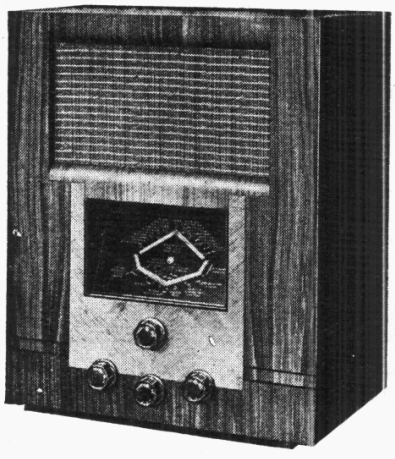
Supplement to The Wireless & Electrical Trader, August 25, 1945

"TRADER" SERVICE SHEET 737

PYE MPU/40 AND MP/UC CONSOLE



The Pye MPU/40 AC/DC superhet.

FOUR wavebands are covered in the Pye MPU/40, a SW band (designated SW1) of 13.5-50 m, a medium-short band (SW2) of 50-200 m, covering the trawler frequencies, and MW and LW bands. The receiver is a 3-valve (plus rectifier) superhet designed to operate from AC or DC mains of 200-250 V, 25-100 c/s in the case of AC.

The MP/UC is a console version of the MPU/40, but its chassis is a little different from that in the table model. The differences, which include another range of valves, are described overleaf.

Release date, both models, 1939. *Original prices: MPU/40,* £11 11*s.*; *MP/UC,* £14 3*s.* 6*d.*

CIRCUIT DESCRIPTION

Aerial input via mains isolating capacitor **C1** and coupling coils **L1** (SW1), **L2** (SW2) and **L3** (MW and LW) to single-tuned circuits **L4, C32** (SW1), **L5, C32** (SW2), **L6, C32** (MW) and **L7, C32** (LW) which precede triode hexode valve **(V1, Mullard metallised ECH33)** operating as frequency changer with internal coupling.

