'TRADER' SERVICE SHEET 248

McMICHAEL 371 (A.C.) AND 401 (A.C. CONSOLE)

FITTED in the McMichael 371 (A.C.) receiver is a 3-valve (plus rectifier) 3-band superhet chassis with a short-wave range of 16·5-50 metres. Features of the set are a flywheel tuning drive and provision for a gramophone pick-up and an extension speaker.

The standard model is for mains of 200-260 V, 40-100 C/S, but other models are made for mains of non-standard voltage and periodicity.

An identical chassis is fitted in the 401 console receiver.

CIRCUIT DESCRIPTION

Aerial input on M.W. and L.W. is via coupling components **C2, L1** and **C3** to inductively coupled band-pass filter. Primary coils **L2, L3** are tuned by **C22**; secondaries **L6, L7** by **C24**; image suppression by coil **L4**. On S.W. input is via condenser **C1** to single tuned circuit **L5, C24.**

First valve (**V1, Mazda metallised AC/TH1**) is a triode-hexode operating as frequency changer with internal coupling. Oscillator anode coils **L12** (M.W.) and **L13** (L.W.) are tuned by **C27**; on S.W., anode coil **L11** is tuned by **C22,** to which it is connected by switch **S12**; parallel trimming by **C25** (M.W.) and **C26** (L.W.); series tracking by fixed condenser **C9** (L.W.); M.W. tracking by specially shaped condenser vanes of **C27.** Grid reaction coils **L8** (S.W.), **L9** (M.W.) and **L10** (L.W.).

Second valve (**V2, Mazda metallised AC/VP2**) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C28, L14, L15, C29** and **C30, L16, L17, C31.**

Intermediate frequency 128·5 KC/S.

Diode second detector is part of double diode pentode output valve (**V3, Mazda AC/2Pen/DD**). Audio-frequency component in rectified output is developed across load resistance **R12** and passed via A.F. coupling condenser **C12,** manual volume control **R11** and I.F. stopper **R13** to C.G. of pentode section. Provision for connection of gramophone pick-up across **R11.** Fixed tone correction by **C16** in anode circuit. Variable tone control by R.C. filter **R19, C17,** also in anode circuit. Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T1.**

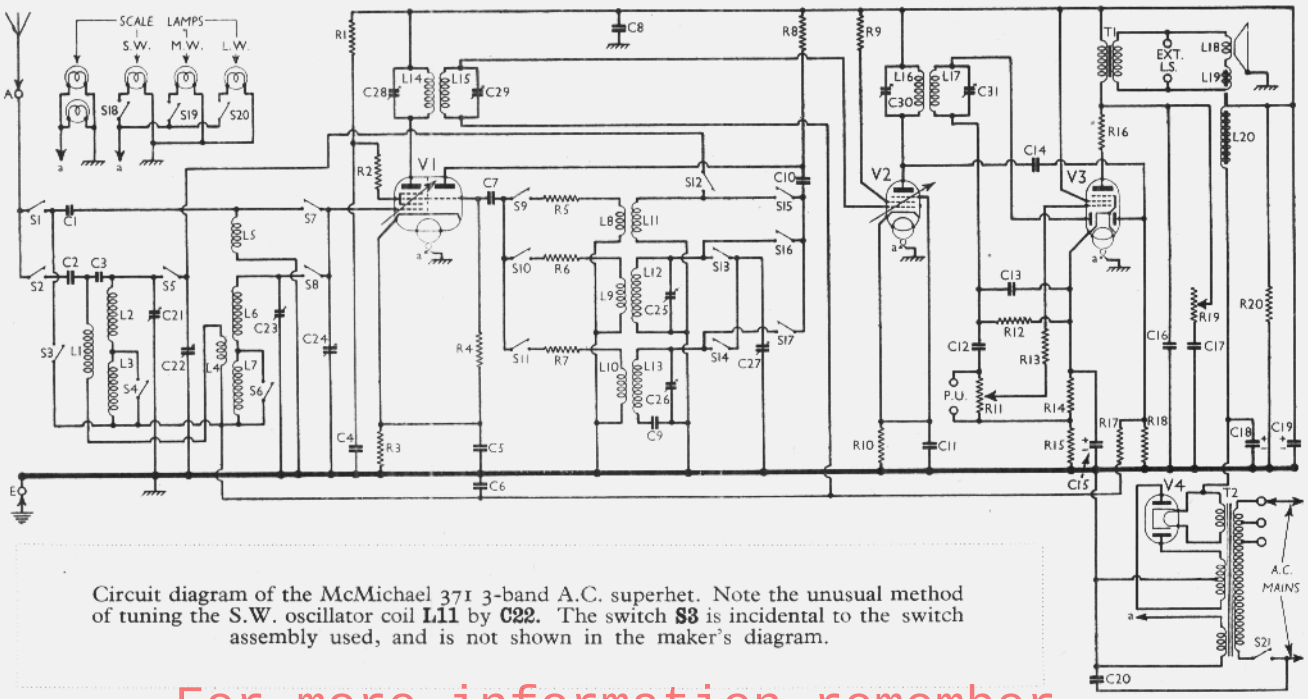
Second diode of **V3,** fed from **V2** anode via **C14,** provides D.C. potential which is developed across load resistance **R18** and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop across resistances **R14, R15** in cathode circuit.

