

"TRADER" SERVICE SHEET

837

# EKCO A28

9-Band & P.B. Superhet



**B**AND-SPREAD tuning on seven S.W. bands, a television channel, M.W. and L.W., are provided on the Ekco A28, a four-valve (plus rectifier) A.C. superhet designed for mains of 200-250V, 40-80 c/s.

A tenth position on the band switch control brings in press-button tuning. S.W. ranges are in 13m, 16m, 19m, 25m, 31m, 41m and 49m bands (bands 1-7). The television channel is accommodated on band 1. A cathode-ray tuning indicator is fitted. Tone control is associated with the negative feed-back system.

Release date and original price: August, 1946; £29 8s plus £6 6s 5d p.t., increased December, 1946, to £31 10s plus £6 15s 6d p.t.

## CIRCUIT DESCRIPTION

On M.W. and L.W., aerial is inductively coupled to single-tuned circuits L4 (M.W.) and L5 (L.W.), tuned manually by C46, which precede triode-hexode valve (V1, Mullard metallized ECH35), operating as frequency changer with internal coupling. Triode oscillator anode coils L16 (M.W.) and L17 (L.W.) are tuned by C51.

For automatic tuning in the aerial circuit, C46 is replaced by pre-set trimmer type capacitors C52-C56, selection being achieved by press-button switches S1a, b to S5a, b, x, which are coded in accordance with our normal practice. In the oscillator circuit the P.B. master coil L38 is shunted by one of the pre-set iron-dust cored coils L33-L37, tuned by C13, and selected by switches S1c to S5c, y.

On S.W., band 7, L12 (aerial) and L24 (oscillator) are permeability tuned by ganged iron-

dust cores, C46 and C51 being disconnected. For the remaining six S.W. bands the appropriate coils are shunted across L12 and L24, which then become ganged master tuning coils.

The television sound channel (T.S.) is tuned by L13, C6 in the aerial circuit, and a second harmonic is used in the oscillator circuit, the receiver being tuned to approximately 13.99m. Second valve (V2, Mullard metallized EF39) is a variable-mu R.F. pentode operating as I.F. amplifier.

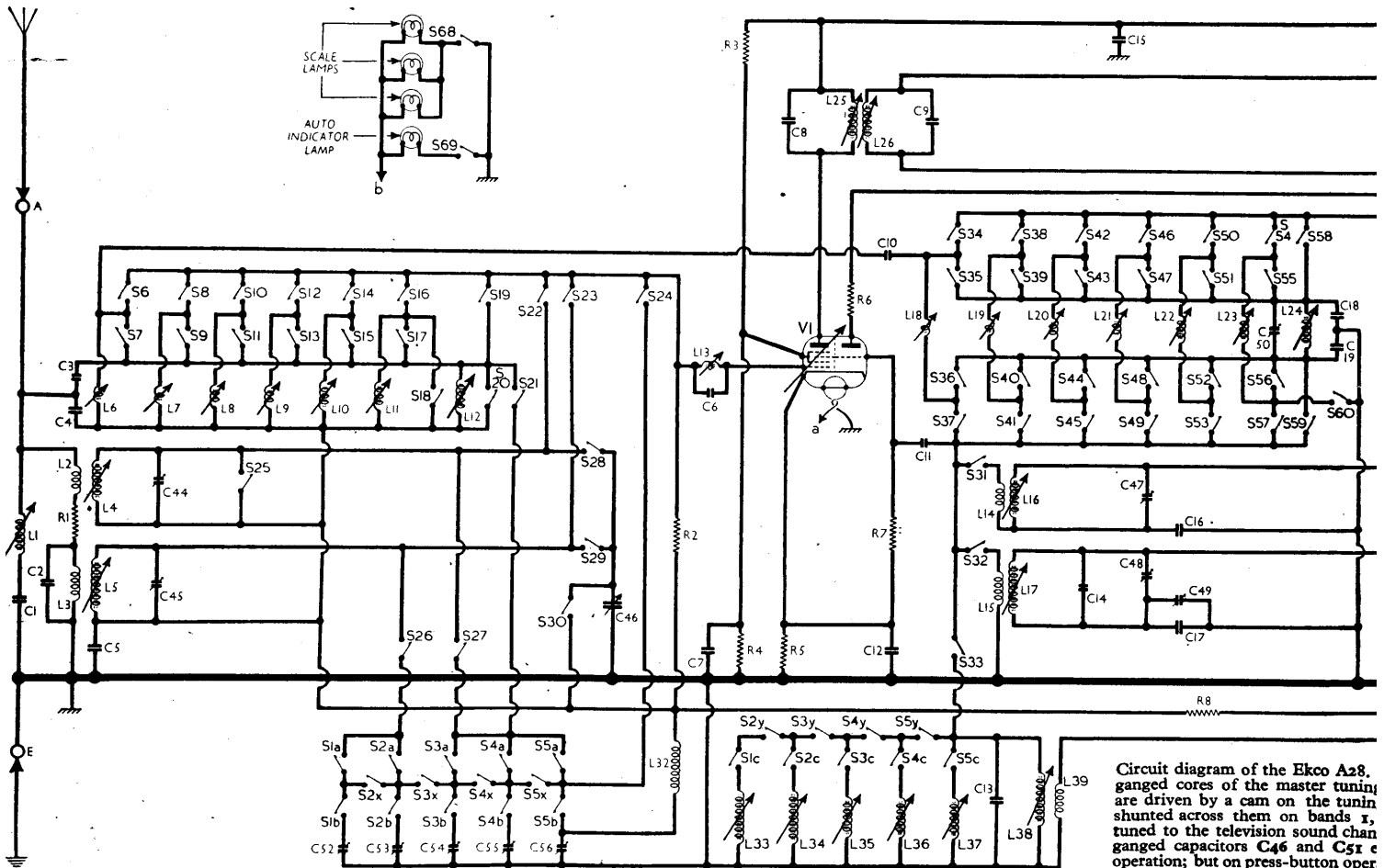
Intermediate frequency 460 kc/s. Diode second detector is part of double diode triode valve (V3, Mullard EBC33), the second diode of which provides A.V.C. voltages.

