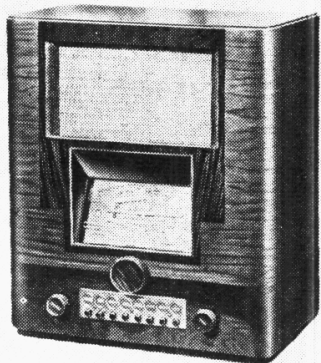


"TRADER" SERVICE SHEET

379

# INVICTA 570

PRESS-BUTTON TUNING INCLUDED



**P**RESS-BUTTON tuning for five stations and also press buttons for wave-change switching are included in the Invicta 570 3-valve (plus rectifier) AC 3-band superhet. Manual tuning is also incorporated and the receiver, which is for mains of 200-250 V, 40-100 C/S, has a short-wave range of 16-52 m and provision for an extension speaker, a gramophone pick-up and for using the mains as an aerial.

Five separate versions of the set are available. Those bearing the suffix

A, B, C or D after the model number cover Droitwich and Luxembourg on the press buttons but differ in the arrangement of the medium wave stations, while models with the suffix S have the stations set up according to individual customers' requirements.

Release date : August, 1938.

### CIRCUIT DESCRIPTION

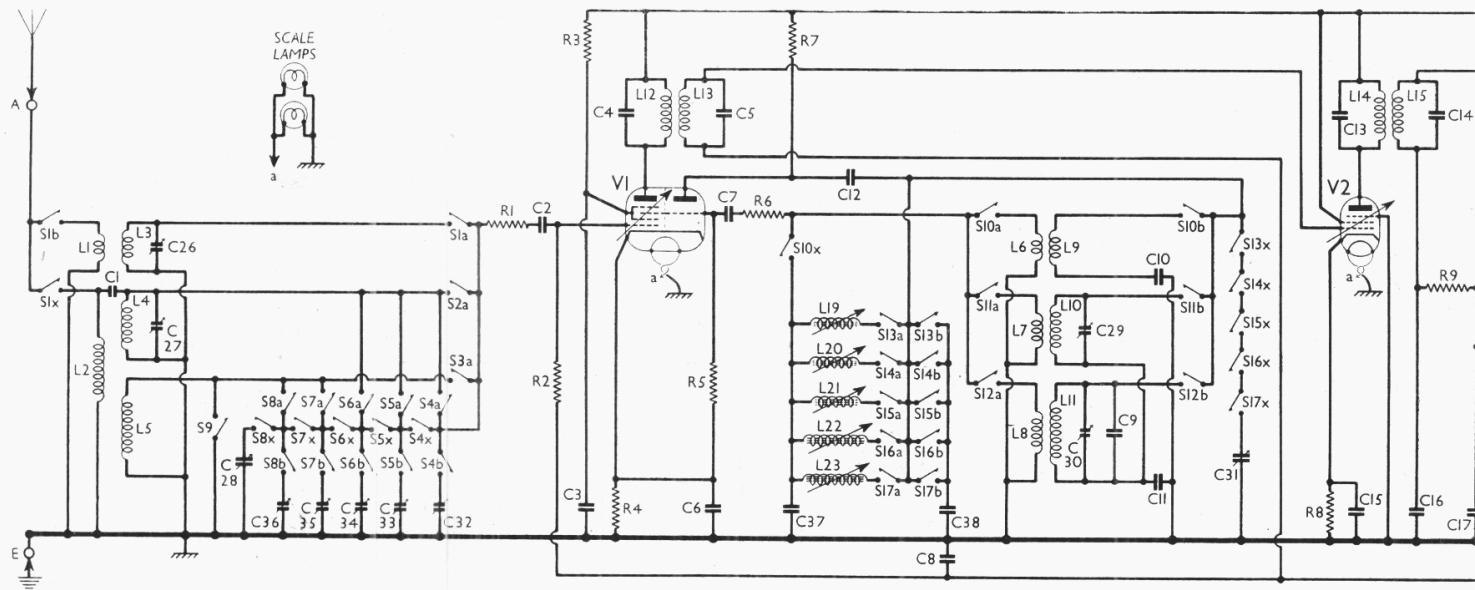
Conventional arrangements are employed in both the aerial and oscillator circuits for manual tuning in this receiver. For automatic tuning, the aerial tuning condenser is switched out of circuit by the action of the press-button and replaced by a pre-set trimmer; otherwise the aerial circuit remains unchanged; in the oscillator circuit, entirely independent tuning circuits are employed. In the diagram, all switches operated by push-buttons are numbered and coded with lettered suffixes, to indicate their action: switches bearing the same number are operated by the same press-button; a suffix **a** or **b** indicates that its switch closes, while an **x** indicates that its switch opens, when the button with which it is associated is pressed.

