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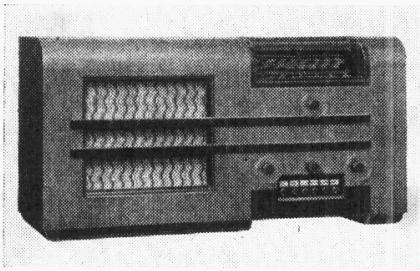
"TRADER" SERVICE SHEET

382

FERRANTI 617PB

3-BAND AC SUPERHET



TRIMMER type press-button tuning for six stations is employed in the Ferranti 617PB 5-valve (plus rectifier) AC 3-band superhet in addition to the usual manual tuning, and it should be noted that separate coils are used for the press-button and manual tuning circuits. The receiver covers a short-wave range of 16·5-51 m, is suitable for mains of 200-270 V, 40-100 C/S, and includes provision for both a gramophone pick-up and an extension speaker.

Release date: July, 1938.

CIRCUIT DESCRIPTION

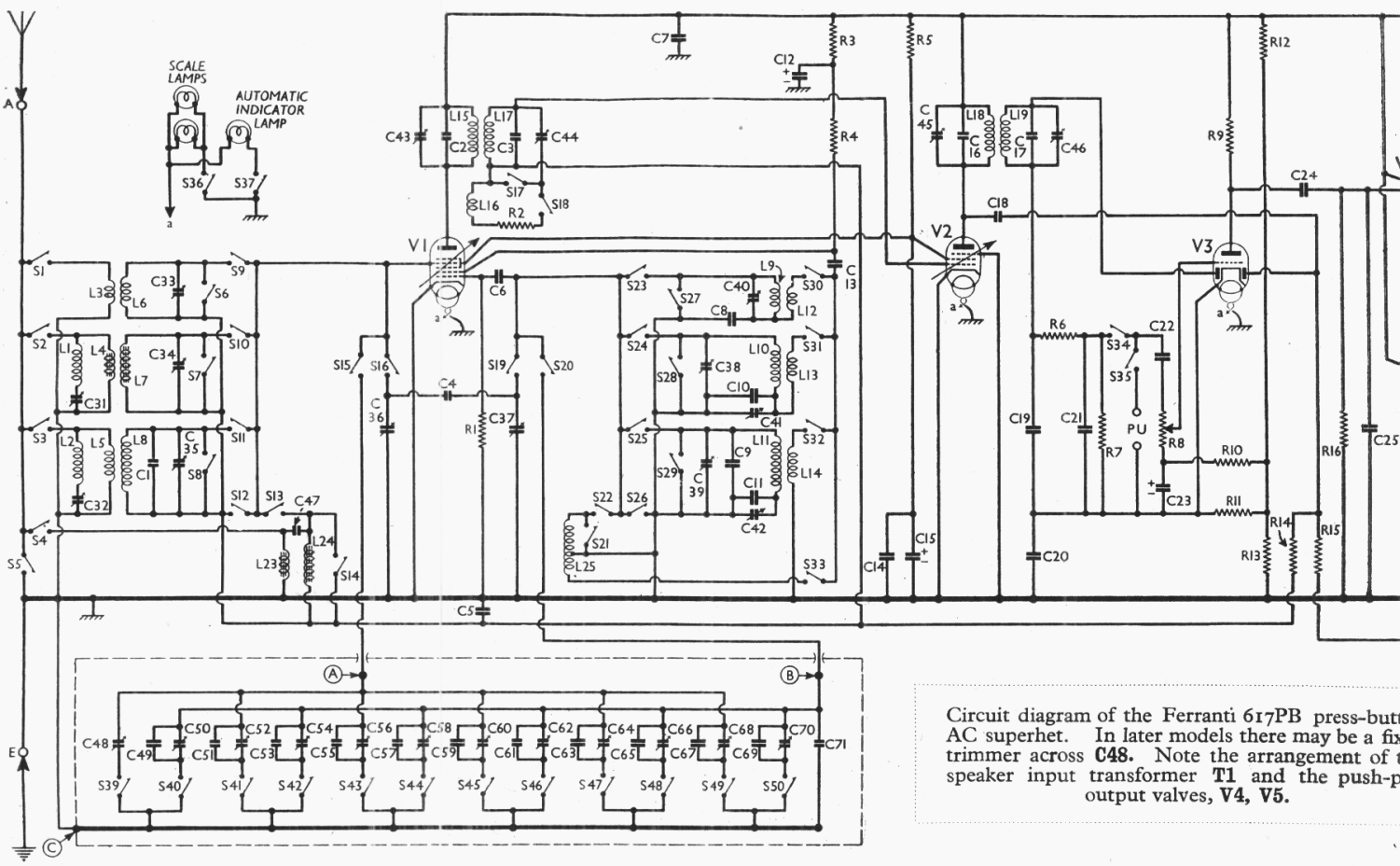
Independent tuning circuits are employed for manual and automatic tuning. Manual aerial input is via coupling coils **L3** (SW), **L4** (MW) and **L5** (LW) to single-tuned circuits **L6, C36** (SW), **L7, C36** (MW) and **L8, C36** (LW). IF filtering by **L1, C31** across MW aerial circuit and a 261 m filter **L2, C32** across LW aerial circuit prevents break-through on that band.

