NUMBER FIFTY-FIVE

'TRADER' SERVICE SHEETS

McMICHAEL MODEL 335

TRANSPORTABLE BATTERY SUPERHET

THE McMichael Model 335 receiver is a battery transportable superhet, with self-contained frame aerial. It has a tuned H.F. stage preceding the heptode (or octode) frequency-changer, and the output valve is a double pentode, feeding into a P.M. M.C. speaker.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L1, L2, C21** to variable-mu pentode H.F. amplifier (**V1, Mazda metallised VP215**). External aerial coupling by small condenser **C1.**

Tuned-secondary transformer coupling by **L3, L4, L5, L6, C23** to heptode or octode frequency-changer (**V2, Cossor metallised 210 PG,** or **Mullard metallised FC2**), operating with electron coupling. Oscillator grid coils **L7, L8** tuned by **C25**; anode coils **L9, L10**; tracking by fixed condensers **C9** (L.W.) and **C10** (M.W.).

Single variable-mu pentode intermediate frequency amplifier (**V3, Mazda metallised VP215**) 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 (**V4, Mazda metallised HL21/DD**). Second diode, fed from **V3** anode by **C16,** provides D.C. potential which is developed across load resistance **R12** and fed back through decoupling circuits as G.B. to H.F., F.C., and I.F. valves, giving full automatic volume control. Delay voltage is obtained from tapping on G.B. potential divider **R15, R16, R17.**

Audio-frequency output from rectifier diode is developed across load resistance **R9** and passed via I.F. choke **L15,** coupling condenser **C13** and manual volume control **R10** to **V4** triode section. Switch **S6** cuts out radio when gramophone pick-up is connected.

Parallel fed transformer coupling by **R11, C15** and **T1** to quiescent push-pull output stage consisting of a double pentode (**V5, Osram QP21**) operating with anode tone compensation by fixed condensers **C17, C18,** and variable tone control by **C19** and **R14.** Coupling to speaker by special transformer **T2.** Provision for connection of low-resistance external speaker across secondary. Switch **S7** cuts out internal speaker.

DISMANTLING THE SET

Removing Chassis.—Remove four control knobs (pull off), and four wood screws holding back of chassis to wooden fillets at sides of cabinet. Remove wooden back of battery compartment (4 wood screws). Withdraw two bolts and nuts (provided with large washers) holding frame aerial to bottom of cabinet. Frame and chassis are now free, but as there is no slack on speaker leads, the speaker will have to be removed. This is accomplished by removing the four wood screws holding it to its sub-baffle.

Frame, chassis and speaker can now be withdrawn, the bottom of the frame being tilted so that it comes out first.

If it is necessary to remove the chassis from the frame, unsolder the three leads from the chassis to the frame, and then remove the four nuts and countersunk-head screws holding the vertical sides of the frame to the sides of the chassis. When replacing, note that the leads go straight across to the nearest tag.

Removing Speaker.—See above. Should it be necessary to disconnect speaker from chassis, unsolder the six leads to the speaker terminal panel and the one to the speaker frame. When replacing leads, it should be noted that they are connected as follows, numbering the tags from the top, with the transformer on the left:—1, white braid; 2, orange rubber; 3, white rubber; 4, brown rubber; 5, red braid; and 6, green braid. The knotted white braid lead goes to the speaker frame.

