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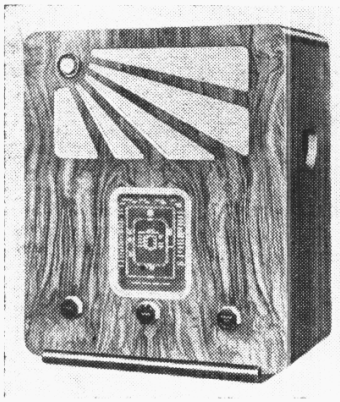
"TRADER" SERVICE SHEET

515

McMICHAEL 374

TRANSPORTABLE SUPERHET



THE McMichael 374 receiver is a 5-valve (plus rectifier) 3-band transportable superhet, designed to operate from AC mains of 200-250 V, 40-100 C/S.

The SW range is 16.5-50 m, and on this band **V4** triode operates as an AF amplifier, whereas on MW and LW bands, this section of the valve is not used; the AVC delay volts and **V1, V3** GB voltages are also modified on this band.

Other features include a tuning indicator and a local/distant switch, and there is provision for connection of a pick-up and an external speaker. An external aerial and earth may be connected if desired.

Release date : *September*, 1937.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L1, C39** (SW), **L2, C39** (MW) and **L3, C39** (LW) to variable-mu RF pentode valve **(V1, Mazda metallised AC/VP2)** which operates as signal frequency amplifier. Provision for connection of external aerial via **C2,** and an earth, if desired.

Tuned-secondary RF transformer coupling by **L4, L7, C43** (SW), **L5, L8, C43** (MW) and **L6, L9, C43** (LW) between **V1** and triode-heptode valve **(V2, Mazda metallised AC/TH1)** which operates as frequency changer with internal coupling. Triode oscillator anode coils **L13** (SW), **L14** (MW) and **L15** (LW) are tuned by **C46.** Parallel trimming by **C44** (MW) and **C45** (LW); series tracking by **C13** (MW) and **C14** (LW), and specially shaped vanes of **C46.** Reaction coupling by grid coils **L10** (SW), **L11** (MW) and **L12** (LW) via stabilising resistances **R13, R14** and **R15** respectively.

Third valve **(V3, Mazda metallised AC/VP2)** is a second variable-mu RF pentode, operating this time as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C47, L16, L17, C48** and **C49, L18, L19, C50.**

