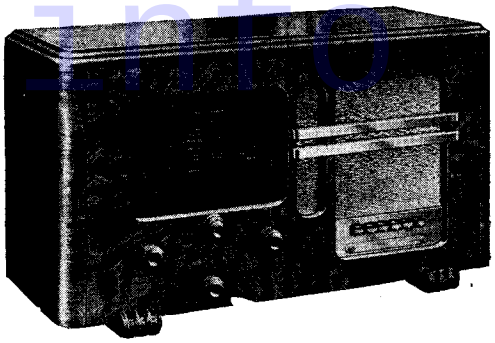
McMICHAEL 381 P.B. FIVE

Four valve, plus rectifier, three waveband manual and press-button tuned table superhet for 200-250 volt, 50-100 cycle, supplies, price 14½ gns.



CIRCUIT OUTLINE

THE input to V1, a triode hexode, is provided either by a push-button tuner with permeability adjustment or by ordinary tuned circuits. The latter provide bandpass input on medium and long waves. On short waves the input is by a simple coupled circuit.

Variable band-width is introduced by a tapped intermediate frequency transformer, the primary winding of which is in the anode circuit of the hexode portion of V1. Use is made of a conventional oscillator circuit, separate heterodyne control resistances being included for each band. The hexode portion has AVC on all bands.

The secondary of IFT1 forms the input to V2, an HF pentode, and this is connected in a standard manner by IFT2 to V3, a double diode triode.

One diode is used for demodulation and the other for AVC. Rectified signal voltages are taken through the usual HF filter to a volume control forming the input to the triode portion. The volume control has a tapping connected to a tone modifying circuit.

Resistance coupling is used between the triode and the input of V4, an output pentode, which feeds the output transformer. The secondary of this transformer has a resistance network used as a feed-back arrangement associated with the tapping on the volume control.

Power supply is taken from V5, a full-wave rectifier, used in conjunction with the speaker field and two smoothing condensers.

CONSTRUCTIONAL FEATURES

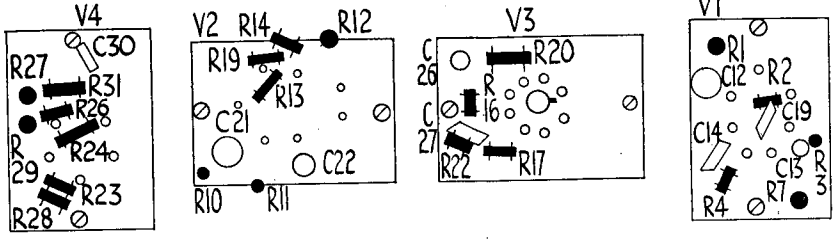
OWING to the unorthodox construction of this receiver we have departed in some details from our normal method of analysis. This set, in common with some of the other McMichael models, employs a unit construction under each valveholder. As this obscures most of the associated components in an ordinary chassis layout, we have provided separate assembly drawings.

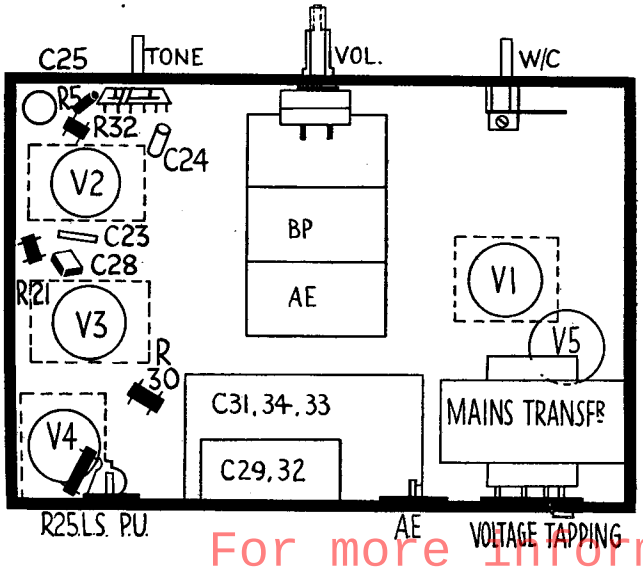
A completely enclosed tuning pack ren-

(*Continued on page 47*)