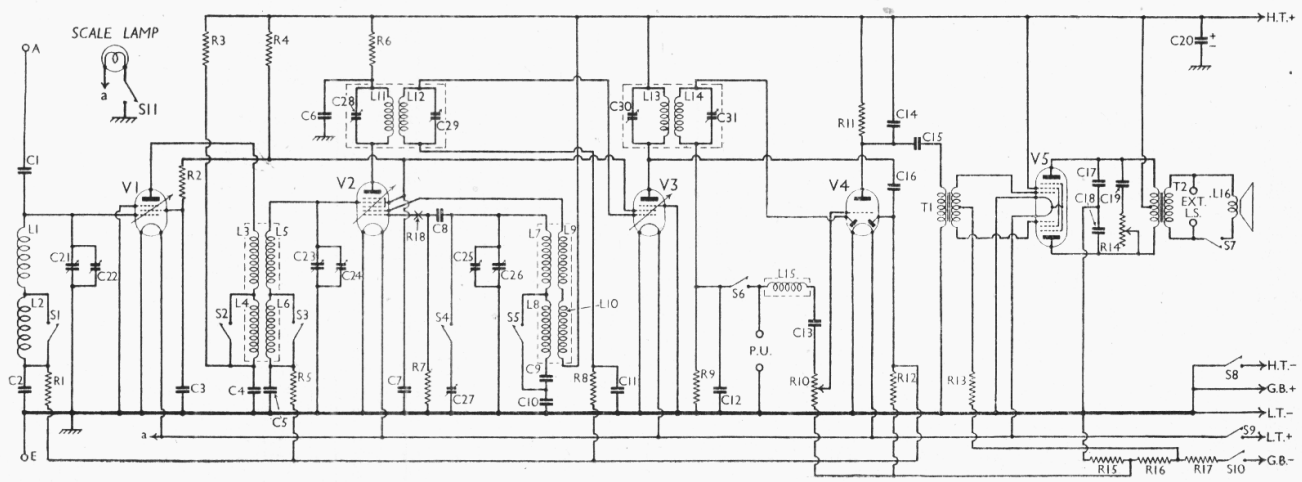
COMPONENTS AND VALUES

	Resistances	Values (ohms)
R1	V1 cont. grid decoupling	500,000
R2	V1 S.G. decoupling	5,000
R3	V1 anode decoupling	5,000
R4	V1, V2, and V3 S.G.'s H.T. feed	50,000
R5	V2 tet. cont. grid decoupling	500,000
R6	V2 tet. anode decoupling	5,000
R7	V2 osc. grid resistance	20,000*
R8	V3 cont. grid decoupling	500,000
R9	V4 rect. diode load	250,000
R10	Manual volume control	500,000
R11	V4 anode resistance	50,000
R12	V4 A.V.C. diode load	2,000,000
R13	V5 grid anti-parasitic resistance	100,000
R14	Variable tone control	100,000
R15	G.B. potential divider	350
R16	G.B. potential divider	2,000
R17	G.B. potential divider	350
R18†	V2 osc. grid series resistance	1,000

* 30,000 Ω with FC2 valve.
† Used with FC2 only.

	Condensers	Values (μF)
C1	External aerial coupling	0·00001
C2	V1 cont. grid decoupling	0·1
C3	V1 S.G. by-pass	0·1
C4	V1 anode decoupling	0·1
C5	V2 tet. cont. grid decoupling	0·1
C6	V2 tet. anode decoupling	0·1
C7	V2 S.G.'s by-pass	0·1
C8	V2 osc. grid condenser	0·002
C9†	Oscillator L.W. tracker	0·001258
C10†	Oscillator M.W. tracker	0·0023
C11	V3 cont. grid decoupling	0·1
C12	I.F. by-pass	0·0001
C13	L.F. coupling to V4 triode	0·1
C14	V4 anode I.F. by-pass	0·001
C15	L.F. coupling to T1	0·5
C16	Coupling to V4 A.V.C. diode	0·0001
C17, C18	V5 anode tone compensators	0·002, 0·002
C19	Variable tone control condenser	0·01
C20*	H.T. reservoir	4·0
C21	Frame aerial tuning	—
C22‡	Frame aerial trimmer	—
C23	H.F. transformer tuning	—
C24‡	H.F. transformer trimmer	—
C25	Oscillator tuning	—
C26‡	Oscillator main trimmer	—
C27‡	Oscillator L.W. trimmer	—
C28‡	1st I.F. trans. pri. tuning	—
C29‡	1st I.F. trans. sec. tuning	—
C30‡	2nd I.F. trans. pri. tuning	—
C31‡	2nd I.F. trans. sec. tuning	—

† Two condensers in parallel.
* Dry electrolytic.
‡ Pre-set condenser.