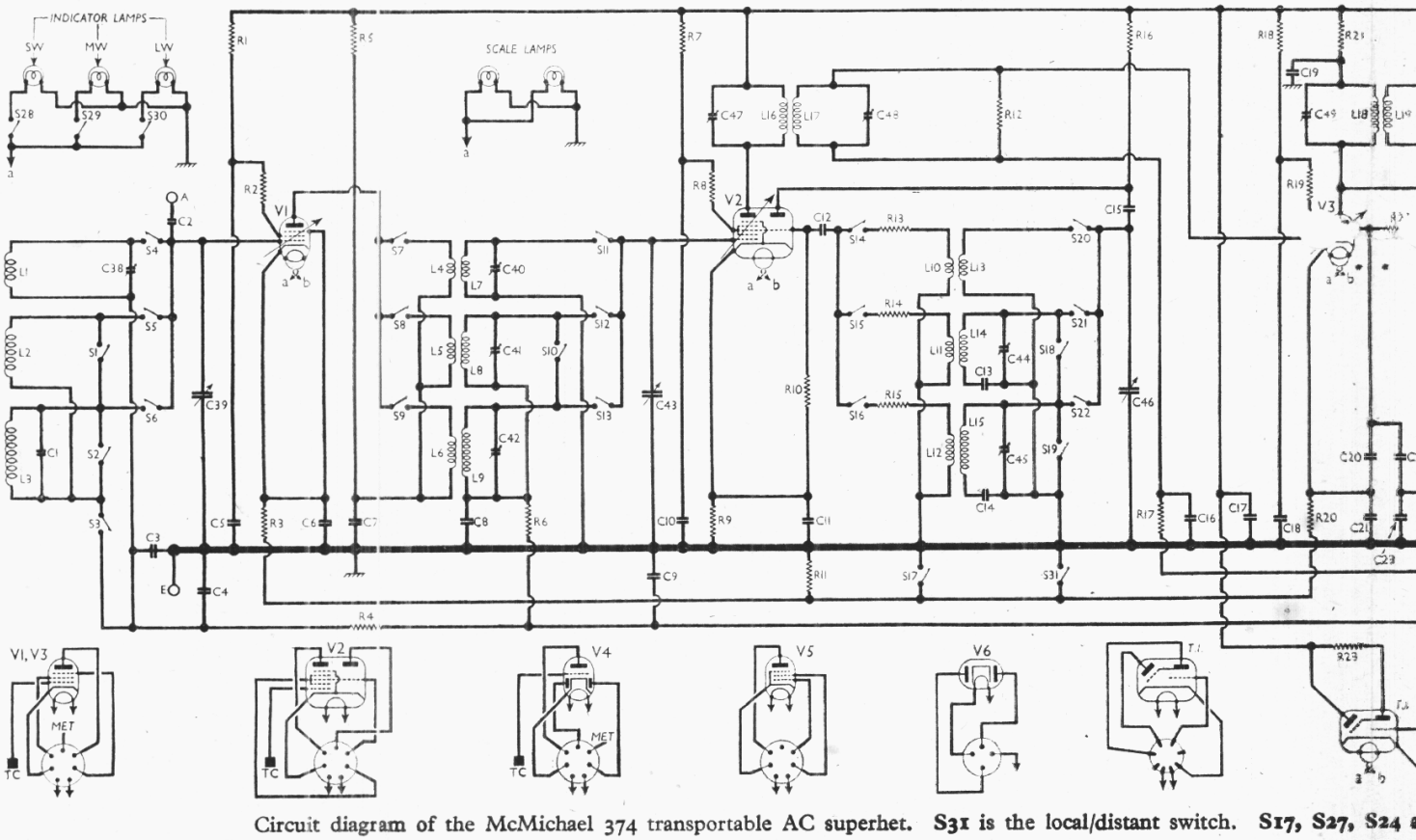
Intermediate frequency 128.5 KC/S.

Diode second detector is part of double diode triode valve **(V4, Mazda metallised AC/HL/DD).** Audio frequency component in rectified output is developed across load resistance **R28.** On SW, it is then passed via AF coupling condenser **C28,** manual volume control **R29,** grid stopper **R32** and switch **S24** to CG of triode section, which operates as AF amplifier.

Resistance-capacity coupling by **R35, C31, S26** and **C32,** via grid stopper **R41,** is then employed between **V4** triode and pentode output valve **(V5, Mazda AC2/Pen).**

On MW and LW, the triode section of **V4** is not used. The audio frequency signal is instead passed via **C28, R29, R32** and **S23** to **C32** and thus directly to **V5,** while **S24** and **S26** are open, and **S25** is closed to short-circuit **V4** triode anode to chassis.

IF filtering by **C24, R24** and **C27.**



Circuit diagram of the McMichael 374 transportable AC superhet. **S31** is the local/distant switch. **S17, S27, S24**

