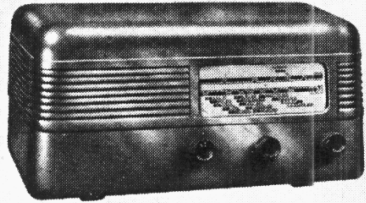


"TRADER" SERVICE SHEET
858

INVICTA
200



PERMEABILITY tuning and a reflex I.F. amplifier are unusual features of the Invicta 200 3-valve (plus rectifier) two-band superhet, designed to operate from A.C. or D.C. mains of 200-250V, or A.C. mains only, of 110V (See under "General Notes"). Plastic (Model 200) or wooden (Model 200W) cabinet versions are available.
Release date, both models, March, 1948.
Original prices: 200, £9 9s; 200W, £10 19s 6d; excluding purchase tax.

CIRCUIT DESCRIPTION

Aerial input is "bottom" coupled, via potential divider **C2, C3, R2**, to ganged permeability-tuned coils **L1** (M.W.) and **L1, L3** (with the addition of loading coil **L2**) on L.W., which precede a triode hexode valve (**V1, Brimar 12K8GT**) operating as frequency changer with electron coupling.

The triode oscillator section operates in a Colpitts circuit and on M.W. the permeability tuned oscillator coil **L4**, shunted by tracking coil **L6**, is tuned by fixed capacitors **C11, C12** in series. For L.W. operation **L5** is included in series with **L4, L6**, and fixed trimmer **C10** is introduced, via **S5**.

Second valve (**V2, Brimar 12C8GT**) is a double diode R.F. pentode with fixed G.B. The pentode section operates in a reflex circuit, first as an intermediate frequency amplifier, with tuned transformer couplings, and then as an A.F. amplifier.

Intermediate frequency 465 kc/s.

One diode section of **V2** provides A.F. output, which is developed across load resistor **R12** and passed, via **C18**, manual volume control **R11**,

and I.F. filter **R10, C13**, back to the control grid of the pentode section.

Second diode of **V2**, fed from **L9** via **C15**, provides D.C. potential, which is used for A.V.C. purposes. Delay voltage, together with G.B. for **V2** pentode section and part of G.B. for **V3**, is developed across **R16** in **V2, V3** cathode lead to chassis.

Amplified A.F. voltages are developed across **R9** and passed to C.G. of beam tetrode output valve (**V3, Brimar 35L6GT**). Voltages appearing across **T1** secondary winding are applied to **V2** C.G. circuit, giving negative feed-back.

When the receiver is operating from A.C. mains, H.T. current is supplied by I.H.C. half-wave rectifying valve (**V4, Brimar 35Z4GT**).

COMPONENTS AND VALUES

CAPACITORS		Values (µF)	Location
C1	Earth isolator	0-01	C4
C2	Aerial coupling ca-	0-0003	A4
C3	pacitors	0-0005	A4
C4	Aerial L.W. trim...	0-001	A4
C5	A.V.C. decoupling	0-1	H9
C6	1st I.F. transformer	0-00006	A1
C7	tuning	0-00006	A1
C8	V1 osc. C.G.	0-0001	J7
C9	V1 cath. by-pass	0-05	I7
C10	Osc. L.W. trim.	0-0001	A3
C11	Reaction coupling	0-0004	J6
C12	capacitors	0-0004	J7
C13	V2 C.G. I.F. by-	0-0003	I6
	pass		
C14	S.G.'s decoupling	0-1	H5
C15	A.V.C. coupling	0-00005	G6
C16	2nd I.F. trans.	0-00006	B2
C17	former tuning	0-00006	B2
C18	A.F. coupling	0-01	E7
C19		0-0001	F6
C20	I.F. by-passes	0-0001	G5
C21		0-001	F6
C22	A.F. coupling	0-005	F5
C23*	V3 cath. by-pass	50-0	F8
C24*	H.T. smoothing ca-	16-0	D2
C25*	pacitors	16-0	D2
C26	Mains R.F. by-	0-1	B4
C27	passes	0-1	C3
C28†	Aerial M.W. trim...	0-00008	A3

* Electrolytic.

† Pre-set.

