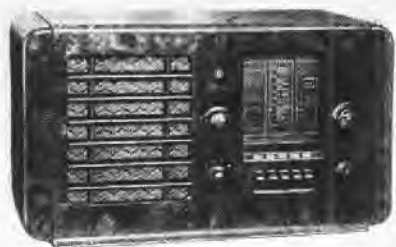


"TRADER" SERVICE SHEET  
**802**

# EKCO A23

Covering also C36 CONSOLE & RG35



**F**IVE pre-tuned station press buttons are provided in the Ekco A23, a 4 valve (plus rectifier) 3-band superhet designed for A.C. mains of 200-250 V, 40-80 c/s. The S.W. range is 15-50 m, and a channel for the television sound (T.S.) programme is included.

An identical chassis is fitted in the C36 console, and a slightly modified version is used in the RG35 radiogram.

*Release dates and original prices:* 123, August, 1946. £21, plus £4 10s 4d purchase tax; C36, January, 1947. £31 10s, plus £6 15s 6d p.t.; RG35, January, 1947. £52 10s, plus £11 5s 9d p.t.

### CIRCUIT DESCRIPTION

Aerial input is via coupling coils **L2** (S.W.), **L3** (M.W.) and **L4** (L.W.) to single-tuned circuits **L5** (S.W.), **L6** (M.W.) and **L7** (L.W.), tuned manually by **C45**.

Provision is made for reception of the television sound channel (T.S.), which is tuned by **L8**, **C6** in the aerial circuit and coupled via **L2**, **L5** to the aerial. A second harmonic is used in the oscillator circuit, the receiver being tuned to 14.62 m.

For automatic tuning, **C45** is replaced by pre-set trimmer type capacitors **C52**, **C53**, **C54** (M.W.) and **C50**, **C51** (L.W.). Selection is achieved by press-button switches **S1a**, **b** to **S5a**, **b**, **x**. These switches are coded with suffix letters to indicate their functions, and are arranged in groups. Two groups are controlled by each press-button, one belonging to the aerial circuit and one to the oscillator.

All the switches in the two groups belonging to a given press-button bear the same number, the individual switches in each group being identified by the suffix letter. If the suffix is **a**, **b**, **c** or **d**, the switch closes when its button is

pressed; if the suffix is **x**, the switch opens.

