# "TRADER" SERVICE SHEET MCMICHAEL 484

# Covering 487 Console and 486 Radiogram

POUR wavebands are covered in the McMichael 484, a 4-valve battery-operated superhet in a table cabinet, with Q.P.P. output. The wavebands are: 16.5-50 m (S.W.1); 50-175 m (S.W.2); 170-550 m (M.W.); 750-2,000 m (L.W.). There is provision for the connection of a gramophone pick-up and an external speaker.

The 487 is a console employing an identical chassis, and the 486 is a radiogram conforming electrically to the 484 chassis but with a different scale assembly which is equipped with scale lamps.

Release dates and original prices: 484, March, 1948, £23 17s 9d; 487, May, 1948, £28 13s 8d; 486, May, 1948, £50 14s 9d, without batteries and plus purchase tax in each case.

### CIRCUIT DESCRIPTION

Aerial input via I.F. rejector L1, C1 and coupling coils L2 (S.W.I), L3 (S.W.2), L4 (M.W.) and L5 (L.W.) to single-tuned circuits L6, C35 (S.W.I), L7, C35 (S.W.2), L8, C35 (M.W.) and L9, C35 (L.W.), which precede an octode valve (V1, Mult-

lard metallized KK32) operating as frequency changer with electron coupling.

Triode oscillator grid coils L10 (S.W.1), L11 (S.W.2), L12 (M.W.) and L13 (L.W.) are tuned by C36, with parallel trimming by C37 (S.W.1), C38 (S.W.2), C39 (M.W.) and C12, C40 (L.W.); series tracking by C13 (S.W.1), C14 (S.W.2), C15 (M.W.) and C16 (L.W.). Reaction coupling from anode, via C17, by anode coils on all bands, with additional coupling on S.W.1 and S.W.2 due to the common impedance of the trackers in the grid and anode circuits.

Second valve (V2, Mullard metallized KF35) is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings C8, L18, L19, C9 and C19, L20, L21, C20, C21, in which the tuning capacitors are fixed and alignment adjustments are carried out by varying the positions of the iron-dust cores.

# Intermediate frequency 465 kc/s.

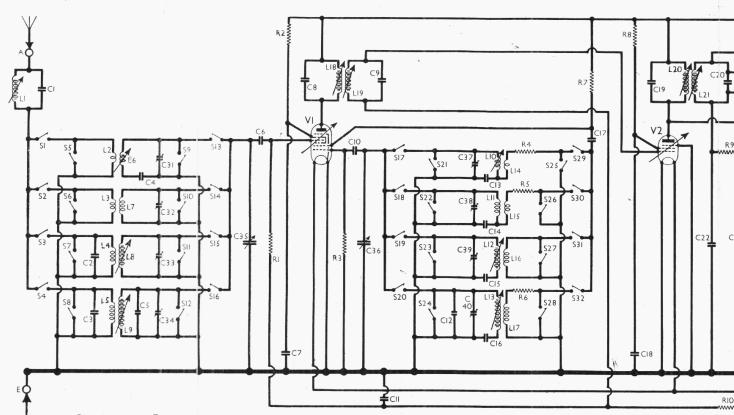
Diode second detector is part of double diode triode valve (V3, Mullard metallized KBC32). Audio frequency component in rectified output is developed across diode

load resistor R11 and passed via A.F. coupling capacitor C25 and manual valume control R12 to C.G. of triode section, which operates as A.F. amplifier. I.F. filtering by C22, R9, C23 in diode circuit, and provision for the connection of a gramophone pick-up across R12, via S34. A switch, S35, is provided to disconnect the filament circuit of V1 and V2 from the L.T. accumulator when the receiver is switched to "Gram."

Second diode of **V3**, fed from **V2** anode via **C24**, provides D.C. potential which is developed across load resistor **R14** and fed back through a decoupling circuit **R10**, **C11** as G.B. to F.C. and I.F. valves, giving automatic volume control.

Parallel-fed transformer coupling by C26 and T1, between V3 triode and double pentode quiescent push-pull output valve (V4, Mullard KLL35). Fixed tone correction in anode circuit by C27, and two-position tone control by C28, C29 and S36, S37. Provision for the connection of a low impedance external speaker across T2 secondary winding.

across **T2** secondary winding.
G.B. potential for **V4** is obtained from the drop across **R18** in the H.T. negative lead to chassis.



