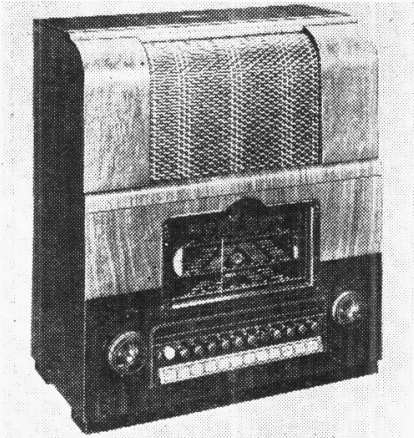


"TRADER" SERVICE SHEET

402

MARCONIPHONE 874 AND H.M.V. 1102



The Marconiphone 874 press-button AC superhet.

THE Marconiphone 874 is a five-valve (plus rectifier) AC 3-band press-button superhet. There are twelve press-buttons, including eight for pre-set stations, three for manual waveband switching, and one for switching off.

Automatic frequency control is incorporated, and is in operation on the eight pre-set station buttons only.

A tuning indicator is fitted, and there is provision for an external speaker and for a pick-up. The SW band covers 13.8-50 m.

The receiver is for 195-255 V, 50-100 C/S mains.

The H.M.V. 1102 has an identical chassis, but this *Service Sheet* was prepared on a Marconiphone 874.

Release dates: Both models, March, 1939.

CIRCUIT DESCRIPTION

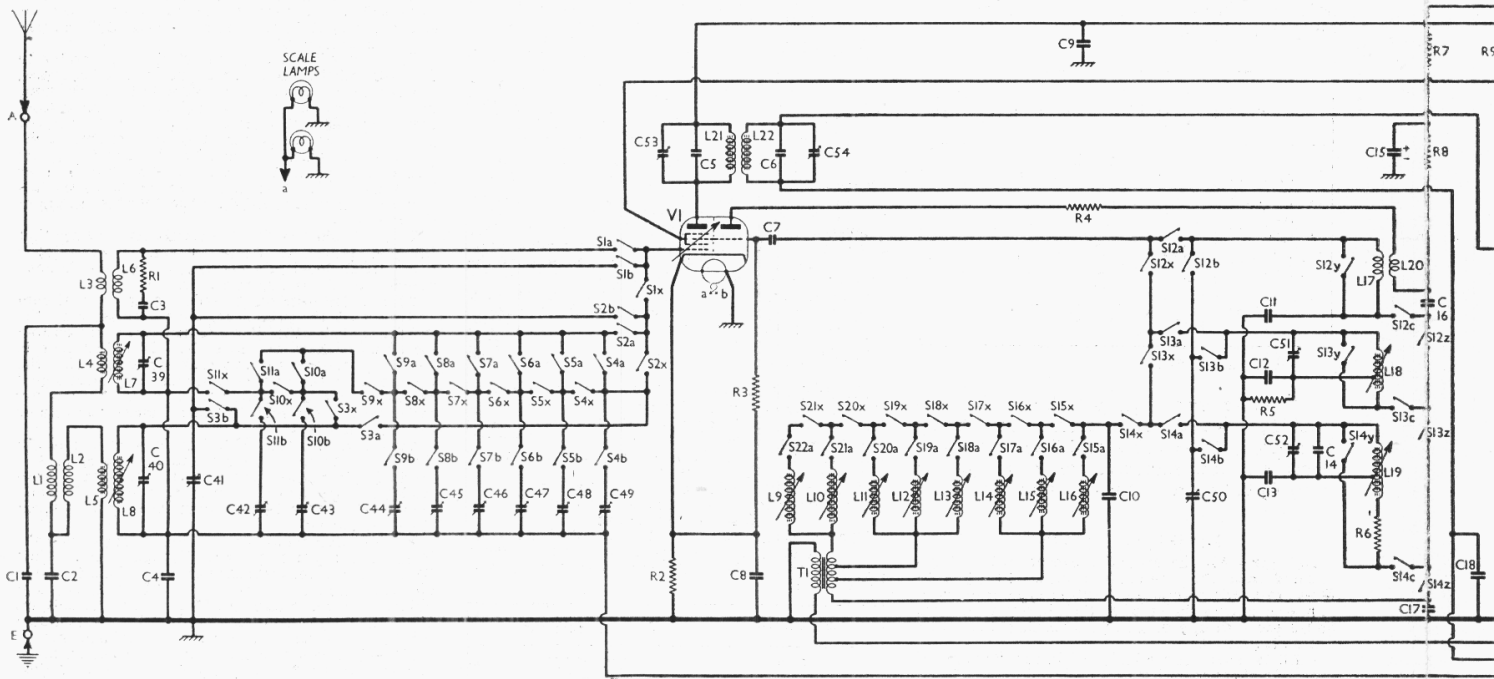
All the switches in the press-button unit, with the exception of **S23** and **S24** have been numbered and lettered in such a manner as to indicate their functions: all switches bearing the same number are operated by the same button; a suffix letter **a**, **b** or **c** indicates the switch to which it is attached closes, while an **x**, **y** or **z** indicates that its switch opens, when its button is pressed; when the button is released, by pressing another button, the **a**, **b** and **c** switches open, and **x**, **y** and **z** switches close. **S24** closes during the movement

