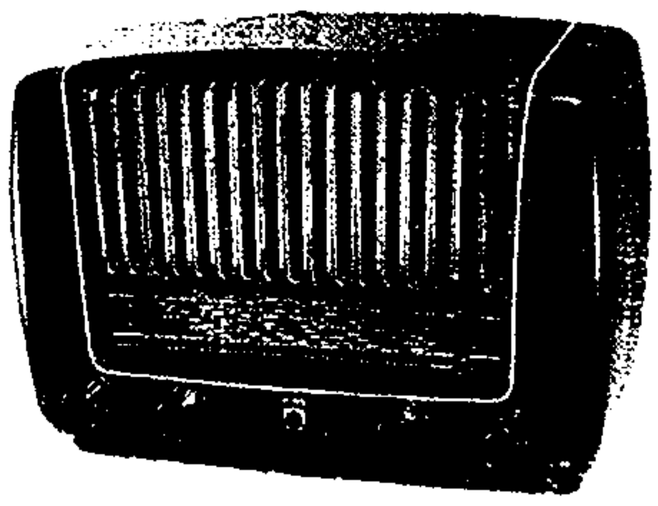
PHILIPS

310A, 411A and 622A



The appearance of the Philips 310A.

THREE Philips receivers are covered here, but the basic one, of which we had a sample, is the 310A. This is a 4-valve (plus rectifier) 3-band superhet operating from A.C. mains of 100-250 V, 50-100 c/s using a double-wound mains transformer. The waveband ranges are 16.5-51 m, 185-580 m and 1,053-1,974 m. Owing to its complicated nature, space is not available here to describe the tuning drive system fully.

The essential electrical difference in the Philips 411A is the addition of a tuning indicator, whose circuit we show below the main diagram. The 622A employs a similar chassis to that in the 310A, but it has a separate pick-up pre-amplifier whose diagram is shown overleaf.

Release date, all models, August 1952. *Original prices:* 310*A*, £14 6*s* 9*d*; 411*A*, £18 7*s* 8*d*; 622*A*, £55 3*s* 1*d*. *Purchase tax extra.*

CIRCUIT DESCRIPTION

Aerial input via I.F. filter **L1, C1** to coupling coils **L2** (S.W.) and **L3** (M.W.), and across the common impedance of **C3** (L.W.). Single-tuned aerial circuits **L4, C30** (S.W.), **L5, C30** (M.W.) and **L6, C30** (L.W.) precede triode hexode valve **(V1, Mullard ECH42).**

Oscillator anode coils **L10** (S.W.) and **L11** (M.W.) are tuned by **C33. L11** is also used for L.W. operation, when it is shunted by **C11.** Parallel trimming by **C32** (S.W.), **C31** (M.W.) and **C11, C31** (L.W.); series tracking by **C9** (S.W.), **C12** (M.W.) and **C12, C13** (L.W.). Reaction coupling from grid by **L9** (M.W. and L.W.). On S.W., the reaction coupling comprises a double resonant circuit **L7, C9, L8** which resonates at both ends of the band to maintain a constant oscillator output over this range.

Second valve **(V2, Mullard EAF42)** is a diode R.F. pentode, its pentode section operating as a variable-mu intermediate frequency amplifier with tuned transformer couplings.

Intermediate frequency 470 kc/s.

Diode section of **V2** is used as signal detector, the audio frequency component in its rectified output being developed across volume control **R10** and passed via **C22** to grid of double diode triode valve **(V3, Mullard EBC41).** I.F. filtering by **C20, R8** and the capacitance of the screened leads. Bass correction at low volume settings of **R10** is effected by **R9, C21.**

Resistance-capacitance coupling by **R13, C24** and **R16** between **V3** and pentode output valve **(V4, Mullard EL41).** Fixed tone correction by **C25** in anode circuit; by negative feed-back via **R15** between **V4** and **V3** cathodes; by feed-back from winding **d-e** on **T1** to volume control; and by feed-back from windings **c-d-e** to **V3** cathode.

