

**McMICHAEL****Models M101R, M101RG**

**General Description:** Seven-valve (including rectifier and tuning indicator), three-waveband, combined A.M./F.M. receiver. Model M101R is a table receiver, while Model M101RG is a bureau auto-radiogramophone with B.S.R. Type UA8 record changer.

**Power Supply:** A.C. mains, 190–260 volts, 40–100 c/s. (M101RG 50-c/s. only). Consumption approximately 50 watts (autochanger 8 watts).

**Wavebands:** L.W. 900–2000 m.; M.W. 190–540 m.; V.H.F. 87.5–100 Mc/s.

**Valve Analysis:** The following measurements were made with Avo Model 8 under no-signal conditions with 230-volt mains to 230-volt tap. Figures in brackets refer to F.M. operation.

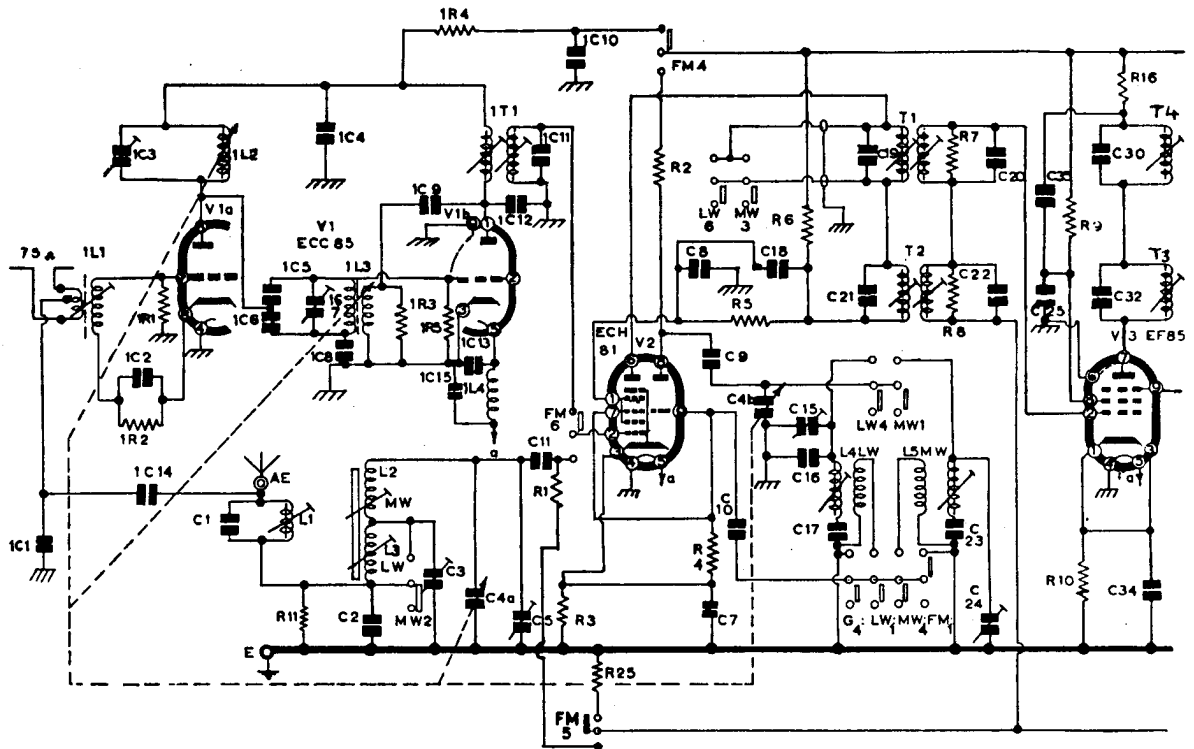
<i>Valve</i>	<i>Anode, volts</i>	<i>Screen, volts</i>	<i>Cathode, volts</i>	<i>Cathode, mA.</i>
V1A ECC85 . . .	— (135)	—	— (2.25)	— (7)
V1B ECC85 . . .	— (125)	—	—	— (4)
V2 ECH81 . . .	192 (170)	75 (69)	1.45 (1.1)	8.7 (8)
(triode) . . .	88 (—)	—	—	—
V3 EF85 . . .	193 (175)	67 (59)	0.7 (0.65)	11.8 (11)
V4 EABC80 . . .	78 (68)	—	—	0.45 (0.4)
V5 EL84 . . .	245 (245)	210 (190)	5.4 (4.8)	43.5 (38)
V6 EZ80 . . .	250 A.C.	—	262 (260)	66 (68)
V7 EM81 . . .	—	—	—	—

