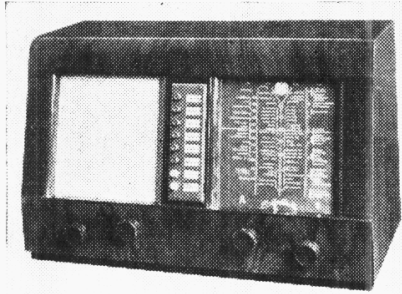


"TRADER" SERVICE SHEET

414

# K.B. 740P

(AND 740) PRESS-BUTTON AC SUPERHET



**T**HE Kolster-Brandes 740P receiver is a 4-valve (plus rectifier) AC 3-band superhet with press-button permeability tuning for eight stations.

The receiver is suitable for mains of 200-250 V, 40-60 C/S.

Model 740 has a similar chassis, but trimmer condensers instead of permeability tuned coils are used in the auto-tuning circuits. Main divergencies are given under "Model 740 Modifications."

Release dates: 740P, November, 1938; 740, August, 1938.

### CIRCUIT DESCRIPTION

Aerial input on SW is via **C1**, coupling coil **L1** and **C2** to single-tuned circuit **L2**, **C24**. On MW and LW, where manual or automatic is optional, the aerial input is developed across condensers **C1** and **C2**

which form a potential divider (via **L1**). That fraction of the signal voltage which appears across **C2** is fed to the manual tuning coils **L3** (MW) and **L4** (LW), which are tuned by **C24**, and to the automatic tuning coils **L16** to **L23** which are tuned by the fixed condenser **C35**, tuning adjustments being effected by movement of the iron cores of the coils. For manual tuning, **S6** is closed and waveband selection is effected by switches **S4** (MW) and **S5** (LW); for automatic tuning, **S6** opens and **S7** closes, station selection being effected by the selector switches **S20** to **S27** which are operated by the press buttons.

First valve (**V1**, **Brimar 20A1**) is a triode hexode operating as frequency changer with internal coupling. Triode oscillator manual tuning grid coils **L5** (SW), **L6** (MW) and **L7** (LW) are tuned by **C25**; parallel trimming by **C26** (SW), **C27** (MW) and **C28** (LW); series tracking by **C30** (MW) and **C29** (LW). Reaction by coil **L8** (SW) and direct coupling via **C6** (MW and LW). These circuits are connected to the oscillator control grid and anode respectively via switches **S9** and **S16**, which are closed in the three manual positions of the waveband control. When the control is turned to "Auto," these two switches open, and **S8** and **S17** close to connect the oscillator automatic tuning circuit between the control grid and the anode