Aerial input is via coupling coils **L1** (SW) and **L2** (MW and LW) to single tuned circuits comprising coils **L3** (SW), **L4** (MW) and **L5** (LW) tuned manually by

**C28** via switches **S4x** to **S8x** or, on MW and LW only, by one of the pre-set trimmers **C32** to **C36** for automatic tuning, via one pair of switches **S4a**, **S4b** to **S8a**, **S8b**, when one switch of the series **S4x** to **S8x** will open to disconnect **C28**. **L5** is shorted by **S9** when any MW button is depressed.

First valve (**V1**, Mullard metallised **TH4B** or **TH4A**) is triode hexode operating as frequency changer with internal coupling. For manual tuning, triode oscillator anode coils **L9** (SW), **L10** (MW) and **L11** (LW) are tuned by **C31** via switches **S13x** to **S17x**; parallel trimming by **C29** (MW) and **C9**, **C30** (LW); series tracking by **C10** (SW) and **C11** (MW and LW). Reaction by grid coils **L6** (SW), **L7** (MW) and **L8** (LW). For automatic operation, when one of the buttons controlling switch groups numbered **S13** to **S17** is pressed, its **a** and **b** limbs will close to connect one of the buttons permeability tuned coils **L19** to **L23** directly between the oscillator grid and anode circuits, their fixed tuning condensers **C37**, **C38** being connected in series across the coils, and their electrical centre, the junction of the two condensers, is connected to chassis.

Second valve (**V2**, Mullard metallised **VP4B**) is a variable-mu RF pentode



Circuit diagram of the Invicta 570, with press-button switching for five stations, and press-button wave-changing. **L4**, **L5** are used both for manual and auto-tuning, but **L9-L11** are used only on manual, the extra coils **L19-L23** being used for the oscillator auto-tuning.

These coils have adjustable iron cores, while **L4**, **L5** are tuned for auto operation by **C32-C36**.

