

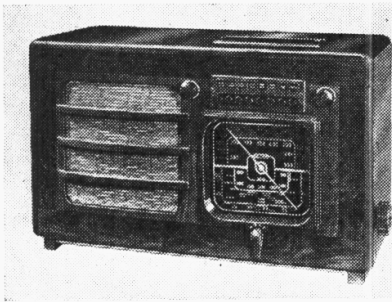
'TRADER' SERVICE SHEET  
**346**

# ULTRA 203

## AND 201

COMPONENTS AND VALUES

CONDENSERS		Values (μF)
C1	Aerial isolating condenser	0.0025
C2	Earth isolating condenser	0.004
C3	A2 series condenser	0.00005
C4	Aerial IF rejector trimmer	0.002
C5	Aerial loading coils' tuning	0.0045
C6	condensers	0.002
C7	V1 hexode CG condenser	0.00005
C8	V1 hexode CG decoupling	0.05
C9	V1 SG decoupling	0.1
C10	V1 cathode by-pass	0.1
C11		0.1
C12	Pick-up isolating condensers	0.1
C13*		4.0
C14	Vr and V2 decoupling	0.0002
C15	Oscillator reaction coupling	0.004
C16	Osc. circuit SW tracker	0.00025
C17	Osc. circuit MW fixed tracker	0.000045
C18	Osc. circuit LW fixed trimmer	0.00001
C19	V2 CG decoupling	0.05
C20	V1 to V4 gram. coupling	0.004
C21	V2 cathode by-pass	0.1
C22	Coupling to V3 AVC diode	0.00001
C23	AF coupling to V4	0.01
C24	IF by-pass condenser	0.0002
C25	V2 cathode by-pass	0.1
C26	Fixed tone corrector	0.004
C27	Part of variable tone control	0.002
C28*	V4 cathode by-pass	50.0
C29*		16.0
C30*	HT smoothing	8.0
C31		0.1
C32	Mains RF by-pass condensers	0.004
C33+	Aerial IF rejector tuning	—
C34+	Aerial circuit SW trimmer	—
C35+	Aerial circuit MW trimmer	—
C36+	Aerial circuit LW trimmer	—
C37+	Aerial circuit manual tuning	—
C38+	Osc. circuit MW tracker	—
C39+	Osc. circuit LW tracker	—
C40+	Osc. circuit SW trimmer	—
C41+	Osc. circuit MW trimmer	—



The Ultra 203 receiver.

**P**RESS-BUTTON tuning of the trimmer type is included in the Ultra 203 4-valve (plus rectifier) AC 3-band superhet and caters for two stations on the long waves and five on the medium waves. A very similar chassis is fitted in the 201 receiver, but this has not the press-button feature. This *Service Sheet* was prepared on a 203 but the differences in the 201 are explained under "201 Modifications."

**CIRCUIT DESCRIPTION**

Two alternative aerial input sockets, **A1** and **A2**. Input from **A1** is via isolating condenser **C1**, IF rejector circuit **L1**, **C4**, **C38** and coupling coil **L2** (SW), coupling coil **L3** (MW) with loading circuit **L4**, **C5**, or loading circuit **L8**, **C6**, to single-tuned circuits comprising coils **L5** (SW), **L6** (MW) or **L7** (LW) tuned by **C37** (manual) via **S28**, or pre-set trimmers **C48-C55** (auto), via **S21**, according to which button is depressed. The loading circuits provide a form of aerial coupling. Input from aerial socket **A2** is fed to socket **A1** via series condenser **C3**.

First valve (**V1**, Mazda metallised AC/TH1) is a triode-hexode operating as frequency changer with internal coupling, the triode section also being em-

ployed as AF amplifier on gram. Triode oscillator anode coils **L12** (SW), **L13** (MW) and **L14** (LW) are tuned by **C43** (manual) via **S43**, or pre-set trimmers **C56-C63** (auto), via **S36**, according to which button is depressed. Parallel trimming by **C40** (SW), **C41** (LW) and **C18**, **C42** (LW); series tracking by **C15** (SW), **C16**, **C38** (MW) and **C17**, **C39** (LW). Reaction by grid coils **L9** (SW), **L10** (MW) and **L11** (LW).

