

Tuning for five stations (two LW and three MW) can be pre-set in the Invicta 500, Monomatic, 4-valve (plus rectifier) AC 4-band superhet, pairs of fixed and variable trimmers being switched into the aerial and oscillator circuits. This circuit diagram is divided between V2 and V3

### COMPONENTS AND VALUES

RESISTANCES	Values (ohms)
R1	V1 SG HT feed .. 20,000
R2	V1 fixed GB resistance .. 300
R3	V1 osc. CG resistance .. 20,000
R4	V1 osc. anode HT feed .. 20,000
R5	V2 fixed GB resistance .. 450
R6	IF stopper .. 100,000
R7	Part of tone control circuit .. 250,000
R8	Part of V3 signal diode load .. 250,000
R9	Part of fixed tone compensator .. 60,000
R10	Manual volume control .. 1,000,000
R11	TI CG decoupling .. 250,000
R12	Part of V3 signal diode load .. 250,000
R13	V3 GB and AVC delay resistance .. 1,000
R14	V3 triode anode decoupling .. 40,000
R15	V3 triode anode load .. 60,000
R16	AVC line decoupling .. 1,000,000
R17	V3 AVC diode load .. 1,000,000
R18	V4 CG resistance .. 500,000
R19	V4 grid stopper .. 100,000
R20	V4 GB resistance .. 150
R21	T.I. anode HT feed .. 2,000,000

OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial SW1 coupling coil .. 0.4
L2	Aerial SW2 coupling coil .. 0.7
L3	Aerial MW and LW coupling .. 70.0
L4	Aerial SW1 tuning coil .. Very low
L5	Aerial SW2 tuning coil .. 0.4
L6	Aerial MW tuning coil .. 2.7
L7	Aerial LW tuning coil .. 13.0
L8	Osc. circuit SW1 reaction .. 47.0
L9	Osc. circuit SW2 reaction .. 85.0
L10	Osc. circuit MW reaction .. 11.0
L11	Osc. circuit LW reaction .. 17.0
L12	Osc. circuit SW1 tuning coil .. Very low
L13	Osc. circuit SW2 tuning coil .. 0.4
L14	Osc. circuit MW tuning coil .. 1.5
L15	Osc. circuit LW tuning coil .. 2.0
L16	1st IF trans. Pri. .. 6.5
L17	1st IF trans. Sec. .. 6.5
L18	2nd IF trans. Pri. .. 6.5
L19	2nd IF trans. Sec. .. 6.5
L20	Speaker speech coil .. 1.75
L21	Hum neutralising coil .. 0.2
L22	Speaker field coil .. 2,000.0
T1	Output trans. Pri. .. 345.0
T2	Mains trans. Pri. .. 49.0
	Heater sec. .. Very low
	Rect. heat. sec. .. 0.15
	HT sec., total .. 375.0
S1-S19	Waveband switches ..
S20-S26	Aerial auto/manual selector switches ..
S27-S33	Oscillator auto/manual selector switches ..
S34-S35	Radio/gram change switches ..
S36-S45	Indicator lamp switches ..
S46-S48	Tone control switches ..
S49	Speaker switch ..
S50	Mains switch, ganged R10 ..