**Alignment Procedure:** The following notes should be read in conjunction with the adjustments listed in the tables.

**A.M. Notes:** Check that pointer coincides with datum mark with tuning gang fully closed. Check mains-tapping adjustment. Disconnect loudspeaker and substitute 3-ohm output meter. Turn volume and tone controls maximum clockwise. Details given in the table are for an accurately calibrated signal generator, modulated 30 per cent at 400 c/s. The output reference is 200 mW. For I.F. alignment connect signal generator direct between control grid of the ECH81 and chassis. For R.F. and I.F. trap alignment connect signal generator via standard dummy aerial to aerial and earth sockets. A production tolerance of  $\pm 3$  db. should be allowed on sensitivity figures. Tune M.W. circuits before L.W.

**F.M. Notes:** The final performance of the receiver on F.M. depends very largely upon having the correct ratio-detector and I.F. response curve.

(1) Switch to F.M. (2) Load secondary of output transformer with either a 3-ohm loudspeaker or 3-ohm wire-wound resistor. (3) Connect a D.C. valve voltmeter or suitable 20,000-ohms/volt testmeter between anode of diode (pin 2 V4) and chassis. Note that the D.C. voltage on the anode is



NOTE: THE WAVECHANGE SWITCH (PUSH BUTTON UNIT) IS SHOWN IN THE FM. POSITION

CIRCUIT DIAGRAM—

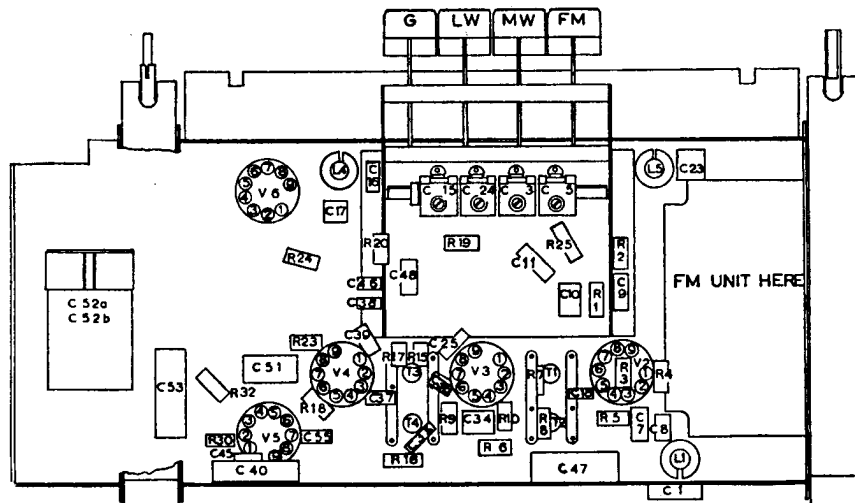
Capacitors.

- IC1 20 pF.
- IC2 1000 pF.
- IC3 0.2-8 pF.
- IC4 600 pF.
- IC5 35 pF. (5%)
- IC6 35 pF. (5%)
- IC7 3-30 pF.
- IC8 10 pF. (5%)
- IC9 18 pF. (5%)
- IC10 0.005
- IC11 20 pF. (5%)
- IC12 10 pF. (5%)

