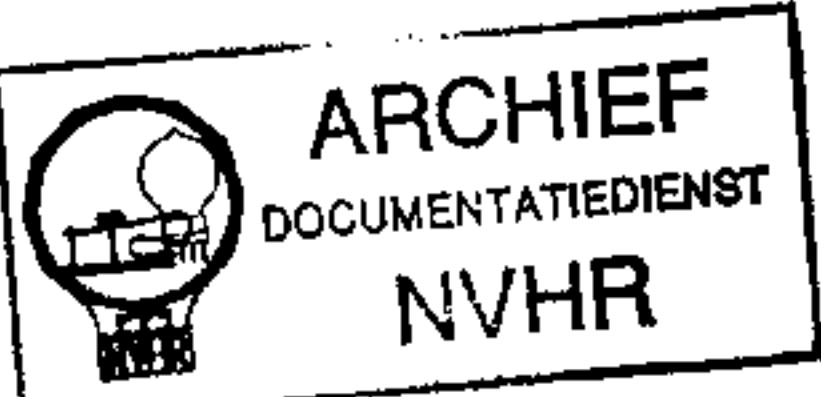
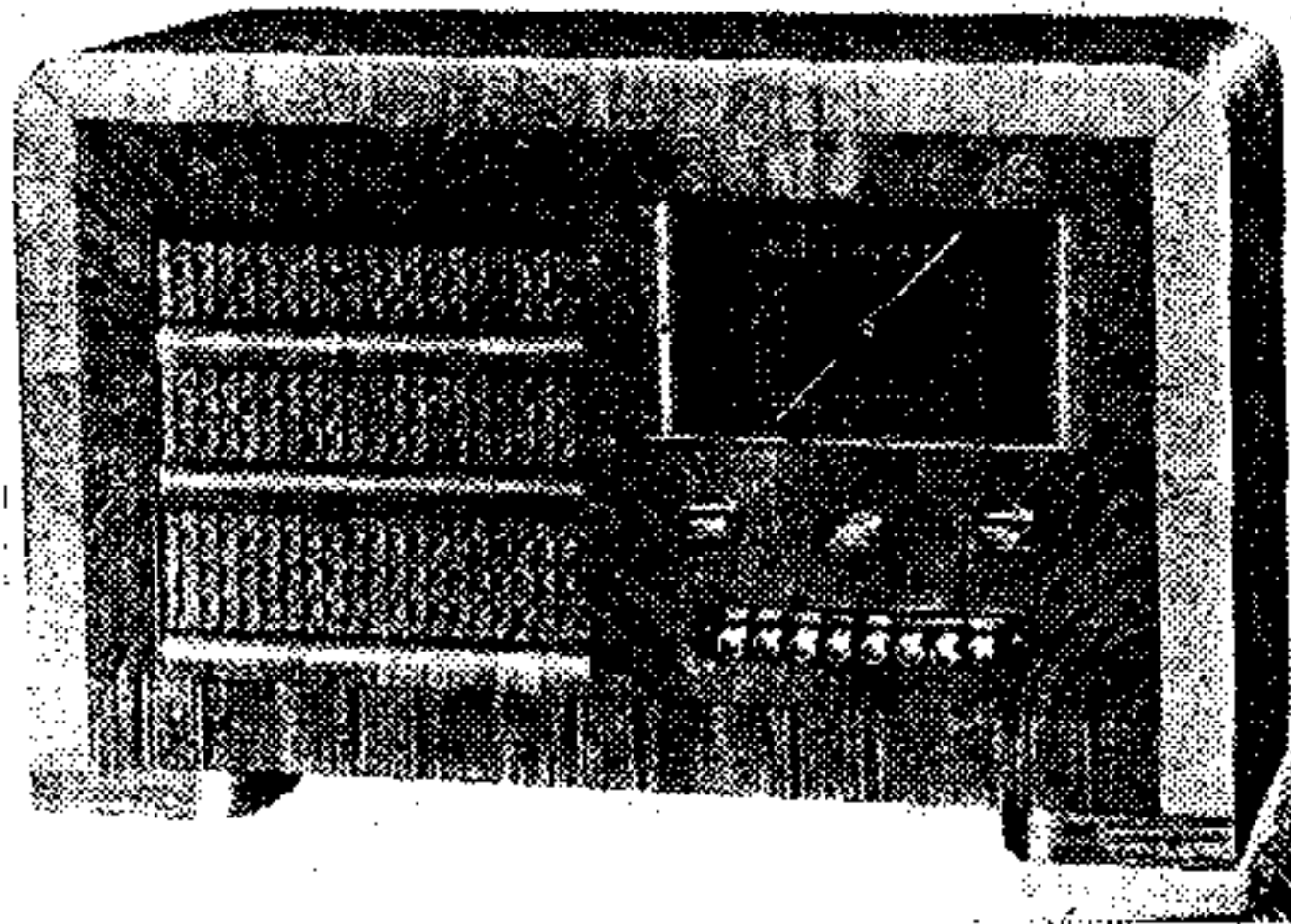


Ned. Ver. v. Historie v/d Radio



DECCA PT/ML/B

(OR PT/B)



PRESS-BUTTON tuning of the trimmer type is included in the Decca PT/ML/B 5-valve battery 2-band superhet and caters for four medium and two long wave stations. Press-buttons are also incorporated for wave changing when manual tuning is being employed.