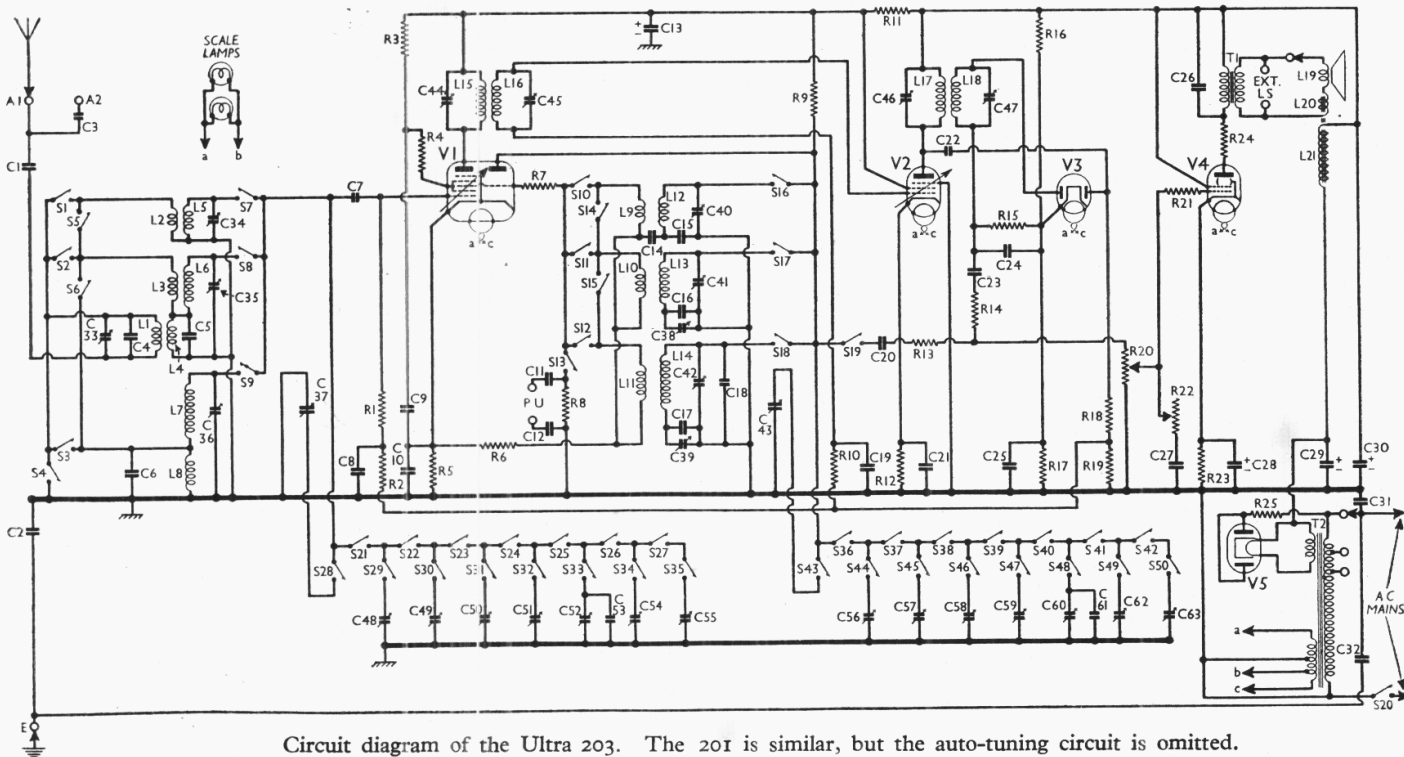
Second valve (**V2**, Mazda metallised AC/VP2) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C44**, **L15**, **L16**, **C45** and **C46**, **L17**, **L18**, **C47**.