H.T. current is supplied by I.H.C. full-wave rectifying valve (**V4, Mazda UU4**). Smoothing by speaker field **L20** and dry electrolytic condensers **C18** and **C19. R20** protects the latter from voltage surge when receiver is first switched on.

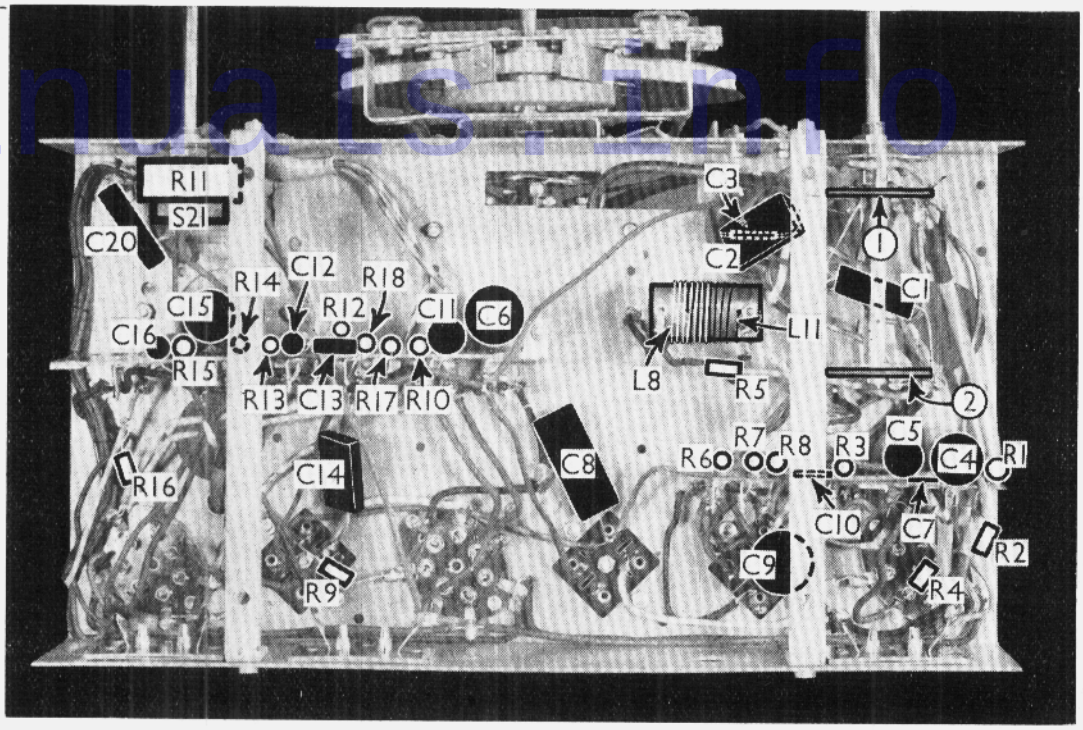
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 S.G. H.T. feed	20,000
R2	V1 S.G. anti-parasitic resistance	40
R3	V1 fixed G.B. resistance	250
R4	V1 osc. C.G. resistance	50,000
R5	Osc. reaction S.W. damping	50
R6	Osc. reaction M.W. damping	2,500
R7	Osc. reaction L.W. damping	5,000
R8	V1 oscillator anode H.T. feed	40,000
R9	V2 S.G. anti-parasitic resistance	40
R10	V2 fixed G.B. resistance	100
R11	Manual volume control	500,000
R12	V3 signal diode load	500,000
R13	V3 pent. C.G. I.F. stopper	100,000
R14	V3 pentode G.B. and A.V.C. delay potential resistances	150
R15		500
R16	V3 anode circuit stabiliser	50
R17	A.V.C. line decoupling	500,000
R18	V3 A.V.C. diode load	1,000,000
R19	Variable tone control	100,000
R20	Voltage surge reducer	40,000