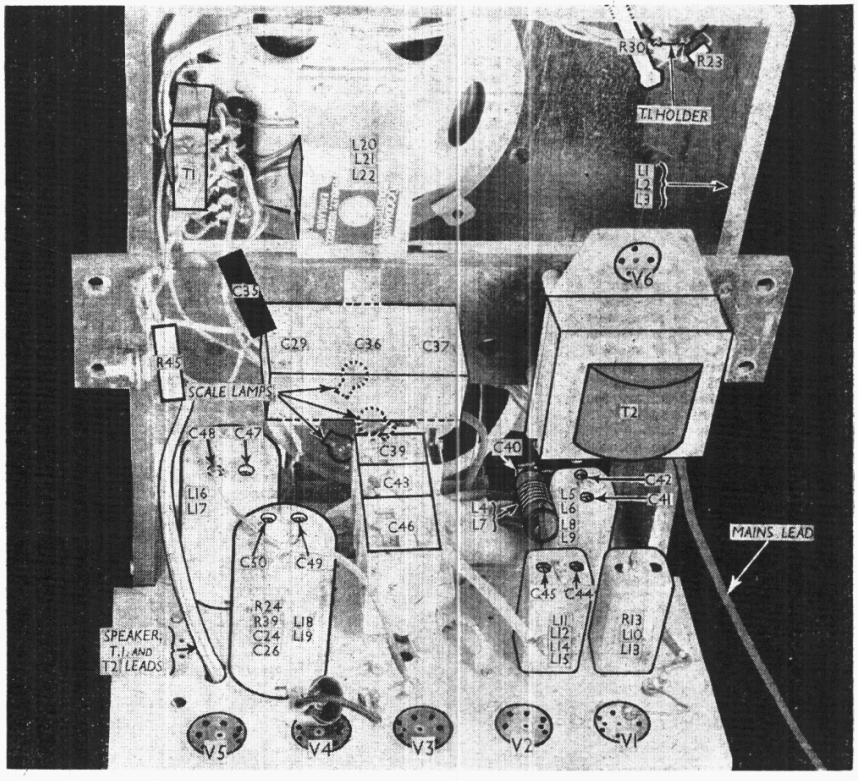
Provision for connection of gramophone pick-up across **C28, R29.** Switch **S32** automatically opens when the pick-up plug is fully inserted, and mutes radio.

DC potential developed across **R28** appears also across **R26, R27,** and that across **R27** is tapped off and fed via decoupling circuit **R25, C25** to operate as control voltage for cathode ray tuning indicator **(T.I., Mullard TV4A).**

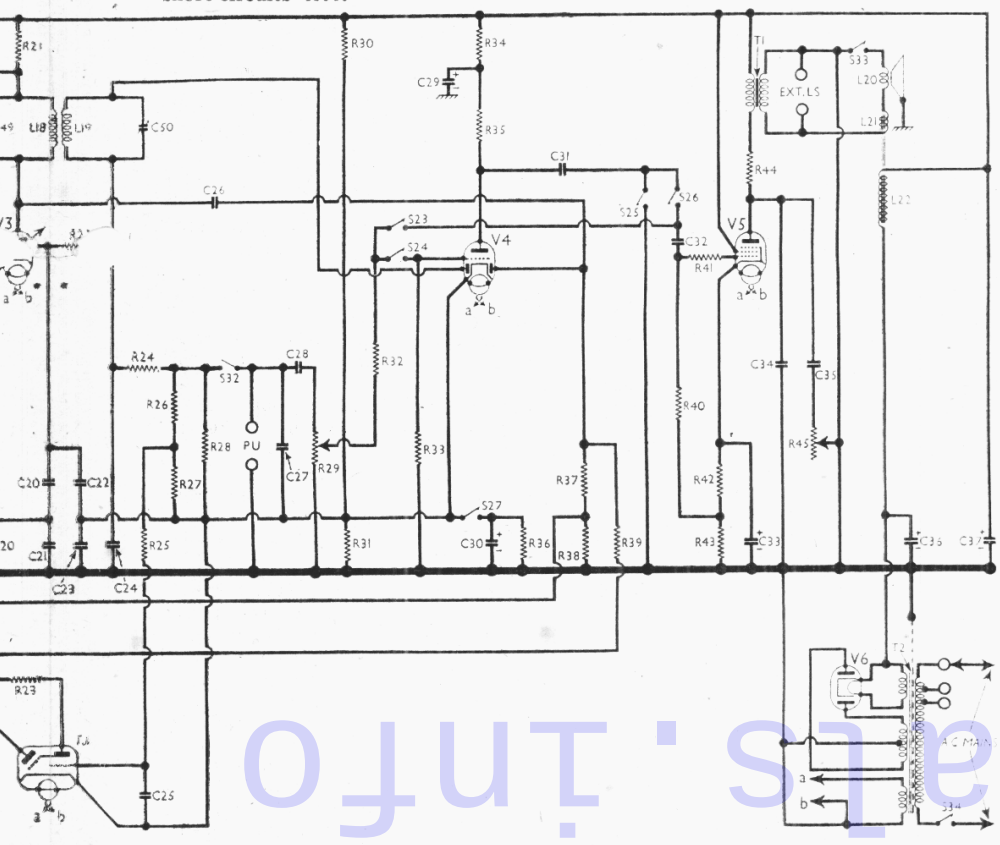
DC potential across **R24, R28** is fed back via **R22** in association with **C20** and **C22** as QAVC control voltage, so that the gain of **V3** is increased with an increase of carrier strength, and reduced for weak signals.