Intermediate frequency 470 KC/S. Diode second detector is part of separate double diode valve (**V3**, Mazda V914). Audio frequency component in rectified output is developed across load resistance **R15** and passed via AF coupling condenser **C23**, stopper **R14**, manual volume control **R20** and stopper resistance **R21** to CG of beam tetrode or pentode output valve (**V4**, Mazda AC5/Pen or AC2/Pen). Variable tone control by **R22**, **C27** in grid circuit and fixed tone correction by **C26** in anode circuit. Provision for connection of low impedance external speaker across secondary of internal speaker input transformer **T1**, a plug and socket device being provided to mute the latter speaker by interrupting its speech coil circuit.

Second diode of **V3**, fed from **V2** anode via **C22**, provides DC potential which is developed across load resistances **R18**, **R19** and fed back through decoupling circuits as GB to FC and IF valves, giving automatic volume control. Delay voltage is obtained from drop along **R17** in cathode lead to chassis.

For use as a gramophone amplifier, pick-up sockets are connected via isolating condensers **C11**, **C12** across CG resistance **R8** between **V1** oscillator section control grid, via **S13**, and chassis. Resistance-capacity coupling by **R9**, **S19** and **C20**, via RF stopper **R13**, between **V1** oscillator section anode and **R20** conveys the amplified pick-up output to **V4** CG.

HT current is supplied by IHC rectifying valve (**V5**, Mazda UU4) with both anodes strapped to operate as half-wave rectifier. Smoothing by speaker field **L21** and wet electrolytic condensers **C29**, **C30**. Mains circuit RF filtering by **C31**, **C32**.



Circuit diagram of the Ultra 203. The 201 is similar, but the auto-tuning circuit is omitted.

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CONDENSERS (Continued)		Values ( $\mu$ F)
C42†	Osc. circuit LW trimmer	—
C43†	Osc. circuit manual tuning	—
C44†	1st IF trans. pri. tuning	—
C45†	1st IF trans. sec. tuning	—
C46†	2nd IF trans. pri. tuning	—
C47†	2nd IF trans. sec. tuning	—
AUTO TUNING UNIT		
C48†	—	—
C49†	—	—
C50†	—	—
C51†	Aerial circuit automatic tuning trimmers	—
C52†		—
C53		0.00005
C54†		—
C55†	—	—
C56†	—	—
C57†	—	—
C58†	—	—
C59†	Oscillator circuit automatic tuning trimmers	—
C60†		—
C61		0.00005
C62†		—
C63†	—	—

\* Electrolytic. † Variable. ‡ Pre-set.  
§ Made up of two condensers in parallel.

RESISTANCES		Values (ohms)
R1	V1 hexode CG resistance	1,000,000
R2	V1 hexode CG decoupling	1,000,000
R3	V1 SG HT feed	10,000
R4	V1 SG RF stopper	60
R5	V1 fixed GB resistance	200
R6	V1 osc. CG resistance	25,000
R7	V1 osc. CG stabiliser	60
R8	V1 osc. gram. CG resistance	250,000
R9	V1 osc. anode HT feed; anode load on gram.	40,000
R10	V2 CG decoupling	1,000,000
R11	V1 HT, and V2 SG HT, feed	2,600
R12	V2 fixed GB resistance	130
R13	RF stopper	100,000
R14	IF stopper	100,000
R15	V3 signal diode load	500,000
R16	AVC delay potential divider	1,000,000
R17	—	50,000
R18	—	250,000
R19	V3 AVC diode load resistances	750,000
R20	Manual volume control	1,000,000
R21	V4 grid stopper	1,000
R22	Variable tone control	2,000,000
R23	V4 GB resistance	140
R24	V4 anode RF stopper	60
R25	V5 anodes current limiter	55