When the waveband switch is turned to the automatic position **S4, S13** and **S15** close so that aerial input is via coupling coil **L23** to **L24,** which, via **S15,** is connected to the common bus-bar of the aerial circuit automatic tuning trimmers **C48; C51, C52; C55, C56; C59, C60; C63, C64; C67, C68;** selection being effected by closing one of the switches (those having odd numbers, **S39-S49** in our diagram) in the low potential end of the circuit.

First valve (**V1, Osram X63** or **Ferranti 6A8G**) is a heptode operating as frequency changer with electron coupling. Manual oscillator grid coils **L9** (SW), **L10** (MW) and **L11** (LW) are tuned by **C37;** parallel trimming by **C40** (SW), **C38** (MW) and **C9, C39** (LW); series tracking by **C8** (SW), **C10, C41** (MW) and **C11, C42** (LW). Reaction by coils **L12** (SW), **L13** (MW) and **L14** (LW).

For automatic tuning, switches **S20, S22** and **S33** close, connecting one end of the automatic oscillator tuning and reaction coil to the bus-bar of the oscillator circuit automatic tuning trimmers, all in pairs consisting of one fixed and one pre-set condenser numbered in pairs in our diagram **C49, C50** to **C69, C70,** selection of any pair being effected by one of the switches having even numbers **S40-S50,** according to which button is depressed, the chassis side of all switches being common with one another and the aerial circuit automatic switches. **C71,** connected, across the oscillator tuning circuit, compensates for fluctuations due to temperature changes.

Second valve (**V2, Ferranti 6K7G** or **Osram KTW63**) is a variable-mu RF pentode or tetrode operating as intermediate frequency amplifier with tuned-



Circuit diagram of the Ferranti 617PB press-butt AC superhet. In later models there may be a fix trimmer across **C48.** Note the arrangement of t speaker input transformer **T1** and the push-p output valves, **V4, V5.**

primary tuned-secondary transformer couplings **C43, C2, L15, L16, R2, L17, C3, C44** and **C45, C16, L18, L19, C17, C46.** The coupling coil **L16** and resistance **R2** modify the response during automatic operation, being automatically switched into circuit by the waveband switch.