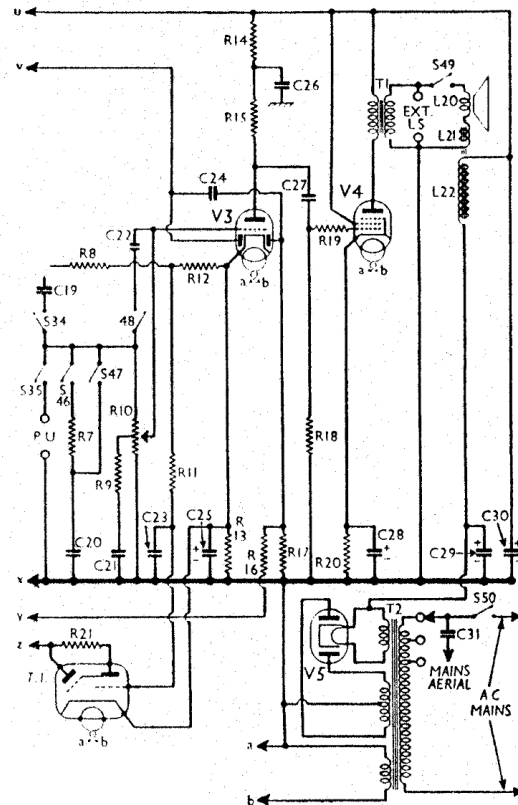
CONDENSERS	Values (μF)
C1	Aerial MW coupling .. 0.000006
C2	V1 SG decoupling .. 0.1
C3	AVC line decoupling .. 0.1
C4	1st IF trans. pri. tuning .. 0.00015
C5	1st IF trans. sec. tuning .. 0.00015
C6	V1 cathode by-pass .. 0.1
C7	V1 osc. CG condenser .. 0.00015
C8	Osc. circuit MW fixed trimmer .. 0.00002
C9	Osc. circuit LW fixed trimmer .. 0.0003
C10	Osc. circuit SW1 tracker .. 0.005
C11	Osc. circuit SW2 tracker .. 0.0013
C12	Osc. MW and LW tracker .. 0.000657
C13	V1 osc. anode coupling .. 0.00015
C14	2nd IF trans. pri. tuning .. 0.00015
C15	2nd IF trans. sec. tuning .. 0.00015
C16	V2 cathode by-pass .. 0.1
C17	IF by-pass condensers .. 0.00015
C18	AF coupling to V3 triode .. 0.05
C19	Part of tone control circuit .. 0.001
C20	Part of tone compensator .. 0.005
C21	Part of tone control circuit .. 0.00002
C22	T.I. CG decoupling .. 0.1
C23	Coupling to V3 AVC diode .. 0.00015
C24	V3 cathode by-pass .. 20.0
C25	V3 triode anode decoupling .. 1.0
C26	V3 triode to V4 AF coupling .. 0.05
C27	V4 cathode by-pass .. 20.0
C28	HT smoothing .. 8.0
C29	HT smoothing .. 8.0
C30	Mains aerial coupling .. 0.001
C31	Aerial circuit SW1 trimmer .. 0.00003
C32	Aerial circuit MW trimmer .. 0.00003
C33	Aerial circuit manual tuning .. 0.00054
C34	Osc. circuit MW trimmer .. 0.00003
C35	Osc. circuit LW trimmer .. 0.00003
C36	Oscillator circuit manual tuning .. 0.00054
C37	Oscillator circuit manual tuning .. 0.000268
C38	Aerial circuit automatic tuning trimmers .. 0.00003
C39	Aerial circuit automatic tuning trimmers .. 0.00003
C40	Aerial circuit automatic tuning trimmers .. 0.00003
C41	Aerial circuit automatic tuning trimmers .. 0.00003
C42	Aerial circuit automatic tuning trimmers .. 0.000158
C43	Aerial circuit automatic tuning trimmers .. 0.00003
C44	Aerial circuit automatic tuning trimmers .. 0.0000958
C45	Aerial circuit automatic tuning trimmers .. 0.00003
C46	Aerial circuit automatic tuning trimmers .. 0.000018
C47	Aerial circuit automatic tuning trimmers .. 0.00003
C48	Aerial circuit automatic tuning trimmers .. 0.000268
C49	Aerial circuit automatic tuning trimmers .. 0.00003
C50	Aerial circuit automatic tuning trimmers .. 0.0001758
C51	Oscillator circuit automatic tuning trimmers .. 0.00003
C52	Oscillator circuit automatic tuning trimmers .. 0.000158
C53	Oscillator circuit automatic tuning trimmers .. 0.00003
C54	Oscillator circuit automatic tuning trimmers .. 0.0000958
C55	Oscillator circuit automatic tuning trimmers .. 0.00003
C56	Oscillator circuit automatic tuning trimmers .. 0.000018
C57	Oscillator circuit automatic tuning trimmers .. 0.00003

\* Electrolytic. † Variable. ‡ Pre-set.  
§ Values for model 500A only.

### GENERAL NOTES

**Switches.**—The switches S1-S45, which are in eight rotary units beneath the chassis, can be divided logically into the following groups: S1-S19, waveband switches; S20-S26, aerial auto/manual switches; S27-S33, oscillator auto/manual switches; S34, S35, radio/gram switches; S36-S45, indicator lamp switches. The units are indicated in our under-chassis view, and are shown in detail in the diagrams overlaid.

Once the functions of the various sets of switches are



### VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 228 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 TH4A	257	4.2	134	6.5
V2 VP4B	112	6.1	—	—
V3 TDD4	257	9.3	257	3.4
V4 PenA4	85	1.6	—	—
V5 IW4/350	245	33.0	257	5.2
T.I. TV4	355†	—	—	—
	19	0.1	—	—
	257	0.3	—	—

† Each anode, AC.

## INVICTA 500—Continued

understood, it will be fairly obvious which ones should close in each of the ten positions of the selector control. It was thought that a complete switch table in our usual style would be cumbersome and unnecessary, but below the switches which are closed in each position (starting from fully anti-clockwise) are given. The pre-set stations indicated are those in Model 500A.