VALVE READINGS

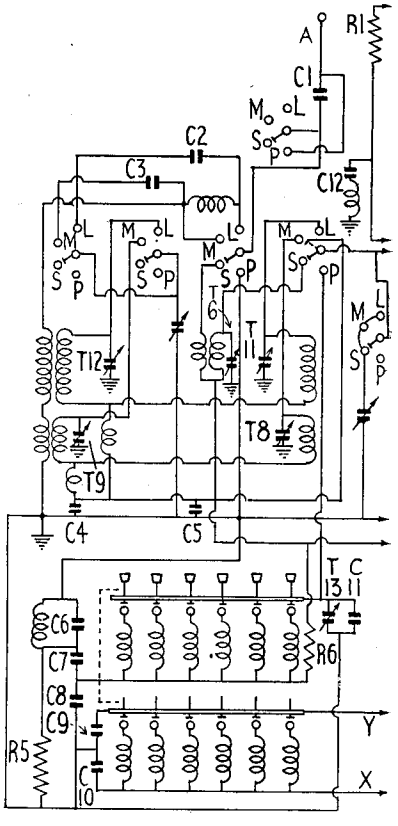
V.	Type.	Electrode.	Volts.	Ma.
	All Mazda.			
1 ..	AC/TH1	Anode ..	228 ..	2
		Screen ..	74 ..	3.85
		Osc.anode	57 ..	3.8
..	AC/VP2 ..	Anode ..	210 ..	9
		Screen ..	223 ..	2.5
3 ..	HL/41/DD	— ..	— ..	—
	Octal.			
4 ..	AC5/Pen..	Anode ..	212 ..	39
		Screen ..	228 ..	7
5 ..	UU4 ..	Heater ..	294 ..	—
	Pilot lamps (*Ever Ready*)	— ..	6.2 ..	300





Above, detail diagrams showing components on the assemblies mounted under the valveholders. The circuit is shown divided only for reasons of presentation.

Left, the under-chassis layout diagram. The dot lines round the valveholders show the positions of the assemblies which are drawn in detail above.



CONDENSERS

		Mfds.
1 ..	Series aerial	.0002
2 ..	LW top coupling	.000012
3 ..	MW aerial coupling	.000007
4 ..	V1 AVC decoupling	.1
5 ..	V1 AVC decoupling	.1
6 ..	Press button primary tune ..	.0007
7 ..	Press button input coupling (part)	.02
8 ..	Press button input coupling (part)	.002
9 ..	Press button osc. tune (part) ..	.000714
10 ..	Press button osc. tune (part) ..	.000212
11 ..	Press button input fixed tune ..	.000075
12 ..	V1 screen decoupling	.1
13 ..	V1 cathode bias shunt	.1
14 ..	V1 osc. grid	.0001
15 ..	MW osc. grid	.0001
16 ..	SW fixed padder	.0035
17 ..	MW fixed padder	.000519
18 ..	LW fixed padder	.000194

10-MINUTE FAULT-FINDER

Power Test.—This test reveals any main H.T. circuit or output valve defects. The two measurement points, *A* and *B*, in common with all the test points given below, are indicated on the circuit diagram. In the receiver they will be found on the upper terminal strip, *A* being the brown lead and *B* the red.

Voltages : *A-E* (chassis), 294; *B-E*, 228.

Resistance : *A-B*, 1,000 ohms.

Total feed : 294-228÷1,000=66 ma.

If defective, check V5 anode volts, 275, and, with set off, resistance *B-E*, 61,500 ohms.

Only when power test is correct, proceed to following tests. When an injection test is satisfactory, proceed at once to injection test on the next stage. Apply voltage and resistance measurements only when faulty stage has been located.

Output Stage, V4.—Inject 2 volts audio frequency between V4 grid (*G* in circuit) and *E*. If defective, check :—

Voltages : *C-E*, 212; *D-E*, 228.

Resistances : *C-B*, 350; *F-E*, 180; *G-E*, 550,000 ohms.

If still defective, examine speaker. When satisfactory proceed to :—

AF Stage, V3.—Inject .5 volt AF V3 grid. If defective, check :—

Voltage : *H-E*, 200.

Resistances : *H-B*, 35,000; *I-E*, 299,500; *J-E*, 1,500 ohms.

Demodulation Stage.—Inject strong 465 kcs. signal V2 anode. If defective, adjust IFT2 trimmer and, if necessary, check :—

Resistances : L3, 12; L4, 12; *L-E*, 251,000 ohms.

I.F. Stage, V2.—Inject 465 kcs. V2 grid. If defective, adjust IFT1 secondary trimmer; check :—

McMICHAEL 381

Voltages : *K-E*, 210; *M-E*, 210.

Resistance : *N-E*, 1 megohm (IFT1 secondary is 3 ohms).

Hexode Section, V1.—Inject 465 kcs. V1 anode. If defective, adjust IFT1 primary trimmer; check :—

Resistances : L1, 6 ohms.

