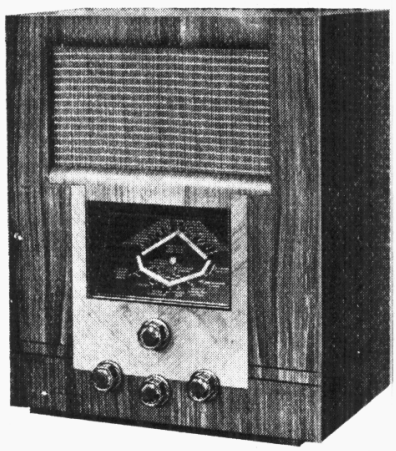
Supplement to The Wireless & Electrical Trader, November 30, 1940

"TRADER" SERVICE SHEET

495

PYE MP/40

MP, MP/C & MP/RG



THE Pye MP/40 is a 3-valve (plus rectifier) 3-band AC table superhet, designed to operate from 200-250 V, 40-100 c/s mains. The SW range is 13.8-54 m.

A similar chassis, with modifications, is employed in the model MP, the MP/C console, and, with further modifications, the MP/RG radiogram. The differences are described under "Model MP Modifications" and "MP/RG Modifications." This *Service Sheet* was prepared on an MP/40 receiver.

Release dates: MP, January, 1939; *MP/C, MP/RG, May,* 1939; *MP/40,* 1940.

CIRCUIT DESCRIPTION

Aerial input is via coupling coils **L1** (SW) and **L2** (MW and LW), with top coupling condenser **C1** on MW, to single-tuned circuits **L3, C29** (SW) **L4, C29** (MW) and **L5, C29** (LW).

First valve **(V1, Mullard ECH33)** is a triode-heptode operating as frequency changer with internal coupling. Triode oscillator anode coils **L8** (SW), **L9** (MW) and **L10** (LW) are tuned by **C32.** Parallel trimming by **C9** (SW), **C30** (MW) and **C8, C31** (LW); series tracking by **C10** (SW) and **C11** (MW and LW).

Reaction coupling is effected on SW by the grid coil **L6;** on MW by the grid coil **L7,** and the common impedance of the tracker **C11,** which is included in both grid and anode circuits; and on LW by the common impedance of **C11** alone. A small coupling is provided between the oscillator and heptode control grids by **C5.**

Second valve **(V2, Mullard EF39)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings, **C3, L11, L12, C4** and **C14, L13, L14, C15.**

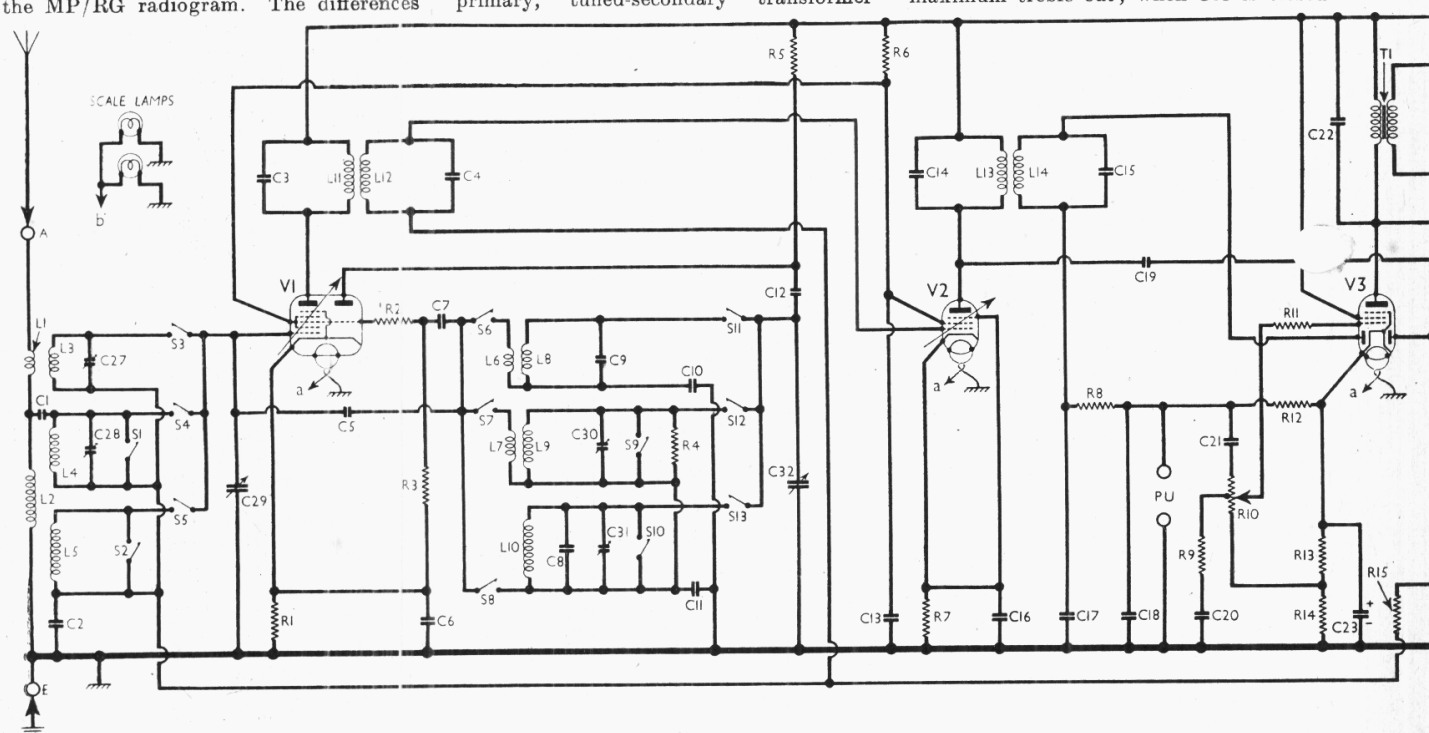
Intermediate frequency 462 KC/S.

