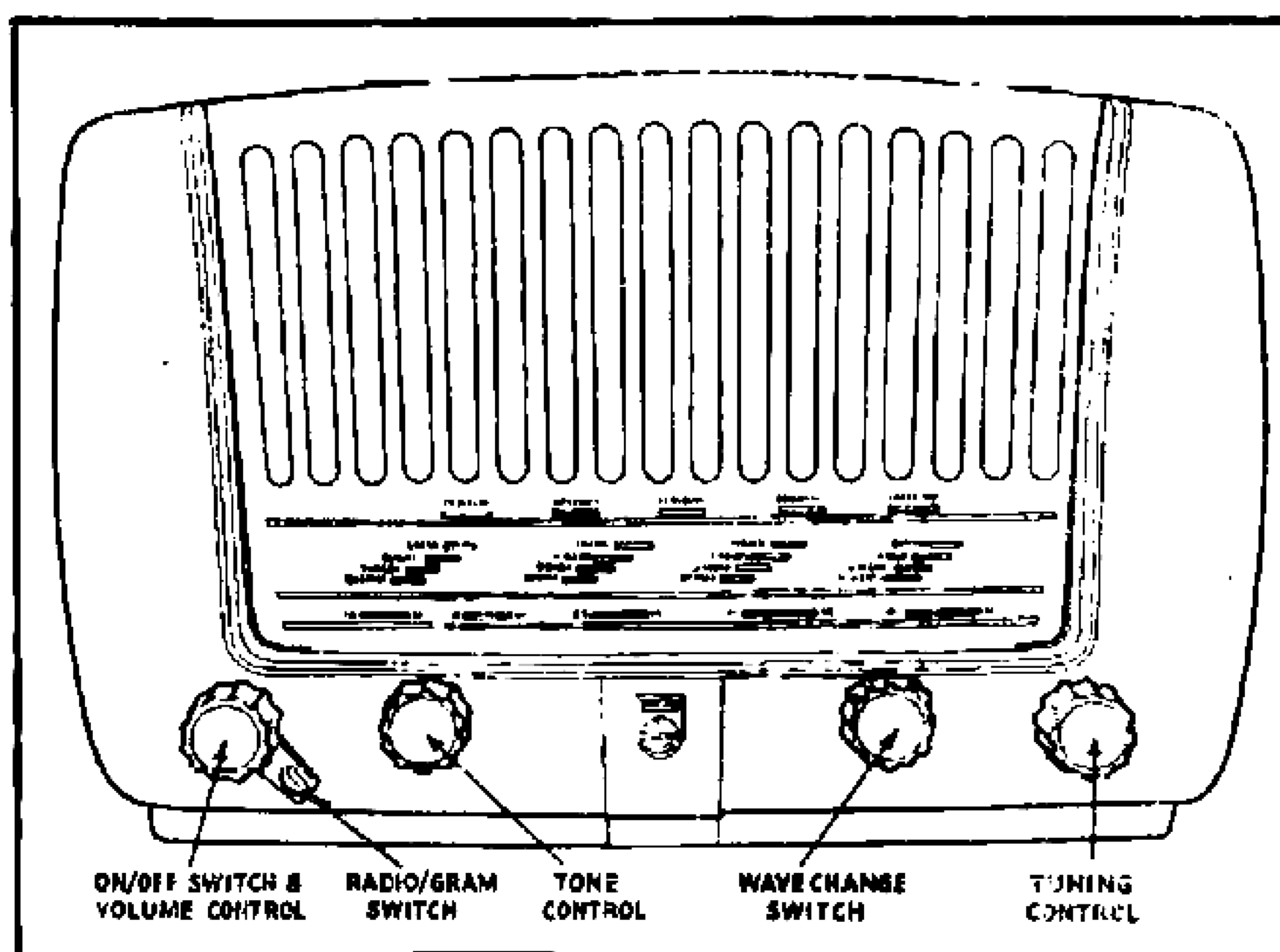


SERVICE MANUAL FOR PHILIPS RECEIVER TYPE 310A



Front view of Receiver

VALVE COMBINATION

V1 ECH42.
V2 EAF42.
V3 EBC41.
V4 EL41.
V5 EZ40.

SCALE LAMP

Type 8028D-00.

WAVEBAND RANGES

S.W. 18.2 to 5.92 Mc/s.
M.W. 1622 to 517 Kc/s.
L.W. 285 to 152 Kc/s.

INTERMEDIATE FREQUENCY

~~450 Kc/s.~~

TRIMMING FREQUENCIES

S.W. 6.2 and 20.1 Mc/s.
M.W. 547 and 1630 Kc/s.
L.W. 159 Kc/s.

EXTENSION SPEAKER

5 to 7 ohms.

MAINS CONSUMPTION

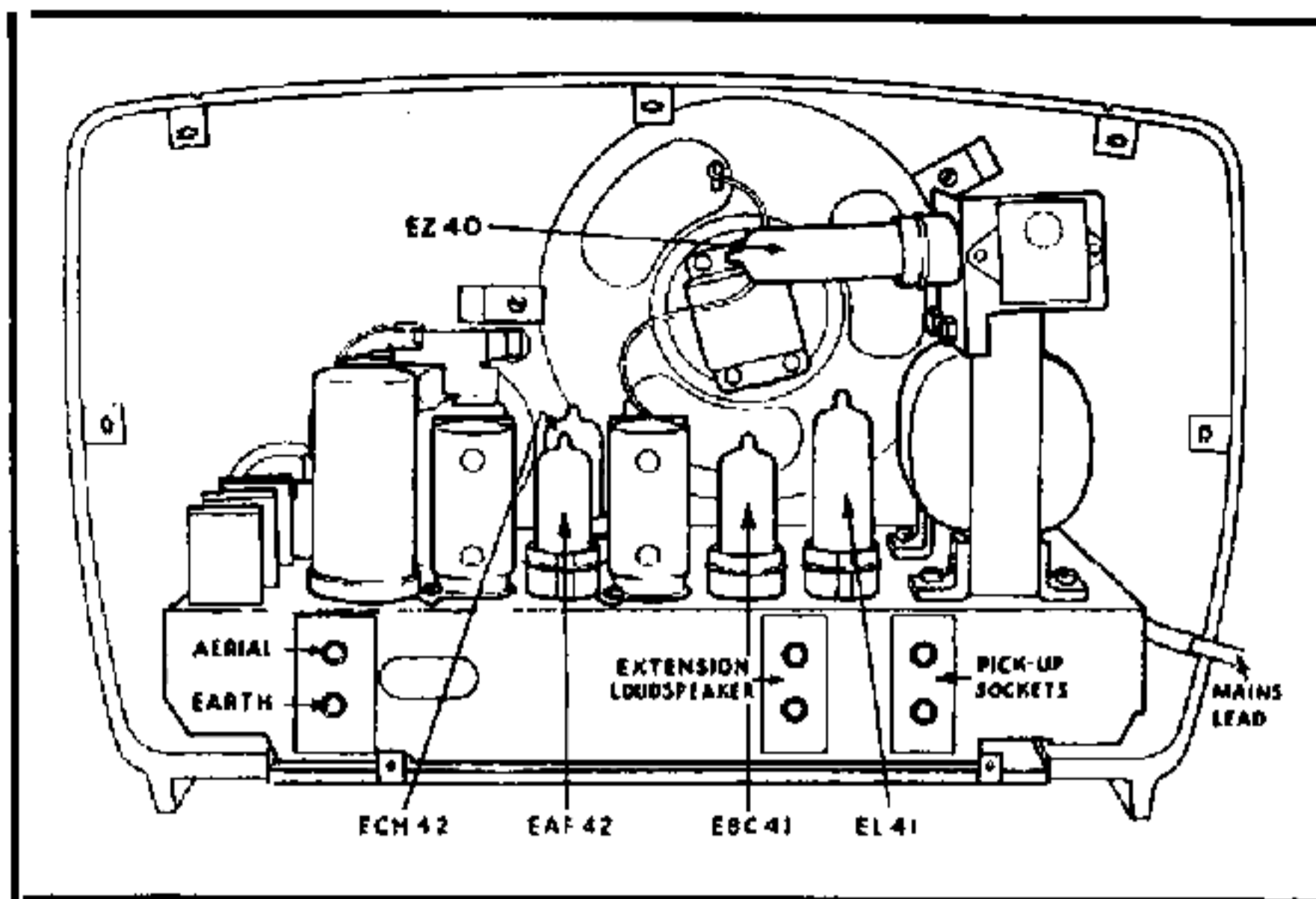
With 220 V. 50 c/s applied to the 220 V. tapping, consumption = 210 mA.
With 245 V. 50 c/s applied to the 245 V. tapping, consumption = 190 mA.