RESISTORS		Values (ohms)	Location
R1	Aerial shunt	500,000	A4
R2	Aerial coupling	47,000	I9
R3	V1 fixed G.B.	330	J7
R4	V1 osc. C.G.	47,000	J6
R5	Osc. H.T. feed	33,000	I5
R6	S.G.'s H.T. feed	4,700	H5
R7	A.V.C. decoupling	1,000,000	G6
R8	A.V.C. diode load...	1,000,000	G6
R9	V2 pent. anode load	10,000	F6
R10	I.F. stopper	470,000	H6
R11	Volume control	600,000	C3
R12	Signal diode load	470,000	F6
R13	I.F. stopper	47,000	F5
R14	V3 C.G. resistor	220,000	E6
R15	V2, V3 G.B. and A.V.C. delay re-	100	F7
R16		sistors	100
R17	H.T. smoothing	15,000	D1
R18	Heater ballast	880*	B3

* Tapped at 750 Ω + 65Ω + 65Ω from V4 heater.

OTHER COMPONENTS

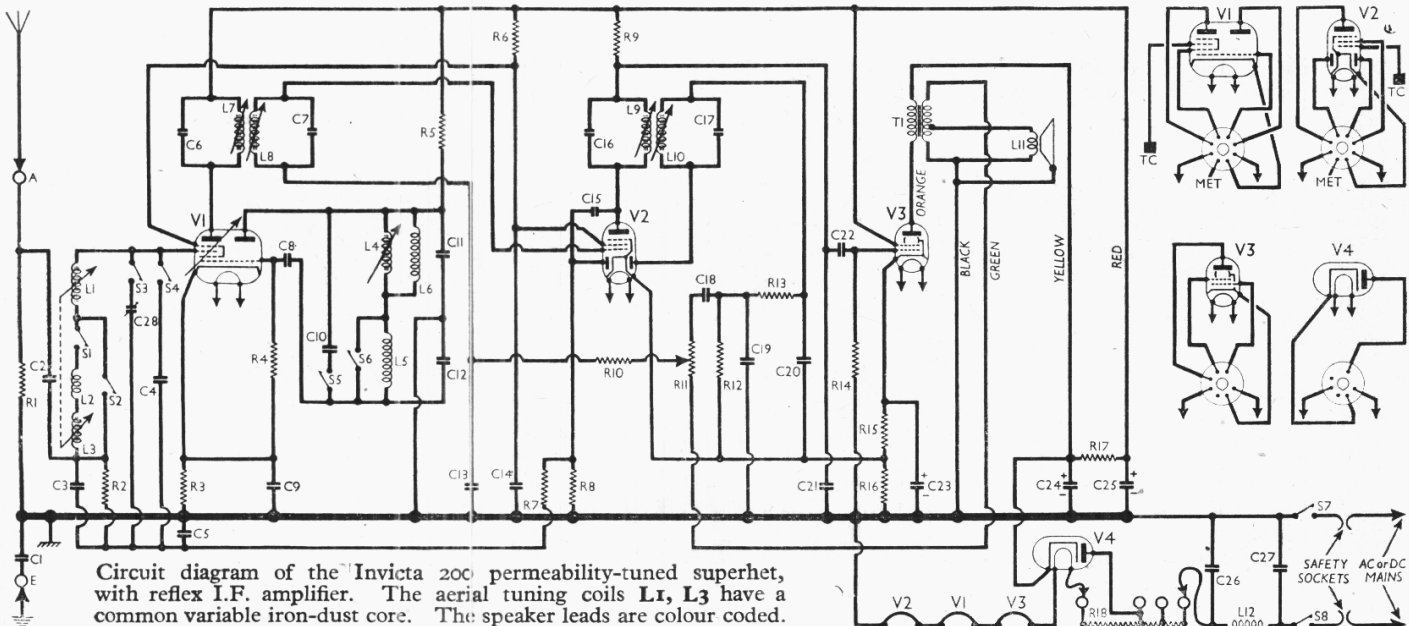
OTHER COMPONENTS		Approx. Values (ohms)	Location
L1	M.W. tuning coil	11-5	J8
L2	L.W. loading coil...	10-0	I9
L3	L.W. tuning coil	10-0	J8
L4	Osc. tuning coil	6-8	I7
L5	L.W. loading coil...	7-5	J8
L6	M.W. tracking coil	10-5	A3
L7	1st I.F. trans.	Pri.	20-0
L8		Sec.	20-0
L9	2nd I.F. trans.	Pri.	20-0
L10		Sec.	20-0
L11	Speech coil	3-0	—
L12	Mains R.F. filter	3-7	B4
T1	Speaker Pri.	450-0	D1
	Spkr. sec.	0-6	D1
	trans. Sec., total	2-7	D1
S1-S6	W/band switches...	—	A3
S7, S8	Mains sw, g'd R11	—	C3

DISMANTLING THE SET

Removing Chassis.—Unsolder the five coloured plastic speaker leads from tags on the speaker assembly;

loosen the captive cheese-head screws at the four corners of the chassis assembly, and lift out the chassis.