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial IF rejector coil	3.8
L2	Aerial SW coupling coil	0.2
L3	Aerial MW coupling coil	0.3
L4	Aerial MW loading coil	17.5
L5	Aerial SW tuning coil	Very low
L6	Aerial MW tuning coil	2.6
L7	Aerial LW tuning coil	19.0
L8	Aerial LW loading coil	31.0
L9	Oscillator SW reaction	0.2
L10	Oscillator MW reaction	1.15
L11	Oscillator LW reaction	1.15
L12	Osc. circuit SW tuning coil	Very low
L13	Osc. circuit MW tuning coil	6.5
L14	Osc. circuit LW tuning coil	17.0
L15	1st IF trans.	Pri. . . . . 14.0
L16		Sec. . . . . 10.0
L17	2nd IF trans.	Pri. . . . . 10.0
L18		Sec. . . . . 10.0
L19	Speaker speech coil	2.0
L20	Hum neutralising coil	0.1
L21	Speaker field coil	1,000.0
T1	Speaker input trans. { Pri. . . . . 470.0 Sec. . . . . 0.6	
T2	Mains auto { Pri. total . . . . . 50.0 Heater sec., total . . . . . 0.1 Rect. heat. sec. . . . . 0.1	
S1-S12	Waveband switches	—
S14-S18	—	—
S13	Gram circuit switches	—
S19	Mains switch, ganged R20	—
S20	Aerial circuit auto/manual change switches	—
S21	Aerial circuit auto/manual change switches	—
S22	Aerial circuit auto tuning continuity switches	—
S27	Aerial circuit auto trimmer selector switches	—
S29	Osc. circuit auto/manual change switches	—
S35	—	—
S36	Osc. circuit auto/manual change switches	—
S43	—	—
S37	Osc. circuit series continuity switches	—
S42	—	—
S44	Osc. circuit auto trimmer selector switches	—
S50	—	—

four bolts (with washers) holding the chassis to the bottom of the cabinet, when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

When replacing, do not forget to place the felt washers on the spindles of the tone and volume controls before fixing the knobs.

To free the chassis entirely, unsolder the speaker leads, and when replacing, connect them as follows, numbering the tags from left to right:—1, no external connection; 2, black; 3, green; 4, orange; 5, blue; 6, red; 7, yellow.

Removing Speaker.—To remove the speaker from the cabinet, remove one of the clamps (nut and spring washer) and slacken the other two. When replacing, see that the transformer is at the bottom and connects the leads as 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 230 V, using the 210-230 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 AC/THr	165	2.0	83	8.6
	64	2.6		
V2 AC/VP2	198	8.3	165	2.3
V3 V914	—	—	—	—
V4 AC/5Pen	177	37.0	198	6.4
V5 UU4	248†	—	—	—

† Each anode, AC

**GENERAL NOTES**

Switches.—S1-S12 and S14-S18 are the waveband switches, while S13, S19 are the radiogram switches. All are included in two ganged rotary units beneath the chassis, indicated in our under-chassis view, and shown in detail in the diagrams on page viii.

The table (p.vii) gives the switch positions for the four control settings, starting from fully anti-clockwise. A dash indicates open, and C, closed.

S20 is the QMB mains switch, ganged with the volume control R20.

S21-S50 are the push-button switches, included in the auto tuning assembly. The contacts of each are indicated in an enlarged view of this part of the chassis. S21, S28 and S36, S43 are the auto/manual change switches. When the manual tuning button is pressed, S28 and S43 are closed, and S21 and S36 are open.

When any other button is pressed, however, S21 and S36 close, and S28 and S43 open, disconnecting the manual tuning condensers C37 and C43, and connecting the trimmer banks into circuit.

The trimmers C48-C55 and C56-C63 are selected by their associated switches S29-S35 and S44-S50. Thus when the first auto button (next to the manual) is pressed, S29 and S44 close, but the other switches remain open.