VOLTAGE RANGE

100—250 V. 50—100 c/s.

CABINET DIMENSIONS

Height 10". Width 14½". Depth 8".



Back view of Receiver

SCALE REMOVAL.

Pull the top of the scale away from the cabinet about 1" and lift upwards. When replacing, make sure that the two top projections are fully seated into the bushes in the cabinet.

REMOVING CHASSIS

Remove backplate (7 screws).

Remove baseplate (4 screws).

Remove knobs (pull off).

Remove chassis fixing bolts.

Remove the scale (see above).

Gently push the pointer through the slot in the cabinet, and withdraw the chassis.

When replacing, place the chassis partly in the cabinet, and gently push the pointer through the slot in the cabinet front.

POINTER DRIVE REPLACEMENT (Fig. 1)

Make up the cables to the dimensions shown. Turn gang to maximum capacitance. Fit the end of the shorter cable into the slot at 4 o'clock and wind on anti-clockwise, winding from front to back on the drum, as indicated. Pass the cable under pulley A, hook the end on to the spring and the spring on to any convenient anchorage point. Fit the end of the longer cable into the slot at 12 o'clock and wind clockwise as indicated, winding from back to front on the drum. Pass the cable round pulley B, and hook the end on to the spring.

CAPACITOR DRIVE REPLACEMENT (Fig. 2)

Make up the cord to the dimensions indicated on Fig. 2. Turn gang to minimum. Set the spring on the pointer cable to the right-hand end of its travel (viewed from the front). The slot in the small diameter section of the moulded drum will then be at 12 o'clock. Insert the collar on the cord into the slot in the drum, leading with the longer end of the cord.

Take the shorter end and pass it $\frac{1}{2}$ turn clockwise round the drum and down to the drive spindle. Wind $2\frac{3}{4}$ turns anti-clockwise round the spindle, winding from front to back on the spindle. Lead the cord up through the right-hand cable guide, and place the cable sheath in position. Lead the cord $\frac{3}{4}$ turn anti-clockwise round the capacitor drum, hook it on to the spring and hook the spring on to its anchorage point.

Now take the longer end of the cord, and wind on $2\frac{1}{2}$ turns anti-clockwise, winding from front to back of the drum. Lead the cord down to the tuning spindle, and wind on $2\frac{1}{2}$ turns clockwise, winding from back to front on the spindle. Lead the cord up through the left-hand guide, and fit the cable sheath in position. Hook the end of the cord on to the spring, and then pass the loop of the cord over the pulley.

The last operation is made easier if at the same time the spring is extended.

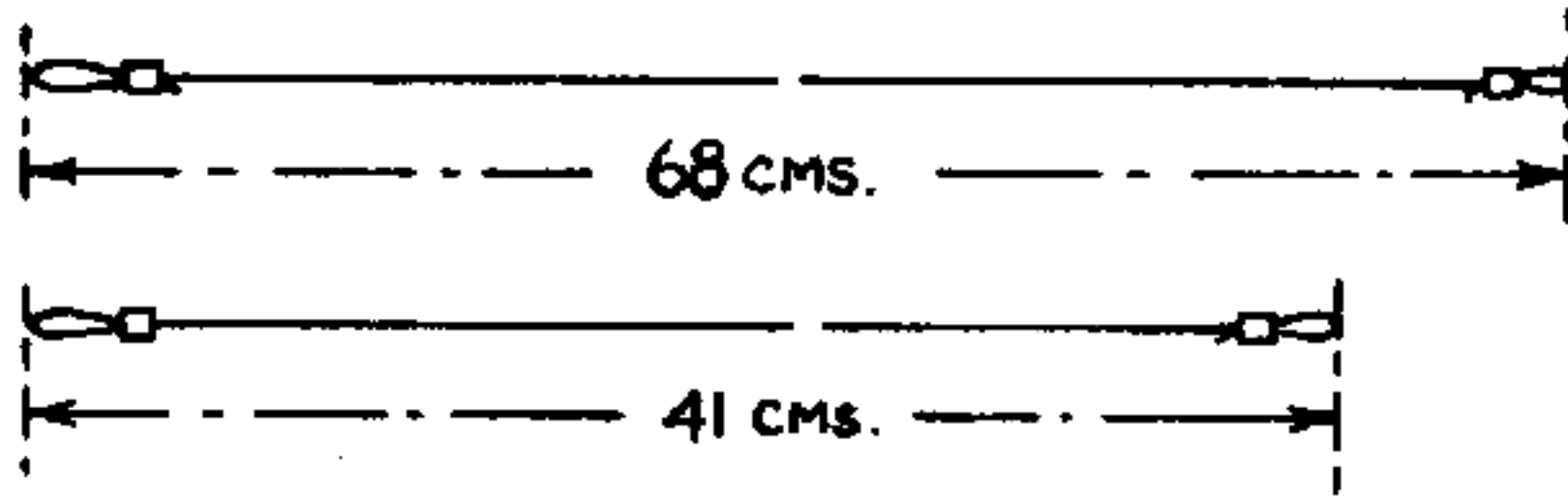
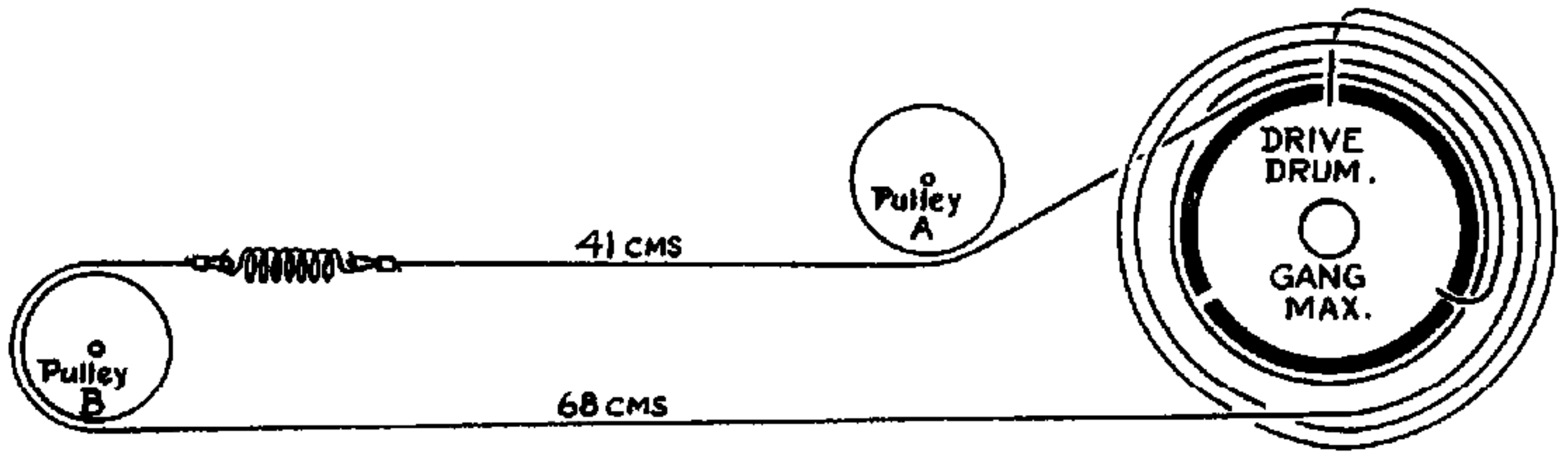