When replacing, the five coloured speaker leads should be reconnected to the tags on the speaker assembly as indicated in our rear view of the chassis, the black lead being soldered to the negative (black) tag of **C24, C25** which is also wired to the speaker frame and one side of the speech coil.



Circuit diagram of the Invicta 200 permeability-tuned superhet, with reflex I.F. amplifier. The aerial tuning coils **L1, L3** have a common variable iron-dust core. The speaker leads are colour coded.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on A.C. mains of 227v, using the 216-235v tapping on the heater ballast resistor.

Voltages were measured on the 400v scale of a model 7 Universal Avometer, chassis being the negative connection.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 12K8GT	82	1.5	64	3.3
V2 12C8GT	43	1.1	64	0.6
V3 35L6GT	56	2.5	82	1.7
V4 35Z4GT†	234	27.0	—	—

† Cathode to chassis, 245 V, D.C.

GENERAL NOTES

Switches.—S1-S6 are the waveband switches, ganged in a single 2-position rotary unit on the rear of the chassis deck. The unit is indicated in our rear view of the chassis and shown in detail in the diagram in col. 2, where it is drawn as seen when viewing the chassis deck from the rear. On M.W., S2, S3 and S6 close, while on L.W., S1, S4 and S5 close.

Coils.—The aerial and oscillator coils L1-L6 are mounted in special supports on the front of the chassis deck. L1, L3 and L4 are the permeability tuning coils, fitted with variable iron-dust cores which are controlled in position by movement of the tuning control knob, and L2, L5 are air-cored "loading" coils.

Capacitors C10, C11 and C12.—These are the oscillator fixed-tuning capacitors requiring a tolerance of ±2% for C10 and ±1% for C11, C12.

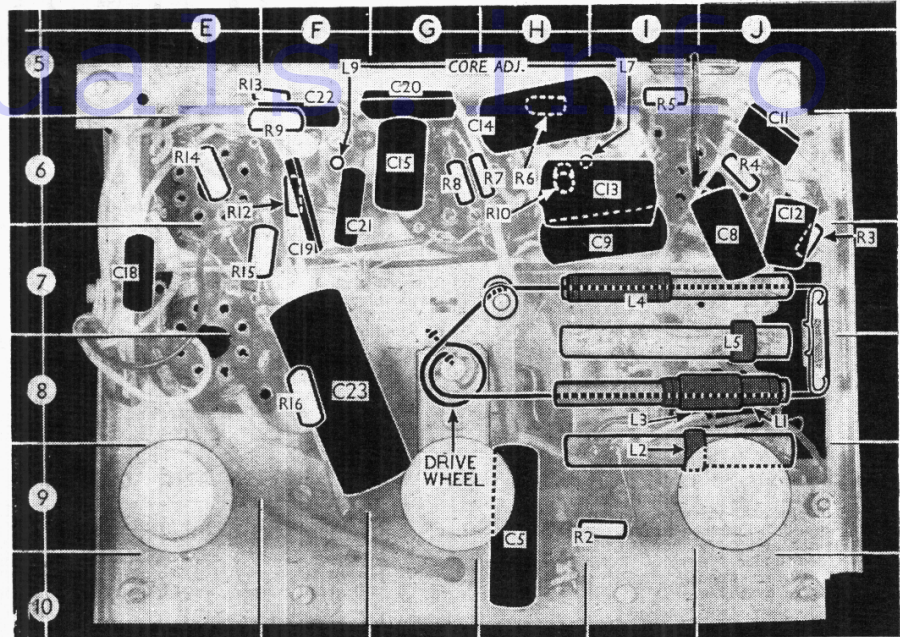
Capacitors C24, C25.—These are two dry electrolytics contained in a tubular metal can mounted, by means of a clip, on the speaker input transformer. Both sections are rated at 16 µF, 350 V D.C. peak working; the common negative tag is black, and the yellow tag is the positive of C24.

110 V A.C. Operation.—To operate the receiver on a supply of this voltage it is necessary to join together both ends of R18, leaving V4 heater connection in place, and move the voltage adjustment clip to the 209-215 V position.

DRIVE CORD REPLACEMENT

Two cords are employed: the cursor drive, and the permeability-tuning drive.

The course of the cursor drive cord is indicated in our rear view of the chassis deck, where it is seen with the tuning knob turned fully clockwise. The nylon braided glass cord is first looped at each end, when it should measure 23½ in. if stretched between two pins, and then the frayed ends should be dipped in a suitable cement to prevent the glass core



Front view of the chassis deck, showing the course of the permeability-tuning drive cord, and the positions of the I.F. transformer primary core adjustments.

from pulling back inside the nylon braiding. The cord must be fitted as indicated, passing over the groove nearer to the chassis in the case of each of the four idler pulleys.