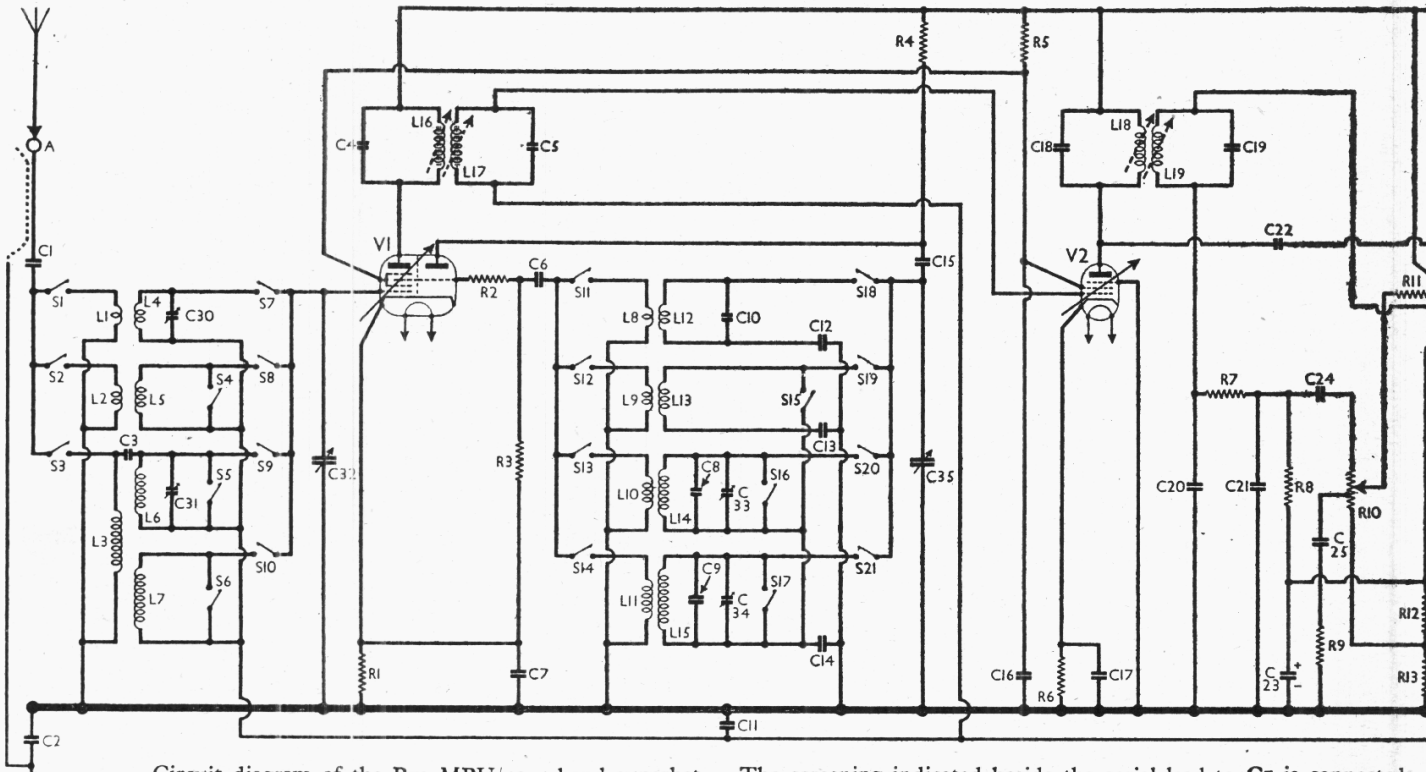
Triode oscillator anode coils **L12** (SW1), **L13** (SW2), **L14** (MW) and **L15** (LW) are tuned by **C35.** Parallel trimming by **C10** (SW1), **C8, C33** (MW) and **C9, C34** (LW); series tracking by **C12** (SW1), **C13** (SW2) and **C14** (MW and LW). Reaction coupling by grid coils **L8** (SW1), **L9** (SW2), **L10** (MW) and **L11** (LW).

Second valve **(V2, Mullard metallised EF39)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C4, L16, L17, C5** and **C18, L18, L19, C19.** All the tuning capacitors are fixed, and the coils of the first transformer are dust-iron cored. Tuning adjustments are made by adjusting the outer sections of the coils to vary their inductance. (See "Chassis Divergencies.")

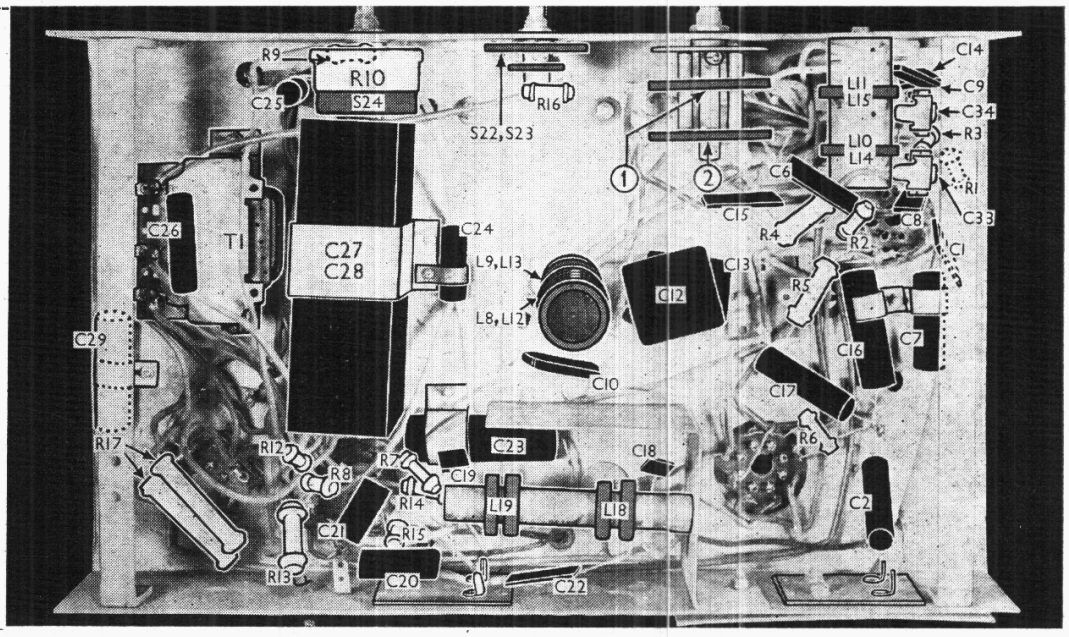
Intermediate Frequency 462 kc/s.

