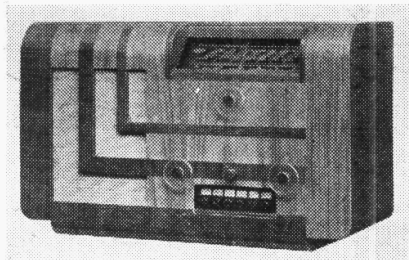


'TRADER' SERVICE SHEET

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# FERRANTI 515PB AND 514PB



The Ferranti 515PB

**T**RIMMER type press-button tuning for six stations is included in the Ferranti 515PB. Prestune, 4-valve (plus rectifier) AC 3-band superhet. An identical chassis is fitted in the 514PB receiver, but this has a moulded cabinet instead of a walnut one.

This Service Sheet was prepared on a 515PB.

### 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**, **C37** (SW), **L7**, **C37** (MW) and **L8**, **C37** (LW). IF filtering by **L1**, **C32** across MW aerial circuit and a 261 m filter **L2**, **C33** 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 **C49**; **C52**, **C53**; **C56**, **C57**; **C60**, **C61**; **C64**, **C65**; **C68**, **C69**, 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, according to which button is depressed.

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 **C38**; parallel trimming by **C41** (SW), **C39** (MW) and **C9**, **C40** (LW); series tracking by **C8** (SW), **C10**, **C42** (MW) and **C11**, **C43** (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 **C50**, **C51** to **C70**, **C71**, 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. **C72**, 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-primary tuned-secondary transformer couplings **C44**, **C2**, **L15**, **L16**, **R2**, **L17**, **C3**, **C45** and **C46**, **C14**, **L18**, **L19**, **C15**, **C47**. 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 **R6** and passed via switch **S34**, AF coupling condenser **C20** and manual volume control **R7** to CG of triode section, which operates as AF amplifier. Variable tone control by **C22**, **R15** in triode anode circuit. IF filtering by **C17**, **R5**, **C19**. Provision for connection of gramophone pick-up across **R8** via switch **S35**.

Second diode of **V3**, fed from **V2** anode via **C16**, provides DC potential which is developed across load resistance **R14** and fed back through decoupling circuit as GB to FC and IF valves, giving automatic volume control. Delay voltage is obtained partly from drop along **R9**, partly from HT circuit potential divider and partly from drop along **R19** in negative

HT lead to chassis, the last also providing fixed GB potential for **V1** and **V2**.

Resistance-capacity coupling by **R3**, **C23** and **C24**. **R17** between **V3** triode and pentode or tetrode output valve (**V4**, Ferranti 6F6G or Osram KT63). Fixed tone correction in anode circuit by **R16**, **C25**. Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T1**.

HT current is supplied by full-wave rectifying valve (**V5**, Ferranti 5Y3G or Osram U50). Smoothing by speaker field **L22** and dry electrolytic condensers **C27**, **C28**, **C29**, **C30**.

