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"TRADER" SERVICE SHEET
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McMICHAEL 153

Covering also Model 535 "Clubman" Autoradiogram

EMPLOYING a separate chassis for the power supply circuits, the McMichael 153AC is a 3-band 4-valve (plus rectifier) table superhet designed to operate from A.C. mains only of 190-250 V, 50 c/s. The waveband ranges are 15-50 m, 190-550 m and 900-2,000 m.

The 535 "Clubman" is a 3-speed table radiogram version of the 153AC and is fully covered in the circuit diagram below where the differences in the radiogram circuit are drawn in broken line.

Release dates and original prices: 153AC, *February* 1953, £16 18s 3d; 535, *May* 1953, £32 11s 10d. *Purchase tax extra.*

CIRCUIT DESCRIPTION

Aerial input via I.F. filter **L1, C1** and aerial coupling coils **L2, L3, L4** to single-tuned circuits **L5, C37** (S.W.), **L6, C37** (M.W.) and **L7, C37** (L.W.) which precede triode heptode valve **(V1, Brimar 7S7)** operating as frequency changer with internal coupling. In the gram model, an internal plate aerial is provided and can be connected via a flexible lead and plug to the aerial input circuit. **C2, R1** shunt the aerial circuit on S.W. to reduce microphony.

Oscillator anode coils **L11, L12, L13** are tuned by **C41.** Trimming by **C38** (S.W.), **C15, C39** (M.W.) and **C16, C40** (L.W.); series tracking by **C12** (S.W.), **C13** (M.W.) and **C14** (L.W.). Reaction coupling from grid circuit by **L8, L9, L10,** with additional coupling across tracker **C12** on S.W.

Second valve **(V2, Brimar 7B7)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C8, L14, L15, C9** and **C18, L16, L17, C19.**

Intermediate frequency 470 kc/s.

Diode signal detector is part of double diode triode valve **(V3, Brimar 7C6).** Audio frequency component in rectified output is developed across **R11** and passed via **C25,** volume control **R12** and **C26** to triode section, which operates as A.F. amplifier.

Provision is made for the connection of a gramophone pick-up across **R12,** tone correction components **C42, C43, R26, R27** being inserted in the gram model. In the gram position of the waveband switch, **S19** opens and **S9, S13** close to prevent radio break-through. The radiogram additions are shown in broken line in the circuit diagram.

Resistance-capacitance coupling by **R14, C27** and **R17** between **V3** and beam tetrode output valve **(V4, Brimar 7C5).** Variable tone control by **R17** and **C29** which apply negative feed-back between **V4** anode and grid circuits.