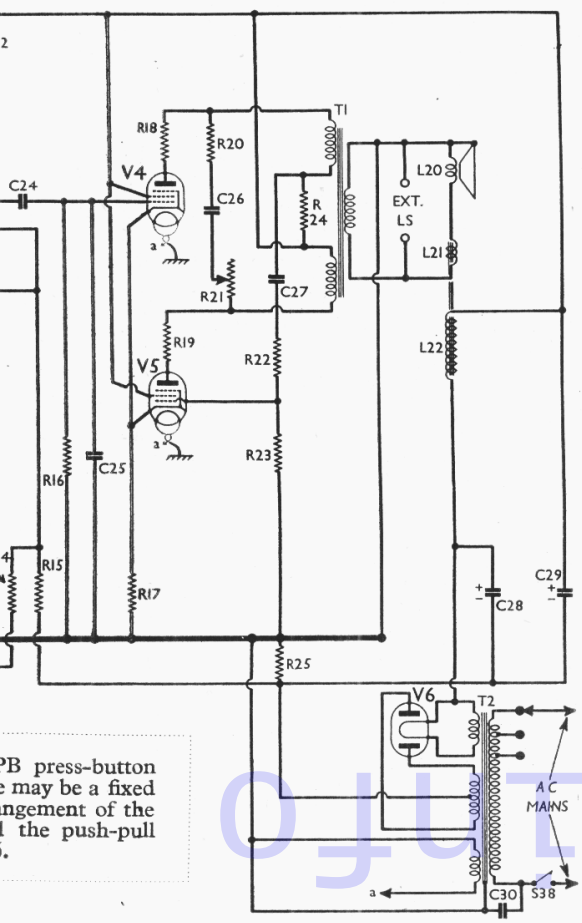
Intermediate frequency 450KC/S.

Diode second detector is part of double-diode triode valve (**V3, Ferranti 6Q7G** or **Osram DH63**). Audio frequency component in rectified output is developed across load resistance **R7** and passed via switch **S34,** AF coupling condenser **C22** and manual volume control **R8** to CG of triode section, which operates as AF amplifier. IF filtering by **C19, R6, C21.** Provision for connection of gramophone pick-up across **R8** via switch **S35.**

Second diode of **V3,** fed from **V2** anode via **C18,** provides DC potential which is developed across load resistance **R15** and fed back through decoupling circuit as GB to FC and IF valves, giving AVC. Delay voltage is obtained from HT potential divider **R12, R13.**

Resistance-capacity coupling by **R9, C24,** and **R16** between **V3** triode and one side (**V4**) of push-pull output stage comprising two pentode valves (**V4, V5, Ferranti 6F6G's**). The speaker input transformer **T1** has a split primary : one-half, which we will call the first half, with **R24** in series with its low potential end, forms the anode load of **V4 ;** the signal thus developed across **R24** is passed via the coupling condenser **C27** to resistances **R22, R23** which form a potential divider. **V5** is fed directly from the junction of **R22, R23** and delivers its output to the second half of **T1** primary in opposite phase to that in the first half.

HT current is supplied by full-wave rectifying valve (**V6, Ferranti 5Y3G**). Smoothing by speaker field **L22** and dry electrolytic condensers **C28, C29.** Fixed GB for **V1** and **V2** is obtained from drop along **R25** in HT negative lead to chassis.



PB press-button
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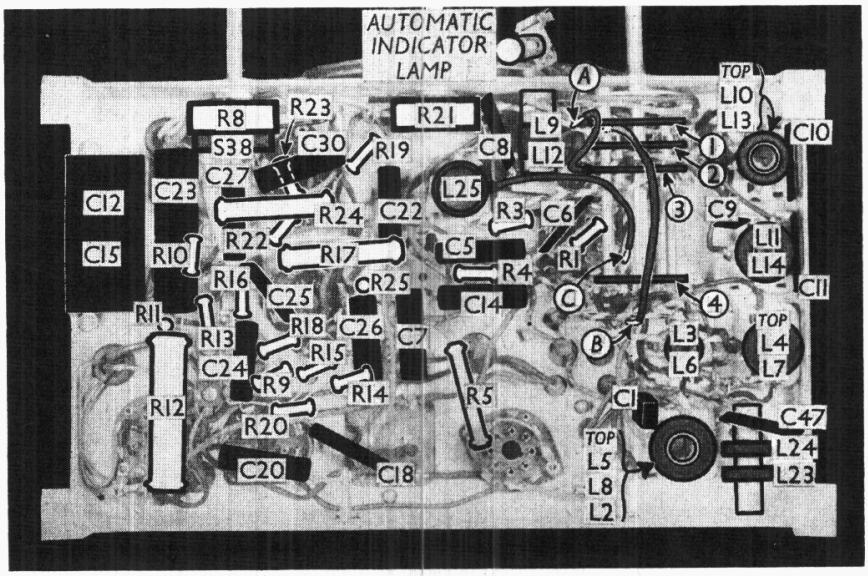