of any button to mute the speaker during the operation.

Aerial input is via coupling coils **L3**, **L4** and (via image rejector circuit **L1**, **L2**, **C2**) **L5** to single-tuned circuits comprising coils **L6** (SW), **L7** (MW) and **L8** (LW) tuned manually by **C41** or automatically (MW and LW only) by pre-set trimmer condensers **C42** to **C49** via switches **S4a**, **S4b** to **S11a**, **S11b** according to which button is depressed.

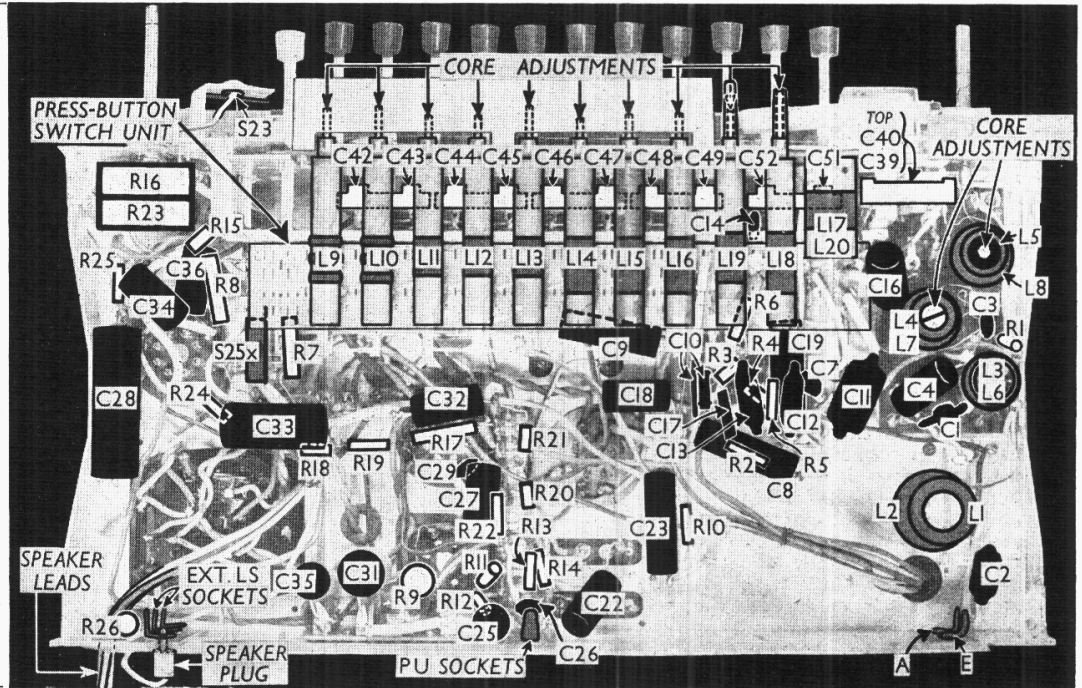
First valve (**V1**, Marconi **X65**) is a triode hexode operating as frequency changer with internal coupling. For manual operation, triode grid coils **L17** (SW), **L18** (MW) and **L19** (LW) are tuned by **C50**; parallel trimming by **C51** (MW) and **C14**, **C52** (LW); series tracking by **C11** (SW), **C12** (MW) and **C13** (LW). Reaction by direct coupling between anode and coils via **C16** and switches **S12c** (SW), **S12z**, **S13c** (MW) and **S13z**, **S14c** (LW). On SW, additional coupling is obtained via **L20**.

