INVICTA 480

Three-valve, two-waveband TRF receiver for battery operation. Provision is made for an external low impedance loudspeaker. Marketed by Invicta Radio, Ltd., Parkhurst Road, London, N7.

THE aerial input circuit incorporates a 1,500m wave trap C2, L1 to minimise interference from a powerful local transmitter. It is brought into operation by plugging the aerial into the A2 socket.

From the A1 socket, signals are fed *via* C1 and the aerial coupling coil L2 to the primary coils L3 (MW), and L4 (LW) of an inductively coupled band-pass unit. The secondary coils L5 (MW), and L6 (LW) transfer the signals direct to the grid of an RF hexode valve V1. The bandpass input circuit is tuned by VC1 and VC2 sections of the ganged condenser.

Anode of V1 is fed from the high tension line *via* R2 and the anode coils L7, and L8. A lower potential is applied to the screen of V1 and the anode of V2 from a second HT line. C3, C4, C5 and C7 are the decoupling components.

Volume control is by variable biasing of V1 grid through the slider of VR1. The bias battery is connected across VR1 and R1, the steady leakage through these ensuring that the bias voltage will fall at about the same rate as the HT voltage. This preserves the correct ratio between anode and bias voltages.

Output from V1 is coupled to the triode detector valve V2 by the anode coils L7 and L8, tuned by VC3 section of the gang. Positive feedback from the anode of V2 is fed to the reaction coil L9, inductively coupled to the anode coils, and is capacity controlled by the condenser VC4 connected in series with the coil to earth.

Cumulative grid detection is employed with C6, and R3 as grid condenser and leak.

From the anode of V2 the AF signals are fed *via* an intervalve transformer L10, L11, and the grid stopper R4 to the grid of the pentode output valve V3. Bias is applied to the grid through the secondary winding L11. The anode and screen are fed direct from the high-tension line.

An output transformer L12, L13, couples the output valve to the permanent-magnet moving-coil loudspeaker and a fixed degree of tone correction is effected by C8.

VALVE READINGS

V	Type	Electrode	Volts	Ma
1	Mullard VP2B	Anode	114	1.5
		Screen	60	.6
2	Mullard PM2HL	Anode	60	.6
3	Mullard PM22A	Anode	120	5.0
		Screen	120	.66

CONDENSERS

C	Mfds
1	.00015
2	.00015
3	.1
4	.1
5	.1
6	.00015
7	.0003
8	.005

RESISTORS

R	Ohms
1	3,000
2	3,000
3	2 meg
4	250,000
VR1	50,000

An extension speaker can be used with the internal speaker by connecting the extension leads to the LS terminals ; these leads should go direct to a 2-ohm speech coil of the external speaker.

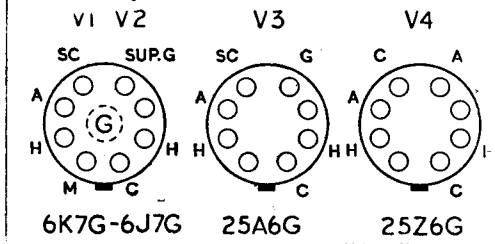
GANGING

See that the scale is fitted correctly with the cross over the centre of the spindle, and that the bottom edge of the glass is horizontal. Turn gang condenser to maximum capacity, and check that the pointer is horizontal.

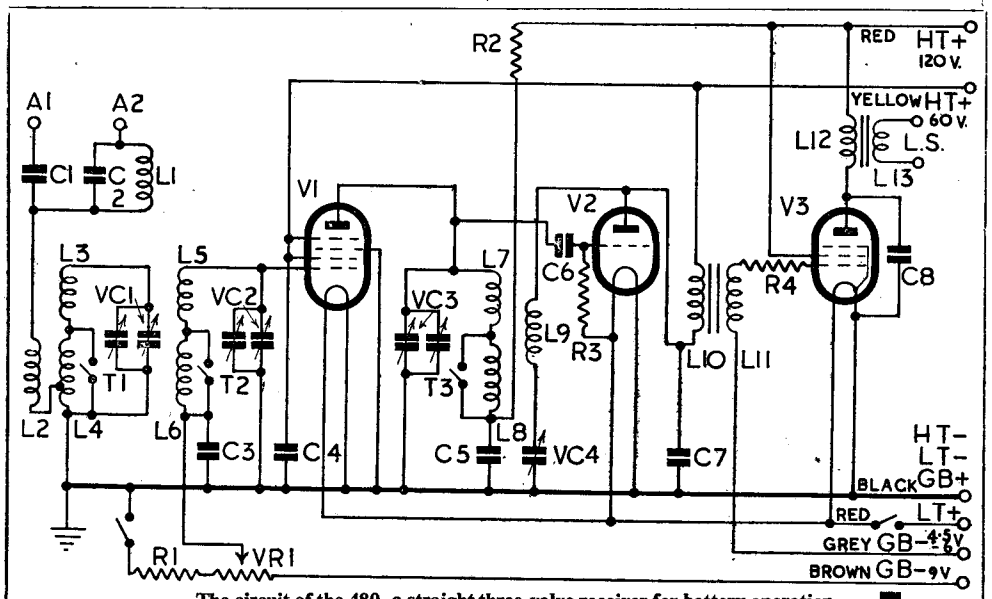
Switch receiver to MW, and connect an oscillator lead to the aerial socket, and inject a signal of 250m. With reaction at minimum, tune set to 250m and adjust T1, and T2 trimmers on the front and middle sections of the gang to give maximum deflection on an output meter.