Diode second detector is part of double diode pentode output valve **(V3, Mullard CBL31).** Audio frequency component in rectified output is developed across load resistor **R8** and passed via AF coupling capacitor **C24,** manual volume control **R10** and grid stopper **R11** to CG of pentode section.

IF filtering by **C20, R7** and **C21** in diode circuit, and by **R11** and the valve capacitance in the control grid circuit. Tone compensation by **C25, R9** across the lower half of **R10,** restoring the bass normally



Circuit diagram of the Pye MPU/40 4-band superhet. The screening indicated beside the aerial lead to **C1** is connected to the earth socket. The first IF transformer **L16, L17** is iron-cored, but the second **(L18, L19)** is air-cored. In the MP/UC console, the only obvious difference in the circuit diagram is the transposition of **L23** from the negative side to the positive side of the HT circuit. Other differences are described in col. 5 overleaf.



Under-chassis view. The waveband switch units (marked 1 and 2) and the tone control unit **(S22, S23)** are indicated here and shown in detail in the diagrams in cols. 1 and 4 respectively overleaf. The SW oscillator coils are seen in the centre, while the MW and LW coils are mounted beside the waveband switch unit with their associated trimmers and tracker.

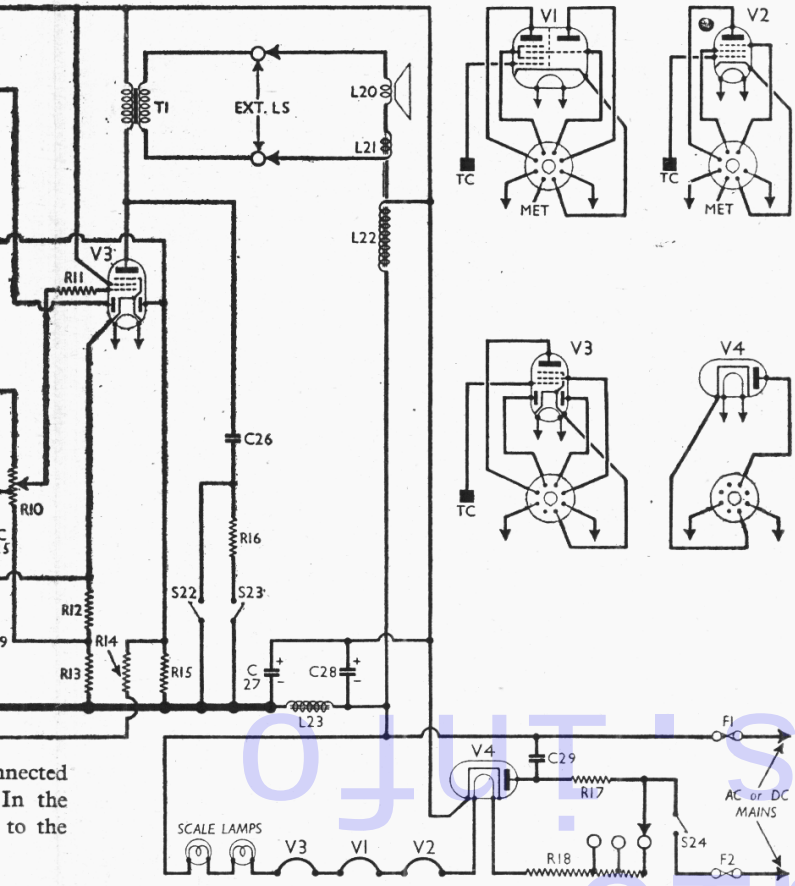
lost at low volume levels. Three-position tone control by **C26, R16** and **S22, S23,** either switch closing or neither, according to the required high-note attenuation.

