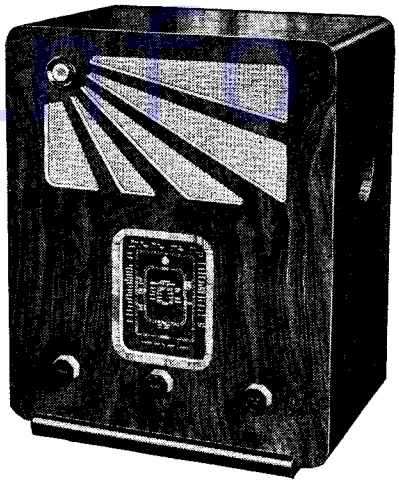
McMICHAEL MODEL 374 TRANSPORTABLE SIX



Five valves and a rectifier are used in this frame aerial A.C. transportable by McMichael. Three wavebands are covered.

CIRCUIT.—Self-contained frame aerial windings constitute the grid coils of V1, a pentode operating as an H.F. amplifier. Provision is made so that an external aerial can be connected.

V1 is coupled to V2, a triode-hexode frequency changer, by H.F. transformer coils, the secondaries of which are tuned. It will be noticed that in the oscillator section separate regeneration modifier resistances are included for each waveband. Fixed padding condensers are used.

An I.F. transformer, tuned to 128.5 kc., and with its secondary shunted by a 500,000 ohms resistance, effects the coupling between V2 and V3, the I.F. amplifier. Extra cathode bias, provided by R5, is applied both to V1 and V3 when the receiver is operating on the medium and long waves.

A second I.F. transformer provides the coupling between V3 and the demodulating diode of V4, a double diode triode. The connection to the demodulating diode load includes an H.F. filter and a noise suppression circuit controlled by a switch. The potentials from the demodulating diode load also operate the visual tuning indicator. The other diode of V4 provides a D.C. potential fed back *via* decoupling circuits to the grids of V1, V2 and V3 for automatic volume control.

The triode section of V4 operates only on the short waves. On the short waves V4 is resistance capacity coupled to the output pentode. On the medium and long waves V5 is fed from the demodulating circuit *via* a coupling arrangement, including a manual volume control.

R35 and C34 provide a tone control circuit, and C33 forms the usual pentode compensator.