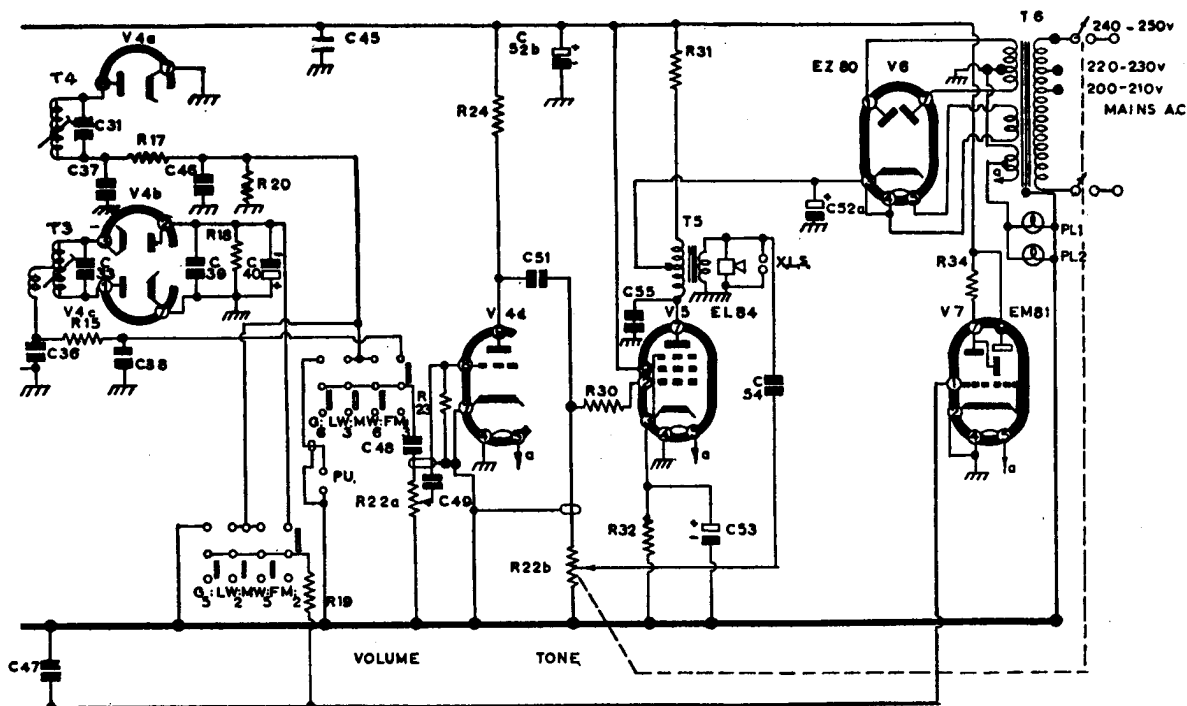
- IC13 0.001
- IC14 500 pF.
- IC15 1000 pF.
- CI 1500 pF.
- C2 0.005
- C3 4-40 pF.
- C5 4-40 pF.
- C7 0.02
- C8 0.005
- C9 200 pF. (10%)
- CI0 50 pF.
- CI1 50 pF.

- CI5 4-40 pF
- CI6 80 pF.
- CI7 180 pF. (2%)
- CI8 0.005
- CI9 30 pF. (5%)
- C20 30 pF. (5%)
- C21 250 pF. (2%)
- C22 250 pF. (2%)
- C23 488 pF. (2%)
- C24 4-40 pF.
- C25 0.005
- C30 250 pF. (2%)

- C31 250 pF. (2%)
- C32 10 pF. (5%)
- C33 30 pF. (5%)
- C34 50 pF.
- C35 5000 pF.
- C36 300 pF.
- C37 100 pF.
- C38 0.001
- C39 0.001
- C40 5 (50 v.)
- C45 0.001
- C46 200 pF.