Provision for connection of low impedance external speaker by sockets in the internal speaker speech coil connecting plugs; or, if these plugs are removed, the internal speaker may be muted, the external speaker plugs replacing them.

Second diode of **V3,** fed from **V2** anode via **C22,** provides DC potential which is developed along load resistor **R15** and fed back through decoupling circuit to FC and IF valves on all bands, giving automatic volume control. Delay voltage, together with GB potential for **V3** pentode, is obtained from the drop along resistors **R12, R13** which form a potential divider in the cathode lead to chassis.

When the receiver is operating from AC mains, HT current is supplied by half-wave rectifying valve **(V4, Mullard CY31)** which, with DC mains, behaves as a low resistance. Smoothing is effected by iron-cored choke **L23,** in the negative HT lead to chassis, and dry electrolytic capacitors **C27, C28.** The speaker field coil **L22** is connected directly across the rectified output, between the cathode and HT negative.

Valve heaters, together with ballast resistor **R18** and scale lamps, are connected in series across the mains input circuit. Mains RF filtering is effected by **C29,** and fuses **F1, F2** protect the input circuit against accidental short-circuits.



VALVE ANALYSIS

Valve voltages and currents given in the tables below are those quoted in the makers' manuals and represent conditions to be expected in an average chassis.

The upper table (table model) was measured with the receiver operating from AC mains of 230 V, using the 220-230 V voltage adjustment tapping, and the lower one (console) with mains of 207 V, using the 200-210 V tapping.

Voltages should be measured with a high-resistance meter whose negative lead is connected to chassis.

Table Model

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 ECH33	195	1·4	65	1·6
	Oscillator			
	100	4·0		
V2 EF39	195	4·0	65	1·2
V3 CBL31	182	37·5	195	5·6
V4 CY31†	—	—	—	—

† Cathode to HT negative, 232v, DC.

Console Model

V1 TH30C	164	1·8	60	44
	Oscillator			
	66	3·8		
V2 VP13C	164	5·8	164	2·2
V3 Pen40DD	156	27·0	164	5·2
V4 UR1C*	—	—	—	—

* Cathode to chassis, 194v, DC.

DISMANTLING THE SET

The cabinet is fitted with a detachable bottom, upon removal of which (four wood screws with brass distance-pieces) access may be gained to components beneath the chassis.

Removing Chassis.—Remove the four control knobs (recessed grub screws);
free the speaker and smoothing choke leads from the cleat on the side of the cabinet;
remove the detachable bottom cover described above, revealing the heads of the four bolts holding the chassis to the bottom of the cabinet;
remove these bolts (with metal and rubber washers and brass distance pieces, longer than the former ones.

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

To free chassis entirely, withdraw the speech coil plugs from their sockets at the rear of the chassis and unsolder the two leads from the speaker field tags and the two leads from the smoothing choke **L23** on the sub-baffle.

When replacing, fit a rubber washer to each fixing screw between the chassis and the bottom of the cabinet;

fit a metal washer, then a rubber washer and a brass sleeve to each fixing screw before inserting it in the pole in the bottom of the cabinet.

connect the red lead and the black lead to the two field coil tags (on a separate connecting panel on the speaker);

connect the green lead and yellow lead to the two tags on **L23** (on the sub-baffle).

