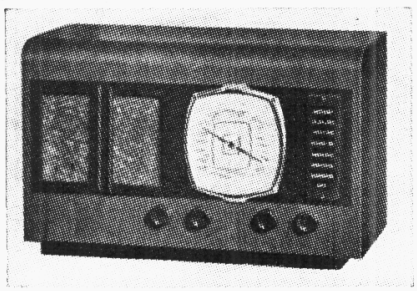
Supplement to The Wireless & Electrical Trader, December 17, 1938

"TRADER" SERVICE SHEET

372

LISSEN 8453 AND 8417



The Lissen 8453. The 8417 (without press-buttons) has a vertical cabinet, with the speaker above the tuning scale.

TRIMMER type press-button tuning for seven stations is included in the Lissen 8453, Kenilworth, 4-valve (plus rectifier) AC 3-band superhet. Pressing any of these buttons switches the set on, in addition to selecting the appropriate station, while an eighth button is for switching the receiver off.

Suitable for mains of 200-250 V, 40-100 C/S, the set covers a short-wave range of 18-52 m and has provision for both a gramophone pick-up and an extension speaker. Two aerial sockets are incorporated, of which one is for use when the set is near a powerful station.

A very similar chassis is fitted in the 8417, Glamis, model, but this does not include press-button tuning. This *Service Sheet* was prepared on an 8453, but the differences in the 8417 are given under "Model 8417 Modifications."

Release date for both models : August, 1938.

CIRCUIT DESCRIPTION

Independent tuning circuits are employed in this receiver for manual and automatic operation, and two alternative aerial input sockets **A1, A2** are provided. From socket **A1,** aerial is connected directly to manual or automatic coupling components, but from **A2** it is connected via a potential divider comprising resistances **R1, R2,** for the reception of local transmissions.

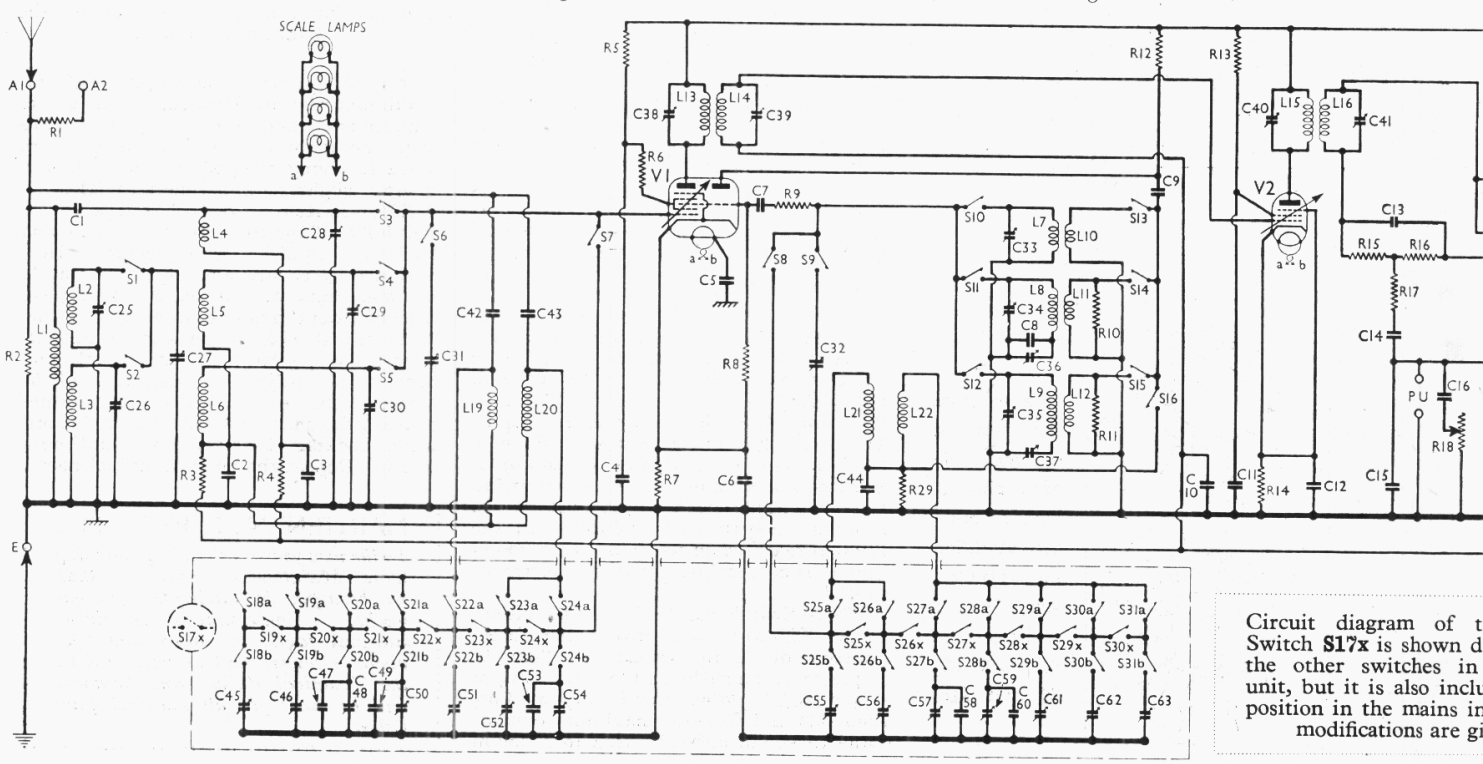
For manual operation on MW and LW, input from **A1** is via coupling coil **L1** to inductively coupled band-pass filter. Primary coils **L2, L3** are tuned by **C27 ;** secondaries **L5, L6** by **C31.** On SW, input from **A1** is via coupling condenser **C1** to single tuned circuit **L4, C31.**