FIG. 1

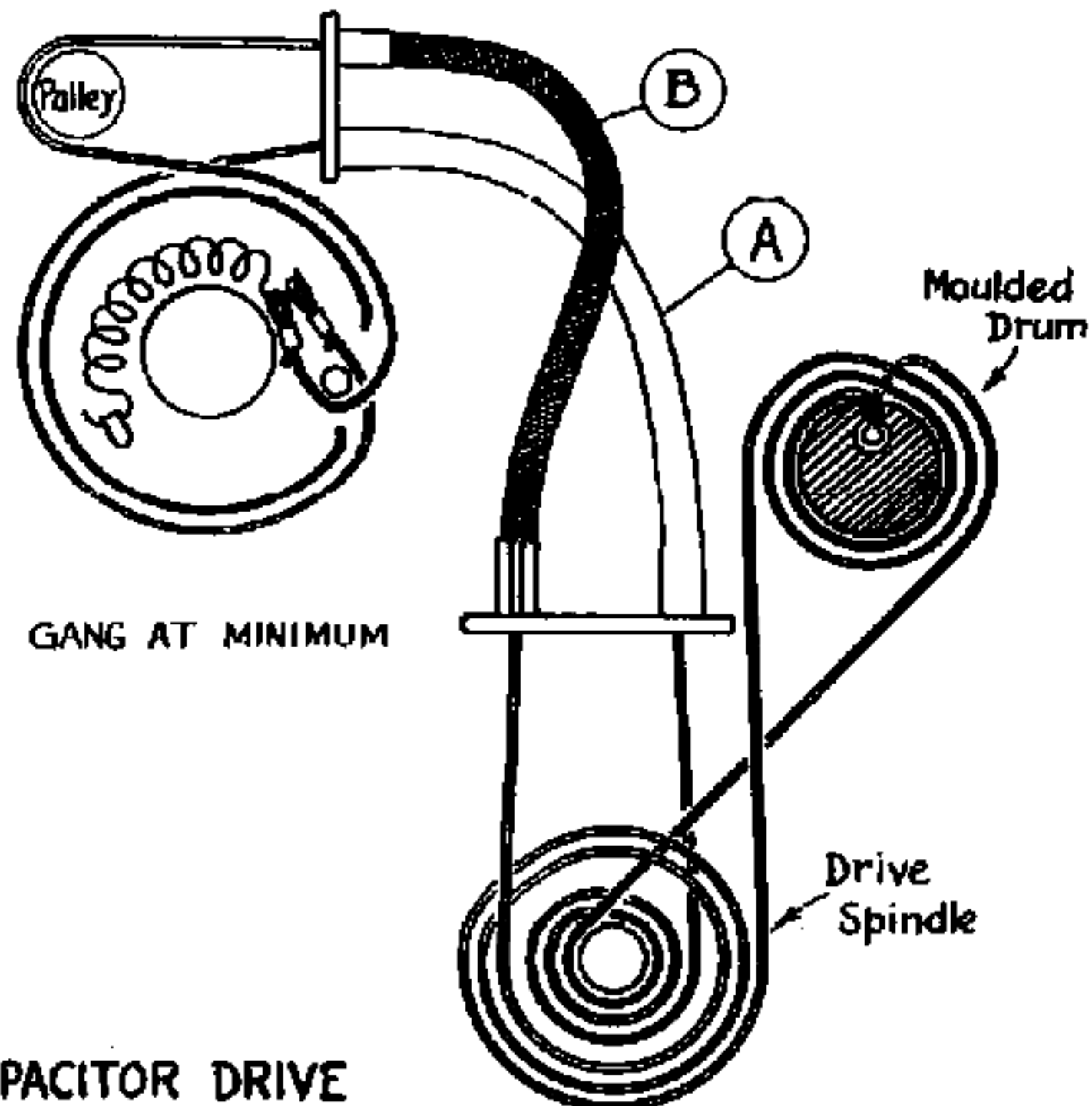
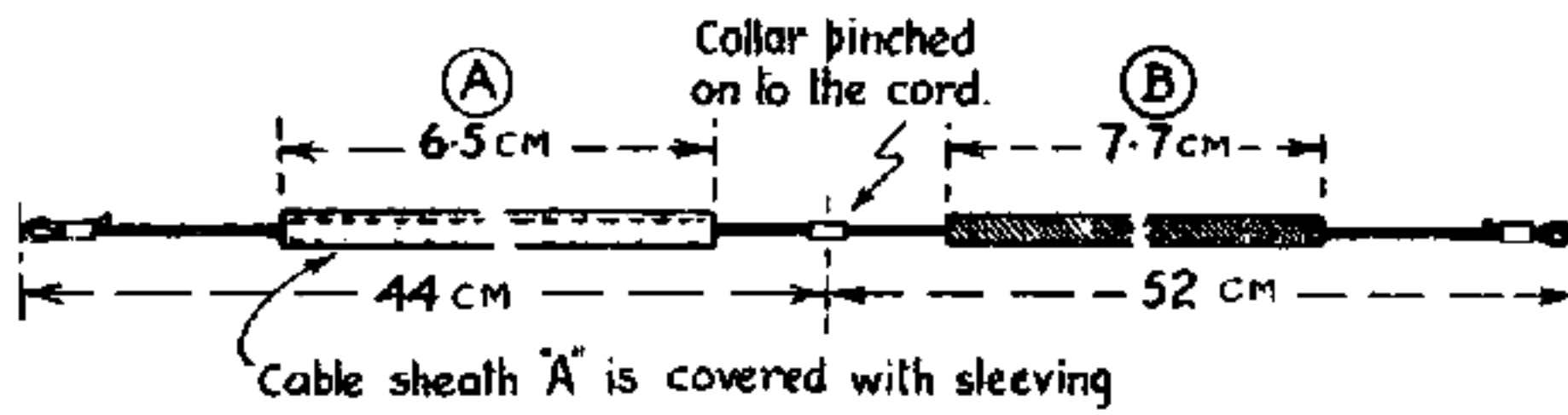


FIG. 2

PILOT LAMP REPLACEMENT

Remove the chassis baseplate. The lamp is then accessible. When replacing, check that the lamp is in the position to give best scale illumination. The fixing bracket has a slotted hole to allow for this adjustment.