If hum is present when testing, reverse the two connections to the field coil.

Removing Speaker.—Unsolder the two leads from the field coil panel and withdraw the speech coil leads from their sockets at the rear of the chassis;

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

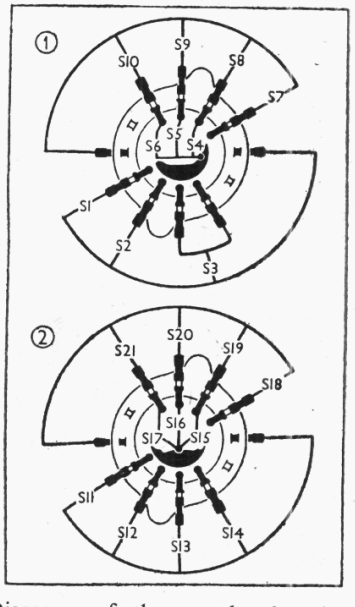
When replacing, the connecting panels should be at the bottom.

As explained previously, if hum is pronounced on test, reverse the field coil connections.

COMPONENTS AND VALUES

	RESISTORS	Values (ohms)
R1	V1 fixed GB resistor ...	200
R2	V1 osc. grid stopper ...	50
R3	V1 osc. CG resistor ...	20,000
R4	V1 osc. anode HT feed ...	20,000
R5	V1, V2 SG's HT feed ...	40,000
R6	V2 fixed GB resistor ...	200
R7	IF stopper	60,000
R8	V3 signal diode load ...	500,000
R9	Part bass compensator ...	60,000
R10	Manual volume control, total	1,000,000*
R11	V3 pent. grid stopper ...	100,000
R12, R13	V3 pent. GB and AVC decoupling resistors	150, 300
R14	AVC line decoupling ...	1,000,000
R15	V3 AVC diode load ...	1,000,000
R16	Part tone control... ...	3,000
R17	Surge limiter	100†
R18	Heater circuit ballast ...	800§

* Centre-tapped.
† Two 200Ω resistors connected in parallel.
§ Tapped at 600Ω+100Ω+100Ω from V4 heater



Diagrams of the waveband switch units, drawn as seen from the rear of the underside of the chassis. The associated table is at the foot of col. 3.

	CAPACITORS	Values (µF)
C1	Aerial isolator	0·00026
C2	Earth isolator	0·05
C3	Small coupling	0·000006
C4, C5	1st IF transformer tuning capacitors	0·00009, 0·00009
C6	V1 osc. CG capacitor ...	0·0001
C7	V1 cathode by-pass ...	0·1
C8	Osc. MW fixed trimmer ...	0·00002
C9	Osc. LW fixed trimmer ...	0·00026
C10	Osc. SW1 trimmer ...	0·000005
C11	AVC line decoupling ...	0·1
C12	Osc. SW1 tracker ...	0·005
C13	Osc. SW2 tracker ...	0·0013
C14	Osc. MW and LW tracker	0·000657
C15	V1 osc. anode coupling ...	0·0001
C16	V1, V2 SG's decoupling ...	0·1
C17	V2 cathode by-pass ...	0·1
C18, C20	2nd IF transformer tuning capacitors	0·00014, 0·00014
C20, C21	IF by-pass capacitors ...	0·00015, 0·00015
C22	AVC diode coupling ...	0·00002
C23*	V3 cathode by-pass ...	25·0
C24	AF coupling to V3 pent....	0·005
C25	Part tone compensator ...	0·005
C26	Part tone control... ...	0·05
C27*, C28*	HT smoothing capacitors	32·0, 16·0
C29	V4 anode RF by-pass ...	0·1
C30‡	Aerial SW1 trimmer ...	0·00003
C31‡	Aerial MW trimmer ...	0·00003
C32‡	Aerial circuit tuning ...	—
C33‡	Osc. circ. MW trimmer ...	0·00003
C34‡	Osc. circ. LW trimmer ...	0·00003
C35‡	Oscillator circuit tuning ...	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial SW1 coupling ...	0·3
L2	Aerial SW2 coupling ...	0·5
L3	Aerial MW and LW coupling	64·3
L4	Aerial SW1 tuning ...	—
L5	Aerial SW2 tuning ...	0·3
L6	Aerial MW tuning... ...	4·0
L7	Aerial LW tuning	13·7
L8	Osc. SW1 reaction coil ...	43·0
L9	Osc. SW2 reaction coil ...	65·0
L10	Osc. MW reaction coil ...	13·5
L11	Osc. LW reaction coil ...	20·2
L12	Osc. circ. SW1 tuning ...	—
L13	Osc. circ. SW2 tuning ...	0·4
L14	Osc. circ. MW tuning ...	2·5
L15	Osc. circ. LW tuning ...	3·2
L16, L17	1st IF trans. Pri. ... Sec. ...	7·0, 7·0
L18, L19	2nd IF trans. Pri. ... Sec. ...	10·0, 10·0
L20	Speaker speech coil ...	2·0
L21	Hum neutralising coil ...	0·1
L22	Speaker field coil	6,500·0
L23	HT smoothing choke ...	560·0
T1	Output trans. Pri. ... Sec. ...	345·0, 0·3
S1-S21	Waveband switches ...	—
S22, S23	Tone control switches ...	—
S24	Mains switch, ganged R10	—
F1,F2	Mains fuses, 1A	—

