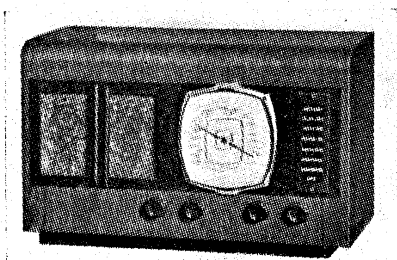


"TRADER" SERVICE SHEET
372

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**.

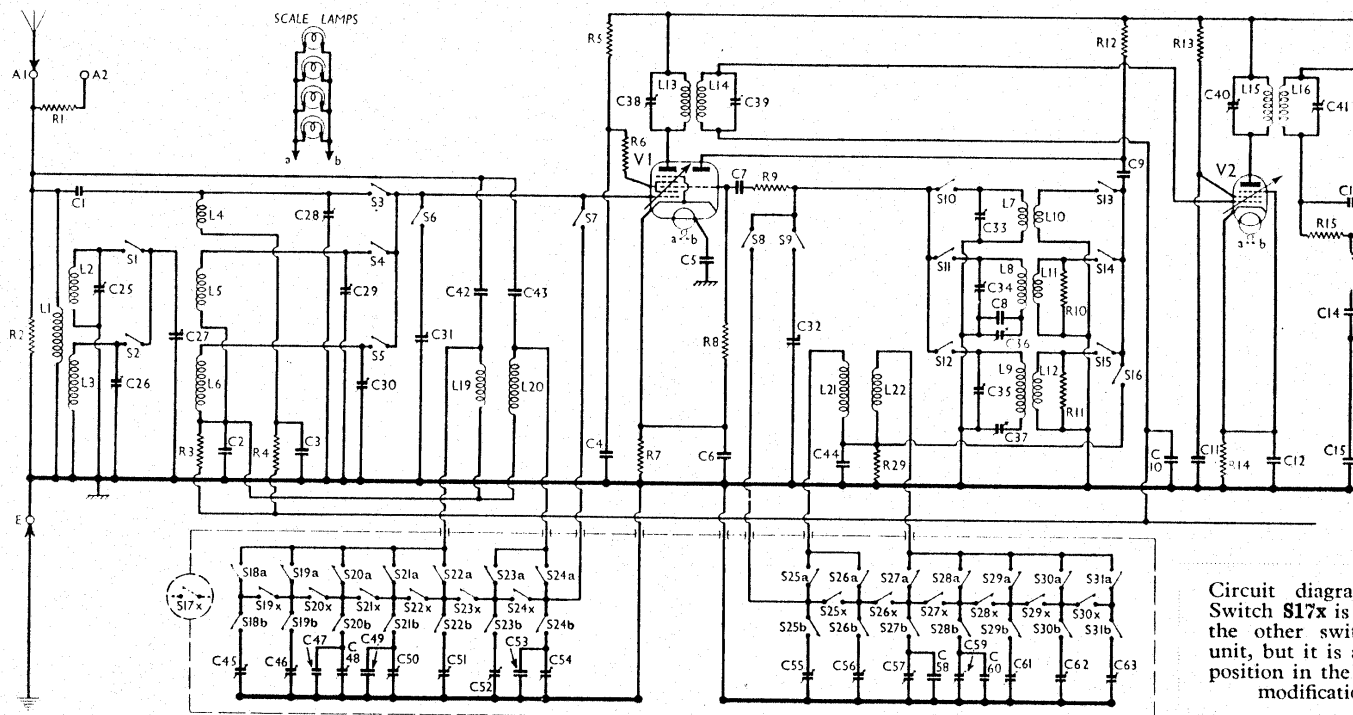
For automatic operation, input from **A1** is via coupling condensers **C42** (MW) and **C43** (LW) to auto-tuning coils **L19** (MW) and **L20** (LW). **S6** is open, disconnecting the manual tuning condenser **C31** from **V1** hexode CG line, which is instead connected via **S7**, now closed, to the 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.