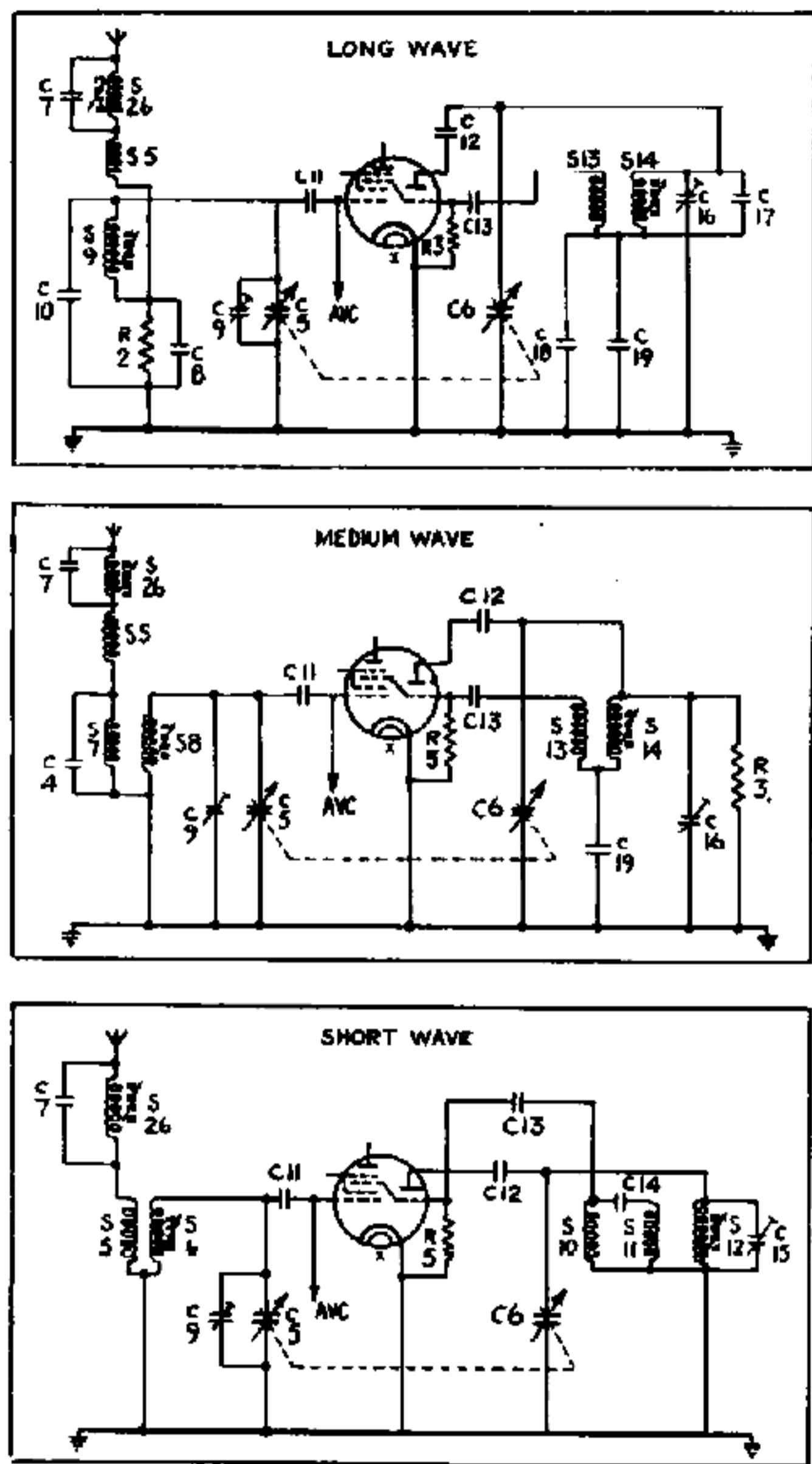


FIG. 3

CIRCUIT NOTES

The circuit in general follows conventional superhetrodyne practice. On L.W. the aerial coil consists of S5 and S9 in series, connected across C10 and the tuning capacitor C5. The capacitor C17 is connected in the oscillator circuit on L.W. The individual L.W., M.W. and S.W., R.F. circuits shown in fig. 3.

The diode in V2 acts as detector, and A.V.C. diode, A.V.C. being fed to the grids of V1 and V2 from the junction of R9/C26.

V3 acts as a triode L.F. amplifier, both diode being connected to cathode.

Variable feedback is applied to V3 and V4 from the secondary of the output transformer via R16. Decoupling capacitors are not used on the cathodes of V3 or V4, and this, together with the inclusion of R22, causes the feedback to be positive on V3 and negative on V4. The value of R22 and R15 are therefore critical.

TRIMMING

(a) I.F. Circuits

Switch to M.W., gram switch set to "radio," volume control to maximum, gang to minimum.

Unscrew the dust iron cores of all the I.F. transformers, apply a signal of 470 Kc/s to g1 V1 via a capacitor of 47,000 pF, and trim for maximum output in the following order:—

- 4th I.F. coil S21/S22 (Bottom).
- 3rd I.F. coil S19/S20 (Top).
- 1st I.F. coil S15/S16 (Bottom).
- 2nd I.F. coil S17/S18 (Top).

(b) I.F. Filter

Apply a signal at the I.F. resonant frequency to the aerial socket. Trim S26 to minimum/output, using the first minimum from the position of the screwed out core.

(c) R.F. Circuit (see table below)

Set gram switch to "radio," turn volume control to maximum. Trim in the order M.W., L.W., S.W. The H.F. trimming point is with the gang at minimum capacitance, at which point the scale pointer should line up with the letter "M" at the left-hand end of each wavechange scale.

Waverange	Set pointer to	Frequency	Trim to Maximum Output
M.W.	550m. "M"	545.5 Kc/s 1630 Kc/c	S14, S8 C16, C9 } Repeat as required
L.W.	1900m.	157.8 Kc/s (approx.)	Swing generator for maximum output, trim S9
S.W.	50m. "M"	6.0 Mc/s 20.1 Mc/s	S12, S6 C15 } Repeat as required

The above frequencies are accurate and those on page 1 are incorrect.

SPARE PARTS LIST—TYPE 310A

IMPORTANT. When ordering spare parts, the type number of the receiver and the code number of the part, as given in this manual, **MUST** be quoted to enable the order to be correctly executed. When claiming free replacement under Guarantee the defective part should be returned and the type and serial number of the receiver, also the date of sale, should be quoted.

CABINET ASSEMBLY

CABINET less fittings (moulded)	MK.95357/BR.GP1
Philips emblem	23.654.14
Felt strip behind scale	A3.614.76
Rubber bushes for securing scale	A3.642.24
Spire clips for back plate	MK.076.11
Metallised Paper (700×40mm.)	06.595.13

CONTROL KNOBS—Volume, Tuning and Tone

Control knob—Waveband	23.952.88/BR.GP1
Control lever—Gram switch	A3.389.65
Felt ring under above	A3.562.16
Felt ring for V/C knob	A3.562.17
Felt rings for other knobs	A3.561.58
Spring clips for knobs	28.753.01

BACKPLATE ASSEMBLY

Rec. head fixing screws (No. 7 × $\frac{3}{8}$ ")	G7.969.43
Valve position label	PG.001.82
Limited licence plate	PG.001.85

METALLISED BASEPLATE complete...**SCALE ASSEMBLY**

Station scale (plastic)	MK.703.47
Support springs for above	A3.649.40
Paxolin light screen	A3.386.71

POINTER ASSEMBLY

Felt ring for above	A3.575.87
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LOUDSPEAKER complete