Second diode of **V4,** fed from **V3** anode via **C26,** provides DC potentials which are developed across load resistances **R37, R38** and fed back through decoupling circuits as GB to RF (on all bands), FC (except on SW) and IF valves, giving automatic volume control. Delay voltage, on MW and LW, is obtained from HT circuit potential divider **R30, R31;** but on SW, **S27** closes and connects **R36** across **R31,** reducing the cathode potential of **V4** above chassis, since the triode section is then operating, for GB purposes, at the same time reducing the AVC delay potential for operation on the SW band.

Likewise, **S17** closes on SW, short-circuiting the common GB resistance **R11** and reducing the fixed GB voltage to **V1** and **V3.** This latter operation can also be effected on MW and LW bands for the reception of weak stations by operating the local/distant switch **S31,** which closes in the "distant" (down) position and short-circuits **R11.**



Plan view of the chassis. **R13** and **R24, R39, C24, C26** are in screening cans, while **T2, V6** and the electrolytic condenser block are mounted on a wooden batten.



S27, S24 and **S26** close on SW; **S23** and **S25** close on MW and LW.

Fixed tone correction in **V5** anode circuit by **C34.** Variable tone control, also in **V5** anode circuit, by **C35, R45.** Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T1,** while switch **S33,** which opens automatically when the external speaker plug is fully inserted, permits internal speaker to be muted if desired.

HT current is supplied by IHC full-wave rectifying valve **(V6, Mazda UU4).** Smoothing by speaker field **L22** and dry electrolytic condensers **C36, C37.**

VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 AC/VP2	212	5·5	216	1·6
V2 AC/TH1	245	1·8	86	3·6
	Oscillator			
	67	3·9		
V3 AC/VP2	193	8·9	210	2·5
V4 AC/HL/DD	117	2·2	—	—
V5 AC2/Pen	228	27·0	245	6·9
V6 UU4	300†	—	—	—
T.I. TV4A	20	0·12	—	—
	Target			
	245	0·6		

† Each anode, AC.

Valve voltages and currents given in the table above are those measured in our receiver when it was operating on mains of 236 V, using the 240 V tapping on the mains transformer.

The receiver was tuned to the lowest wavelength on the medium wave band and the volume control was at maximum, but in order to suppress any signal that might be picked up a 0.1 μF