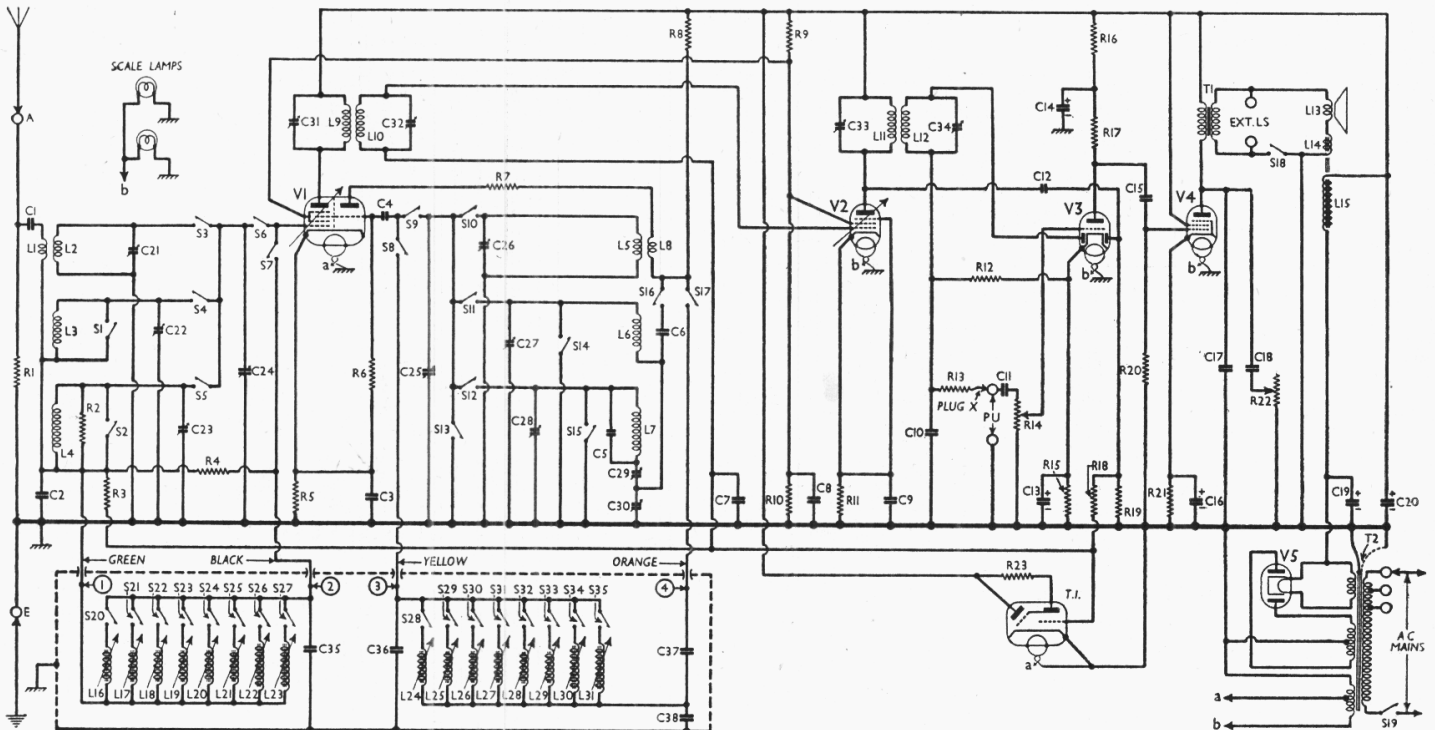
coupling condensers **C37** and **C38**. The coils **L24** to **L31** are selected by the switches **S28** to **S35** and tuned by a fixed condenser **C36**.

Second valve (**V2**, **Brimar 9D2**) is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary tuned-secondary transformer couplings **C31**, **L9**, **L10**, **C32** and **C33**, **L11**, **L12**, **C34**.

### Intermediate frequency 464 KC/S.

Diode second detector is part of double-diode triode valve (**V3**, **Brimar 11D3**). Audio frequency component in rectified output is developed across load resistance **R12** and passed via **R13**, plug **X**, AF coupling condenser **C11** and manual volume control **R14** to CG of triode section, which operates as AF amplifier. IF filtering by **C10** and **R13**. Sockets are provided for connection of gramophone pick-up across **C11**, **R14**. Before the pick-up plugs can be inserted in the sockets, plug **X**, which on radio occupies one of them, must be withdrawn, so that radio is automatically muted.

