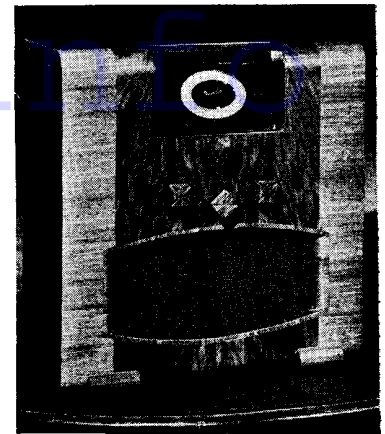


# INVICTA 300 TABLE A.C. SUPERHET



The Invicta Radio Model 300 is a three waveband superhet using four valves. It is for A.C. mains operation and is listed at £10 15s.

**CIRCUIT.**—The aerial is transformer coupled to V1, a triode-pentode frequency changer. The signal then passes through an I.F. transformer to the grid of V2, an H.F. pentode, which forms the I.F. amplifying stage.

V3 is a double diode triode, one diode of which acts as the demodulator and the other providing the A.V.C. A volume control is connected in the grid of the triode section of this valve.

The output of V3 is resistance-capacity coupled to V4, an output pentode, and the signal then passes to the speaker.

Mains equipment consists of an indirectly heated full-wave rectifier, electrolytic smoothing condensers and the smoothing choke (speaker field).

**Special Notes.**—In our particular chassis, C32 was found to be .002 mfd., C29 to be 25 mfd., R11 to be 3,000 Ω, C27 to be 130 mmfd., C10 to be 130 mmfd.

C24, C25, R8 and R9 are inside the second I.F. transformer can. C2 was found to be 130 mmfd. The rectifier in the set supplied was an IW3.

The two dial lights are fixed in screw-in holders, clamped to the wavelength dial. They are rated at 6.2 volts .3 amp.

Sockets are supplied for use with a pick-up.

Another pair of sockets enable an external speaker to be used. The speaker must be of the low-resistance type, about 2 ohms, or have a matching device which can be adjusted to give this resistance. The speaker should be a permanent-magnet moving-coil.

**Chassis Removal.**—Remove the four control knobs from the front of the cabinet. These are fixed by grub screws. The back of the cabinet is removed by unscrewing, to the extent of half a turn, the two screws on the upper part of the back.

Next remove the fixing bolts and

washers from the underside of the chassis —not forgetting the four rubber washers in the upper side of the supporting panel. The chassis can then be removed from the cabinet to the extent of the speaker leads.

## Circuit Alignment Notes

Inject a signal of 465 kc. between the grid of V1 and the chassis via a small condenser. Connect an output meter across the primary of the speaker transformer.

Adjust the I.F. transformer trimmers for maximum response in the following manner. Commencing with the second I.F. transformer (nearer the back of the chassis), trim the secondary (trimmer nearest I.F. valve) and then primary.

The first I.F. transformer is trimmed in the same way, secondary winding first (in this case the trimmer nearer the frequency changer valve).

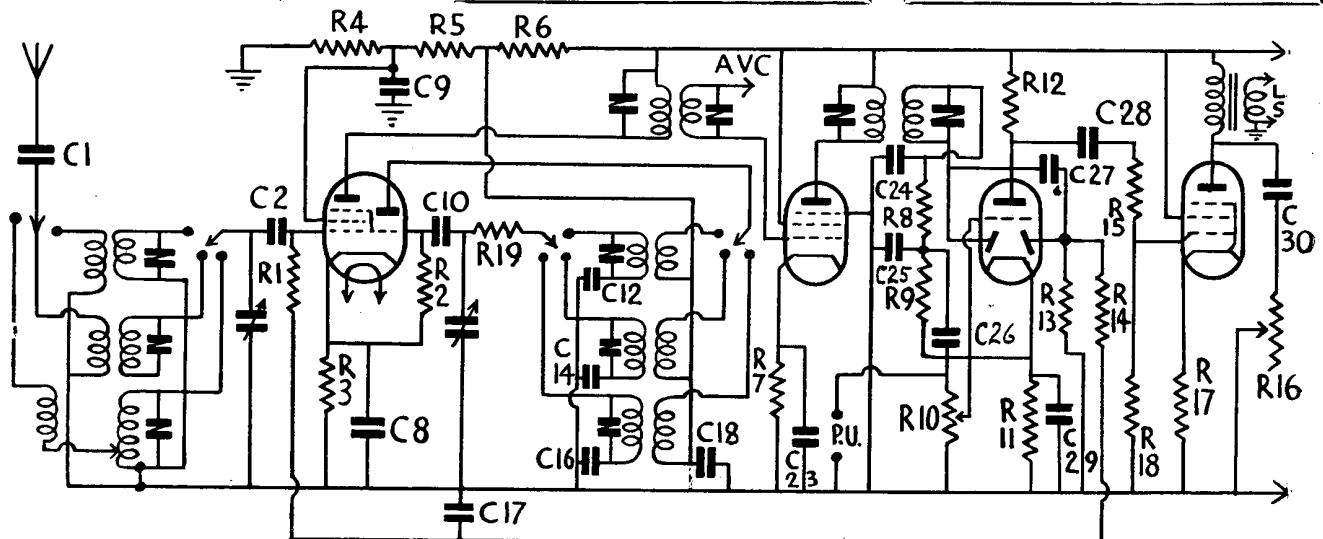
**Signal Circuits.**—Before commencing to calibrate the receiver, see that the pointer

