"TRADER" SERVICE SHEET

1170

McMICHAEL 354

2-band A.C./D.C./A.D. Portable Superhet

EMPLOYING a ferrite-rod type internal aerial, the McMichael 354 is a 4-valve (plus metal rectifier) 2-band portabe superhet, designed to operate from all-dry batteries or A.C./D.C. mains of 190-250V, 40-100 c/s in the case of A.C. The waveband ranges are 190-550m and 900-2,000m.

Release date and original price: July, 1954, £15 2s 1d. Batteries and purchase tax extra.

CIRCUIT DESCRIPTION

The aerial input coils **L1** (M.W.) and **L2** (L.W.) are mounted on opposite ends of a length of ferrite rod to form the internal aerial, and are tuned by **C31.** Provision is made for the connection of an external aerial and earth, the **A** and **E** sockets being isolated from chassis by **C1** and **C2.** **R1** provides a leakage path for static charges developed on the aerial.

Heptode valve **(V1, Mullard DK92)** operates as frequency changer with electron coupling. Oscillator grid coils **L3** (M.W.) and **L4** (L.W.) are tuned by **C32.** Parallel trimming by **C11, C33** (M.W.) and **C12, C34** (L.W.); series tracking by **C13** (M.W.) and **C14** (L.W.). Reaction coupling from oscillator anode circuit via **L5** (M.W.) and **L6** (L.W.). Oscillator stabilization by **R5.**

Second valve (V2, Mullard DF91) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C6, L7, L8, C7** and **C17, L9 L10, C18.**

Intermediate frequency 470 kc/s.

Diode signal detector is part of diode pentode valve **(V3, Mullard DAF91).** Audio frequency component in rectified output is developed across volume control **R11,** which acts as diode load, and is passed via **C21** to control grid of pentode section. I.F. filtering by **C20, R9** and the capacitance of the screened lead to chassis.

D.C. potential developed across **R11** is fed back as bias to **V1** and **V2** giving automatic gain control. Resistance-capacitance coupling by **R13, C23** and **R15** between **V3** and pentode output valve **(V4, Mullard DL94).** Tone correction in anode circuit by **C24.**

For battery operation, power supplies are carried by mains/battery switches **S10 (B), S11 (B)** and **S14 (B)** which close in that position as indicated by the suffix **(B).** For mains operation, **S9 (M), S12 (M), S13 (M), S15 (M)** and **S16 (M)** close. In the "off" position all the switches open.

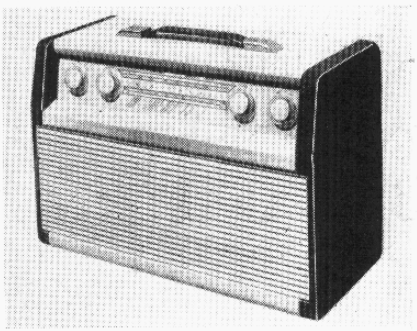
Mains H.T. current is supplied by metal rectifier **(Westinghouse 15B35).** Smoothing by **R19, R22,** voltage adjustment resistors **R20, R21** and electrolytic capacitors **C25, C26, C27.** Filament current for mains operation is taken from the H.T. circuit via **R18.**

(*Continued col. 1 overleaf*)