For automatic operation, input from **A1** is via coupling condensers **C42** (MW) and **C43** (LW) to auto-tuning coils **L19** (MW) and **L20** (LW). **S6** is open, disconnecting the manual tuning condenser **C31** from **V1** hexode CG line, which is instead connected via **S7,** now closed, to the automatic switch unit and thus, via the requisite number of series switches **S19x** to **S24x** and one of the selector switches **S18a** to **S24a,** to either **L19** or **L20,** according to which button is depressed. At the same time, one of the trimmer selector switches **S18b** to **S24b** closes, connecting the appropriate tuning trimmer across the tuning coil.

The operation of the press-button switches can be deduced from the diagram by observing the lettered suffix attached to each number ; **"a"** or **"b"** indicates that the switch to which it is attached closes, while that with an **"x"** opens, when its button is pressed, the converse being the case when the button is released. Switches bearing the same number, apart from the suffix, are associated with the same press button.

First valve (**V1, Ever Ready metallised A36B**) is a triode hexode operating as frequency changer with internal coupling. For manual operation, triode oscillator grid coils **L7** (SW), **L8** (MW) and **L9** (LW) are tuned by **C32 ;** parallel trimming by **C33** (SW), **C34** (MW) and **C35** (LW) ; series tracking by **C8, C36** (MW) and **C37** (LW). Reaction by coils **L10** (SW), **L11** (MW) and **L12** (LW).

Arrangements similar to those in the aerial circuit are employed for automatic operation. **S9** opens and **S8** closes, so that the tuning coils **L22** (MW) and **L21** (LW) are connected to the CG line via switches **S25x** to **S30x** and **S25a** to **S31a,** and to the tuning trimmers via switches