Circuit diagram of the McMichael 484, which applies equally to the 486 and 487. C21 is connected in parallel with C20, but it is beneath the chassis, outside the I.F. transformer assembly. The numbers associated with the speaker transformer T2 connections refer

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# **COMPONENTS AND VALUES**

	CAPACITORS	Values (μF)	Loca- tions	
C1	I.F. rejector tune	0.0005	J7	
C2	Aerial M.W. shunt	0.0001	J4	
C3	Aerial L.W. shunt	0.001	G4	
C4	Aerial S.W.1. track	0.0015	G5	
C5	Aerial L.W. trim	0.000025	G4	
Č6	V1 pent C.G	0.00015	C2	
Č7	V1 S.G. decoup	0.1	H7	
Č8	) 1st I E transformer (	0.0001	A3	
C9	\begin{cases} \text{1st I.F. transformer } \text{tuning } \end{cases}	0.0001	A3	
C10	V1 osc. C.G.	0.00015	H7	
C11	A.V.C. decoupling	0.1	K7	
C12	Osc. L.W. trim	0.000025	G6	
C13	Osc. S.W.1. track	0.000	G6	
C14	Osc. S.W.2. track	0.0018	J7	
C15	Osc. M.W. track	0.000538	16	
C16	Osc. L.W. track	0.00016	G6	
C17	Osc. anode coup	0.0001	H7	
C18	V2 S.G. decoup	0.1	K5	
C19		0.0001	A2	
C20	2nd I.F. transformer	0.0001	A2	
C21	tuning	0.000005	K5	
C22	\	0.00000	K5	
C23	I.F. by-passes	0.0001	K5	
C24	)	0:0001	K5	
C25	A.V.C. coupling  A.F. coupling capa-	0:000023	K5	
C26	citors	0.1	F5	
C27	Tone corrector	0.002	F4	
C28	Tone control capa-	0.002	F4	
C29	citors	0.003	F4	
C30	H.T. reservoir	0.5	K7	
C31±	Aerial S.W.1. trim.	0.00004	G5	
C321	Aerial S.W.2. trim.	0.00004	J5	
C331	Aerial M.W. trim.	0.00004	J5	
C341	Aerial L.W. trim	0.00004	G5	
C35†	Aerial tuning	0.00004	C2	
C36†	Osc. tuning		C2	
C371	Osc. S.W.1, trim,	0.00004	G7	
C38†	Osc. S.W.1. trim	0.00004	J7	
C391	Osc, M.W. trim,	0.00004	J7	
C401	Osc. L.W. trim	0.00004	G7	
0404	OSC. L.W. UIIII	0.00004	01/	

‡ Variable.

† Pre-set.



The appearance of the McMichael 484 table superhet.

RESISTORS	Values (ohms)	Loca- tions
R1	470,000 47,000 33,000 22 270 22,000 120,000 470,000 4,000,000 1,000,000 1,20,000 1,200 33,000 1,200	C3 H7 H7 H7 H6 H7 K6 K5 K4 K4 K4 F6 F6

OTI	HER COMPONENTS	Approx. Values (ohms)	Loca- tions
L1	I.F. rejector coil	4.0	J7
L2		Very low	G5
L3	Aerial coupling coils	0.6	J5
L4	Aeriai coupling const	16.0	J4
L5		27.0	G4
L6		Very low	G5
L7	Aerial tuning coils	0.5	$J_5$
.L8	(Actial tuning cons)	2.6	J4
L9		19.0	G4
L10		Very low	G7
L11	(Oscillator tuning)	0.4	J7
L12	coils	1.7	J6
L13	)	$7 \cdot 3$	G6
L14		0.5	G7
L15	Oscillator reaction)	1.2	J7
L16	( coils)	1.4	J6
L17	1	3.0	G6
L18	1st I.F. trans.	10.0	A3 .
L19	( 560.	10.0	A3
L20	\ \rangle 2nd I.F. trans. \{\begin{aligned} \text{Pri.} \\ \text{Soc} \end{aligned}	10.0	A2
L21	) ( 500.	9.5	A2
L22	Speech coil	2.0	
T1	Intervalve Pri	850.0	F7
	trans. \ Sec., total	2,600.0	F7
T2	Speaker Pri., total	820.0	
0.00	trans.\ Sec	0.4	
Sil-			
832	W/band switches		-
S33-			
835	Radio/Gram. switches		
S36,			T14
837	Tone cont. switches		F4
S38	Battery switches,		K4
S39	∫ ganged R12 \		K4