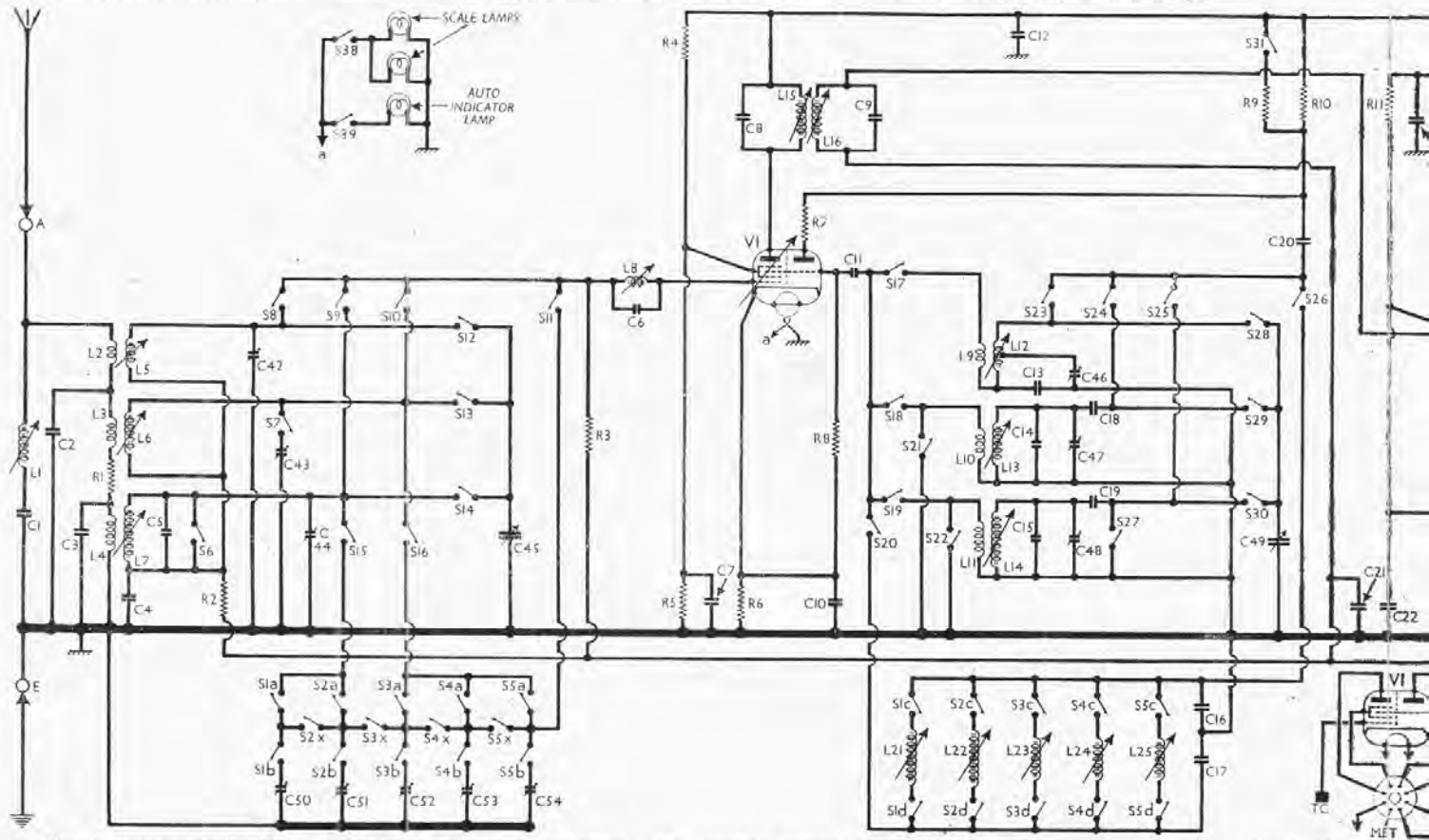
First valve (**V1**, Mullard metallized **ECH35**) is a triode-hexode operating as frequency changer with internal coupling. For manual operation, triode oscillator anode coils **L12** (S.W.), **L13** (M.W.) and **L14** (L.W.) are tuned by **C49**. Parallel trimming by **C46** (S.W.), **C14**, **C47** (M.W.) and **C15**, **C48** (L.W.); series tracking by **C13** (S.W.), **C18** (M.W.) and **C19** (L.W.).

For automatic tuning, all the foregoing circuits are disconnected and replaced, via **S20** and **S26**, by one of the iron-dust cored pre-set coils **L21** to **L25**, which are tuned by fixed capacitors **C16**, **C17** in series, selection being determined by switches **S1c**, **d** to **S5c**, **d** as explained previously.

The change-over from manual to automatic tuning is performed at a fourth position on the waveband control, when **S11**, **S15** and **S16** in the aerial circuit, and **S20**, **S26** in the oscillator circuit, close, and all other waveband switches open.

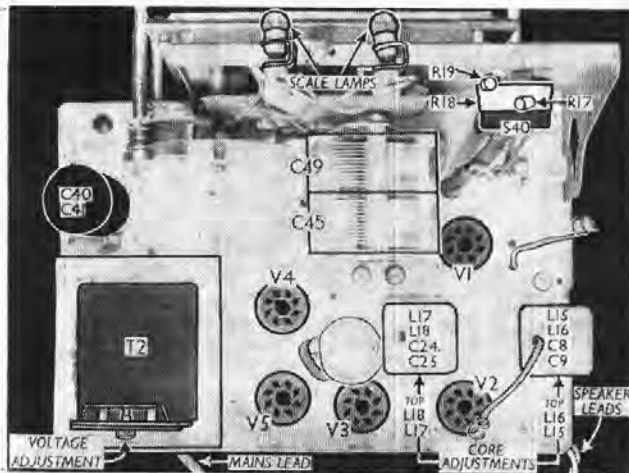
Second valve (**V2**, Mullard metallized **EF39**) is a variable- $\mu$  R.F. pentode operating as I.F. amplifier.