Speaker holding clamps	MK.860.94
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CHASSIS ASSEMBLY**POINTER DRIVE ASSEMBLY**

Bracket with pulley—200m. end	MK.826.18
Bracket with pulley—550m. end	MK.826.26
Pulley only	23.681.81
Pins for above	A3.599.26
Fixing bush for pulley	07.068.23
Drive cable only	33.403.04
Cable loop grips	MK.116.01
Tension spring	A3.646.14

TUNING UNIT

Gang capacitor with large drum	49.001.42
Small inner drum for above	A3.327.12
Circlip for above	A3.563.36
Bracket with brass pulley	MK.825.92
Brass pulley only	A3.322.40
Pin for above	A3.599.26
Fixing bush for pulley	07.068.23
Drive cord only	06.606.29
Cord loop grips	MK.908.99
Cord tension spring	A3.646.26
Outer casing for drive cord (A Fig. 2)	08.010.54/65mm.
Outer casing for drive cord (B Fig. 2)	08.010.54/78mm.
Ferrules for above	A3.303.63
Moulded drum	P4.095.01
Bracket with spindle for above	A3.343.32
Locking ring for drum	A1.756.55
Tuning spindle	MK.002.97
Bearing bracket for above...	A3.414.38
Presspahn washer for above	07.027.05
Locking ring for spindle	A1.756.55

WAVEBAND SWITCH ASSEMBLY

Switch section No. 1	A3.201.70
Switch section No. 2	A3.201.69
Retaining bracket for above	A3.191.93
Flat spindle	A3.194.33

WAVEBAND SPINDLE ASSEMBLY...

Bearing bush for above	28.265.35
Locking ring for above	A1.756.56
Spring washer for above	07.043.07
Spacing ring for stop plate	A3.208.23
Steel ball $\frac{1}{32}$ "	89.205.05

PILOT LAMP HOLDER

Spring for above	28.730.43
Bracket for lampholder	A3.455.30

TONE CONTROL

Control spindle	49.470.45
Bearing bracket for above...	MK.002.94

VOLUME CONTROL & SWITCH

Volume control only	49.500.34
Mains switch	MK.810.07
Switch mounting screws	08.529.38
Insulator between switch and control	07.800.10
Control spindle	28.315.23
Distance pieces for V/c	A3.431.40
Control spindle	07.005.31
Distance pieces for V/c	MK.003.02
Screws for above (3 × 30mm.)	MK.116.25
Bearing plate for spindle	07.803.30
	A3.615.12

SPARE PARTS LIST—TYPE 310A (Contd.)

GRAM SWITCH	A3.402.44	WASHERS	
Distance pieces for above	07.005.22	3mm. ... 07.035.30	4mm. ... 07.014.40
Metal operating sleeve	A3.674.02		
Circlip for above	A3.562.12	NUTS	
		3mm. ... 07.104.30	4mm. ... 07.014.40
COMPONENT RACK FOR MOUNTING RESISTORS, etc.	MK.888.73		
MISCELLANEOUS		VALVES AND PILOT LAMPS	
Voltage adjustment plate	A3.228.39	V1 Valve	ECH42
Mounting bracket for above	A3.455.31	V2 Valve	EAF42
Voltage adjustment disc	A3.228.43	V3 Valve	EBC41
Cover plate for above	A3.438.72	V4 Valve	EL41
Socket plate—Aerial/Earth	A3.381.10	V5 Valve	EZ40
Socket plate—Extension speaker	A1.340.42	L1 Pilot Lamp	00.080.28D-00
Socket plate—Pick-up	A1.340.92		
Single-pin plugs	08.281.72	FUSE	
Valve holders	49.232.02	Z1	08.100.99
Coil fixing clips	28.084.83		
Mounting bracket for trimmers C15/C16... ..	MK.062.44	TRANSFORMERS AND COILS	
Mounting bracket for trimmer C9	MK.062.43	S1/2 & S4 Mains transformer	MK.513.56
Mains lead only	K3.976.78	S5-8 Aerial coil S.W. & M.W.	MK.564.26
Fixing clip for above	A3.469.42	S10.14 Oscillator coil	MK.564.25
Chassis fixing bolts (4 × 20mm.)	07.804.20	S9/S26 L.W. Aerial & I.F. Filter	MK.564.27
Rubber bushes for chassis	A3.327.14	S15-18 1st I.F. coil	MK.564.56
Distance pieces for above	07.007.46	S19-22 2nd I.F. coil	MK.564.56
Plate washers for above	07.025.14	S23/24 & S27 Speaker transformer	A3.152.18
Spring washers for above	07.041.40	S25 Loudspeaker	MK.860.94
Type plate	A1.872.23		
Rivet caps for above	07.067.06	CORES for S6, S12, S14	23.643.06
"A6" licence plate	MK.699.15	Core for S8	A3.367.33
GENERAL (Screws, Nuts, etc.)		Cores for S9/S26	A3.367.32
CHEESEHEAD SCREWS		Cores for I.F. coils	23.644.67
3 × 5mm. ... 07.803.05	4 × 6mm. ... 07.804.06		
3 × 6mm. ... 07.803.06	4 × 8mm. ... 07.804.08	WAX for air capacity trimmers	GBX.008.13/01
3 × 8mm. ... 07.803.08	4 × 10mm. ... 07.804.10	Wax for I.F. coils ... ..	... GBX.009.47
3 × 10mm. ... 07.803.10	4 × 20mm. ... 07.804.20		

SPARE PARTS LIST—TYPE 310A (Contd.)