Inject 465 kcs. V1 grid. If defective, check :—

Voltages : *O-E*, 228; *P-E*, 74.

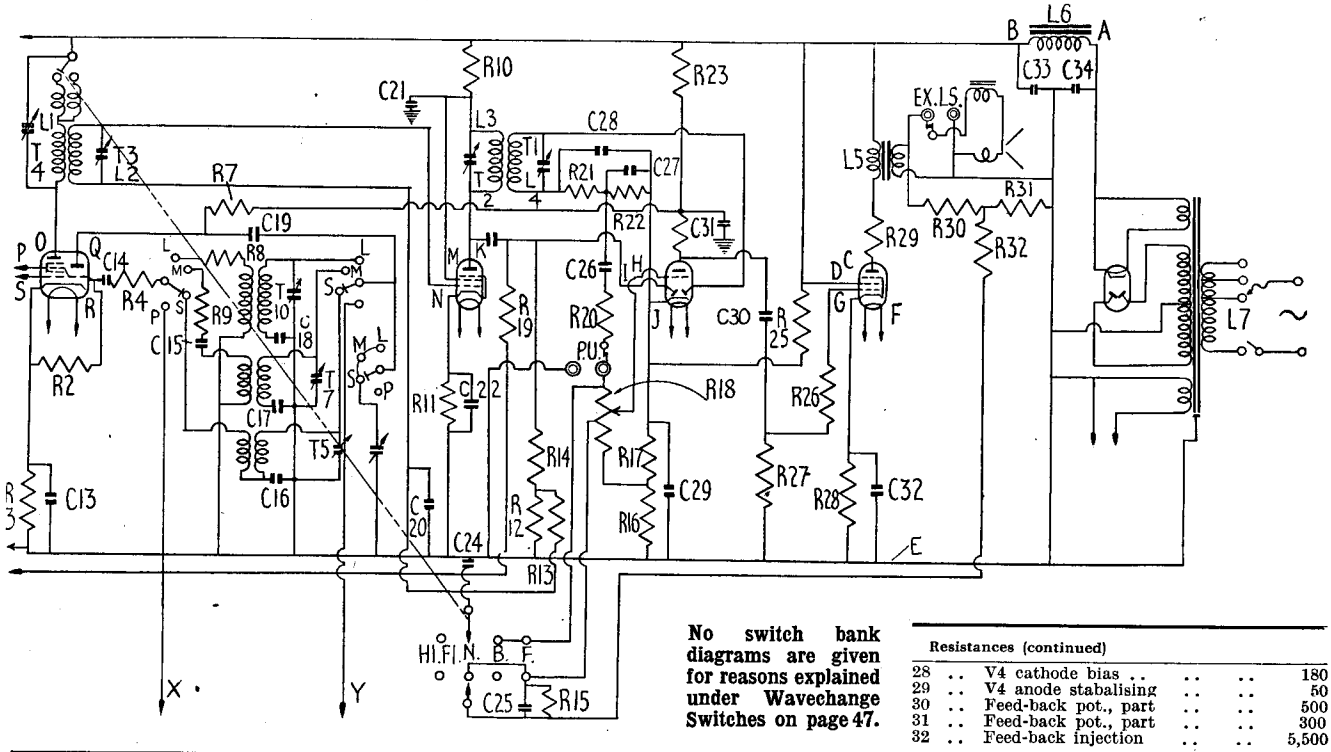
Resistances : *P-B*, 40,000 ohms.

Oscillator Section, V1.—Check :—

Voltage : *O-E*, 57.

Resistances : *A-B*, 45,000; *R-E*, 50,000; *S-E*, 250 ohms.

Input Circuits.—Inject at *R*, 465 kcs. plus frequency of local station. Tune set to local station and, if signals are still absent, check input circuit resistances and switches.



No switch bank diagrams are given for reasons explained under Wavechange Switches on page 47.