Circuit diagram of the McMichael Model 335. The battery voltages are: H.T., 120 V; G.B., −9 V; L.T., 2 V.

	Other Components	Values (ohms)
L1	Frame aerial	2·5
L2	Frame aerial	21·0
L3	H.F. transformer primary	5·3
L4	H.F. transformer primary	9·7
L5	H.F. transformer secondary	4·5
L6	H.F. transformer secondary	11·7
L7	Oscillator grid tuning coils	3·8
L8	Oscillator grid tuning coils	11·4
L9	Oscillator anode coils	1·8
L10	Oscillator anode coils	2·5
L11	1st I.F. trans. Pri.	42·0
L12	1st I.F. trans. Sec.	42·0
L13	2nd I.F. trans Pri.	42·0
L14	2nd I.F. trans Sec.	42·0
L15	I.F. choke	1,000
L16	Speaker speech coil	2·0
T1	Intervalve trans Pri.	720
	Intervalve trans Sec. total	6,500
T2	Speaker input trans. Pri. total	1,200
	Speaker input trans. Sec.	0·3
S1-S5	Waveband switches	—
S6*	Gram. pick-up switch	—
S7*	Internal speaker switch	—
S8	H.T. switch	—
S9	Filament switch	—
S10	G.B. switch	—
S11	Scale lamp switch	—

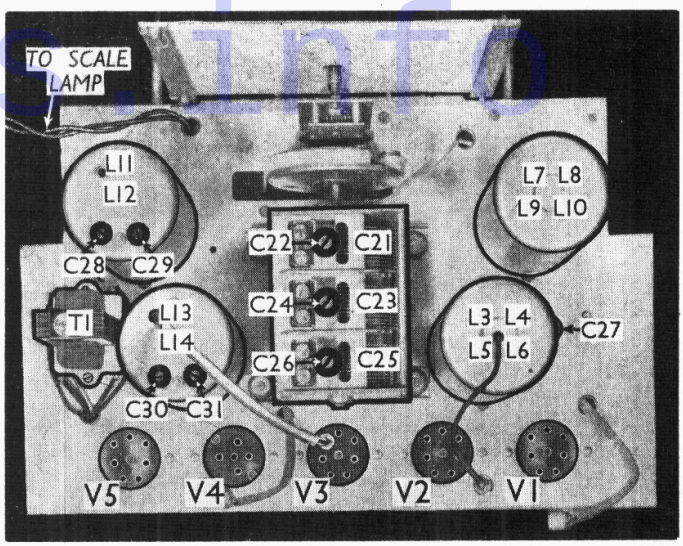
* Operated by special plug.

VALVE ANALYSIS

Valve	Anode Volts	Anode Current (mA)	Screen Volts	Screen Current (mA)
V1 VP215	115	1·3	50	0·3
V2 FC2*†	118	0·5	53	0·8
V3 VP215	123	1·45	53	0·4
V4 HL21/DD	85	0·6	—	—
V5 QP21	123‡	2·0‡	123	1·25

* 210 PG heptode will give slightly different readings.
† Osc. anode (G2) 124 V, 1·2 mA.
‡ Each anode.

Above is a table giving the valve voltages and currents as measured in our chassis. These readings were taken with no signal input and the volume control at minimum, and voltages were read on the 1,200 V scale of an Avometer, the chassis being negative. New batteries were used.



Plan view of the chassis. Note the oscillator L.W. trimmer, C27, reached through a hole in the chassis.