While the chassis of the receiver bears a plate carrying the model number PT/ML/B, the receiver itself is catalogued as PT/B.

Release date: July, 1938.

CIRCUIT DESCRIPTION

Coupling between the aerial and MW tuning coil **L4** is via coupling condenser **C2** and coupling coil **L2**. On LW, however, **C31** is connected by switching across **L4**, the two together operating as an aerial

coupling to the LW tuning coil **L3** and as an aerial loading circuit. The aerial circuit is tuned by **C23** (manual) or one of the trimmer units **C32** to **C39**, selection being effected by switches mounted on the auto tuning unit and controlled by the press-buttons, **L1, C1** connected across aerial circuit is an IF filter.

The action of the switches can be followed from the circuit diagram when it is explained that the switches are numbered in the same sequence in the diagram as they appear in the accompanying illustration of the auto unit and are numbered in pairs as attached to each button, each switch bearing a lettered suffix to indicate its action.

S1a and **S1x** are associated with the MW manual button on the extreme left of the unit, while **S8a** and **S8x** are associated with the LW manual button, situated at the opposite end of the unit, so that **S1** and **S8** form the manual waveband switching.

Throughout the diagram the suffix "a" indicates that the switch with which it is associated closes when its button is depressed, while an "x" indicates that its switch opens when the button is depressed. When the button is released by the depression of another button, the position is reversed, so that the "a" switch opens and the "x" closes.

At any time, therefore, all "x's" but one are closed and all "a's" but one are open, from which it will be seen that, if

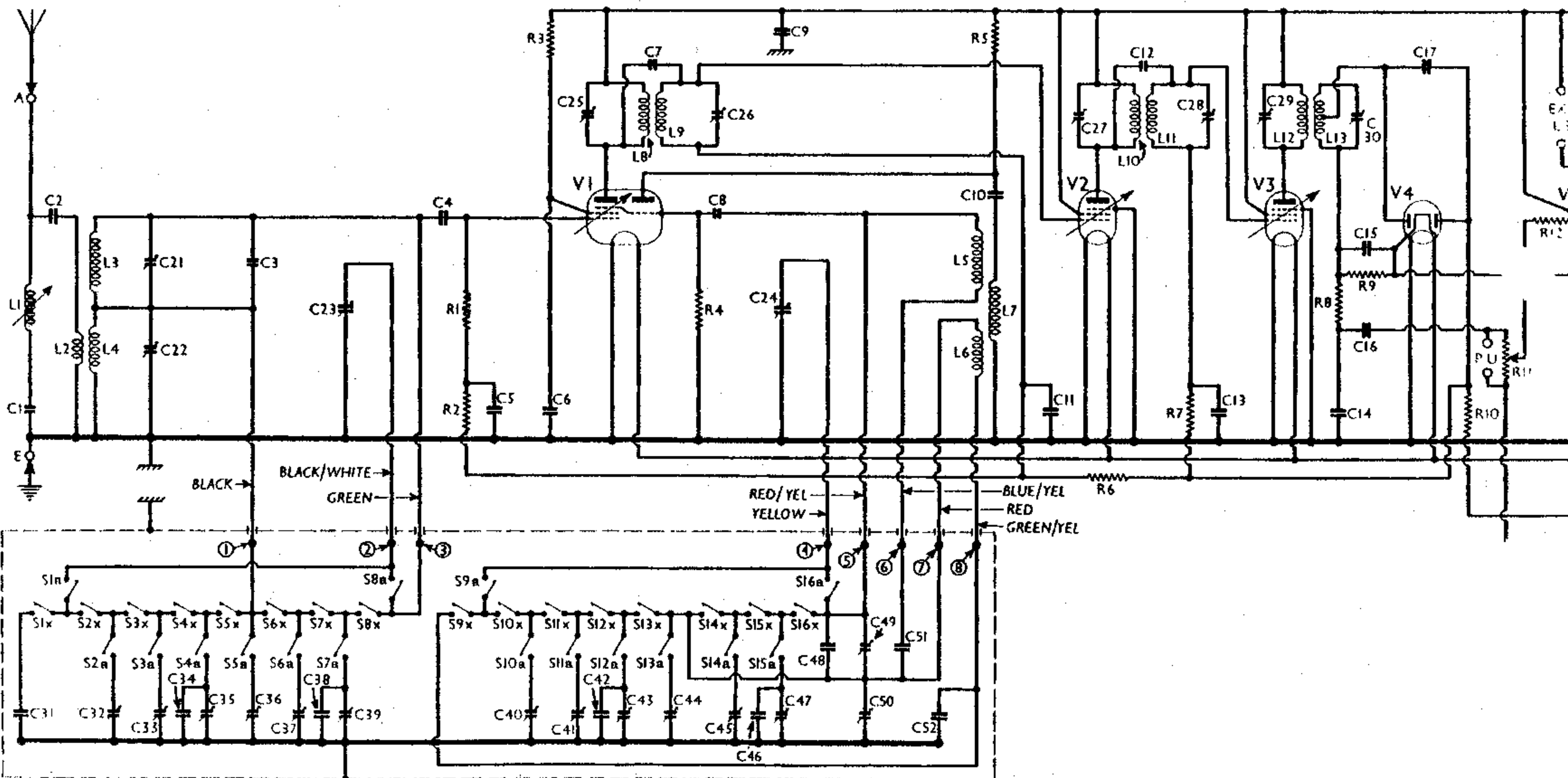
the button controlling **S6, S7** or **S8** is depressed, all "x's" from **S1** to **S5** will be closed, connecting **C31** between the junction of **L3** and **L4**, and chassis. In this condition, the receiver will be operating on LW, **S6x, S7x** or **S8x** being open.