Reduce oscillator output and increase reaction to just below oscillation point, then adjust anode trimmer T3 on rear section of gang for maximum deflection. Check at 550m and on LW.

No re-adjustment is necessary on LW as the coils are accurately matched.



Bases of valves in Model "Imp"



The circuit of the 480, a straight three-valve receiver for battery operation.

INVICTA "IMP".

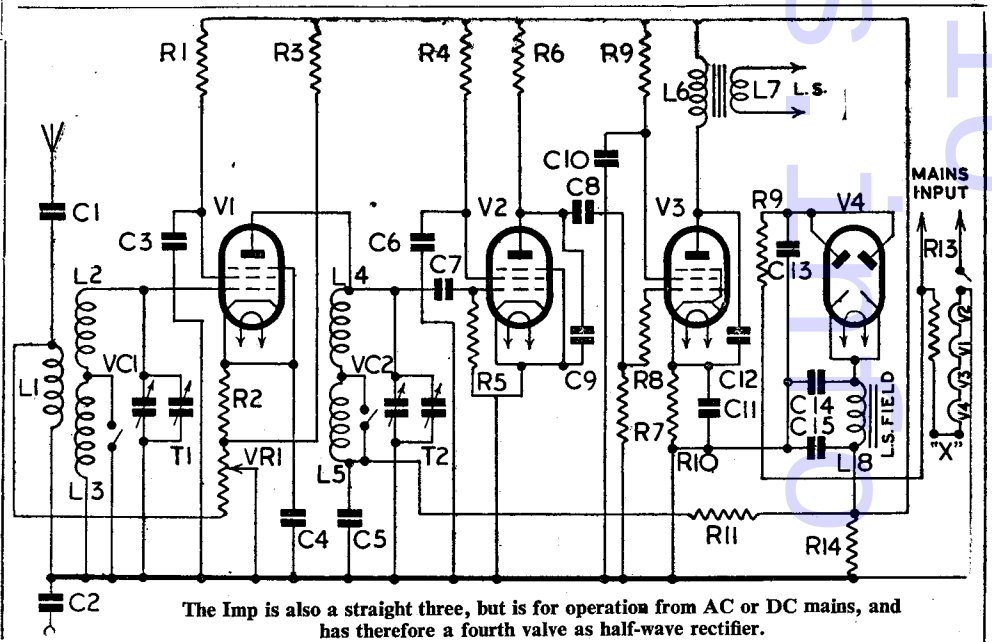
Three-valve, plus rectifier, two-waveband TRF receiver for operation on AC/DC mains, 200/240 volts, 25/100 cycles. Marketed by Invicta Radio Ltd., 79a, Parkhurst Road, London, N7.

AERIAL input is *via* C1 and the aerial coupling coil L1, inductively coupled to the grid coils L2 (MW) and L3 (LW), tuned by VC1 section oft he ganged condenser. From the grid coils the signal is fed direct to the grid of the RF pentode valve V1.

Volume control VR1 in the cathode circuit and across the aerial input, controls the volume by regulating the bias and, therefore, the amplification of the pentode, which has variable-mu characteristics.

The bottom of R3 is taken to the cathode circuit to ensure that the screen voltage changes in "step" with the bias. R2 is included so that even when VR1 is at minimum, V1 will have sufficient bias to prevent overloading and instability. C4 is the by-pass condenser.

The screen is fed from the high-tension line through R1, and decoupled by C3 ; the anode receives current through R12 and anode coils, and is decoupled by C5.



The Imp is also a straight three, but is for operation from AC or DC mains, and has therefore a fourth valve as half-wave rectifier.

INVICTA "IMP"

Continued

Output from V1 is coupled by the anode coils L4 (MW) L5 (LW), tuned by VC2 of the gang, to V2, and RF pentode used as a grid leak detector. C7 and R5 are the grid condenser and leak. R4 feeds the screen, and C4 decouples.