**Intermediate frequency 460 kc/s.**



Circuit diagram of the Ekco A23 press-button A.C. superhet. The muting socket, by the P.U. sockets, is connected to chassis if desired to

Plan view of the chassis. The tuning gang sections C49 and C45 are transposed in the C36 console, and may be so in some table models and the radio-gram RG35.



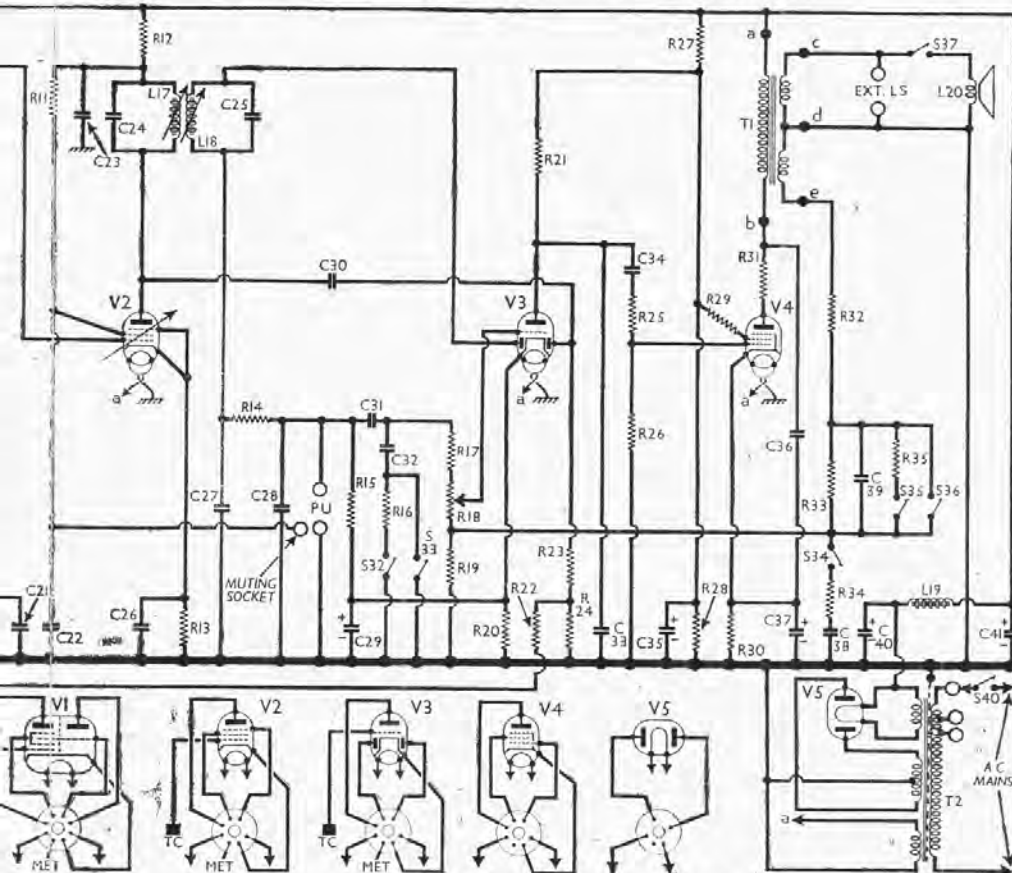
Diode second detector is part of double diode triode valve (V3, Mullard metallized EBC33). Audio-frequency component in rectified output is developed across load resistor R15 and passed via A.F. coupling capacitor C31 and manual volume control R18 to C.G. of triode section. Provision for connection of a gramophone pick-up across R15.

Second diode of V3, fed from V2 anode via C30, provides D.C. potential which is developed across load resistors R23, R24, giving automatic volume control.

Resistance-capacitance coupling by R21, C34 and R26, via I.F. stopper R25, be-

tween V3 triode and pentode output valve (V4, Mullard EL33). Fixed tone correction in pentode anode circuit by C36, and provision for connection of low impedance external speaker across the speech coil secondary of T1. A further winding on this transformer provides output voltages which are stepped down by the potential divider network R32, R33 and R19, and those appearing across R19 are fed back in negative phase to V3 triode grid circuit.

