



McMICHAEL MS203 and SOBELL SG670

a.m./f.m. radiograms

THE MS203 and SG670 are seven-valve, three waveband stereo radiograms designed for both mono and stereo records. They are fitted with a B.S.R. Monarch UA14 four-speed record changer, incorporating a TC8S cartridge. The waveband coverage is: l.w. - 950m to 2000m; m.w. - 185m to 575m; f.m. - 87.5Mc/s to 100Mc/s.

Internal aerials for a.m. and f.m. are provided in the form of a ferrite rod and dipole respectively. A conventional long wire external a.m. aerial can be used if required and there is a socket for an external f.m. dipole. An EM81 tuning indicator is fitted on the MS203.

Two 8in 3Ω loudspeakers are provided and provision is made for the connection of external loudspeakers either in addition to or in place of the external loudspeakers on either or both channels by means of plugs and sockets located on the rear of the chassis.

Operation on f.m.

The signal from the aerial is fed via L1 and L2 to V1a which functions as r.f. amplifier. The amplified signal is then fed via anode coil L3 and the oscillator coupling coil L4 to the grid of V1b which functions as a self-oscillating

mixer, L3 and C9 forming part of a neutralising network to minimise oscillator radiation.

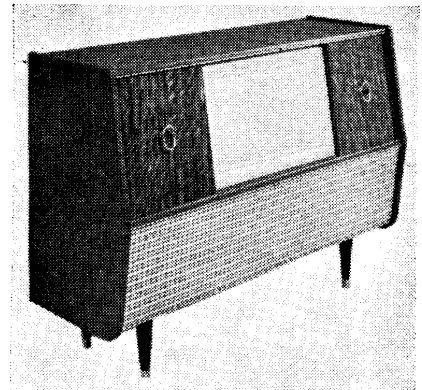
The i.f. signal at 10.7Mc/s is developed across L12 and coupled via L13 to the control grid of V2a, the first i.f. amplifier, the output from this stage being fed via L14/L15 to the control grid of V3. L20, the anode coil of V3, is matched via L22 to the centre tap of L21 which feeds the diodes of the unbalanced ratio detector V4. The sum of the rectified voltages appears across R38 and C55 and is fed to the suppressor grid of V3 as an a.g.c. voltage.

The audio output, de-emphasised and filtered by C50, R18 and C54, is fed to VR1 and VR2 via contacts FM3, C56 and contacts G1 and G2.

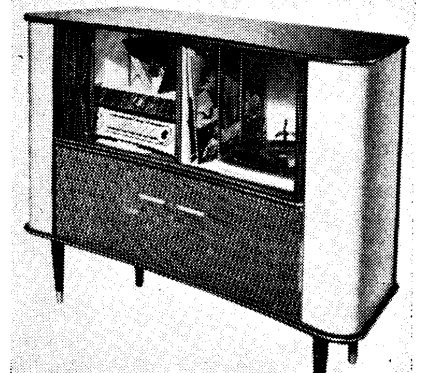
Operation on a.m.

On a.m., the circuit operates as a conventional superhet, the signals being fed from the external aerial through C21 to the junction of L7 and C22/R7, which functions as bottom-capacity coupling. L6 and L7, the medium and long wave aerial coils are mounted on a ferrite rod and form the internal aerial.

The primary winding of the first f.m. i.f. transformer L14 is short-circuited on a.m. by contacts LW6 and MW3 to prevent amplification of unwanted



McMichael MS203



Sobell SG670

harmonics of the a.m. intermediate frequency signals. One of the diode sections of V3 acts as a.m. detector, the audio output appearing across R20 and being filtered by C48, R19, C52. It is then fed via contacts FM3, C56 and contacts G1 and G2 to VR1 and VR2. An a.g.c. voltage is derived from this circuit and, after decoupling by R37 and C51, is applied to the control grids of V2 and V3.

Audio Section

The audio signals from VR1 and VR2 are fed to the control grids of V5a and V6a via C57 and C58 respectively. The amplified output from V5a and V6a is fed via the tone control networks VR3/C61 and VR4/C62 to the control grids of V5b and V6b. A frequency-selective negative feedback loop is incorporated in each amplifier, the feedback being taken from the secondaries of the output transformers via R33/C70 and R34/C71 to the earthy end of the volume controls. The balance control varies the feedback applied to each amplifier and thus controls the relative gain. This control is intended to be adjusted during the playing of a stereo record.

