

INVICTA

502, 503

RADIOGRAMS

Five-valve, plus rectifier, four-band (including television band) superhet receiver with Monomatic (switch) automatic station selection, suitable for 200-250 volt 40-60 cycle A.C. supplies. The 502 is a radiogram and the 503 an auto-radiogram. Made by Invicta Radic, Ltd., Cambridge.

Circuit.—Transformer aerial coils are used with common primary on medium and long waves. The first of the four bands was for television, and there is no corresponding oscillator coil because the second harmonic of the S.W. oscillator circuit is used.

A single rotary switch selects the manual tuning circuits and the push-

button circuits. These consist of pre-set condensers across the M. or L.W. aerial coils and permeability-trimmed coils in the oscillator section.

V1, the frequency-charger, is coupled by fixed tuned I.F. transformers to V2, the I.F. amplifier, and V3, the double-diode triode. R5 and R6 form the signal diode load, control voltage for V6, the tuning indicator being tapped off by R7.

L.F. is passed by C23 to all the contacts on the P.U. switch, except that going to the P.U. input. The latter is shunted by a tone circuit R9, C26. The volume control, R15, has R16, C28 for tone compensation. The triode section resistance-capacity feeds V4, the output pentode. This has a grid "stopper" and grid circuit tone control. The output transformer secondary is coupled back to V3 cathode for negative feedback.

Bias for V4 and for A.V.C. is provided by R21, R22 between chassis and H.T. negative. An orthodox choke and electrolytic smoothing arrangement is supplemented by R23 (two resistors in parallel), and C34.

Notes.—The extension speaker should be of 2 ohms impedance. The Garrard pick-up is a 2,000 ohm magnetic type.

The service engineer can adjust tone on pick-up reproduction if required by altering the values of R.9 and C.26.

To cut top, reduce R.9 or increase C26. To increase top it is suggested both components be removed.

The variable tone control is a switch in conjunction with C.29 and R.17 across the output valve grid circuit.

GANGING

I.F. Circuits.—The frequency is 465 kc., but the transformers should not be interfered with unless the circuits have been altered in some way and are badly off tune.

M.W. Band.—See that cross in middle of dial is over spindle, and bottom of dial is horizontal. Inject 250 m. to aerial, tune to 250 m., and adjust T1 (under

VALVE READINGS

V	Type	Electrode	Volts	Ma.
1	TH4A	Anode	265	1.1
		Screen	265	3.5
		Osc. anode	60	5
		Cathode	—	9.6
2	VP4B	Anode	265	14
		Screen	265	4.5
		Cathode	—	18.5
3	TDD4	Anode	80	—
		Cathode	1.5	—
4	PenB4	Anode	250	62
		Screen	265	7
		Cathode	—	69
5	1W4/350	Cathode	425	—
6	TV4	Target	265	—
		Cathode	1.5	—

Dial lamps, 6.2 v., 3 amp., 15 mm., M.E.S.

chassis, bottom of horizontal coil at rear). Then adjust T2 (horizontal at front of chassis).

L.W. Band.—Inject and tune to 1,200 m. Adjust T3 (under chassis, rear vertical coil). There is no aerial trimmer.

S.W. Band.—Inject and tune to 14 m. Adjust T4 (same former as T1) and then T5 (top of remaining former). Check on 31 and 49 metres.

Television Band.—Adjust T6 (same former as T5), but do not touch T4.

AUTO-TUNING

Wave coverage with the standard models is:—

Position.	Models 502A, 502C, 503A, 503C.	Models 502D, 502G, 503D, 503G.
	M.	M.
1	1,400-1,900	1,400-1,900
2	1,100-1,450	1,100-1,450
3	290-420	380-540
4	203-400	380-540
5	203-300	203-300

The corresponding trimmers are on the top of the chassis, the pair for No. 1 position being nearest the front edge. The left-hand coil trimmer screw should be adjusted first and the right-hand condenser trimmer second.

It is best to adjust the trimmers with the set well warm and connected to the aerial with which it will be used.

