

NUMBER SEVENTY-FOUR

'TRADER' SERVICE SHEETS

McMICHAEL 435

A.C. TRANSPORTABLE RECEIVER

COMPONENTS AND VALUES

A FRAME aerial is fitted in the McMichael 435 transportable superhet receiver for A.C. mains operation. It is a 5-valve (plus rectifier) model with a tuned H.F. stage preceding a triode-pentode frequency changer and is provided with sockets for a gramophone pick-up, an extension speaker and an external aerial and earth.

CIRCUIT DESCRIPTION

Tuned frame aerial input (L1, L2, C28) to initial variable-mu pentode H.F. amplifier (V1, Mazda metallised AC/VP1). Provision for connection of external aerial and earth.

Tuned-secondary transformer coupling by L3, L4, L5, L6, C30 to triode-pentode frequency changer (V2, Mazda metallised AC/TP), operating with cathode injection.

Variable-mu pentode section functions as first detector, while triode forms separate oscillator with anode coils, L9, L10 tuned by C32, and coupling coils L7, L8 in common cathode circuit. Tracking by fixed condensers C12 (L.W.) and C13 (M.W.); harmonic suppression by grid resistance R10.

Single variable-mu H.F. pentode intermediate frequency amplifier (V3, Mazda metallised AC/VP1) with tuned-primary tuned-secondary transformer couplings L11, L12 and L13, L14.

Intermediate frequency 128.5 KC/S.

Diode second detector forms part of double diode triode valve (V4, Mazda metallised AC/HL/DD). Audio-frequency component in rectified output is developed across load resistance R17 and passed via coupling condenser C18 and manual volume control R18 to triode section which operates as L.F. amplifier. Switch S7 cuts out radio when gramophone pick-up is connected.

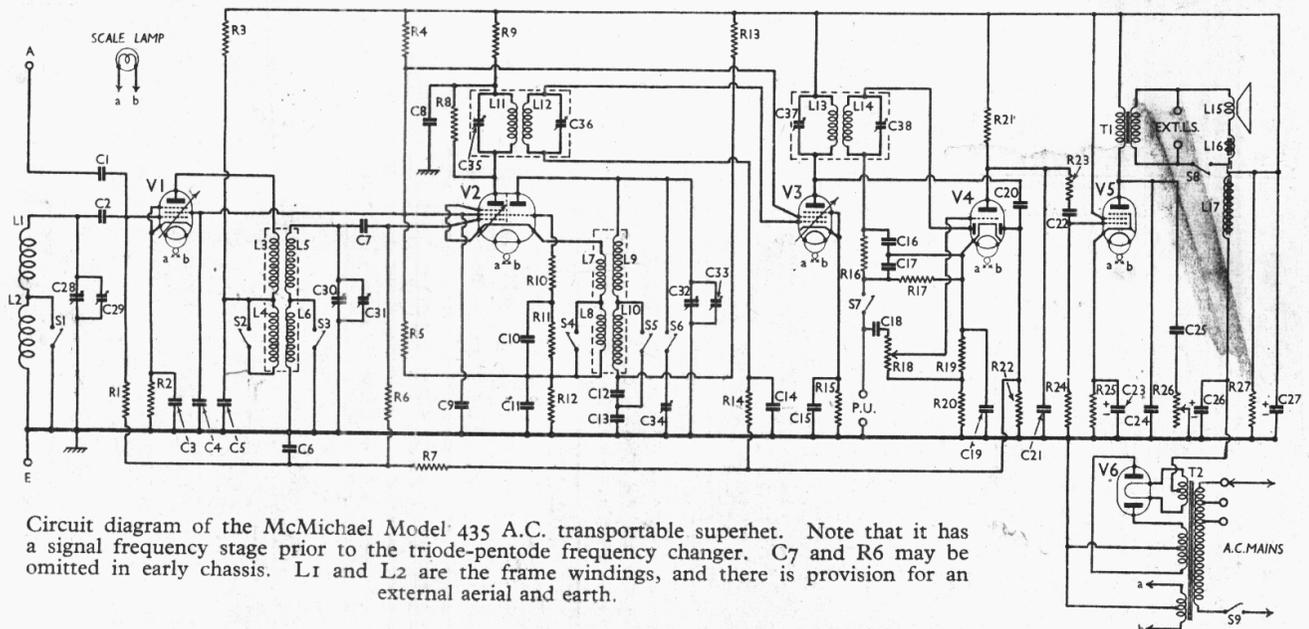
Second diode of V4 is fed from V3 anode by condenser C20 and develops D.C. potential across load resistance R22, which is fed back through decoupling circuit as G.B. to H.F., F.C., and I.F. valves, giving full automatic volume control. Delay voltage is obtained from cathode resistances R19, R20.