Under-chassis view, with the press-button unit removed. The inter-connecting leads are lettered **A** to **C.**

COMPONENTS AND VALUES

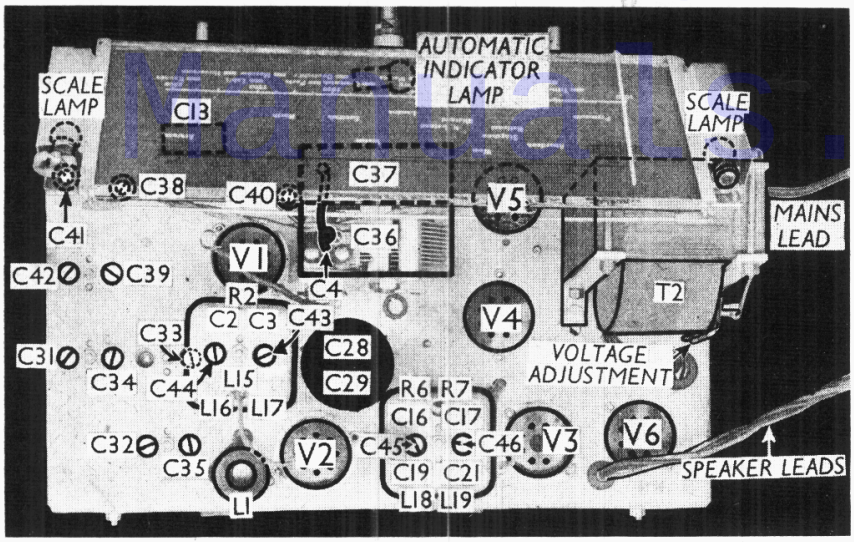
	CONDENSERS	Values (μF)
C1	Aerial LW fixed trimmer	0·00005
C2	1st IF trans. pri. trimmer	0·00009
C3	1st IF trans. sec. trimmer	0·00009
C4	Small coupling	Very low
C5	AVC line decoupling	0·05
C6	V1 osc. CG condenser	0·0001
C7	HT circuit RF by-pass	0·1
C8	Osc. circuit SW tracker	0·004
C9	Osc. circuit LW fixed trimmer	0·0001
C10	Osc. circuit MW fixed tracker	0·0004
C11	Osc. circuit LW fixed tracker	0·00015
C12*	V1 osc. anode decoupling	6·0
C13	V1 osc. anode coupling	0·001
C14	V1, V2 SG's RF by-pass	0·1
C15*	V1, V2 SG's decoupling	2·0
C16	2nd IF trans. pri. trimmer	0·00009
C17	2nd IF trans. sec. trimmer	0·00009
C18	Coupling to V3 AVC diode	0·00005
C19	IF by-pass	0·00015
C20	V3 cathode RF by-pass	0·05
C21	IF by-pass	0·00015
C22	AF coupling to V3 triode	0·02
C23*	V3 triode CG decoupling	6·0
C24	V3 triode to V4 AF coupling	0·05
C25	V4 CG IF by-pass	0·0004
C26	Part of variable tone control	0·02
C27	V5 CG condenser	0·05
C28*, C29*	HT smoothing condensers	12·0
C30	Mains RF by-pass	0·002
C31‡	Aerial IF filter tuning	—
C32‡	Aerial 261 m filter tuning	—
C33‡	Aerial circuit SW trimmer	—
C34‡	Aerial circuit MW trimmer	—
C35‡	Aerial circuit LW trimmer	—
C36†	Aerial circuit manual tuning	—
C37†	Oscillator circuit manual tuning	—
C38‡	Osc. circuit MW trimmer	—
C39‡	Osc. circuit LW trimmer	—
C40‡	Osc. circuit SW trimmer	—
C41‡	Osc. circuit MW tracker	0·0002
C42‡	Osc. circuit LW tracker	0·00007
C43‡	1st IF trans. pri. tuning	0·00007