Resistance capacitance coupling is employed between V3 triode and pentode output valve (V4, Mullard EL33). Voltages developed across the feed-back winding 1, 6, of the output transformer T1, are fed back to V3 triode grid circuit via the manual tone control R34.

H.T. current is supplied by full-wave rectifying valve (V5, Mullard AZ31).

## COMPONENTS AND VALUES

RESISTORS		Values (ohms)	Location
R1	Aerial damping ...	330	L10
R2	V1 hex. C.G. ...	4,700,000	L12
R3	V1 S.G. H.T. poten-	33,000	H7
R4	tial divider ...	33,000	G7
R5	V1 fixed G.B. ...	270	H7
R6	Osc. stabiliser ...	15	G6
R7	V1 osc. C.G. ...	47,000	G7
R8	A.V.C. decoupling ...	100,000	H8
R9	V1 osc. anode H.T. {	47,000	M12
R10	feed ...	47,000	M12
R11	V2 S.G. feed ...	100,000	G9
R12	V2 fixed G.B. ...	330	G8
R13	V2 H.T. decoupl. ...	2,200	H7
R14	T.I. triode anode {	1,500,000	A2
R15	load resistors ...	6,800,000	A2
R16	T.I. C.G. feed ...	3,300,000	H8
R17	I.F. stopper ...	47,000	I8
R18	V3 sig. diode load... {	220,000	I8
R19	Part. tone corrector	220,000	J5
R20	Volume control ...	1,000,000	J5
R21	I.F. stopper ...	1,000,000	C3
R22	A.V.C. decoupling ...	1,500,000	H8
R23	V3 G.B. and A.V.C. delay ...	1,000	I8
R24	V3 anode load ...	47,000	H7
R25	V3 sig. diode load... {	220,000	H9
R26	A.V.C. diode load... {	1,500,000	H9
R27	V4 C.G. ...	220,000	I8
R28	H.T. potential {	10,000	H7
R29	divider ...	68,000	G9
R30	V4 S.G. stopper ...	100	I7
R31	V4 C.G. stopper ...	47,000	I8
R32	V4 G.B. ...	150	I7
R33	V4 anode stopper... {	100	I8
R34	Tone control ...	500,000	E2
R35	Part feed - back {	15,000	J9
R36	potential divider {	47,000	E2
R37		470	J5