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	LW frame fixed trimmer	0·00005
C2	Ext. aerial series ...	0·00001
C3	V1 SW CG decoupling ...	0·01
C4	V1 MW and LW decoupling	0·1
C5	V1 SG decoupling ...	0·1
C6	V1 cathode by-pass ...	0·1
C7	V1 anode decoupling ...	0·1
C8	V2 heptode CG decoupling	0·1
C9	AVC line decoupling ...	0·01
C10	V2 SG decoupling ...	0·1
C11	V2 cathode by-pass ...	0·1
C12	V2 osc. CG condenser ...	0·0001
C13	Osc. circ. MW tracker ...	0·00223
C14	Osc. circ. LW tracker ...	0·000719
C15	V2 osc. anode coupling...	0·0001
C16	V3 CG decoupling ...	0·1
C17	HT circuit RF by-pass...	0·1
C18	V3 SG decoupling ...	0·1
C19	V3 anode decoupling ...	0·1
C20	V3 suppressor decoupling	0·01
C21	V3 cathode by-pass ...	0·1
C22	Part QAVC circuit ...	0·03
C23	V4 cathode by-pass ...	0·1
C24	IF by-pass	0·0001
C25	T.I. CG decoupling ...	0·1
C26	Coupling to V4 AVC diode	0·0001
C27	IF by-pass	0·0001
C28	AF coupling to V4 triode	0·005
C29*	V4 triode anode decoupling	4·0
C30*	V4 SW cathode by-pass	50·0
C31	V4 triode to V5 coupling	0·01
C32	AF coupling to V5 ...	0·1
C33*	V5 cathode by-pass ...	25·0
C34	Fixed tone corrector ...	0·002
C35	Part variable tone control	0·03
C36*	HT smoothing condensers	8·0
C37*		8·0
C38‡	SW frame aerial trimmer	—
C39†	Frame aerial tuning ...	—
C40‡	RF trans. SW trimmer ...	—
C41‡	RF trans. MW trimmer...	—
C42‡	RF trans. LW trimmer...	—
C43†	RF trans. sec. tuning ...	—
C44‡	Osc. circ. MW trimmer...	—
C45‡	Osc. circ. LW trimmer ...	—
C46†	Oscillator circuit tuning	—
C47‡	1st IF trans. pri. tuning	—
C48‡	1st IF trans. sec. tuning	—
C49‡	2nd IF trans. pri. tuning	—
C50‡	2nd IF trans. sec. tuning	—

	RESISTANCES	Values (ohms)
R1	V1 SG HT feed	10,000
R2	V1 SG stabiliser... ...	50
R3	V1 fixed GB resistance...	750
R4	V1 CG decoupling ...	500,000
R5	V1 anode HT feed ...	5,000
R6	V2 heptode CG decoupling	500,000
R7	V2 SG HT feed	40,000
R8	V2 SG stabiliser... ...	50
R9	V2 fixed GB resistance...	350
R10	V2 osc. CG resistance ...	50,000
R11	V1, V3 gain control ...	750
R12	V3 CG damping... ...	500,000
R13	Osc. SW reaction damping	40
R14	Osc. MW reaction damping	2,000
R15	Osc. LW reaction damping	5,000
R16	V2 osc. anode HT feed ...	40,000
R17	V3 CG decoupling ...	1,000,000*
R18	V3 SG HT feed	10,000
R19	V3 SG stabiliser ...	50
R20	V3 fixed GB resistance...	400
R21	V3 anode HT feed ...	5,000
R22	V3 suppressor decoupling	1,000,000
R23	T.I. anode HT feed ...	2,000,000
R24	IF stopper	100,000
R25	T.I. CG decoupling ...	250,000
R26	T.I. CG feed potential divider	1,000,000
R27		250,000
R28	V4 signal diode load ...	500,000
R29	Manual volume control .	500,000
R30	V4 triode GB and AVC delay potential divider	40,000
R31		2,000
R32	V4 triode grid stopper ...	100,000
R33	V4 triode CG resistance...	500,000
R34	V4 triode anode decoupling	25,000
R35	V4 triode anode load ...	30,000
R36	V4 SW GB resistance ...	350
R37	V4 AVC diode load resistances	500,000
R38		500,000
R39	AVC line decoupling ...	1,000,000
R40	V5 CG resistance ...	250,000
R41	V5 grid stopper	100,000
R42	V5 GB resistances ...	150
R43		350
R44	V5 anode stabiliser ...	50
R45	Variable tone control ...	100,000