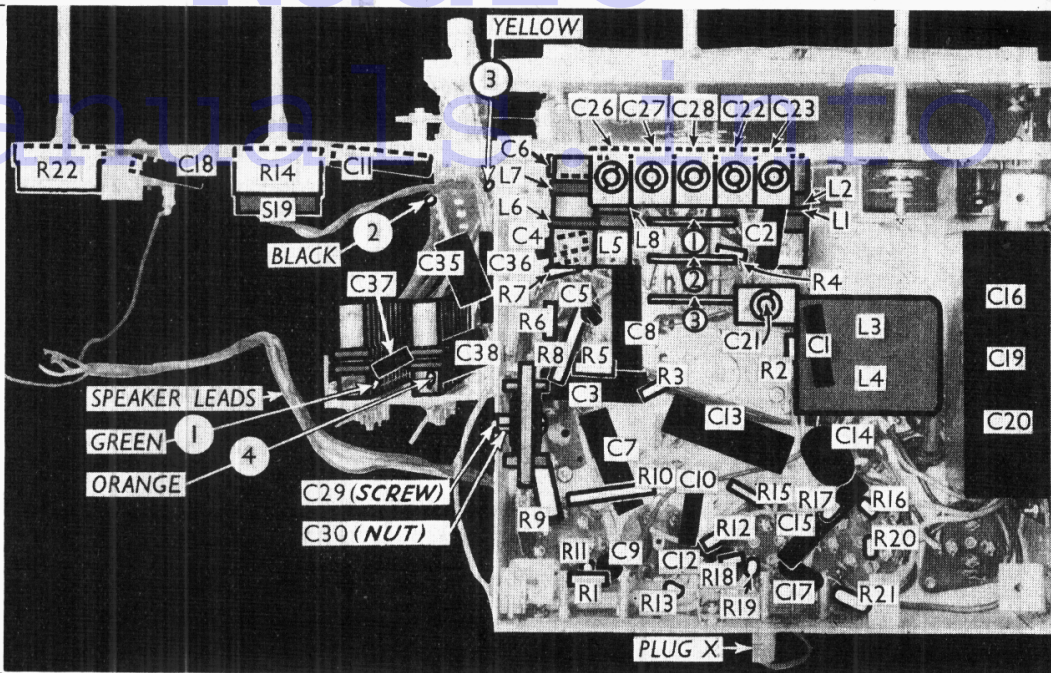
Second diode of **V3**, fed from **V2** anode via **C12**, provides DC potential which is developed across load resistance **R19** and fed back through decoupling circuits as GB to FC (except on SW) and IF valves, giving automatic volume control. Delay voltage, together with GB for triode section is obtained from drop along **R15** in cathode lead to chassis.



Circuit diagram of the K.B. 740P permeability-tuned press-button AC superhet.



Under-chassis view. The four connection points between the auto-tuning unit and the main chassis are numbered and colour-coded to agree with the circuit diagram. Diagrams of the three rotary switch units are in col. 6 overleaf.



The AVC line potential is also used as control voltage for cathode-ray tuning indicator (T.I., Mullard TV4).

Resistance-capacity coupling by R17, C15 and R20 between V3 triode and pentode output valve (V4, Brimar 7D5). Fixed tone correction by C17 in anode circuit, and variable tone control by C18 and R22, also in anode circuit. Provision for connection of low impedance external speaker across secondary of internal speaker input transformer T1, while provision is made to mute the internal speaker, if desired.

HT current is supplied by IHC rectifying valve (V5, Brimar R2). Smoothing by speaker field L15 and dry electrolytic condensers C19 and C20.

### DISMANTLING THE SET

The cabinet is fitted with a detachable bottom, removal of which (two round-head wood screws) gives access to the underside of the chassis.

**Removing Chassis.**—Remove the four control knobs (recessed grub screws) from the front panel and the four round-head bolts (with claw washers and lock washers) holding the chassis to the bottom of the cabinet. Remove the two wood screws (with washers) which hold the top of the scale assembly to the inside of the cabinet and lift the two scale lamps from their brackets, when the chassis can be withdrawn to the extent of the speaker leads.

To remove the chassis completely, unsolder the leads from the connecting panel on the speaker. *When replacing*, connect the speaker leads as follows, numbering from bottom to top: 1, brown lead from chassis and red lead from L15; 2, blue lead from chassis and blue lead from C18; 3, red lead from chassis and lead in yellow sleeving from L15. The black lead from the chassis goes to the tag on the speaker frame, to which are also connected a lead in yellow sleeving from L14 and a grey rubber

lead from the extension speaker panel.

**Removing Speaker.**—To remove the speaker, remove the four brackets (with nuts and lock washers) holding the speaker to the sub-baffle, and the extension speaker panel (two wood screws) from the right-hand side of the rear of the cabinet, and unsolder the five leads to the speaker.

*When replacing*, see that the transformer is on the right.