Circuit diagram of the Ekco A28. Ganged cores of the master tuning are driven by a cam on the tunin shunted across them on bands 1, tuned to the television sound chan ganged capacitors C46 and C51 e operation; but on press-button oper tuning devices shown benea

CAPACITORS		Values ( $\mu$ F)	Location
C1	I.F. filter tuning ...	0-00015	L12
C2	Aerial L.W. shunt ...	0-00082	L10
C3	Aerial S.W. coup- ling ...	0-000068	L12
C4	V1 hex. C.G. decoup. ... T.S. tuning ...	0-00047	L12
C5	V1 hex. C.G. decoup. ... V1 S.G. decoup. ...	0-05	G7
C6	T.S. tuning ...	0-00002	G8
C7	V1 S.G. decoup. ...	0-1	G7
C8	1st I.F. transformer tuning ...	0-00015	D3
C9	Neutralising ...	0-00001	M12
C10	V1 osc. C.G. ...	0-000047	G6
C11	V1 cath. by-pass ...	0-1	H6
C12	V1 osc. C.G. ...	0-000047	G6
C13	P.B. osc. tuning ...	0-00027	G6
C14	L.W. fixed trim. ...	0-00006	M10
C15	H.T. R.F. by-pass ...	0-1	H7
C16	M.W. tracker ...	0-00056	M10
C17	L.W. fixed track. ...	0-00019	M10
C18	Osc. S.W. fixed tun- ing ...	0-00015	M12
C19	Osc. anode coup. ...	0-0001	M12
C20	V2 C.G. decoup. ...	0-05	H8
C21	V2 S.G. decoup. ...	0-1	G9
C22	V2 H.T. decoup. ...	0-1	G9
C23	2nd I.F. transformer tuning ...	0-0001	D3
C24	V2 cath. by-pass ...	0-00022	D3
C25	V2 cath. by-pass ...	0-1	G9
C26	T.I. C.G. decoup. ...	0-01	A2
C27	I.F. by-passes ...	0-0001	H8
C28	V3 cath. by-pass ...	0-0001	H8
C29	A.V.C. coupling ...	25-0	K7
C30*	A.F. coupling ...	0-000015	H8
C31	A.F. coupling ...	0-02	I7
C32	"Top" boost ...	0-0001	K5
C33	I.F. by-pass ...	0-00005	C3
C34	A.F. coupling ...	0-05	I7
C35	V3 H.T. decoupling ...	4-0	H9
C36*	Tone corrector ...	0-0025	I8
C37	V4 cath. by-pass ...	25-0	K7
C38*	Het. filter tuning ...	0-005	K8
C39	Part variable tonef control ...	0-002	K5
C40	(Continued next col.)	0-1	E2

\* Electrolytic.