Circuit diagram of t
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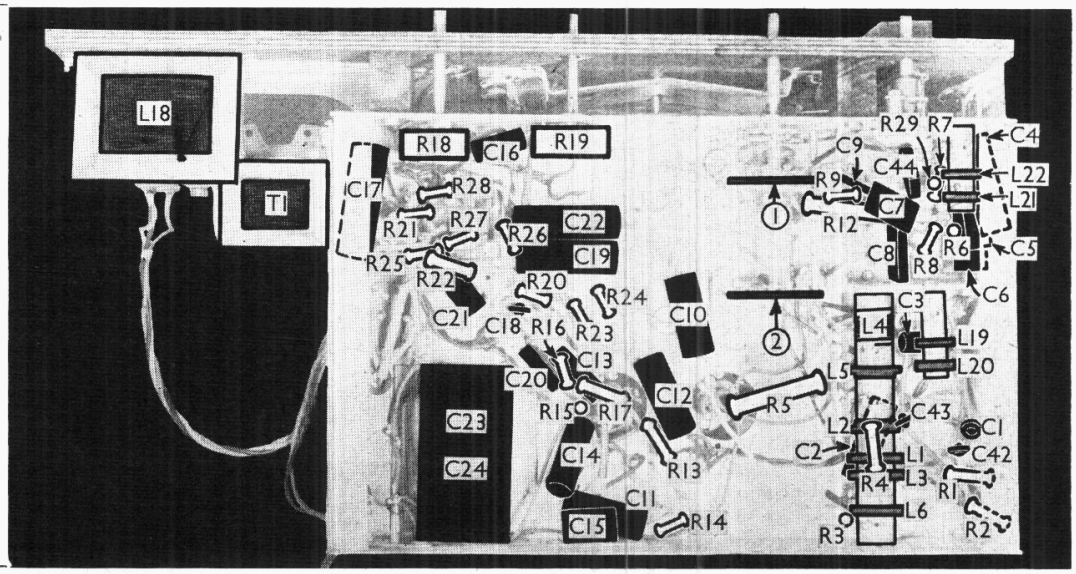


Under - chassis view. **L19, L20** and **L21, L22** are the auto-tuning coils, and are not included in model 8417. **R29** and **C42-C44** are also omitted in tha model. The end turn of **L4** is used for adjustment of inductance when aligning the SW band.

S25b to **S31b.** The anode is coupled via **C9** directly to the low potential end of the tuning coils.

Second valve (**V2, Ever Ready metallised A50P**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C38, L13, L14, C39** and **C40, L15, L16, C41.**

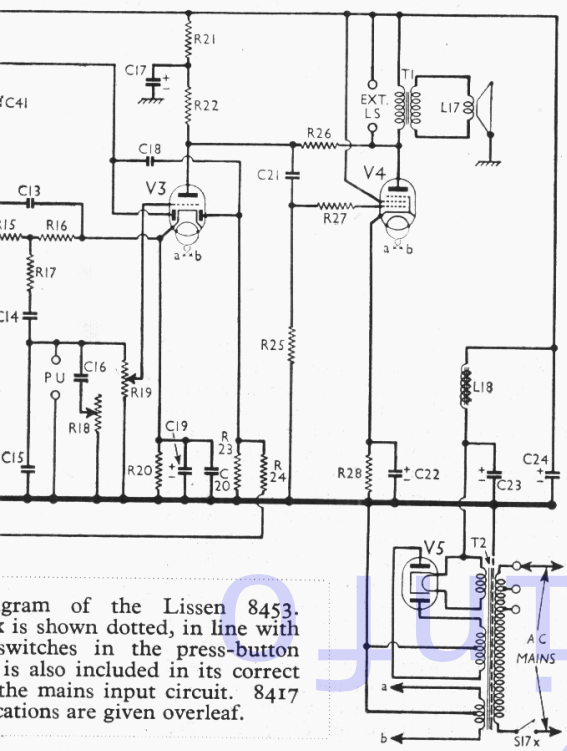
Intermediate frequency 452 KC/S.

Diode second detector is part of double diode triode valve (**V3, Ever Ready metallised A23A**). Audio frequency component in rectified output is developed across load resistances **R15, R16,** that at their junction being tapped off and passed via IF stopper **R17,** AF coupling condenser **C14** and manual volume control **R19** to CG of triode section, which operates as AF amplifier. IF filtering by **C13** and **C15.** Variable tone control by **C16, R18** across **R19.** Provision for connection of gramophone pick-up also across **R19.**

Second diode of **V3,** fed from **L16** via **C18,** provides DC potential which is developed across load resistance **R23** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control. Delay voltage is obtained from drop along **R20** in cathode lead to chassis.