If a button controlling switch pairs **S1** to **S5** is depressed, the associated "x" will open, the "a" close, **S6x, S7x** and **S8x** will short-circuit **L3** and the receiver will operate on MW.

First valve (**V1, Mazda metallised TP23**) is a triode pentode operating as frequency changer with internal coupling. Triode oscillator grid coils **L8** (MW) and **L5** (LW) are tuned by **C24** (manual), or one of the trimmer units **C40** to **C47** via selector switches **S10a** to **S15a** (auto.) Parallel trimming by **C50** (MW) and **C48, C49** (LW); series tracking by **C52** (MW) and **C51** (LW). Reaction by coil **L7**.

It will be seen that, as in the aerial circuit, MW and LW oscillator circuits are connected in series and the "x" switches are connected between the two extreme ends of the coils. The junction of the two coils is connected to the junction of **S13x** and **S14x** and, as only one of the "x" series can be open at a time, one of the tuning coils is short-circuited so that waveband selection is automatically effected, whichever button is depressed.

Second valve (**V2, Tungram metallised VP2B**) is a variable-mu RF pentode operating as intermediate frequency



amplifier with tuned-primary tuned-secondary transformer couplings C25, L8, C7, L9, C26 and C27, L10, C12, L11, C28. The two small condensers C7 and C12 form small top couplings.

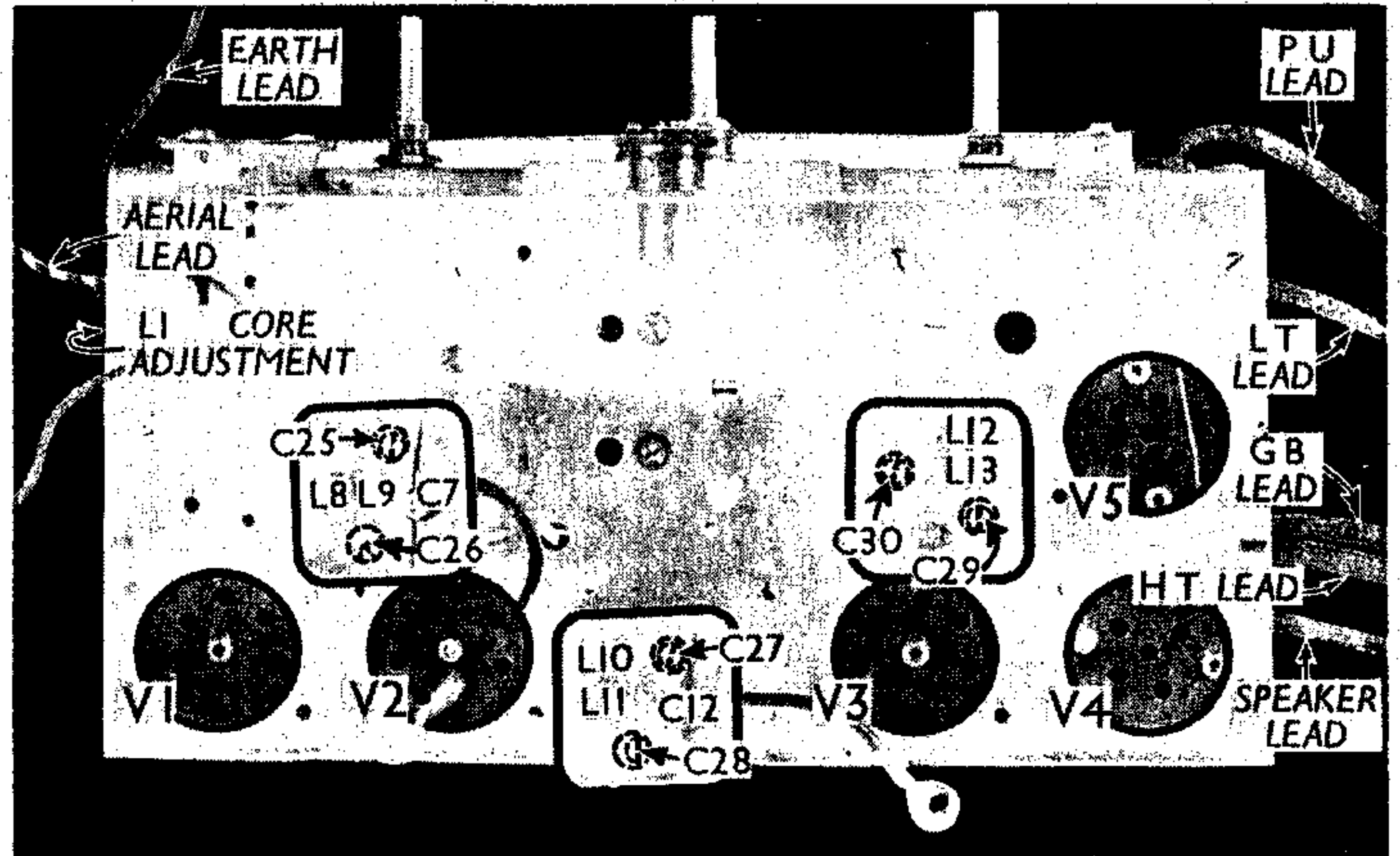
Third valve (V3, Tungram metallised VP2B) is also a variable-mu RF pentode, providing further intermediate frequency amplification with output coupling transformer C29, L12, L13, C30.