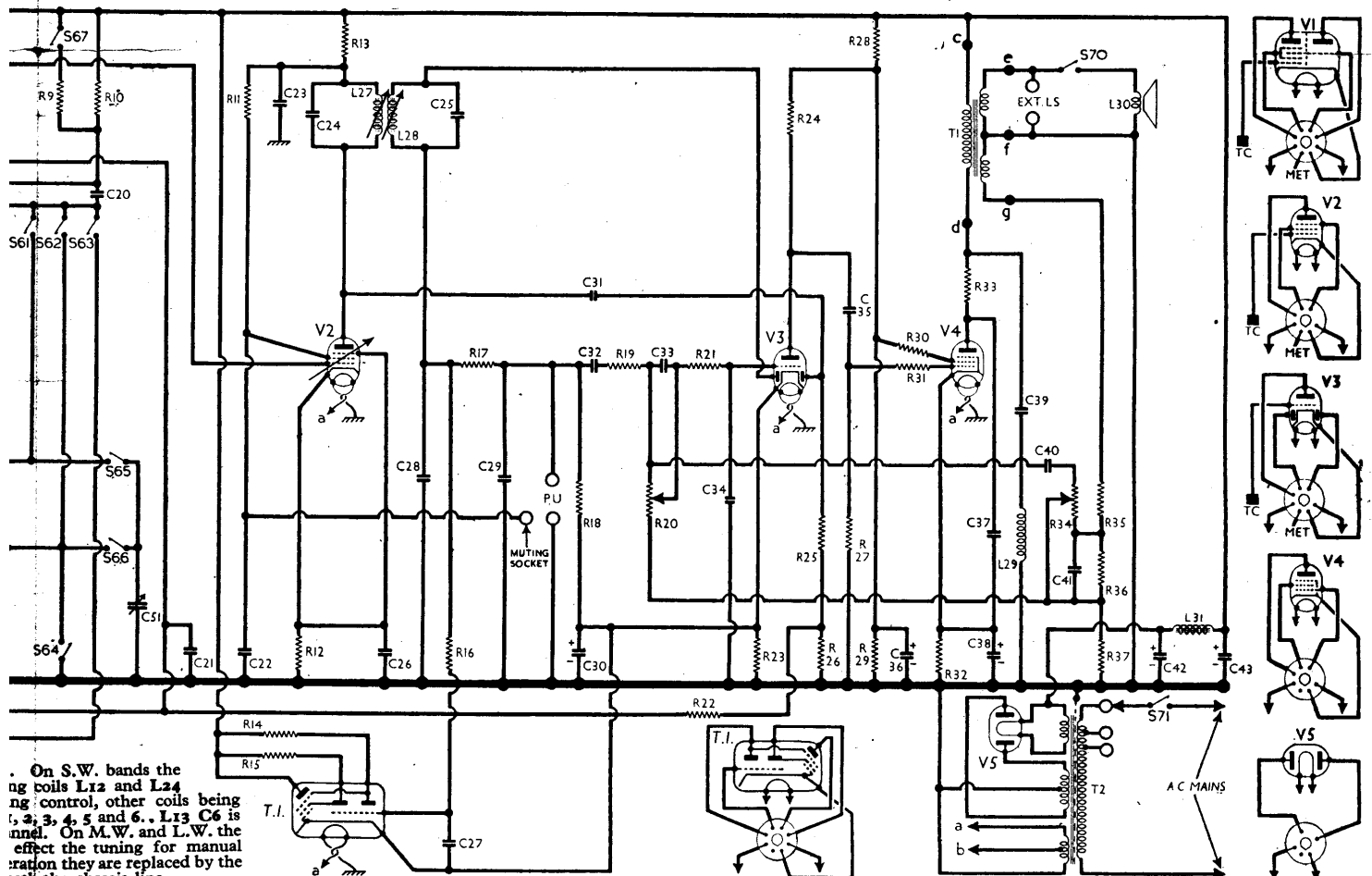
CAPACITORS (continued)		Values ( $\mu$ F)	Location
C42*	H.T. smoothing ...	8-0	A2
C43*		16-0	A2
C44†	Aerial M.W. trim. ...	—	L10
C45†	Aerial L.W. trim. ...	—	L10
C46†	Aerial tuning ...	—	C3
C47†	Osc. M.W. trim. ...	—	M10
C48†	Osc. L.W. trim. ...	—	M10
C49†	Osc. L.W. track. ...	—	L10
C50†	Osc. S.W. trim. ...	—	M10
C51†	Osc. tuning ...	—	C2
C52†	Aerial circuit press- button tuning trimmers ...	0-00055	I5
C53†		0-00027	I5
C54†		0-00055	H5
C55†		0-00027	H5
C56†		0-00013	G5

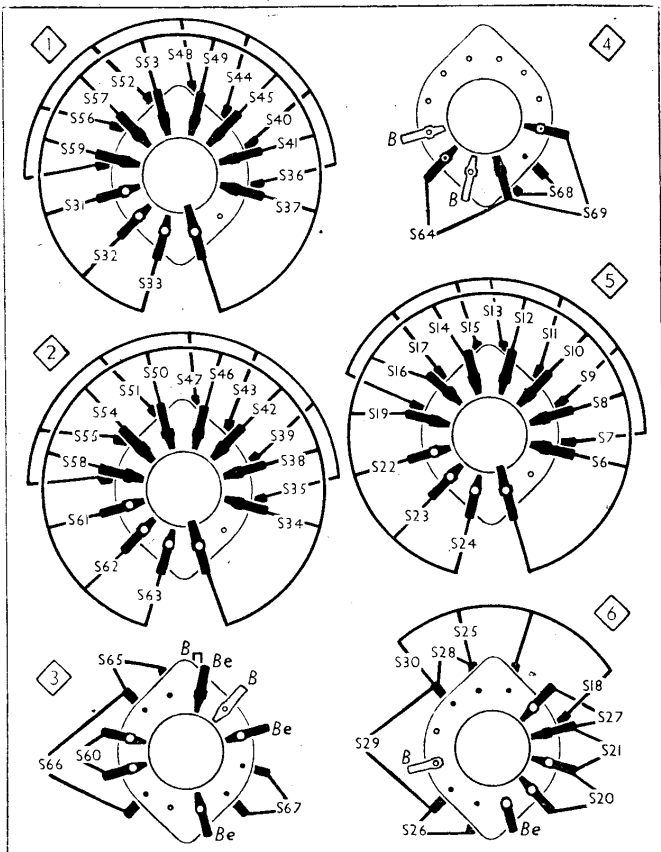
\* Electrolytic. † Variable. ‡ Pre-set.