	CONDENSERS	Values (μF)
C1	Aerial S.W. coupling	0·00005
C2	Aerial M.W. and L.W. couplings	0·0002
C3		0·00001
C4	V1 S.G. decoupling	0·1
C5	V1 cathode by-pass	0·1
C6	A.V.C. line decoupling	0·5
C7	V1 osc. C.G. condenser	0·0001
C8	H.T. positive line R.F. by-pass	0·1
C9	Osc. circuit L.W. tracker	0·001081
C10	V1 osc. anode coupling	0·0001
C11	V2 cathode by-pass	0·1
C12	A.F. coupling to V3 pentode	0·005
C13	I.F. by-pass	0·0001
C14	Coupling to V3 A.V.C. diode	0·0001
C15*	V3 cathode by-pass	25·0
C16	V3 anode fixed tone corrector	0·002
C17	Part of variable T.C. filter	0·03



Circuit diagram of the McMichael 371 3-band A.C. superhet. Note the unusual method of tuning the S.W. oscillator coil **L11** by **C22.** The switch **S3** is incidental to the switch assembly used, and is not shown in the maker's diagram.



Under-chassis view. The two switch units are indicated, and are shown in detail on page VIII. **C9** is a flat disc-type condenser. **C3** is below **C2**. **L8** and **L11** are the S.W. oscillator coils, **L11** being the enamelled wire winding.

	CONDENSERS (*Continued*)	Values (μF)
C18*	H.T. smoothing	8·0
C19*	H.T. smoothing	8·0
C20	Mains R.F. by-pass	0·002
C21‡	Band-pass pri. M.W. trimmer	—
C22†	Band-pass pri. and S.W. osc. tuning	—
C23‡	Band-pass sec. M.W. trimmer	—
C24†	Band-pass sec. and S.W. aerial tuning	—
C25‡	Osc. circuit M.W. trimmer	—
C26‡	Osc. circuit L.W. trimmer	—
C27†	Oscillator circuit tuning (M.W. and L.W.)	—
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	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial M.W. and L.W. coupling		10·75
L2	Band-pass primary coils		3·6
L3	Band-pass primary coils		11·5
L4	Image suppressor		0·45
L5	Aerial S.W. tuning coil		0·1
L6	Band-pass secondary coils		3·3
L7	Band-pass secondary coils		12·75
L8	Oscillator S.W. grid reaction		6·0
L9	Oscillator M.W. grid reaction		2·5
L10	Oscillator L.W. grid reaction		4·75
L11	Osc. circuit S.W. tuning coil		0·1
L12	Osc. circuit M.W. tuning coil		3·2
L13	Osc. circuit L.W. tuning coil		14·3
L14	1st I.F. trans.	Pri.	65·0
L15	1st I.F. trans.	Sec.	65·0
L16	2nd I.F. trans.	Pri.	65·0
L17	2nd I.F. trans.	Sec.	65·0
L18	Speaker speech coil		3·0
L19	Hum neutralising coil		0·15
L20	Speaker field coil		1,800·0
T1	Speaker input trans.	Pri.	600·0
T1	Speaker input trans.	Sec.	0·1
T2	Mains trans.	Pri. total	30·0
T2	Mains trans.	Heater sec.	0·1
T2	Mains trans.	Rect. heat. sec.	0·1
T2	Mains trans.	H.T. sec. total	550·0
S1-S17	Waveband switches		—
S18-20	Scale lamp switches		—
S21	Mains switch, ganged R11		—

DISMANTLING THE SET

Removing Chassis.—To remove the chassis from the cabinet, remove the three control knobs on the front of the cabinet (pull off), taking care not to lose the springs. Free the mains lead from the cleat on the side of the cabinet and remove the four bolts (with washers) holding the chassis to the bottom of the cabinet. Now remove the screen held to the side of the cabinet by two cleats and unsolder the lead to one of the cleats.

The chassis can now be withdrawn to the extent of the speaker leads, which should be sufficient for normal purposes.