Four-position tone control by C32, R16 in V3 triode grid circuit, R35, C39 and R34, C38 in the negative feed-back circuit, and switches S32-S36.



desired to mute radio. The connections to the output transformer T1 are coded a, b, c, d, e.

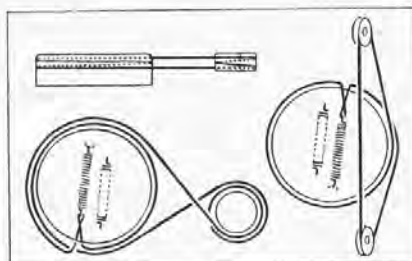
COMPONENTS AND VALUES

RESISTORS	Values (ohms)
R1	Aerial damping ... 330
R2	V1 hex. C.G. decoupling ... 100,000
R3	V1 hex. C.G. resistor ... 4,700,000
R4	V1 S.G. H.T. potential divider ... 33,000
R5	... 33,000
R6	V1 fixed G.B. resistor ... 270
R7	V1 osc. anode stabiliser ... 15
R8	V1 osc. C.G. resistor ... 47,000
R9	V1 osc. anode H.T. feed resistors ... 47,000
R10	... 47,000
R11	V2 S.G. H.T. feed ... 100,000
R12	V2 H.T. decoupling ... 2,200
R13	V2 fixed G.B. resistor ... 330
R14	I.F. stopper ... 47,000
R15	V3 signal diode load ... 220,000
R16	Tone control resistor ... 68,000
R17	I.F. stopper ... 220,000
R18	Manual volume control ... 1,000,000
R19	Feedback coupling resistor ... 680
R20	V3 fixed G.B. resistor ... 1,000
R21	V3 triode anode load ... 47,000
R22	A.V.C. line decoupling ... 1,500,000
R23	V3 A.V.C. diode load resistors ... 220,000
R24	... 1,500,000
R25	I.F. stopper ... 47,000
R26	V1 C.G. resistor ... 220,000
R27	... 10,000
R28	H.T. feed potential divider ... 68,000
R29	V4 S.G. stopper ... 100
R30	V4 G.B. resistor ... 150
R31	V4 anode stopper ... 100
R32	Part feed-back potential divider ... 15,000
R33	... 47,000
R34	... 330
R35	Tone control resistors ... 47,000

CAPACITORS	Values (µF)
C1	Aerial I.F. filter tuning ... 0.00015
C2	Aerial M.W. shunt ... 0.00047
C3	Aerial L.W. shunt ... 0.00082
C4	V1 hex. C.G. decoupling ... 0.05
C5	Aerial L.W. fixed trimmer ... 0.00015
C6	T.S. channel tuning capacitor ... 0.00002
C7	V1 S.G. decoupling ... 0.1
C8	1st I.F. transformer fixed tuning capacitors ... 0.00015
C9	... 0.00015
C10	V1 cathode by-pass ... 0.1
C11	V1 osc. C.G. capacitor ... 0.000047
C12	H.T. circuit R.F. by-pass ... 0.1
C13	Osc. circ. S.W. tracker ... 0.0047
C14	Osc. M.W. fixed trimmer ... 0.00015
C15	Osc. L.W. fixed trimmer ... 0.000082
C16	Osc. circuit auto-tuning capacitors ... 0.00033
C17	... 0.00082
C18	Osc. circ. M.W. tracker ... 0.0006
C19	Osc. circ. L.W. tracker ... 0.00024
C20	V1 osc. anode coupling ... 0.0001
C21	V2 C.G. decoupling ... 0.05
C22	V2 S.G. decoupling ... 0.1
C23	V2 H.T. feed decoupling ... 0.1
C24	2nd I.F. transformer fixed tuning capacitors ... 0.00022
C25	... 0.00022
C26	V2 cathode by-pass ... 0.1
C27	I.F. by-pass capacitors ... 0.0001
C28	... 0.0001
C29	V3 cathode by-pass ... 25.0
C30	V3 A.V.C. diode coupling ... 0.0001
C31	A.F. coupling to V3 G.G. ... 0.02
C32	Tone control capacitor ... 0.002
C33	I.F. by-pass capacitor ... 0.0003
C34	A.F. coupling to V4 C.G. ... 0.05
C35	H.T. feed decoupling ... 4.0
C36	Fixed tone corrector ... 0.0025
C37	V4 cathode by-pass ... 25.0
C38	... 0.25
C39	Tone control capacitors ... 0.1
C40	... 0.1
C41	H.T. smoothing capacitors ... 8.0
C42	... 16.0
C43	Aerial S.W. trimmer ...
C44	Aerial M.W. trimmer ...
C45	Aerial L.W. trimmer ...
C46	Aerial circuit tuning ...
C47	Osc. circ. S.W. trimmer ...
C48	Osc. circ. M.W. trimmer ...
C49	Osc. circ. L.W. trimmer ...
C50	Oscillator circuit tuning ... 0.00055
C51	... 0.00027
C52	Aerial circuit press-button tuning trimmers ...
C53	... 0.00013
C54	... 0.00013