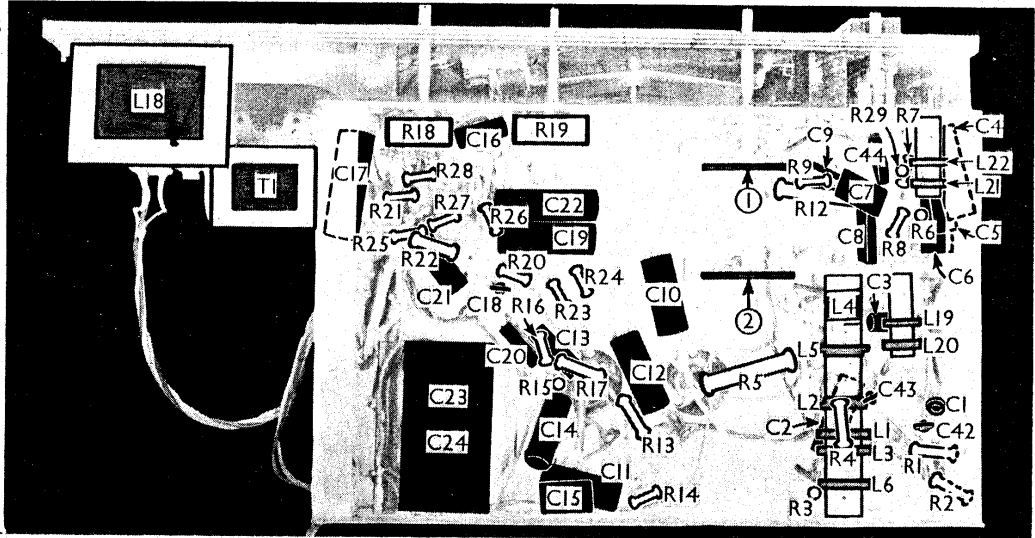
The operation of the press-button switches can be deduced from the diagram by observing the lettered suffix attached to each number; "a" or "b" indicates that the switch operation, triode closes, while that with an "x" opens, when its button is pressed, the converse being the case when the button is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

First valve (**V1**, Ever Ready metallised **A30B**) 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



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 the 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 (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 feedback by resistance R26 between V3 triode and V4 anodes. Provision for external speaker in V4 anode circuit.

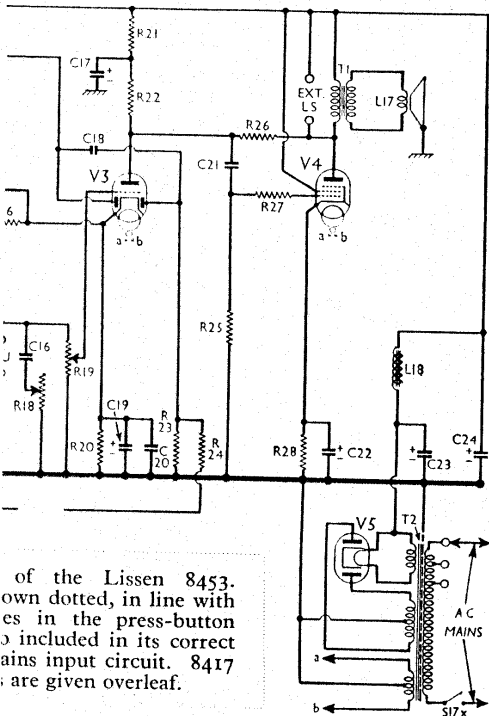
HT current is supplied by IHC full-wave rectifying valve (V5, Ever Ready A11D). Smoothing by iron-cored choke L18 and dry electrolytic condensers C23, C24.

COMPONENTS AND VALUES

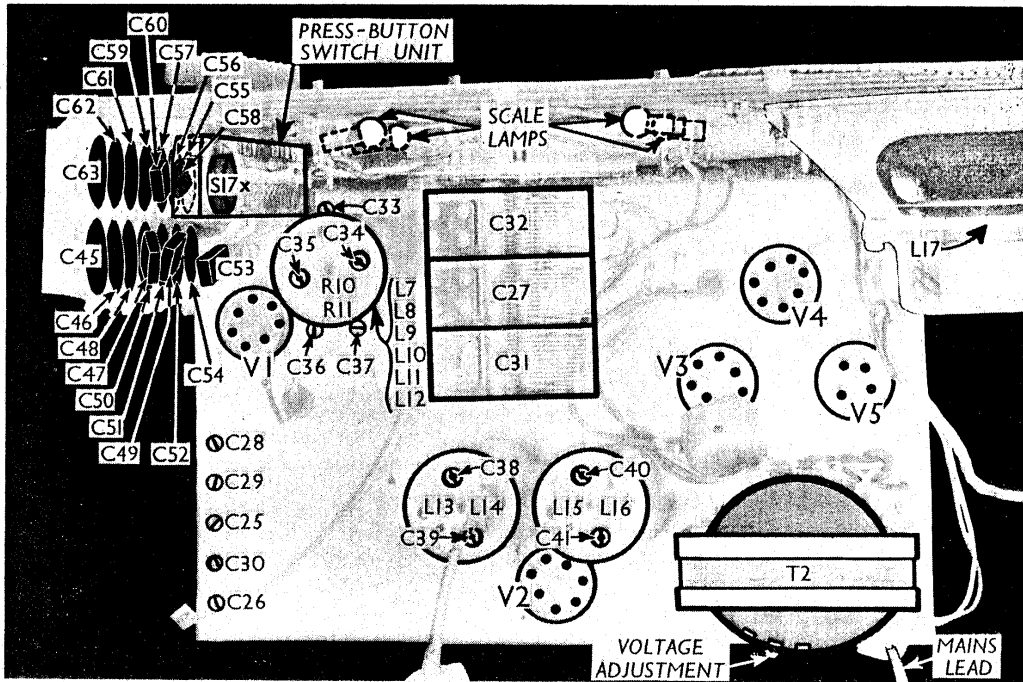
RESISTANCES		Values (ohms)
R1	Aerial input potential divider resistances	110,000
R2	V1 hexode MW and LW CG decoupling	11,000
R3	V1 hexode MW and LW CG decoupling	110,000
R4	V1 hexode SW CG decoupling	110,000
R5	V1 SG HT feed resistance	20,000
R6	V1 SG stabiliser	75
R7	V1 fixed GB resistance	150
R8	V1 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	200,000
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	200,000
R25	V4 CG resistance	510,000
R26	Negative feedback 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	0.1
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 triode to V4 AF coupling	0.05
C21	V3 triode to V4 AF coupling	50.0
C22	V4 cathode by-pass	8.0
C23	HT smoothing	16.0
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	0.00001
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	—	0.0001
C46	—	0.0001
C47	—	0.00005
C48	—	0.0003
C49	Aerial circuit automatic tuning trimmers	0.0001
C50	—	0.0001
C51	—	0.0001
C52	—	0.0001
C53	—	0.0002
C54	—	0.0003
C55	—	0.0001
C56	—	0.0001
C57	—	0.0003
C58	Oscillator circuit automatic tuning trimmers	0.0003
C59	—	0.0003
C60	—	0.00005
C61	—	0.0003
C62	—	0.0001
C63	—	0.0001