To free the chassis entirely, unsolder the speaker leads from the terminal strip on the top of the mains transformer and *when replacing*, connect them as follows, numbering the tags from left to right:—1, brown; 2, red; 3, yellow; 4, blue; 5, green; 6, black.

Removing Speaker.—If it is desired to remove the speaker from the cabinet without disturbing the chassis, unsolder the leads from the speaker transformer terminal strip and earthing tag and slacken the four clamps holding the speaker to the sub-baffle (four round-head wood screws). *When replacing*, see that the transformer is at the top and connect the leads from the chassis as follows, numbering the tags from left to right:—1, brown; 2, yellow; 3 and 5 joined together, blue; 4, green; 6, red and one end of **R20**. Connect one of the red leads from the electrolytic block to tag 1, the other red lead to tag 6 and the black lead to the earthing tag on the speaker frame. Take the free ends of **R20** and **C17** to the earthing tag and the red lead from **R19** to tag 2.

VALVE ANALYSIS

Valve voltages and currents given in the table (Col. 3) 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 control was at maximum, but there was no signal input.

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/TH1*	240	2·3	93	6·4
V2 AC/VP2	240	12·0	240	3·4
V3 AC/2Pen/DD	220	27·0	240	5·8
V4 UU4	335†	—	—	—

* Oscillator anode, 70 V, 4·0 mA.
† Each anode, A.C.

GENERAL NOTES

Switches.—**S1-S17** are the waveband switches, and **S18-S20** the scale lamp switches, all ganged in two rotary units beneath the chassis. These are indicated in our under-chassis view, and are shown in detail in the diagrams on page VIII. Note the extra switches formed by the two contacts on the rotor of the first switch unit. **S3** appears to be merely incidental to the switching system used. It is not shown in the makers' diagram, but we include it for the sake of completeness.

The table (p. VIII.) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C**, closed.

S21 is the Q.M.B. mains switch, ganged with the volume control **R11.**

Coils.—**L1-L4** and **L6, L7** are on a single unscreened tubular former mounted vertically on the chassis deck. The positions of the individual coils, from top to bottom, are indicated in our plan

Continued overleaf

McMICHAEL 371—*Continued*

chassis view. **L5** is on a separate unscreened former mounted just above the chassis deck. **L9, L10, L12, L13** and the I.F. transformers **L14, L15** and **L16, L17** are in three screened units on the chassis deck. The S.W. oscillator coils **L8, L11** are on an unscreened tubular former beneath the chassis. **L11** is the enamelled wire winding.

Scale Lamps.—There are five of these in all, two being for indirect illumination of the scale, and alight whenever the set is on, the remainder being switched in one at a time by **S18-S20,** according to the waveband in use. The three lamps rotate with the large indicator wheel behind the scale, their connections passing through the hollow spindle and being brought out to flexible leads.

All the lamps are Ever Ready M.E.S. types, 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 O) external speaker.

Components Inside Cabinet.—Apart from the speaker, speaker transformer and speaker field, the following components are inside the cabinet: **R19,** the variable tone control (attached to the left-hand side of the cabinet); **C17,** the tone control condenser; **R20,** the voltage surge reducer; **C18** and **C19,** the H.T. smoothing condensers.

Looking inside the cabinet, with the speaker *in situ*, **T1** being on top, **R19** is connected with its centre tag joined to the second tag from the left of the **T1** connection panel, one outside tag of **R19** going to one side of **C17,** the other outside tag being blank. The other side of **C17** goes to the earthing tag on the speaker chassis.

