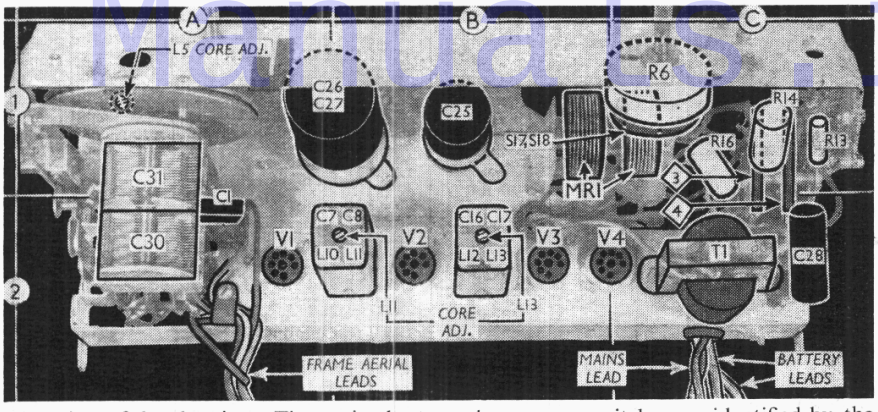

Plan view of the chassis. The mains/battery change-over switches are identified by the numbers **3** and **4**. They are shown in detail in diagrams inset in the circuit overleaf.

direction in which they are viewed in the diagrams (overleaf), where they are shown in detail.

Their action is indicated by the suffix letter. Those with the suffix **(B)** close for battery operation (control knob turned clockwise), while those with the suffix **(M)** close for mains operation, when the control knob is turned anti-clockwise.

There appears to be an unnecessarily large number of switches in the change-over for a circuit in which the filaments are permanently operated in series, as in the duplication of **S22** by **S23** for instance, but this is apparently due to the use of two-way switching facilities on the switch unit even where they are not required by the circuit.

Batteries.—Representative types of batteries are L.T., Vidor type L5042 or Ever Ready All-dry 31, 7.5 V; H.T., Vidor L5039, Ever Ready B107, Drydex H1146, 90 V. The L.T. unit is fitted with a 2-pin socket, of which the thicker pin is the positive. Grid bias is automatic.

Warning.—Our H.T. used two ordinary wander-plug sockets, but the Every Ready B107 is fitted with a 3-pin socket, and the makers warn users that when inserting one of these into the case, the 3-pin plug must be located near the side of the case. If it is located near the centre, as it can be if the battery is turned round, the back cover latch bar may short-circuit it.

Another warning issued by the makers is against pulling the valves out of their sockets while the receiver is working on mains. If a valve is withdrawn, the filament series becomes open-circuited and **C25** charges up to H.T. potential. Its discharge is likely to damage the filaments when the valve is replaced.

Chassis Divergencies.—In very early "A" versions, **R11** was connected across **V1** filament. Where this is found, the makers recommend re-connecting it as shown in our diagrams. At the same time, the value of **R25,** which was 680 ohms, should be changed to 1,000 ohms, as in the "B" version.

R8 is quoted in our tables as 4.7 megohms but in some chassis it may be 3.3 megohms.

"A" and "B" MODEL DIFFERENCES

Approximately 5,000 "A" version chassis were made. In addition to the differences that can be seen in the two circuit diagrams, there are several physical changes that are not obvious. Our photographs were taken from our sample receiver, which was a "B" version, and we show the trimmers **C29, C32, C33** in a row beneath the chassis. In the "A" version, they are disposed on either side of the gang unit on the chassis deck, as indicated by the location references in our "Circuit Alignment" instructions. With them are two trimmers **C36, C37** that are omitted in the "B" version.

Only S.W. and M.W. frame windings are fitted to the back cover, modifying the connections between the cover and the chassis, which are indicated in our "B" circuit diagram by arrowheads identified by lead colours as found in the "B" version. The modified "A" connections are indicated in our "A" circuit, but the colours are omitted.

The additional coil unit containing the L.W. aerial coils **L16, L17** in the "A" version is beside the oscillator coil unit **L5—L9**, in front of the **L4, L7** unit, at location reference **G3.** In the tuning drive system, a short length of wire is used at one end of the cord in the "A" version.

In the circuit diagram for the "A" version we have given components that are additional to those in the "B" version, and those that have different values, higher numbers than any in the "B" circuit. Additional resistors start off at **R17,** capacitors at **C34** and coils at **L15.**

In our component tables are given their "A" circuit values and the reference location in which they would be found in an "A" chassis. These components are not, however, actually shown in our chassis photographs.

CIRCUIT ALIGNMENT

Receivers intended for use in Northern England have a large "N" stamped in the carrying case and should have an intermediate frequency of 460 kc/s., while those used in Southern England are marked with a large "S" and should have an intermediate frequency of 455 kc/s.

I.F. Stages.—To facilitate adjustments, the chassis and frame aerial should be removed from the carrying case and placed front downwards on the bench.

Switch set to M.W. and turn gang and volume control to maximum. Connect signal generator via a 0.01uF capacitor in each lead to control grid (pin 6) of **V1** and chassis, feed in a 460 kc/s. (652.1 m.) signal for "N" models, or a 455 kc/s. (659.3 m.) signal for "S" models and adjust **L13, L12, L11 and L10** (location references **B2, E5, F5**), in that order, for maximum output, reducing the input as the circuits come into line to avoid A.G.c. action.

R.F. and Oscillator Stages.—As these adjustments must be carried out with the chassis