COMPONENTS AND VALUES

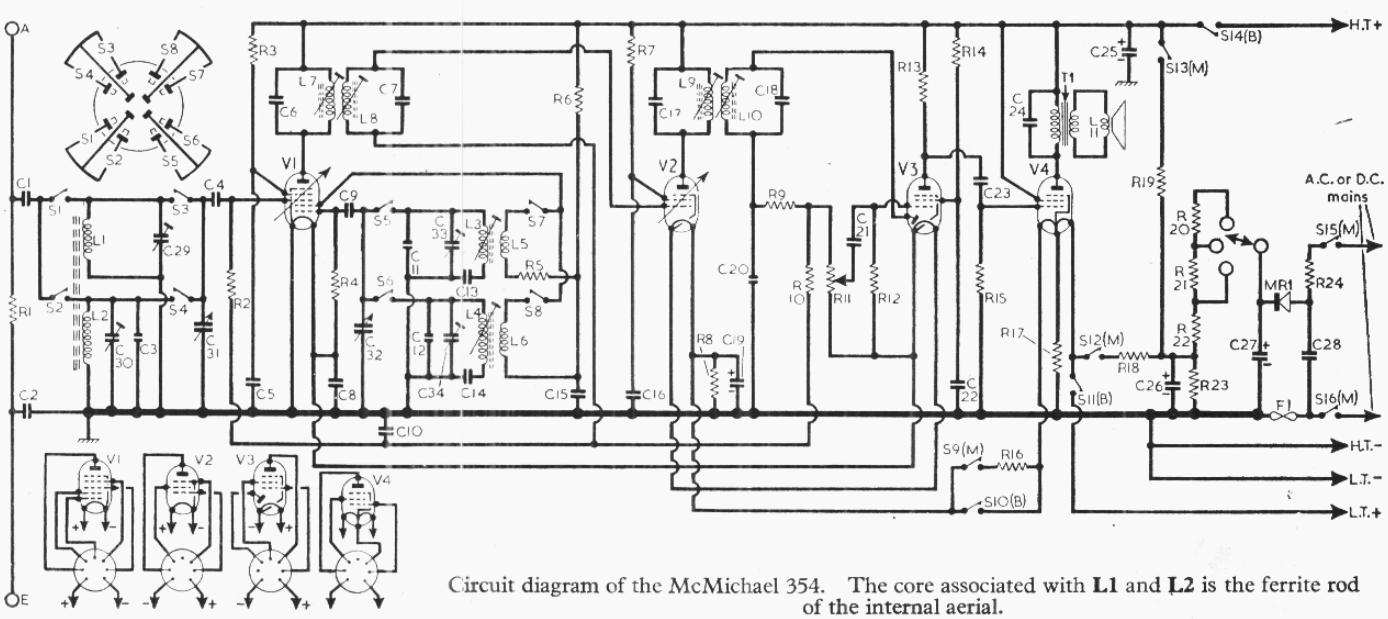
	CAPACITORS	Values	Locations
C1	Aerial and earth isolators	0·001μF	D3
C2	Aerial and earth isolators	0·005μF	E3
C3	L.W. aerial trim	15pF	D4
C4	V1 C.G.	100pF	E4
C5	V1 S.G. decoupling	0·05μF	E4
C6	1st I.F. trans. tuning	100pF	B2
C7	1st I.F. trans. tuning	100pF	B2
C8	Filament by-pass	0·05μF	D4
C9	V1 osc. C.G.	100pF	E3
C10	A.G.C. decoupling	0·1μF	E4
C11	M.W. osc. trim.	20pF	D4
C12	L.W. osc. trim.	80pF	D4
C13	M.W. osc. tracker	526pF	D4
C14	L.W. osc. tracker	160pF	D3
C15	Osc. anode decoup.	0·05μF	D4
C16	V2 S.G. decoupling	0·05μF	F4
C17	2nd I.F. trans. tuning	100pF	B2
C18	2nd I.F. trans. tuning	180pF	B2
C19*	Filament by-pass	500μF	F3
C20	I.F. by-pass	30pF	F4
C21	A.F. coupling	0·005μF	F3
C22	V3 S.G. decoupling	0·1μF	G4
C23	A.F. coupling	0·01μF	F4
C24	Tone corrector	0·005μF	B1
C25*	H.T. smoothing	16μF	A1
C26*	H.T. smoothing	32μF	A1
C27*	H.T. smoothing	32μF	A1
C28	Mains R.F. by-pass	0·01μF	G4
C29‡	M.W. aerial trim.	30pF	C2
C30‡	L.W. aerial trim.	30pF	C2
C31†	Aerial tuning	528pF	C1
C32†	Oscillator tuning	528pF	C1
C33‡	M.W. osc. trim.	30pF	C2
C34‡	L.W. osc. trim.	30pF	C2

*Electrolytic. † Variable. ‡ Pre-set.

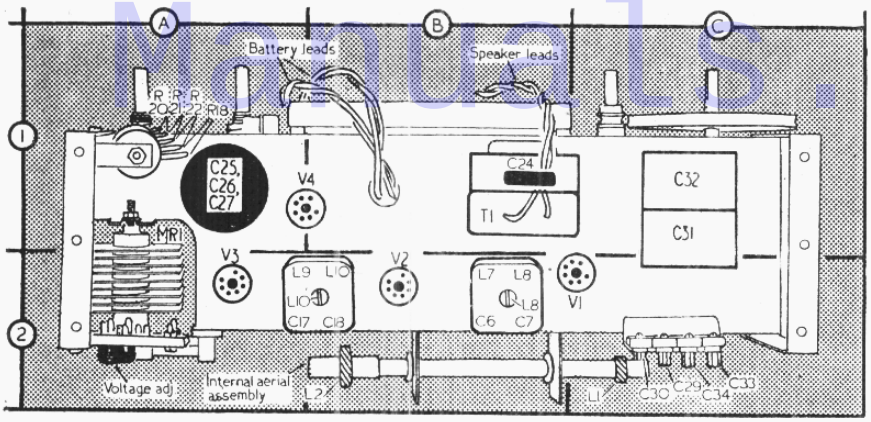


Appearance of the McMichael 354.