Resistance-capacity coupling by **R22, C21, R25,** via grid stopper **R27,** between **V3** triode and pentode output valve (**V4, Ever Ready A70D**). Negative feed-back by resistance **R26** between **V3** triode and **V4** anodes. Provision for external speaker in **V4** anode circuit.

HT current is supplied by IHC full-wave rectifying valve (**V5, Ever Ready A11D**). Smoothing by iron-cored choke **L18** and dry electrolytic condensers **C23, C24.**



gram of the Lissen 8453. x is shown dotted, in line with switches in the press-button is also included in its correct the mains input circuit. 8417 cations are given overleaf.

COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	Aerial input potential divider	110,000
R2	Aerial input potential divider resistances	11,000
R3	V1 hexode MW and LW CG decoupling	110,000
R4	V1 hexode SW CG decoupling	110,000
R5	V1 SG HT feed resistance	20,000
R6	V1 SG stabiliser	75
R7	V1 fixed GB resistance	150
R8	V1 osc. CG resistance	51,000
R9	Oscillator circuit damping	200
R10	Oscillator MW reaction damping	1,100
R11	Oscillator LW reaction damping	2,100
R12	V1 osc. anode HT feed	20,000
R13	V2 SG HT feed	25,000
R14	V2 fixed GB resistance	250
R15	V3 signal diode load resistances	510,000
R16	V3 signal diode load resistances	260,000
R17	IF stopper	110,000
R18	Variable tone control	2,000,000
R19	Manual volume control	500,000
R20	V3 triode GB ; AVC delay	1,000
R21	V3 triode anode decoupling	11,000
R22	V3 triode anode load	40,000
R23	V3 AVC diode load	1,100,000
R24	AVC line decoupling	260,000
R25	V4 CG resistance	510,000
R26	Negative feed-back coupling	250,000
R27	V4 grid stopper	110,000
R28	V4 GB resistance	150
R29	Osc. circuit auto damping	5,100

	CONDENSERS	Values (μF)
C1	Aerial SW coupling	0·00001
C2	V1 hexode CG MW and LW decoupling	0·1
C3	Aerial circuit SW tracker	0·01
C4	V1 SG decoupling	0·1
C5	V1 heater RF by-pass	0·005
C6	V1 cathode by-pass	0·1
C7	V1 osc. CG condenser	0·0001
C8	Osc. circuit MW fixed tracker	0·0005
C9	V1 osc. anode coupling	0·0003
C10	V2 CG decoupling	0·1
C11	V2 SG decoupling	0·1
C12	V2 cathode by-pass	0·1
C13	IF by-pass	0·00005
C14	AF coupling to V3 triode	0·05
C15	IF by-pass	0·0001
C16	Part of variable tone control	0·002
C17*	V3 triode anode decoupling	2·0
C18	Coupling to V3 AVC diode	0·00001
C19*	V3 cathode AF by-pass	50·0
C20	V3 cathode RF by-pass	0·0005
C21	V3 triode to V4 AF coupling	0·05
C22*	V4 cathode by-pass	50·0
C23*	HT smoothing	8·0
C24*	HT smoothing	16·0
C25‡	Band-pass pri. MW trimmer	0·00004
C26‡	Band-pass pri. LW trimmer	0·00009
C27†	Band-pass pri. tuning	—
C28‡	Aerial circuit SW trimmer	0·00004
C29‡	Band-pass sec. MW trimmer	0·00004
C30‡	Band-pass sec. LW trimmer	0·00009
C31†	SW aerial and band-pass secondary tuning	—
C32†	Oscillator circuit tuning	—
C33‡	Osc. circuit SW trimmer	0·00002
C34‡	Osc. circuit MW trimmer	0·0001
C35‡	Osc. circuit LW trimmer	0·0001
C36‡	Osc. circuit MW tracker	0·00025
C37‡	Osc. circuit LW tracker	0·00025
C38‡	1st IF trans. pri. tuning	0·0003
C39‡	1st IF trans. sec. tuning	0·0003
C40‡	2nd IF trans. pri. tuning	0·0003
C41‡	2nd IF trans. sec. tuning	0·0003
C42	Auto circ. MW aerial coupling	0·00001
C43	Auto circ. LW aerial coupling	0·00001
C44	Auto circuit osc. coupling	0·0002
C45‡	Aerial circuit automatic tuning trimmers	0·0001
C46‡		0·0001
C47		0·00005
C48‡		0·0003
C49		0·0001
C50‡		0·0003
C51‡		0·0003
C52‡		0·0003
C53		0·0002
C54‡		0·0003
C55‡	Oscillator circuit automatic tuning trimmers	0·0001
C56‡		0·0001
C57‡		0·0003
C58		0·0003
C59‡		0·0003
C60		0·00005
C61‡		0·0003
C62‡		0·0001
C63‡		0·0001