GENERAL NOTES

Switches.—S1-S21 are the waveband switches, ganged in two rotary units beneath the chassis. These are indicated in our under-chassis view by numbers **1** and **2** in circles, with associated arrows showing the direction in which they are viewed in the diagrams in col. 1, where they are shown in detail and identified again by numbers in circles.

The short-circuiting switches like **S4, S5, S6, etc.**, which close always on the next band higher in wavelength to the one actually in use, that is to say, **S4** short-circuits the SW2 band while SW1 is in use, consist of a contact stud attached to a metal plate on the rotor wafer, the plate being connected by a flexible lead to the AVC line in the case of the aerial circuit, and to the junction of **L14** and **L15** in the oscillator circuit.

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

S22, S23 are the tone control switches, in a three-position unit beneath the chassis. This is indicated in our under-chassis view and shown in detail in the diagram in col. 4, where it is drawn as seen from the rear of the underside of the chassis. In the fully anti-clockwise position of the control **S22** is closed, giving maximum high-note attenuation; in the centre position, **S22** opens and **S23** closes, giving reduced attenuation; in the fully clockwise position both switches are open.

S24 is the QMB mains switch, ganged with the volume control **R10.**

Coils.—The SW1 and SW2 aerial circuit coils **L1, L2, L4, L5** are in a tubular unit on the chassis deck with **C30** mounted on top. **L4** is the thick wire winding, and **L1** is interwound with it. The MW and LW aerial coils **L3, L6, L7** are in a second unit on the chassis deck, with **C31** mounted on top and the small coupling capacitor **C3** mounted on the side. All are unscreened.

The SW1 and SW2 oscillator coils **L8, L9, L12, L13** are in a tubular unit in the centre of the underside of the chassis, **L12** being the thick wire winding and **L8** being interwound with it. The MW and LW oscillator coils **L10, L11, L14, L15** are in a second tubular unit beneath the chassis with their trimmers mounted directly on them. All are unscreened.

The first IF transformer **L16, L17** is mounted on the chassis deck beside **V2** holder, and the second one **L18, L19** is in a partly screened compartment beneath the chassis. As is explained under "Chassis Divergencies," there are two alternative types of first IF transformer, one with variable dust-iron cores and one with fixed dust-iron cores. Our sample was of the latter type. The second IF transformer is air-cored.