### DISMANTLING THE SET

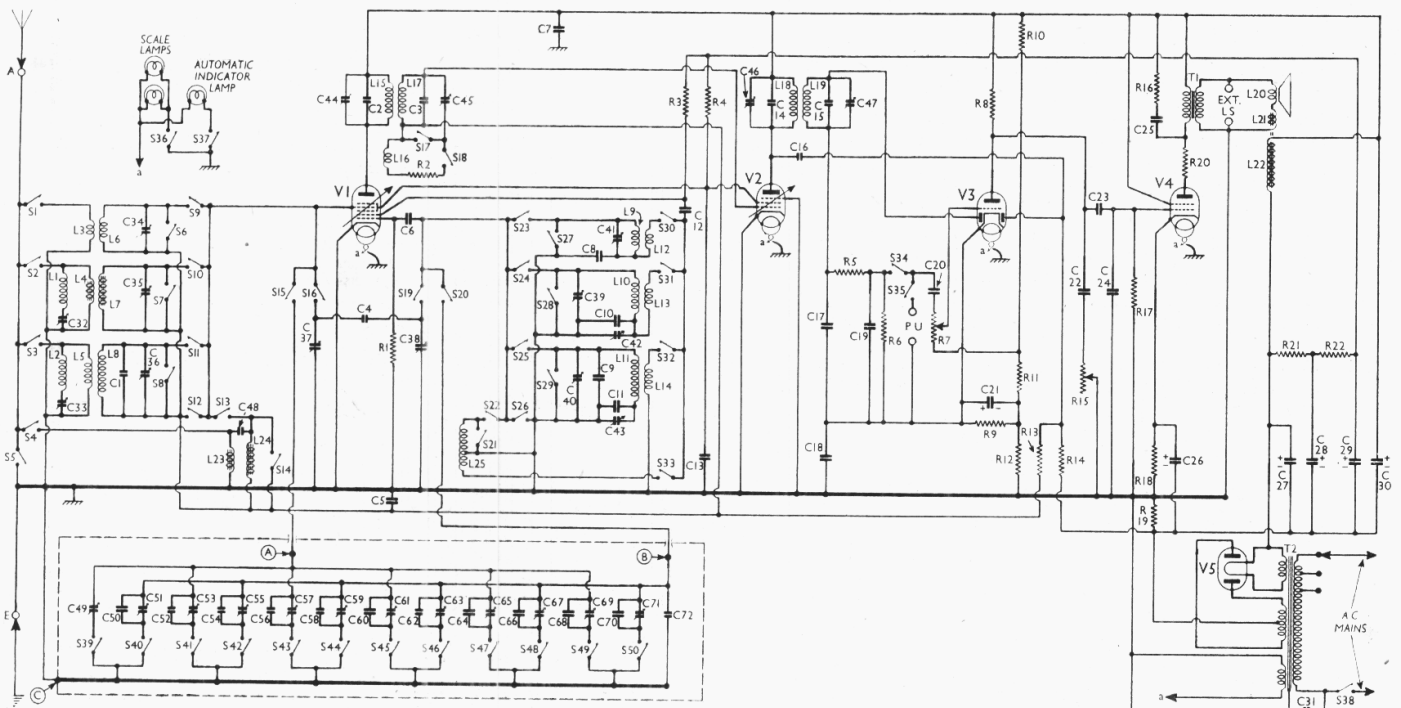
**Removing Chassis.**—If it is desired to remove the chassis from the cabinet, remove the four control knobs (pull off), taking care not to lose the springs, and the four bolts holding the chassis to the bottom of the cabinet. By tilting the back upwards, the chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

**When replacing**, see that there is a distance piece and rubber washer on each of the control spindles before the chassis is inserted in the cabinet and that there is a rubber washer on each of the chassis fixing bolts, between the chassis and the bottom of the cabinet. Do not forget to replace the felt washer on the tuning drive spindle.

Before access can be obtained to the components beneath the chassis it will be necessary to remove the press-button unit, by unsoldering the three leads from the main chassis, freeing the indicator lamp from the clip and removing the two self-tapping screws holding the unit to the front member of the chassis. **When replacing**, consult the illustrations of the under-chassis and the press-button unit 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, red; 2, black; 3, green; 4, blue.