## RESISTANCES

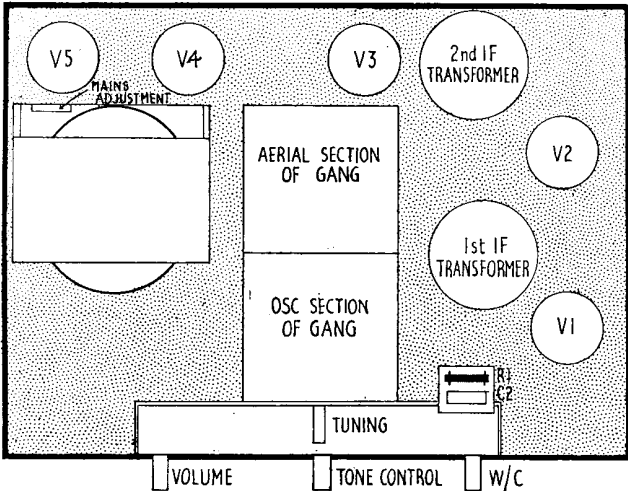
R.	Purpose.	Ohms.
1	V1 A.V.C. feed	250,000
2	Oscillator grid leak	20,000
3	V1 cathode bias	200
4	V1 screen decoupling (part)	20,000
5	V1 screen decoupling (part)	10,000
6	Oscillator anode decoupling	10,000
7	V2 cathode bias	150
8	Diode demodulator load (part of)	100,000
9	Diode demodulator load (part of)	500,000
10	Volume control	½ meg.
11	V3 cathode bias	3,000
12	V3 anode load	100,000
13	A.V.C. diode load	1 meg.
14	A.V.C. decoupling	250,000
15	V4 grid stopper	100,000
16	Tone control	50,000
17	V4 cathode bias	150
18	V4 grid leak	1 meg.
19	Regeneration modifier	50

## CONDENSERS

C.	Purpose.	Mfds.
1	Series aerial	.0003
2	V1 grid isolating	.00015
3	S.W. aerial trimmer	3/40 mfd.
4	M.W. aerial trimmer	3/40 mfd.
5	L.W. aerial trimmer	3/40 mfd.
6	Aerial section of gang	553 mfd.
7	Oscillator section of gang	553 mfd.
8	V1 cathode shunt	.1
9	V1 screen decoupling	.1
10	Oscillator grid	.00015
12	S.W. oscillator padder	.005
14	M.W. oscillator padder	.000657
16	L.W. oscillator padder	.00023
17	A.V.C. decoupling	.05
18	Oscillator anode decoupling	.1
23	V2 cathode shunt	.1
24	H.F. by-pass	.00015
25	H.F. by-pass	.00015
26	L.F. coupling	.05
27	A.V.C. diode coupling condenser	.00015
28	L.F. coupling	.05
29	V3 cathode shunt	.20
30	Tone control	.05
31	H.T. smoothing	8+8
32	Mains aerial	.001



Above, on this page and the next, is given the theoretical circuit arrangement of the Invicta Model 300 all-wave superhet. In the and power-pack sections; arrows indicate the continuation of connections. Valves used are a TH4 triode-pentode frequency changer, a TDD4 double-diode triode; a Pen 4B output pentode and an IW3 rectifier. All



The diagram on the left and that below show the arrangement of components on the chassis of the Invicta Model 300. That on the left, shown "tinted," is the top; below is the underside view.

## Invicta 300 on Test

**MODEL 300.** — Standard model for A.C. mains operation, 200-250 volts, 40 to 100 cycles. Price £10 15.

**DESCRIPTION.** — Three-waveband, table superhet for A.C. operation, using four valves plus rectifier. Controls for volume, wave selection, tone and tuning. Double aeroplane type, full-vision scale calibrated in wavelengths and station names. Wave selector position with indicator chart on tuning scale. Sockets for pick-up and extension speaker.

**LOADING.**—84 watts.

### Sensitivity and Selectivity.

**SHORT WAVES (16.5-52 metres).**— Good sensitivity and representative selectivity. Some backlash in high radio-tuning control.