Trimming adjustments are made in both cases in our sample type by softening the wax by heating and moving the outer coils only, to alter the inductance. In the alternative type the first IF transformer (on the chassis deck) is adjusted

Switch Table

Switch	SW1	SW2	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

by means of screws attached to the cores.

The HT smoothing choke **L23** is mounted on the sub-baffle, but the output transformer **T1** is mounted beneath the chassis.

Scale Lamps.—These are two MES-type lamps, with clear spherical bulbs, rated at 6.2 V, 0.3 A.

External Speaker. — The internal speaker speech coil is connected to the chassis by means of plugs, which have sockets inset at the top for an external speaker, and a pair of sockets at the rear of the chassis. A low impedance (2-4 Ω) external speaker may thus be connected so that both speakers operate; or, if the internal speaker plugs are withdrawn from their sockets, those of the external speaker may replace them, muting the internal speaker.

Fuses F1, F2.—These are the standard 1¼ in. glass type, rated at 1 A. They fit into holders mounted on the chassis deck.

Capacitor C3.—This is a small "top" aerial MW coupling, made by winding a thin enamelled copper wire over a thicker one, and it is mounted directly on to the **L3, L6, L7** coil unit.

Capacitors C27, C28.—These are two dry electrolytics in a single rectangular waxed cardboard container mounted beneath the chassis. The red lead is the common positive; the brown lead is the negative of **C28** (16 μF) and goes to the HT negative line; the black lead that of **C27** (32 μF) and goes to chassis. **C28** is rated at 500 V peak working, 600 V surge limiting; **C27** is rated at 400 V peak working, 525 V surge limiting. When dealing with a console model it should be borne in mind that this unit has a common negative, as explained under "Console Modifications."

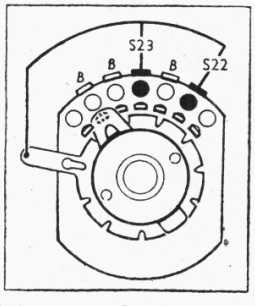
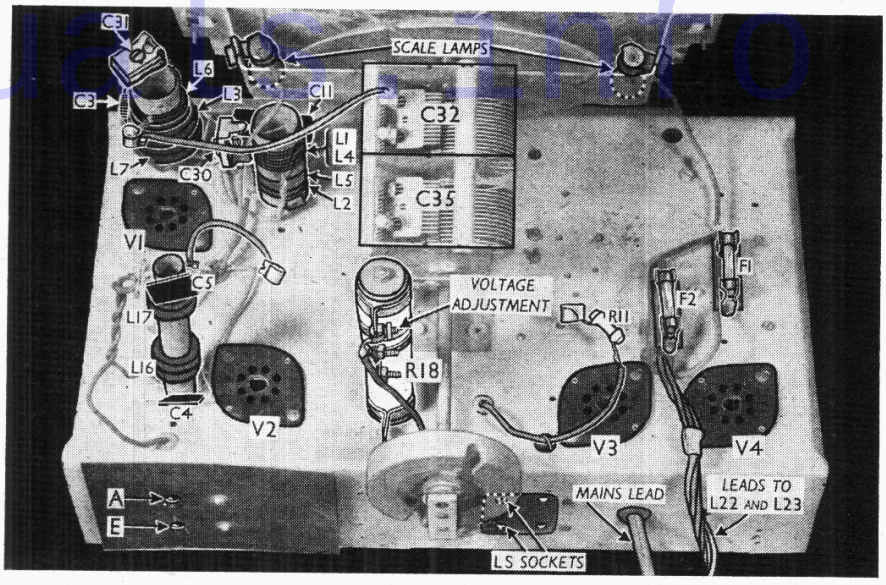


Diagram of the tone control switch unit, as seen from the rear of the underside of the chassis.

Capacitor C23.—This is a dry electrolytic in a tubular cardboard container mounted in a clip inside the second IF transformer screening compartment beneath the chassis. It is rated at 25 μF, 25 V working, 35 V surge.