Continued in next column

	CONDENSERS (*Continued*)	Values (μF)
C44‡	1st IF trans. sec. tuning	0·00007
C45‡	2nd IF trans. pri. tuning	0·00007
C46‡	2nd IF trans. sec. tuning	0·00007
C47	Automatic tuning aerial coupling	0·00001
	AUTOMATIC TUNING UNIT	
C48‡	Aerial	For values see separate table
C49	Oscillator	
C50‡		
C51	Aerial	
C52‡		
C53	Oscillator	
C54‡		
C55	Aerial	
C56‡		
C57	Oscillator	
C58‡		
C59	Aerial	
C60‡		
C61	Oscillator	
C62‡		
C63	Aerial	
C64‡		
C65	Oscillator	
C66‡		
C67	Aerial	
C68‡		
C69	Oscillator	
C70‡		
C71	Auto osc. circuit temperature compensating condenser	0·00004

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTANCES	Values (ohms)
R1	V1 osc. CG resistance	50,000
R2	1st IF trans. damping on auto	50
R3, R4	V1 osc. anode HT feed resistances	10,000
R5	V1, V2 SG's HT feed	40,000
R6	IF stopper	250,000
R7	V3 signal diode load	500,000
R8	Manual volume control	1,000,000
R9	V3 triode anode load	130,000
R10	V3 triode CG decoupling	50,000
R11	V3 GB resistance	3,000
R12, R13	AVC delay voltage HT potential divider	25,000 1,500
R14	AVC line decoupling	2,000,000
R15	V3 AVC diode load	2,000,000
R16	V4 CG resistance	500,000
R17	V4, V5 GB resistance	220
R18	V4 anode stabiliser	100
R19	V5 anode stabiliser	100
R20	Part variable tone control	1,000
R21	Variable tone control	100,000
R22, R23	V5 CG feed resistances	140,000 330,000
R24	V4 to V5 coupling resistance	990
R25	V1 tetrode and V2 fixed GB	30



Plan view of the chassis. **C4** is a twisted wire condenser. Note the various trimmer adjusting screws.

OTHER COMPONENTS		Approx. Values (ohms)
L1	MW aerial IF filter coil	35·0
L2	LW aerial 261 m filter coil	5·0
L3	Aerial SW coupling coil	0·25
L4	Aerial MW coupling coil	35·0
L5	Aerial LW coupling coil	65·0
L6	Aerial SW tuning coil	Very low
L7	Aerial MW tuning coil	2·5
L8	Aerial LW tuning coil	25·0
L9	Osc. circuit SW tuning coil	0·05
L10	Osc. circuit MW tuning coil	5·0
L11	Osc. circuit LW tuning coil	12·0
L12	Oscillator SW reaction	Very low
L13	Oscillator MW reaction	1·5
L14	Oscillator LW reaction	3·0
L15	1st IF trans. pri.	9·5
L16	Part IF trans. coupling on auto	0·8
L17	1st IF trans. sec.	9·5
L18	2nd IF trans. Pri.	9·5
L19	2nd IF trans. Sec.	9·5
L20	Speaker speech coil	2·0
L21	Hum neutralising coil	0·25
L22	Speaker field coil	550·0
L23, L24	Aerial automatic tuning circuit coils	85·0 / 1·15
L25	Oscillator automatic tuning circuit coil, total	9·5
T1	Speaker input trans. V4 pri.	250·0
	Speaker input trans. V5 pri.	300·0
	Speaker input trans. Sec.	0·5
T2	Mains trans. Pri., total	30·0
	Mains trans. Heater sec.	0·1
	Mains trans. Rect. heat. sec.	0·1
	Mains trans. HT sec., total	280·0
S1-S3, S5-S12, S23-S32	Manual waveband switches	—
S4, S13, S14, S15-S22, S33	Auto/manual change switches	—
S34, S35	Radio/gram change switches	—
S36, S37	Scale/auto indicator lamps switches	—
S38	Mains switch, ganged R8	—
S39-S50	Auto selector switches	—

DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (pull off), taking care not to lose the springs, and the four bolts holding the chassis to the bottom of the cabinet. The chassis can now be withdrawn to the extent of the leads, which is sufficient for normal purposes.

When replacing, see that there is a rubber washer and distance piece on each of the lower three spindles and that there is a rubber washer on each of the fixing bolts, between the chassis and the bottom of the cabinet.

Before access can be gained to some of the components beneath the chassis it may be necessary to remove the press-button unit from the main chassis. To do this unsolder the three leads to the main chassis, remove the indicator lamp from its clip and unscrew the two self-tapping screws holding the unit to the main chassis. *When replacing*, consult the illustrations of the press-button unit and main chassis for the connections.

To free the chassis entirely, unsolder the speaker leads and *when replacing*, connect them as follows, numbering the tags from left to right:—1, black; 2, green/yellow; 3, red; 4, red/green; 5, green; 6, blue.

Removing Speaker.—The speaker can be removed from the cabinet by unsoldering the leads and removing the nuts and spring washers from the three screws holding it to the sub-baffle. *When replacing*, see that there are three washers on each of the fixing screws, between the sub-baffle and the speaker, and that the transformer is at the top and connect the leads as follows, numbering the tags from left to right: 1, black; 2, green/yellow; 3, red; 4, red/green; 5, green; 6, blue.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 223 V, using the centre 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.

If, as in our case, **V2** should become unstable when its screen current is being measured, it can be stabilised by connecting a non-inductive condenser of 0·1 μF from that electrode to chassis.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 X63	253	2·3	81	3·0
	Oscillator			
	158	4·0		
V2 6K7G	253	5·0	81	1·2
V3 6Q7G	118	0·6	—	—
V4 6F6G	210	35·0	253	6·2
V5 6F6G	240	36·0	253	6·6
V6 5Y3G	350†	—	—	—

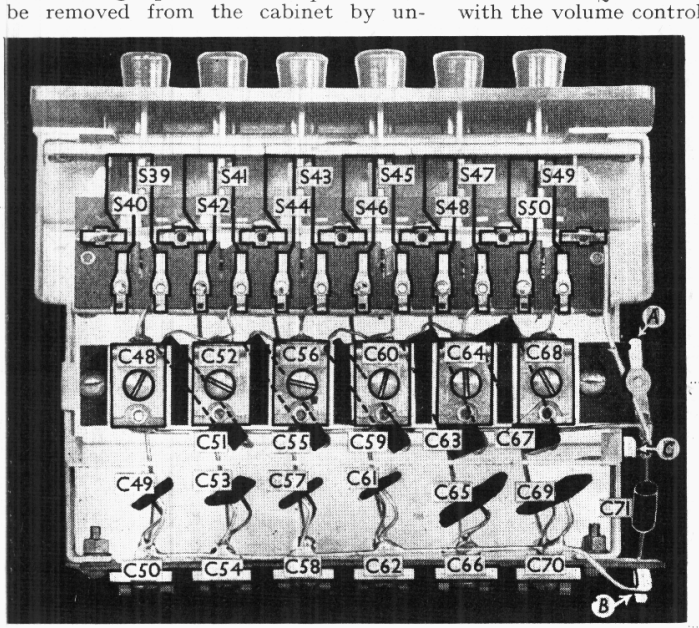
† Each anode, AC.