	RESISTORS	Values	Locations
R1	Anti-static shunt	1MΩ	E3
R2	V1 C.G.	1MΩ	E4
R3	V1 S.G. feed	180kΩ	E4
R4	V1 osc. C.G.	27kΩ	E4
R5	Osc. stabilizer	680Ω	D3
R6	Osc. anode feed	33kΩ	E3
R7	V2 S.G. feed	33kΩ	E4
R8	Filament H.T. shunt	1kΩ	E4
R9	I.F. stopper	270kΩ	F3
R10	A.G.C. decoupling	2·2MΩ	E4
R11	Volume control	1MΩ	G3
R12	V3 C.G.	10MΩ	G4
R13	V3 anode load	1MΩ	F4
R14	V3 S.G. feed	4·7MΩ	F4
R15	V4 C.G.	1MΩ	F4
R16	V4 mains G.B.	22Ω	G3
R17	Filament H.T. shunt	2kΩ	F3
R18	Filament ballast	2,520Ω	A1
R19	H.T. smoothing	3·9kΩ	G3
R20	Voltage adj.	422Ω	A1
R21	Voltage adj.	428Ω	A1
R22	H.T. smoothing	810Ω	A1
R23	H.T. shunt	100kΩ	G3
R24	Surge limiter	300Ω	G4



Circuit diagram of the McMichael 354. The core associated with **L1** and **L2** is the ferrite rod of the internal aerial.



Plan view of chassis showing the internal aerial coils **L1, L2** on their ferrite rod.

OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	Internal aerial coils	1·8	D4
L2		8·7	F4
L3	Oscillator tuning coils	2·8	D4
L4		7·0	D4
L5	Oscillator reaction coils	1·2	D4
L6		3·7	D4
L7	1st I.F. trans. Pri.	13·5	B2
L8	1st I.F. trans. Sec.	13·5	B2
L9	2nd I.F. trans Pri.	12·5	B2
L10	2nd I.F. trans Sec.	9·5	B2
L11	Speech coil ...	2·8	—
T1	O.P. trans. Pri.	490·0	B1
	O.P. trans. Sec.	—	
S1-S8	Waveband switches	—	D3
S9(M) to S16(M)	Mains/battery switches ...	—	G3
MR1	Westinghouse 15B35	—	A2

Circuit Description—*continued*

The filaments are series-connected for both mains and battery operation. Bias is obtained from the appropriate points in the filament chain. For mains operation the bias to **V4** is increased by making its filament more positive with respect to chassis via **R16**. **R8** and **R17** by-pass the H.T. current from the valves past the filaments.

CIRCUIT ALIGNMENT

The following alignment adjustments should be carried out with the chassis in its carrying case.

I.F. Stages.—Switch receiver to M.W. and turn gang to maximum capacitance. Connect output of signal generator, via an 0.01 μF capacitor in each 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 **L10** (location reference B2), **L9** (F4), **L8** (B2) and **L7** (E4) for maximum output. Repeat these adjustments until no further improvement results.

R.F. and Oscillator Stages.—Check that with the gang at minimum capacitance the cursor coincides with the lowest wavelength end of the tuning scales. If the receiver is aligned with the chassis removed from its carrying case, the substitute calibration marks labelled 0, 4, 3 and 1 on the lower flange of the scale backing plate should be used. These calibration points are given in brackets after each alignment wavelength in the following instructions. If the receiver is removed from its carrying case check that with the gang at maximum capacitance, the cursor coincides with the zero mark on the substitute scale. Transfer signal generator leads, via a standard dummy aerial, to **A** and **E** sockets.

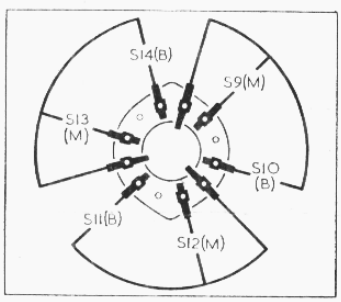


Diagram of the mains/battery switch unit as viewed from the rear of an inverted chassis.