* Two 500,000 Ω resistances in series.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Frame aerial windings ...	0·05
L3		2·4
L3		27·0
L4	RF trans. SW pri.... ...	0·3
L5	RF trans. MW pri. ...	4·6
L6	RF trans. LW pri. ...	5·4
L7	RF trans. SW sec.... ...	0·1
L8	RF trans. MW sec. ...	2·0
L9	RF trans. LW sec. ...	21·0
L10	Oscillator SW reaction ...	42·0
L11	Oscillator MW reaction ...	2·4
L12	Oscillator LW reaction ...	4·4
L13	Osc. circ. SW tuning coil...	0·15
L14	Osc. circ. MW tuning coil...	3·0
L15	Osc. circ. LW tuning coil ...	14·0
L16	1st IF trans. Pri. ...	40·0
L17	Sec. ...	40·0
L18	2nd IF trans. Pri. ...	40·0
L19	Sec. ...	40·0
L20	Speaker speech coil ...	3·0
L21	Hum neutralising coil ...	0·1
L22	Speaker field coil	1,200·0
T1	Speaker input trans. Pri.	550·0
	Sec.	0·4
T2	Mains trans. Pri., total ...	20·0
	Heater sec. ...	0·05
	Rect. heat. sec. ...	0·1
	HT sec., total ...	300·0
S1-S30	Waveband switches ...	—
S31	Local/distant switch ...	—
S32	Radio muting Switch ...	—
S33	Internal speaker switch ...	—
S34	Mains switch, ganged R29.	—

* Electrolytic. † Variable. ‡ Pre-set.

condenser was connected between the top cap of **V1** and chassis.

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

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs from the front of the cabinet, and one from the side (all pull-off);

remove the fixing nut from the tone control on the side of the cabinet;

unscrew the wood screw holding the earthing tag from the tone control to the metal plate on the inside wall of the cabinet, and withdraw the control;

remove two nuts (with metal washers) from each end of the wooden cross-batten carrying the electrolytic block and mains transformer;

remove the four hexagon screws (with large metal washers) holding the chassis to the bottom of the cabinet.

Chassis, complete with whole assembly, speaker, frame aerial, etc., can now be withdrawn from the cabinet.

When replacing, a spacing washer should be fitted to each of the four bolts holding the cross-batten, before the chassis is inserted in the cabinet;

a large metal washer should be fitted over the tone control spindle before it is inserted in its fixing hole;

a felt washer should be fitted to each of the front control spindles, between the knob and the cabinet.

Removing Speaker.—Unsolder from the connecting panel on the transformer the eleven external connecting leads, and two black earthing leads from the tag at the foot of the transformer;

remove two adjacent screws and clamps holding the speaker to the sub-baffle, and loosen the remaining pair.

When replacing, the transformer should be on the left.

Connect the leads as follows, numbering the tags from top to bottom:

1, two red leads from bunch and one yellow from electrolytic, together with blue lead from speaker field;

2, white lead from bunch and black lead from earthing tag on frame aerial support;

3, green lead from bunch, together with black sleeved lead from speaker field bobbin;

4, blue lead from bunch;

5, yellow lead from bunch and yellow sleeved lead from **C35**;

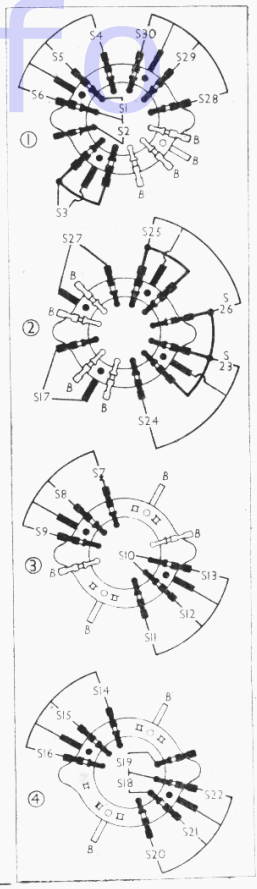
6, brown lead from bunch and red from electrolytic block.

