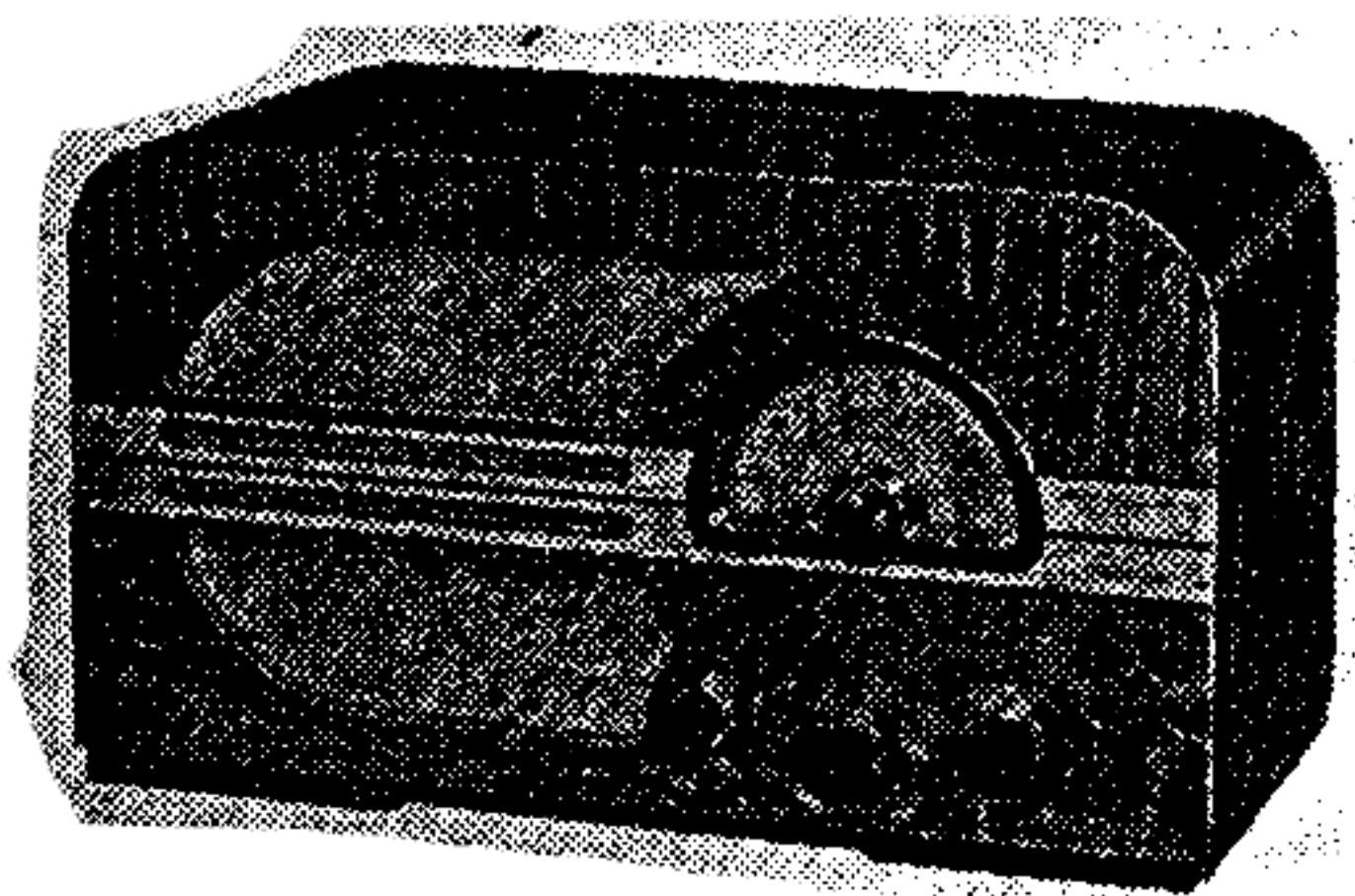


Ned. Ver. v. Historie v/d Radio



DECCA AW4

3-BAND AC/DC SUPERHET



A SHORT-WAVE range of 19-49 m is covered by the Decca AW4 4-valve (plus rectifier) AC/DC 3-band superhet, which is suitable for mains of 190-250 V (50-60 C/S in the case of AC). Provision is made for the connection of both a gramophone pick-up and an extension speaker.