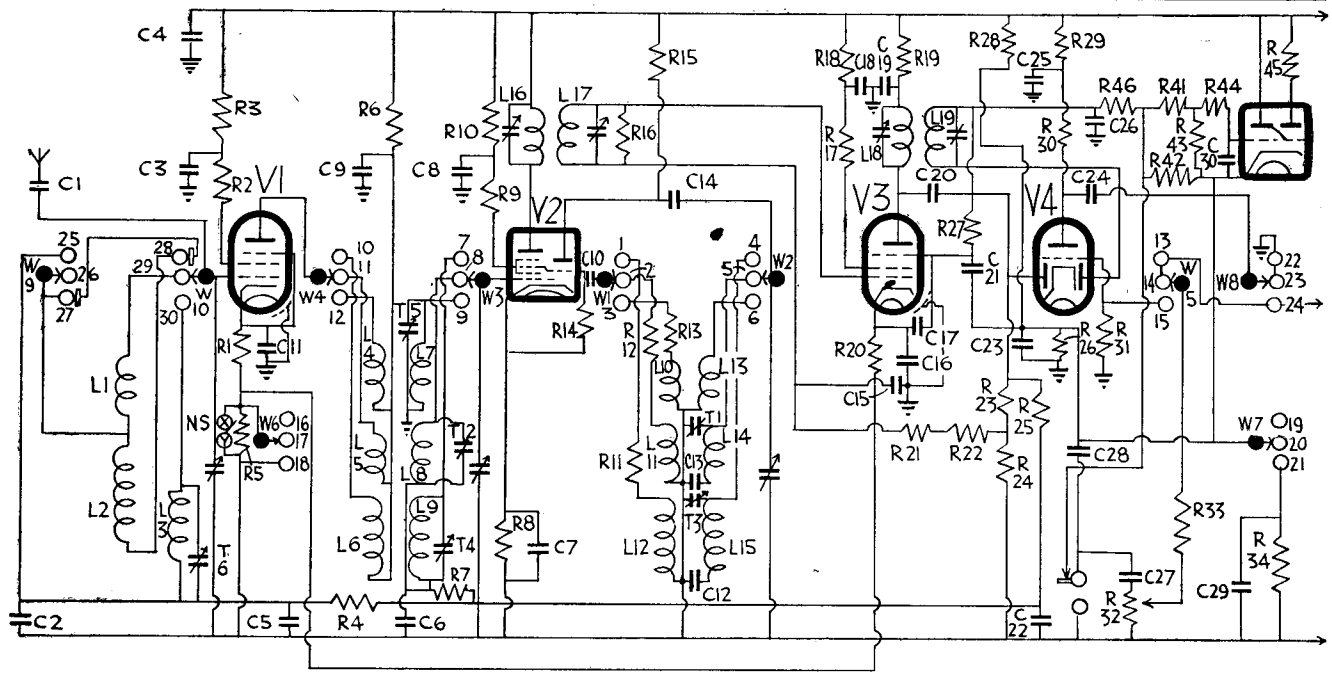
VALVE READINGS

No signal. Volume maximum. M.W. min. cap. except where stated. 200 volt A.C. mains.

V.	Type.	Electrode.	Volts.	Ma.
	All Mazda.			
1	AC/VP2 ..	Anode ..	240	3.8
		Screen ..	240	1
2	ACTH1 ..	Anode ..	265	2.1
		Screen ..	80	4.5
		Osc.anode	68	5
3	AC/VP2 ..	Anode ..	240	3.8
		Screen ..	240	1
4	AC/HL DD ..	Anode ..	160	.5
		SW band only.		
5	AC2/Pen ..	Anode ..	255	28
		Screen ..	265	6.8
6	UU4	Cathode..	350	—

CONDENSERS

C.	Purpose.	Mfds.	C.	Purpose.	Mfds.
1	External aerial coupling ..	.00001	20	A.V.C. diode coupling ..	.0001
2	V1 A.V.C. decoupling (part)	.01	21	V3 suppressor grid coupling..	.03
3	V1 screen decoupling ..	.1	22	A.V.C. line decoupling ..	.1
4	H.T. line bypass	.1	23	V4 cathode bias shunt ..	.1
5	V1 A.V.C. decoupling (part)	.1	24	L.F. coupling	.01
6	V2 A.V.C. decoupling ..	.1	25	V4 anode decoupling ..	4
7	V2 cathode bias shunt ..	.1	26	H.F. bypass	.0001
8	V2 screen decoupling ..	.1	27	L.F. coupling..	.005
9	V1 anode decoupling ..	.1	28	H.F. bypass	.0001
10	Osc. grid	.0001	29	T.I. and V4 cathode bias shunt.	50
11	V1 cathode bias shunt ..	.1			
12	L.W. osc. fixed padder ..	.00023	30	T.I. grid decoupling ..	.1
13	M.W. osc. fixed padder ..	.000719	31	L.F. coupling..	.1
14	Osc. anode coupling ..	.0001	32	V5 cathode bias shunt ..	25
15	V3 A.V.C. decoupling ..	.1	33	Pentode compensator ..	.002
16	V3 cathode bias shunt ..	.1	34	Tone control	.03
17	V3 suppressor grid shunt ..	.01	35	H.T. smoothing	8
18	V3 screen decoupling ..	.1	36	H.T. smoothing	8
19	V3 anode decoupling ..	.1			



An H.F. amplifier precedes the frequency changer to give the extra gain required by a frame aerial set. A distinctive feature is only on short waves. There is also an interesting noise suppression circuit.

Mains equipment consists of a mains transformer, a full-wave rectifying valve, V6, electrolytic smoothing condensers and a smoothing choke (the speaker field coil).

Chassis Removal.—Take off the back, the three spring-fixed control knobs from the front, the spring-fixed tone control knob from the side, and also the tone control resistance. The wire from the tone control resistance to the metal plate on the side of the cabinet has to be unsoldered.

Remove the chassis securing bolts from the base and the four nuts from the ends of the woodcross-bar that supports the electrolytic smoothing condenser block and the mains transformer, etc.

It is then found possible to withdraw the chassis, speaker and frame aerial structure as a complete unit.