Condensers (continued)

19	Oscillator coupling		.0001
20	V2 AVC decoupling		.1
21	V2 screen decoupling		.1
22	V2 cathode bias shunt		.1
23	AVC coupling		.0001
24	Tone compensation		.001
25	Feed-back injection		.06
26	LF coupling		.005
27	HF filter		.0001
28	HF filter		.0001
29	V3 cathode bias shunt		50
30	LF coupling		.01
31	V3 and V1 decoupling		8
32	V4 cathode bias shunt		100
33	HT smoothing		16
34	HT smoothing		8

RESISTANCES

		Ohms.
1	V1 screen feed	40,000
2	V1 osc. grid leak	50,000
3	V1 cathode bias	250

Resistances (continued)

4	Regeneration modifier	100 (150)
5	Press button input impedence	10,000
6	AVC line	2,000
7	V1 osc. anode load	40,000
8	LW het. voltage control	5,500
9	MW het. voltage control	2,500
10	V2 anode decoupling	2,000
11	V2 cathode bias	200
12	AVC diode load, part	500,000
13	AVC decoupling	500,000
14	AVC decoupling	500,000
15	Feed-back input	200,000
16	V3 bias pot., part	1,000
17	V3 bias pot., part	500
18	Volume control	500,000
19	V2 AVC decoupling	500,000
20	HF filter	500,000
21	HF filter	50,000
22	Signal diode load	200,000
23	HT line decoupling	5,000
24	V3 anode load	30,000
25	V3 cathode pot., part	60,000
26	V4 grid stopper	50,000
27	V4 grid leak	500,000

Resistances (continued)

28	V4 cathode bias	180
29	V4 anode stabalising	50
30	Feed-back pot., part	500
31	Feed-back pot., part	300
32	Feed-back injection	5,500

WINDINGS

L.	Ohms.	Range.	Where measured.
1	6	—	V1 anode and HT+
2	3	—	V2 grid and C20.
3	12	—	C21+R10 and V2 anode.
4	12	—	V3 signal diode and C28+R21.
5	300	—	Red and yellow.
6	1,000	—	Red and brown.
7	20	—	Mains plug.
—	21	LW	BP gang aud C4+C5
—	2	MW	BP gang and C4+C5
—	77	LW	AE gang and E
—	17	MW	AE gang and E

Replacement Condensers.

Exact replacements are available from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18. For C29 + C32, there is unit 1,176, 4s. 6d., and for C31 + C33 + C34, unit 3,909, 10s. 6d.

McMichael Model 381

(*Continued from page* 38)

ders all the coils and switches entirely inaccessible without completely dismantling the assembly. This means that the ordinary routine resistance measurements cannot be taken by the service engineer.

In the usual windings table we have shown the resistances between the condenser gangs and chassis or some convenient junction point on the three wavebands. If the measured resistance value is incorrect it then indicates that there is a fault in the coil and switch assembly, and accordingly the tuning pack must be dismantled.

When this is done there will be no difficulty in identifying the coil connections as the respective coils are adjacent to the switch tags and are readily distinguished.

Wave-change Switches.

The complete switch assembly is mounted inside the tuning unit and is not accessible without dismantling the whole tuner unit. The wafers perform the usual functions of selecting the three wavebands and also the press-button pack. In addition they remove the bandpass input or aerial circuits on the short band, connecting the single coupled short wave coil to the grid circuit of V1.

The fidelity switch is a separate unit, and in the high fidelity position puts in the IFT primary tapping to increase the band width.

In the "bass" and "foreign" positions the volume control is shunted by a fixed condenser. In the "bass" position a bass lift filter is included in the feedback or tone modifying circuit.

Chassis Removal.

Remove the five knobs by releasing the grub screws and then release the four main chassis retaining bolts. This chassis is connected to a subsidiary chassis, which is held by four wood screws accessible from the inside of the cabinet.

The latter carries the speaker and press button tuning pack and is connected to the main one by two strips, each carrying six terminals. The top strip is connected to a multiple cable with the colours in the following order: Blue, white, green, yellow, red, brown.

Separate leads connect the second strip as follows, reading from the top downwards: Plain, black, black slip back, green slip back, blue, and red.

Alignment

IF Circuits. (Intermediate frequency 465 kcs.)

Connect an output meter to the extension speaker sockets and a signal generator to the grid of V1, shorting out the oscillator section. Tune the generator to 465 kc. and tune T1, T2, T3 and T4 for maximum, using a value below the AVC level.

Before tracking the signal circuits, check the alignment of the scale and pointer in the following manner. Slacken the glass scale and align the two red rings with the holes in the metal back plate. Turn the condenser to its mechanical maximum and see that the three pointers are in line with the marks at the extreme bottom of the wavelength scale.

Short Waves. (19-50 metres.)

Connect generator to the aerial and earth, unshort the oscillator section and tune set and generator to 15.3 mc. Adjust T5 for resonance and T6 for maximum.

The correct scale setting is with the pointer mid-way between the top of the scale and the 20 metre calibration.