CIRCUIT DESCRIPTION

Aerial input via series condenser **C1** and coupling coils **L2** (SW), **L4** (MW) and (via 342 metre rejector circuit **L1**, **C3**) **L6** (LW) to single-tuned circuits **L3**, **C31** (SW), **L5**, **C31** (MW) and **L7**, **C31** (LW).

First valve (**V1**, Mazda metallised **TH2320**) is a triode-hexode operating as frequency changer with internal coupling. Oscillator anode coils **L9** (SW), **L11** (MW) and **L13** (LW) are tuned by **C37**; parallel trimming by **C32** (SW), **C33** (MW) and **C34**, **C11** (LW); series tracking by **C9** (SW), **C10**, **C35** (MW) and **C36** (LW). Oscillator grid reaction coils **L8** (SW), **L10** (MW) and **L12** (LW).

Second valve, a variable-mu RF pentode (**V2**, Mullard metallised **VP13C**), operates as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C38**, **L14**, **L15**, **C39** and **C40**, **L16**, **L17**, **C41**.

Intermediate frequency 465 KC/S. Diode second detector is part of separate double diode valve (**V3**, Brimar **10D1**). Audio frequency component in rectified output is developed across load resistance **R11** and passed via stopper resistance **R10**, AF coupling condenser **C16** and manual volume control **R12** to CG of pentode output valve (**V4**, Mullard **Pen36C** or Brimar **7D6**). Fixed tone correction in anode circuit by **C22**. Variable tone control by **C41** across **R12**. Provision for connection of high impedance external speaker across primary of internal speaker input transformer **T1**. Provision for connection of gramophone pick-up across **R12**, via isolating condenser **C17**.

Second diode of **V3**, fed from tapping on **L17** via **C18**, provides DC potential which is developed across load resistance **R13** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control. Delay voltage is obtained from drop across **V4** cathode resistances **R14**, **R15**.

When the receiver is used with AC mains HT current is supplied by a half-wave rectifier (**V5**, Brimar **1D5** or Mullard **URIC**) which, with DC supplies, behaves as a low resistance. Smoothing is effected by iron-cored choke **L19** and dry electrolytic condensers **C23**, **C24**.

Valve heaters are connected in series together with current regulating barretter

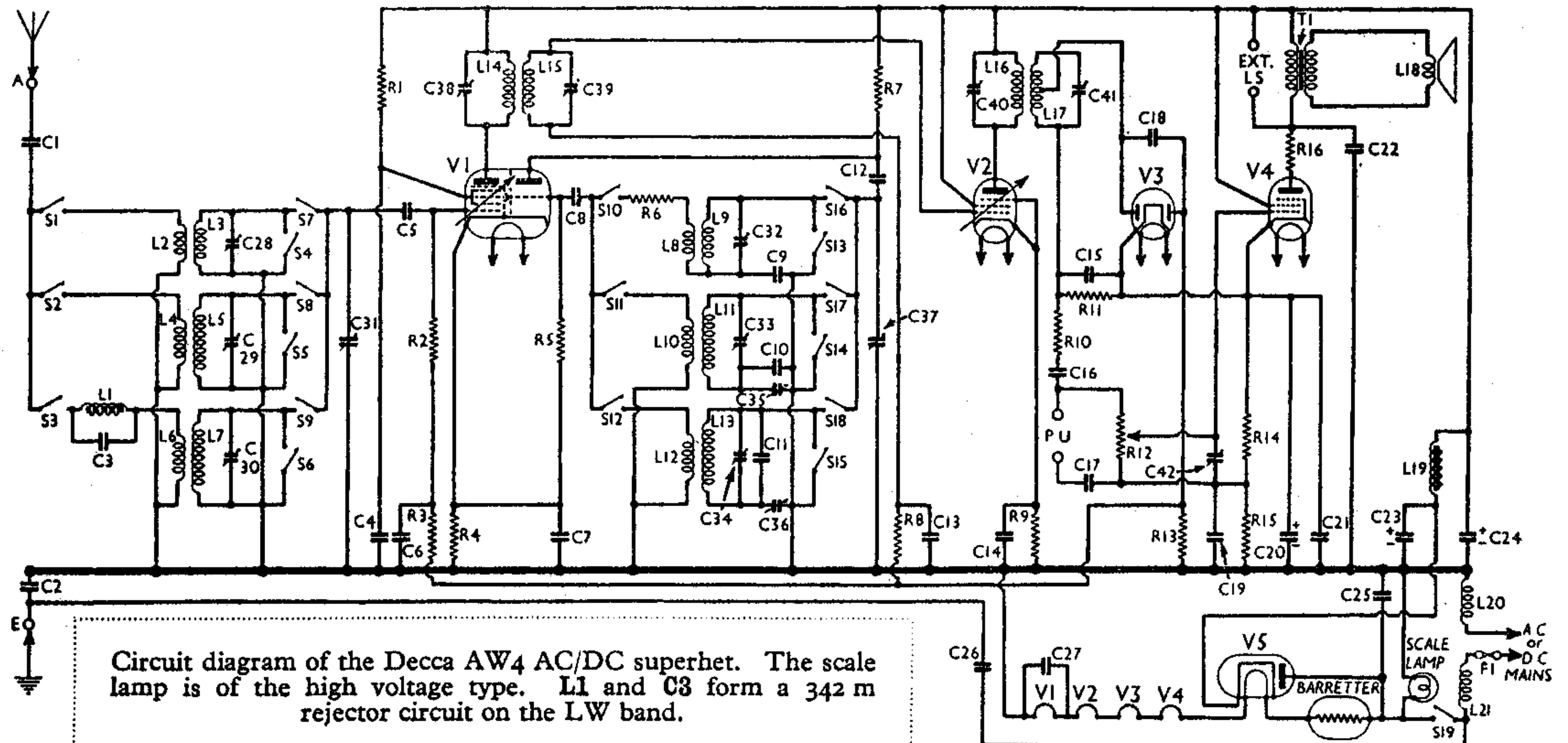
(Type **150A**), across mains input. Scale lamp, which floodlights the tuning scale, is connected directly across the mains input.

