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"TRADER" SERVICE SHEET

SELF-CONTAINED all-dry bat tery portable, the Invicta 25 is a 4-valve, 2-band superhet employing B7G-based valves and a 6-inch speaker. Negative feed-back is introduced between the last two valves. waveband ranges are 200-550m and 1,000 2,000m. The makers state that it must not be connected to an external aerial or earth.

Release date and original price: August, 1949; £11 2s. 5d. without batteries. Purchase tax extra.

# CIRCUIT DESCRIPTION

Tuned frame aerial input L1, C21 (M.W.) or L1, L2, C21 (L.W.) precedes a heptode valve (V1, Mullard DK91) operating as frequency changer with electron coupling.

Oscillator grid coils L3 (M.W.) and L4 (L.W.) are tuned by C22. Parallel trimming by C23 (M.W.) and C5, C24 (L.W.);

ming by C23 (M.W.) and C5, C24 (L.W.); series tracking by C6 (M.W. and L.W.). Inductive reaction coupling by oscillator anode coil L5 (M.W. and L.W.).

Second valve (V2, Mullard DF91) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings C2 16 17 tuned transformer couplings C2, L6, L7, C3 and C9, L8, L9, C10.

## Intermediate frequency 470 kc/s.

Diode signal detector is part of single diode pentode valve (V3, Mullard DAF91). Audio frequency component in rectified output is developed across manual volume control R7, which is also the diode load resistor, and passed via A.F. coupling capacitor C13 to control grid of pentode section, which operates as A.F. amplifier. I.F. filtering by C11,

D.C. potential developed across R7 is fed back via decoupling resistor R6 as bias to the F.C. and the I.F. valves,

giving automatic gain control.

**R5** and **C12**.

Resistance-capacitance coupling by R9, C16 and R11 between V3 pentode and pentode output valve (V4, Mullard DL92). Fixed tone correction in anode circuit by C17 and R13. V3 C.G. resistor R8 is returned to chassis via T1 secondary, giving negative feed-back. Grid bias potential for V4 is obtained from the drop across R15 in the H.T. negative lead to chassis.

## COMPONENTS AND VALUES

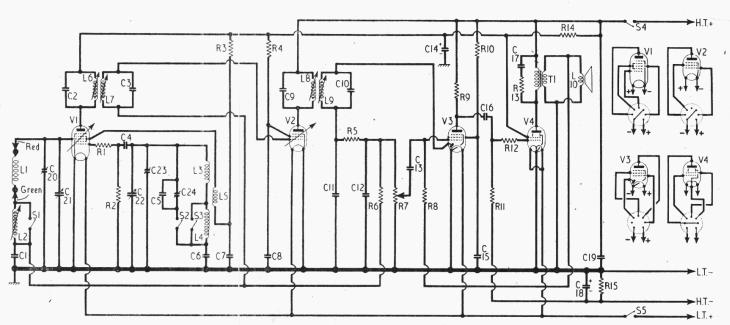
RESISTORS		Values	Loca- tions
R1	Osc. C.G. stopper	10kΩ	F3
R2	V1 osc. C.G	100kΩ	F3
R3	Osc. H.T. feed	$10k\Omega$	F4
R4	V2 S.G. feed	$100 \mathrm{k}\Omega$	G4
R5	I.F. stopper	$47k\Omega$	G4
R6	A.G.C. decoup	$2 \cdot 2M\Omega$	F3
R7	Volume control	$1M\Omega$	E3
R8	V3 C.G	4·7MΩ	G3
R9	V3 pentode load	$330 k\Omega$	G4
R10	V3 S.G. feed	3·3MΩ	G4
R11	V4 C.G	1ΜΩ	H4
R12	V4 grid stopper	$27k\Omega$	H4
R13	Tone corrector	$27k\Omega$	A2
R14	H.T. decoupling	$4.7k\Omega$	G4
R15*	V4 G.B	$910\Omega$	H4

<sup>\*</sup> Made up of  $1,000\Omega$  and  $10,000\Omega$  resistors, in parallel.



CAPACITORS	Values	Loca- tions
A.G.C. decoupling   C2	0-05µF 100pF 100pF 150pF 300pF 500pF 0-05µF 100pF 100pF 100pF 100pF 0-01µF 0-01µF 25µF 0-01µF 30pF 	F3 C2 C2 C2 C1 D1 C1 F4 B2 G4 G3 G3 G3 H4 A1 D1 D2 D2 D2 D1

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



Circuit diagram of the Invicta 25 all-dry portable superhet. L1 is the frame aerial winding. The speech coil circuit is included in the return path of V3 pentode C.G. resistor, introducing inverse feed-back.

ОТ	HER COMPONENTS	Approx. Values (ohms)	Loca- tions
L1 L2 L3 L4 L5 L6	Frame aerial L.W. loading coil M.W. osc. tuning L.W. osc. tuning Osc. reaction coil	1·8 27·0 2·0 0·5 9·5	B1 C1 C1 C1
L7 L8 L9 L10	1st I.F. trans. { Pri. Sec. Speech coil	12.0 $12.0$ $12.0$ $12.0$ $12.0$	C2 C2 B2 B2
T1 S1- S5	O.P. trans. { Pri. Sec. Waveband and battery switches	660·0 Very low	A1 F3

# CIRCUIT ALIGNMENT

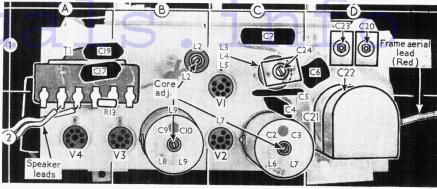
R.F. and oscillator adjustments can be made with the chassis in its carrying case, but for I.F. adjustments the chassis should be withdrawn and placed, resting on its transformer end, on the bench. The frame aerial should be connected with the leads lengthened to give greater freedom to the chassis.

