

'TRADER' SERVICE SHEET

204

McMICHAEL 364

A.C. SUPERHET TRANSPORTABLE

A FRAME aerial is fitted in the McMichael 364 5-valve (plus rectifier) A.C. transportable superhet, which is suitable for operation on mains of 200-250 V, 40-100 C/S.

Refinements in the receiver are a sensitivity switch at the back of the chassis, and provision for a gramophone pick-up, an extension speaker and an external aerial and earth. In conjunction with the extension speaker sockets there is a jack switch allowing the internal speaker to be cut out of circuit.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L1, L2, C27** to variable-mu pentode signal frequency amplifier (**V1, Mazda metallised AC/VP1**). Provision for connection of external aerial (via **C1**) and earth. Tuned secondary transformer coupling by **L3, L4, L5, L6, C29** to triode-pentode (**V2, Mazda metallised AC/TP**) operating as frequency changer with cathode injection. Triode section forms separate oscillator, with anode coils **L9, L10**, tuned by **C31**, and coupling coils **L7, L8** in common cathode circuit. Tracking by shaped vanes of **C31** and additional fixed condenser **C12** (L.W.). Trimming by **C32** (M.W.) and **C33** (L.W.).

Third valve, a variable-mu pentode (**V3, Mazda metallised AC/VP1**) operates as I.F. amplifier with tuned-primary tuned-secondary couplings **C34, L11,**

L12, C35 and **C36, L13, L14, C37.**

Intermediate frequency 128.5 KC/S.

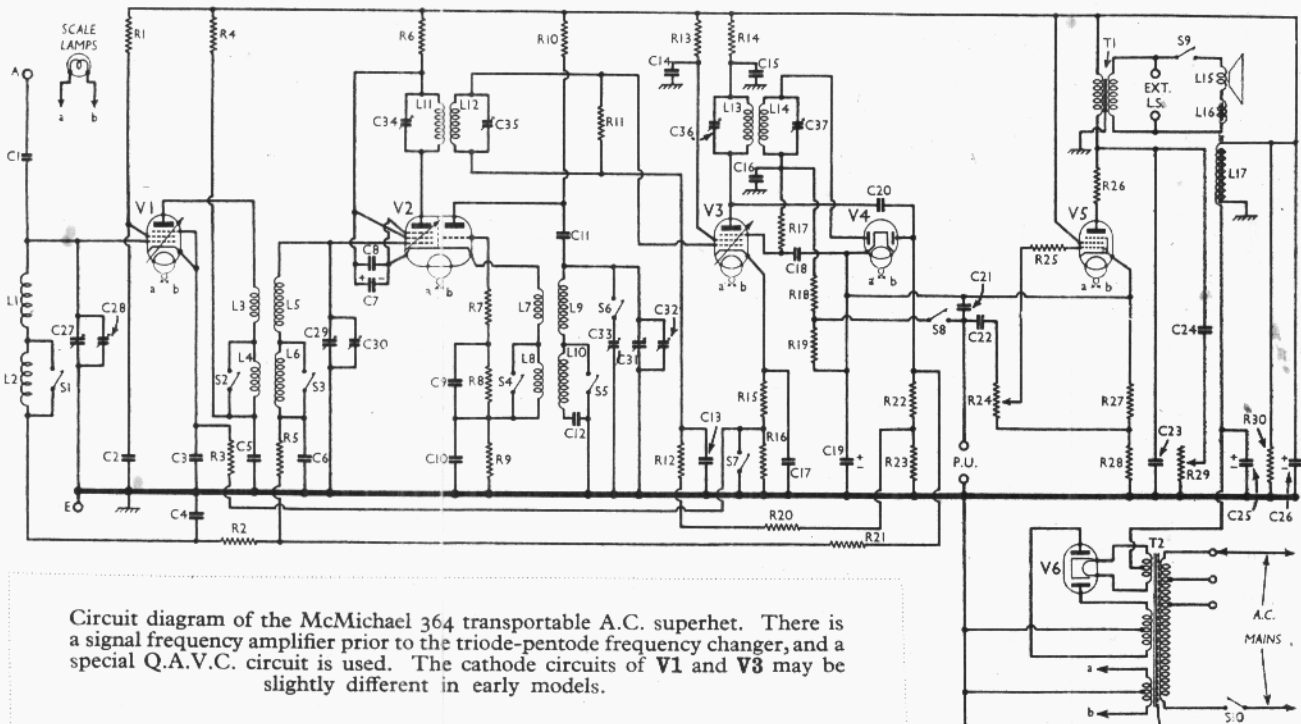
Diode second detector forms part of separate double-diode valve (**V4, Mazda V914**). Audio frequency in rectified output is developed across load resistances **R18, R19**, and passed via switch **S8**, coupling condenser **C22**, manual volume control **R24** and I.F. stopper **R25** to C.G. of pentode output valve (**V5, Mazda AC2/Pen**). Provision for connection of pick-up via **C22, R24** and **R25** to C.G. of **V5. S8** opens, and prevents radio break-through. Fixed tone correction in anode circuit of **V5** by **C23**; variable tone control by R.C. filter **R29, C24**. Provision for connection of low impedance external speaker across secondary of internal speaker transformer **T1**. Switch **S9** breaks internal speaker speech coil circuit.