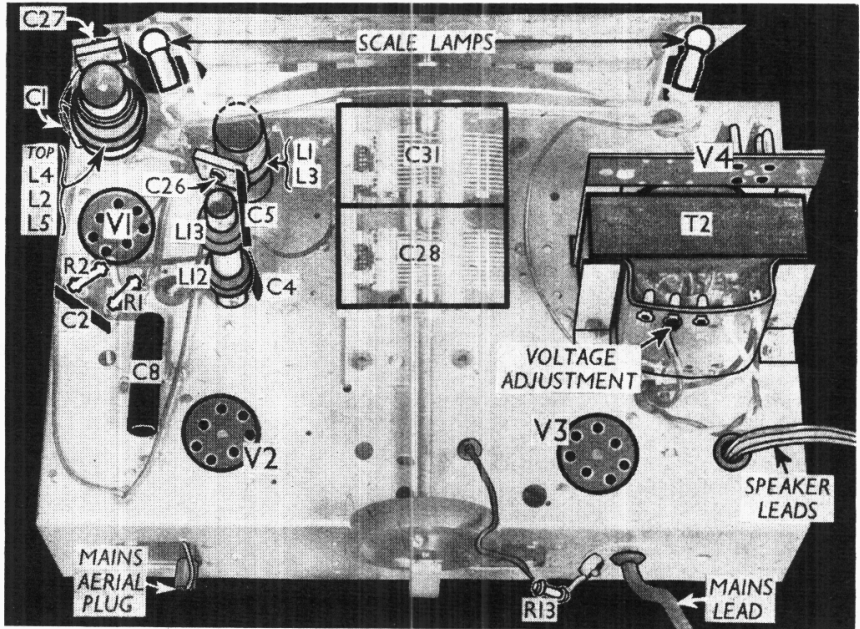
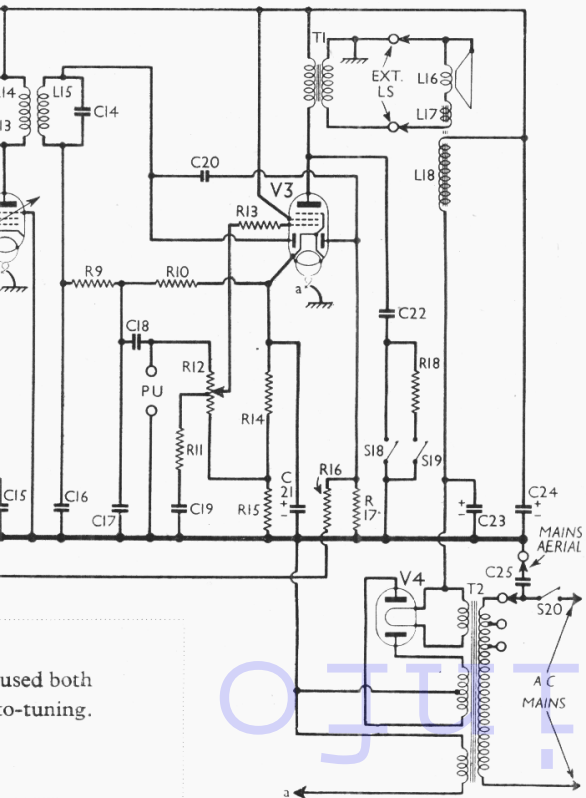
operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer coupling **C4, L12, L13, C5** and **C13, L14, L15, C14**. These transformers are tuned at the works, and no provision is made for adjustment.

**Intermediate frequency 465 KC/S.**

Diode second detector is part of double diode output pentode valve (**V3, Mullard Pen4DD**). Audio frequency component in rectified output is developed across resistances **R9** and **R10**, that across **R10** being passed via AF coupling condenser **C18**, manual volume control **R12** and grid stopper **R13** to CG of pentode section, which provides the total AF amplification. Three position tone control by **C22, R18** and **S18, S19** in anode circuit. Tone compensation by **R11, C19** across lower half of **R12**. Provision for connection of gramophone pick-up across **R12**. Provision for low impedance external speaker across secondary of **T1** by sockets in the internal speaker plugs when both speakers are required to operate, or directly to sockets fitted to the chassis when the external speaker only is required.

Second diode of **V3**, fed from **L15** via **C20**, provides DC potentials which are developed across load resistance **R17** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control. Delay voltage is obtained from drop along resistances **R14** and **R15** in cathode lead to chassis.

HT current is supplied by full-wave rectifying valve (**V4, Mullard DW4/350**). Smoothing by speaker field **L18** and dry electrolytic condensers **C23** and **C24**. Mains aerial coupling by plug via **C25**. When not required, the plug is inserted in a socket connected to chassis, and **C25** then acts as a mains RF by-pass.



Plan view of the chassis. The aerial coil units and the first IF transformer are at the top left hand corner, and are unscreened.