Intermediate frequency 465 KC/S.

Diode second detector is part of separate double diode valve (V4, Mullard metallised 2D2) employing an indirectly heated cathode. Audio frequency component in rectified output is developed across load resistance R9 and passed via IF stopper R8, AF coupling condenser C16, manual volume control R11 and grid stopper R12 to CG of pentode output valve (V5, Mullard PM22D). Provision for connection of gramophone pick-up across R11. Fixed tone correction by C18 and variable tone control by C19, R13, both in anode circuit. Provision for connection of high impedance external speaker across primary of T1.

Second diode of V4, fed from tap on L13 via C17, provides DC potential which is developed across load resistance R10 and fed back through decoupling circuits as GB to FC and both IF valves, giving AVC.

The grid bias battery is virtually divided into two sections, the yellow GB -2 lead, which is connected to chassis in the receiver, being plugged into the 6 V GB socket of the battery. That section of the battery which lies between -6 V and -9 V is used to provide a voltage across the potentiometer formed of resistances R15, R16 and R17 from which are obtained minimum GB potential for V1, V2 and V3 and GB potential for V5. The other section of the battery, that between -6V and GB+ sockets, biases V4 cathode positively with respect to chassis to provide the major portion of the



Plan view of the chassis. Note that there are three IF transformers, with their associated trimmers.

AVC delay voltage, to which of course must be added the minimum GB on V1, V2 and V3.

The resistance R14 in the negative HT lead to chassis is inserted to limit the HT current in case of accidents.