Filter comprising **C26**, chokes **L20**, **L21** and condensers **C25**, **C26**, suppresses mains-borne interference.

COMPONENTS AND VALUES

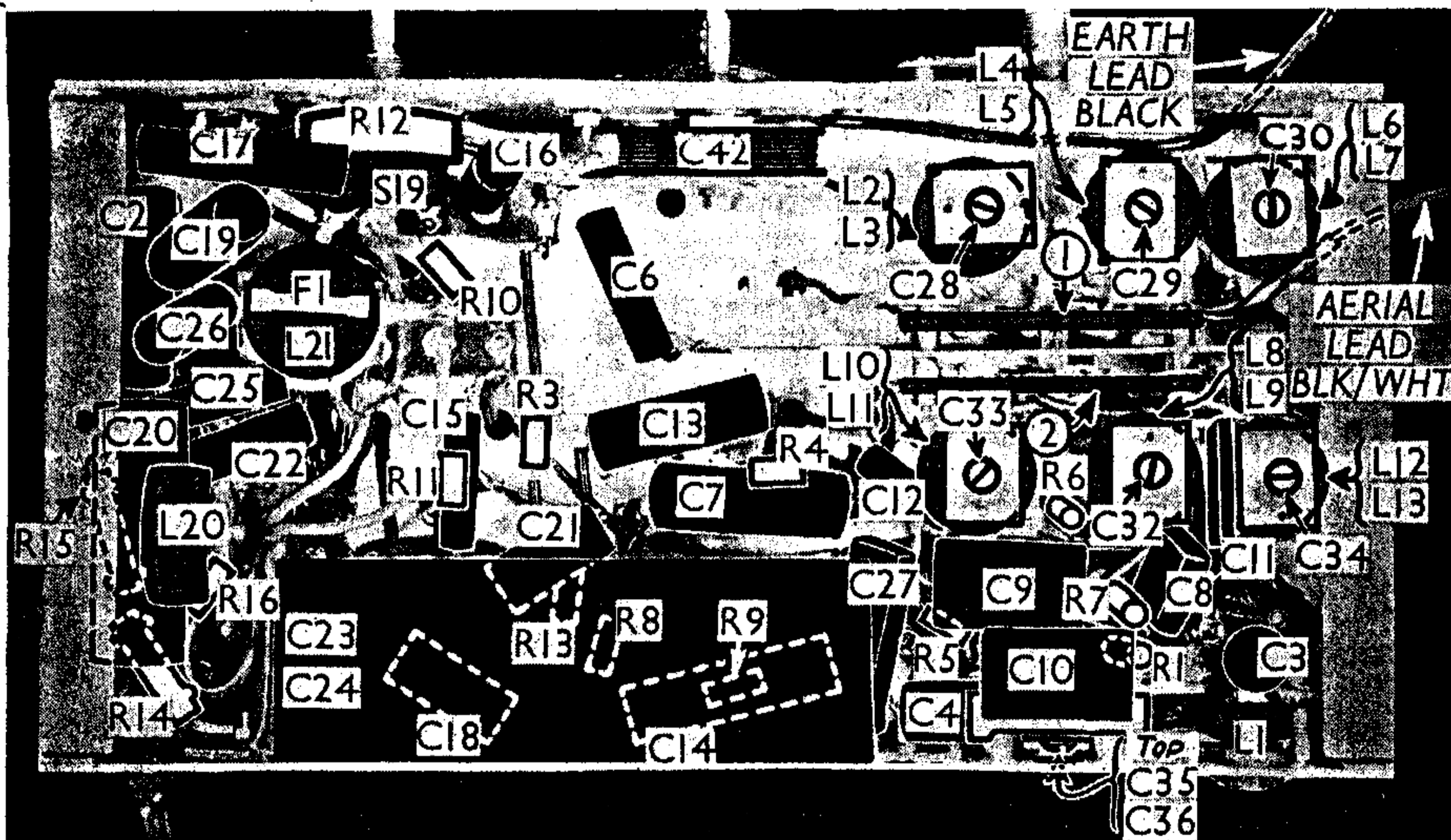
| RESISTANCES | | Values (ohms) |
|-------------|--|---------------|
| R1 | V1 SG HT feed | 25,000 |
| R2 | V1 hexode CG resistance .. | 500,000 |
| R3 | V1 hexode CG decoupling resistance | 500,000 |
| R4 | V1 fixed GB resistance | 200 |
| R5 | V1 osc. CG resistance | 50,000 |
| R6 | Osc. circuit SW stabiliser .. | 75 |
| R7 | V1 osc. anode HT feed | 40,000 |
| R8 | V2 CG decoupling resistance .. | 500,000 |
| R9 | V2 fixed GB resistance | 200 |
| R10 | IF stopper | 70,000 |
| R11 | V3 signal diode load | 300,000 |
| R12 | Manual volume control | 500,000 |
| R13 | V3 AVC diode load | 500,000 |
| R14 | AVC delay voltage and V4 GB resistances .. | 140 |
| R15 | | 160 |
| R16 | V4 anode circuit stabiliser .. | 150 |

| CONDENSERS | | Values (μF) |
|------------|--|-------------|
| C1 | Aerial series condenser | 0.0004 |
| C2 | Earth blocking condenser .. | 0.02 |
| C3 | Aerial circuit 342 m rejector tuning | 0.000012 |
| C4 | V1 SG decoupling | 0.1 |
| C5 | V1 hexode CG condenser | 0.0001 |
| C6 | V1 hexode CG decoupling | 0.02 |
| C7 | V1 cathode by-pass | 0.1 |
| C8 | V1 osc. CG condenser | 0.0002 |
| C9 | Osc. circuit SW fixed tracker .. | 0.003 |
| C10 | Osc. circuit MW fixed tracker .. | 0.0003 |
| C11 | Osc. circuit LW fixed trimmer .. | 0.00006 |
| C12 | V1 osc. anode coupling | 0.0001 |
| C13 | V2 CG decoupling | 0.02 |
| C14 | V2 cathode by-pass | 0.1 |



Circuit diagram of the Decca AW4 AC/DC superhet. The scale lamp is of the high voltage type. L1 and C3 form a 342 m rejector circuit on the LW band.