Removing Frame Aerial Assembly.—Unsolder three leads from the trimmer at the side of the frame support, and three from the connecting panel at the front (inside) the frame, labelling the leads as they are freed;

unsolder the eleven external leads from the speaker transformer;

free the tuning indicator leads from their cleat, and free the tuning indicator from its supports (two knurled nuts);

remove the two metal cross-members from under the chassis (three set screws each);



Diagrams of the four switch units, drawn as seen when viewed from the rear of the underside of the chassis, as indicated by the numbers in circles in our under-chassis view opposite. The table in col. 4 gives the switch positions for the three control settings.

remove four set screws (with their metal washers) holding the frame support sides to the chassis;
remove the wood screw holding the earthing tag to the frame support near the speaker transformer;
remove the four countersunk-head wood screws holding the two ends of the wooden cross-batten to the frame support uprights.
When replacing, connect the speaker leads as previously indicated.

GENERAL NOTES

Switches.—S1-S27 are the waveband switches, and **S28-S30** the scale lamp switches, in four ganged rotary units beneath the chassis. They are indicated in our under-chassis view, and shown in detail in the diagrams in col. 3, where they are drawn as seen when viewed from the rear of the underside of the chassis. The table below gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control spindle. A dash indicates open, and **C**, closed.

S31 is the "Local/distant" switch. It is mounted on the rear member of the chassis, and short-circuits **R11** in the "distant" position; i.e. : when the toggle is "down." It does not operate on the SW band, since **S17** is already closed.

S32 is the radio muting switch, associated with the gramophone pick-up sockets at the rear of the chassis. It opens automatically when the pick-up plug is fully inserted.

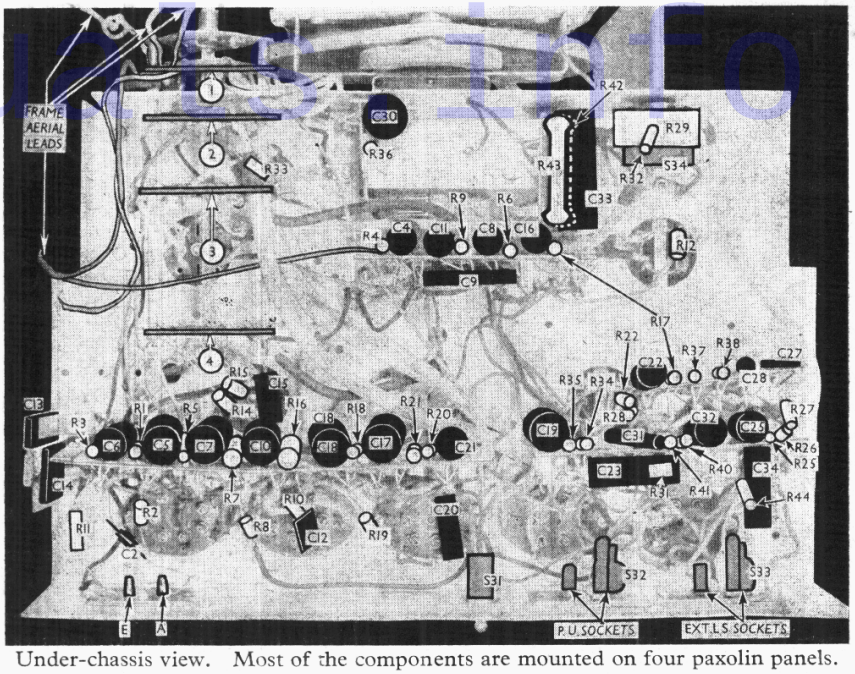
S33 is the internal speaker muting switch in a unit similar to that used with **S32.** When the external speaker plug is partly inserted, both speakers operate; but when the plug is pushed right home, **S33** opens and mutes the internal speaker.