M.W.—Switch receiver to M.W., tune to 190 m (calibration mark 1), feed in a 190 m (1,580 kc/s) signal and adjust **C33** (C1) and **C29** (C2) for maximum output. Tune receiver to 500 m (mark 2), feed in a 500 m (600 kc/s) signal and adjust the core of **L3** (D4) for maximum output. The internal aerial coil **L1** (C2) should also be adjusted for maximum output at this frequency by sliding the coil along the ferrite rod. Repeat these adjustments until no further improvement results.

L.W.—Switch receiver to L.W., tune to 900 m (mark 3), feed in a 900 m (333 kc/s) signal and adjust **C34** (C2) and **C30** (C2) for maximum output. Tune receiver to 2,000 m (mark 4), feed in a 2,000 m (150 kc/s) signal and adjust the core of **L4** (D4) for maximum output. The internal aerial coil **L2** should also be adjusted for maximum output at this frequency by sliding the coil along the ferrite rod. Repeat these adjustments until no further improvement results.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those derived from the manufacturers' information. They were measured on a new receiver when it was operating from 230V A.C. mains. The receiver was tuned to the high wavelength end of M.W. but there was no signal input.

Voltage measurements were made with a Model 7 Avometer, chassis being the negative connection in each case. The total H.T. current drawn through **R19** was 10mA, and the total L.T. current drawn through **R18** was 50mA.

Valve		Anode		Screen	
		V	mA	V	mA
V1	DK92 ...	85	0·75	37	0·15
		Oscillator			
		25	0·15		
V2	DF91 ...	85	1·5	60	0·5
V3	DAF91 ...	10	0·07	4	0·02
V4	DL94 ...	85	5·0	85	1·0

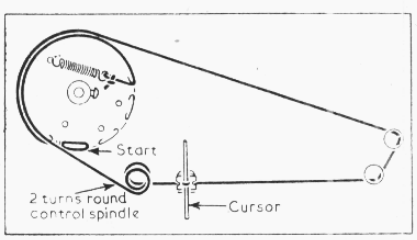
GENERAL NOTES

Switches.—**S1-S8** are the waveband switches ganged in a single rotary unit beneath the chassis. The unit is indicated in our underside illustration of the chassis and shown in detail in the diagram inset in the top left-hand corner of the circuit diagram overleaf, where it is drawn as seen from the rear of an inverted chassis.

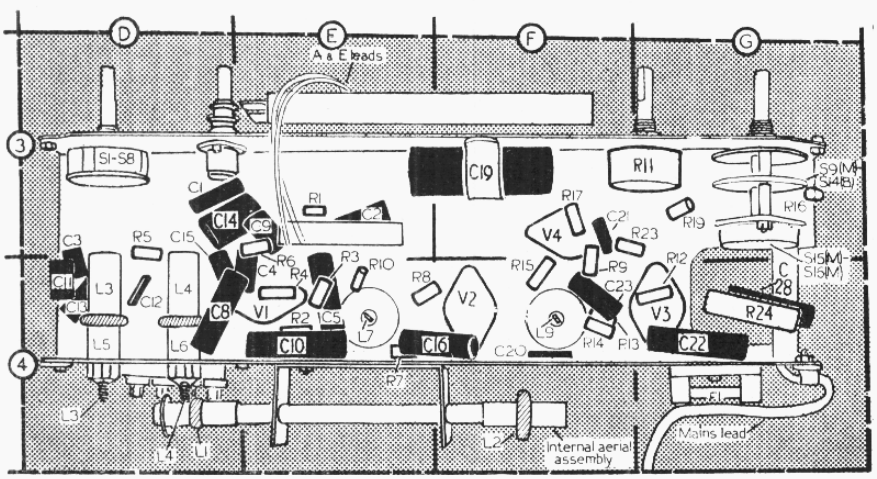
S9(M)-S16(M) are the mains/battery changeover switches ganged in a single rotary unit beneath the chassis. The unit is indicated in our under chassis illustration, and shown in detail in the diagram in column 2, where it is drawn as viewed from the rear of an inverted chassis.

Batteries.—The batteries recommended by the manufacturers are as follows: H.T., Ever Ready B107, Siemens S107 or Vidor L5508, rated at 90V; L.T., Ever Ready AD31, Siemens 1518, or Vidor L5642, rated at 7.5V.

Drive Cord Replacement.—About 3ft of high-quality flax fishing line, plaited and waxed, is required for a new tuning drive. It should be run as indicated in the sketch of the drive cord system in column 1, where it is viewed from the front of the chassis with the gang at maximum capacitance.



Sketch of the tuning drive system.



Under-side view of chassis showing the R.F. and oscillator core adjustments.

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