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

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial I.F. filter coil	7.9
L2	Aerial S.W. coupling coil	0.14
L3	Aerial M.W. coupling coil	0.6
L4	Aerial L.W. coupling coil	31.0
L5	Aerial S.W. tuning coil	0.04
L6	Aerial M.W. tuning coil	4.5
L7	Aerial L.W. tuning coil	23.0
L8	T.S. channel coil	0.03
L9	Osc. S.W. reaction coil	0.18
L10	Osc. M.W. reaction coil	1.0
L11	Osc. L.W. reaction coil	4.4
L12	Osc. S.W. tuning coil	0.05
L13	Osc. M.W. tuning coil	2.4
L14	Osc. L.W. tuning coil	4.5
L15	1st I.F. trans.	Pri. 8.1
L16		Sec. 8.7
L17	2nd I.F. trans.	Pri. 14.0
L18		Sec. 6.5
L19	H.T. smoothing choke	550.0
L20	Speaker speech coil	2.6
L21	Oscillator circuit press-button tuning coils	3.6
L22		3.6
L23		3.8
L24		3.3
L25		1.7
T1	Output trans.	Pri. 350.0
		Spkr. sec. 0.1
		P.R. sec. 40.0
T2	Mains trans.	Pri. total 11.0
		Heater sec. 0.1
		Rect. heat. sec. 0.15
S1a, b, to S8a, b, x	Aerial circuit press-button switches	500.0
S1c, d to S5c, d		Oscillator circuit press-button switches
S6-S31	Waveband switches	
S32-S36	Tone control switches	...
S37	Int. speaker switch	...
S38, S39	Scale lamp switches	...
S40	Mains switch, ganged R18	...



Diagrams of the two wire drive systems, as seen from the front. Left, gang drive (with plan view above it); right, pointer drive.

**VALVE ANALYSIS**

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 218 V, using the 220-230 V tapping on the mains transformer. Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being the negative connection.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 ECH35	250	2.3	87	3.2
V2 1E39	Oscillator	2.3	87	3.2
	107	3.5		
V3 EBC33	237	4.2	72	1.4
V4 EL33	100	1.9		
V5 AZ31	240	21.0	173	2.6
	275†			

+ Each anode, A.C.

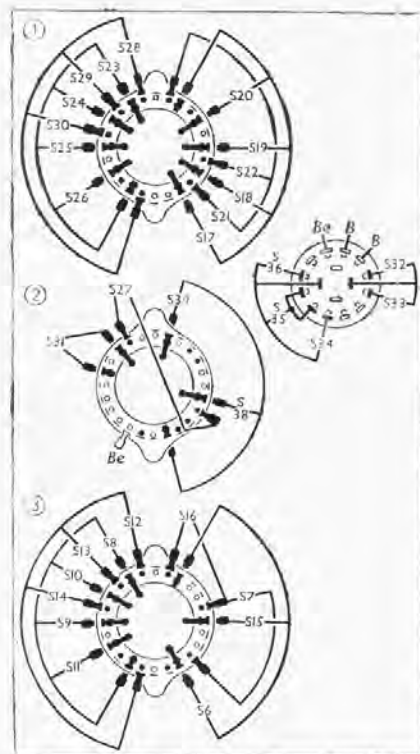
**DISMANTLING THE SET**

**Removing Chassis.**—Remove the four control knobs (recessed grub screws); remove the four 2BA cheese-head fixing bolts securing the chassis to the cabinet bottom; the chassis may now be withdrawn to the extent of the speaker leads.