RELEASE DATES AND ORIGINAL PRICES

MS203: September 1960:
69 gn. (£54 17s. 0d., plus tax)

SG670: March 1960:
65 gn. (£51 13s. 5d., plus tax)

BASIC DATA

Valves: ECF80 (f.m. r.f. amp., mixer and oscillator); ECH81 (first f.m. i.f. amplifier, a.m. frequency changer); EBF89 (second f.m. i.f. amplifier, first a.m. i.f. amplifier, a.m. detector); EB91 (f.m. ratio detector); two ECL82 (left- and right-hand channel a.f. amplifier and output); EZ81 (h.t. rectifier); (MS203 only) EM81 (tuning indicator).

Lamps: Three 6V types; one mains type.

Potentiometers: Twin ganged 500k log with d.p. mains switch; twin ganged 250k log; 1k linear.

Electrolytics: Three 32μF 350V; two 50μF 25V; one 5μF 50V.

Surge Limiter: None.

Intermediate Frequencies: 10.7Mc/s on f.m.; 470kc/s on a.m.

Mains Input: 200V to 250V a.c. only.

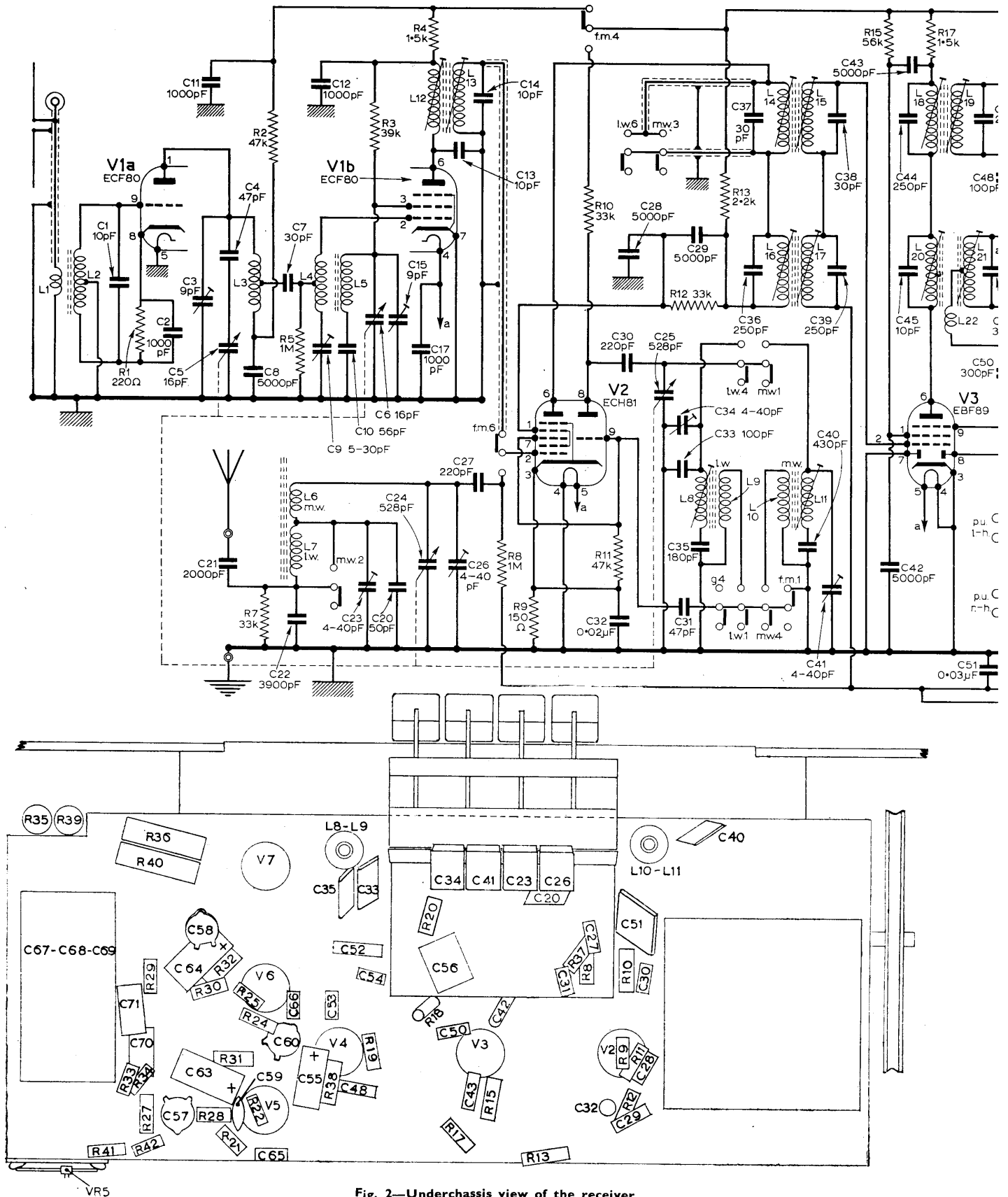


Fig. 2—Underchassis view of the receiver

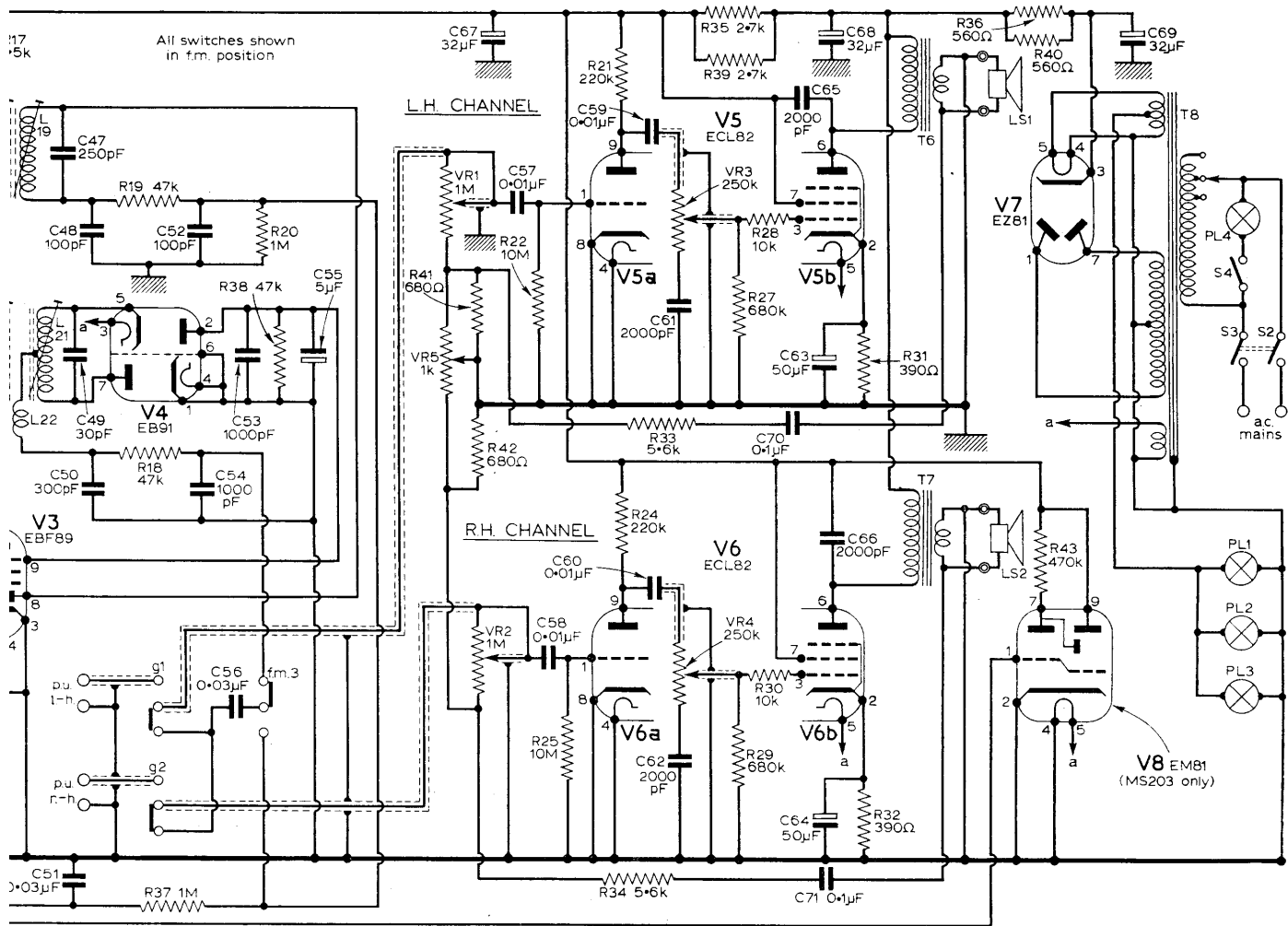
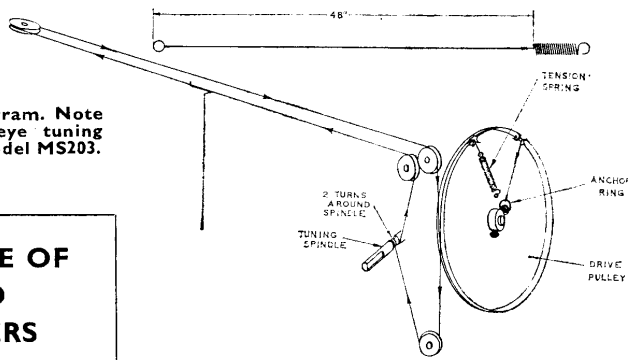