Diode second detector is part of double diode pentode output valve **(V3, Mullard EBL31).** Audio frequency component in rectified output is developed across load resistance **R12** and passed via AF coupling condenser **C21,** manual volume control **R10** and grid stopper **R11** to control grid of pentode section, which provides the sole AF amplification.

IF filtering by **C17, R8** and **C18** in diode circuit. Provision for connection of a high voltage output gramophone pick-up by sockets effectively across **C21, R10.** Provision also for connection of a low impedance external speaker by sockets connected across the secondary winding of the output transformer **T1.**

Tone compensation for changes in [illegible] setting of the volume control is provided by the resistance-capacity filter **R9, C20,** which is connected between the centre-tap on **R10** and chassis.

Fixed tone correction by **C22** in **V3** pentode anode circuit. Three-position tone control by **C24, R17** and the switches **S14, S15,** also in the pentode anode circuit, but this time returned to chassis. When **S14** is closed, **C24** is connected between the anode and chassis, giving maximum treble cut; when **S15** is closed



Circuit diagram of the Pye MP/40 AC Superhet. Late issues of the model MP, those with serial numbers from MKZ1100 upwards, employed the same chassis, while the differences in earlier issues of the MP are described under "Model MP Modifications." The MP/C console also employed the early MP chassis. The differences in the radiogram model MP/RG are dealt with under "MP/RG Modifications."

R17 is inserted in the circuit, reducing the ratio of top cut to bass; in the third position of the control, when both switches are open, maximum treble response is obtained.

Second diode of **V3,** fed from **V2** anode via the small coupling condenser **C19,** provides DC potential which is developed across load resistance **R16** and fed back through decoupling circuit **R15, C2** to frequency changer and intermediate frequency amplifier valves, giving automatic volume control.

Delay voltage, together with grid bias for pentode section, is obtained automatically from drop along resistances **R13** and **R14,** which form a potential divider in the cathode lead to chassis.

HT current is supplied by full-wave rectifying valve **(V4, Mullard AZ31).** Smoothing is effected by speaker field **L17** in conjunction with electrolytic condensers **C25** and **C26.**

DISMANTLING THE SET

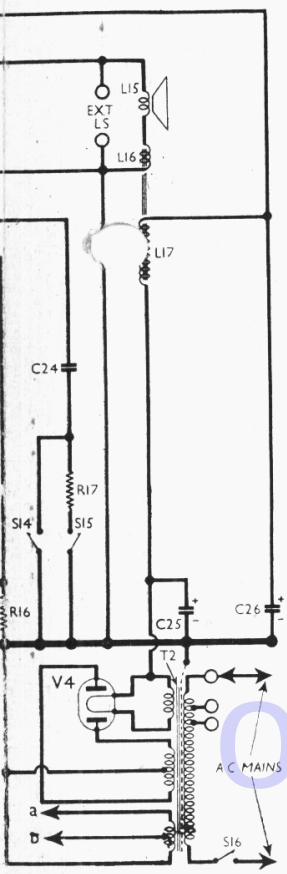
Removing Chassis.—Remove the four control knobs (pull-off) from the front of the cabinet;

free the speaker leads from the cleat on the sub-baffle;

remove the four cheese-head bolts (with metal and rubber washers and brass sleeves) holding the chassis to the bottom of the cabinet.