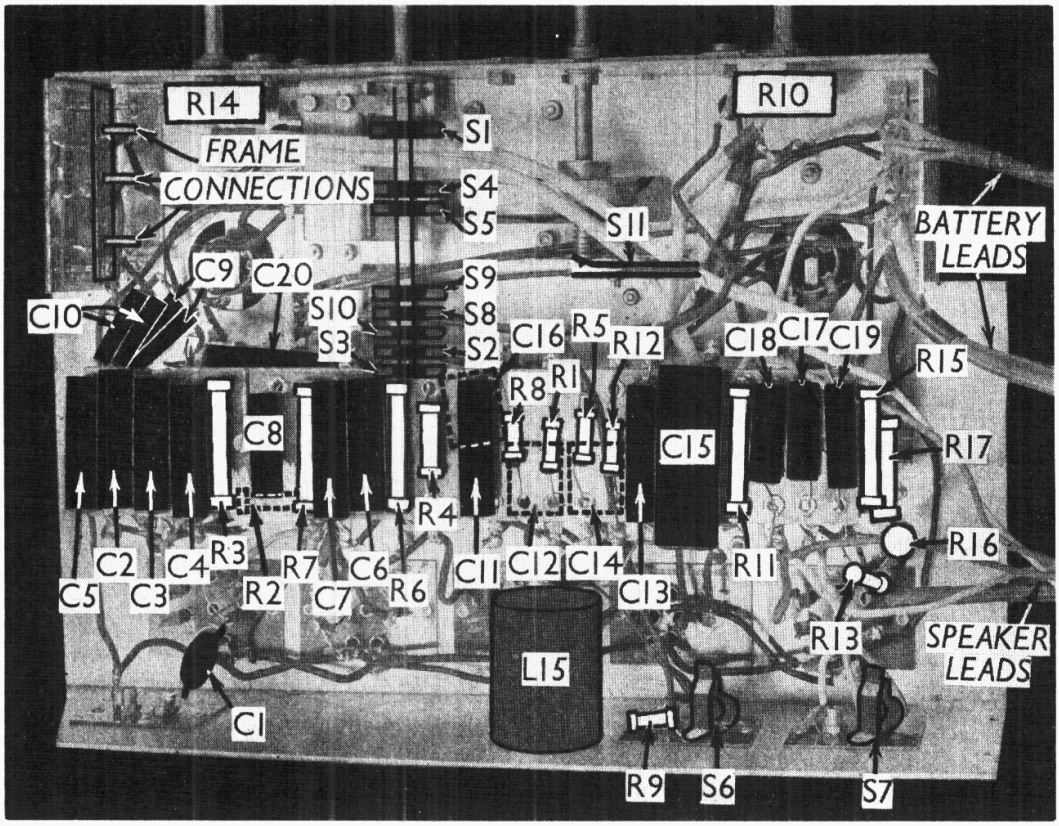
GENERAL NOTES

Switches.—**S1-S5** are the waveband switches, and **S8-S10** are the battery switches, all being ganged on a single spindle. They are indicated in our under-chassis view. **S8-S10** are all open in the "off" position, and closed in the M.W. and L.W. positions. The positions for **S1-S5** are given in col. 3, O indicating open and C, closed.

Position	S1	S2	S3	S4	S5
M.W.	C	C	C	O	C
L.W.	O	O	O	C	O

S6 is the pick-up jack switch, at the rear of the chassis, which opens when the pick-up plug is inserted. **S7** is the internal speaker switch, normally closed, which opens when an external speaker plug is pushed fully in.

S11 is the scale lamp switch, which closes when the tuning knob is pushed in. It is indicated in our under-chassis view.



Under-chassis view. C12, C14, C16 and R2 are beneath the paxolin component strip.

Coils.—**L1** and **L2** are the frame aerial windings. **L3-L6,** and **L7-L10,** are the remaining signal frequency, and the oscillator coils, in two screened units on top of the chassis. The I.F. transformers, **L11, L12** and **L13, L14,** are in two more screened units, which also contain the trimmers. In each case the primary coil is at the top, and the secondary below.

L15 is the I.F. choke in a screening can beneath the chassis.

Scale Lamp.—This is an Osram M.E.S. type, rated at 2.0 V, 0.6 A. It is only switched on when the tuning knob is pushed in, closing **S11.**

Condensers C9, C10.—These each comprise two fixed mica condensers in parallel to make up the required capacity.

External Speaker.—This should be of the low resistance (2 O) type, and is plugged into the sockets at the rear of the chassis.