For automatic operation, independent tuned circuits are employed comprising coils **L9** to **L16** tuned by fixed condenser **C10**. They are connected between the control grid (via **x** switches) and the anode (via **z** switches) via the secondary



Circuit diagram of the Marconiphone 874 and H.M.V. 1102. In the press-button section, condenser trimmers are used for the aerial coils for the oscillator circuit. **V3** is the double-diode AFC discriminator valve, which has two separate cathodes. **T1** is the AFC control transformer; its pick-up socket is split.

Under-chassis view. The core and trimmer adjustments are indicated. Diagrams of the press-button switch unit are in cols. 5 and 6 overleaf. S23 is the AFC eliminator switch, operated when the escutcheon plate is removed or replaced. C10 consists of two condensers in parallel.



of the AFC control transformer T1. The appropriate coil is selected by one of the switches S15a to S22a, according to which button is pressed.

Second valve (V2, Marconi KTW63) is a variable-mu RF tetode operating as intermediate frequency amplifier with iron-cored transformer couplings C53,

L21, L22, C54 and C55, L23, L24, L25, C56. L25, C56 is associated with the AFC circuit (see later).

Intermediate frequency 465KC/S.

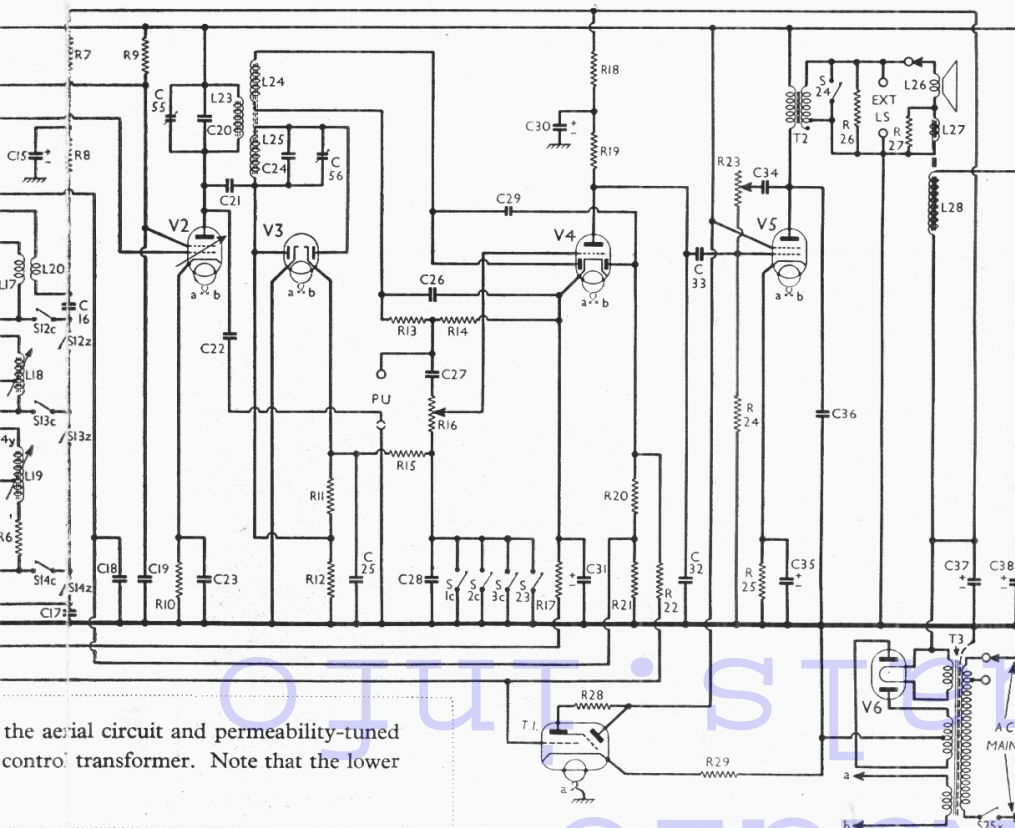
Diode second detector is part of double diode triode valve (V4, Marconi DH63) and is fed from the untuned secondary