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

To free the chassis entirely, unsolder from the output transformer the four leads connecting it to chassis, and unsolder from the **bottom tag** on the speaker field connecting panel a red braided lead connecting it to chassis.



When replacing, fit a shaped rubber washer to each chassis fixing bolt, between the chassis and the bottom of the cabinet.

fit a metal washer, a plain rubber washer and a brass sleeve to each fixing bolt before inserting it into its hole in the bottom of the cabinet.

The speaker leads should be connected as follows, numbering the tags on the output transformer from top to bottom :

1, black;
2, pink;
3, green;
4, yellow.

The red lead, as stated above, goes to the bottom tag on the speaker field panel.

Removing speaker.—Unsolder from the speaker the three leads connecting it to the output transformer, and the red lead connecting the field to chassis; remove the four round-head wood screws (with metal washers) holding the speaker to the sub-baffle.

When replacing, the connecting panels should point towards the bottom right-hand corner of the sub-baffle.

The two short fixing screws should be fitted left and right of the speaker, and the two long ones top and bottom.

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

green lead from top speech coil tag to tag 3 on transformer;

yellow lead from bottom speech coil tag to tag 4 on transformer;

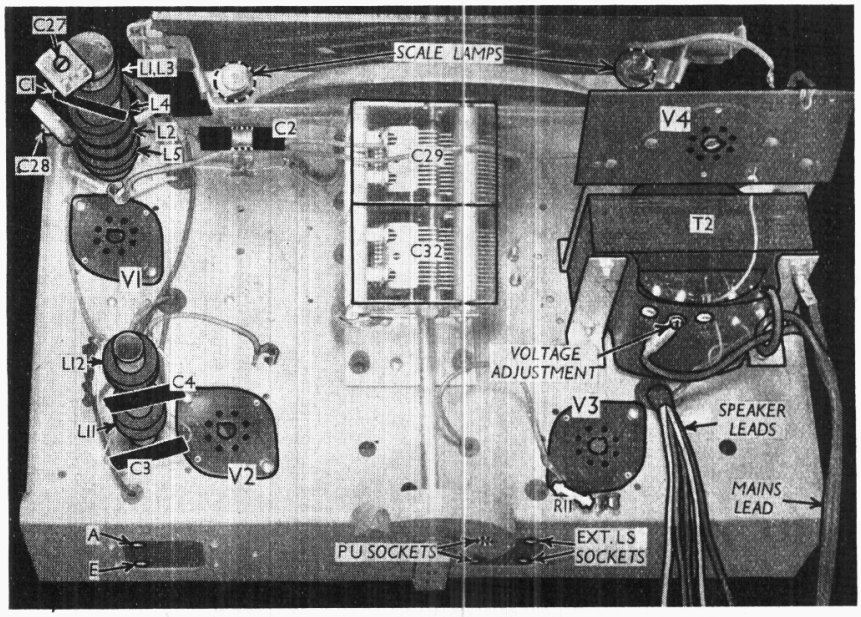
plain wire from top speaker field panel to tag 1 on transformer.

The red lead from chassis goes to the bottom field tag.

Removing Output Transformer.—This is fixed to the sub-baffle by two round-head wood screws.

When replacing, the connecting panel should face the speaker connecting panels;

the leads should be connected as described for replacing chassis and replacing speaker.



Plan view of the chassis. The aerial trimmers are mounted on the coil unit.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 223 V, using the 216-225 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 400 V scale of a model 7 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 ECH33	272	2·0		
	Oscillator		100	2·7
	70	4·3		
V2 EF39	272	6·0	100	1·7
V3 EBL31	250	30·0	272	5·0
V4 AZ31	370†	—	—	—

† Each anode, AC.