OTHER COMPONENTS		Approx. Values (ohms)	Location
L1	I.F. filter coil ...	8-0	L12
L2	Aerial coupling ...	9-5	L10
L3	coils ...	32-0	L10
L4	Aerial tuning coils ...	4-5	L10
L5		26-0	L10
L6	Aerial S.W.1 coil ...	Very low	L11
L7	Aerial S.W.2 coil ...	Very low	L11
L8	Aerial S.W.3 coil ...	Very low	L11
L9	Aerial S.W.4 coil ...	Very low	L11
L10	Aerial S.W.5 coil ...	0-1	L11
L11	Aerial S.W.6 coil ...	0-2	L11
L12	Aerial band-spread master coil ...	0-8	D2
L13	T.S. tuning coil ...	Very low	G8
L14	Osc. reaction coils ...	1-0	M10
L15	Osc. tuning coils ...	2-5	M10
L16		2-2	M10
L17		4-5	M10

(Continued next col.)

OTHER COMPONENTS (Continued)		Approx. Values (ohms)	Location
L18	Osc. S.W.1 coil ...	Very low	M11
L19	Osc. S.W.2 coil ...	Very low	M11
L20	Osc. S.W.3 coil ...	Very low	M11
L21	Osc. S.W.4 coil ...	Very low	M11
L22	Osc. S.W.5 coil ...	0-1	M11
L23	Osc. S.W.6 coil ...	0-2	M11
L24	Osc. band-spread master coil ...	0-7	D2
L25	1st I.F. trans. { Pri. Sec. ...	9-0	D3
L26		9-0	D3
L27	2nd I.F. { Pri. trans. { Sec. ...	14-0	D3
L28		7-0	D3
L29	Het. filter coil ...	215-0	K9
L30	Speech coil ...	2-0	—
L31	H.T. choke ...	620-0	J7
L32	Osc. circuit press- button tuning coils ...	16-0	G6
L33		6-5	I6
L34		5-5	I6
L35		3-5	H6
L36	P.B. master osc. { coils ...	3-5	H6
L37		1-8	H6
L38	Output trans. { Pri. Spkr. sec. ...	9-0	G6
L39		3-0	G6
T1	Output trans. { Pri. Spkr. sec. ...	334-0	J9
T2		0-3	J9
T3		42-0	J9
T4		43-0	B4
T5	Mains trans. { Heat sec. Rect. heat. sec. ...	Very low	B4
T6		0-1	B4
T7	Mains trans. { H.T. sec. total ...	580-0	B4
T8		—	—
S1a, b to S5a, b, x	Aerial press-button switches ...	—	—
S1c, to S5c, y	Oscillator press- button switches ...	—	—
S6-S69	Waveband switches ...	—	—
S70	Int. speaker switch ...	—	19
S71	Mains switch, ganged R20 ...	—	K6





## 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. 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	280	1.7	94	1.9
V2 EF39	91	3.2	94	1.5
V3 EBC33	261	4.1	190	2.9
V4 EL33	89	1.7	—	—
V5 AZ31	267	26.0	—	—
T.I. EM34	303†	0.04 (Pin 3)	—	—
	32	0.18 (Pin 6)	—	—
	280	1.5 (Pin 5)	—	—

† Each anode, A.C.

Above: Diagrams of the six waveband switch units, viewed over the A and E sockets. Right: the associated switch table, in which band 1 is represented by S.W.1, etc. M.W. is band 8, and L.W. band 9.