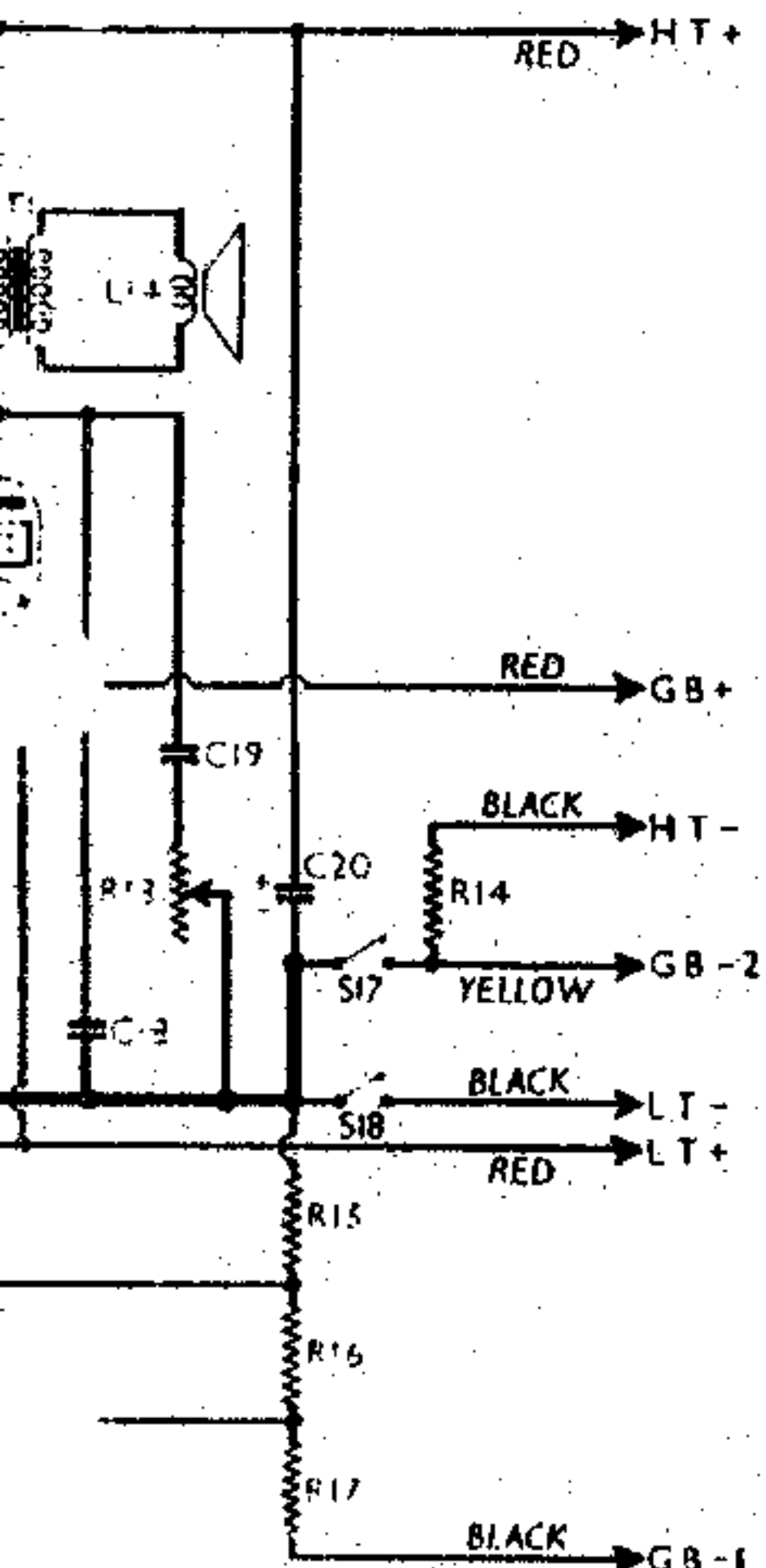
COMPONENTS AND VALUES

| CONDENSERS | | Values (μF) |
|------------------|--|-------------|
| C1 | Aerial IF filter tuning | 0.000068 |
| C2 | Aerial coupling condenser | 0.0004 |
| C3 | Aerial circuit LW fixed trimmer | 0.00003 |
| C4 | V1 pentode CG condenser | 0.0001 |
| C5 | V1 pentode CG decoupling | 0.02 |
| C6 | V1 SG decoupling | 0.1 |
| C7 | 1st IF trans. top coupling | 0.000025 |
| C8 | V1 osc. CG condenser | 0.000068 |
| C9 | HT circuit RF by-pass | 0.1 |
| C10 | V1 osc. anode coupling | 0.0002 |
| C11 | V2 CG decoupling | 0.02 |
| C12 | 2nd IF trans. top coupling | 0.000025 |
| C13 | V3 CG decoupling | 0.02 |
| C14 | IF by-pass condensers | 0.0001 |
| C15 | | 0.0001 |
| C16 | AF coupling to V5 | 0.02 |
| C17 | Coupling to V4 AVC diode | 0.0001 |
| C18 | Fixed tone corrector | 0.006 |
| C19 | Part of variable tone control | 0.01 |
| C20* | HT reservoir condenser | 4.0 |
| C21† | Aerial circuit LW trimmer | — |
| C22† | Aerial circuit MW trimmer | — |
| C23† | Aerial circuit manual tuning | — |
| C24† | Oscillator circuit manual tuning | — |
| C25† | 1st IF trans. pri. tuning | — |
| C26† | 1st IF trans. sec. tuning | — |
| C27† | 2nd IF trans. pri. tuning | — |
| C28† | 2nd IF trans. sec. tuning | — |
| C29† | 3rd IF trans. pri. tuning | — |
| C30† | 3rd IF trans. sec. tuning | — |
| AUTO-TUNING UNIT | | |
| C31 | Aerial LW coupling condenser | 0.00125 |
| C32† | — | — |
| C33† | — | — |
| C34 | Aerial circuit automatic tuning trimmers | 0.000175 |
| C35† | | — |
| C36† | | — |
| C37† | | — |
| C38 | Oscillator circuit automatic tuning trimmers | 0.0002 |
| C39† | | — |
| C40† | | — |
| C41† | | — |
| C42 | Oscillator circuit manual tuning trimmers | 0.000175 |
| C43† | | — |
| C44† | | — |
| C45† | | — |
| C46 | Oscillator circuit auto selector switches | 0.0002 |
| C47† | | — |
| C48 | | — |
| C49† | | — |
| C50† | Osc. circuit MW trimmer | — |
| C51 | Osc. circuit LW tracker | 0.00101 |
| C52 | Osc. circuit MW tracker | 0.000541 |

*Electrolytic. †Variable. ‡Preset. §Made up of two in parallel.

| RESISTANCES | | Values (ohms) |
|-------------|------------------------------|---------------|
| R1 | V1 pentode CG resistance | 500,000 |
| R2 | V1 pentode CG decoupling | 500,000 |
| R3 | V1 SG HT feed | 100,000 |
| R4 | V1 osc. CG resistance | 50,000 |
| R5 | V1 osc. anode HT feed | 30,000 |
| R6 | AVC line decoupling | 500,000 |
| R7 | V3 CG decoupling | 500,000 |
| R8 | IF stopper | 70,000 |
| R9 | V4 signal diode load | 300,000 |
| R10 | V4 AVC diode load | 500,000 |
| R11 | Manual volume control | 500,000 |
| R12 | V5 grid stopper | 15,000 |
| R13 | Variable tone control | 50,000 |
| R14 | HT current limiter | 150 |
| R15 | GB battery potential divider | 300 |
| R16 | | 150 |
| R17 | | 150 |

| OTHER COMPONENTS | | Approx. Values (ohms) |
|------------------|--|-----------------------------|
| L1 | Aerial IF filter coil | 9.0 |
| L2 | Aerial coupling coil | 14.0 |
| L3 | Aerial LW tuning coil | 12.0 |
| L4 | Aerial MW tuning coil | 2.7 |
| L5 | Osc. circuit LW tuning coil | 3.5 |
| L6 | Osc. circuit MW tuning coil | 1.6 |
| L7 | Oscillator reaction coil | 6.5 |
| L8 | 1st IF trans. | Pri. ... 6.0 |
| L9 | | Sec. ... 6.0 |
| L10 | 2nd IF trans. | Pri. ... 6.0 |
| L11 | | Sec. ... 6.0 |
| L12 | 3rd IF trans. | Pri. ... 6.0 |
| L13 | | Sec., total ... 6.0 |
| L14 | Speaker speech coil | 1.7 |
| T1 | Speaker input trans. | Pri... 650.0 Sec... 0.15 |
| S1a, x | Aerial circuit manual wave-band switches | — |
| S2a to S7a | | — |
| S2x to S7x | | — |
| S9a, x | Oscillator circuit manual wave-band switches | — |
| S16a, x | | — |
| S10a to S15a | Oscillator circuit auto selector switches | — |
| S10x to S15x | | — |
| S17 | HT and GB circuits switch | ganged |
| S18 | LT circuit switch | R11 |