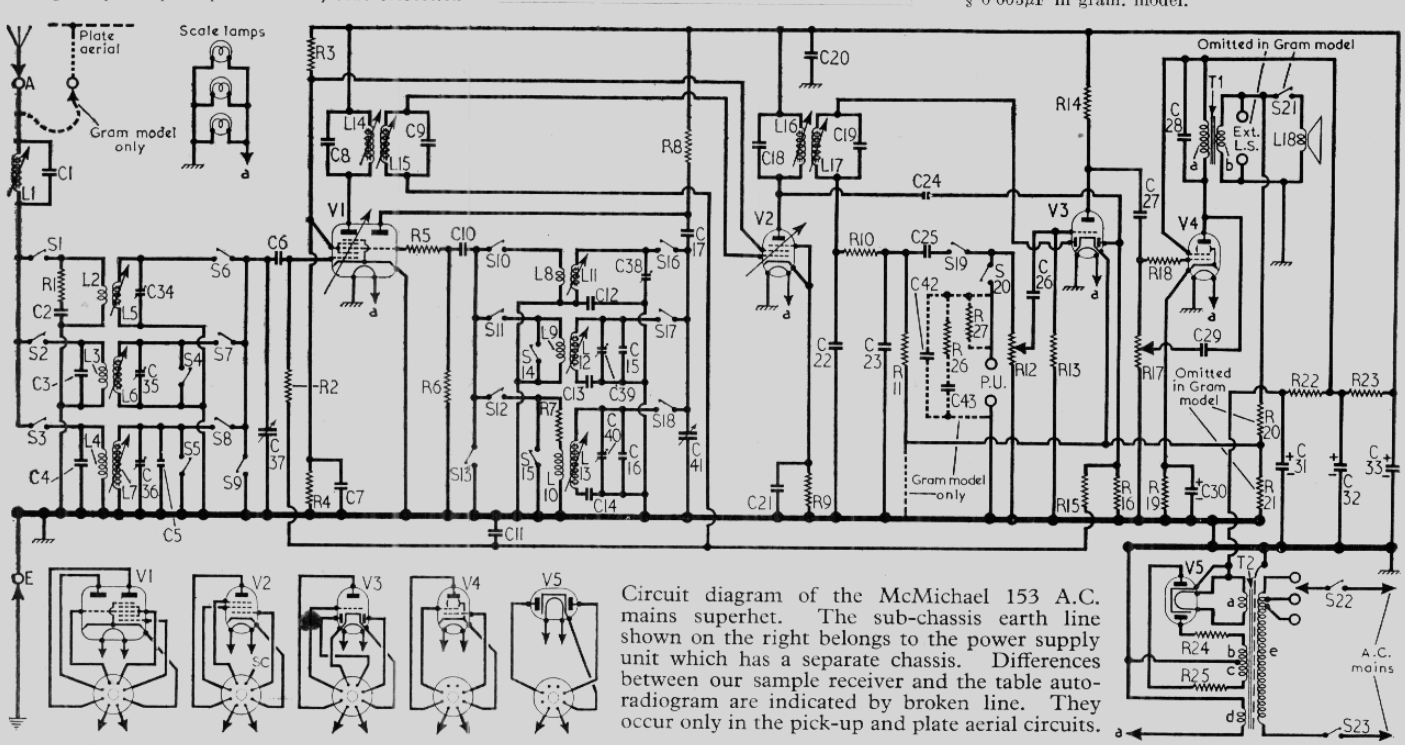
H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Brimar 7Y4).** Smoothing by **R22, R23** and electrolytic capacitors **C31, C32, C33. V5** is protected from overload by surge limiting resistors **R24, R25.**

COMPONENTS AND VALUES

	RESISTORS	Values	Locations
R1	S.W. aerial shunt	3·3Ω	D1
R2	V1 C.G.	1MΩ	G2
R3	S.G. H.T. pot.	18kΩ	G2
R4	divider ...	47kΩ	G2
R5	Osc. stabilizer ...	100Ω	F2
R6	V1 osc. C.G. ...	47kΩ	F2
R7	L.W. osc. stabilizer	680Ω	D1
R8	Osc. anode feed ...	18kΩ	G2
R9	V2 G.B.	270Ω	G2
R10	I.F. stopper ...	47kΩ	H2
R11	Signal diode load ...	470kΩ	H2
R12	Volume control ...	2MΩ	D1
R13	V3 C.G.	10MΩ	H2
R14	V3 anode load ...	390kΩ	H2
R15	A.G.C. decoupling	1MΩ	G2
R16	A.G.C. diode load ...	1MΩ	H2
R17	Tone control ...	500kΩ	A1
R18	V4 C.G. stopper ...	100kΩ	H2
R19	V4 G.B.	390Ω	H2
R20	Neg. feed-back ...	680Ω	H2
R21		33Ω	H2
R22	H.T. smoothing ...	750Ω	J3
R23		1kΩ	J3
R24	V5 surge limiters	100Ω	J3
R25		100Ω	J3
R26	P.U. tone corrector	680kΩ	—
R27	(Gram. model)	220kΩ	—