Under-chassis view. Diagrams of the two switch units, as seen in the directions of the arrows, are on page IV. Note the six coil units with one trimmer above each. F1 is mounted above L21.



| CONDENSERS (Continued) | | Values (μF) |
|---------------------------|--------------------------------|----------------|
| C15 | IF by-pass | 0.0001 |
| C16 | AF coupling to V4 .. . | 0.02 |
| C17 | PU isolating condenser .. . | 0.02 |
| C18 | Coupling to V3 AVC diode .. . | 0.0001 |
| C19 | V4 CG decoupling .. . | 0.1 |
| C20* | V4 cathode by-pass .. . | 50.0 |
| C21 | V3, V4 cathodes RF by-pass.. . | 0.0001 |
| C22 | V4 anode tone corrector .. . | 0.006 |
| C23* | HT smoothing .. . | 8.0 |
| C24* | | 16.0 |
| C25 | Mains RF filter condensers | 0.006 |
| C26 | | 0.02 |
| C27 | | 0.01 |
| C28† | V1 heater RF by-pass .. . | — |
| C29† | Aerial circuit SW trimmer .. . | — |
| C30† | Aerial circuit MW trimmer .. . | — |
| C31† | Aerial circuit LW trimmer .. . | — |
| C32† | Aerial circuit tuning .. . | — |
| C33† | Osc. circuit SW trimmer .. . | — |
| C34† | Osc. circuit MW trimmer .. . | — |
| C35† | Osc. circuit LW trimmer .. . | — |
| C36† | Osc. circuit MW tracker .. . | 0.00022 |
| C37† | Osc. circuit LW tracker .. . | 0.00022 |
| C38† | Osc. circuit tuning .. . | — |
| C39† | 1st IF trans. pri. tuning .. . | — |
| C40† | 1st IF trans. sec. tuning .. . | — |
| C41† | 2nd IF trans. pri. tuning .. . | — |
| C42† | 2nd IF trans. sec. tuning .. . | — |
| C42† | Variable tone control .. . | 0.0005 |

* Electrolytic. † Variable. ‡ Pre-set.

| OTHER COMPONENTS | | Approx. Values (ohms) |
|------------------|---|--------------------------|
| L1 | Aerial circuit 342 m rejector coil .. . | 6.0 |
| L2 | Aerial circuit SW coupling coil .. . | 0.3 |
| L3 | Aerial circuit SW tuning coil .. . | 0.05 |
| L4 | Aerial circuit MW coupling coil .. . | 14.5 |
| L5 | Aerial circuit MW tuning coil .. . | 3.5 |
| L6 | Aerial circuit LW coupling coil .. . | 75.0 |
| L7 | Aerial circuit LW tuning coil .. . | 16.5 |
| L8 | Osc. circuit SW grid reaction .. . | 0.5 |
| L9 | Osc. circuit SW tuning coil .. . | 0.05 |
| L10 | Osc. circuit MW grid reaction .. . | 5.25 |
| L11 | Osc. circuit MW tuning coil .. . | 2.0 |
| L12 | Osc. circuit LW grid reaction .. . | 5.75 |
| L13 | Osc. circuit LW tuning coil .. . | 5.0 |
| L14 | 1st IF trans. { Pri. .. . | 8.0 |
| L15 | | { Sec. .. . |
| L16 | 2nd IF trans. { Pri. .. . | 8.0 |
| L17 | | { Sec., total .. . |
| L18 | Speaker speech coil .. . | 1.7 |
| L19 | HT smoothing choke .. . | 400.0 |
| L20 | Mains filter chokes .. . | 2.0 |
| L21 | | 2.0 |
| T1 | Speaker input trans. { Pri. .. . | 650.0 |
| | { Sec. .. . | 0.03 |
| Sr-Sr8 | Waveband switches .. . | — |
| S19 | Mains switch, ganged R12 .. . | — |
| F1 | Mains circuit fuse .. . | — |

DISMANTLING THE SET

A detachable bottom is fitted to the cabinet and upon removal (six counter-sunk-head wood screws) gives access to most of the components beneath the chassis.

Removing Chassis.—If it is necessary to remove the chassis from the cabinet, remove the four control knobs (recessed grub screws) and the two bolts (with lock and claw washers) holding the chassis to the bottom of the cabinet. The chassis can now be withdrawn to the extent of the leads, which should be just sufficient for normal purposes.

To free the chassis entirely, remove the socket strip for the aerial, earth and pick-up (three round-head wood screws) and the scale lamp holder (two round-head wood screws), and unsolder the speaker leads.