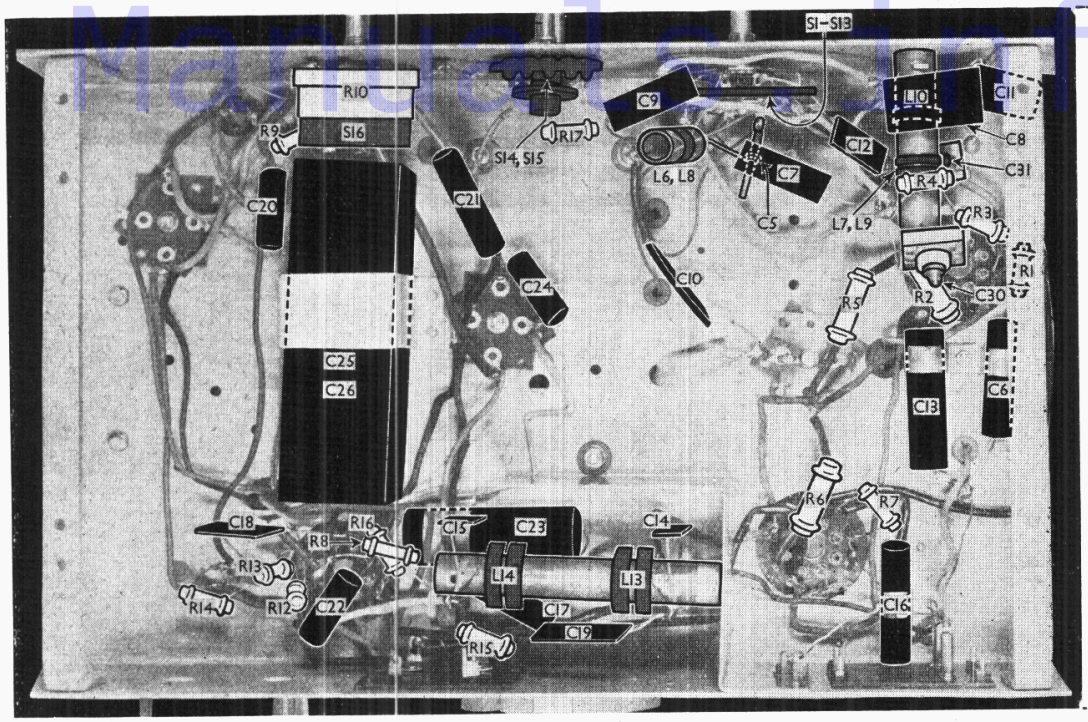
COMPONENTS AND VALUES

	RESISTANCES	Values (ohms)
R1	V1 fixed GB resistance ...	150
R2	Oscillator reaction stabiliser	50
R3	V1 osc. CG resistance ...	20,000
R4	Osc. circuit MW damping	25,000
R5	V1 osc. anode HT feed ...	40,000
R6	V1, V2 SG's HT feed ...	40,000
R7	V2 fixed GB resistance ...	250
R8	IF stopper	110,000
R9	Part of tone compensator	50,000
R10	Manual volume control ...	1,000,000*
R11	V3 pentode CG stopper ...	10,000
R12	V3 signal diode load ...	510,000
R13	V3 pentode GB; AVC delay resistances ...	150
R14		500
R15	AVC line decoupling ...	1,100,000
R16	V3 AVC diode load ...	1,100,000
R17	Part of tone control ...	25,000

* Centre-tapped.

	CONDENSERS	Values (μF)
C1	Aerial MW top coupling...	0·000005
C2	AVC line decoupling ...	0·1
C3	1st IF transformer tuning condensers	0·00014
C4		0·00014
C5	Small coupling	0·000001
C6	V1 cathode by-pass ...	0·1
C7	V1 osc. CG condenser ...	0·0002
C8	Osc. circ. LW fixed trimmer	0·00025
C9	Osc. circuit SW trimmer...	0·000005
C10	Osc. circuit SW tracker ...	0·005
C11	Osc. circuit MW and LW tracker	0·0007
C12	V1 osc. anode coupling ...	0·00005
C13	V1, V2 SG's decoupling ...	0·1
C14	2nd IF transformer tuning condensers	0·00014
C15		0·00014
C16	V2 cathode by-pass ...	0·1
C17	IF by-pass condensers	0·0001
C18		0·0001
C19	Coupling to V3 AVC diode	0·00001
C20	Part of tone compensator	0·01
C21	AF coupling to V3 pentode	0·002
C22	Fixed tone corrector ...	0·001
C23*	V3 cathode by-pass ...	25·0
C24	Part of tone control ...	0·01

(*Continued overleaf.*)



Under - chassis view. The positions of the two switch units for wave-changing and tone control are indicated here and shown in detail in the diagrams in column 4. The arrows indicate the direction in which they are viewed.