The L.F. section of the underside of the chassis is shielded by a metal screen secured by six nuts. This screen must be removed if the L.F. circuits require testing. To remove the screen, detach the six nuts, bolts and lock washers and also the two bolts on either side of the chassis securing the under-chassis bracing piece and the nuts and bolt securing the bracing piece to the frame aerial structure.

Special Notes.—A pair of sockets at the rear of the chassis enables an external aerial and earth system to be connected. Another pair of sockets at the rear of the chassis is for operating an external speaker of some 2 to 3 ohms impedance. If the special plug supplied is used, then control of the internal speaker can be obtained.

An adjacent pair of sockets enables a pick-up to be connected. The special plug supplied should be used, as insertion of it cuts off radio reception.

A Q.M.B. switch at the rear of the chassis controls the noise suppression circuit. When the switch is "up" the

(Continued on page 13)

RESISTANCES

R.	Purpose.	Ohms.	R.	Purpose.	Ohms.
1	V1 cathode bias (part) ..	750	25	A.V.C. line decoupling ..	1 neg.
2	V1 screen stopper	50	26	V4 cathode potentiometer (part).	2,000
3	V1 screen decoupling ..	10,000			
4	V1 A.V.C decoupling ..	500,000	27	V3 suppressor load	1 meg.
5	V1 and V3 cathode bias (part)	750	28	V4 cathode potentiometer (part).	40,000
6	V1 anode decoupling ..	5,000			
7	V2 A.V.C. decoupling ..	500,000	29	V4 anode decoupling ..	25,000
8	V2 cathode bias	350	30	V4 anode load	30,000
9	V2 screen stopper	50	31	V4 grid leak	500,000
10	V2 screen decoupling ..	40,000	32	Volume control	500,000
11	L.W. regeneration modifier ..	5,000	33	H.F. stopper	100,000
12	M.W. regeneration modifier ..	2,000	34	T.I. and V4 cathode bias ..	350
13	S.W. regeneration modifier ..	40	35	Tone control	100,000
14	Osc. grid leak.	50,000	36	V5 cathode bias (part) ..	350
15	Osc. anode load	40,000	37	V5 cathode bias (part) ..	150
16	I.F.T.1 sec. shunt	500,000	38	V5 grid leak	250,000
17	V3 screen stopper	50	39	V5 grid stopper	100,000
18	V3 screen decoupling ..	10,000	40	V5 anode stabiliser	50
19	V3 anode decoupling ..	5,000	41	T.I. grid feed	1 meg.
20	V3 cathode bias (part) ..	400	42	Demodulating diode load ..	500,000
21	V3 A.V.C. decoupling (part)	500,000	43	T.I. grid leak	250,000
22	V3 A.V.C. decoupling (part)	500,000	44	T.I. grid decoupling	250,000
23	A.V.C. diode load (part) ..	500,000	45	T.I. anode feed	2 meg.
24	A.V.C. diode load (part) ..	500,000	46	H.F. stopper	100,000

McMichael 374 on Test

MODEL 374.—Standard model for A.C. mains operation, 200-260 volts, 40-100 cycles. Price 16 gns.

DESCRIPTION.—Transportable five-valve, plus rectifier, superhet receiver.

FEATURES.—Full-vision scale calibrated in metres and station names with separate illuminated pointers to each scale. Pointers also give waveband indication. Visual tuning indicator. Controls for wave selection, tone, flywheel tuning and combined volume control and master switch. Noise-suppression switch at rear of chassis. Sockets for external aerial and earth, pick-up and extension speaker.

LOADING.—68 watts.

Sensitivity and Selectivity

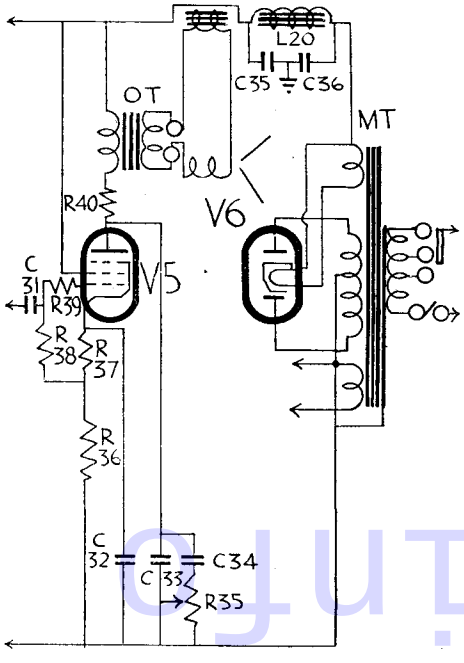
SHORT WAVES (16.5-51 metres).—Excellent selectivity and general all-round performance. Very easy handling. No drift.