# **VALVE ANALYSIS**

Valve voltages and currents in the table overleaf are those measured in our receiver when it was operating from a new H.T. battery measuring 144 V on load. The receiver was tuned to the (Continued col. 1 overleaf)

RED (1967-5)

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ons refer to the pins of the speaker plug, a diagram of which is inset in the circuit diagram. S35 opens on gram to economise in L.T. current.

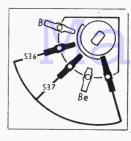


Diagram of the tone control switch unit, drawn as seen from the rear of an i n v e r t e d chassis.

lowest wavelength on the M.W. band, and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Avometer, chassis being the negative connection.

	Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA).
V1	KK32	$\left\{\begin{array}{c} 132\\ \text{Oscil}\\ 83 \end{array}\right.$	$\left\{\begin{array}{c} 1\cdot1\\ \text{llator} \end{array}\right\}$	53	1.5
V2 V3 V4	KF35 KBC32 KLL35	132 53 130*	2·0 2·4 0·6	$\frac{48}{132}$	0.7

\* Each anode.

# DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws); withdraw the speaker plug from its socket on the chassis deck;

remove the two large hexagon head screws (with metal washers) securing the chassis to the base of the cabinet, and withdraw the chassis from the cabinet, lifting the rear edge slightly while doing so.

Removing Speaker.—Withdraw the connecting plug from its socket on the chassis deck;

remove the four nuts (with metal washers) holding the speaker to the sub-baffle.

When replacing, the transformer should be on the left, and if the leads have been unsoldered they should be reconnected as follows, numbering the tags on the connecting panel from left to right when viewed from the rear: 1,

black; 2, yellow; 3, red; 4, yellow; 5, black.

## **GENERAL NOTES**

Switches.—S1-S35 are the waveband and radio/gram change-over switches, ganged in three rotary units beneath the chassis. These units are indicated in our underchassis view, where they are identified by numbers in diamonds. Arrows there indicate the direction in which they are viewed in the diagrams (next col.) where they are shown in detail.

Although these arrows point to the front faces of the wafers, the units are actually viewed in this direction from the rear of the chassis, and to do this the chassis must be tilted up so that the deck is vertical. The upper "pip" on the units in our diagrams is then the one close to the chassis deck.

The table below gives the switch positions for the five control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and C, closed.

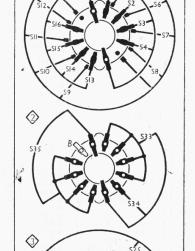
\$36, \$37 are the tone control switches, in a 3-position unit beneath the chassis, indicated in our under-chassis view. A diagram in col. 1 shows the unit in detail. Starting from the fully anti-clockwise position of the control knob, the settings are: Treble (both switches open); Normal (\$36 closed); Bass (\$37 closed).

**External Speaker.**—Two sockets are provided at the rear of the chassis for a low impedance (about 2-4  $\Omega$ ) external speaker.

**Speaker Plug.**—The primary and secondary connections of the output transformer **T2**, which is mounted on the speaker, are taken to the chassis via a five-way cable which is terminated in an octal-type valve base adaptor with a socket on the chassis deck

The connections are indicated in our circuit diagram by arrows and circles, these being identified by the numbers conventionally assigned to their pins on an octal base, a diagram of which, viewed from the free ends of the pins, is inset just beneath them.

The lead colours in our sample were: 2, black; 4, yellow; 5, red; 7, yellow; 8, black. Pins 1, 3 and 6 are not used.