* Electrolytic. † Variable. ‡ Pre-set.

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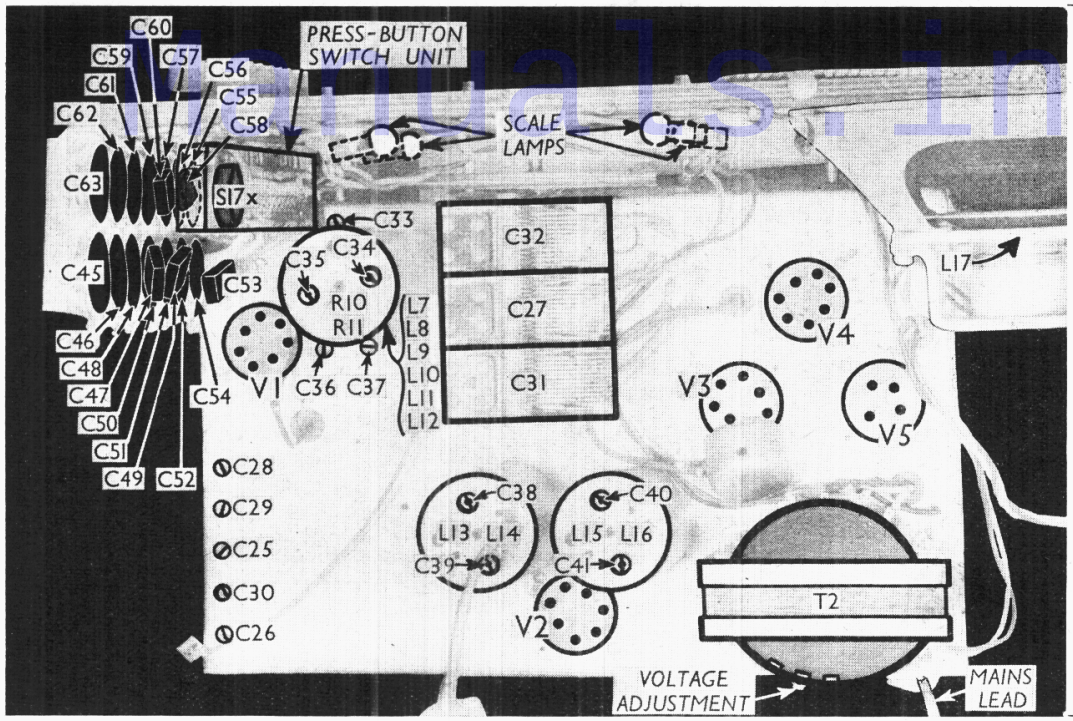