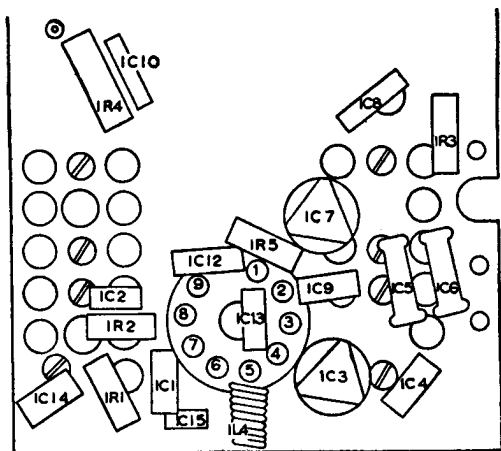


UNDER CHASSIS COMPONENT LAY-OUT

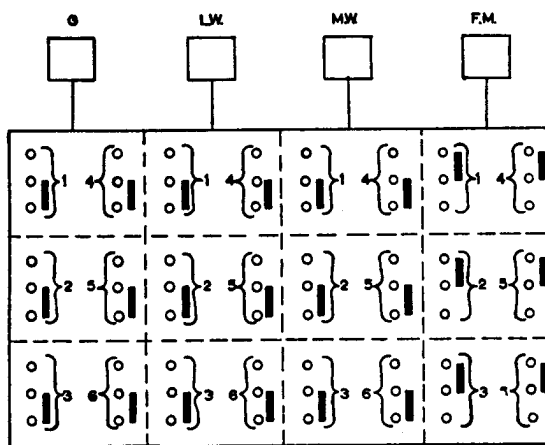


MCMICHAEL MODELS M101

C47	0.1	<i>Resistors.</i>	R7	15k (10%)	R22a	1M (log.)	
C48	0.04	1R1	220	R8	220k	R22b	250k (lin.)
C49	0.01	1R2	120	R9	56k (10%)	R23	10M
C51	0.01	1R3	2.2k	R10	56 (10%)	R24	330k
C52	50 + 50 (275 v.)	1R4	4.7k (10%)	R11	33k	R25	1M
C53	50 (12 v.)	1R5	1M	R15	47k	R30	15k
C54	0.005	R1	1M	R16	1.5k	R31	2.2k (10%)
C55	0.001	R2	33k	R17	47k	R32	120 (10%)
		R3	150	R18	47k	R34	470k
		R4	47k	R19	1M		
		R5	33k	R20	1M		
		R6	2.2k				



V.H.F. "FRONT-END" UNIT

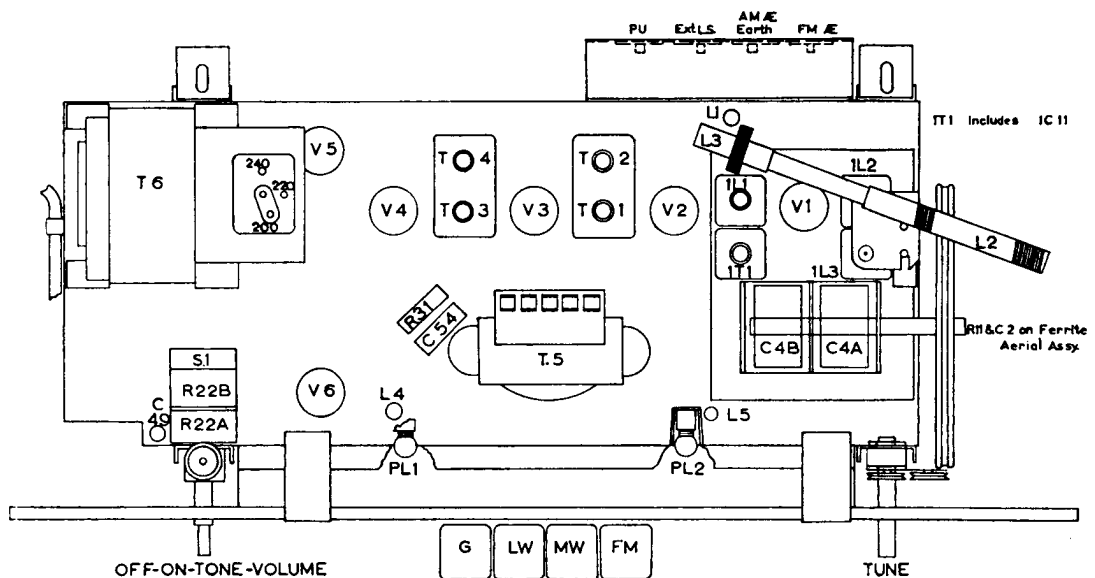


SWITCH DETAILS

A.M. ALIGNMENT

Operation	Wave-change Switch Position	Scale Pointer Position	Inject Signal at	Low Impedance or Dummy Aerial	Frequency, kc/s.	Approx. Signal Required	Adjust Core for Max. Output	Remarks
(1)	M.W.	Gang mid-position	Pin 2 V <sub>2</sub>	Low impedance	470	50 μV.	T <sub>2</sub>	
(2)	M.W.	Gang mid-position	Pin 2 V <sub>2</sub>	Low impedance	470	50 μV.	T <sub>4</sub>	
Repeat Operations (1) and (2)								
(3)	M.W.	Gang mid-position	Aerial input	Dummy aerial	470	8 mV.	L <sub>1</sub> min. output	I.F. Trap
(4)	M.W.	500M	Aerial input	Dummy aerial	600	30 μV.	L <sub>5</sub>	Oscillator coil
(5)	M.W.	500M	Aerial input	Dummy aerial	600	30 μV.	L <sub>2</sub>	Ferrox rod tuned
(6)	M.W.	190M	Aerial input	Dummy aerial	1580	20 μV.	C <sub>24</sub>	Oscillator trimmer
(7)	M.W.	190M	Aerial input	Dummy aerial	1580	20 μV.	C <sub>5</sub>	Aerial trimmer
Repeat Operations (4), (5), (6) and (7) as long as there is a change in frequency and gain in sensitivity								
(8)	L.W.	2000M	Aerial input	Dummy aerial	150	30 μV.	L <sub>4</sub>	Oscillator coil
(9)	L.W.	2000M	Aerial input	Dummy aerial	150	30 μV.	L <sub>3</sub>	Ferrox rod tuned
(10)	L.W.	900	Aerial input	Dummy aerial	333	25 μV.	C <sub>15</sub>	Oscillator trimmer
(11)	L.W.	900	Aerial input	Dummy aerial	333	25 μV.	C <sub>3</sub>	Retune slightly if oscillator frequency is changing during trimming