Resistance capacity coupling by R21, C22 and R24 between V4 and output pentode (V5, Osram Catkin MPT4). Fixed tone compensation in anode circuit by C24; variable tone control by R.C. filter R26, C25. Provision for connection of low-impedance external speaker across secondary of speaker input transformer T1. Switch S8 cuts out internal speaker.

H.T. current is supplied by full-wave rectifying valve (V6, Cossor 442BU). Smoothing by speaker field winding L17 and the two dry electrolytic condensers C26, C27.

Condensers		Values (μF)
C1	External aerial coupling	0.0001
C2	V1 cont. grid condenser	0.01
C3	V1 cathode by-pass	0.1
C4	V1 S.G. by-pass	0.1
C5	V1 anode decoupling	0.1
C6	V1 and V2 A.V.C. line decoupling	0.1
C7	V2 pent. cont. grid condenser	0.0002
C8	V2 pent. anode decoupling	0.1
C9	V2 pent. S.G. by-pass	0.1
C10	V2 osc. grid condenser	0.0002
C11	V2 cathode by-pass	0.1
C12†	Osc. L.W. tracker	0.001258
C13†	Osc. M.W. tracker	0.0023
C14	V3 cont. grid decoupling	0.1
C15	V3 cathode by-pass	0.1
C16	I.F. by-passes	0.0002
C17		
C18	L.F. coupling to V4 triode	0.1
C19	V4 cathode by-pass	0.5
C20	Coupling to V4 A.V.C. diode	0.0001
C21	V4 anode I.F. by-pass	0.001
C22	L.F. coupling to V5	0.01
C23*	V5 cathode by-pass	25.0
C24	Fixed tone compensator	0.002
C25	Part of variable T.C. filter	0.03
C26*	H.T. smoothing	8.0
C27*		
C28	Frame aerial tuning	—
C29†	Frame aerial trimmer	—
C30	H.F. transformer tuning	—
C31†	H.F. transformer trimmer	—
C32	Oscillator tuning	—
C33†	Oscillator main trimmer	—
C34†	Oscillator L.W. trimmer	—
C35†	1st I.F. trans. pri. tuning	—
C36†	1st I.F. trans. sec. tuning	—
C37†	2nd I.F. trans. pri. tuning	—
C38†	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Pre-set.
‡ Two condensers in parallel.



Circuit diagram of the McMichael Model 435 A.C. transportable superhet. Note that it has a signal frequency stage prior to the triode-pentode frequency changer. C7 and R6 may be omitted in early chassis. L1 and L2 are the frame windings, and there is provision for an external aerial and earth.

Resistances	Values (ohms)
R1	V1 cont. grid resistance ... 500,000
R2	V1 fixed G.B. resistance ... 1,000
R3	V1 anode decoupling ... 10,000
R4	V1, V2, and V3 S.G.'s H.T. potential divider ... 30,000
R5	... 20,000*
R6†	V2 pent. cont. grid resistance ... 500,000
R7	V1 and V2 A.V.C. line decoupling ... 500,000
R8	1st I.F. trans. pri. shunt ... 250,000
R9	V2 pent. anode decoupling ... 10,000
R10	V2 osc. harmonic suppressor ... 2,000
R11	V2 osc. grid resistance ... 50,000
R12	V2 fixed G.B. resistance ... 1,000
R13	V2 osc. anode decoupling ... 60,000
R14	V3 cont. grid decoupling ... 500,000
R15	V3 fixed G.B. resistance ... 1,000‡
R16	I.F. stopper ... 250,000
R17	V4 signal diode load ... 250,000
R18	Manual volume control ... 500,000
R19	V4 G.B. and A.V.C. delay voltage resistances ... 500
R20	... 2,000
R21	V4 anode load ... 100,000
R22	V4 A.V.C. diode load ... 500,000§
R23	V5 grid I.F. stopper ... 100,000
R24	V5 grid resistance ... 500,000
R25	V5 G.B. resistance ... 500
R26	Variable tone control ... 100,000
R27	H.T. supply ballast ... 40,000

* May be 10,000 O. ‡ May be 5,000 O.