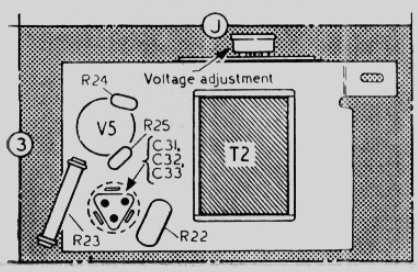
	CAPACITORS	Values	Locations
C1	I.F. filter tune ...	500pF	D1
C2	S.W. aerial shunt...	0·002μF	D1
C3	M.W. aerial shunt	250pF	D1
C4	L.W. aerial shunt...	0·001μF	D1
C5	L.W. aerial trim ...	20pF	D1
C6	V1 C.G.	100pF	F2
C7	V1 S.G. decoup. ...	0·1μF	G2
C8	1st I.F. trans tun-	100pF	B1
C9	ting	100pF	B1
C10	V1 osc. C.G. ...	100pF	D1
C11	A.G.C. decoupling	0·1μF	G2
C12	S.W. osc. tracker ...	6,770pF	C1
C13	M.W. osc. tracker...	503pF	C1
C14	L.W. osc. tracker...	150pF	D1
C15	M.W. osc. trimmer	10pF	C1
C16	L.W. osc. trimmer	60pF	D1
C17	Osc. reaction coup.	100pF	F2
C18	2nd I.F. trans tun-	100pF	A1
C19	ing	180pF	A1
C20	H.T. by-pass ...	0·1μF	G2
C21	V2 cath. by-pass ...	0·1μF	G2
C22	I.F. by-passes ...	100pF	H2
C23		100pF	H2
C24	A.G.C. coupling ...	50pF	H2
C25	A.F. coupling ...	0·01μF	H2
C26		0·01μF	H2
C27		§0·1μF	H2
C28	Tone corrector ...	0·001μF	B1
C29	Part tone control...	500pF	B1
C30*	V4 cath. by-pass ...	25μF	H2
C31*	H.T. smoothing ...	16μF	J3
C32*		32μF	J3
C33*		8μF	J3
C34‡	S.W. aerial trim ...	40pF	E2
C35‡	M.W. aerial trim....	40pF	E2
C36‡	L.W. aerial trim. ...	40pF	E2
C37†	Aerial tuning ...	528pF	C1
C38‡	S.W. osc. trim. ...	40pF	C1
C39‡	M.W. osc. trim. ...	40pF	C1
C40‡	L.W. osc. trim. ...	40pF	D1
C41†	Oscillator tuning ...	528pF	C1
C42	P.U. tone correctors	100pF	—
C43	(Gram. model) ...	0·001μF	—

* Electrolytic. † Variable. ‡ Pre-set.
§ 0·003μF in gram. model.



Circuit diagram of the McMichael 153 A.C. mains superhet. The sub-chassis earth line shown on the right belongs to the power supply unit which has a separate chassis. Differences between our sample receiver and the table auto-radiogram are indicated by broken line. They occur only in the pick-up and plate aerial circuits.

	OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	I.F. filter	...	3·5	D1
L2	Aerial coupling coils		—	D1
L3			13·0	D1
L4			19·0	D1
L5	Aerial tuning coils		—	D1
L6			3·0	D1
L7			17·0	D1
L8	Oscillator reaction coils		—	C1
L9			3·0	C1
L10			3·0	D1
L11	Oscillator tuning coils		—	C1
L12			2·0	C1
L13			7·0	D1
L14	1st I.F. trans.	Pri.	12·0	B1
L15		Sec.	12·0	B1
L16	2nd I.F. trans.	Pri.	12·0	A1
L17		Sec.	8·5	A1
L18	Speech coil ...		2·6	—
T1	O.P. trans.	a ...	400·0	B1
		b ...	—	
T2	Mains trans.	a ...	—	
		b ...	300·0	J3
		c ...	300·0	
		d ...	—	
		e, total	48·0	
S1-S20	Waveband switches		—	D1
S21	Speaker switch ...		—	—
S22, S23	Mains sw., g'd R17		—	A1



Underside of the power supply unit.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturer's information and were measured with the receiver operating from 230 V A.C. mains. There was no signal input. When the triode oscillator section of **V1** was stopped, the triode anode voltage and current readings increased to 155 V and 6.9 mA respectively.