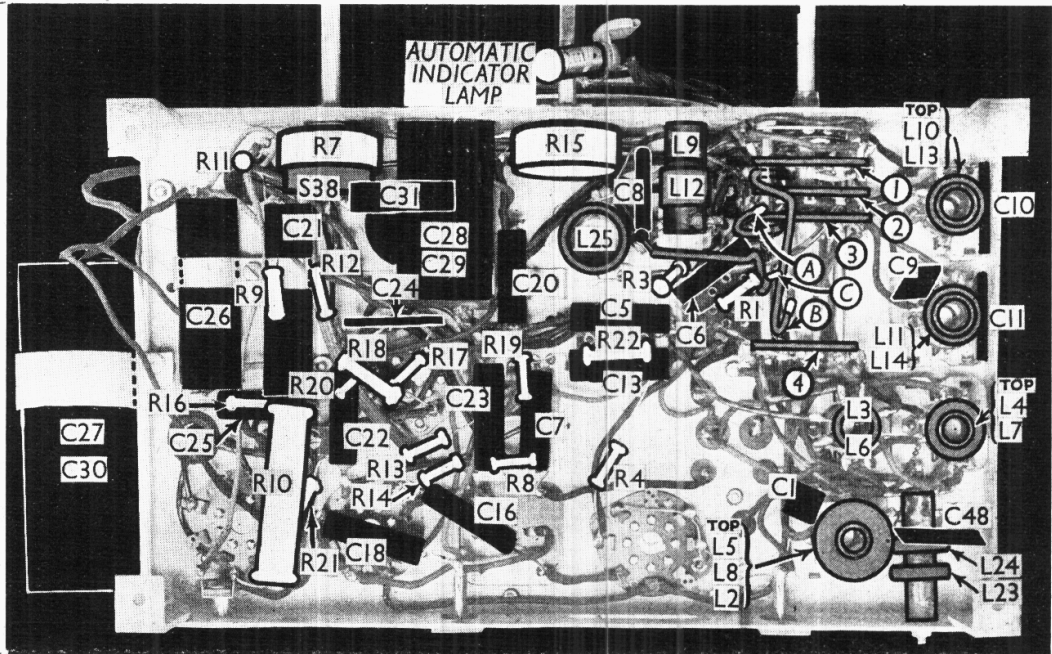
**Removing Speaker.**—If it is necessary to remove the speaker from the cabinet, unsolder the leads and remove the nuts and spring washers from the four screws holding the speaker to the sub-baffle. **When replacing**, see that the transformer is at the top and connect the leads as above.



Circuit diagram of the Ferranti 515PB push-button AC superhet. The 514PB has an identical chassis.

For more information remember  
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Under-chassis view, with the push-button unit removed. The inter-connecting leads are lettered A to C. The four switch units are shown in detail overleaf.



COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	V1 osc. CG resistance	50,000
R2	1st IF trans. damping on auto	50
R3	V1 osc. anode HT feed	10,000
R4	V1, V2 SG's HT feed	40,000
R5	IF stopper	100,000
R6	V3 signal diode load	500,000
R7	Manual volume control	1,000,000
R8	V3 triode anode load	250,000
R9	Part V3 triode GB circuit	10,000
R10	HT potential divider resistances	20,000
R11		250
R12		1,000
R13	AVC line decoupling	2,000,000
R14	V3 AVC diode load	2,000,000
R15	Variable tone control	500,000
R16	Part of fixed tone corrector	20,000
R17	V4 CG resistance	500,000
R18	V4 GB resistance	450
R19	V1, V2, fixed GB; part AVC delay	50
R20	V4 anode stabiliser	100
R21	V1 osc. anode and V1, V2 SG HT feed resistances	10,000
R22		10,000

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 coupling	0.001
C13	V1, V2 SG's decoupling	0.1
C14	2nd IF trans. pri. trimmer	0.00009
C15	2nd IF trans. sec. trimmer	0.00009
C16	Coupling to V3 AVC diode	0.00005
C17	IF by-pass	0.00018
C18	V3 cathode RF by-pass	0.05
C19	IF by-pass	0.00018
C20	AF coupling to V3 triode	0.02
C21*	V3 cathode AF by-pass	6.0
C22	Part of variable tone control	0.005
C23	V3 triode to V4 AF coupling	0.02
C24	V4 CG IF by-pass	0.0004
C25	Part of fixed tone corrector	0.01
C26*	V4 cathode by-pass	50.0
C27*		12.0
C28*		4.0
C29*	HT smoothing	4.0
C30*		12.0
C31	Mains RF by-pass	0.002
C32†	Aerial IF filter tuning	—
C33†	Aerial 261 m filter tuning	—

CONDENSERS (Continued)		Values (μF)
C34‡	Aerial circuit SW trimmer	—
C35‡	Aerial circuit MW trimmer	—
C36‡	Aerial circuit LW trimmer	—
C37†	Aerial circuit manual tuning	—
C38†	Oscillator circuit manual tuning	—
C39‡	Osc. circuit MW trimmer	—
C40‡	Osc. circuit LW trimmer	—
C41‡	Osc. circuit SW trimmer	—
C42†	Osc. circuit MW tracker	0.0002
C43†	Osc. circuit LW tracker	0.00007
C44†	1st IF trans. pri. tuning	0.00007
C45†	1st IF trans. sec. tuning	0.00007
C46†	2nd IF trans. pri. tuning	0.00007
C47†	2nd IF trans. sec. tuning	0.00007
C48	Automatic tuning aerial coupling	0.00001
AUTOMATIC TUNING UNIT		
C49‡	aerial	—
C50	Oscillator	—
C51†		—
C52	Aerial	—
C53†		—
C54	Oscillator	—
C55†		—
C56	Aerial	—
C57†		—
C58	Oscillator	—
C59†		—
C60	Aerial	—
C61†		—
C62	Oscillator	—
C63†		—
C64	Aerial	—
C65†		—
C66	Oscillator	—
C67†		—
C68	Aerial	—
C69†		—
C70	Oscillator	—
C71†		—
C72	Auto osc. circuit temperature compensating condenser	0.00004