**Position 1 (Droitwich):** S3, S8, S13, S18, S20, S27, S34, S36.

**Position 2 (Luxembourg):** S3, S8, S13, S18, S21, S28, S34, S37.

**Position 3 (London Reg.):** S3, S7, S12, S17, S22, S29, S34, S38.

**Position 4 (Midland Reg.):** S3, S7, S12, S17, S23, S30, S34, S39.

**Position 5 (R. Normandie):** S3, S7, S12, S17, S24, S31, S34, S40.

**Position 6 (Gram.):** S4, S9, S14, S19, S25, S32, S35, S41.

**Position 7 (Short, SW1):** S1, S5, S10, S15, S26, S33, S34, S42.

**Position 8 (Med.-Short, SW2):** S2, S6, S11, S16, S28, S33, S34, S43.

**Position 9 (MW):** S3, S7, S12, S17, S26, S33, S34, S44.

**Position 10 (LW):** S3, S8, S13, S18, S26, S33, S34, S45.

S46-S48 are the tone control switches in a 3-position rotary switch at the front of the chassis. The switches are indicated in our under-chassis view. In the fully anti-clockwise position, S47 is closed; in the central position S46 is closed; and in the fully clockwise position S48 is closed.

S49 is the QMB internal speaker switch, at the rear of the chassis, while S50 is the QMB mains switch ganged with the volume control R10.

**Coils.**—L1, L2, L4, L5; L3, L6, L7; L8, L10, L12, L14 and L9, L11, L13, L15 are in four unscreened units beneath the chassis. The IF transformers (fixed tuned) are also unscreened. L16, L17 is on the chassis deck, and L18, L19 beneath the chassis.

**Scale and Indicator Lamps.**—There are two scale lamps, and ten indicator lamps. All are MES types, rated at 6.2 V, 0.3 A.

**Trimmers.**—These are all beneath the chassis, with the exception of the fixed trimmers C4, C5 on the first IF unit on the chassis deck.

Each of the five pre-selected stations has two fixed and two variable trimmers. The latter are of low capacity, and slight changes in their capacity will have a negligible effect on the tuning.

The fixed trimmers for the selected stations are silvered mica type, with values specially chosen for the indicated station. The values given in our condenser table are those for the fixed trimmers used in Model

500A. Models with other suffix letters may have condensers of different values in these positions.

Both aerial and oscillator circuits use condensers of the same value for the selected stations.

The variable trimmers only cover a small band of wavelengths, and if stations of appreciably different wavelengths are required, pairs of fixed trimmers of the correct capacity (obtainable from the makers) will have to be substituted for the original ones. Station nameplates are also available from the makers.

**Condensers C29, C30.**—These are two 8  $\mu$ F dry electrolytics in a single carton beneath the chassis, having a common negative (black) lead. The red lead to V5 valve-holder is the positive of C29, and the red lead to R14 is the positive of C30.

**Condenser C1.**—This is a small fixed condenser formed of one insulated wire spiralled over a thicker straight wire. It is associated with the L3, L6, L7 coil unit.

**Chassis Divergencies.**—C8, C9 and R19 were not shown in the maker's diagram, but are included in our own chassis.

### CIRCUIT ALIGNMENT

**IF Stages.**—The makers state that the IF transformers are permanently adjusted at the factory and do not anticipate that their adjustment will alter at all in use. They state that no endeavour should be made to adjust the transformers.

Should a transformer be damaged in such a way as to alter its adjustment a new replacement should be obtained from the makers.

**RF and Oscillator Stages.**—Make sure that the tuning scale is properly adjusted. The cross in the centre of the scale should be exactly over the centre of the pointer spindle and the bottom edge of the scale should be horizontal. If not, slacken the two screws on either side of the scale, adjust it and tighten the screws.

Then turn the gang to maximum capacity and slip the pointer on the spindle so that it covers the 200 m mark on the SW2 scale.

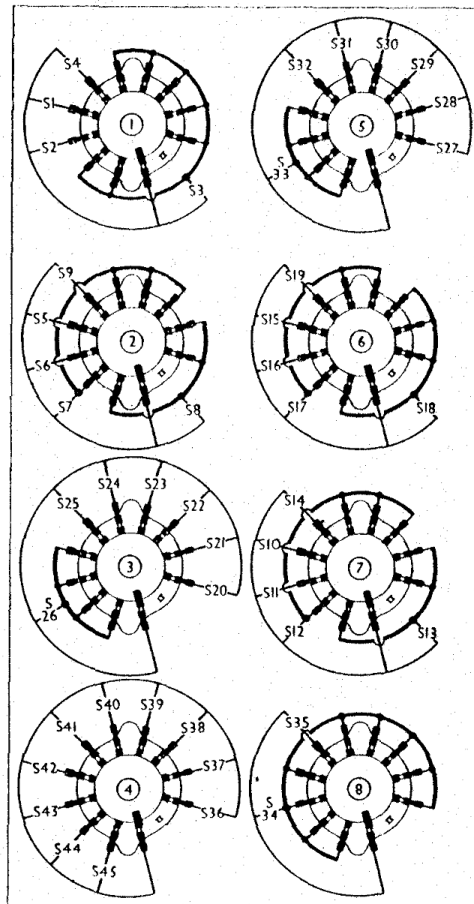
It should be noted that any re-alignment of the MW and LW circuits will necessitate readjustment of the trimmers for the pre-selected stations.