### COMPONENTS AND VALUES

CONDENSERS		Values (μF)
C1	Aerial coupling potential	0.0005
C2	divider condensers	0.005
C3	V1 cathode by-pass	0.1
C4	V1 osc. CG condenser	0.00005
C5	Osc. circuit LW fixed trimmer	0.0000013
C6	V1 osc. anode MW and LW coupling condenser	0.005
C7	V2 CG decoupling	0.1
C8	V1, V2 SG's decoupling	0.1
C9	V2 cathode by-pass	0.1
C10	IF by-pass	0.0005
C11	AF coupling to V3 triode	0.02
C12	Coupling to V3 AVC diode	0.000025
C13*	V3 cathode by-pass	25.0
C14*	V3 anode decoupling	2.0
C15	V3 triode to V4 AF coupling	0.02
C16*	V4 cathode by-pass	25.0
C17	Fixed tone corrector	0.001
C18	Part of variable tone control	0.02
C19*	HT smoothing condensers	8.0
C20*		16.0
C21†	Aerial circuit SW trimmer	—
C22†	Aerial circuit MW trimmer	—
C23†	Aerial circuit LW trimmer	—
C24†	Aerial circuit tuning	0.0005
C25†	Oscillator circuit tuning	0.0005
C26†	Osc. circuit SW trimmer	—
C27†	Osc. circuit MW trimmer	—
C28†	Osc. circuit LW trimmer	—
C29†	Osc. circuit LW tracker	—
C30†	Osc. circuit MW tracker	—
C31†	1st IF trans. pri. trimmer	—
C32†	1st IF trans. sec. trimmer	—
C33†	2nd IF trans. pri. trimmer	—
C34†	2nd IF trans. sec. trimmer	—
C35	Automatic aerial circuit fixed tuning condenser	0.0002
C36	Automatic osc. circuit fixed tuning condenser	—
C37	V1 osc. anode automatic osc.	0.0004
C38	circuit coupling condensers	0.0004

\* Electrolytic. † Variable. ‡ Pre-set.

RESISTANCES		Values (ohms)
R1	Aerial circuit shunt	10,000
R2	Aerial circuit LW shunt	250,000
R3	V1 hexode CG decoupling	500,000
R4	V1 hexode CG resistance	2,000,000
R5	V1 fixed GB resistance	200
R6	V1 osc. CG resistance	50,000
R7	V1 osc. anode circuit stabiliser	100
R8	V1 osc. anode HT feed	50,000
R9	V1, V2 SG's HT feed potential	20,000
R10	divider resistances	15,000
R11	V2 fixed GB resistance	500
R12	V3 signal diode load	500,000
R13	IF stopper	100,000
R14	Manual volume control	500,000
R15	V3 triode GB and AVC delay	5,000
R16	V3 triode anode decoupling	100,000
R17	V3 triode anode load	250,000
R18	AVC line decoupling	500,000
R19	V3 AVC diode load	500,000
R20	V4 CG resistance	250,000
R21	V4 GB resistance	400
R22	Variable tone control	50,000
R23	T.I. anode HT feed	2,000,000

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial SW coupling coil	0.1
L2	Aerial SW tuning coil	Very low
L3	Aerial MW tuning coil	3.0
L4	Aerial LW tuning coil	12.0
L5	Osc. circuit SW tuning coil	Very low
L6	Osc. circuit MW tuning coil	3.75
L7	Osc. circuit LW tuning coil	9.0
L8	Oscillator SW reaction coil	0.05
L9	1st IF trans.	Pri. 5.5
L10		Sec. 8.0
L11	2nd IF trans.	Pri. 8.0
L12		Sec. 5.5
L13	Speaker speech coil	1.8
L14	Hum neutralising coil	0.1
L15	Speaker field coil	1,250.0
L16	Aerial circuit MW automatic tuning coils	4.0
L17		5.0
L18		5.0
L19		7.0
L20		7.0
L21		8.8
L22	Aerial circuit LW automatic tuning coils	27.0
L23		34.0
L24		3.0
L25	Oscillator circuit MW automatic tuning coils	3.5
L26		3.5
L27		4.0
L28	Oscillator circuit LW automatic tuning coils	4.0
L29		4.5
L30		9.0
L31	9.0	

*Continued overleaf*



TABLE AND DIAGRAMS OF THE SWITCH UNIT

put, while rocking the gang for optimum results. Repeat the 214 m adjustments as a check.