GENERAL NOTES

Switches.—**S1-S37** are ganged in four rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in col. 6. The table (col. 5) gives the switch positions for the five control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

S38 is the QMB mains switch, ganged with the volume control **R8.**

S39-S50 are the auto-selector switches incorporated in the push-button unit. Each button controls two of the switches, which close when the button is depressed. The switches are shown in detail in a separate view of the auto unit.



The press-button unit, showing the switches, condensers and connecting points.

Coils.—**L1** is on the chassis deck, and the remainder of the RF and oscillator coils, including those used solely in the automatic tuning circuits (**L23-L25**), are beneath the chassis. The IF transformers **L15-L17** and **L18, L19** are in two screened units on the chassis deck.

Scale and Indicator Lamps.—These are three Osram MES type bulbs, rated at 6·5 V, 0·3 A. They have small bulbs.

External Speaker.—Two sockets are provided on the internal speaker connection panel for a low impedance (2 to 3 O) external speaker.

Condensers C28, C29.—These are two 12 μF dry electrolytic types, in a large tubular carton fitted on the chassis deck. The black lead is the common negative, the red lead to **V6** holder is the positive of **C28,** and the other red lead that of **C29.**

Condensers C12, C15.—These are two dry electrolytics in a single rectangular carton beneath the chassis, having a common negative (black) lead. The red lead is the positive of **C12** (6μF) and the yellow lead the positive of **C15** (2μF).

Condenser C4.—This is a small capacity formed by an insulated wire from the top connecting tag of **C37** being twisted round the top tag of **C36.**

Auto Unit.—The three connections to the auto unit are indicated by the letters A to C in the under-chassis view, the view of the auto-unit, and the circuit.

Ten different station groupings, each embodying six out of fourteen alternative stations, are available. The values of the aerial and oscillator circuit fixed trimmers for these stations are given in a table below, and the types of pre-set trimmers used are also indicated.

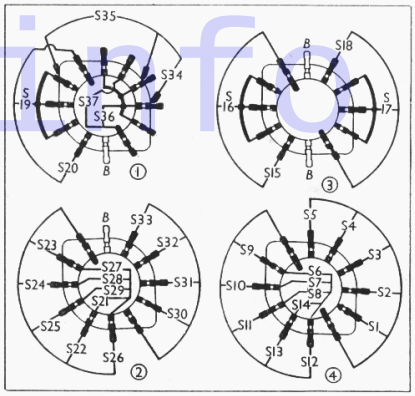
AUTOMATIC TRIMMER CAPACITIES

Pre-set stations	Aerial Circuit		Oscillator Circuit	
	Fixed	Pre-set	Fixed	Pre-set
L. Nat. ..	0·000035	Y	0·000016	X
Stagshaw ..	0·000035	Y	0·000016	X
R. Normandie	0·000045	Y	0·00002	X
West Reg. ..	0·000055	Y	0·000028	X
Mid. Reg. ..	0·000065	Y	0·000035	X
N. Ireland ..	0·000075	Y	0·00004	X
Lond. Reg. ..	0·00012	Y	0·000062	X
Welsh Reg. ..	0·00016	Y	0·000082	X
Scot. Reg. ..	0·00018	Y	0·000093	X
Hilversum ..	0·000215	Y	0·00011	X
N. Reg. ..	0·00027	Y	0·00013	X
Athlone ..	0·00041	Y	0·000184	X or Y
Luxembourg	0·00311	Y	0·00052	Y
Droitwich ..	0·00441	Y	0·000585	Y

X trimmers are special silvered ceramic types.
Y trimmers are all 0·00005 μF maximum.