**Removing Speaker.**—Loosen the four nuts on the speaker-retaining clamps; support the speaker with one hand, and swivel the clamps out of the way with the other. When replacing, the connecting panel should be at the bottom.

**GENERAL NOTES**

**Switches.**—S1a, b, c, d to S5a, b, c, d and X are the automatic tuning switches, operated by the five press-buttons. They are on the two sides of the press-button switch unit, which is indicated in our



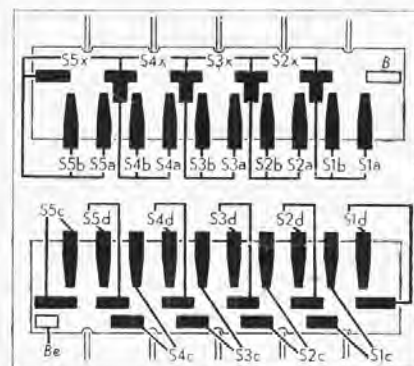
Diagrams of the three waveband (left) and the tone control (right) switch units, as seen from the rear of an inverted chassis. The associated table is on the right (next col.).

under-chassis view and shown in detail in the diagrams below, where the upper diagram shows the side seen in our photograph, and the lower one the other side as it is seen when the unit is freed and turned over on its connecting leads.

The unit is freed by removing the three nuts and bolts (with spacing collars) holding it to the front chassis member, but the outer L.W. press-button knob must be removed (by heating plunger stem with a soldering iron) before the unit can be extracted. The action of the switches is explained under "Circuit Description."

S6-S31 are the waveband and manual/auto change-over switches, and S38, S39 the scale lamp switches, ganged in three rotary units beneath the chassis. These are indicated in our under-chassis view and the separate illustration of the coil assembly, and they are shown in detail in the diagrams in col. 1, where they are drawn as seen from the rear of an inverted chassis. The table (col. 2) gives the switch positions for the four control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and C, closed.

S32-S36 are the tone control switches, ganged in a single rotary four-position



Diagrams showing both sides of the press-button switch unit. Above, as seen in one under-chassis view; below, as seen when the unit is unbolted and turned over on its leads.

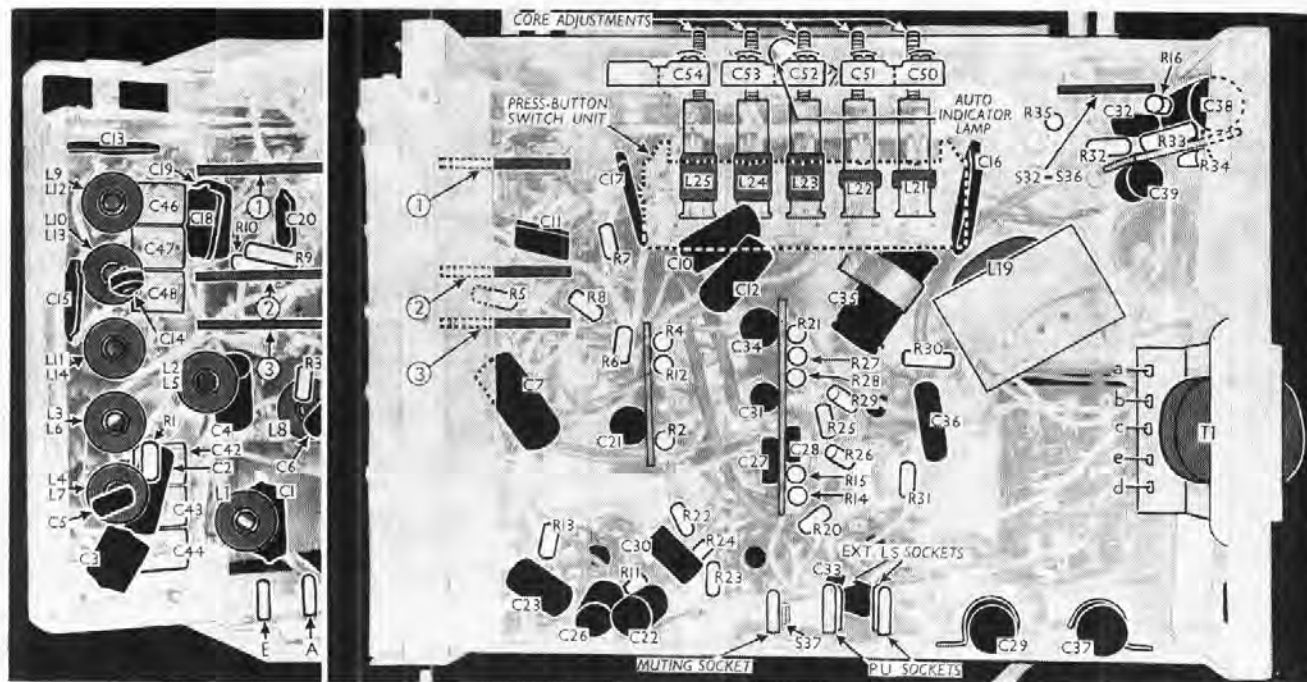
unit beneath the chassis, indicated in our under-chassis view and shown in detail in the diagram inset with the waveband switch units in col. 1. This unit also is viewed from the rear of an inverted chassis. In position 1 (fully anti-clockwise, deep tone) S33 and S36 close; in position 2, S32 and S35 close; in position 3, S35 closes; and in position 4, S34 closes. Otherwise they are open.