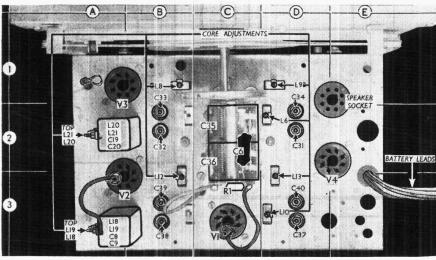


Switch Diagrams and Table

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Diagrams of the three waveband switch units. These are the *front* sides, drawn as seen from the *rear* of an inverted chassis after tilting up the front of it sufficiently to show them. Below is the associated table.

Switch	S.W.1.	S.W.2.	M.W.	L.W.	Gram
\$1 \$2 \$3 \$3 \$4 \$5 \$5 \$6 \$7 \$8 \$9 \$11 \$12 \$13 \$14 \$15 \$15 \$16 \$17 \$18 \$20 \$21 \$22 \$23 \$24 \$25 \$26 \$27 \$28 \$27 \$28 \$28 \$28 \$28 \$28 \$28 \$28 \$28 \$28 \$28	0			_	-
S2		C	_	-	
83	_		C	_	, i
04 95		0	0	č	0
S6	C	_	č	č	č
S7	č	C		č	č
S8	Č	Č	C		č
$\tilde{S9}$	_	C	Č	С	Č
S10	С		C	C	C
S11	С	C		C	C
S12	C	C	С	-	C
S13	С	-	-		_
814	_	C	-		
815		_	C	_	_
817	-	_		C	_
810	C	•			
S10	-	_	0	-	
S20			_	C	-
$\tilde{S}21$	- 1	C	С	Č	С
S22	C		С	С	C
S23	C	C	-	С	C
S24	С	C	С	_	С
S25		С	C	C	C
S26	C	_	C	C	C
527	Ö	Č	_	C	C
S20	č		C		C
830	<u> </u>	C	2000		000000000                 00000000
S31			C		
S32		0   0   0 0 0   0 0   0   0   0   0   0		00000   0000           0         00000   0000           000   0	c
S33	С	С	С	C	-
S34			· , — · ·	-	C
S35	C	C	С	C	



Plan view of the chassis showing all the alignment adjustments (except Lt).

Batteries and Leads.—Almost any standard 2 V accumulator cell and 136 V H.T. battery with suitable tappings can be used with this receiver, but the makers suggest an Exide CZG3 accumulator and an Ever Ready "Portable 56" H.T. battery. The usual red and black spade tags on circles above the suitable states and the states of the suitable space of the suitable space.

The usual red and black spade tags on similarly coloured plastic leads are provided for the L.T. connections. Three rubber-covered leads of the same colours as their plugs go to the H.T. battery. The black plug goes to the H.T. negative socket, the yellow plug to a tapping at 10.5 V positive, and the red plug to 136.5 V positive.

#### DRIVE CORD REPLACEMENT

In this receiver, the drive to the gang is via a small drum on the gang spindle, the drum being driven directly by the control spindle. A second (large) drum, also mounted on the gang spindle, drives the cursor via a drive cord. Thirty inches of Nylon braided glass yarn is required for a new drive cord, and this includes an adequate margin for tying off.

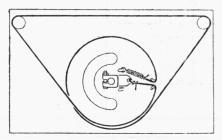
Access can be gained to the drive without removing the scale assembly, if the work is done from the rear of the chassis, and for that reason our sketch below showing the cursor drive cord system is drawn as seen from the rear. With the drum in the position shown, the gang should be at minimum capacitance.

Pass one end of the cord through the groove slot in the drum, and tie it to the anchorage provided in the central bracket. Turn the gang to minimum, and take the cord downwards and about a quarter of the way round the drum groove in a clockwise direction, then up to the left-hand pulley and across to the right hand pulley, and finally down again under the drum, making nearly a whole turn clockwise round the groove, entering the slot again and tying off on to the tension spring.

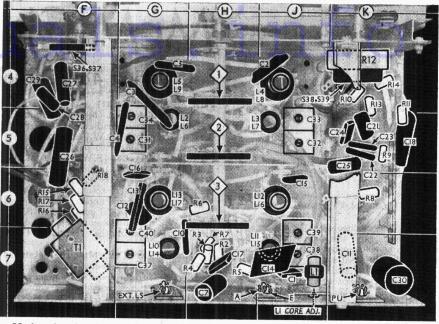
The length should be such that the spring is opened to about  $1\frac{1}{2}$  times its normal length when hooked to the anchor tag pressed in the drum. Both cord knots should be painted with some acetate adhesive to prevent them from slipping.