CAPACITORS

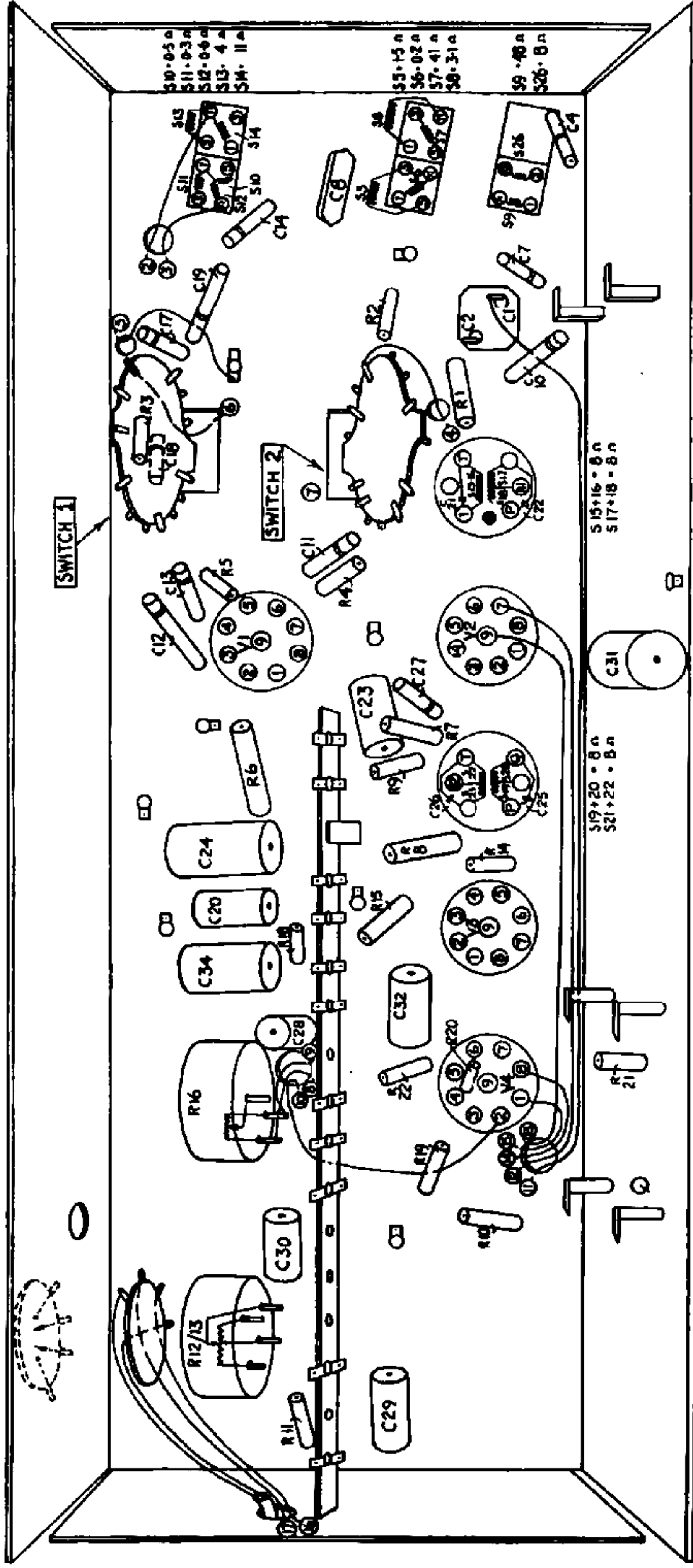
					Working Voltage	Permitted Tolerance	
C1/2	Electrolytic	...	...	50 + 50	uF	350V	MK.182.35/50 + 50
C4	Ceramic	...	...	39	pF		48.406.10/39E
C5/6	Gang	...	...	11-500	pF		49.001.42
C7	Ceramic	...	...	270	pF		48.406.05/270E
C8	Mica	...	...	1,780	pF		MK.193.02/1K78
C9	Trimmer	...	...	3-30	pF		28.212.36
C10	Ceramic	...	...	72	pF		48.406.02/72E
C11	Ceramic	...	...	220	pF		48.406.10/220E
C12	Ceramic	...	...	470	pF		48.406.10/470E
C13	Ceramic	...	...	56	pF		48.406.10/56E
C14	Ceramic	...	...	68	pF		48.406.02/68E
C15	Trimmer	...	...	3-30	pF		28.212.36
C16	Trimmer	...	...	3-30	pF		28.212.36
C17	Ceramic	...	...	370	pF		48.406.01/370E
C18	Ceramic	...	...	47	pF		48.406.02/47E
C19	Ceramic	...	...	415	pF		48.406.01/415E
C20	Paper	...	...	1,800	pF	400V	48.751.10/1K8
C21		...	...	115	pF		In 1st I.F. coil
C22		...	...	115	pF		
C23	Paper	...	...	47,000	pF	125V	48.750.10/47K
C24	Paper	...	...	0.1	uF	400V	48.751.10/100K
C25		...	...	115	pF		In 2nd I.F. coil
C26		...	...	115	pF		
C27	Ceramic	...	...	82	pF		48.406.10/82E
C28	Paper	...	...	12,000	pF	125V	48.750.10/12K
C29	Paper	...	...	15,000	pF	125V	48.750.10/15K
C30	Paper	...	...	8,200	pF	125V	48.750.10/8K2
C31	Paper	...	...	2,700	pF	400V	48.751.10/2K7
C32	Paper	...	...	3,300	pF	400V	48.751.10/3K3
C33	Paper	...	...	6,800	pF	1,000V	48.758.20/6K8
C34	Paper	...	...	0.1	uF	400V	48.751.10/100K

RESISTORS

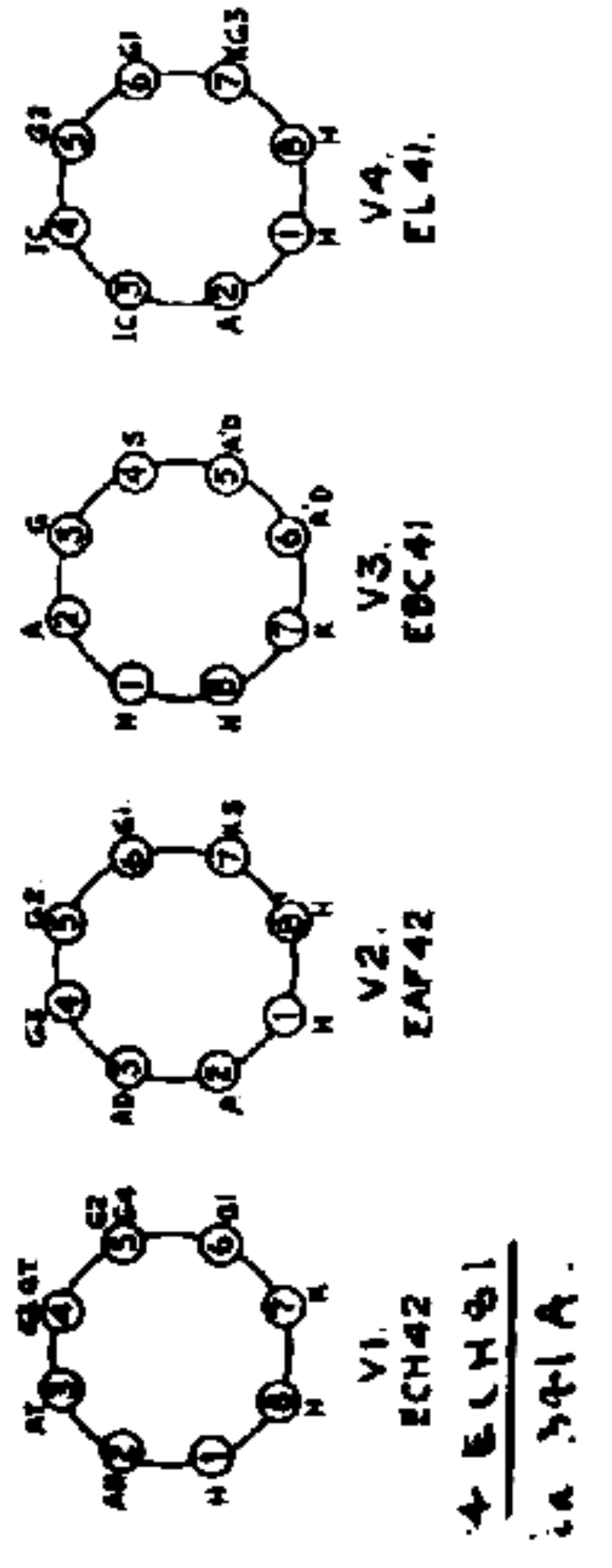
N.B.—Wattage is based upon an ambient temperature of 70° C.