Switch	S.W.1	S.W.2	S.W.3	S.W.4	S.W.5	S.W.6	S.W.7	M.W.	L.W.	Aut
S6	o	—	—	—	—	—	—	—	—	—
S7	o	—	—	—	—	—	—	—	—	—
S8	o	—	—	—	—	—	—	—	—	—
S9	o	—	—	—	—	—	—	—	—	—
S10	—	o	—	—	—	—	—	—	—	—
S11	—	o	—	—	—	—	—	—	—	—
S12	—	o	—	—	—	—	—	—	—	—
S13	—	o	—	—	—	—	—	—	—	—
S14	—	o	—	—	—	—	—	—	—	—
S15	—	o	—	—	—	—	—	—	—	—
S16	—	o	—	—	—	—	—	—	—	—
S17	—	o	—	—	—	—	—	—	—	—
S18	—	o	—	—	—	—	—	—	—	—
S19	—	o	—	—	—	—	—	—	—	—
S20	—	o	—	—	—	—	—	—	—	—
S21	—	o	—	—	—	—	—	—	—	—
S22	—	o	—	—	—	—	—	—	—	—
S23	—	o	—	—	—	—	—	—	—	—
S24	—	o	—	—	—	—	—	—	—	—
S25	—	o	—	—	—	—	—	—	—	—
S26	—	o	—	—	—	—	—	—	—	—
S27	—	o	—	—	—	—	—	—	—	—
S28	—	o	—	—	—	—	—	—	—	—
S29	—	o	—	—	—	—	—	—	—	—
S30	—	o	—	—	—	—	—	—	—	—
S31	—	o	—	—	—	—	—	—	—	—
S32	—	o	—	—	—	—	—	—	—	—
S33	—	o	—	—	—	—	—	—	—	—
S34	—	o	—	—	—	—	—	—	—	—
S35	—	o	—	—	—	—	—	—	—	—
S36	—	o	—	—	—	—	—	—	—	—
S37	—	o	—	—	—	—	—	—	—	—
S38	—	o	—	—	—	—	—	—	—	—
S39	—	o	—	—	—	—	—	—	—	—
S40	—	o	—	—	—	—	—	—	—	—
S41	—	o	—	—	—	—	—	—	—	—
S42	—	o	—	—	—	—	—	—	—	—
S43	—	o	—	—	—	—	—	—	—	—
S44	—	o	—	—	—	—	—	—	—	—
S45	—	o	—	—	—	—	—	—	—	—
S46	—	o	—	—	—	—	—	—	—	—
S47	—	o	—	—	—	—	—	—	—	—
S48	—	o	—	—	—	—	—	—	—	—
S49	—	o	—	—	—	—	—	—	—	—
S50	—	o	—	—	—	—	—	—	—	—
S51	—	o	—	—	—	—	—	—	—	—
S52	—	o	—	—	—	—	—	—	—	—
S53	—	o	—	—	—	—	—	—	—	—
S54	—	o	—	—	—	—	—	—	—	—
S55	—	o	—	—	—	—	—	—	—	—
S56	—	o	—	—	—	—	—	—	—	—
S57	—	o	—	—	—	—	—	—	—	—
S58	—	o	—	—	—	—	—	—	—	—
S59	—	o	—	—	—	—	—	—	—	—
S60	—	o	—	—	—	—	—	—	—	—
S61	—	o	—	—	—	—	—	—	—	—
S62	—	o	—	—	—	—	—	—	—	—
S63	—	o	—	—	—	—	—	—	—	—
S64	—	o	—	—	—	—	—	—	—	—
S65	—	o	—	—	—	—	—	—	—	—
S66	—	o	—	—	—	—	—	—	—	—
S67	—	o	—	—	—	—	—	—	—	—
S68	—	o	—	—	—	—	—	—	—	—
S69	—	o	—	—	—	—	—	—	—	—

## DISMANTLING THE SET

**Removing Chassis.**—Remove the four control knobs (grub screws and felt washers); from the rear of cabinet remove the two round-head wood screws securing the heat deflector plate close to T2;

slide out the T1 valve from its retaining clamp;

remove the four 2 B.A. cheese-head screws securing the chassis to the base of the cabinet, and slide out the chassis to the extent of the speaker leads.