I.F. Stages .- Switch set to M.W., turn gang to minimum capacitance and volume control to maximum and connect signal generator, via a 0.01  $\mu$ F capacitor in the "live" lead, to control grid (pin 6) of **V1**. Feed in a 470 kc/s signal (638.3 m) signal and adjust the cores of **L9** (location reference B2), **L8** (G4), **L7** (C2) and **L6** (F4) for maximum output, reducing the input as the circuits come into line to avoid A.G.C. action. Repeat these adjustments until no improvement results.

R.F. and Oscillator Stages .- As the tuning scale remains fixed in the carrying case, the chassis should be replaced in the case before making these adjustments. Check that at the maximum and minimum capacitance settings of the gang, the cursor is obscured by the high and low wavelength ends, respectively, of the tuning scale. The cursor may be adjusted by sliding it along the drive cord. Connect signal generator to a loop of wire placed approximately 12in from the frame aerial.

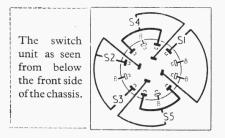
M.W.—Switch set to M.W., tune to 210 m on scale, feed in a 210 m (1,429 kc/s) signal and adjust C23 (D1) and C20 (D1) for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal and check calibration.

(Green)



Rear view of the chassis, as seen from the rear of the receiver, where the four RF adjustments are accessible.

L.W.-Switch set to L.W., tune to  $1,250~\mathrm{m}$  on scale, feed in a  $1,250~\mathrm{m}$ (240 kc/s) signal and adjust C24 (C1) for maximum output. Tune to 1,800 m on scale, feed in a 1,800 m (166.7 kc/s) signal and adjust the core of L2 (B1) for maximum output. Repeat these adjustments until no improvement results.



## DISMANTLING THE SET

Removing Chassis .- Remove the three control knobs (pull off), with felt washers, and unplug battery connectors; unsolder the two frame aerial leads from tags

unsolder the two frame aerial leads from tags on frame in carrying case on right of chassis; unsolder leads from speech coil tags on speaker; remove two 4BA nuts, with spacers, securing scale backing plate to top of carrying case; remove two 4BA nuts, holding bottom of chassis to sub-baffle, and, pulling lower edge of chassis forward slightly to clear bottom fixing botts, lower it sufficiently to free scale backing plate from ton fixing botts and withdraw.

ing plate from top fixing bolts, and withdraw.

Cursor carriage

2 turns round

When replacing, connect the green lead to the tag on the frame aerial near the front of the set and the red lead to the rear one.

Removing Speaker.—Remove four 4BA nuts, with washers, holding speaker to sub-baffle.

When replacing, the speech coil tags should be on the left.

## **GENERAL NOTES**

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Switches.—\$1-\$3 are the waveband switches, and \$4, \$5 are the battery switches, ganged in a single 3-position rotary unit beneath the chassis. The unit is indicated in our front view of the chassis, and is shown in detail in the diagram in col. 2, where it is drawn as seen from below the front of the chassis, in the direction of the arrow in our front view.

\$1 and \$3 close on M.W. (control knob fully clockwise); \$2 closes on L.W. (control knob fully anti-clockwise). \$4 and \$5 close in both of these positions, while in the central position (off) all switches are open.

Batteries.—Recommended batteries are as follows: L.T.. Ever Ready AD4 or Vidor L5041. rated at 1.5 V. These have a 2-pin connector of which the thicker pin is positive. Recommended H.T. batteries are Ever Ready B107 or B126, or Vidor L5508 or L5512, rated at 90 V.

The H.T. plug has three pins of which the centre one is used only as a locator. When the plug is viewed from the free ends of its pins, with the locator at the top, the left-hand pin is positive, and the right-hand pin is negative.

Chassis Divergencies.—In the original circuit diagram, R3 and C7 were omitted, and the H.T. end of L5 was connected to V2 screen. R4 was then 10 kΩ, and C8 was 0.05 μF. R9 may be 330 kΩ or 390 kΩ. In our chassis, the 910 Ω of R15 was made up by connecting a 10 kΩ resistor and a 1 kΩ resistor in parallel.

## DRIVE CORD REPLACEMENT

About three feet of fine gauge nylon braided glass yarn is required for a new drive cord, whose course is shown in our front view of the chassis, where the drive drum and the cursor are shown with the gang at maximum.

To run the cord, one end is tied to a drum boss screw as shown in our photograph, then the run is made, pulling the gang against its stop to hold the cord in position.

#### **VALVE ANALYSIS**

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on a new set of batteries. The tang and volume control were at maximum, but there was no signal input. Voltages were measured on the 400 V range of a Model 7 Avometer, chassis being the negative connection.

Valves	Anode		Screen	
valves	V	mA	V	mA
V1 DK91	60	0.8	44	1.5
V2 DF91 V3 DAF91	76 16	0·8 0·1	25	0.4
V4 DL92	74	4.5	60	1.0

\* Negligible readings.

control spindle **CI8** rame aeria

Front side of the chassis, in which the course of the tuning drive cord is indicated.

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