Removing Speaker.—Should it be desired to remove the speaker from the cabinet, unsolder the leads and remove 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 on AC mains of 232 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 TH2320 | { 210 Oscil. } { 75 lator } | { 3.0 { 3.1 | 75 | 5.4 |
| V2 VP13C | 210 | 8.9 | 210 | 3.4 |
| V3 10D1 | — | — | — | — |
| V4 Pen36C | 180 | 41.0 | 210 | 6.4 |
| V5 1D5† | — | — | — | — |

† Cathode to chassis, 240 V DC.

GENERAL NOTES

Switches.—S1-S18 are the waveband switches, ganged in two rotary units beneath the chassis. The units are indicated in our under-chassis view and are shown in detail in the diagrams on p. iv, as seen looking in the directions of the arrows in the under-chassis view.

The table (p. iv) gives the switch positions for the three control settings, starting from fully clockwise. A dash indicates *open* and **C** *closed*.

S19 is the QMB mains switch, ganged with the volume control R12.

Coils.—All the RF and oscillator coils are in pairs on six tubular or wood formers in two screened compartments beneath the chassis, with their parallel pre-set trimmers mounted above them. There is one trimmer to each pair of coils, which are indicated in our under-chassis view. In the case of the SW band the two coils on each former are interwound but in each case the tuned coil is of thick bare copper wire.

The rejector circuit coil L1 is iron-cored and, tuned by C3, is included to prevent break-through on LW from the London Regional transmitter.

L1 is provided with a core adjustment for accurate setting, which is indicated in our plan chassis view.

L20 and L21 are on separate formers beneath the chassis.

The IF transformers, L14, L15 and L16, L17, are in two screened units on the chassis deck with their associated trimmers.

Scale Lamp.—The tuning scale is flood-lit by a high voltage lamp with a large bulb and an MES base which is fixed to the inside of the front of the cabinet. It is rated at 200-250 V 15 W, and is connected across the mains input.

Fuse F1.—This is held in clips mounted on the L21 former, beneath the chassis. It is a 1 in. glass tubular type, rated at 1.0 A.

External Speaker.—Two sockets are provided on a panel at the rear of the

Continued overleaf

DECCA AW4—Continued

cabinet for a high impedance (7,000-10,000 Ω) external speaker. The sockets are not isolated.

Condensers C23, C24.—These are two dry electrolytics in a single carton beneath the chassis, having a common negative (black) lead. The yellow lead is the positive of C23 ($8\mu\text{F}$) and the red the positive of C24 ($16\mu\text{F}$).

Condenser C9.—This consists actually of two moulded bakelite condensers connected in parallel. The capacity ($0.003\mu\text{F}$) is the total capacity of the pair and is marked only on one of them.

CIRCUIT ALIGNMENT

IF Stages.—Connect across C37 a $0.01\mu\text{F}$ swamp condenser and turn volume control to maximum. Remove top cap from V1 and connect one lead of the signal generator in its place, the other lead being connected to chassis.

Feed in a 465KC/S signal and adjust C41, C40, C39 and C38 in that order for maximum output, keeping the generator output as low as possible consistent with an adequate reading on the meter. Repeat the process until the maximum peak is obtained on the meter. Remove swamp condenser and replace cap on V1.

RF and Oscillator Stages.—Tune to 220 m on the scale, feed in a 220 m signal to A and E sockets via a $0.0002\mu\text{F}$ condenser, with the receiver switched to MW, and adjust C33 and C29 for maximum output. Next tune to 500 m on the scale, feeding in a 500 m signal and adjust MW tracker C35 for maximum output whilst rocking the gang. Return to 220 m and adjust C33 and C29 accurately.

Switch receiver to LW, tune to 1,200 m on scale, feed in a 1,200 m signal and adjust C34 and C30 for maximum output. Tune to 1,875 m and adjust LW tracker C36 whilst rocking the gang, finally returning to 1,200 m and accurately adjusting C34 and C30