**Removing Speaker.**—Loosen the nuts of the four speaker-retaining clamps, and lift out speaker.

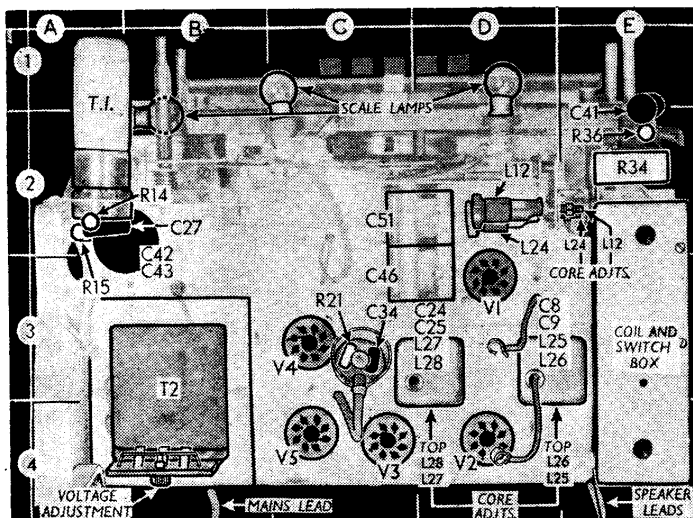
When replacing, the connecting panel should be at the top.

## GENERAL NOTES

**Switches.**—The first group of switches S1-S5 comprises all the switches in the press-button unit, coded with suffixes a, b, x, etc. This was fully explained in *Service Sheet 786* on the Ekco A21. The press-buttons cannot be operated unless the main waveband control is at the "auto" position (fully clockwise), as a sliding link holds the latch-bar at the "release".

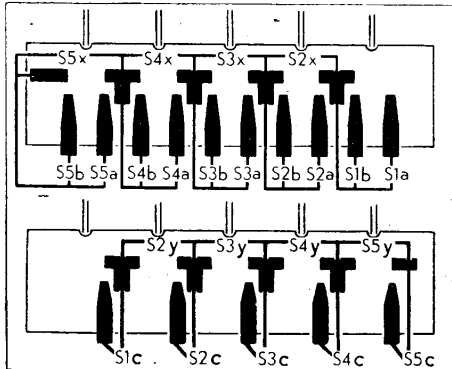
The unit may be freed if the left-hand button is pulled off its plunger (heated by a soldering iron) and the fixing screws are removed, when it may be turned over for inspection. When replacing, it is important to ensure that the latch-bar release link engages the edge of the cam on the waveband switch spindle. Diagrams are shown in col. 4.

The second group consists of S6-S69. These are the waveband switches, in a ten-position rotary assembly containing six units, located at the bottom of the coil and switch box in whose illustration (col. 4) the units are identified by numbers in diamonds.



Plan view of the chassis. The ganged inductive tuner L12, L24 is driven by a cam on the spindle of the capacitive gang C46, C51. R21, C34 are in the top cap connector of V3. The top of the coil unit is seen on the right; an interior view appears in col. 4.

The units are shown in detail in the diagrams in col. 1, and the associated table is in cols. 2 and 3 beside them. In the table, a dash indicates open, and C closed. In the tenth



Diagrams of both sides of the P.B. switch unit. Above, as seen in our under-chassis view; below, as seen when turned over on its leads.

(fully clockwise) position, the press-button system is brought into circuit.

The remaining two switches are the speaker muting switch S70 and the mains switch S71, the latter being ganged with R20.

**Coils.**—The positions of all components are indicated by location references in the tables. All the press-button coils are grouped round the P.B. unit. With the exception of the television sound channel coil L13 and the I.F. transformers, all remaining tuning coils are in the coil and switch box, which is shown in the separate illustration below, viewed from the end of a chassis standing upright.

**External Speaker.**—Two sockets are provided at the rear of the chassis for a low impedance (3-4Ω) external speaker. Switch S70 is provided to units the internal speaker if desired.

**Muting Socket.**—This is provided for muting radio when using a gramophone pick-up. Muting is effected by connecting this socket to chassis.

**Scale and Indicator Lamps.**—These are four Osram lamps, with large spherical bulbs and M.E.S. bases, rated at 6.2 V, 0.3 A. The auto indicator lamp has a frosted bulb, but the others are clear.