\* Electrolytic. † Variable. ‡ Pre-set.

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

OTHER COMPONENTS (Continued)		Approx. Values (ohms)	
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		{ Sec. ... 9.5	
L20	Speaker speech coil	2.0	
L21	Hum neutralising coil	0.25	
L22	Speaker field coil	1,000.0	
L23	Aerial automatic tuning circuit coils	{ 85.0	
L24		{ 1.15	
L25	Oscillator automatic tuning circuit coil, total	9.5	
T1	Speaker input trans.	{ Pri. ... 220.0	
		{ Sec. ... 0.4	
T2	Mains trans.	{ Pri., total ... 45.0	
		{ Heater sec. ... 0.2	
		{ Rect. heat. sec. ... 0.2	
	{ HT sec., total ... 450.0		
S1-S3	Manual waveband switches	—	
S5-S12			—
S14			—
S23			—
S32			—
S4, S13	Auto/manual change switches	—	
S15			—
S22			—
S33	Radio/gram change switches	—	
S34			—
S35	Scale/auto indicator lamps switches	—	
S36			—
S37			—
S38	Mains switch, ganged R7	—	
S39	Auto selector switches	—	
S50			—

VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 X63	290	2.7	75	2.1
	Oscillator			
V2 6K7G	155	4.0	75	0.9
	290	3.9		
V3 6Q7G	80	0.5	—	—
V4 6F6G	275	38.0	290	6.8
	358†	—		
V5 5Y3G	—	—	—	—

† Each anode, AC.

Valve voltages and currents given in the table above are those measured in our receiver when it was operating on mains of 227 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.

Continued overleaf

**FERRANTI 515PB—Continued**

**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. 3. The table (col. 3) 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 R7.

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.

**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. L19 contains a number of additional components.

**Scale and Indicator Lamps.**—These are three Osram MES type bulbs, rated at 6.5 V, 0.3 A. They have small bulbs (type S).

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

**Condensers C27, C30.**—These are two 12 μF dry electrolytic types, in a large tubular unit fitted to one side of the chassis. The black lead is the common negative, the red lead to V5 holder is the positive of C27, and the other red lead the positive of C30.

**Condensers C28, C29.**—These are two 4 μF dry electrolytic types, in a carton beneath the chassis having a common negative (black) lead. The red lead to the junction of R21 and R22 is the positive of C28, and the red lead to the junction of R22 and R3 is the positive of C29.

**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 diagram.

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 in col. 2, and the types of pre-set trimmers used are also indicated.

**CIRCUIT ALIGNMENT**

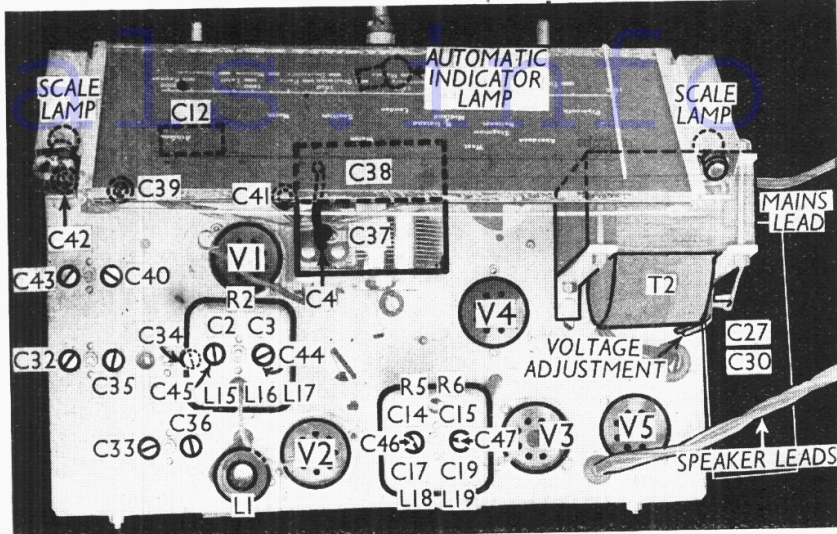
**IF Stages.**—Turn volume control to maximum, gang condenser to minimum, and switch set to LW. Connect signal generator to control grid (top cap) of V1 (via a 0.05 μF fixed condenser) and chassis. Feed in a 450 KC/S signal, and adjust C44, C45, C46 and C47 for maximum output.