winding L24. Audio frequency component in rectified output is developed across load resistances R13, R14 and passed via AF coupling condenser C27 and manual volume control R16 to CG of triode section, which operates as AF amplifier. Provision for connection of gramophone pick-up between top of C27 and chassis. The chassis socket is split and the isolated half is connected via C22 to V2 anode, so that when a plug is inserted in the split socket, the two halves are connected together and thus C22 short-circuits the output from V2 and mutes radio.

Second diode of V4, fed from L24 via C29, provides DC potentials which are developed across load resistances R20, R21 and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control. Delay voltage is obtained from same source as GB for triode section, which is mentioned later. AVC line controlling FC valve is also connected to control grid of cathode ray tuning indicator (T.I., Marconi Y63) to provide operating potential.

Resistance-capacity coupling by R19, C33 and R24 between V4 triode and tetrode output valve (V5, Marconi KT63). Variable tone control by R23, C34 between grid and anode. Fixed tone correction by C36 between anode and chassis. Provision for connection of low impedance external speaker across secondary of output transformer T2, while internal speaker may be muted by withdrawal of speaker plug. S24 momentarily short-circuits T2 secondary while any of the press-buttons is being operated.

HT current is supplied by full-wave rectifying valve (V6, Marconi U50). Smoothing by speaker field L28 and dry-electrolytic condensers C37, C38.



the aerial circuit and permeability-tuned control transformer. Note that the lower

AFC Circuit

The tuned secondary **L25, C56** of the second IF transformer operates as a discriminator coil and its output, together with that from **C21**, is applied across the anodes of a double diode discriminator valve (**V3, Marconi metallised D63**). If the IF signal is off resonance, a higher peak voltage is applied to one anode than the other, and correspondingly unbalanced currents flow in their load circuits **R11** and **R12**. These resistances are of equal value, but the current through each flows in an opposite direction, so that the voltage developed across one tends to neutralise that across the other and the total voltage appearing across **C25** is the algebraic sum of the two voltages, and may be positive or negative with respect to chassis.

The voltage so obtained is applied via **R15, R16** to the control grid of **V4**, so that this valve behaves as a DC amplifier, and its anode current varies according to the discriminator output; as the cathode is returned to chassis via the primary winding of the AFC control transformer **T1**, a change in the anode current of **V4** triode produces a change of inductance in the secondary winding of **T1** which, in turn is in series with the oscillator circuit auto tuning coils, so that the oscillator frequency is altered in such a way as to tend to correct the intermediate frequency.

Frequency control is intended to operate only in association with the automatic tuning system; during manual operation, AFC action is automatically suppressed by switches **S1c** to **S3c**, and during alignment, by **S23**.