MEDIUM WAVES (200-550 metres).—Excellent gain and representative selectivity. Background good and no undue second channel for a frame aerial set.

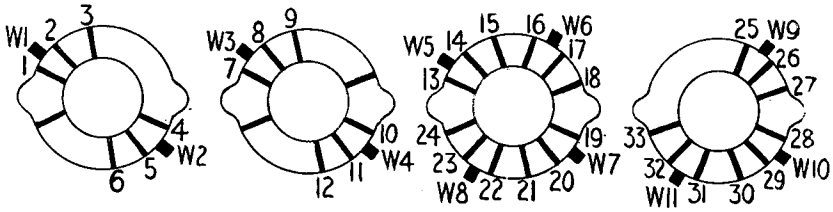
LONG WAVES (700-2,000 metres).—Excellent gain and selectivity. Deutschlandsender received free of interference.

Acoustic Output

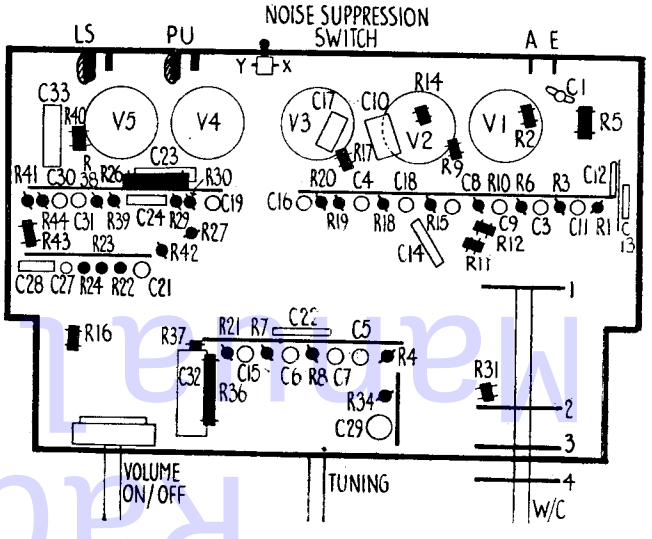
Ample volume for an ordinary room, with good high-note response and excellent attack. Very good low-note radiation and generally well-balanced reproduction. Tone control quite vigorous.



that the triode section of V4 operates



Above, the switch banks one to four (left to right) drawn as seen from the back of the chassis.



Right, the diagram identifying the parts on the underside of the 374 chassis. The top "deck" diagram is given on page 13.

McMichael 374 Transportable

(Continued from page 9)

noise suppression circuit comes into operation.

The electrolytic smoothing condenser block (C25, C35 and C36) is mounted on the wood cross-bar, which also supports the mains transformer and rectifying valve, V6. The tone control resistance and condenser (C34 and R35) are mounted on the side of the cabinet. The visual tuning indicator is secured with its holder on the speaker baffle board; on its holder are located R28 and R45.

The mains adjustment, located on the mains transformer, consists of a threaded member adapted to make contact with one of three inscribed sockets.

The combined dial illumination and waveband indication lights, of which there are three, are mounted in screw-in holders on the rotating drum behind the wavelength scale. They have M.E.S. bases, and are rated at 6.2 volts .3 amp.