**COMPONENTS AND VALUES**

RESISTANCES		Values (ohms)
R1	V1 hexode CG stabiliser	50
R2	V1 hexode CG resistance	250,000
R3	V1 SG HT feed	20,000
R4	V1 fixed GB resistance	200
R5	V1 osc. CG resistance	20,000
R6	V1 osc. CG stabiliser	50
R7	V1 osc. anode HT feed	20,000
R8	V2 fixed GB resistance	150
R9	V3 signal diode load	50,000
R10	resistances	500,000
R11	Part of tone compensator	60,000
R12	Manual volume control	1,000,000
R13	V3 pentode grid stopper	100,000
R14	V3 pentode GB and AVC	200
R15	delay resistances	300
R16	AVC line decoupling	1,000,000
R17	V3 AVC diode load	1,000,000
R18	Part of tone control	60,000

CONDENSERS (Continued)		Values (μF)
C32‡	Aerial circuit automatic tuning trimmers	0.00012
C33‡		0.000375
C34‡		0.0006
C35‡		0.000375
C36‡	Osc. circuit automatic fixed tuning condensers	0.0006
C37		0.0003
C38		0.0003

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

CONDENSERS		Values (μF)
C1	MW aerial coupling	Very low
C2	V1 hexode CG condenser	0.00015
C3	V1 SG decoupling	0.1
C4	1st IF transformer fixed tuning condensers	0.00015
C5	V1 cathode by-pass	0.1
C6	V1 osc. CG condenser	0.00015
C7	AVC line decoupling	0.1
C8	Osc. circuit LW fixed trimmer	0.00025
C9	Osc. circuit SW tracker	0.005
C10	Osc. circuit MW and LW tracker	0.000657
C11	V1 osc. anode coupling	0.00015
C12	2nd IF transformer fixed tuning condensers	0.00015
C13	V2 cathode by-pass	0.1
C14	IF by-pass condensers	0.00015
C15	AF coupling to V3 pentode	0.05
C16	Part of tone compensator	0.005
C17	Coupling to V3 AVC diode	0.00002
C18*	V3 cathode by-pass	20.0
C19	Part of tone control	0.01
C20*	HT smoothing condensers	8.0
C21*	Mains aerial coupling	16.0
C22‡	Aerial circuit SW trimmer	0.0003
C23‡	Aerial circuit MW trimmer	0.0003
C24‡	Aerial circuit manual tuning	0.00054
C25‡	Osc. circuit MW trimmer	0.00003
C26‡	Osc. circuit LW trimmer	0.00003
C27‡	Osc. circuit manual tuning	0.00054

Continued in next column

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial SW coupling coil	0.15
L2	Aerial MW and LW coupling coil	65.0
L3	Aerial SW tuning coil	Very low
L4	Aerial MW tuning coil	2.25
L5	Aerial LW tuning coil	12.0
L6	Oscillator SW reaction coil*	13.0
L7	Oscillator MW reaction coil*	16.0
L8	Oscillator LW reaction coil*	21.0
L9	Osc. circuit SW tuning coil*	Very low
L10	Osc. circuit MW tuning coil*	1.5
L11	Osc. circuit LW tuning coil*	2.2
L12	1st IF trans. { Pri. . . . .	7.5
L13	{ Sec. . . . .	7.5
L14	2nd IF trans. { Pri. . . . .	7.5
L15	{ Sec. . . . .	7.5
L16	Speaker speech coil	1.7
L17	Hum neutralising coil	0.25
L18	Speaker field coil	3,000.0
L19	Osc. circuit automatic tuning coils	1.0
L20		1.0
L21		1.4
L22	Speaker input trans. { Pri. . . . .	420.0
L23		{ Sec. . . . .
T1	Mains Heater sec. trans. { Pri., total . . . . .	23.0
T2		{ Rect. heat. sec. HT sec., total . . . . .
S1a, b, x to S3a	Aerial circuit waveband switches	—
S4a, b to S8a, b	Aerial circuit automatic tuning selector switches	—
S4x to S8x	Manual tuning cut-out switches	—
S9	Aerial LW shorting switch	—
S10a, b, x to S12a, b	Oscillator circuit manual waveband switches	—
S13a, b to S17a, b	Oscillator circuit automatic tuning selector switches	—
S13x to S17x	Manual tuning cut-out switches	—
S18, S19	Tone control switches	—
S20	Mains switch, ganged R12	—

\*Manual tuning only.

**DISMANTLING THE SET**

A detachable bottom is fitted to the cabinet and upon removal (two counter-sunk-head wood screws) gives access to most of the components beneath the chassis.