	CONDENSERS (*continued*)	Values (μF)
C25*	HT smoothing condensers	8·0
C26*	HT smoothing condensers	8·0
C27‡	Aerial circuit SW trimmer	—
C28‡	Aerial circuit MW trimmer	—
C29†	Aerial circuit tuning ...	—
C30†	Osc. circuit MW trimmer	—
C31‡	Osc. circuit LW trimmer...	—
C32†	Oscillator circuit tuning...	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial SW coupling ...	0·4
L2	Aerial MW and LW coupling	65·0
L3	Aerial SW tuning coil...	Very low
L4	Aerial MW tuning coil...	2·6
L5	Aerial LW tuning coil...	14·0
L6	Oscillator SW reaction	36·0
L7	Oscillator MW reaction	12·0
L8	Osc. circ. SW tuning coil	0·05
L9	Osc. circ. MW tuning coil	3·3
L10	Osc. circ. LW tuning coil	4·3
L11	1st IF trans. Pri. ...	7·0
L12	1st IF trans. Sec. ...	7·0
L13	2nd IF trans. Pri. ...	7·0
L14	2nd IF trans. Sec. ...	7·0
L15	Speaker speech coil ...	2·0
L16	Hum neutralising coil...	0·1
L17	Speaker field coil ...	2,000·0
T1	Output trans. Pri. ...	700·0
T1	Output trans. Sec. ...	0·3
T2	Mains trans. Pri., total ...	23·0
T2	Mains trans. Heater sec. ...	0·2
T2	Mains trans. Rect. heat. sec.	0·1
T2	Mains trans. HT sec., total	750·0
S1-S13	Waveband switches ...	—
S14-S15	Tone control switches...	—
S16	Mains switch, ganged R10	—

GENERAL NOTES

Switches.—S1-S13 are the waveband switches in a single rotary unit, mounted on the front member of the chassis. It is indicated in our under-chassis view, and shown in detail in the upper diagram in column 4, where it is viewed in the direction of the arrow in the under-chassis view. The table (column 3) gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open, and **C** closed.

S14, S15 are the tone control switches, in a second rotary unit, also mounted on the front chassis member, in the centre. This unit is also indicated in our under-chassis view, where the arrow again gives the direction in which it is viewed, this time in the lower diagram in column 4.

There are three positions on the control spindle, and they are, starting from fully anti-clockwise: 1, **S14** closed, giving maximum treble attenuation; 2, **S15** closed, giving reduced treble attenuation; 3, both switches open, giving maximum treble response.

S16 is the QMB mains switch, ganged with the manual volume control **R10.**

Coils.—All the aerial coils **L1, L3** and **L2, L4, L5** are mounted on a single unscreened tubular paxolin former, standing vertically on the chassis deck. This unit is shown in the top left-hand corner of our plan view, where the two aerial circuit trimmers are also indicated.

The oscillator coils **L6, L8;** and **L7, L9, L10** are in two unscreened tubular units on paxolin formers beneath the chassis. The **L6, L8** unit is mounted directly by its tags on the waveband switch unit.

The **L7, L9, L10** unit is mounted horizontally on the front chassis member. Its trimmers and tracker, together with the damping resistance **R4,** are mounted on the unit directly to the appropriate tags.

The first IF transformer **L11, L12** is mounted vertically on an unscreened tubular former on the chassis deck, with its associated fixed tuning condensers. The second IF transformer **L13, L14** is mounted horizontally on its screening shield near the rear of the under-side of the chassis, also with its fixed tuning condensers.

Scale Lamps.—These are two Mazda MES types, with large diameter spherical bulbs, rated at 6.2 V, 0.3 A. They are connected on one side to a tapping on the heater secondary of the mains transformer **T2,** at the point marked **b** in the circuit diagram. The other side makes to chassis via the mounting clips, so that it is necessary to see that the paint is scraped away where the clips are fitted.