**MEDIUM WAVES (200-550 metres).**—Sensitivity and selectivity well up to standard, with well-maintained gain and good background.

**LONG WAVES (800-2,000 metres).**— Representative gain, very good selectivity.

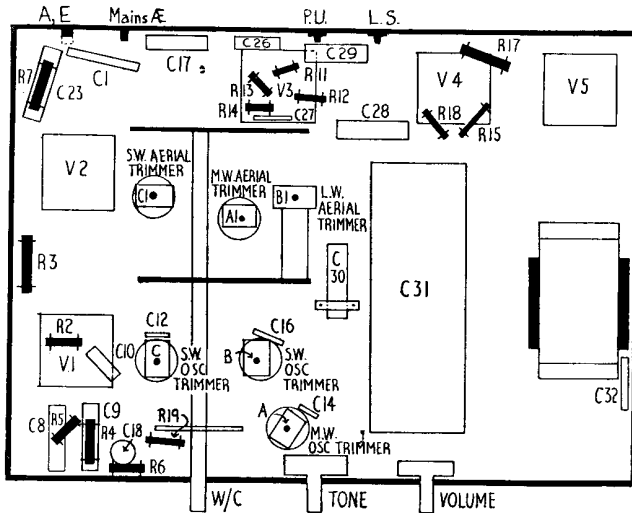
### Acoustic Output.

Ample volume for ordinary room. With tone in maximum position, crisp, clean-cut response with predominant medium and upper frequencies. Tone control vigorous in action in full position. Representative balanced output.

## QUICK TESTS

Quick tests are available on this receiver between two of the three screw terminals on the speaker assembly, and the chassis. Volts measured between these should be:—  
Middle screw, 240 volts, smoothed H.T.  
Bottom screw, 390 volts, unsmoothed H.T.

In these diagrams trimmers are numbered in accordance with the ganging instructions given on the opposite page under the heading "Circuit Alignment Notes" As in all these reviews, resistors are shown in solid black for easy reference.

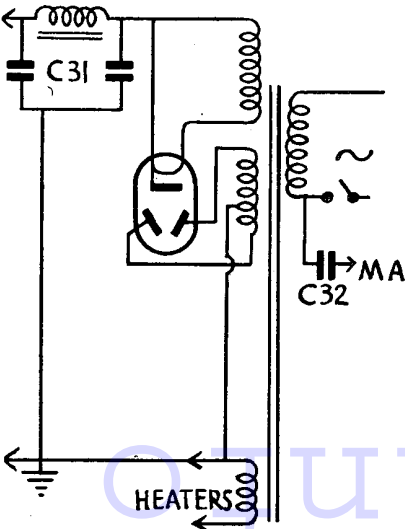


of the set is vertical with the gang condenser at maximum.

Reduce the input from the oscillator as the circuits come into line so as to have only a reasonable deflection (half scale) on the output meter.

**Medium Waves.**—Connect a service oscillator between the aerial socket and earth. Inject a signal of 250 metres (1,200 kc.), turn the set pointer to 250 metres and adjust the medium-wave oscillator trimmer A, followed by trimmer A1, for maximum.

**Long Waves.**—Switch the set to long waves, turn the pointer to 1,200 metres (250 kc.), inject a signal to correspond, and adjust the long-wave oscillator trim-



drawing, it is shown with separated receiver VP4B H.F. pentode in the I.F. stage; a are Mullard types.

## VALVE READINGS

*No signal. Volume maximum. 200 volt A.C. mains.*

V.	Type.	Electrode.	Volts	Ma.
1	All Mullard. TH4 met. (7) ..	Anode ..	220	1.25
		Screen ..	35	1.6
		Osc. anode ..	90	.6
2	VP4B met. (7)	Anode ..	220	13.8
		Screen ..	220	5.
3	TDD4 (7) ..	Anode ..	80	1.5
4	Pen4B (7) ..	Anode ..	205	35
		Screen ..	220	4.5
5	IW3 (4) ..	Filament	390	—

mer B, followed by trimmer B1, for maximum.

**Short Waves.**—Turn the wave-range switch to short waves. Then set the oscillator and set pointer to 30 metres (10 mc.), and adjust the short-wave oscillator trimmer C, followed by C1.

Check for calibration on 16.5 metres.

## Replacement Condensers

Exact replacements for certain condensers in the Invicta 300 are made by A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18. They are: for C31, list 1573, price 6s. 6d.; for C29, list 2916, price 2s.

## Leaky Coupling

A three-valve plus rectifier straight A.C. receiver was giving serious distortion not due to the pentode or the speaker.

Measurement showed the pentode anode current to be very high, but the bias resistance was in order. The circuit diagram showed that the output pentode was resistance capacity coupled to the detector, and suspicion centred on the .01 coupling condenser.

It was found on test to be leaking and so putting a positive bias on the pentode.