Chassis Divergencies.—The principal difference that may be found in some chassis as compared with our sample is that the first IF transformer may have adjustable dust-iron cores.

This is easily recognisable by its shape, as it then consists of two separate asemblies for primary and secondary windings mounted in a horizontal position on a vertical bracket, with core adjustment screws projecting rearwards. In both types the upper winding is the secondary.



Plan view of the chassis. In some samples, **L16, L17** may be mounted in two separate units on a vertical bracket, with screwed core adjustments projecting rearwards.

In some chassis also, **C1** may be 0.0003 μF, instead of 0.00026 μF as in our case, and **R17** may consist of two 400 Ω resistors connected in parallel, instead of two 200 Ω ones. In some cases, too, the valve range may be the same as that described for the console version.

CONSOLE MODEL MP/UC

There are several modifications in the console version as compared with the table model, but the principal differences concern the use of a different range of valves and the transfer of the HT smoothing choke **L23** from the negative side of the HT circuit to the positive side.

As a result of the second item, the HT– line goes directly to chassis, and the electrolytic block **C27, C28** requires a common negative lead instead of a common positive. It also becomes an 8 μF + 8 μF unit instead of 16 μF + 32 μF.

Several changes result from the change of valve range. **R5** becomes 20,000 Ω, and feeds only **V1** screen, **V2** screen being fed directly from the HT positive line. **R6** becomes 150 Ω, and **R7** 100,000 Ω. The valves are all Mullard, their types being quoted in the lower table under "Valve Analysis," and although their heater current rating is the same as for those in the table model, **R18** is altered to a total of 650 Ω, including the two 100 Ω sections between the three voltage adjustment tappings, to accommolate the change in heater voltage drop.

The intermediate frequency is given in the MP/UC manual as 465 kc/s instead of 462 kc/s as in the table model, and **C4, C5** and **C18, C19** are all 0.0001 μF.

CIRCUIT ALIGNMENT

IF Stages.—Remove the control grid (top cap) connector from **V1,** connect signal generator leads via a 0.1 μF capacitor between the connector and the top cap of the valve, and connect a 500,000 Ω resistor between the top cap of the valve and the AVC line.

Switch set to MW, tune to 500 m on scale, turn the volume control to maximum, feed in a 462 kc/s (649.4 m) signal, and adjust the outer coils only of **L18** and **L19,** after softening the wax with a soldering iron, for maximum output. A stick of insulating material (dry wood will do) makes a convenient adjusting tool. In the console, the IF is 465 kc/s (645.16 m).

Now adjust **L16, L17,** using the same method if the transformer is of the same type as ours, or adjusting the core screws if the alternative type is used. Finally, it is advisable to seal the coils again with insulating varnish such as Durofix (the makers recommend British Celanese Solution 202) before leaving them, then remove resistor and replace **V1** top cap connector.

RF and Oscillator Stages. — Transfer signal generator leads to **A** and **E** sockets, via a suitable dummy aerial. See that the glass scale sits squarely in its clamps, with the central "Pye" motif circle concentric with the pointer spindle. With the gang at maximum, the pointer should be horizontal.

MW.—Tune to 210 m on scale, feed in a 210 m (1,429 kc/s) signal, and adjust **C33,** then **C31,** for maximum output. Feed in a 520 m (576.9 kc/s) signal, and check calibration on the scale.

LW.—Switch set to LW, tune to 1,300 m on scale, feed in a 1,300 m (231 kc/s) signal, and adjust **C34,** gently rocking the gang for optimum results.

SW1.—Switch set to SW1, tune to 15 m on scale, feed in a 15 m (20 Mc/s) signal, and adjust **C30** for maximum output, rocking the gang for optimum results. There are no adjustments for the SW2 band.

Printed in Great Britain by The Cornwall Press Ltd., Paris Garden, London, S.E.1

*