Circuit diagram of the Decca PT/ML/B 2-band battery press-button superhet. The auto-unit is shown in a dotted enclosure at the bottom left-hand corner of the diagram. Note that in the main part of the diagram the MW coils are placed below the LW ones, a reversal of the usual practice. Thus L4 and L6 are the MW coils. The battery connections are explained under General Notes.

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (six counter-sunk-head wood screws) gives access to the trimmers for the pre-set stations and to certain others.

Removing Chassis.—If it is desired to remove the chassis from the cabinet, remove the three knobs (recessed grub screws) and the two bolts (with claw and spring washers) holding the chassis to the bottom of the cabinet.

Now remove the aerial, earth and pick-up terminal strip from the back of the cabinet (three round-head wood screws) and free the aerial lead from the cleat on the side of the cabinet (round-head wood screw).

The chassis can now be withdrawn to the extent of the speaker leads which is sufficient for normal purposes. *When replacing*, make sure that the chassis is correctly positioned in the cabinet as otherwise the buttons may jam on the escutcheon.

Removing Auto Unit.—Before access can be gained to the components beneath the chassis, it is necessary to remove the press-button unit. This can be done by unsoldering the blue/yellow, green/yellow, red, black/white, green, yellow and red/yellow leads from the unit and the black lead from C21 in the main chassis. Then remove the four self-tapping screws holding the press-button unit to the main chassis.

When replacing, consult the illustrations of the chassis and the press-button unit for the connections for the leads which have been removed. The leads on the chassis are colour-coded and numbered, while the connecting points on the press-button unit are numbered.

Removing Speaker.—The speaker can be removed from the cabinet by removing the nuts and lock washers from the four screws holding it to the sub-baffle. *When replacing*, see that the transformer is at the top.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating with an HT battery reading 120 V. 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 TP23 .. | 118 Oscillator | 1.1 | 54 | 0.6 |
| V2 VP2B | 50 | 1.6 | | |
| V3 VP2B | 118 | 0.7 | 118 | 0.3 |
| V4 2D2 | 118 | 0.9 | 118 | 0.3 |
| V5 PM22D | 116 | 3.5 | 118 | 0.6 |

GENERAL NOTES

Switches.—S1a to S16x are all push-button switches contained in a 2-bank push-button unit with eight plungers. Each plunger controls four switches, two on the upper and two on the lower paxolin terminal strip. S1x to S16x are of the "series" type, incorporating "L" shaped moving contacts, while S1a to S16a are of the ordinary type, consisting of two straight contacts which are shorted when the plunger is depressed. Push-button switch units of this type were described in articles 8 and 9 of the series "Automatic Tuning" (April 30 and May 7, 1938).

Of the four switches controlled by each plunger, two are of the "L" type, and two of the ordinary type. Thus the left-hand plunger (in our view of the auto-unit), controls S1x, S1a, S9x and S9a. The second from the left controls S2x, S2a, S10x and S10a, and so on.

When all the buttons are out, S1x to S16x are closed and S1a-S16a are open.

When any button is depressed, only its four associated switches are affected: the two "L" types open, while the two ordinary types close.

Thus when the left-hand button is depressed, S1x and S9x open, and S1a and S9a close. All the other switches remain unaltered.

The tags of all the switches are shown in our view of the auto-unit. The tags of the "L" contacts have no external connection to them; in addition, two tags (second from the right, top and bottom bank) are blank, and do not form part of the circuit.

The functions of the various switches are given in the table "Other Components."

S17, S18 are the QMB battery circuit switches, in the main chassis, ganged with the volume control R11.

Coils.—L1; L3; L2, L4 and L5-L7 are in four unscreened units beneath the main chassis. The IF transformers L8, L9; L10, L11 and L12, L13 are in three screened units on the chassis deck, with their associated Tempa trimmers.

V2, V3 Valveholders.—Note that the tag of socket 6 on each of these holders is used as a bearer. Pin 6 on the Tungram VP2B is blank.