Voltages were measured on the 400 V and 10 V ranges of a 1,000 ohms-per-volt meter, chassis being the negative connection.

Valves		Anode V	Anode mA	Screen V	Screen mA	Cath. V
V1	7S7 ...	225	2·4	80	3·8	—
		Oscillator				
		95	4·1			
V2	7B7 ...	225	6·5	80	1·5	2
V3	7C6 ...	65	0·4	—	—	—
V4	7C5 ...	230	30·0	245	5·0	13
V5	7Y4 ...	280*	—	—	—	290†

* A.C., each anode. † Cathode current 55 mA.

CIRCUIT ALIGNMENT

I.F. Stages.—Switch receiver to M.W. and tune to about 300 m. Connect output of signal generator via an 0.01 μF capacitor in the "live" lead to control grid (pin 6) of **V1** and chassis, feed in a 470 kc/s (638.3 m) signal and adjust the cores of **L17** (location reference A1), **L16** (H2), **L15** (B1) and **L14** (G2) for maximum output. Repeat these adjustments.

I.F. Filter.—Transfer signal generator leads, via a dummy aerial to **A** and **E** sockets. Feed in a 470 kc/s signal, and adjust the core of **L1** (E2) for minimum output.

R.F. and Oscillator Stages.—Check that with the gang at maximum capacitance, the cursor coincides with the high wavelength ends of the tuning scales. With the signal generator connected via a dummy aerial to the **A** and **E** sockets, carry out the following adjustments.

Switches	Gram.	M.W.	L.W.	S.W.
S1	—	—	—	C
S2	—	C	—	—
S3	—	—	C	—
S4	—	—	C	C
S5	—	—	—	C
S6	—	—	—	C
S7	—	C	—	—
S8	—	—	C	—
S9	C	—	—	—
S10	—	—	—	C
S11	—	C	—	—
S12	—	—	C	—
S13	C	—	—	—
S14	—	—	C	C
S15	—	—	—	C
S16	—	—	—	C
S17	—	C	—	—
S18	—	—	C	—
S19	—	C	C	C
S20	C	—	—	—

S.W.—Switch receiver to S.W., tune to 15 m, feed in a 15 m (20 Mc/s) signal and adjust **C38** (C1) and **C34** (D1) for maximum output, rocking the gang while adjusting the latter for optimum results. **C38** should be adjusted to the peak involving the greater capacitance. Tune receiver to 50 m, feed in a 50 m (6 Mc/s) signal and adjust the cores of **L11** (F2) and **L5** (E2) for maximum output. Repeat these adjustments.

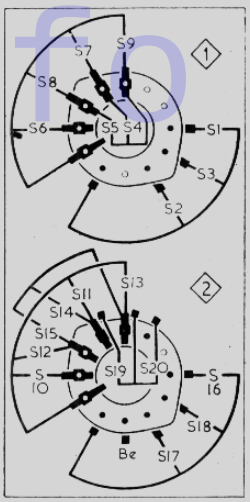
M.W.—Switch receiver to M.W., tune to 190 m, feed in a 190 m (1,580 kc/s) signal and adjust **C39** (C1) and **C35** (D1) for maximum output. **C39** should be adjusted to the peak involving the greater capacitance. Tune receiver to 500 m, feed in a 500 m (600 kc/s) signal and adjust the cores of **L12** (F2) and **L6** (E2) for maximum output. Repeat these adjustments.