Turn the gang to maximum capacitance, slide the cursor along to register with the dot beneath 175 m on the S.W.2 scale, and clamp up the claws on the cursor carrier.

Waveband Indicator.—To replace the waveband indicator drive cord, for which any good quality twine or stout thread may be used, remove the channel-section scale lamp housing (two set screws)



Sketch showing the run of the cursor drive cord.



Under-chassis view. The waveband switch units 1, 2, 3, shown in detail in the diagrams in col. 3, are viewed in the direction of the arrows by standing at the rear and tilting the front of the chassis upwards.

clamping the glass scale plate to the top edge of the scale assembly, remove the glass, and slacken the two nuts and bolts (with lock-washers) holding the indicator housing to the outer edge of the scale assembly, and ease the housing away.

When replacing, note that two large rubber bands are stretched over each of the side flanges, one going on before the scale glass, to cushion it against the assembly, and the other after the glass is in position, so that it forms a rubber buffer on the front of the glass.

To adjust the cord length, turn the waveband control fully clockwise, turn the groove quadrant so that it faces the volume control spindle, and tie the cord to the upper anchor arm, at the same time pulling it to bring the white bar into view in the "Gram" arrow aperture on the indicator. Finally, adjust position of white bar accurately by turning the groove quadrant on the control spindle, then tighten up the fixing screw and check that the appropriate white bars register correctly with their respective arrow apertures.

# CIRCUIT ALIGNMENT

1.F. Stages.—Connect signal generator, via an  $0.1\,\mu\mathrm{F}$  capacitor in the "live" lead, to control grid (top cap) of V1 and the E socket. Switch set to M.W., turn the gang and volume control to maximum, slacken the core adjustment locknuts, feed in a  $465\,\mathrm{kc/s}$  ( $645.16\,\mathrm{m}$ ) signal, and adjust the cores of L18, L19, L20 and L21 (location references A3, A2) for maximum output.

R.F. and Oscillator Stages.—Transfer "live" signal generator lead to A socket, via a suitable dummy aerial. In the case of models 484 and 487 the cursor should coincide with the dot on the S.W.2 scale beneath the 175 m calibration mark

when the gang is at maximum capacitance, and it may be adjusted in position by sliding the cursor carriage along the drive cord. In the Model 486 the pointer should be horizonal and directly behind the mark at the high-wavelength end of the M.W. scale when the gang is at maximum.

1.F. Rejector.—Switch set to M.W., tune to 550 m on scale, feed in a  $465\,\mathrm{kc/s}$  signal, and adjust the core of L1 (J7) for minimum output.

S.W.1.—Switch set to S.W.1, tune to 48 m on scale, feed in a 48 m (6.25 Mc/s) signal, and adjust the cores of L10 (D3) and L6 (D2) for maximum output. Tune to 16.5 m on scale, feed in a 16.5 m (18.19 Mc/s) signal, and adjust C37 (D3) and C31 (D2) for maximum output. Repeat these operations until no improvement results.

S.W.2.—Switch set to S.W.2, tune to 50 m on scale, feed in a 50 m (6.0 Mc/s) signal, and adjust C38 (B3) and C32 (B2) for maximum output. Check calibration at 171.4 m (1.75 Mc/s).

M.W.—Switch set to M.W., tune to 526.3 m (spot on scale), feed in a 526.3 m (570 kc/s) signal, and adjust the cores of L12 (B3) and L8 (B1) for maximum output. Tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust C39 (B3) and C33 (B2) for maximum output. Repeat these operations until no improvement results.

L.W.—Switch set to L.W., tune to 2,000 m on scale, feed in a 2,000 m (150 kc/s) signal, and adjust the cores of L13 (D3) and L9 (D1) for maximum output. Tune to 750 m on scale, feed in a 750 m (400 kc/s) signal, and adjust C40 (D3) and C34 (D2) for maximum output. Repeat these operations until no improvement results.