Second diode of **V4**, fed from **V3** anode via **C20** provides D.C. potentials which are developed across load resistances **R23** and **R24** and fed back through decoupling circuits as G.B. to R.F., F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along **V5** cathode resistances **R27, R28**. Q.A.V.C. effect obtained by special circuit arrangement which includes **R17** and **C18**. Two-position sensitivity control by switch **S7**, which alters fixed bias applied to **V1** and **V3**.

H.T. current is supplied by I.H.C. full-wave rectifying valve (**V6, Mazda UU4** or **UU3**). Smoothing by speaker field coil **L17** and dry electrolytic condensers **C25, C26**.

COMPONENTS AND VALUES

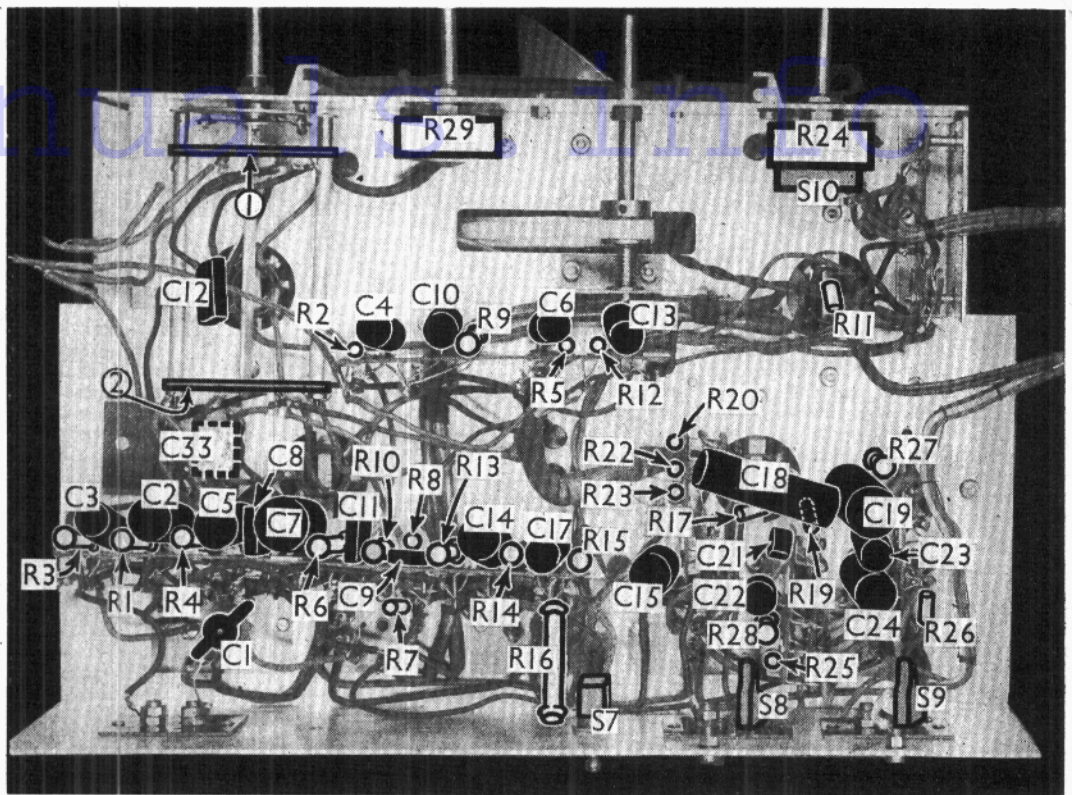
RESISTANCES		Values (ohms)
R1	V1 S.G. H.T. feed	20,000
R2	V1 C.G. decoupling	500,000
R3	Part V1 fixed G.B. resistance	750
R4	V1 anode H.T. feed	5,000
R5	V2 pent. C.G. decoupling	500,000
R6	V2 pent. anode and S.G. H.T. feed	10,000
R7	V2 osc. harmonic suppressor	1,000
R8	V2 osc. C.G. resistance	50,000
R9	V2 fixed G.B. resistance	750
R10	V2 osc. anode resistance	60,000
R11	1st I.F. trans. sec. shunt	500,000
R12	V3 C.G. decoupling	500,000
R13	V3 S.G. H.T. feed	20,000
R14	V3 anode decoupling	5,000
R15	Part V3 fixed G.B. resistance	750
R16	Part V1 and V3 fixed G.B. resistance	750
R17	Part Q.A.V.C. circuit	1,000,000
R18	V4 signal diode load	100,000
R19		500,000
R20	V3 A.V.C. line decoupling	500,000
R21	V1 A.V.C. line decoupling	1,000,000
R22	V4 A.V.C. diode load	500,000
R23		500,000
R24	Manual volume control	500,000
R25	V5 C.G. I.F. stopper	100,000
R26	V5 anode circuit stabiliser	50
R27	V5 G.B. and A.V.C. delay voltage resistances	150
R28		350
R29	Variable tone control	100,000
R30	H.T. line bleeder	40,000