RESISTANCES

R	Ohms.	R	Ohms.
1	40,000	13	25
2	40,000	14	100
3	20,000	15	1 meg.
4	100,000	16	60,000
5	250,000	17	15,000
6	250,000	18	100,000
7	250,000	19	100,000
8	2 meg.	20	500,000
9	5,000	21	35
10	1 meg.	22	115
11	1 meg.	23	750
12	1,000	Field	1,000

CONDENSERS

C	Mfds.	C	Mfds.
1	.1	23	.05
2	150 mmfds.	24	.1
3	150 mmfds.	25	150 mmfds.
4	6 mmfds.	26	.05
7	.1	27	.20
10	5,000 mmfds.	28	.005
13	657 mmfds.	29	.01
19	300 mmfds.	30	.05
20	300 mmfds.	31	.20
21	150 mmfds.	32	.001
22	150 mmfds.	33	8 x 16
		34	8

A Valve Fault

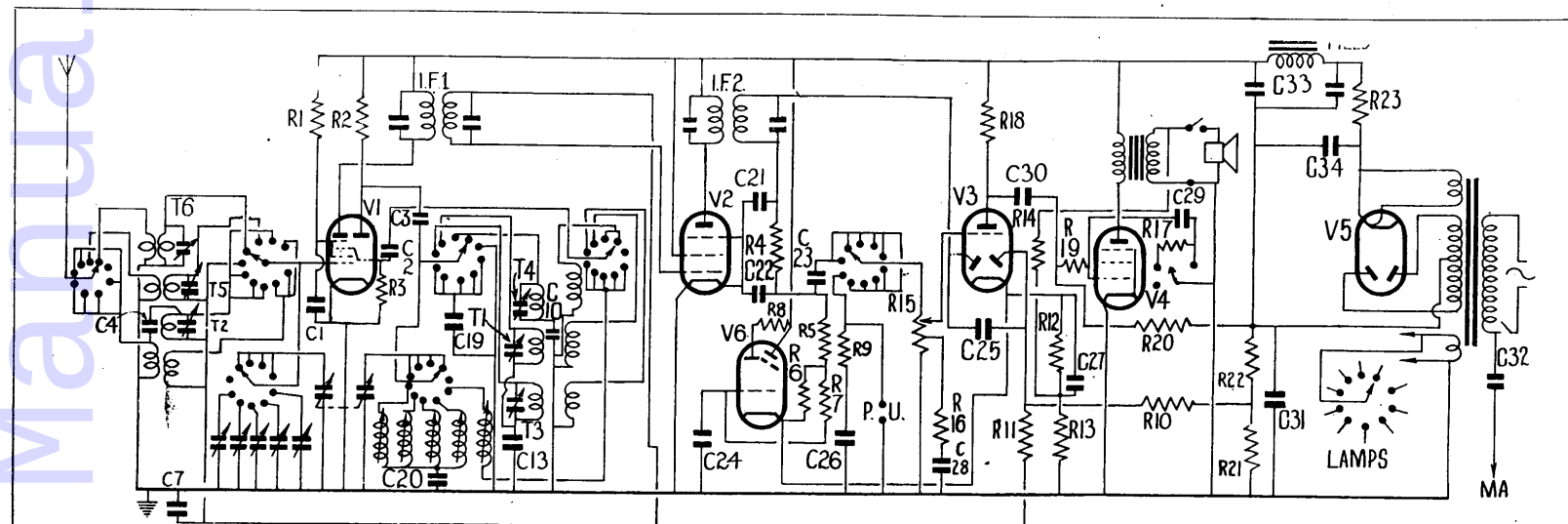
A FAULT of exceptional character was encountered on an H.M.V. model 580, a nine-valve auto-radiogram, using two PX4 valves in push-pull for output. In its normal position in the cabinet the chassis is vertical, with controls at the top on the motor-board. The valves are in a horizontal position.

This model showed signs of an overheated mains transformer. All valves were first removed and checked individually on a valve-tester. All passing the tests O.K., they were re-inserted. The trouble had cleared, however, and the set was left in normal working order.

Some days later it was giving the same trouble. Another test of similar character was made with the same result. It was decided to remove the chassis to the workshop for a soak test. On the bench it worked satisfactorily, and it was subsequently decided to return it to its cabinet—though not without some trepidation, as nothing had shown up.

During the operation of cabinet fitting, signs of overheating were perceived. It was found to vary according to the amount of movement to which the chassis was subject and was finally traced to an intermittent grid short in one of the PX4 valves.

This fault, it would appear, was peculiar to the valve when in the horizontal position. In the workshop soak test and in the valve-tester the valve had been vertical.—A. R. T.



There are four sets of coils in the aerial circuit and three in the oscillator circuit. This is because the first band, for television reception, uses the harmonic of the second band in the oscillator stage. Auto-tuning is by rotary switch instead of push buttons.