**Coils.**—All the R.F. and oscillator tuning coils (L1-L14) for manual tuning are in eight small iron-cored units in a vertical assembly forming one end of the under-chassis compartment, with their trimming capacitors and other associated components.

This assembly is shown in a separate photograph beside our under-chassis illustration, where it takes up approximately the position that it would adopt if it were hinged at the chassis deck and let down like a flap. The assembly can be removed if necessary, but coil replacements can be made without disturbing it.

The oscillator circuit coils L21-L25 for

Switch	S.W.	M.W.	L.W.	Auto.
S6		C		
S7		C		
S8	O	C		
S9		C		
S10		C	C	
S11		C		C
S12	O	C		
S13		C		
S14			C	
S15				C
S16				C
S17	O			
S18		C		
S19			C	
S20				C
S21	O			
S22		C		
S23	O	C		
S24		C		
S25			C	
S26				C
S27	O	C		
S28	O	C		
S29		C		
S30			C	
S31	C			



Under-chassis view, with a separate view (left) of the coil assembly as seen when viewed from the direction of the output transformer **T1**. Diagrams of the waveband, press-button and tone control switches (**S32-S36**) indicated here are shown in detail in cols. 1 and 3. The tags of **T1** are lettered to agree with the circuit diagram overleaf.

automatic operation are mounted directly on the press-button switch unit assembly, together with the associated pre-set capacitors. Their adjustments are indicated in our under-chassis view.

**Scale and Indicator Lamps.**—These are three Osram lamps, with spherical bulbs and M.E.S. bases, rated at 6.5 V, 0.3 A. Two are used to illuminate the scale, or the third to illuminate the auto station indicator.

**External Speaker.**—Two sockets are provided at the rear of the chassis for a low impedance (about 3Ω) external speaker. A screw-type switch is provided with them to mute the internal speaker.

**Radiogram Modifications.**—In the RG35, the chassis of the A23 is used, but it is slightly modified. The press-button unit and volume control (with mains switch) are fitted to the front of the cabinet and connected to chassis by cables. A single-pole change-over switch fitted on the motor-board is connected on one side to the upper pick-up socket and on the other to **C31**; its centre goes to the top of **R17**.

**Drive Wire Replacement**

Two wire drives are used in this system: the gang drive, and the pointer drive. The sketches (col. 2) show the course taken by each drive. The length of the gang drive wire is quoted by the makers as 24½ ins., and the length of its tension spring ½ in. when contracted; the length of the pointer drive wire is given as 23½ ins., and its spring as ¼ in. contracted. Replacement wires can be obtained from the makers, part numbers B32417/2 and B32417/1 respectively.

To obtain access to the rear of the drum, remove the light excluding plate (three set-screws), first withdrawing the scale lamps.