TABLE AND DIAGRAMS OF THE S1-S37 SWITCH UNITS

Switch	SW	MW	LW	Auto	Gram
S1	C	—	—	—	—
S2	—	C	—	—	—
S3	—	—	C	—	—
S4	—	—	—	C	—
S5	—	—	—	—	C
S6	—	C	C	C	C
S7	C	—	C	C	C
S8	C	C	—	C	C
S9	C	—	—	—	—
S10	—	C	—	—	—
S11	—	—	C	—	—
S12	—	—	—	—	C
S13	—	—	—	C	—
S14	C	C	C	—	C
S15	—	—	—	C	—
S16	C	C	C	—	—
S17	C	C	C	—	C
S18	—	—	—	C	—
S19	C	C	C	—	—
S20	—	—	—	C	—
S21	C	C	C	—	C
S22	—	—	—	C	—
S23	C	—	—	—	—
S24	—	C	—	—	—
S25	—	—	C	—	—
S26	—	—	—	—	C
S27	—	C	C	C	C
S28	C	—	C	C	C
S29	C	C	—	C	C
S30	C	—	—	—	—
S31	—	C	—	—	—
S32	—	—	C	—	—
S33	—	—	—	C	—
S34	C	C	C	C	—
S35	—	—	—	—	C
S36	C	C	C	—	C
S37	—	—	—	C	—



Switch diagrams, as seen from the rear of the underside of the chassis.

Chassis Divergencies.—Our receiver was an early model, produced when Radio Normandie was at the bottom of the MW band. In this case **C48** had no fixed trimmer across it, while **C49** was 0·000212 μF. In later models, there will be a 0·000045 μF fixed condenser across the Normandie variable aerial trimmer, while a 0·00002 μF fixed condenser will be across the Normandie variable oscillator trimmer, in place of the 0·000212 μF condenser.

The extra fixed condenser is not shown in our circuit diagram or in the view of the auto-unit, but it will be across **C48** when Normandie is set up on the left-hand button.

CIRCUIT ALIGNMENT

IF Stages.—Turn volume control to maximum, gang condenser to minimum, and switch set to LW. Connect signal generator to control grid (top cap) of **V1** (via a 0·05 μF fixed condenser) and chassis. Feed in a 450 KC/S signal, and adjust **C43, C44, C45** and **C46** for maximum output.

RF and Oscillator Stages.—Connect signal generator via a suitable dummy aerial to **A** and **E** sockets.

MW.—Switch set to MW, keep gang at minimum, feed in a 200 m (1,500 KC/S) signal and adjust **C38** for maximum output. Feed in a 228 m (1,316 KC/S) signal, tune it in, and adjust **C34** for maximum output.

Feed in a 500 m (600 KC/S) signal, tune it in, and adjust **C41** for maximum output, while rocking the gang slightly.

Turn gang to maximum, feed in a 450 KC/S signal, and adjust **C31** for *minimum* output.

Repeat the 200, 228 and 500 m adjustments.

LW.—Switch set to LW, tune to 1,128m on scale, feed in a 1,128 m (266 KC/S) signal, and adjust **C39,** then **C35,** for maximum output.

Feed in a 1,800 m (166·5 KC/S) signal, tune it in, and adjust **C42** for maximum output, while rocking the gang.

Tune to 1,200 m on scale, feed in a *strong* 261 m (1,149 KC/S) signal, and adjust **C32** for *minimum* output.

Return to 1,128 m and re-adjust **C39** and **C35,** then re-adjust **C42** at 1,800 m.

SW.—Switch set to SW, and use a SW dummy aerial. Turn gang to minimum, feed in a 16·67 m (18 MC/S) signal, and adjust **C40** for maximum output. The peak requiring the least trimmer capacity is the correct one. Now tune to 20 m on the scale, feed in a 20 m (15 MC/S) signal, and adjust **C33** for maximum output.

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