Plan view of the 8453 chassis. A diagram of both sides of the press-button switch unit is in column 6. This unit, and the automatic tuning trimmers, are omitted in model 8417. Note the various manual tuning trimmers adjustable through holes in the chassis deck.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial MW and LW coupling	11·0
L2	Band-pass primary coils	2·5
L3	Band-pass primary coils	11·0
L4	Aerial SW tuning coil	Very low
L5	Band-pass secondary coil)	2·5
L6	Band-pass secondary coil)	11·0
L7	Osc. circuit SW tuning coil	Very low
L8	Osc. circuit MW tuning coil	1·8
L9	Osc. circuit LW tuning coil	5·0
L10	Oscillator SW reaction	0·3
L11	Oscillator MW reaction	6·25
L12	Oscillator LW reaction	8·3
L13	1st IF trans. Pri.	7·0
L14	1st IF trans. Sec.	7·0
L15	2nd IF trans. Pri.	7·0
L16	2nd IF trans. Sec.	7·0
L17	Speaker speech coil	2·5
L18	HT smoothing choke	230·0
L19	Auto circuit MW aerial tuning coil	2·6
L20	Auto circuit LW aerial tuning coil	12·0
L21	Auto circuit LW oscillator tuning coil	7·5
L22	Auto circuit MW oscillator tuning coil	2·4
T1	Speaker input trans Pri...	650·0
	Speaker input trans Sec...	0·4
T2	Mains trans. Pri., total	19·0
	Mains trans. Heater sec.	0·05
	Mains trans. Rect. heat. sec...	0·1
	Mains trans. HT sec., total	290·0
S1-S16	Waveband and manual/auto switches	—
S17x	Mains switch	—
S18a, b to S24a, b, x	Aerial circuit automatic tuning selector switches	—
S25a, b, x to S31a, b	Oscillator circuit automatic tuning selector switches	—

DISMANTLING THE SET

The chassis and speaker can be removed from the cabinet as a complete assembly so that tests can be carried out under operating conditions.

Removing Assembly.—To do this, remove the four control knobs (pull off) and the four bolts (with washers) holding the chassis to the bottom of the cabinet, and free the brackets holding the sub-baffle to the front of the cabinet (four round-head wood screws). The complete assembly can now be withdrawn from the cabinet.

Removing Speaker.—If it is desired to remove the speaker from the cabinet it is first necessary to remove the assembly as described above. Then unsolder the leads from the chassis and remove the nuts, washers and lock washers from the four screws holding the speaker to the sub-baffle.

When replacing, see that the transformer is at the bottom, and do not forget to replace the black lead on the bottom right-hand screw. Connect the green lead from the speaker to pin 7 of **V4** valve-holder, and the brown lead to pin 3 of **V4** valve-holder.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 234 V, using the 216-235 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

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

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 A36B	280	4·8	118	7·6
	Oscillator			
	120	7·4		
V2 A50P	280	8·7	186	3·2
V3 A23A	123	3·2	—	—
V4 A70D	253	34·0	280	5·0
V5 A11D	264†	—	—	—

† Each anode, AC.

GENERAL NOTES

Switches.—**S1-S16** are the waveband and manual/auto switches, in two rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in column 4, where they are drawn as seen looking from the rear of the underside of the chassis.

The table (col. 4) gives the switch positions for the four control settings, starting from fully anti-clockwise. A dash indicates *open*, and **C**, *closed*.

S17x is the QMB mains switch, in a small cylindrical unit at the top of the press-button switch assembly. On pressing the top button (marked "Off"), **S17x** opens and breaks the mains input circuit. Pressing any other button, and thus releasing the top one, switches the set on.

S18a, b to **S24a, b, x** and **S25a, b, x** to **S31a, b** are the aerial and oscillator circuits auto-tuning switches, all ganged in a double-sided press-button unit mounted vertically at the front of the chassis. This is indicated in our plan chassis view, and shown in detail in the diagrams in column 6. The diagrams are drawn looking from the rear of the chassis, with the chassis standing normally on a bench. The left-hand diagram shows the left-hand side of the unit (nearest the bank of auto trimmers) while the right-hand diagram shows the right-hand side of the unit (nearest the gang condenser).

In all cases but one, each button controls six switches. Thus the bottom button controls **S24a, b, x** and **S25a, b, x,** the second from the bottom controls **S23a, b, x** and **S26a, b, x** and so on. The top station button controls **S18a, b** and **S31a, b.** Although there are tags for switches which would be **S18x** and **S31x,** and these switches are wired up, they play no part in the circuit, and are not shown in our circuit diagram. The

tags are marked as bearers (**Be**) in the switch diagrams.