L.W.—Switch receiver to L.W., tune to 900 m, feed in a 900 m (333 kc/s) signal and adjust **C40** (D1) and **C36** (D1) for maximum output. **C40** should be adjusted to the peak involving the greater capacitance. Tune receiver to 2,000 m, feed in a 2,000 m (150 kc/s) signal and adjust the cores of **L13** (E2) and **L7** (E2) for maximum output. Repeat these adjustments.

GENERAL NOTES

Switches.—**S1-20** are the waveband and radio/gram change-over switches, ganged in two rotary units on the rear of the main chassis. These are indicated in our rear view of the main chassis, where arrows show the direction in which they are seen in the detailed drawings of the units in column 3. The table (col. 2) gives the switch operations for the four control positions, starting from the fully anti-clockwise setting. A dash indicates open, and **C** closed.

Diagrams of the waveband switch units, drawn as seen from the rear of the chassis, as indicated by the arrows in our rear chassis illustration below.



S21 is the internal speaker muting switch and is mounted on the external speaker socket panel. Both the switch and the sockets are omitted in the gram model.

S22, S23 are the Q.M.B. mains switches, ganged with the tone control **R17**.

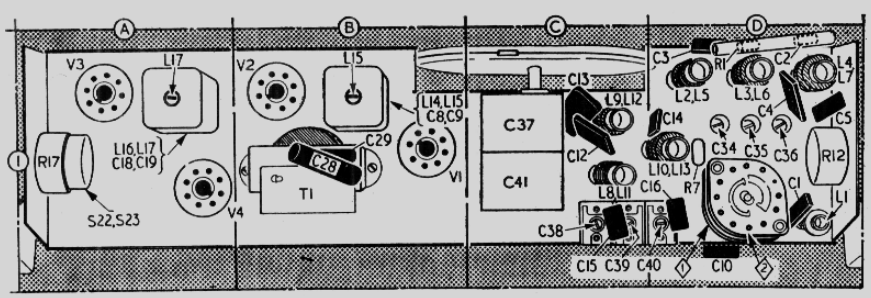
External Speaker.—Two sockets are provided on a panel at the rear of the cabinet for the connection of a low impedance (about 3 Ω) external speaker.

Scale Lamps.—These have small clear spherical bulbs and are rated at 6.5 V, 0.3 A.

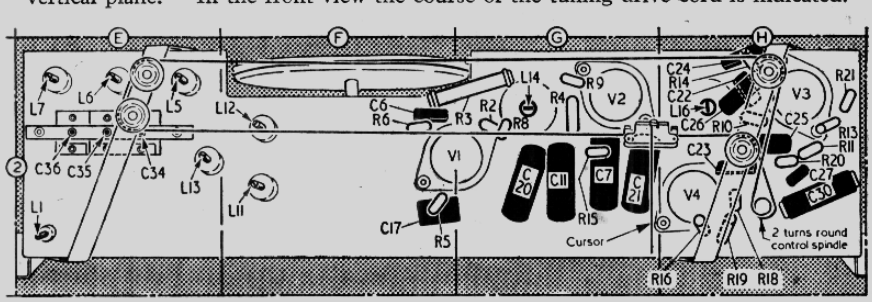
Drive Cord Replacement.—About four feet of high-quality flax fishing line, plaited and waxed, is required for a new drive cord. It should be run as shown in the front view of the main chassis, starting with the gang at maximum capacitance and attaching one end of the cord to the right-hand side lug (viewed from top) on the drive drum.

Model 535.—This is a table radiogram version of model 153AC, employing a Garrard 3-speed record changer RC75A and an Acos GP29 pick-up. Differences between this and the radio model are shown in broken line in the circuit overleaf.

Modifications.—**R1, C2** may not be present in some models, and shorting switches **S14, S15** may be connected across **L12, L13** instead of across **L9, L10** as shown.



Front view (below) and rear view (above) of the chassis, which is mounted in a vertical plane. In the front view the course of the tuning drive cord is indicated.



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