CONDENSERS (Continued)		Values (μF)
C7	V1 osc. CG condenser	0.00005
C8	V1 cathode by-pass	0.1
C9	HT circuit RF by-pass	0.1
C10	Osc. auto circuit fixed tuning condenser	0.000158
C11	Osc. circuit SW tracker	0.005
C12	Osc. circuit MW tracker	0.00055
C13	Osc. circuit LW tracker	0.00023
C14	Osc. circuit LW fixed trimmer	0.000075
C15*	V1 osc. anode decoupling	4.0
C16	V1 osc. anode coupling condensers	0.005
C17	V2 CG decoupling	0.00015
C18	V1 and V2 SG's decoupling	0.05
C19	V1 and V2 SG's decoupling	0.1
C20	2nd IF trans. pri. fixed trimmer	0.00013
C21	Part coupling to V3	0.0001
C22	Radio muting on gram	0.05
C23	V2 cathode by-pass	0.1
C24	2nd IF trans. disc. sec. trimmer	0.00013
C25	IF by-pass	0.001
C26	IF by-pass	0.0001
C27	AF coupling to V4 triode	0.0023
C28	V4 triode CG decoupling	0.5
C29	Coupling to V4 AVC diode	0.000075
C30*	V4 triode anode decoupling	4.0
C31*	V4 cathode by-pass	50.0
C32	IF by-pass	0.001
C33	V4 triode to V5 AF coupling	0.1
C34	Part of variable tone control	0.001
C35*	V5 cathode by-pass	10.0
C36	Fixed tone corrector	0.0035
C37*	HT smoothing condensers	16.0
C38*	HT smoothing condensers	8.0
C39†	Aerial circuit MW trimmer	—
C40†	Aerial circuit LW trimmer	—
C41†	Aerial circ. manual tuning	—
C42†	Aerial circuit LW auto tuning trimmers	—
C43†	Aerial circuit MW auto tuning trimmers	—
C44†	Aerial circuit MW auto tuning trimmers	—
C45†	Aerial circuit MW auto tuning trimmers	—
C46†	Aerial circuit MW auto tuning trimmers	—
C47†	Aerial circuit MW auto tuning trimmers	—
C48†	Aerial circuit MW auto tuning trimmers	—
C49†	Aerial circuit MW auto tuning trimmers	—
C50†	Osc. circ. manual tuning	—
C51†	Osc. circuit MW trimmer	—
C52†	Osc. circuit LW trimmer	—
C53†	1st IF trans. pri. tuning	—
C54†	1st IF trans. sec. tuning	—
C55†	2nd IF trans. pri. tuning	—
C56†	2nd IF trans. discriminator sec. tuning	—

OTHER COMPONENTS (Continued)		Approx. Values (ohms)
L4	Aerial MW coupling coil	0.6
L5	Aerial LW coupling coil	4.0
L6	Aerial SW tuning coil	0.1
L7	Aerial MW tuning coil	2.0
L8	Aerial LW tuning coil	0.5
L9	Oscillator circuit LW auto tuning coils	10.5
L10	Oscillator circuit MW auto tuning coils	10.5
L11	Oscillator circuit MW auto tuning coils	0.5
L12	Oscillator circuit MW auto tuning coils	0.5
L13	Oscillator circuit MW auto tuning coils	2.3
L14	Oscillator circuit MW auto tuning coils	2.3
L15	Oscillator circuit MW auto tuning coils	2.3
L16	Oscillator circuit MW auto tuning coils	2.3
L17	Osc. circuit SW tuning coil	0.1
L18	Osc. manual MW coil, total	4.5
L19	Osc. manual LW coil, total	11.0
L20	Oscillator SW reaction	0.6
L21	1st IF trans. Pri.	0.5
L22	1st IF trans. Sec.	0.5
L23	2nd IF trans. Pri.	5.0
L24	2nd IF trans. Sec.	10.5
L25	Discriminator sec.	4.0
L26	Speaker speech coil	3.0
L27	Hum neutralising coil	0.5
L28	Speaker field coil	1,660.0
T1	AFC control trans. Pri., total	430.0
	Sec., total	1.75
T2	Output trans. Pri.	280.0
	Sec.	0.6
T3	Mains Heater sec.	30.0
	Rect. heat. sec.	0.1
	HT sec., total	630.0
Sta, b, x to S3a, b, x S4a, b, x to S11a, b, x S12a, b, c and S12x, y, z to S14a, b, c and S14x, y, z S15a, x to S22a S24 S25x	Aerial circuit waveband switches (manual tuning)	—
	Aerial circuit auto tuning selector switches	—
	AFC eliminator switches	—
	Oscillator circuit waveband switches (manual tuning)	—
	Osc. circuit auto tuning selector switches	—
	Speaker muting switch	—
	Mains switch	—