The course of the permeability-tuning drive

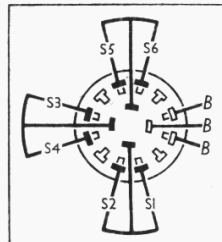


Diagram of the waveband switch unit drawn as seen from the rear of the chassis.

cord is indicated in our front view of the chassis deck, where it is seen with the tuning knob turned fully clockwise, and the complete cord, knotted and with cores attached, must

be obtained from the manufacturers (Part No. 730645).

The cord should be fitted by inserting one core into the right-hand end of each former. The end of the cord associated with L4 core should be passed over the groove further from the chassis on the idler pulley, and then taken once round the drive wheel and anchored in the slot provided, with the knot facing the chassis deck. The end of the cord associated with L1, L3 core should be passed for half a turn clockwise round the drive wheel, pulled to take up any slack, and then anchored in the slot provided, with the knot facing the control knob. When the cord has been fitted the left-hand end of L4 core should be flush with the left-hand end of its former, and the right-hand end of L1, L3 core should be flush with the right-hand end of its former. Finally, the cord should be cemented in the drive wheel slots.

CIRCUIT ALIGNMENT

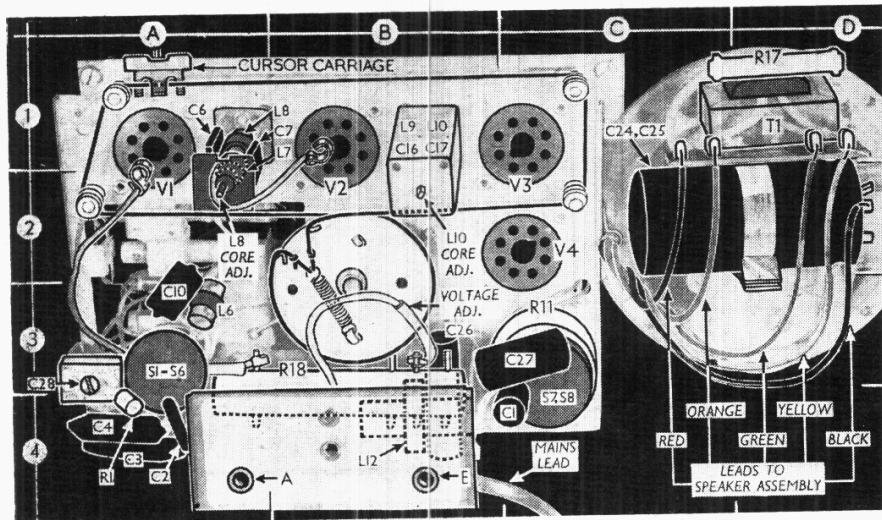
I.F. Stages.—Switch set to M.W., tune to 560 m on scale, turn volume control to maximum, and connect signal generator, via an 0.1 µF capacitor, to control grid (top cap) of V1 and the E socket, removing the existing top cap connector but connecting a 500,000Ω resistor between the top cap of the valve and the A.V.C. line. Feed in a 465 kc/s (645.16 m) signal and adjust the cores of L10, L9, L8 and L7 (location references B2, F6, A1, H6) for maximum output.

R.F. and Oscillator Stages.—With the tuning control turned fully clockwise the cursor should coincide with the high wavelength ends of the scales. Transfer "live" signal generator lead to A socket, via a suitable dummy aerial.

M.W.—With set still switched to M.W., tune to 193.6 m (spot on scale), feed in a 193.6 m (1,550 kc/s) signal and slide the former carrying L4 (17) back and forth in its supports, after loosening the compound which normally fixes it in position, until maximum output is obtained. Then adjust C28 (A3) for maximum output.

Tune to 300 m on scale, feed in a 300 m (1,000 kc/s) signal, and adjust the position of L1 (J8) for maximum output. Repeat these operations until optimum results are obtained and then reseal the coil formers in position.

L.W.—Switch set to L.W., tune to 1,200 m on scale, feed in a 1,200 m (250 kc/s) signal, and check calibration. Tune to 1,667 m (spot on scale), feed in a 1,667 m (180 kc/s) signal, and check calibration. If any errors are present they will, in all probability, be due to incorrect M.W. alignment or a change in the capacity of the L.W. fixed trimmer C10, or the Colpitts reaction capacitors C11, C12.



Rear view of the chassis deck, showing the course of the cursor drive cord and the connections of the five coloured speaker leads.