**Removing Chassis.**—If it is necessary to remove the chassis from the cabinet, remove the three control knobs (pull off) and the four bolts (with washers, rubber washers and distance pieces) holding the chassis to the bottom of the cabinet. 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 rubber washer on each of the fixing bolts, between the chassis and the bottom of the cabinet, do not forget to replace the felt washers on the tone and volume control spindles and note that the tone and volume control knobs are marked, so that they must be placed on the correct spindles.

To free the chassis entirely, unplug the speaker speech coil leads from the sockets at the rear of the chassis and unsolder the other speaker leads. *When replacing,* connect the leads as follows, numbering the tags from bottom to top:—1, black; 3, brown; 4, red. The green lead goes to the bottom stud on the side of the transformer and the yellow lead to the other stud.

**Removing Speaker.**—The speaker can be removed from the cabinet by unsoldering the leads and removing the four screws holding it to the sub-baffle. *When replacing,* see that the transformer is on the right and connect the leads as follows, numbering the tags from bottom to top:—1, black braided lead; 2, red rubber covered lead; 3, brown; 4, red braided lead. The green lead goes to

the bottom stud on the side of the transformer and the yellow lead to the other stud, while the black rubber covered lead goes to the earthing tag on the speaker frame.

**VALVE ANALYSIS**

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 227 V, using the 216-235 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 TH4B	{ 215 Oscillator 100	{ 1.2 4.8	82	1.2
V2 VP4B	215	11.0		
V3 Pen4DD	205	21.0	215	3.9
V4 DW4/350	365†	—	—	—

† Each anode, AC.

**GENERAL NOTES**

**Switches.**—The eight buttons control the whole of the manual wavechange, manual/auto and auto-selector switches, which are mounted in a double-sided unit behind the front of the chassis. This unit is indicated in our under-chassis view, and both sides are shown in diagrammatic form in cols. 5 and 6. The upper view in this diagram shows the side of the unit seen when looking at the underside of the chassis, while the lower view shows the side nearer the chassis deck, as seen when the switch unit is

unbolted from the front of the chassis, turned over, and viewed from the front of the underside of the chassis.

Each button controls switches with two different numbers, and various suffixes. Thus the SW manual button controls **S1a, b, x** and **S10a, b, x**; the LW manual button controls **S3a** and **S12a, b**.

The purposes of the various switches are given in the Other Components table, while their position and operation are explained in the Circuit Description.

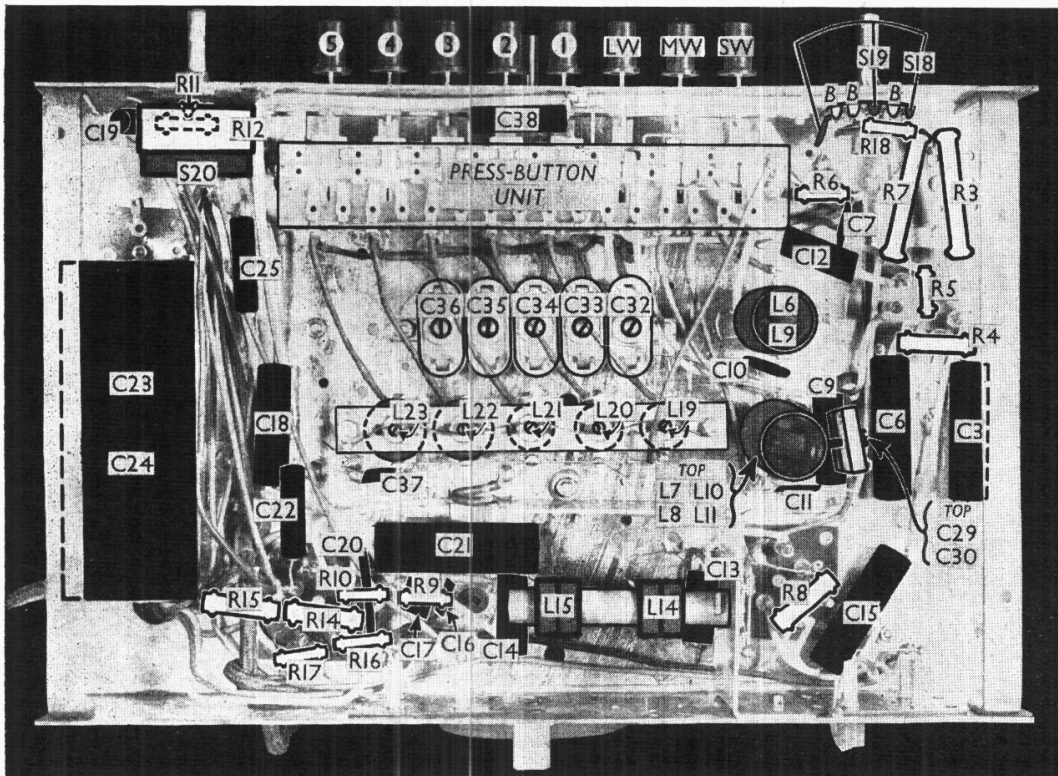
It is important to note that when any button is depressed the “a” and “b” switches associated with it *close*, while the x switches *open*, and vice-versa.