Circuit diagram of the McMichael 364 transportable A.C. superhet. There is a signal frequency amplifier prior to the triode-pentode frequency changer, and a special Q.A.V.C. circuit is used. The cathode circuits of **V1** and **V3** may be slightly different in early models.

Manu... Info

Under-chassis view. Diagrams of the two switch units, indicated by numbers in circles, are given on page VIII. S7 is the sensitivity switch, used in conjunction with R16. C33 is adjusted through a hole in the chassis deck. S8 and S9 are two jack switches.



CONDENSERS		Values (μ ²)
C1	External aerial coupling	0.00001
C2	V1 S.G. by-pass	0.1
C3	V1 cathode by-pass	0.1
C4	V1 C.G. decoupling	0.1
C5	V1 anode by-pass	0.1
C6	V2 pent. C.G. decoupling	0.1
C7	V2 pent. S.G. decoupling	1.4
C8	V2 pent. S.G. R.F. by-pass	0.001
C9	V2 osc. C.G. condenser	0.0002
C10	V2 cathode by-pass	0.1
C11	V2 osc. anode condenser	0.001
C12	Osc. L.W. tracker	0.001081
C13	V2 C.G. decoupling	0.1
C14	V3 S.G. by-pass	0.1
C15	V3 anode decoupling	0.1
C16	I.F. by-pass	0.0001
C17	V3 cathode by-pass	0.1
C18	Part O.A.V.C. circuit	0.03
C19	V4 cathode by-pass	25.0
C20	Coupling to V4 A.V.C. diode	0.0001
C21	I.F. by-pass	0.0001
C22	A.F. coupling to vol. cont.	0.003
C23	Fixed tone corrector	0.003
C24	Part var. tone control filter	0.03
C25*	H.T. smoothing	8.0
C26*		8.0
C27†	Frame aerial tuning	—
C28†	Frame aerial trimmer	—
C29†	R.F. trans. sec. tuning	—
C30†	R.F. trans. sec. trimmer	—
C31†	Oscillator tuning	—
C32†	Oscillator M.W. trimmer	—
C33†	Oscillator L.W. trimmer	—
C34†	1st I.F. trans. pri. tuning	—
C35†	1st I.F. trans. sec. tuning	—
C36†	2nd I.F. trans. pri. tuning	—
C37†	2nd I.F. trans. sec. tuning	—

* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS (Continued)		Approx. Values (ohms)
L7	Oscillator coupling coils	0.5
L8		1.0
L9		3.5
L10		7.5
L11	1st I.F. transformer	Pri... 43.0
L12		Sec... 43.0
L13	2nd I.F. transformer	Pri... 43.0
L14		Sec... 43.0
L15	Speaker speech coil	2.0
L16	Hum neutralising coil	0.2
L17	Speaker field coil	2,000.0
T1	Speaker input trans.	Pri... 350.0
		Sec... 0.5
T2	Mains trans.	Pri. (total) 25.0
		Heater sec. 0.03
		Rect. heat. sec. 0.06
	H.T. sec. (total) 600.0	
Sr-6	Waveband switches	—
S7	Sensitivity switch	—
S8	Radio muting switch (gram.)	—
S9	Internal speaker switch	—
S10	Mains switch, ganged R24	—

DISMANTLING THE SET

Removing Chassis.—The chassis, frame aerial, speaker and mains transformer unit can be removed from the cabinet intact in a few moments. First remove the four control knobs (pull off) taking care not to lose the springs, then free the mains lead from the cleat on the side of the cabinet.