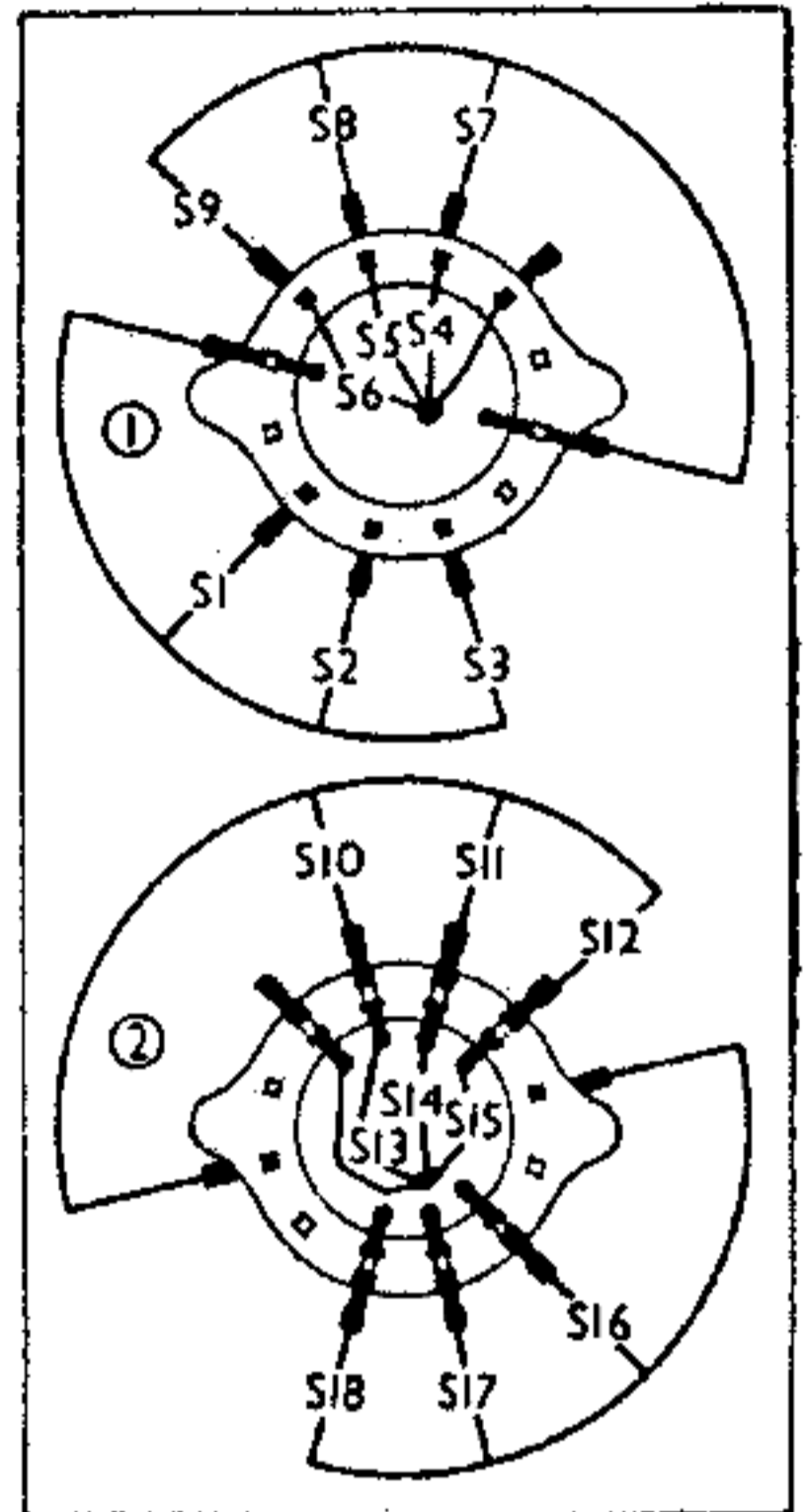
Switch on SW, tune to 19 m on scale,

feed in a 19 m signal and accurately adjust C32 and C28.