Switch Table

Switch	SW	MW	LW
S1	C	—	—
S2	—	C	—
S3	C	—	—
S4	—	C	—
S5	—	—	C
S6	C	—	—
S7	—	C	—
S8	—	—	C
S9	C	—	—
S10	—	C	—
S11	C	—	—
S12	—	C	—
S13	—	—	C

Gramophone Pick-up.—Two sockets are provided on a panel at the rear of the chassis for a pick-up of the Piezo-electric type, giving an output of 2-3 V. If a pick-up of lower output is used, it will be necessary to connect it via a step-up transformer, the high-ratio side of which should go to the pick-up sockets.

If the connecting leads are provided with a screening braid, this should be connected to the lower socket, which is connected directly to chassis.

The receiver should be switched to short waves while the pick-up is used, to avoid radio interference, and the connecting plugs should be withdrawn when reverting to radio reception, unless a switch is fitted in the upper connecting

lead, close to the socket in order to keep the lead short.

External speaker.—Two further sockets are provided on the same panel as the above for a low impedance (2-4 O) external speaker.

Condensers C25, C26.—These are two dry electrolytics in a rectangular waxed cardboard container, mounted by a clamp beneath the chassis deck. They are both 8 μF condensers, and are rated at 550 V peak.

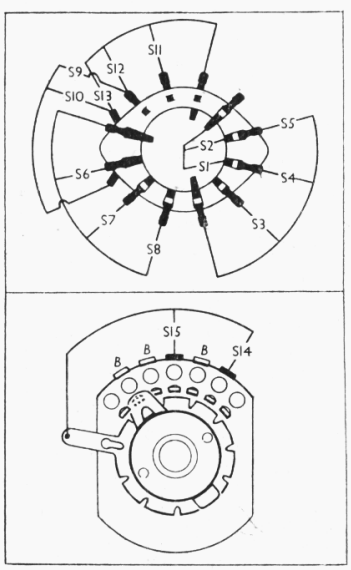
The red positive leads are connected to opposite tags on a paxolin connecting panel bolted to the underside of the chassis deck. The black lead is the common negative.

Condenser C23.—This is a 25 μF dry electrolytic in a tubular cardboard container, mounted by a metal clamp beneath the chassis deck. It is rated at 25 V working and 35 V surge.

Condenser C5.—This is a small coupling condenser, made by winding two turns of enamelled wire over the insulating sleeving covering a short length of tinned copper wire. Its value is 1 μμF (0.000001 μ). A disc type condenser may be used.

Valves.—All the valves in this receiver are Mullard "E" types fitted with American octal type bases instead of the usual side-contact base. Thus EF39 is equivalent to EF9, the figure 3 indicating that an octal base is fitted.

Pre-set condensers.—The two aerial circuit trimmers **C27, C28** are soldered directly to the appropriate coil tags on the coil unit, where they are indicated in our plan view. The two oscillator circuit trimmers **C30, C31** are similarly mounted on their coil unit beneath the chassis,



Diagrams of the two switch units. *Above :* the waveband unit; *below :* the tone control unit.

together with the damping resistance **R4** and fixed LW trimmer **C8.** There are no other pre-set condensers.

Chassis Divergencies.—In our chassis, **C5** was made of wire, but in some cases a disc type of condenser may be used. **C8** was 0.00025 μF, but it may be 0.00026 μF. Also, a similar fixed trimmer of 0.00003 μF may be used in the MW oscillator circuit, across **C30,** but it was not present in our chassis. The makers' manual gives the value of **C23** as 20 μF, 30 V, whereas in our chassis it was 25 μF, 25 working. The difference is unimportant.

MODEL MP MODIFICATIONS

There are two versions of the MP model, both of which are in table-type cabinets. The later version, whose serial numbers run from MKZ1100 upwards, are similar in every respect excepting the valve bases, which are referred to later, to the MP/40. In the earlier models, however, whose serial numbers are all lower than MKZ1100, several differences will be found.

The greatest difference is in the oscillator circuit, the early version of which is reproduced in the diagram below. It will be observed that a LW reaction coil is employed, that **R4** is omitted and that the reaction circuit switching is different.

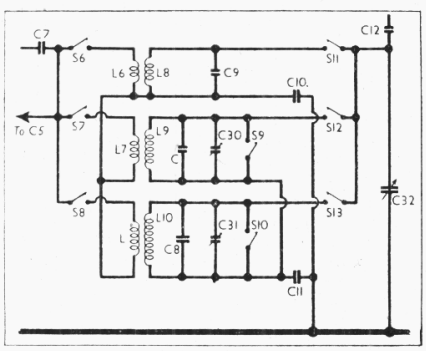


Diagram of oscillator circuit of the early MP model.