**LW.**—Switch set to LW, and tune to 1,000 m on scale. Feed in a 1,000 m (300 KC/S) signal, and adjust **C28**, then **C23**, for maximum output. Feed in a 1,714 m (175 KC/S) signal, tune it in, and adjust **C29** (screw) for maximum output, while rocking the gang for optimum results. Repeat the 1,000 m adjustments as a check.

**SW.**—Switch set to SW, and tune to 17.6 m on scale. Feed in a 17.6 m (17 MC/S) signal, and adjust **C26** for maximum output. Two peaks will be found, the correct one being that obtained with the lower capacity of **C26** (nearest to fully unscrewed position). Now adjust **C21** for maximum output, rocking the gang very slightly for optimum results. No tracer is provided on this band.

**AUTO-TUNING ADJUSTMENTS**

The wavelength ranges of the various buttons, numbering from top to bottom, are as follows: 1, 200-280 m; 2 and 3, 259 to 359 m; 4 and 5, 333 to 454 m; 6, 389 to 555 m; 7, 1,176 to 1,428 m; 8, 1,428 m to 1,875 m.

To adjust the circuits for a given station, switch set to "Auto" and depress the appropriate button. Adjust the trimmer of the oscillator coil controlled by this button for maximum output from the station, using the tuning indicator as a guide, then adjust the corresponding aerial coil trimmer. Re-adjust the

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

oscillator coil, if necessary. Final adjustments should always be made using the aerial with which the set is to work.

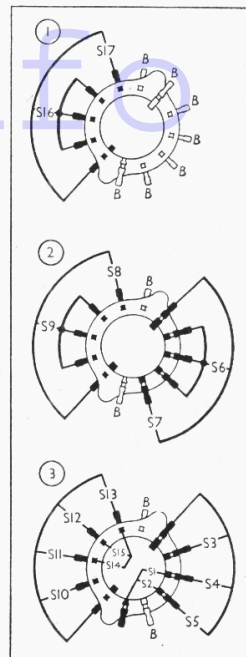
To increase the wavelength, unscrew the trimmers, and vice-versa.

To change the range covered by a given button, it will be necessary to replace the existing coils associated with this button by different ones, which are obtainable from the manufacturers, on quoting the name and wavelength of the station it is required to cover.

First unscrew the cores of the coils it is desired to change, using a screwdriver in the slot in the actual core, reached through the open end of the coil former.

Now unsolder the wires connected to

Diagrams of the three rotary switch units, containing **S1-S17**, as seen looking from the rear of the underside of the chassis. The switch table is on the left.



the coils, and also the metal fixing tags which pass through holes in the vertical brass mounting strips. The coils can then be removed and the new ones substituted, making sure that the oscillator coil is the closer to the press-button unit. Pass the fixing tags through the holes in the brass mounting strips, bend them to overlap the tags of the adjacent coils, and solder in position.

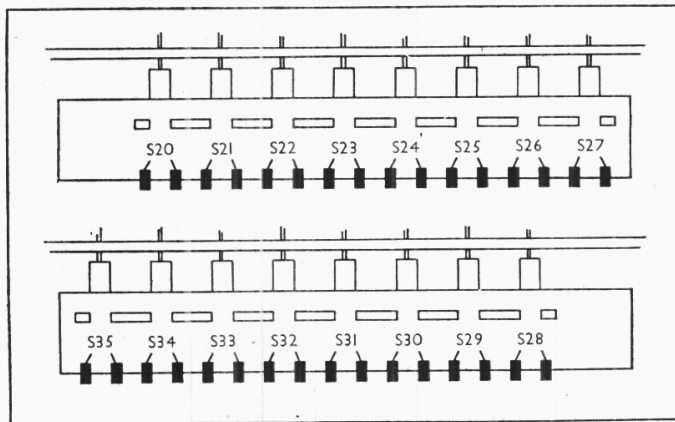
Now screw in the cores again, re-connect the coils, and align for the desired station.