† May not appear in some chassis.

§ May be 2,000,000 O.

Other Components	Values (ohms)
L1	Frame aerial windings ... 2.5
L2	... 21.0
L3	H.F. transformer primary ... 3.8
L4	... 9.2
L5	H.F. transformer secondary ... 4.7
L6	... 12.0
L7	Oscillator coupling coils ... 1.8
L8	... 2.5
L9	Oscillator tuning coils ... 4.0
L10	... 9.6
L11	1st I.F. trans. { Pri. total ... 42.0
L12	{ Sec. ... 42.0
L13	2nd I.F. trans. { Pri. ... 42.0
L14	{ Sec. ... 42.0
L15	Speaker speech coil ... 1.5
L16	Hum neutralising coil ... 0.1
L17	Speaker field winding ... 2,000.0
T1	Speaker input trans. { Pri. ... 360.0
	{ Sec. ... 0.25
T2	Mains trans. { Pri. total ... 25.0
	{ Heater sec. ... 0.02
	{ Rect. fil. sec. ... 0.05
	{ H.T. sec. ... 580.0
S1-S6	Waveband switches ... —
S7*	Gram. pick-up switch ... —
S8*	Internal speaker switch ... —
S9	Mains switch, ganged R18 ... —

* Operated by special plugs.

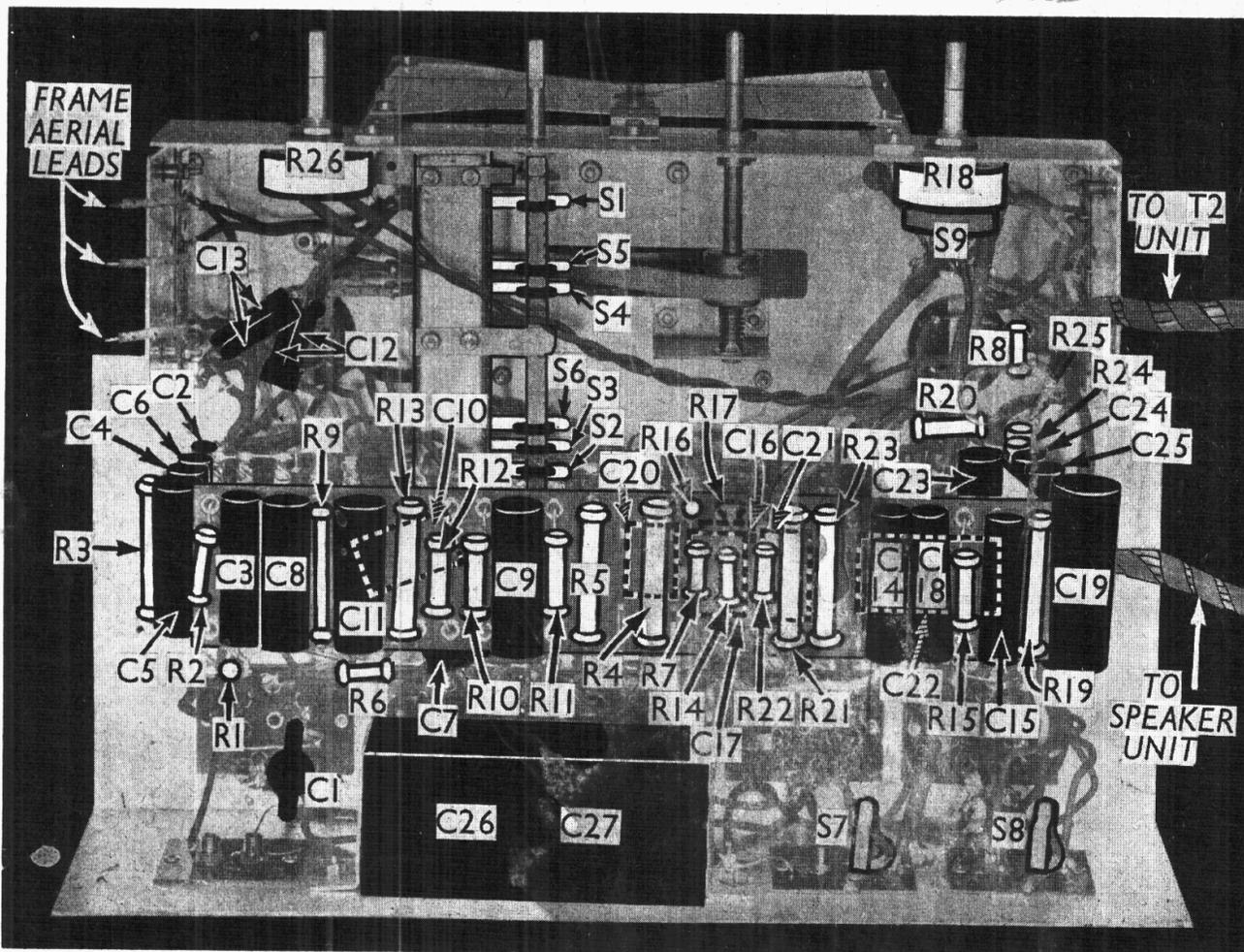
DISMANTLING THE SET

Removing Chassis.—To remove chassis, remove back and the four control knobs (pull off), taking care not to lose springs. Remove the two bolts (each with a nut and two large washers) holding frame to cabinet bottom, the four round-head wood screws holding back of chassis to wooden fillets at sides of cabinet (taking care not to lose the two black fibre strips), the dial lamp and the fibre strip at right-hand side of cabinet (two round-head wood screws).

Now remove mains transformer (four nuts and washers), taking care not to lose distance pieces. Chassis and frame can now be withdrawn sufficiently for most purposes by tilting frame so that bottom comes out first.

If it is necessary to remove chassis from frame, unsolder the three connecting leads and remove mains lead from clip on frame and the four countersunk-head bolts and nuts holding chassis to sides of frame. When replacing, note that the connecting leads go straight across to the nearest tag.

Removing Speaker.—Four round-head wood screws hold speaker to sub-baffle (Continued overleaf)



Under-chassis view. C12 and C13 each consist of two condensers in parallel. Six condensers and a resistance are beneath the paxolin component strip. Their positions are indicated by dotted lines. The mains transformer T2 and the rectifier V6 are in a unit at the base of the cabinet, and do not appear in the chassis. R27 is on the speaker unit.