The push-button switches contain "L" contacts, each of which is common to two adjacent buttons. These form the switches S22-S27 and S37-S42, which are described as continuity switches.

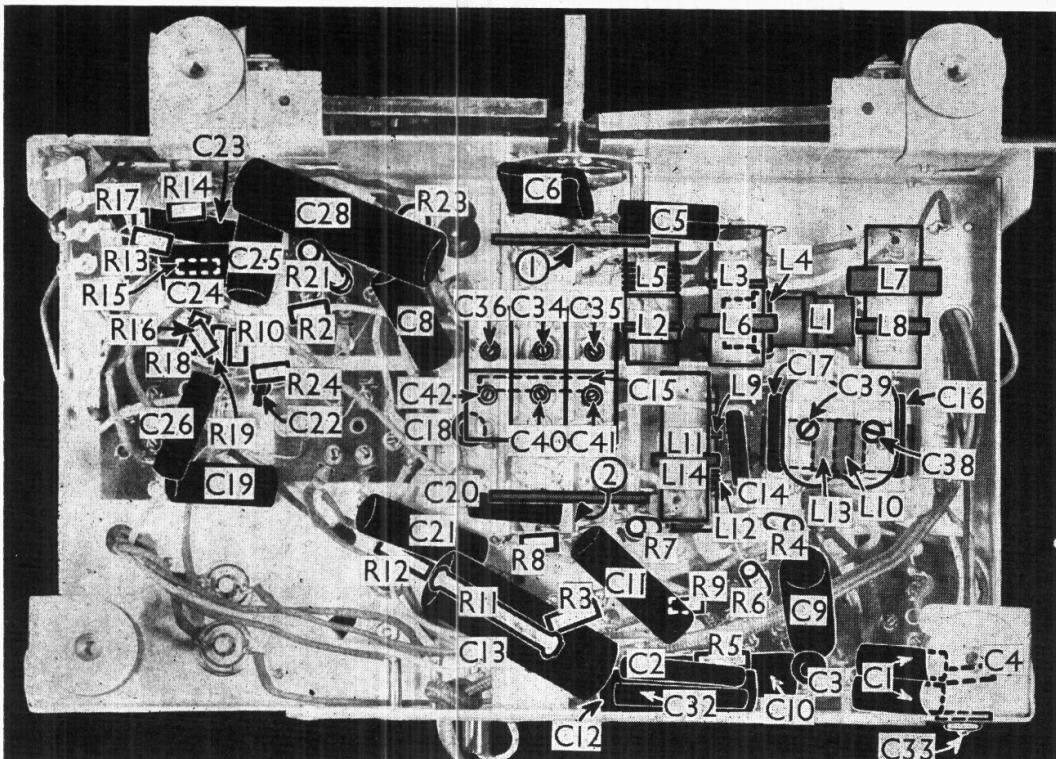
These are so arranged that normally they are all closed, but the act of pressing any auto button leaves all the continuity switches to the left of its selector switch (in our circuit) closed, but breaks the connection

Continued overleaf

**DISMANTLING THE SET**

A detachable bottom is fitted to the cabinet and upon removal (eight 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 tone and volume control knobs (pull off), the wave-change switch knob (recessed grub screw) and the tuning knob (screw accessible from inside of cabinet). Now remove the



Under-chassis view. The C38 and C39 unit may be positioned slightly differently.



ULTRA 203—Continued

to the continuity switches to the right of its selector switch.

For instance, if the button controlling S32 is pressed, S32, of course, closes. S21-S24 remain closed, but S25 opens, and breaks the circuit to S26 and S27 (which remain closed).

S21, S28, S36 and S43 carry the five leads (two common) from the chassis to the auto unit, chassis, of course, being another common connection.