**MODEL 740 MODIFICATIONS**

The main difference in the K.B. 740 receiver is that instead of permeability tuning for the auto circuits, trimmer condensers are used in conjunction with the manual tuning coils. For all but the lowest wavelength button, each variable trimmer has a fixed trimmer in parallel.

Naturally, the switching is modified to a certain extent, but apart from this, there is very little difference in the chassis.

Diagrams of each side of the press-button switch unit. The upper view is that seen from the **R22** end of the chassis.



# S A T O R

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OTHER COMPONENTS (Continued)		Approx. Values (ohms)
T1	Speaker input trans. { Pri. . . . . Sec. . . . .	400·0 0·4
T2	Mains trans. { Pri., total . . . . . Heater sec., total . . . . . Rect. heat. sec. . . . . HT sec., total . . . . .	29·0 0·4 0·2 200·0
S1-S17	Waveband and manual/auto change switches . . . . .	—
S18	Speaker switch . . . . .	—
S19	Mains switch, ganged R14 . . . . .	—
S20-27	Aerial circuit automatic selector switches . . . . .	—
S28-35	Oscillator circuit automatic selector switches . . . . .	—

**VALVE ANALYSIS**

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 236 V, using the 225 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 20A1	{ 293 Oscillator 98	{ 3·1 3·7	100	2·1
V2 9D2	293	4·5	100	1·15
V3 11D3	85	0·4	—	—
V4 7D5	275	33·5	293	5·45
V5 R2	315†	—	—	—
T.I. TV4	{ 30 Target 293	{ 0·18 0·7	—	—

† Each anode, AC.

**GENERAL NOTES**

**Switches.**—S1-S17 are the waveband and auto/manual change switches, ganged in three rotary units beneath the chassis. These are indicated in our under-chassis view, and shown in detail in the diagrams in col. 6, where they are drawn as seen looking from the rear of the underside

of the chassis. The table (col. 5) gives the switch positions for the four control settings, starting from fully anti-clockwise. A dash indicates open, and C, closed.

S18 is the internal speaker switch, associated with the external speaker sockets at the rear of the cabinet. It is operated by a small screw knob.

S19 is the QMB mains switch, ganged with the manual volume control R14.

S20-S35 are the automatic tuning selector switches, in a press-button unit, mounted vertically at one side of the tuning scale. There are eight press-buttons, each one controlling two switches. When a button is pressed in, its associated switches are closed. Diagrams of each side of the unit are given in cols. 4 and 5. The upper diagram shows the switches seen when looking from the tone control end of the chassis, while the lower diagram shows the side of the unit nearest the gang condenser.

**Coils.**—L1, L2 ; L5, L8 ; and L6, L7 are in three unscreened tubular units beneath the chassis. L3, L4 are inside a screening can beneath the chassis. The IF transformers L9, L10 and L11, L12 are in two screened units on the chassis deck, with their associated trimmers. L13-L15 are included in the speaker.

L16-L31 are the sixteen auto-tuning coils (eight aerial and eight oscillator) in two rows in a vertical unit at one side of the press-button unit. They are indicated in our plan chassis view. All these coils have variable iron cores, a trimmer screw being associated with each.

**Scale Lamps.**—These are two Tre-Vita MES types, rated at 12·16 V, 0·3 A.

**External Speaker.**—Two sockets are provided on a panel at the rear of the cabinet for a low impedance (2·5 Ω) external speaker. The internal speaker may be muted by unscrewing the knob of S18 (between the two sockets).

**Condensers C16, C19, C20.**—These are three dry electrolytics in a single carton

beneath the chassis. A common negative (black) lead is used for C19 and C20. The yellow lead is the positive of C19 (8μF, 450 V working), while the red lead is the positive of C20 (16μF, 450 V working). The brown lead is the negative, and the green lead the positive of C16 (25 μF, 25 V peak).