The **a** and **b** switches *close* when their appropriate buttons are pressed, and the **x** switches *open*, and *vice-versa*.

Coils.—**L1-L6** are in a tubular unscreened unit beneath the chassis. **L7-L12,** and the IF transformers **L13, L14** and **L15, L16** are in three screened units on the chassis deck, with their associated trimmers.

The auto-tuning coils **L19, L20** and **L21, L22** are in pairs in two unscreened units beneath the chassis.

The smoothing choke **L18** is mounted on the baffle below the speaker.

External Speaker.—Two sockets are provided at the rear of the chassis for a high impedance (10,000 O) external speaker.

Pre-Set Condensers.—All the auto-tuning trimmers are adjustable through holes in the wooden panel at the side of the chassis. Of the remaining trimmers eight are reached through holes in the chassis deck, while six are at the tops of the three coil units on the chassis deck.

Condensers C23, C24.—These are two dry electrolytics (350 V working) in a single carton beneath the chassis, having a common negative (black) lead. The yellow lead is the positive of **C23** (8 μF) and the red the positive of **C24** (16 μF).

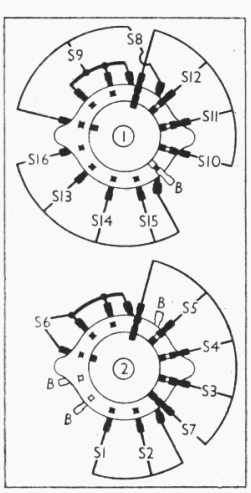
Scale Lamps.—These are four Ever Ready MES types, rated at 5·5 V, 0·3A.

Pillar Bearers.—At several points beneath the chassis ebonite pillars are provided, with screws and soldering tags at their tops, to act as bearers.

Chassis Divergency.—In some chassis there may be a 0·0002 μF fixed trimmer across **C51** in the aerial auto trimmer bank. It was not included in our chassis.

TABLE AND DIAGRAM OF THE S1—S16 UNIT

Switch	Auto	SW	MW	LW
S1	—	—	**c**	—
S2	—	—	—	**c**
S3	—	**c**	—	—
S4	—	—	**c**	—
S5	—	—	—	**c**
S6	—	**c**	**c**	**c**
S7	**c**	—	—	—
S8	**c**	—	—	—
S9	—	**c**	**c**	**c**
S10	—	**c**	—	—
S11	—	—	**c**	—
S12	—	—	—	**c**
S13	—	**c**	—	—
S14	—	—	**c**	—
S15	—	—	—	**c**
S16	**c**	—	—	—



Wavechange and manual/auto switches as seen from the rear of the underside of the chassis. These units are modified in model 8417, by the omission of **S6, S7, S8, S9** and **S16.**

PRESS-BUTTON ADJUSTMENT

The tuning of each of the seven station press-buttons is adjustable within certain limits, by means of the pairs of trimmers which may be reached by removing the small panel from the right-hand side of the receiver. The adjustment range of each button, as shown on the trimmer board, is as follows, numbering the station buttons from top to bottom :—1, 200 to 300 m ; 2, 200 to 300 m ; 3, 290 to 445 m ; 4, 350 to 480 m ; 5, 470 to 535 m ; 6, 850 to 1,460 m ; 7, 1,300 to 1,665 m. The top button switches the set off.

To receive a certain wavelength on a press-button, apply that signal to the **A** and **E** sockets of the receiver. With the appropriate button pressed, adjust the corresponding oscillator trimmer, which is on the left of the panel, to receive this signal. Then adjust the aerial circuit trimmer (on the right) for maximum output. Check each circuit by going over the trimmers in the same order again.

MODEL 8417 MODIFICATIONS

Model 8417 has a similar chassis, but the press-button feature is omitted, the set being arranged for manual tuning only. There are thus only three positions on the wave-change switch, the "auto" position being eliminated, and with it **S6, S7, S8, S9** and **S16.**

Coils **L19, L20, L21** and **L22** are removed, together with **R29, C42, C43** and **C44,** and their associated wiring.