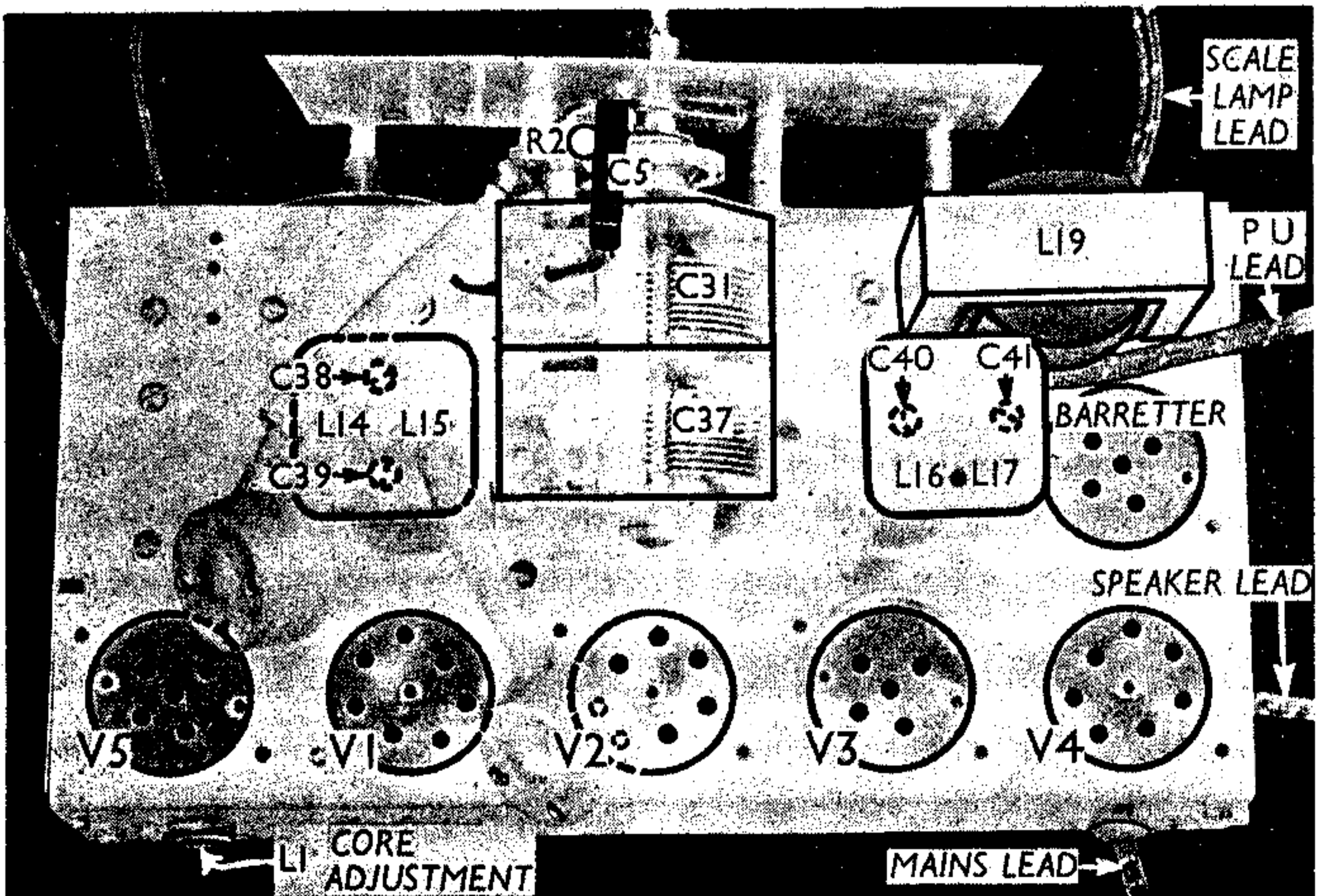
Whilst alignment of any stage is carried out the volume control must be kept at maximum and the input from the signal generator progressively reduced as the circuits come into line, so that the output is no greater than is necessary to give an adequate reading on the meter, in order to avoid overloading in the receiver.

SWITCH DIAGRAMS AND TABLE

Diagrams of the two switch units, looking in the directions of the arrows of the arrows in the under-chassis view.



| Switch | SW | MW | LW |
|--------|----|----|----|
| S1 | C | — | — |
| S2 | — | C | — |
| S3 | — | C | C |
| S4 | — | C | C |
| S5 | C | — | C |
| S6 | C | C | — |
| S7 | C | — | — |
| S8 | — | C | — |
| S9 | — | — | C |
| S10 | C | — | — |
| S11 | — | C | — |
| S12 | — | C | C |
| S13 | — | C | C |
| S14 | C | — | C |
| S15 | C | C | — |
| S16 | C | — | — |
| S17 | — | C | — |
| S18 | — | — | C |



Plan view of the chassis. A core adjustment for L1 tunes the 342 m rejector.