* Electrolytic, † Variable, ‡ Pre-set.



of the Lissen 8453. own dotted, in line with es in the press-button s included in its correct ains input circuit. 8417 ; are given overleaf.



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		11·0
L4	Aerial SW tuning coil	Very low
L5	Band-pass secondary coil	2·5
L6		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	{ Sec.	7·0
L15	2nd IF trans. { Pri.	7·0
L16	{ Sec.	7·0
L17	Speaker speech coil	7·0
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
	{ Sec.	0·4
T2	Mains trans. { Pri., total	19·0
	{ Heater sec.	0·05
	{ Rect. heat. sec.	0·1
	{ 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	7·4		
V2 A50P	280	8·7	186	3·2
V3 A23A	123	3·2	—	—
V4 A76D	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 un-screened 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 un-screened 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 Ω) 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 μ F) and the red the positive of C24 (16 μ F).

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 μ F fixed trimmer across C51 in the aerial auto trimmer bank. It was not included in our chassis.

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.

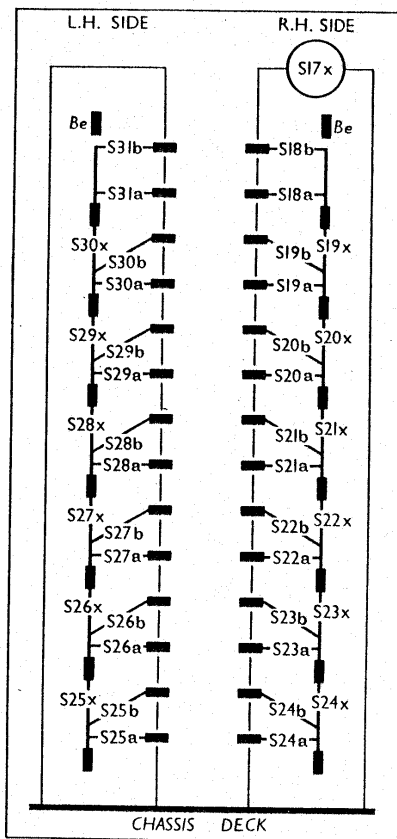
CIRCUIT ALIGNMENT

IF Stages.—Switch set to MW, and short circuit C32. Connect signal generator to control grid (top cap) of V1, via a 0.1 μ F 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



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.

(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.

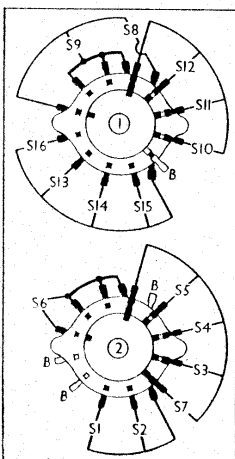
SW.—Switch set to SW, and screw up C33 fully. Tune to 15 MC/S on scale, and feed in a 15 MC/S (20 m) signal. Now unscrew C33 slowly, and adjust accurately for maximum output on the first peak reached from the fully screwed up position. Next adjust C28 for maximum output. Feed in a 7.5 MC/S (40 m) signal, 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.

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	—	—	—	—
S10	—	C	C	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.