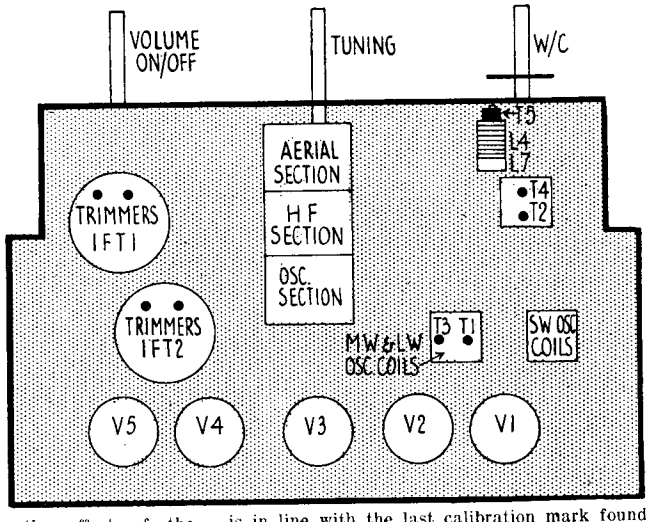
In our particular chassis R11 was found to have a value of 2,000 ohms and C22 was .01 mfd. R25, R42. C20 and C26 are contained in I.F.T.2. C2 is mounted on the frame aerial structure near T6. The short wave padding condenser is included in the oscillator coil can with R13.

Noise Suppression Circuit.—A noise suppression circuit controlled by a switch is included in this receiver enabling "quiet" reception to be obtained in "noisy" localities. V4 is given a positive potential of about 12 volts by a potentiometer between the H.T. positive line and chassis. This potential is only applied on the medium and long wave bands as on S.W. the cathode is returned to chassis *via* R26 and R34 connected in parallel.

The "cold" end of the secondary winding of the second I.F. transformer is connected to the demodulating diode load and also to the suppressor electrode of V3 *via* R27. The suppressor grid is used as a diode and saves the use of a separate valve. The noise suppression switch (N.S.) is open when in use and brings R5 into operation.

The demodulating diode of V4 has a quieting or quenching voltage applied to it when operating on the medium and long wavebands and, in effect, this potential is obtained from a potentiometer, R27 and R42. This voltage is approximately a third of the voltage applied to the cathode of V4—*i.e.*, about 4 volts.

When a signal is tuned in the diode (suppressor electrode) becomes of infinitely high impedance, the quenching voltage on the diode of V4 is removed and normal operation ensues. When the "noise suppression" comes into operation an extra bias is applied both to V1 and V3, and, therefore, a stronger signal will be needed to neutralise the effect of the quenching voltage, as both V1 and V2 are in a less sensitive condition.



The valves are accessibly arranged along the rear of the 374 chassis as the top "deck" diagram shows. Construction throughout is on particularly orderly lines.

Alignment Notes

I.F. Circuits.—Connect an output meter across the primary of the speaker transformer and a service oscillator between the top grid cap of V2 and chassis. Switch receiver to M.W. band, turn gang to maximum capacity, volume to maximum and tone to "high."

Tune the service oscillator to 128.5 kc., and adjust the trimmers of I.F.T.2 and then I.F.T.1 for maximum response, reducing the input from the service oscillator as the circuits come into line to render the A.V.C. inoperative.

Signal Circuits.—Connect the leads from the service oscillator to a few turns of wire and bring these close to the cabinet, so that a signal is heard. As the volume increases, owing to adjustment of trimmers, move the coil further away, so that the receiver always operates below the A.V.C. level.

With gang at maximum, check that the leading edge of the medium wave tuning light is in line with the last calibration mark found 3-16 in. from the top (high wavelength) end of the medium wave scale.

Medium Waves.—Tune set and oscillator to 214 metres (1,400 kc.). On the set scale this is the short line opposite Radio Lyons. Adjust T1 and T2 for maximum response.

The medium wave padding is fixed, but if calibration is very much out at 500 metres (600 kc.), compensate with T1, and then retrim T2 on a 214 metres signal.

Long Waves.—Tune set and oscillator to 1,000 metres (300 kc.), and adjust T3 and T4 for maximum response. L.W. padding is fixed.

Short Waves.—Tune set and oscillator to 16.5 metres (18.2 mcs.) and adjust T5 and T6 for maximum response. T6 is the trimming condenser mounted on the frame aerial structure.

Replacement Condensers.