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McMICHAEL 435 (continued)

and it can be removed by withdrawing these and unsoldering the connecting leads from terminal panel. When replacing, see that transformer is on left and connect leads as follows:—F, brown; 1, white; 2, green; 3, yellow; 4, black; and F, red. The 40,000 Ω 3 W resistor is connected between the F tag bearing the red lead and speaker frame, which is also connected to the single black lead soldered to the mains transformer frame.

If mains transformer should be disconnected from chassis, note that, when replacing, connections should be made as follow, numbering the tags from left to right when looking across terminal panel towards rectifier valve:—1, yellow; 2, green; 3, red; 4, black stranded lead; 5, red-yellow. Solid-core black lead goes to transformer frame, which is also connected to speaker frame.

VALVE ANALYSIS

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 AC/VP*	270	1.9	100	0.7
V2 AC/TP	260	1.2	100	0.2
V3 AC/VP1	280	1.7	100	0.5
V4 AC/HL/DD	75	2.0	—	—
V5 MPT4	275	28.0	290	5.3
V6 442BU	365†	—	—	—

* Osc. anode (G2) 140 V, 2.2 mA.

† Each anode, A.C.

Readings of valve voltages and currents given in the table above were measured with the receiver operating on A.C. mains of 225 V, using the 220 V tap on the mains transformer, in accordance with the maker's instructions. The

volume control was at maximum and there was no signal input. Voltages were measured on the 1,200 V scale of an Avometer, with chassis as negative.

GENERAL NOTES

Switches.—S1-S6 are the waveband switches, ganged together in one unit. On the M.W. band, all switches, except S6, are closed. On the L.W. band, all switches, except S6, are open. S6 is open on the M.W. band, and closed on the L.W. band.

S7 is the pick-up jack-switch, normally closed, which opens when the pick-up plug is inserted. S8 is the internal speaker jack-switch, normally closed, which opens and switches off the internal speaker when an external speaker plug is pushed fully home.

S9 is the Q.M.B. mains switch, ganged with the volume control, R18.