To obtain access to the front of the drum, remove the glass scale panel (four phosphor-bronze clamps with rubber liners held by four set-screws); turn the gang to maximum, and remove the four set-screws holding the black sprayed scale backing plate behind the glass, lowering it about an inch so that the scale cursor-bar pointers pass through holes provided for them at the tops of the vertical slots.

With the gang at maximum, the drum should take up the position shown in the sketches. When fitting the wire, care should be taken not to kink it. When replacing the scale glass, the pointers should coincide with the last calibration marks at the high-wavelength ends of the scales. See that the glass rests squarely on the felt base provided; see that the felt spacers are in position on the backing plate, and that the rubber liners are in position where the clamps grip the edges of the glass.

**CIRCUIT ALIGNMENT**

**I.F. Stages.**—Switch set to M.W., turn gang and volume control to maximum, connect signal generator via a 0.1µF capacitor to control grid (top cap) of **V1** and chassis, feed in a 400 kc/s (652.1 m) signal, and adjust the cores of **L18**, **L17**, **L16** and **L15** in that order for maximum output.

**I.F. Filter.**—Transfer signal generator leads to **A** and **E** sockets, discarding the 0.1µF capacitor, feed in a 400 kc/s signal, and adjust the core of **L1** for minimum output.

**R.F. and Oscillator Stages.**—With the gang at maximum, the pointers should coincide with top calibration marks at the high wavelength ends of the scales. They may be adjusted by slackening the wire clamp (two set-screws) on the rear of the cursor carrier, and sliding the carrier up or down the drive wire. Access is

permitted to the carrier if the metal light excluder plate is removed (three set-screws).

All trimmers involved in the following adjustments are grouped on the outer side of the coil assembly which forms one end of the chassis, facing the speaker chamber. These adjustments are identified in the sketch (col. 5), which shows this end of the chassis as seen while in the cabinet, from the rear, after removal of the guard strip.

**S.W.**—Switch set to S.W., tune to 20 m on scale, feed in a 20 m (15 Mc/s) signal, and adjust **C46**, then **C42**, for maximum output. If two positions are found for **C46**, use that involving the lesser trimmer capacitance. Tune to 50 m on scale, feed in a 50 m (6 Mc/s) signal, and adjust the cores of **L12** and **L5** for maximum output. Repeat these adjustments until no improvement can be obtained.

**T.S.**—Tune to 14.62 m on scale, feed in a 41.5 Mc/s (7.23m) signal, and adjust **L8** for maximum output. A 75Ω dummy load should be shunted across the signal generator leads. If a suitable signal generator is not available, **L8** may be adjusted on the transmitted television sound signal.

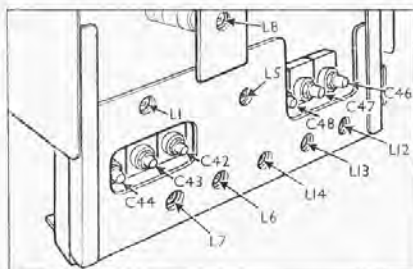
**M.W.**—Switch set to M.W., tune to 250 m on scale, feed in a 250 m (1,200 kc/s) signal, and adjust **C47** and **C43** for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust the cores of **L13** and **L6** for maximum output. Repeat these adjustments until no improvement can be obtained.

**L.W.**—Switch set to L.W., tune 1,000 m on scale, feed in a 1,000 m (300 kc/s) signal, and adjust **C48** and **C44** for maximum output. Tune to 1,800 m on scale, feed in an 1,800 m (166 kc/s) signal, and adjust the cores of **L14** and **L7** for maximum output. Repeat these adjustments until no improvement can be obtained.

**Press-button Setting**

Numbering the press-buttons from left to right as seen from the front, the range of each is as follows: 1, 200-308 m; 2, 283-448 m; 3, 342-560 m; 4, 1,160-1,580 m; 5, 1,430-1,986 m.

To set any button, remove the press-button escutcheon (two set-screws) from front of cabinet, and switch set to auto. Press the appropriate button, and adjust the upper screw (oscillator coil core), then the lower (aerial) trimmer, preferably using the desired transmission as the signal.



Sketch giving the positions of the various trimmers, as seen from the rear of the speaker chamber.