					Wattage	Permitted Tolerance	
R1		...	...	1,200	Ohm	1 watt	48.427.10/1K2
R2		...	...	12,000	Ohm	$\frac{1}{2}$ watt	48.426.10/12K
R3		...	...	8,200	Ohm	$\frac{1}{2}$ watt	48.426.10/8K2
R4		...	...	0.82M	Ohm	$\frac{1}{2}$ watt	48.426.10/820K
R5		...	...	33,000	Ohm	$\frac{1}{2}$ watt	48.426.10/33K
R6		...	...	33,000	Ohm	1 watt	48.427.10/33K
R7		...	...	1.5M	Ohm	$\frac{1}{2}$ watt	48.426.10/1M5
R8		...	...	56,000	Ohm	1 watt	48.427.10/56K
R9		...	...	47,000	Ohm	$\frac{1}{2}$ watt	48.426.10/47K
R10		...	...	1.0M	Ohm	$\frac{1}{2}$ watt	48.426.10/1M
R11		...	...	27,000	Ohm	$\frac{1}{2}$ watt	48.426.10/27K
R12/13	Potentiometer	...	0.05 + 0.45M	Ohm	Log law		49.500.34
R14		...	...	1,800	Ohm	$\frac{1}{2}$ watt	48.426.10/1K8
R15	High Stability	...	...	0.12M	Ohm	$\frac{1}{2}$ watt	MK.770.73
R16	Potentiometer	...	...	50,000	Ohm	Linear law	49.470.45
R18		...	...	0.1M	Ohm	$\frac{1}{2}$ watt	48.426.10/100K
R19		...	...	0.68M	Ohm	$\frac{1}{2}$ watt	48.426.10/680K
R20		...	...	1,000	Ohm	$\frac{1}{2}$ watt	48.426.10/1K
R21		...	...	180	Ohm	$\frac{1}{2}$ watt	48.426.10/180E
R22	High Stability	...	...	43,000	Ohm	$\frac{1}{4}$ watt	MK.771.07

S 9.12.11.10.5.6.26.78.14.13.
 15.16.18.17.
 21.22.19.20.
 29 30 28.32.34. 20. 24. 26.25. 23.27.31.12. 13. 11. 21.22.18. 10.17.2.1 19.7.14. 8. 4.
 R 11 12.13. 10. 19. 16.22.21.20. 18.15.14.8. 9.6.7. 4.5. 3.1. 2.

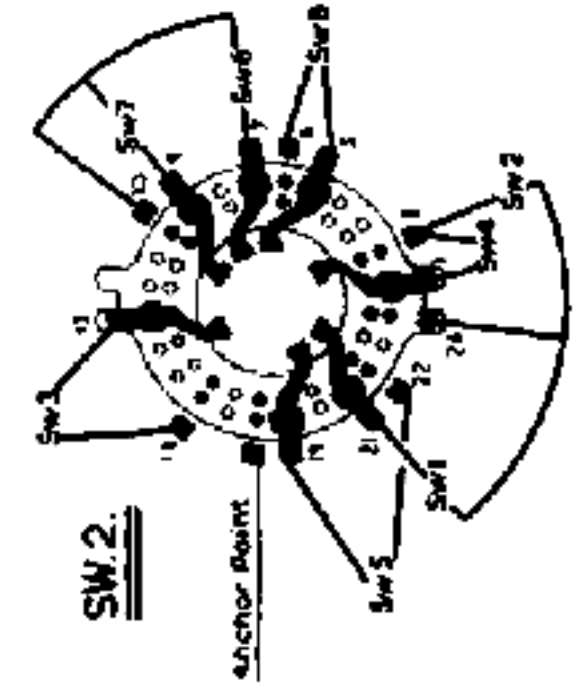


CURRENTS AND VOLTAGES.					
Conditions	V.1.	V.2.	V.3.	V.4.	V.5.
220v input to 220v tap.	Vah 250v dc	Va 250vdc	Va 111 vdc	Va 244v dc	Va1 251 vdc
M.W. Radio, gang at minimum, volume control at maximum, tone control at brilliant.	Vat 107 - Vg1+3 -0.5 - Vg2+4 54 - Vg1 -0.5 - Vg2 1.0 mA	Va 54 - Vg1 -0.4 - Ia 3.5 mA	Vk 1.3 - Ia 0.6 mA	Vg2 250 - Vg1 6.5 - Ia 35.0 mA	Va2 251 - Vg2 251 - Vg1 6.5 - Ia 35.0 mA
No signal applied. Voltages are of valve sockets with respect to chassis, using a 20,000 μ /V Meter.	Iah 1.6 mA Iat 4.2 mA Iq2+4 2.5 mA	Ia 1.6 mA Iat 4.2 mA Iq2 1.0 mA	Ia 0.6 mA	Ia 35.0 mA Iq2 4.5 mA	Vc1 270vdc Vc2 250 " I tab1 53.0 mA



UNDER VIEW OF CHASSIS

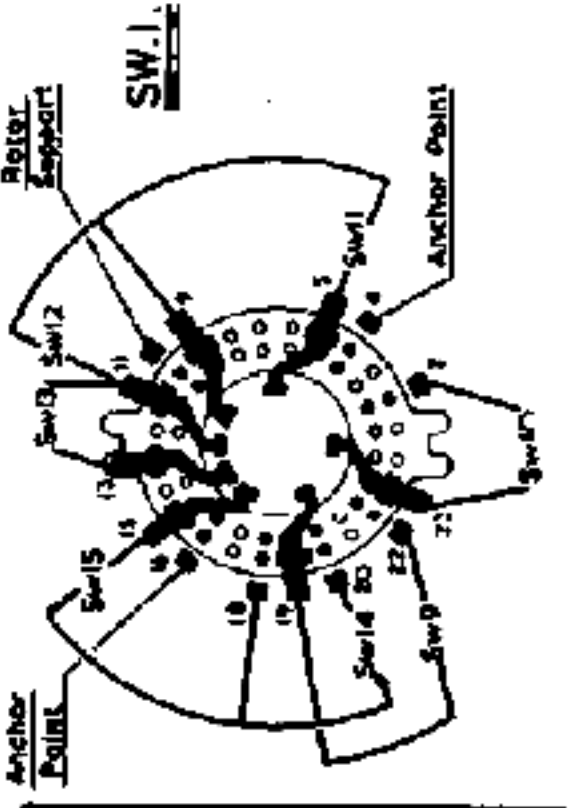
S:	5, 9, 6, 8,	15, 17, 11, 12,	19, 21, 24,	4,
C:	10, 7, 4, 8,	16, 18, 22, 13, 18, 14,	20, 22, 23, 27, 25,	2, 1,
R:	2,	9, 5, 11, 21, 4, 3, 6, 6,	26, 29, 27, 30, 34, 32,	2, 1,
		7, 9, 13, 10, 14, 18, 22, 19, 20, 21, 16,	15,	1,