Coils.—L1 and L2 are the frame aerial windings. The signal frequency and oscillator coils, L3-L6 and L7-L10 are in two screened units on the chassis deck. The two I.F. transformers, L11, L12 and L13, L14, are in two additional screened units, containing also the associated trimmers. The primary coils are at the top, and the secondaries at the bottom, in both I.F. units.

Scale Lamp.—This is an Osram M.E.S. type, rated at 6.2 V, 0.3 A. It is fitted in a conical reflector.

Trimmer C34.—This is adjusted through a hole in the chassis deck, near the L3-L6 coil unit.

Condensers C26, C27.—These are two 8 μ F dry electrolytics, in a single unit with a common negative (black) lead. Of the two red leads (positives), that connected to the auxiliary grid of V5 belongs to C27.

V5 Wiring.—In the MPT4 output pentode, pin 1 is, of course, blank. In the chassis, the tag of the corresponding valve-holder socket is used as a bearer, to which three wires are joined.

Condenser C7, Resistance R6.—The condenser and resistance in the control grid circuit of the pentode section of V2 are not included in the maker's early circuit, and may therefore not occur in some chassis. In this case the lead from the coil and condenser will go direct to the grid.*

Condenser C1.—This is a very small fixed mica condenser.

Resistance Values.—In early models, R5, R15 and R22 may have different values, given in the footnotes to the resistance table.

Heater Potentiometer.—Early models may have a 50 Ω wire-wound centre-tapped potentiometer connected across the heater secondary of T2. Other models have a centre-tapped winding, as shown in our circuit diagram.

External Speaker.—This should be of the low resistance type (1-2 Ω). Sockets are provided at the rear of the chassis to take a special plug which, when fully inserted, opens S8 and cuts out the internal speaker.

T2 Unit.—The mains transformer, T2, is not mounted on the chassis, but is fitted inside the base of the cabinet. A platform carries the valve-holder for the rectifier V6, and a cable connects the unit to the chassis. In cases where a fixed centre-tapped potentiometer is used across the heater winding of T2, this will be found, wound on a strip of paxolin, beneath the transformer.

Resistance R27.—This is a 40,000 Ω 3 W resistance, and is mounted on the speaker unit. It therefore does not appear in our chassis views.

ULTRA 25 CORRECTION

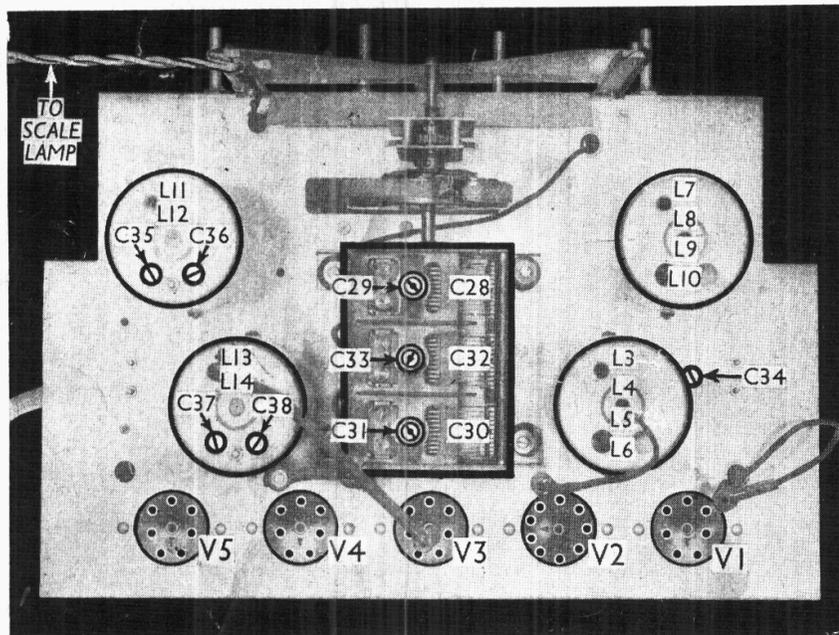
In Service Sheet No. 66 (p. vi, December 21st), coil L5 was inadvertently described as an image suppressor. We understand that no such suppression is necessary in this receiver, and coil L5 merely loads L6, L7 to correspond with the load of the aerial circuit on L3, L4.

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Plan view of the chassis. V6 holder is attached to the mains transformer mounted at the base of the cabinet. C34 is the oscillator L.W. trimmer, adjusted through a hole in the chassis.