**MW.**—Connect signal generator to A and E sockets, switch set to MW, tune to 250 m on scale and inject a 250 m (1,200 KC/S) signal. Adjust C35 and C33 in that order for maximum output, keeping input as low as possible, consistent with a reasonable deflection on the output meter.

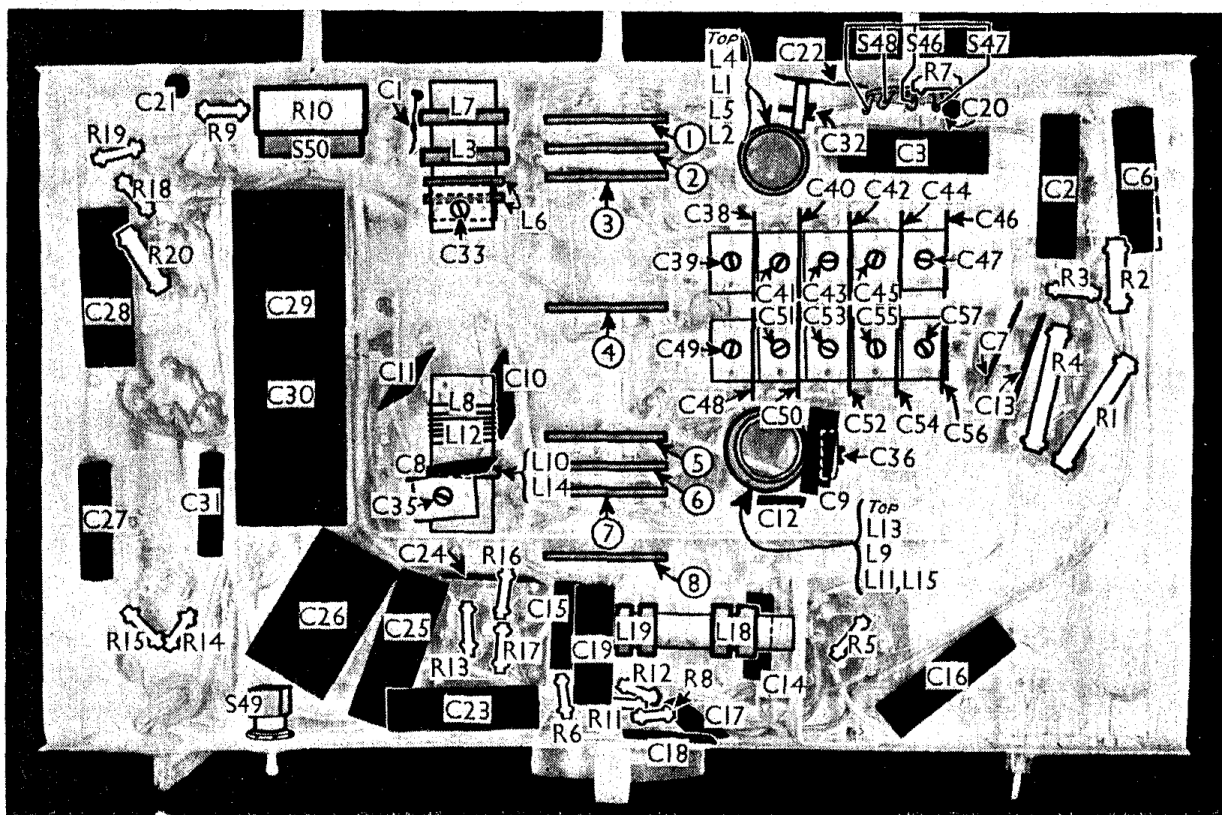
**LW.**—Switch set to LW, tune to 1,200 m on scale, feed in a 1,200 m (250 KC/S) signal, and adjust C36 for maximum output, keeping input low. There is no aerial trimmer.

**SW1.**—Switch set to SW1 (13-52 m), tune to 14 m on scale, feed in a 14 m (21.43 MC/S) signal and adjust C32 for maximum output, keeping input low. There is no oscillator trimmer. Check calibration at 50 m.

**SW2.**—There are no trimmers on this band so no adjustment can be made.



Diagrams of the wave-change switch units, drawn as seen from the directions of the arrows in the under-chassis view below.



The variable trimmers for the pre-set stations are seen on the right of this view of the under-neth of the chassis, the aerial trimmers being at the top, with the oscillator trimmers at the bottom. Diagrams of the wave-change switches are given above, but the tone control switches (S46 - S48) are indicated here.