S34 is the QMB mains switch, ganged with the volume control **R29.**

Coils.—L1-L3 are the frame aerial windings on a wooden support fitted to the front of the chassis. **L2, L3** are wound in two grooves round the framework, and **L1** is a single loop on one side, above its trimmer **C38,** and **C3.**

Switch Table

Switch	SW	MW	LW
S1	C	—	—
S2	—	C	—
S3	—	C	C
S4	C	—	—
S5	—	C	—
S6	—	—	C
S7	C	—	—
S8	—	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	—	—
S21	—	C	—
S22	—	—	C
S23	—	C	C
S24	C	—	—
S25	—	C	C
S26	C	—	—
S27	C	—	—
S28	C	—	—
S29	—	C	—
S30	—	—	C



Under-chassis view. Most of the components are mounted on four paxolin panels.

L4-L9 are the RF transformer coils, mounted on the chassis deck. The SW transformer **L4, L7** is mounted unscreened with its trimmer **C40** at the front of the chassis, while **L5, L6, L8, L9** are in a screening can with their trimmers.

The oscillator coils **L10-L15** are in two screening cans on the chassis deck, a separate container being used for **L10, L13.** The trimmers **C44, C45** are in the other can with their associated coils.

The IF transformers **L16, L17** and **L18, L19** are in the two circular metal containers with their tuning condensers on the chassis deck.

Scale and Indicator Lamps.—These are five Ever Ready MES types, with spherical bulbs, rated at 6.2 V 0.3 A.

External Speaker.—Two sockets, with which are associated **S33,** are provided at the rear of the chassis for a low impedance (about 2 Ω) external speaker. When its plug is fully inserted, **S33** opens and mutes the internal speaker.

Power Unit Assembly.—The mains transformer **T2** and the electrolytic condensers **C29, C36, C37** are mounted on a wooden cross-brace on the frame aerial support. Their positions are seen in our plan view of the chassis. **V6** is mounted on **T2.**

Tuning Indicator.—This is a Mullard **TV4A,** mounted in the top right-hand corner of the frame assembly (viewed from the rear). On it are mounted **R23** and **R30.**

Condensers C1, C3, C38.—These are all mounted on the frame assembly. **C3, C38** are associated with **L1** and are mounted on the side of the assembly. **C3** is connected to chassis via one of the fixing bolts. **C1** is connected to the **L2, L3** connecting panel, inside the assembly at the bottom.

Condensers C29, C36, C37.—These are three dry electrolytics in a single rectangular cardboard container, mounted on the frame assembly as previously indicated. They are all rated at 550 V peak. The green lead is the positive of **C29** (4 μF), red the positive of **C36** (8 μF) and yellow the positive of **C37** (8 μF). The black lead is the common negative connection.

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator to control grid (top cap) of **V2** and chassis. Connect a 0.1 μF condenser across **C46** to swamp the oscillator section of **V2.** Switch set to MW, and turn gang and volume control to maximum.

Feed in a 128.5 KC/S (2334.65 m) signal, and adjust **C47, C48, C49** and **C50** for maximum output, keeping the input low to avoid AVC action. Finally, remove the 0.1 μF condenser.

RF and Oscillator Stages.—With gang at maximum, the leading edge of the MW tuning light should be in line with the last calibration mark about ¼in. from the high-wavelength end of the MW scale. Adjust it, if necessary, by means of the set screws on the condenser coupling.

Connect the signal generator to a few turns of wire inductively coupled to the frame aerials.

MW.—Switch set to MW, tune to 214 m on scale (short line opposite "Rad. Lyons"), feed in a 214 m (1,400 KC/S) signal, and adjust **C44,** then **C41,** for maximum output.

LW.—Switch set to LW, tune to 1,000 m on scale, feed in a 1,000 m (300 KC/S) signal, and adjust **C45,** then **C42,** for maximum output.

SW.—Switch set to SW, tune to 18.75 m (mark on scale), feed in a 18.75 m (16 MC/S) signal, and adjust **C38** for maximum output. There are no other adjustments for the SW band, but calibration should be checked at about 50 m (6 MC/S).

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