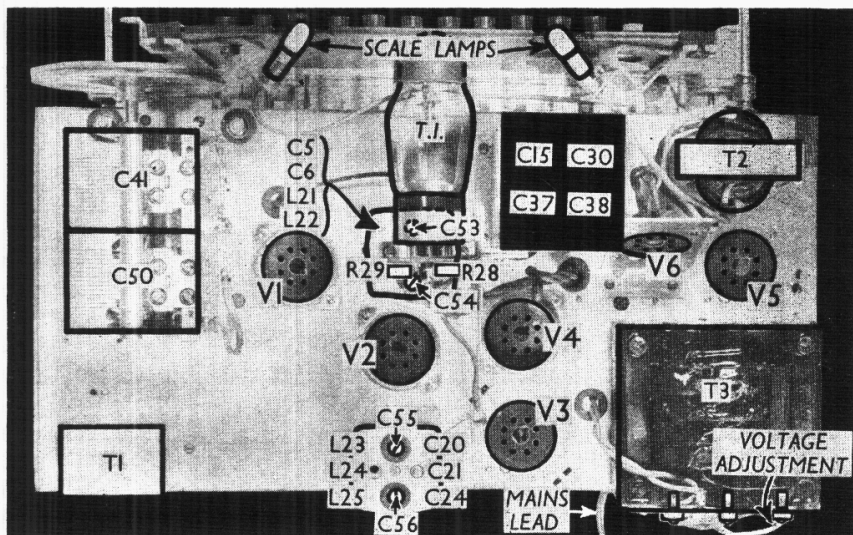
COMPONENTS AND VALUES

RESISTANCES		Values (ohms)
R1	Aerial circuit SW damping	23
R2	V1 fixed GB resistance	350
R3	V1 osc. CG resistance	50,000
R4	V1 osc. anode stabiliser	150
R5	Osc. circuit MW damping	2,300
R6	Osc. LW reaction damping	1,000
R7	V1 osc. anode decoupling	23,000
R8	V1 osc. anode HT feed	23,000
R9	V1 and V2 SG's HT feed	35,000
R10	V2 fixed GB resistance	350
R11	V3 diodes load resistances	2,300,000
R12	V3 diodes load resistances	2,300,000
R13	V4 signal diode load resistances	100,000
R14	V4 signal diode load resistances	500,000
R15	V4 triode CG decoupling	1,000,000
R16	Manual volume control	2,000,000
R17	V4 triode fixed GB; AVC delay	2,300
R18	V4 triode anode decoupling	50,000
R19	V4 triode anode load	150,000
R20	V4 AVC diode load resistances	1,500,000
R21	V4 AVC diode load resistances	1,000,000
R22	AVC line decoupling	1,500,000
R23	Variable tone control	2,000,000
R24	V5 CG resistance	500,000
R25	V5 GB resistance	400
R26	T1 sec. artificial loading	50
R27	Hum neut. coil shunt	0.4
R28	T.I. anode HT feed	1,000,000
R29	T.I. GB resistance	500

CONDENSERS		Values μF
C1	Part aerial SW coupling	0.000015
C2	Part LW image rejector	0.00035
C3	Aerial circuit SW trimmer	0.00001
C4	V1 hexode CG decoupling	0.05
C5	1st IF transformer fixed trimmers	0.000075
C6	1st IF transformer fixed trimmers	0.000075

* Electrolytic. † Variable. ‡ Pre-set.
§ Two 0.000075 μF in parallel.

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial LW image rejector coils	18.0
L2	Aerial LW image rejector coils	10.0
L3	Aerial SW coupling coil	5.5



Plan view of the chassis. Only the IF and discriminator trimmers are above the chassis, the remainder being adjusted from the front or underside of the chassis.

DISMANTLING THE SET

Removing Chassis.—A detachable bottom is fitted to the cabinet, upon removal of which access can be gained to the underside of the chassis. To remove the chassis from the cabinet, remove the three control knobs, the two round-head wood screws holding the scale assembly to the front of the cabinet and the four bolts (with claw washers and lock washers) holding the chassis to the base of the cabinet, and slip the speaker leads from the cleat at the side of the cabinet, when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes. To free the chassis entirely, unsolder the four leads from the speaker, and when replacing, connect them to the tags, on the larger paxolin panel, numbered as follows: 1, yellow; 3, red/black; 4, red. The black lead goes to the right-hand tag on the small speech coil panel above.

Removing Speaker.—To remove the speaker, unsolder the four leads and remove the three nuts (with washers) holding it to the sub-baffle, and when replacing, see that the small panel is at the top and connect the leads as indicated above.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 226 V, using the 224-255 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the MW 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 X65 ..	250 Oscillator	1.2	90	3.1
V2 KTW63	95 250	5.5 6.3	90	1.5
V3 D63 ..	120	0.8	—	—
V4 DH63 ..	120	0.8	—	—
V5 KT63 ..	236	35.0	250	5.2
V6 U50 ..	330†	—	—	—
T.I. Y63 ..	18 Target	2.5	—	—
	246	1.3	—	—

† Each anode, AC.