Fig. 1 (above)—The circuit diagram. Note that V8 (EM81), the magic eye tuning indicator, is present only on model MS203.

Fig. 3 (right)—The cord drive



CHASSIS REMOVAL

To remove the chassis, disconnect all interconnecting leads from the back panel of the chassis and remove the mains terminal block from the left-hand side chassis runner, disconnecting the leads to the record player unit and the record compartment light. Unclip the pilot lamp in the centre of the loud-speaker baffle from its support bracket,

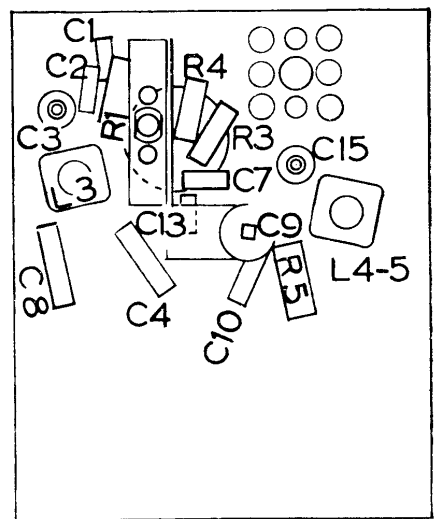


Fig. 4—Underchassis view of the f.m. unit

and remove the tone control knob. The chassis may now be withdrawn complete with controls and scale on removal of the two chassis-retaining screws at the rear of the chassis runners.

D.C. RESISTANCE OF COILS AND TRANSFORMERS

L6	1.8Ω	L11	2.6Ω
L7	8.4Ω	L16	6.0Ω
L8	7.0Ω	L17	6.0Ω
L9	6.0Ω	L18	6.0Ω
L10	2.0Ω	L19	6.0Ω

T6 primary 420Ω
 T7 primary 420Ω
 T8 primary—start to 200V tap 33.5Ω
 start to 220V tap 37.5Ω
 start to 240V tap 41.0Ω
 secondary 138 + 142Ω

All coils not listed above have d.c. resistances less than 0.5Ω.

ALIGNMENT

First check that the mains tapping plug is correctly set, and that the pointer coincides with the datum point on the right-hand edge of the v.h.f scale with the tuning gang fully closed. Allow the receiver to warm up for at least ten minutes before beginning the alignment. Connect 3Ω dummy loads or power output meters across the secondaries of the output transformers during the alignment process.

It is important that all coils are tuned to their outer tuning positions.

F. M. Procedure

Connect a high resistance voltmeter across R38 (positive to chassis).

With the tuning gang closed, inject a 10·7Mc/s unmodulated signal at about 10mV at pin 2 of V3. Trim L20 (top core) for maximum output.

Connect two matched 100k resistors in series across R38 and connect the voltmeter between the junction of these two resistors and the junction of R18 and C54. With the same signal input as

given above, adjust L21 (bottom core) for zero deflection on the meter. The core position for zero deflection should be about level with the base of the former. Starting with the core well out of the former, a peak should be reached with one polarity as the core is screwed in. After passing this peak, the reading should drop until zero is reached and, upon screwing the core in further, the reading should again rise, but with opposite polarity.