Now remove the two bolts (with nuts and washers) holding the frame to the bottom of the cabinet and the nuts (with washers) from the four bolts holding the mains transformer unit to the cabinet bottom. After removing the four screws (with lock washers and nuts), the chassis, frame, speaker and mains transformer unit can be withdrawn together. *When replacing, do not forget the packing be-*

tween the frame aerial and cabinet bottom.

If it should be necessary to remove the chassis from the frame, unsolder the leads to the frame and speaker, and remove the four countersunk-head screws (with nuts) holding the chassis to the sides of the frame. Now free the two straps holding the top of the tuning scale to the frame (two round-head wood screws), when the chassis is free.

When replacing, connect the leads to the frame as follows, numbering the tags from front to back: 1, blue and long green leads; 2, short green lead; 3, two long green leads. Connect the leads to the speaker as follows, numbering the tags from bottom to top: 1, brown; 2, yellow; 3, black; 4, green; 5, white; 6, red.

Removing Speaker.—To remove the speaker, unsolder the leads and remove two of the clamps (two round-head wood screws), slackening the other two. *When replacing,* see that the transformer is on the left and connect the leads as follows, numbering the tags from bottom to top: 1, brown to chassis and red to electrolytic; 2, yellow; 3, black in bunch of four leads; 4, green; 5, white; 6, red to chassis, the other red to electrolytic and one end of the 40,000 Ω resistance. The black lead in the bunch of three from the chassis, the black lead from the electrolytic and the other end of the resistance go to the earthing tag on the speaker frame.

Removing Mains Transformer Unit.—Unsolder the leads to the chassis and remove the nuts and washers from the four

Continued overleaf

OTHER COMPONENTS		Approx. Values (ohms)
L1	Frame aerial windings	2.5
L2		20.0
L3	R.F. trans. pri. coils	3.5
L4		2.5
L5	R.F. trans. sec. coils	4.5
L6		12.0

McMICHAEL 364—Continued

bolts holding it to the cabinet bottom. When replacing, connect the leads as follows, numbering the tags from back to front: 1, yellow; 2, yellow; 3, green; 4, green; 5, brown. The black lead goes to the earthing tag.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 230 V, using the 220 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the medium band and the volume and sensitivity controls were at maximum (the latter in the "H" position). There was no signal input, the frame aerial connections being shorted.

Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 AC/VP1	230	6.0	215	1.6
V2 AC/TP*	200	4.5	200	1.5
V3 AC/VP1	230	5.3	215	1.5
V4 Vg14	—	—	—	—
V5 AC/2Pen	255	28.0	270	6.2
V6 UU4	355†	—	—	—

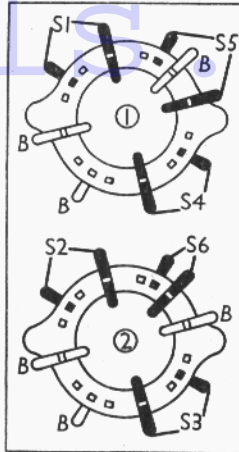
* Oscillator anode 80 V, 2.2 mA.
† Each anode, A.C.

GENERAL NOTES

Switches.—S1 to S6 are the wavechange switches, in two rotary units beneath the chassis, indicated in our under-chassis view, and shown in detail in the diagrams

below. All the switches except S6 are closed on M.W. and open on L.W. S6 is open on M.W. and closed on L.W.

Diagrams of the two switch units, looking from the rear of the underside of the chassis. There are three blank tags in each unit.



S7 is the Q.M.B. sensitivity switch, mounted at the rear of the chassis. The switch is closed when the knob is "down." S8 is the radio muting jack switch at the rear of the chassis which opens when the pick-up plug is fully inserted. S9 is a similar jack switch, also at the rear of the chassis, which opens when the external speaker plug is fully inserted, thus disconnecting the internal speaker.

S10 is the Q.M.B. mains switch, ganged with the manual volume control, R24.

Coils.—L1 and L2 are the frame aerial windings. L3-L6 and L7-L10 are in two screened units on the chassis deck. The I.F. transformers, L11, L12 and L13, L14 are in two further screened units on the

chassis deck, which contain the associated trimmers.

The second unit also contains R18, R21, C16 and C20.

Scale Lamp.—This is an Osram M.E.S. type, rated at 6.2 V, 0.3 A.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (2 Ω) external speaker. By fully inserting the special plug supplied, S9 opens, and cuts out the internal speaker.