Repeat Operations (8), (9), (10) and 11 until no further adjustment is necessary (max. sensitivity)



ABOVE CHASSIS LAY-OUT

## F.M. ALIGNMENT

Wave-change switch in F.M. position.

Allow the set to warm up for five minutes before alignment.

Operation	Scale Pointer Setting	Valve Voltmeter		Inject Signal at	Frequency (Mc/s.)	Approx. Signal Required	Position of Core	Adjust Core for		Adjust Signal for D.C. Volts Reading
		Position	D.C. or A.C.					Max. volts	Min. volts	
(1)	87.5 Mc/s. (gang closed)	Chassis (+) to Pin 2 V4 (-)	D.C.	Pin 2 V2	10.7	0.1 v.	Top	T1 prim.	—	3
(2)	87.5 Mc/s. (gang closed)	Chassis (+) to Pin 2 V4 (-)	D.C.	Pin 2 V2	10.7	—	Bottom	T1 sec.	—	3
(3)	87.5 Mc/s. (gang closed)	Chassis (+) to Pin 2 V4 (-)	D.C.	Pin 2 V2	10.7	—	Top	T3 prim.	—	3

Repeat Operations (1), (2) and (3) (see Notes on Ratio Detector Alignment).

Check bandwidth by swinging signal-generator frequency either side of 10.7 Mc/s. until output drops 3 db. (3-2.1 v.). Bandwidth should be  $\pm 150$  kc/s. Retune I.F.s if necessary.

Obtain two accurately matched resistors about 100k each and connect in series across R18. Connect meter between junction of these two resistors and junction R15, C38.

(4)	87.5 Mc/s. (gang closed)	Chassis (+) to Pin 2 V4 (-)	D.C.	Pin 2 V2	10.7	—	Bottom	—	T3 sec.	Zero
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Note: The core position on tune is approximately level with the base of former. Starting with core well out, a peak occurs in one direction. On screwing core in the output goes through zero to a peak on the opposite direction. The tune position is for zero output. A centre zero meter is of assistance here.

(5)	87.5 Mc/s. (gang closed)	Chassis (+) to Pin 2 V4 (-)	D.C.	F.M. aerial input	10.7	—	Top	1T1 prim.	—	—
(6)	87.5 Mc/s. (gang closed)	Chassis (+) to Pin 2 V4 (-)	D.C.	F.M. aerial input	10.7	—	Bottom	1T1 sec.	—	—
Repeat Operations (5) and (6)										
(7)	88 Mc/s.	Chassis (+) to Pin 2 V4 (-)	D.C.	F.M. aerial input	88	—	—	1L3	—	—
(8)	88 Mc/s.	Chassis (+) to Pin 2 V4 (-)	D.C.	F.M. aerial input	88	—	—	1L2	—	—
(9)	93 Mc/s.	Chassis (+) to Pin 2 V4 (-)	D.C.	F.M. aerial input	88	—	—	1C7 and 1C3	—	—
(10)	93 Mc/s.	Chassis (+) to Pin 2 V4 (-)	D.C.	F.M. aerial input	88	—	—	1L1	—	—

Check calibration at 98 Mc/s. Should the received signal appear to the left of the scale calibration mark (insufficient frequency throw), the core of 1L3 should be screwed in at the approximate rate of half turn per 500 kc/s. error. Conversely, should the received signal appear to the right of the scale calibration mark (frequency throw too great) the core of 1L3 should be screwed out.

negative in respect to chassis. (4) Switch on receiver, with volume control at minimum. (5) Adjust the circuits in the order given.

**Wobbulator Check:** To check the setting of the ratio detector with the aid of a wobbulator proceed as follows:

Inject R.F. signal from F.M. signal generator to aerial sockets. Connect oscilloscope input leads across volume control and output indicating meter across R18. Switch off modulation and adjust receiver for maximum reading on output meter. Adjust input to give 3 volts. Modulate signal generator  $\pm 200$  kc/s. and tune secondary of T3 to give linear output as viewed on oscilloscope.