**S9** is a supplementary shorting switch, built on to the side of the unit nearer the chassis deck (lower diagram). It is operated by any of the MW auto buttons, or the MW manual button, and is *closed* when the button is pressed, due to a projection on the button plunger making contact with spring projections on a metal strip fixed to the body of the press-button switch unit. Since the plungers are at chassis (earth) potential, **S9** connects the top of **L5** to chassis when it closes.

**S18, S19** are the tone control switches, in a rotary unit at the front of the chassis, each switch being indicated in our under-chassis view. In the fully anti-clockwise position of the control **S18** is closed; in the central position **S19** is closed; and in the fully clockwise position, both switches are open.

**S20** is the QMB mains switch, ganged with the volume control **R12**.

**Coils.**—**L1, L3** and **L2, L4, L5** are in two unscreened tubular units on the chassis deck, each supporting an associated trimmer. **L6, L9** and **L7, L8, L10, L11** are in two unscreened tubular units



Under-chassis view. The press-button unit is shown in detail in columns 5 and 6. **L14, L15** form the second IF transformer, which is unscreened. **S18, S19** are the tone control switches, their tags being individually indicated. Note the aerial auto trimmers **C32 - C36** and the core adjustments of the oscillator auto coils **L19-L23**.

beneath the chassis, the latter supporting two trimmers.

**L3** and **L9** are the thick wire windings in their respective units.

The first IF transformer **L12**, **L13** is unscreened, and mounted on the chassis deck, while the second, **L14**, **L15**, is a similar unit beneath the chassis. These transformers are fixed-tuned by suitable condensers mounted on them.

**L19-L23** are the oscillator circuit auto-tuning coils, one being associated with each of the five pre-set station buttons. They are mounted in a row beneath the chassis. **L19**, **L20** and **L21**, associated with buttons 1, 2 and 3, are for MW use in models 570A, B, C and D, while **L22** and **L23** (buttons 4 and 5) are for LW use. In 570 S models, the arrangement may be different, these sets being non-standard.

Each of these five coils has an adjustable iron core for permeability tuning to the correct frequency for the required station, the adjusting screws being indicated in our under-chassis view.

**External Speaker.**—Two sockets are provided at the rear of the chassis to take the leads from the internal speaker. If an external speaker is to be used as well, a 2 O type should be plugged into the socketed plugs of the internal speaker. If the external speaker only is required, the internal speaker plugs are removed and the external speaker plugged directly into the sockets in the chassis.

**Internal Speaker.**—In order that the speaker frame shall be directly earthed, the black lead should be in the top socket (nearer the chassis deck).