Condensers C25, C26.—There are two 8μF dry electrolytics in a single carton mounted on the aerial frame, to the right of the speaker (looking at the underside of the chassis and frame unit). The black lead is the common negative. The red lead which goes to one end of the large resistance (R30) is the positive of C26, the other red lead being the positive of C25.

Resistance R30.—This is mounted on the speaker unit.

Trimmer C28.—No adjusting nut is fitted to this, as it must always be left at the minimum position.

Chassis Divergency.—In our chassis we find that the bias circuits of V1 and V3 differ from the makers' diagram. R3 is an extra resistance, which provides fixed bias for V1, in conjunction with R16 (shorted out in the most sensitive position of S7). In the makers' diagram the cathode of V1 was taken to the top of R15, this resistance providing bias for V1 and V3, instead of V3 only, as in our diagram. Consequently in the makers' diagram it has the value of 400 Ω (not 750 Ω).

T2 and V6.—These are in a separate unit, mounted on the base of the cabinet.

CIRCUIT ALIGNMENT

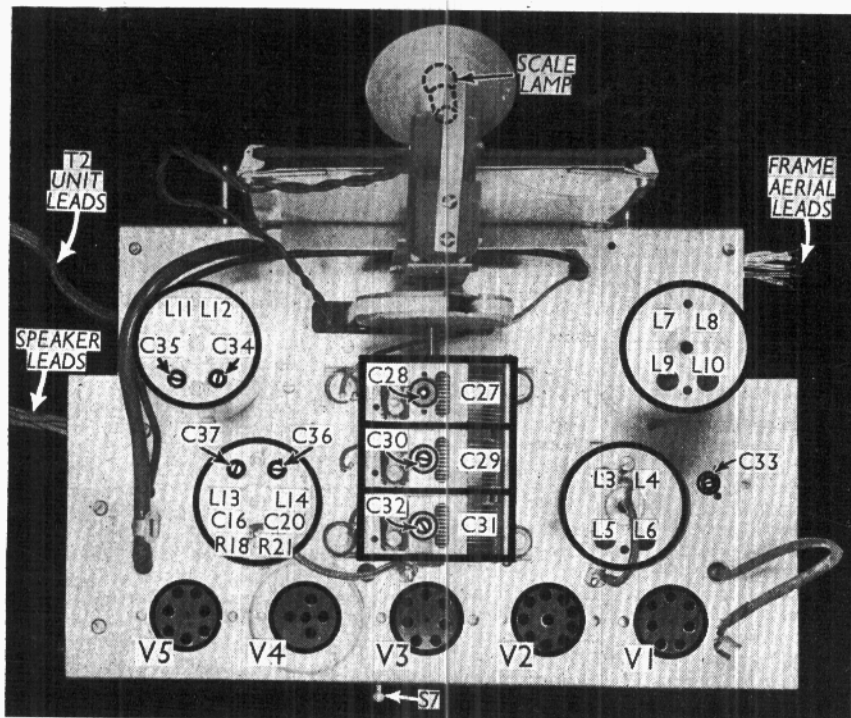
I.F. Stages.—Switch set to M.W., set sensitivity switch for maximum (knob down) and connect across C31 a 0.1 μF swamp condenser. Remove top cap from V2 and connect the signal generator output lead in its place, the other lead going to chassis.

Feed in a 128.5 KC/S signal, and adjust C37, C36, C35 and C34 for maximum output in that order. Keep the input low to avoid A.V.C. action. Remove swamp condenser, and replace top cap of V2.

R.F. and Osc. Stages.—With gang at maximum, pointer should rest over the black mark on the double line of the outer scale, about 1/8 in. to the left of the pointer bearing support. If it does not, rotate it round its centre fixing screw to the correct position.

Tune to 214 m. on scale (pointer resting so that "Radio Lyons" can be read along upper edge of pointer). Inject a 214 m. (1,400 KC/S) signal into external A and E sockets, and adjust C32 for maximum output. If there are two peaks, that produced with the least capacity of C32 is correct. Now adjust C30 for maximum output. Return to C32, which may need slight re-adjustment. Always leave C28 at minimum (no adjusting nut is fitted here).

Switch set to L.W., and tune to 1,000 m. on scale. Inject a 300 KC/S (1,000 m.) signal, and adjust C33 (through hole in chassis deck) for maximum output, rocking the gang slightly for optimum results.



Plan view of the chassis. The trimmer C28 must always be at minimum, and has no adjusting nut. The adjusting screw of C33 can be seen.