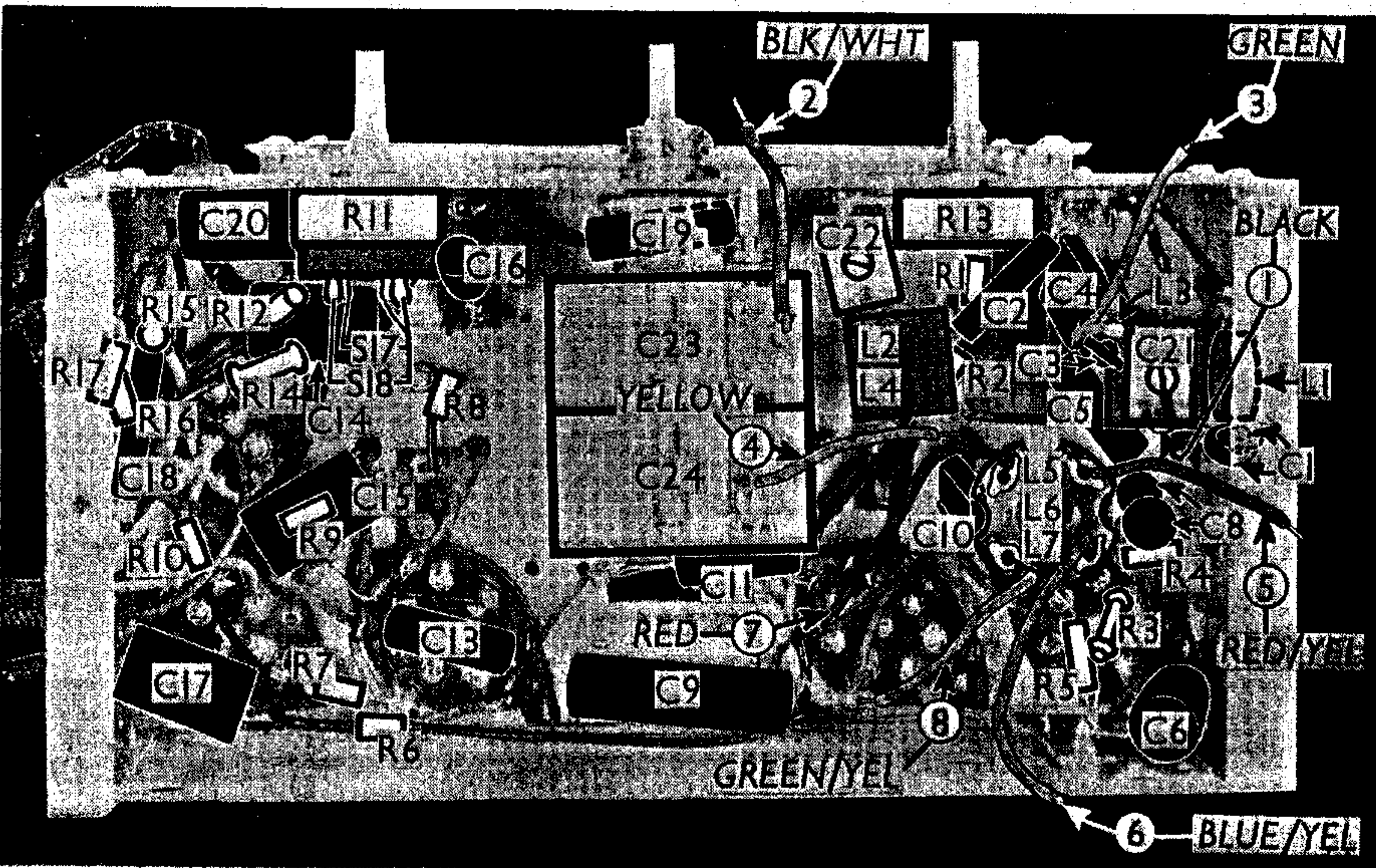
Condensers C1, C8.—Note that these each consist of two disc-type condensers in parallel.

Resistance R8.—This has a value of 70,000 O in our chassis, but is shown as 700,000 O in the makers' diagram.

Batteries.—LT, 2 V accumulator cell; HT, 120 V dry HT battery (no tappings needed); GB, 9 V tapped GB battery.

Battery Leads and Voltages.—Black lead, spade tag, LT negative; red lead, spade tag, LT positive 2 V; black lead and plug, HT negative; red lead and plug, HT positive 120 V.

The GB leads are a little confusing, since part of the battery is used to provide a positive bias relative to chassis. The



Under-chassis view, with the press-button unit removed. The inter-connecting leads are colour-coded and numbered to agree with the circuit diagram. C1 and C8 each consist of two small condensers in parallel.

red lead and plug, marked Grid +, goes into the positive socket of the GB battery. The yellow lead and plug, marked Grid - 2, goes into the negative 6 V socket of the battery, which is thus connected to chassis. The black lead and plug, marked Grid - 1 goes into the negative 9 V socket of the battery, thus applying a negative voltage of 3 V, with respect to chassis.

Auto-Tuning Unit.—This is shown, with all the components included in it, at the bottom left-hand corner of the circuit diagram, and in a separate chassis illustration. All the interconnecting leads (of which there are eight) are indicated and colour-coded on the circuit diagram and on the under-chassis view. Their connection points on the auto-tuning unit are also indicated and numbered on the illustration of this unit. In addition, although there is no wire connecting them the auto-unit and the main chassis are connected electrically by the bolts holding them together.

The auto-unit contains the switches S1a to S16x (see under switches), the fourteen Tempa trimmers, external parallel fixed trimmers across certain of the Tempa types (C34, C38, C42, C46 and C48), the LW coupling condenser C31 and the fixed trackers C51 and C52.

Of the Tempa trimmers, C49 and C50 are LW and MW trimmers (the former having C48 across it). The remaining twelve are for the six pre-set stations.