The press-button switch unit is omitted, but **S17x** becomes a normal QMB mains switch, ganged with volume control **R19. C45** to **C63** are omitted.

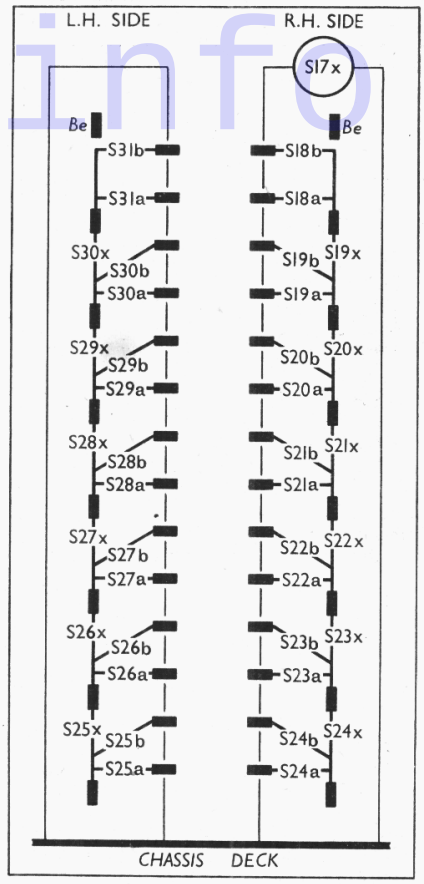
CIRCUIT ALIGNMENT

IF Stages.—Switch set to MW, and short circuit **C32.** Connect signal generator to control grid (top cap) of **V1,** via a 0·1 μF condenser, and chassis. Feed in a 452 KC/S signal, and adjust **C41, C40, C39** and **C38,** in that order, for maximum output. Re-check these settings, then remove the short circuit from **C32.**

RF and Oscillator Stages.—With gang at maximum, pointer should register with the horizontal line across the centre of the scale. Connect signal generator to **A1** and **E** sockets.

LW.—Switch set to LW, and adjust tracker **C37** to be at approximately three-quarters of its full capacity. Tune to 1,200 m on scale, feed in a 1,200 m (250 KC/S) signal, and adjust **C35,** then **C30** and **C26,** for maximum output. Tune to 1,700 m on scale, feed in a 1,700 m (176·5 KC/S) signal, and adjust **C37** for maximum output. Now repeat the 1,200 m adjustments, and return to 1,700 m. See that the pointer is at the 1,700 m mark when receiving the 1,700 m signal. If not, make a slight re-adjustment to **C37.**

MW.—Switch set to MW, and adjust tracker **C36** to be at approximately three-quarters of its full capacity. Tune to 214 m mark on scale, and feed in a 214 m (1,400 KC/S) signal, and adjust **C34,** then **C29** and **C25,** for maximum output. Tune to 500 m on scale, feed in a 500 m (600 KC/S) signal, and adjust **C36** for maximum output. Now repeat the 214 m adjustments, and return to 500 m. See that the pointer is at the 500 m mark when receiving the 500 m signal. If not, make a slight re-adjustment to **C36.**



Diagrams of both sides of the press-button switch unit. They are as seen looking from the rear of the chassis, when it is standing normally on a bench. The left-hand side is that nearer the banks of trimmers.

SW.—Switch set to SW, and screw up **C33** fully. Tune to 15 MC/S on scale, and feed in a 15 MC/S (20 m) signal. Now unscrew **C33** slowly, and adjust accurately for maximum output on the first peak reached from the fully screwed up position. Next adjust **C28** for maximum output. Feed in a 7·5 MC/S (40 m) signal, and tune it in. Adjust the end turn of **L4** (nearest the end of the coil former beneath the chassis) for maximum output, while rocking the gang for optimum results. Repeat the 15 MC/S adjustments.

MAINTENANCE PROBLEMS

In the new year we shall be publishing more Maintenance Problems than has been possible during the past few weeks. Contributions describing unusual *faults in sound and television receivers will be welcomed by the Technical Editor, and payment will be made for all material published.*