Exact replacement condensers are available for the McMichael 374 from A. H. Hunt, Ltd. These are: for the block containing C35, 36 and 25, unit 3666, 8s. 6d.; for C29, 2915, 1s. 9d.; and for C32, 2918, 1s. 9d

WINDINGS (D.C. Resistances)

Winding.	Ohms.	Range.	Where measured.	Winding.	Ohms.	Range.	Where Measured
L1 ..	25.4	L.W.	Top grid V1 and C2.	L12+R13	52	S.W.	C10 and chassis.
L2 ..	2.2	M.W.	Top grid V1 and C2.	L13 ..	13	L.W.	C14 and C 12.
L3 ..	Low	S.W.	Top grid V1 and C2.	L14 ..	3	M.W.	C14 and C13.
L4 ..	5.2	L.W.	Anode V1 and R6+C9.	L15 ..	Low	S.W.	Inaccessible.
				L16 ..	42	—	Across I.F. tags
L5 ..	4.5	M.W.	Anode V1 and R6+C9.	L17+R16	42	—	Across I.F. tags.
				L18 ..	42	—	Anode of V3 and R19.
L6 ..	.2	S.W.	Anode V1 and R6+C9.	L19 ..	—	—	Inaccessible.
				L20 ..	1,200	—	1st and 6th tags spkr. trans.
L7 ..	19.6	L.W.	Top grid V2 and R7+C6.	O.T. prim.	550	—	1st and 5th tags spkr. trans.
L8 ..	1.7	M.W.	Top grid V2 and R7+C6.	M.T. prim.	17	—	Across mains plug.
L9 ..	Low	S.W.	Top grid V2 and chassis.	Total H.T sec.	300	—	Across anode pins V6.
L10 ..	4.5	L.W.	R11 and chassis.				
L11 ..	2.2	M.W.	R12 and chassis.				

Alignment Notes for Ferranti Model 513A.M.

(Continued from page 5.)

I.F. Circuits.—Connect an output meter across the primary of the speaker transformer, inserting a 2 mfd., 350 volt working, condenser in series with one of the leads. Switch receiver to M.W. band, turn gang to maximum, volume to maximum and tone to high position. Connect a service oscillator between the top grid of V1 cap (via a .01 condenser) and chassis.

Tune service oscillator to 450 kcs., and adjust TC1, TC2, TC3 and then TC4 for maximum response, reducing the input from the service oscillator as the circuits come into line in order to keep the signal below the point at which the A.V.C. operates.

Signal Circuits.—Connect the service oscillator to the A and E sockets *via* a dummy aerial only feeding sufficient input to obtain reliable peaks in the output meter and reducing the input as the circuits come into line.

Short Waves.—With the gang condenser at minimum capacity (vanes fully out) inject a weak signal of 16.6 metres (18 mcs.) and adjust T1 to obtain the signal. Rotation of T1 may produce more than two signals, but the output of the service oscillator should be adjusted until only two peaks are heard. The correct peak is the one obtained with T1 in the smaller capacity (anti-clockwise) position.

Medium Waves.—With vanes still fully out, inject a weak 200 metres (1,500 kcs.) signal, screw T2 right up and then unscrew until the second peak is heard.

Set service oscillator to 228 metres (1,316 kcs.), tune in on receiver and adjust T3.

Set service oscillator to 500 metres (600 kcs.), tune in on receiver and adjust P1 for maximum, simultaneously rocking the gang.

Repeat all operations until no further improvement results. Then turn gang to maximum capacity, tune service oscillator to 666.6 metres (450 kcs.), increase input from oscillator until the signal registers on the output meter and then adjust T4 for maximum or zero deflection.

Long Waves.—Set oscillator to 1,128 metres (266 kcs.), tune in on receiver and adjust T5 for maximum, simultaneously rocking the gang.

Set oscillator to 1,807 metres (166 kcs.), tune in on receiver and adjust P2 for maximum, simultaneously rocking the gang.

Repeat both operations until no further improvement results. Then set oscillator to 261 metres (1,149 kcs.), tune in harmonic on receiver (about 1,200 metres), increase input from service oscillator until signal registers on the output meter, then adjust T6 for minimum or zero deflection.

Replacement Condensers.

Exact service replacement condensers for the 513 A.M. are available from **A. H. Hunt, Ltd.**

For the block containing Cs 30 and 31 there is unit 1992, price 8s. 6d.; for the block containing Cs 15 and 26, unit 4162, 6s. 6d., and for either C10, C14 or C25, unit 3542, 2s.