Resistance-capacity coupling is employed between V2 and the output pentode, with C8, R6 and R7 as the coupling components, and C9, the decoupling condenser. C8 passes the AF signal *via* the grid stopper R8 to the grid of V3, which is biased by R10 and C11. Potential is applied to the screen through R9, and is decoupled by C10.

V3 is coupled to the energised moving-coil loudspeaker by the output transformer L6, L7, and a fixed degree of tone correction is obtained through C12 being connected between the anode and cathode.

Mains input to the receiver is taken direct to the voltage dropping resistance R13, then through a surge limiter R9, to the anodes of a full-wave rectifier V4, which has its anodes strapped so that it functions as a half-wave rectifier. High-tension supply is obtained from the cathode of V4, and smoothing is effected by the speaker field L8, and condensers C14, C15.

C2 is the isolating condenser between chassis and earth. The "bleed" resistance R14, connected between the HT line and chassis, in conjunction with the isolating condenser C2, gives a certain degree of protection against shock.

The heater circuit comprises the normal arrangement of valve heaters in series with the mains dropping resistance R13.

On 250 volt mains, a 60 ohm, 6 watt resistance may be inserted at point "X" shown on the accompanying diagram. This is achieved by removing the bridging wire across the junction strip on the top right-hand corner of chassis, and connecting the resistance between the two tags. This resistance may also be fitted on 240 volt mains, especially if the mains voltage fluctuates badly.

VALVE READINGS

V.	*Type.*	*Electrode.*	*Volts.*	*Ma.*
1	6K7G	Anode	80/170*	5.7/.7*
		Screen	70/130*	1.4/.1*
		Cathode	5/40	7.1/8*
2	6J7G	Anode	30	1
		Screen	25	—
3	25A6G	Anode	180	40
		Screen	140	7
4	25Z6G	Cathode	240	58

* With volume control max./min. setting.

Measured with 1,000 o. p. volt meter.

GANGING

Switch receiver to MW, turn gang condenser fully clockwise and check that pointer registers on 550 metres.

With volume control set at a point just below regeneration, connect an oscillator to aerial and earth terminals.

Inject and tune in a signal of 200 metres, and adjust T1 trimmer located on the front section of gang, to give maximum deflection on output meter.

Reduce output from oscillator, and adjust T2 trimmer on rear section of gang, to give maximum deflection. Check at 550 metres and on LW. No re-adjustment is necessary on LW as the coils are accurately matched.

RESISTORS

R	*Ohms*
1	100,000
2	450
3	50,000
4	1 meg
5	1 meg
6	250,000
7	1 meg
8	40,000
9	10,000
10	450
11	15,000
12	100
13	530
14	15,000
LS field	600

CONDENSERS

C	*Mfds.*
1	.001
2	.05
3	.1
4	.1
5	.1
6	.00015
7	.01
8	.003
9	.1
10	10.0*
11	.005
12	.01
13	16.0*
14	8.0*
15	8.0*

* Electrolytic.

Metallised-paper Condensers

A WAR-TIME development in condenser design has been the use by A. H. Hunt, Ltd., of a metallised paper in place of the usual paper tissue and separate metal foil. This has resulted in a range of small tubular condensers possessing several interesting features.

In some ways the new paper condenser is similar to an electrolytic. The test voltage is not much greater than the working voltage. Within limits, a momentary overload does not do permanent damage as, should the dielectric be punctured, it will usually reseal itself.

The working voltages of 150, 250 and 350 volts DC at an ambient temperature of +71° C, the condensers are at present made in capacities ranging from 0.05 mfd to 2 mfd. Finish is either a synthetic rubber Neoprene sleeve or a waxed cardboard tube; when enclosed in Neoprene the maximum temperature is raised to +85° C although working voltages have to be slightly lowered.

Insulation resistance of the units is a little lower than is usual for the paper capacitor and for the 150-volt type it is given as 50 ohms/farad which for a 1 mfd gives a value of 50 megohms and for one of 0.1 mfd the insulation works out at 500 megohms; these figures are approximately doubled for the 250- and 350-volt pattern. This is because a thicker sheet of tissue is employed.

Provided the capacitors are used within their rated voltages they will serve most purposes. They are recommended by the manufacturers for use in RF, AF and DC circuits which covers all positions in an average radio except for the power unit.

The 150-volt unit should prove exceptionally useful in amplifiers and hearing aids because of their small size.

It has not been attempted to provide for close tolerances in the metallised paper types, ± 25 per cent being claimed as the best for the time being.