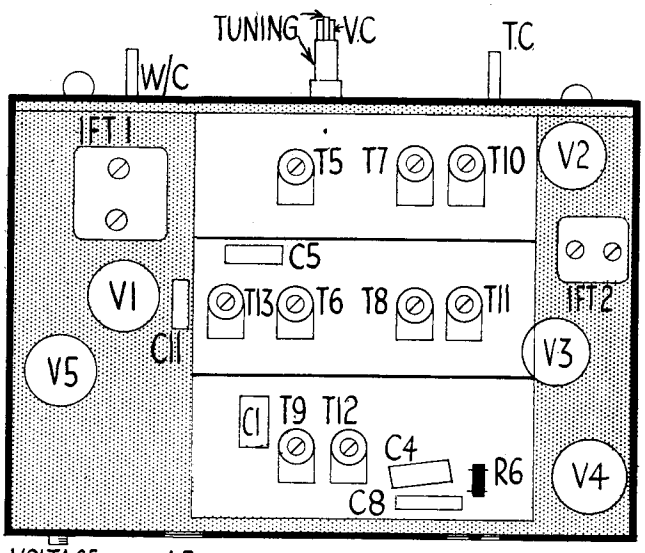
Medium Waves. (200-550 metres.)

Tune set and generator to 214 metres (indicated by a small dot on the tuning scale) and adjust T7 for resonance and T8 and T9 for maximum.

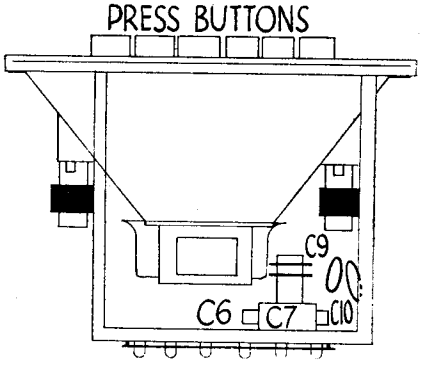
Long Waves (900-2,000 metres.)

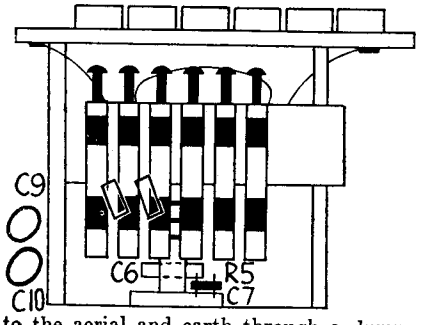
Tune set and generator to 1,125 metres (273 kc.) and adjust T10 for resonance and T11 and T12 for maximum.

The top of the main chassis carries the trimmers. Alignment notes are given on this page.



Below are two layout diagrams of the components associated with the push button coils on the speaker sub-assembly.





Push-Buttons

TO adjust a push-button, remove the strip from under the buttons by taking out the two screws. Then adjust the appropriate screw rod for the station required.

Aerial and oscillator coil cores are ganged and hence only the one adjustment has to be made for each button.

The lowest wave-range button is on the extreme right. All the buttons have wider ranges, however, and the arrangement is very flexible for station selection.

Check whether the correct station has been tuned in by switching over to manual.

When all the buttons seem out of adjustment or any work has been done on the push-button circuits, it is necessary, since aerial and oscillator circuits are ganged to realign them.

Inject a modulated signal of 214 metres to the aerial and earth through a dummy aerial and connect an output meter.

Reduce all the cores to minimum wavelength except the one on the extreme right.

Push in the button for the latter and adjust this core and T13 for maximum, using a low signal.

Then set up the other buttons as required without altering T13.

Cameo ABX

(*Continued from page* 50)

a multiple cable and the colours are as follows: Top connection, green; tapping point, red; lower end, black.

IF Circuits (Frequency 430 kcs.)

Connect an output meter to the set and a generator to the grid of V1.

Tune the set to 200 metres and inject a signal of 430 kcs., using a low value below the AVC level. Progressively adjust the permeability cores of the IF transformers. (Some sets appear to have a transformer with trimmer tuning in the second stage.)

Short Waves (15 to 60 metres.)

Tune set and oscillator to 19 metres and adjust T1 and T2 for maximum.

Medium Waves (200 to 550 metres).

Tune set and generator to 200 metres and adjust T3 and T4 for maximum.

Tune set and generator to 500 metres and adjust P1 for maximum.

The oscillator trimmers in the set examined comprised trimming cores in the centres of the medium and long wave oscillator coils and not trimmers as shown in the circuit.

Long Waves (850 to 2,200 metres).

Tune set and generator to 1,300 metres and adjust T5 and T6 for maximum.

Tune set and generator to 1,800 metres and adjust P2 for maximum.