**Scale Lamps.**—These are two Rival MES types, rated at 6.2 V, 0.3 A.

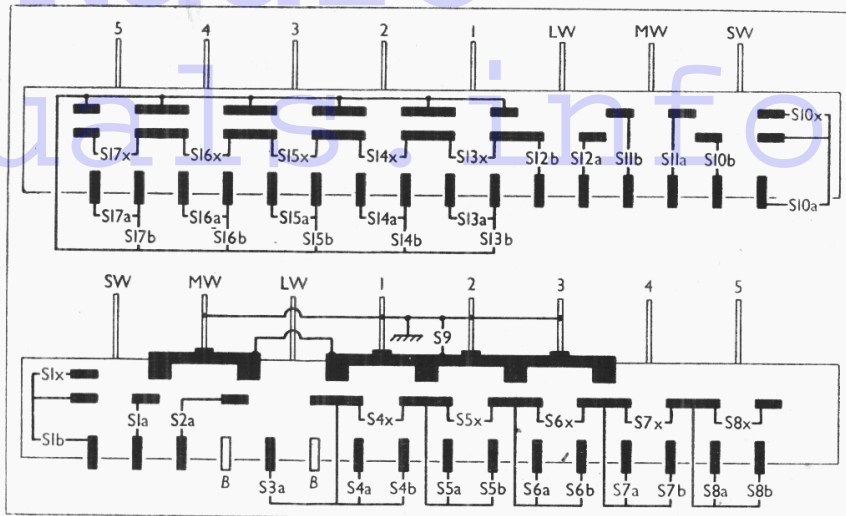
**Condensers C23, C24.**—These are two dry electrolytics (550 V peak) in a single carton beneath the chassis, having a common negative (black) lead. The yellow lead is the positive of **C23** (8  $\mu$ F) and the red the positive of **C24** (16  $\mu$ F).

**Chassis Divergencies.**—**R1** and **R6**, and **C1**, **C9** are not in the maker's diagram.

#### CIRCUIT ALIGNMENT

**IF Stages.**—The transformers are permanently adjusted at the works, and must not be altered.

**RF and Oscillator Stages.**—See that the scale is correctly fitted. The cross in the



Diagrams of the press-button unit. The upper one is that seen from the underside of the chassis, while the lower one is the reverse side. The press-button plungers are marked SW, MW, LW and 1 to 5 as in the under-chassis view.

middle of it must be over the centre of the spindle, and the bottom edge of the scale must be horizontal. With gang at maximum, pointer should be horizontal. Connect signal generator to **A** and **E** sockets.

**MW.**—Switch set to MW by pressing MW manual button. Tune to 250 m on scale, feed in a 250 m (1,200 KC/S) signal, and adjust **C29**, then **C27**, for maximum output.

**LW.**—Switch set to LW by pressing LW manual button. Tune to 1,200 m on scale, feed in a 1,200 m (250 KC/S) signal and adjust **C30** for maximum output.

**SW.**—Switch set to SW by pressing SW manual button. Feed in a 14 m (21.4 MC/S) signal and tune it in. Calibration should be correct, but if it is not, slightly adjust the top end turn of **L9**, as there is no oscillator trimmer on this band. Then adjust **C26** for maximum output. Check at 50 m (6 MC/S).

#### PRE-SET STATIONS

The five buttons numbered 1 to 5 control pre-set stations, buttons 1 to 3 being for MW stations, and 4 and 5,

LW stations. The wavelength coverages for the various buttons in models 570 A, C and B, D are in the table below. Models with the suffix S are specials, with different coverages.

Button	570 A 570 C	570 B 570 D
1	203- 300 m	203- 300 m
2	203- 300 m	380- 540 m
3	290- 420 m	380- 540 m
4	1,100-1,450 m	1,100-1,450 m
5	1,400-1,900 m	1,400-1,900 m

Adjustment of any particular station setting, or station changing (within the limits of the waveband coverage of each button) is achieved by adjusting the iron core of the associated oscillator coil in the group **L19-L23**, and the associated trimmer in the group **C32-C36**, either to the station itself, or to a signal generator accurately adjusted to the correct wavelength. In any case it is desirable to make final adjustments on the actual station.

Note that turning a core adjusting screw clockwise increases the wavelength. The same, of course, applies to the pre-set condenser adjusting screws.

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