The physical arrangement is different also, all the oscillator coils being wound on a single former, which is mounted in the same position as that occupied by the MW and LW unit in the MP/40. In addition, the DC resistance of the coils is different.

Apart from the oscillator circuit, a 50 μμF (0.00005 μF) condenser is connected directly across **L2,** and the speaker arrangements are different, the internal speaker speech coil leads being plugged into the LS sockets at the rear of the chassis, by means of socketed plugs. Also, **R6** becomes 20,000 O.

The valves used in the MP model are the same as those in the MP/40, except that instead of American octal bases, the valves are fitted with side-contact bases. The types used are : **V1** (prior to serial No. MKZ1100) ECH2; or (from MKZ 1100 onwards) ECH3; **V2,** EF9; **V3,** EBL1; **V4,** AZ1.

MP/RG MODIFICATIONS

The radio-gramophone version of the MP series is basically similar to the early MP table and console chassis (see under "Model MP Modifications"), but considerable modifications are introduced to accommodate the pick-up, **V1** triode section being used as an AF amplifier on gram.

A fourth (gram) position is provided on the waveband switch, at which **V1** triode control grid goes to the junction of two resistances valued at 50,000 O and 15,000 O and a condenser of 0.01 μF. The other end of the 15,000 O resistance goes to the upper pick-up socket; that of the 50,000 O goes to a second condenser valued at 0.01, which, in turn, goes to chassis, together with the other end of the first condenser and the second pick-up socket.

Two resistances in series feed the triode section anode, the first (joined to HT+ line) being 15,000 O, and the second (joined to triode anode) 25,000 O; at their junction is connected the positive side of an electrolytic condenser (8 μF), the other side of which goes to chassis.

At the gram setting of the waveband switch, a condenser of 0.02 μF, one end of which is permanently connected to **V1** triode anode together with **C12,** is connected at the other end to the top of **R10.**

An additional switch unit, ganged with the original waveband switch unit, is used to accomplish this connection, and at the same time it breaks the connection between **R10** and **C21,** thus muting radio.

Another modification is that **R3** becomes 20,000 O and is connected between the junction of **L6, L7, L** (in separate MP oscillator circuit in col. 5) and **V1** cathode, while the triode control grid goes directly to the **S6, S7, S8** switch unit, omitting **C7** and **R2;** the junction between **L6** and **L8** is broken, and **C7** makes a reappearance, connected between these two points.

Further, **C12** becomes 0.0002 μF, and if the serial number is lower than MJZ0940, **R6** is 20,000 O, whereas from that number onwards it is 40,000 O, as in the MP/40. Similarly, **V1** is ECH2 prior to MJZ0940, but ECH3 from that number onwards.

CIRCUIT ALIGNMENT

IF Stages.—Switch set to SW, and turn volume control to maximum. Connect signal generator via a 0.1 μF condenser to control grid (top cap) of **V1** and chassis, removing existing top cap connection. Connect a 500,000 O resistance between control grid and the AVC line end of **C2.**

Feed in a 462 KC/S signal, and adjust the position of the *outer* sections of the coils **L14, L13, L12** and **L11** in turn, finally checking, and sealing off with an application of coil dope. The makers recommend British Celanese Solution 202.

RF and Oscillator Stages.—See that the scale is horizontally mounted. With the gang at maximum, the pointer should be horizontal. Connect signal generator to **A** and **E** sockets via a suitable dummy aerial.

MW.—Switch set to MW, tune to 210 m on scale, feed in a 210 m (1,430 KC/S) signal, and adjust **C30,** then **C28,** for maximum output. Check calibration at 520 m (577 KC/S). Repeat if necessary.

LW.—Switch set to LW, tune to 1,300 m on scale, feed in a 1,300 m (230 KC/S) signal, and adjust **C31** for maximum output, whilst gently rocking the gang for optimum results. Check calibration at about 1,900 m (158 KC/S).

SW.—Switch set to SW, tune to 15 m on scale, feed in a 15 m (20 MC/S) signal, and adjust **C27** for maximum output. Feed in a 50 m (6 MC/S) signal, tune it in, adjust the spacing of the turns of **L3** if considered necessary for maximum output.

If the calibration is incorrect at 50 m, it can be adjusted by altering the positions of the turns of **L8,** while rocking the gang slightly for optimum results.

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