Coils.—L1-L14 are in pairs in seven tubular un-screened units beneath the chassis, indicated in our under-chassis view. The IF transformers L15, L16 and L17, L18 are in two screened units on the chassis deck, with their associated trimmers.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (about 2 Ω) external speaker. A plug and socket device permits the internal speaker to be muted.

Scale Lamps.—These are two Osram MES types, rated at 4.5 V, 0.3 A, run in parallel across a tapping on the heater secondary of T2.

Condensers C29, C30.—These are two wet electrolytics in a tubular metal can on the chassis deck, the can being the common negative. The positive connections are beneath the chassis, that with the red washer belonging to C29 (10μF), and that with the black washer belonging to C30 (8μF).

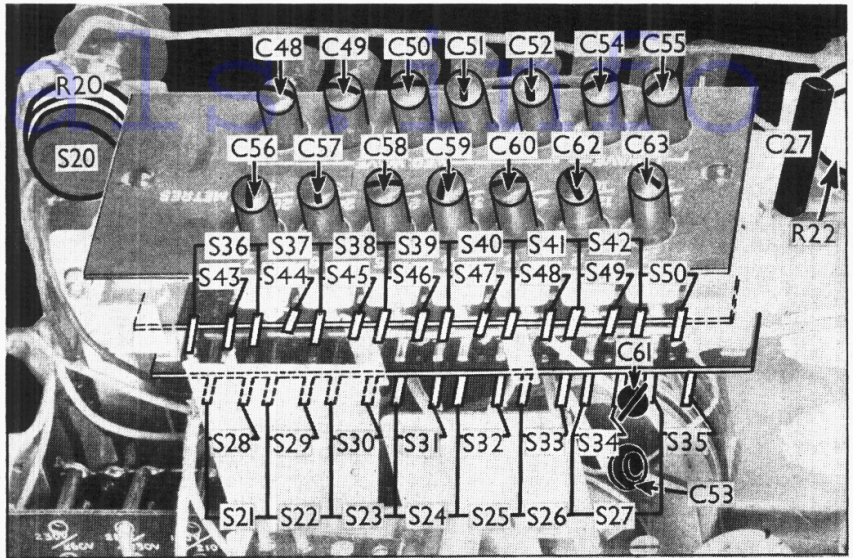
Trackers C38, C39.—In some chassis, this dual unit may be mounted in a slightly different position, so that C38 is towards the rear of the chassis, and C39 towards the front.

Transformer T2.—Note that the primary of this is used as an auto-transformer for HT supply, there being no HT secondary. Hence the need for aerial and earth isolating condensers.

Model 201 Modifications

Model 201 is similar to the 203, except that the press-button automatic tuning feature is not fitted. S21-S50 and C48-C63 are therefore omitted, and the tuning condensers are connected between chassis and the common side of S7-S9, and between chassis and the common side of S16-S18 respectively.

C7 may be 0.0002 μF in this model. The controls fitted to the press-button unit are placed in different positions in the 201.



Enlarged view of the auto-tuning assembly, showing the switch contacts.

CIRCUIT ALIGNMENT

IF Stages.—Connect signal generator to control grid (top cap) of V1 and E, feed in a 470 KC/S signal, and adjust C47, C46, C45 and C44, in that order, for maximum output. Now connect signal generator to A1 and E sockets, feed in a 470 KC/S signal, switch set to LW and tune to 950 m. Adjust C33 for minimum output.

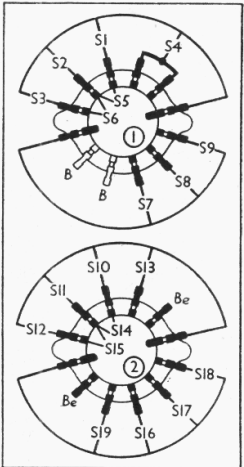
RF and Oscillator Stages.—When the gang is at maximum, pointer should lie between the two cream horizontal dial lines. Connect signal generator to A1 and E sockets.