SW.No.	SW	M	W	L	W
1	C	C	-	-	-
2	-	C	-	-	C
3	C	-	-	-	-
4	-	-	C	-	C
5	C	-	-	-	C
6	-	C	-	-	-
7	-	-	-	-	C
8	C	-	-	-	-

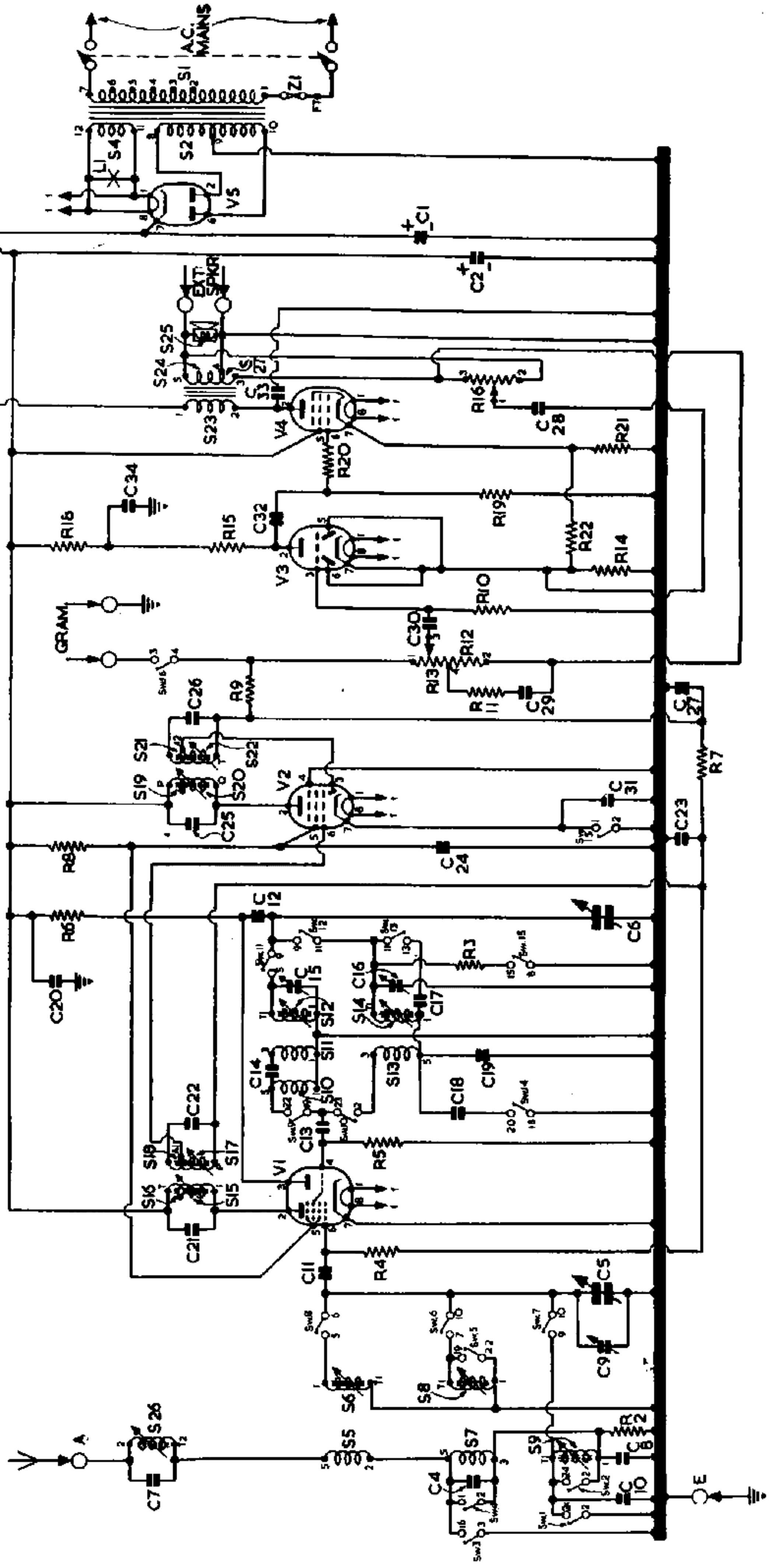
SWITCHES DRAWN AS SEEN FROM REAR OF AN INVERTED CHASSIS.

SW.No.	SW	M	W	L	W
9	C	-	-	-	-
10	-	C	-	-	C
11	C	-	-	-	-
12	-	-	C	-	C
13	-	-	-	-	C
14	-	-	-	-	C
15	-	-	-	-	C

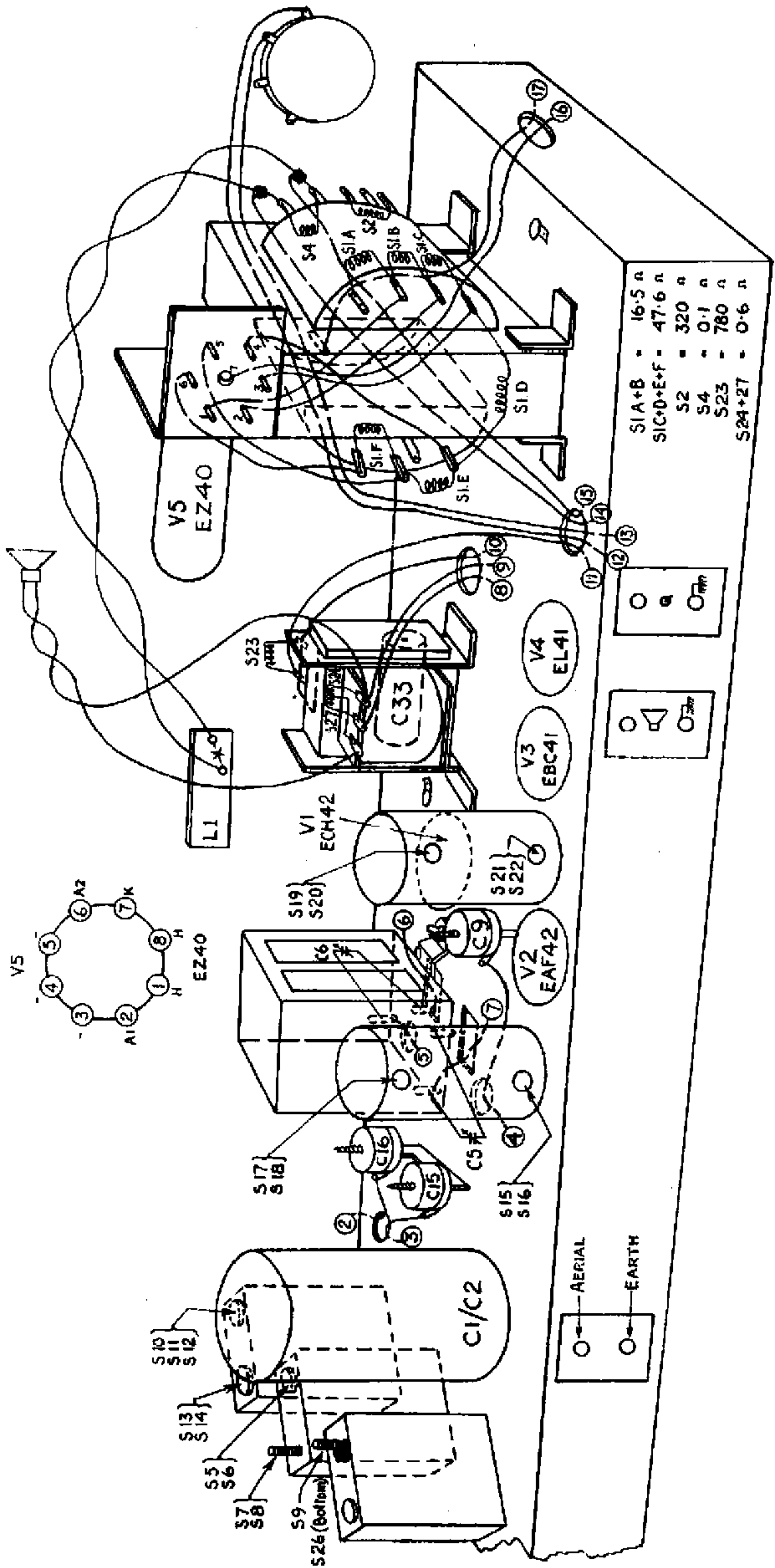


RADIO-GRAM SW:

SW.No.	RADIO-GRAM
15	C
16	-
	C



CIRCUIT DIAGRAM



S1A+B	=	16.5 n
S1C+D+E+F	=	47.6 n
S2	=	320 n
S4	=	0.1 n
S23	=	780 n
S24+27	=	0.6 n

TOP VIEW OF CHASSIS