**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 C39 for maximum output. Feed in a 228 m (1,316 KC/S) signal, tune it in, and adjust C35 for maximum output.

Feed in a 500 m (600 KC/S) signal, tune it in, and adjust C42 for maximum output, rocking the gang for optimum results.

Turn gang to maximum, feed in a 450 KC/S signal, and adjust C32 for minimum output.



Plan view of the chassis. C4 is a twisted wire condenser.

Pre-set stations	AUTOMATIC TRIMMER CAPACITIES			
	Aerial Circuit		Oscillator Circuit	
	Fixed	Pre-set	Fixed	Pre-set
R. Normandie	—	Y	0.000212	X
L. Nat.	0.000035	Y	0.000016	X
Stagslaw	0.000035	Y	0.000016	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.

Repeat the 200, 228 and 500 m adjustments.

**LW.**—Switch set to LW, tune to 1,128 m on scale, feed in a 1,128 m (266 KC/S) signal, and adjust C40, then C36, for maximum output.

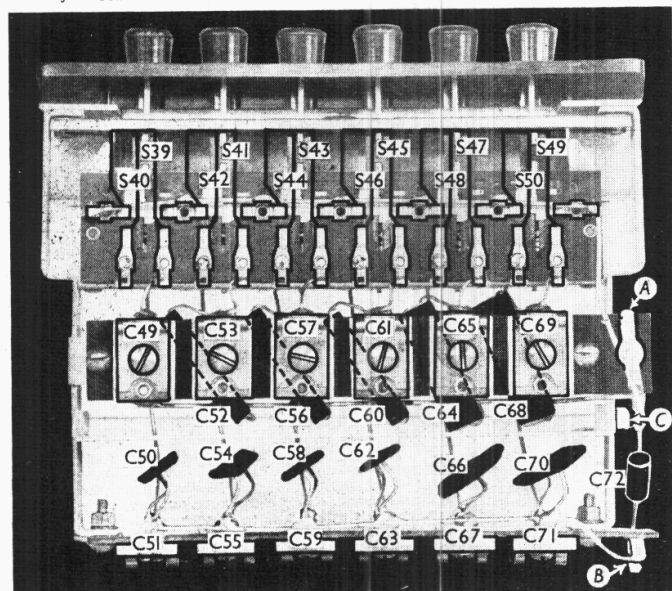
Feed in a 1,800 m (166.5 KC/S) signal, tune it in, and adjust C43 for maximum output, while rocking the gang for optimum results.

Tune to 1,200 m on scale, feed in a strong 261 m (1,149 KC/S) signal, and adjust C33 for minimum output.

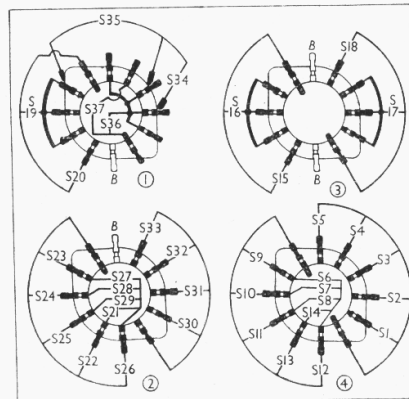
Return to 1,128 m and re-adjust C40 and C36, then re-adjust C43 at 1,800 m. Repeat until no further improvement results.

**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 C41 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 C34 for maximum output.

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	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	—	—
S37	—	—	—	C	—



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



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