**Trackers C29, C30.**—These are in a dual unit, fitted to one of the side plates of the chassis, and are adjustable by a concentric nut and screw. The screw adjusts C29 and the nut C30.

**Plug X.**—In the circuit diagram and the under-chassis view is a plug marked "X." Normally this plug must be inserted in the right-hand pick-up socket, looking at the rear of the set. It connects R13 to C11 for radio reception. When a pick-up is used, plug X is withdrawn, thus muting radio, and permitting the pick-up plugs to be inserted in their two sockets.

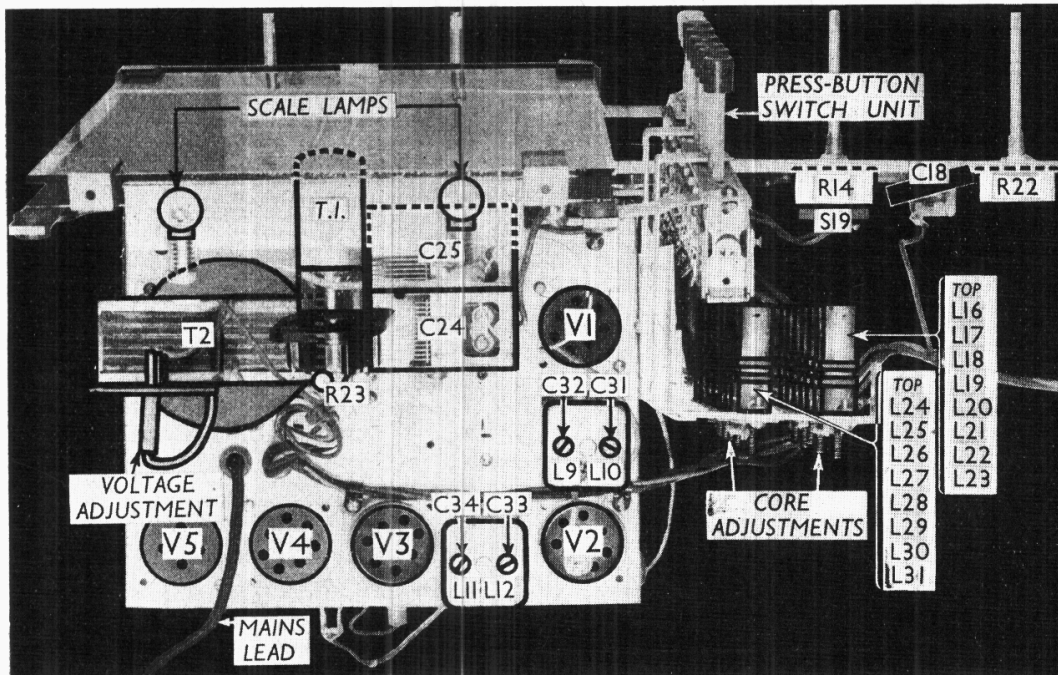
**Valve Heater Voltages.**—Note that V2 to V4 are 13 V valves, whereas V1 is a 4 V type, run from a tapping on the 13 V heater winding of T2.

**CIRCUIT ALIGNMENT**

**IF Stages.**—Switch set on, and turn volume control to maximum. Connect signal generator between control grid (top cap) of V1 and chassis. Feed in a 464 KC/S signal, and adjust C31, C32, C33 and C34 in turn for maximum output. Re-check these settings.

**RF and Oscillator Stages.**—When gang is at maximum, see that pointer coincides with the top ends of the scales. Connect signal generator, via a dummy aerial, to A and E sockets, and keep volume control at maximum.

**MW.**—Switch set to MW, tune to 214 m (white dot) on scale, feed in a 214 m (1,400 KC/S) signal, and adjust C27, then C22, for maximum output. Feed in a 500 m (600 KC/S) signal, tune it in, and adjust C30 (nut) for maximum out-



Plan view of the chassis, showing the press-button switch unit (of which detailed diagrams are in cols. 4 and 5) and the auto-tuning coils, numbered from top to bottom. Note the positions of the core adjustments for station setting.