If, as in our case, V2 should become unstable when its currents are being measured, it can be stabilised by connecting a non-inductive condenser (about 0.1 μF) between its top-cap and chassis.

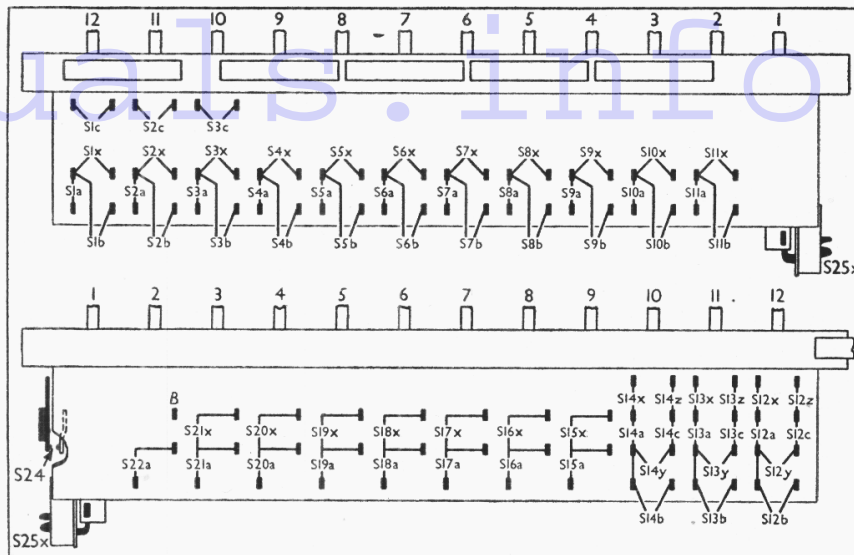
GENERAL NOTES

Switches.—All the switches, except S23, are associated with the press-button unit. S1a, b, x to S22a are of the normal press-button type, those with a, b, or c suffixes closing when their button is pressed, and those with x, y or z suffixes opening when their button is pressed.

All these switches are indicated in the diagrams of each side of the press-button unit in cols. 5 and 6.

S24 is the speaker muting switch (shown in the lower of the two diagrams) which is normally open, but closes whilst any one of the press-buttons is being operated.

S25x is the QMB mains switch operated by the press-button numbered 1 ("Off"). It opens when the button is pressed, and switches the set off. Operation of any other button causes this switch to close, and switch the set on.



Diagrams of the press-button unit. The lower one is drawn as seen from beneath the chassis, while the upper one shows the switches on the reverse side of the unit. S24 is the speaker muting switch and S25x the mains switch.

S23 is normally open, but closes when the press-button escutcheon moulding is removed for station setting and alignment, thus eliminating the AFC action. S23 is actually in parallel with S1c, S2c and S3c, which eliminate the AFC action when any of the manual waveband buttons are depressed.

Coils.—L1, L2; L3, L6; L4, L7 and L5, L8 are in four units beneath the chassis, to the right of our under-chassis view. L9-L16 are the eight permeability-tuned oscillator auto coils, in a row above the press-button unit. L17, L20; L18 and L19, which are the oscillator manual coils, are in the same row, at the right-hand end in the under-chassis view. L9-L16 and L18, L19 all have adjustable iron cores.

The IF transformers L21, L22 and L23-L25 are in two screened units on the chassis deck, with their associated trimmers, and certain other components.

The transformers T1-T3 are all on the chassis deck.

Scale Lamps.—These are two Osram MES types, rated at 6.5 V, 0.3 A. They have tubular bulbs.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (50) external speaker. There is also another socket, into which a plug on a flying lead fits. On removal of this plug the internal speaker is muted.

Pick-up Connections.—Note that the lower pick-up socket is split, and when a plug is inserted C22 is connected to chassis, thus muting radio. Hence, for radio reception, both pick-up plugs must be removed.