MW.—Switch set to MW, tune to 200 m on scale,

feed in a 200 m (1,500 KC/S) signal, and adjust C41, then C35, for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust C38 for maximum output, while rocking the gang for optimum results. Repeat the MW adjustments until no improvement results.

LW.—Switch set to LW, tune to 1,300 m on scale, feed in a 1,300 m (230 KC/S) signal, and adjust C42, then C36, for maximum output. Feed in a 1,700 m (176 KC/S) signal, tune it in, and adjust C39 for maximum output, while rocking the gang for optimum results. Repeat the LW adjustments until no further improvement results.

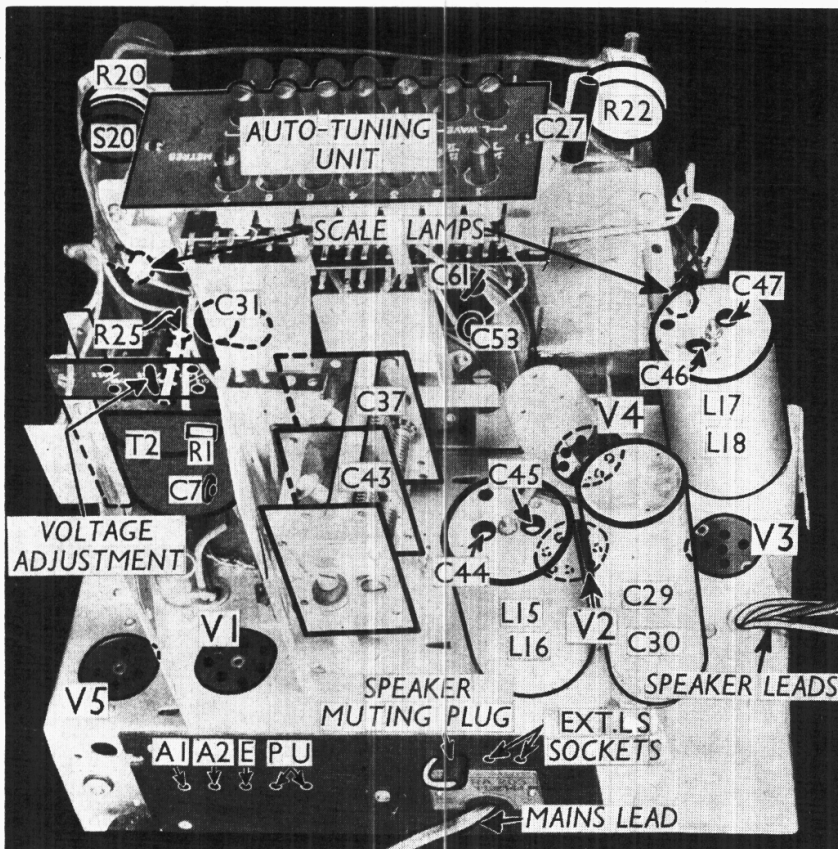
SW.—Switch set to SW, tune to 19 m on scale, feed in a 19 m (15.8 MC/S) signal, and adjust C40, then C34, for maximum output. The correct peak for C40 is that obtained with the trimmer nearest its fully unscrewed position. Check at 30 and 50 m.



The wave-change and gram. switch units, as seen from the rear of the underside of the chassis.

SWITCH TABLE

Switch	Gram.	SW	MW	LW
S1	—	C	—	—
S2	—	—	C	—
S3	—	—	—	C
S4	C	—	—	—
S5	C	—	—	—
S6	C	C	—	—
S7	—	C	—	—
S8	—	—	C	—
S9	—	—	—	C
S10	—	C	—	—
S11	—	—	C	—
S12	—	—	—	C
S13	C	—	—	—
S14	C	—	—	—
S15	C	C	—	—
S16	—	C	—	—
S17	—	—	C	—
S18	—	—	—	C
S19	C	—	—	—



General view of the top of the chassis.