The circuit may seem a little confusing in that C31 and C48 to C52 are shown in the auto-unit, but as they are actually in this part of the receiver it was thought best to place them similarly in the circuit diagram. By tracing this out, it will be seen that they are actually in their usual positions relative to the tuning coils and the gang condenser. Note, however, that the LW coils are *above* the MW coils, a reversal of the usual practice. Thus L3 and L5 are LW coils, and L4 and L6 MW coils.

CIRCUIT ALIGNMENT

IF Stages.—According to the makers, the IF trimmers are adjusted at the factory for the correct response curve with an oscilloscope, and should not be touched unless they have been tampered with, or a new transformer has been fitted. The IF is 465 KC/S and alignment follows the usual practice.

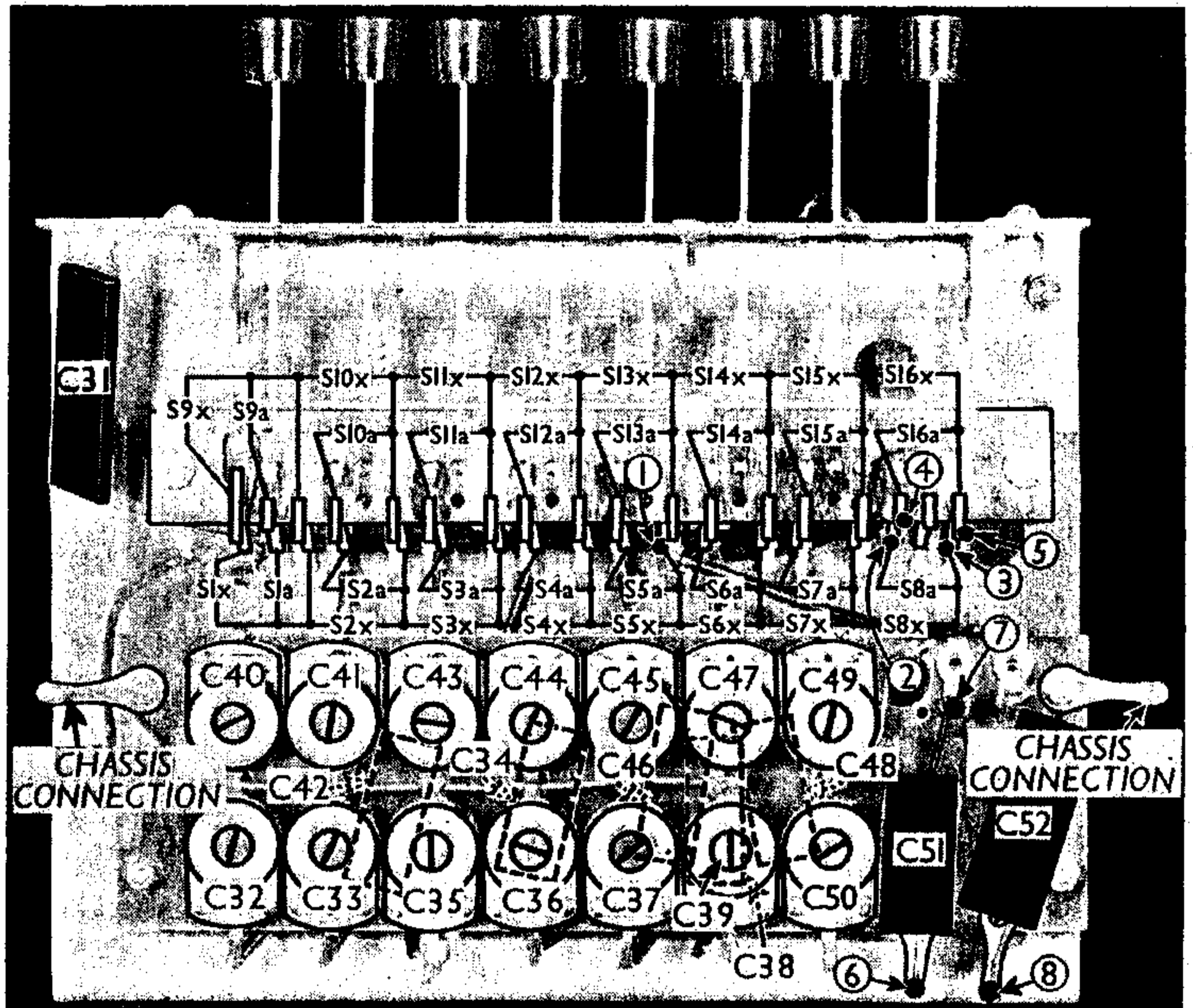
IF Filter.—To adjust this, feed a 465 KC/S signal into the A and E sockets, tune to bottom of LW band, and adjust core of L1 for *minimum* output.

RF and Oscillator Stages.—Set pointer so that it is vertical when gang is at maximum.

MW.—Press MW manual button, connect signal generator to A and E sockets and feed in a 200 m (1,500 KC/S) signal. Tune to 200 m on scale, and adjust C22 (under main chassis) and C50 (on auto unit) for maximum output.

LW.—Press LW manual button, feed in a 1,200 m (250 KC/S) signal, tune to 1,200 m on scale and adjust C21 (under main chassis) and C49 (on auto unit) for maximum output.

Adjustment of the trimmers for the pre-set stations is best carried out on the signals from the stations themselves.



The underside of the auto-tuning unit, showing all the switch tags, and the points to which the leads from the main chassis are connected.