Condensers C15, C30, C37, C38.—These are four dry electrolytics (570 V DC) in a rectangular metal case on the chassis deck. The brown lead is the negative, and the red lead the positive of C37 (10μF). The black lead is the common negative of the other three condensers. The yellow lead is the positive of C38 (8μF); the green lead to the junction of R7, R8 is the positive of C15 (4μF), while the green lead to the junction of R18, R19 is the positive of C30 (4μF).

Pre-Set Condensers.—The eight aerial auto trimmers, C42-C49, are in four dual units in a row, adjustable from the front of the chassis. C39, C40 and C51, C52 are in two further dual units, also adjustable from the front of the chassis. The remaining trimmers are in the IF units on the chassis deck.

Condenser C10.—This consists of two 75μF condensers, one flat and one tubular, in parallel.

Press-Button Ranges
The wavelength ranges of the eight station buttons are given in the table below, the buttons being numbered in accordance with the moulded numbers on the escutcheon.

Button Nos.	Wavelength Ranges
2, 3	1,140—2,150 m
4, 5, 6	300—600 m
7, 8, 9	195—335 m

The setting of each button involves two tuning adjustments, one (above, and slightly to the right) for the aerial circuit trimmer, and the other (directly below) for the oscillator coil core. The AFC is out of action when the escutcheon is removed (S23 closed) and the tuning indicator is used for accurate setting.

CIRCUIT ALIGNMENT

IF and AFC Stages.—Press the Droitwich button, turn tone control fully anti-clockwise, and short-circuit C17. Connect signal generator to control grid (top cap) of V2 and chassis. Connect a DC milliammeter in series with the earth return of the AFQ unit (T1 primary, yellow lead).

Screw C56 fully in. Feed in a 465 KC/S signal, and adjust C55 for maximum output. Note the exact reading of the DC milliammeter, then insert a piece of paper between the contacts of S23, and adjust C56 for exactly the same milliammeter reading as before. Remove paper from S23, and re-adjust C55 for maximum output.

Repeat these adjustments, and finally remove paper from S23 and connect signal generator to control grid (top cap) of V1 and chassis. Adjust C53 and C54 for maximum output.

To check AFC action, connect signal generator to A and E sockets, feed in a 1,293 m (232 KC/S) signal, adjust attenuator to 1 mV input and press Luxembourg button. Check up the pre-set trimmers for this button, then open S23 with a piece of paper. De-tune signal generator, then slowly tune towards 1,293 m. Note the point at which the signal is "pulled in"; the frequencies should be not more than 226 KC/S or less than 238 KC/S (that is, plus or minus 6 KC/S from the nominal 232 KC/S). Repeat the test on 274 m (button 8).

To check whether C56 is correctly set, first see that the press-button trimmers are correct for a given station (S23 closed), then open S23. This should have no effect on the tuning indicator.

RF and Oscillator Stages.—Turn gang to maximum and see that the pointer registers accurately on the small mark below the LW calibration line at the bottom right-hand corner of the scale. If adjustment is necessary, slacken the two grub screws securing the drive disc to the condenser spindle. Connect signal generator to A and E sockets via a suitable dummy aerial, set tone control fully anti-clockwise, and volume control to maximum.

SW.—Switch set to SW, feed in a 50 m (6MC/S) signal, tune to 50 m on scale, and adjust loop of wire inside L17 for maximum output. Feed in a 30 m (10 MC/S) signal, tune to 30 m on scale, and adjust loop of wire inside L6 for maximum output. Repeat these adjustments.

MW.—Switch set to MW, and tune to 225 m on scale. Feed in a 225 m (1,333.3 KC/S) signal, and adjust C51, then C39, for maximum output. Tune to 530 m on scale, feed in a 530 m (566 KC/S) signal, and adjust the cores of L18 and L7 for maximum output. Unless these coils have been changed, little adjustment should be necessary. Repeat the MW adjustments.

LW.—Switch set to LW, tune to 850 m on scale, and feed in an 850 m (352.9 KC/S) signal. Adjust C52, then C40, for maximum output. Tune to 1,900 m on scale, feed in a 1,900 m (157.9 KC/S) signal, and adjust cores of L19 and L8 for maximum output if necessary. Repeat the LW adjustments.

Press-buttons.—Adjustments to the press-button trimmers should always be made after IF alignment and after any adjustments to the MW and LW aerial coils. Final press-button adjustments must be made on the mains on which the set is to work.