Tone control **R19** varies the coupling in this last circuit, and as the windings are earthed at **d** it also varies the phase of the feed-back voltage, thus modifying the frequency response. Provision is made for the connection of a low impedance external speaker across winding **c-d.**

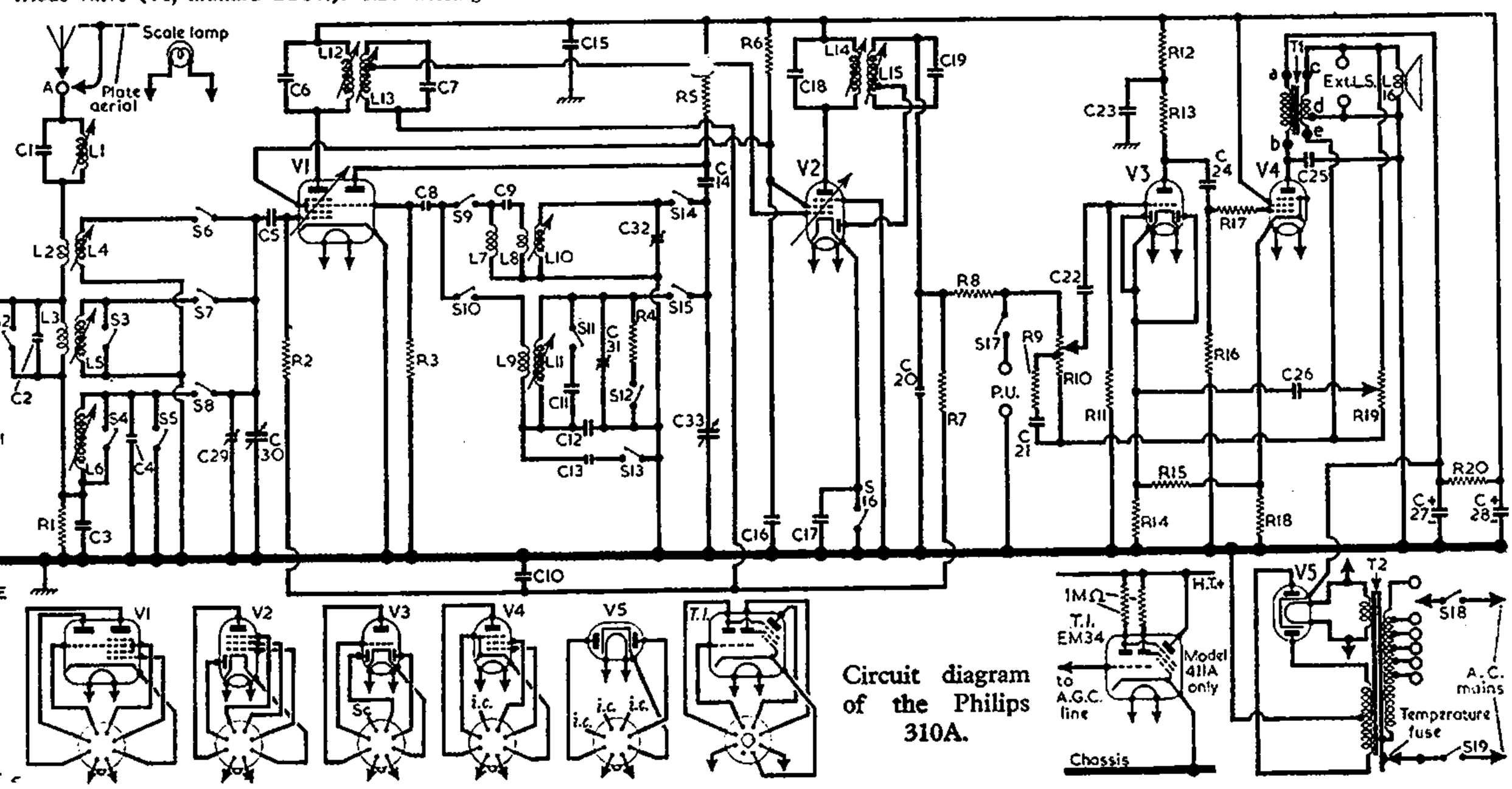
H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Mullard EZ40).** Smoothing by **R20** and electrolytic capacitors **C27, C28.** The temperature fuse opens only if transformer **T2** overheats.