Disconnect the 100k resistors and reconnect the voltmeter across R38. With the tuning gang closed, inject a signal at 10·7Mc/s to pin 2 of V3 and adjust L20 (top core) for maximum. Connect the signal generator to pin 2 of V2 and adjust L14 (top core) for maximum, damping pin 2 of V3 to chassis with a resistor of 4·7k and a condenser of 0·01μF in series. With the tuning gang still closed, and the signal injected into pin 2 of V2, damp pin 6 of V2 to chassis. Adjust L15 (bottom core) for maximum. Now readjust L20 (top core) for maximum.

¶ With the gang closed, transfer the

signal generator to the aerial socket and inject a signal at 10·7Mc/s and adjust L12 and L13 for maximum output. Retune the tuning gang to 88Mc/s and inject a signal at 88Mc/s into the aerial socket adjusting L4/L5 for maximum. Tune the gang to 98Mc/s, inject a signal of 98Mc/s and tune C15 for maximum. Retune to 88Mc/s and tune L3 for maximum. Retune to 98Mc/s and tune C3 for maximum.

Remove the signal generator and tune the tuning gang to 93Mc/s. Connect the valve voltmeter across C5 and adjust C9 for minimum oscillator voltage.

Repeat the operations from ¶ onwards, since the last adjustment above affects the tracking.

A.M. Alignment

Disconnect one loudspeaker and substitute an output meter with a loading of 3Ω. Substitute a loading resistor of 3Ω for the other loudspeaker. The reference level for the alignment (which must not be exceeded) is 50mW.

Turn the volume and tone controls fully clockwise, and perform the following procedure. Switch to medium waves with the tuning gang closed and inject a signal at 470kc/s to pin 2 of V3, tuning L18 (top core) for maximum output. Then tune L19 (bottom core) for maximum. Transfer the generator to pin 2 of V2 and tune L16 (top core) and L17 (bottom core) for maximum.

Switch to long waves and, with the receiver tuned to 1765m, inject a signal at 170kc/s into the aerial socket via a dummy aerial, tuning L8 for maximum. Tune the receiver to 1000m and inject a signal of 300kc/s, trimming C34 for maximum. Repeat the last two adjustments until correct tracking is obtained on long waves.

With the receiver tuned to 1765m inject a signal of 170kc/s and tune L7 for maximum. Retune to 1000m and inject 300kc/s and adjust C23 for maximum. Repeat these two adjustments until no further improvement is obtained.

Tune the receiver to 500m (m.w.) and inject a signal of 600kc/s, tuning L11 for maximum. Tune to 214m and adjust C41 for maximum. Repeat these two adjustments until correct tracking is obtained on medium waves.

Tune the receiver to 500m and inject a signal of 600kc/s, tuning L6 for maximum. Tune to 214m and inject a signal of 1500kc/s adjusting C26 for maximum. Repeat these two adjustments until no further improvement is obtained.

VALVE VOLTAGES AND CURRENTS

F.M. Operation					A.M. Operation				
Valve	Va	Vg2	Vk	Ik(mA)	Valve	Va	Vg2	Vk	Ik(mA)
V1a	35	—	0·7	—	V1a	—	—	—	—
V1b	176	100	—	—	V1b	—	—	—	—
V2a	164	75	1·3	8·1	V2a	84	—	1·15	9·0
V2b	—	—	—	—	V2b	183	69	1·15	9·0
V3	170	61	—	9·6	V3	181	64	—	—
V4	—	—	—	—	V4	—	—	—	—
V5a	68	—	—	0·56	V5a	71	—	—	0·6
V6a	68	—	—	0·56	V6a	71	—	—	0·6
V5b	222	180	12·4	33·5	V5b	224	192	13·25	35·5
V6b	222	180	12·4	33·5	V6b	224	192	13·25	35·5
V8	52	—	—	—	V8	56	—	—	—

Note: The voltages and currents of V2 screen and oscillator anode may vary considerably with oscillator drive. V8 is present in the MS203 only.

OTHER VOLTAGES AND CURRENTS

A.C.				D.C.			
Rectifier anodes .. .. .	..	..	236V	Rectifier cathode .. .. .	..	..	255V
Pilot lamp .. .. .	..	..	5·3V	H.T. (at C68) .. .. .	..	..	235V
				H.T. (at C67) .. .. .	..	..	180V
Total h.t. current .. .. .	..	..	89mA	Total f.m. tuner current .. .. .	..	..	8·3mA

All voltages and currents quoted are approximate and were made with a 20,000Ω/V meter with no signal input.

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