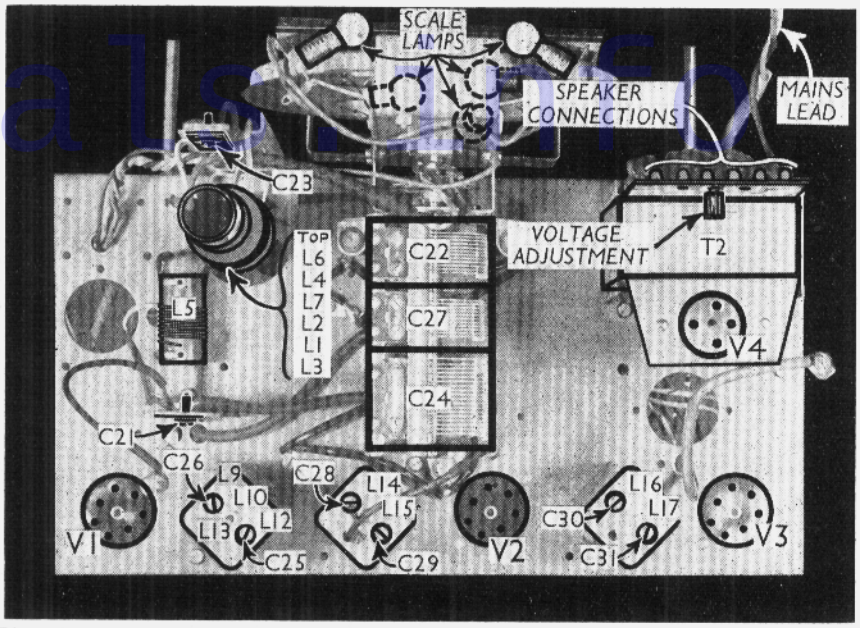
One side of **R20** also goes to this earthing tag, the other side going to the right-hand tag on the **T1** panel.

The common negative (black) lead of the **C18, C19** block goes to the earthing tag on the speaker chassis, the two red leads (positives) going to the extreme left and right-hand tags respectively on the **T1** panel.

Chassis Divergencies.—**S3** is not shown in the makers' diagram (see note under Switches). **R19** is shown as a fixed 50,000 O resistance, not a 100,000 O variable, in the makers' first diagram.

SWITCH TABLE

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



Plan view of the chassis. Note the panel carrying the tags for the speaker connections. (See " Removing Chassis ").

CIRCUIT ALIGNMENT

With the gang at maximum the tuning drive should be adjusted (using the set-screws of the flexible coupling) so that when switched to the M.W. band the orange indicating slit points to the calibration mark which will be found about ½ in. to the right of the 550 m. calibration.

I.F. Stages.—Connect signal generator to grid (top cap) of **V1** and chassis, switch set to M.W., connect a 0·1 μF or larger swamp condenser across **C27,** and feed in a 128·5 KC/S signal. Adjust **C31, C30, C29** and **C28** in turn for maximum output. Re-check, then remove swamp condenser and replace normal top cap connection.

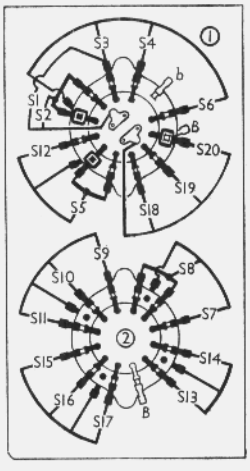
R.F. and Oscillator Stages.—Connect signal generator to **A** and **E** sockets.

M.W.—Switch set to M.W., tune so that pointer light is at the bottom edge of the station name " Rad. Lyons." Inject a 1,400 KC/S (214 m.) signal, and adjust **C25** for maximum output. Then adjust **C23** and **C21** for maximum output.

L.W.—Switch set to L.W., set pointer light to read 1,000 m., and inject a 1,000 m. (300 KC/S) signal. Adjust **C26** for maximum output.

No variable tracking is provided on M.W. or L.W., and no variable trimming or tracking on S.W.

Switch diagrams, looking from the rear of the underside of the chassis. B indicates blank, and b, bearer.



MAINTENANCE PROBLEMS

Instability in Pye T7

AFTER overhauling a Pye model T7 receiver recently a slight " plopping " was noticed when the set was tuned very slightly off the local station. No doubt the job could have been passed out and the customer would not have been any the wiser, but taking no chances it was decided to investigate, and it was found that instability was taking place in the I.F. stage.

Decoupling the anode circuit of this stage effected a complete cure. Most sets these days are designed and work satisfactorily without the I.F. stage decoupled, but I have come across the trouble before.—W.A.D.

Electrolytic Condenser Trouble

ON testing a G.E.C. AVC5 it was found that one section of the main condenser block (electrolytic) had the usual dead short. This condenser has a common positive, so the negative was disconnected, but on checking the total H.T. current load, this was still found to be excessive. The other two sections were also disconnected, and were found to be leaking, leaving only the positive lead connected. The current, however, was still high. There was no short on the lead itself, and it was found that the leakage was actually taking place through the cardboard container to the metal casing in which it is fitted.—W. A. DAVIS, NEWCASTLE-ON-TYNE.

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