COMPONENTS AND VALUES

	RESISTORS	Values	Locations
R1	L.W. aerial shunt	12kΩ	F4
R2	V1 C.G.	820kΩ	F4
R3	V1 osc. C.G.	33kΩ	F3
R4	M.W. osc. stabilizer	8·2kΩ	F3
R5	Osc. anode feed	33kΩ	E3
R6	S.G. H.T. feed	56kΩ	E4
R7	A.G.C. decoupling	1·5MΩ	F4
R8	I.F. stopper	47kΩ	E4
R9	Tone compensator	27kΩ	D4
R10	Volume control	500kΩ	D3
R11	V3 C.G.	1MΩ	D4
R12	V3 H.T. decoup.	100kΩ	E4
R13	V3 anode load	120kΩ	E4
R14	V3 G.B.	1·8kΩ	E4
R15	Neg. feed-back	43kΩ	E4
R16	V4 C.G.	680kΩ	E4
R17	V4 C.G. stopper	1kΩ	E4
R18	V4 G.B.	180Ω	E4
R19	Tone control	50kΩ	E3
R20	H.T. smoothing	1·2kΩ	F4

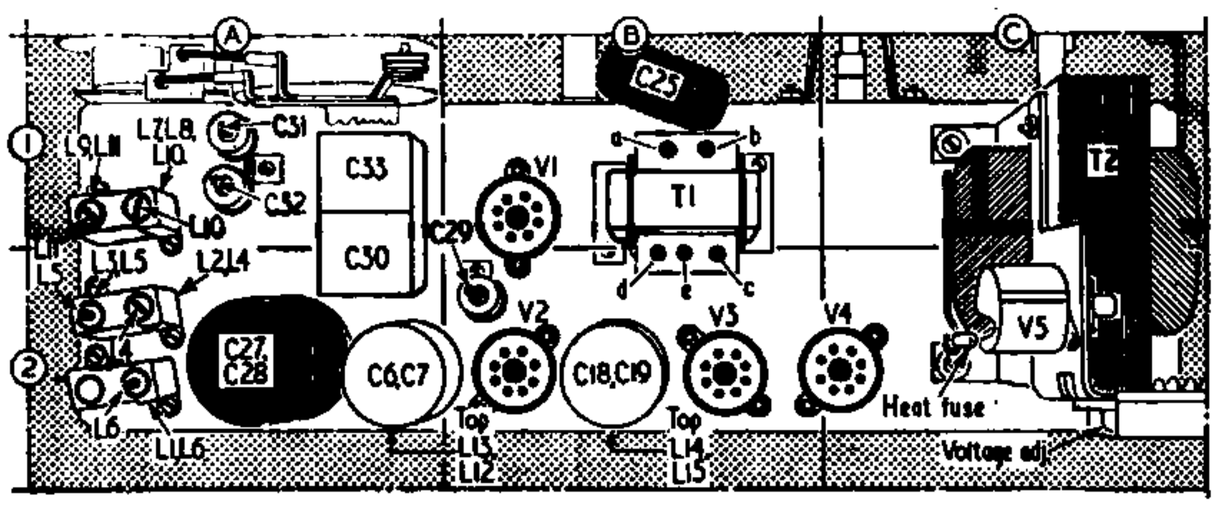
	CAPACITORS	Values	Locations
C1	I.F. filter tune	270pF	G4
C2	M.W. aerial shunt	39pF	G4
C3	L.W. aerial coup.	1,780pF	G4
C4	L.W. aerial trim.	72pF	G4
C5	V1 C.G.	220pF	F4
C6	1st I.F. trans. tun.	115pF	A2
C7	1st I.F. trans. tun.	115pF	A2
C8	V1 osc. C.G.	56pF	F3
C9	S.W. osc. coup.	68pF	G3
C10	A.G.C. découp.	0·047μF	F4
C11	L.W. osc. trim.	370pF	G3
C12	M.W. osc. track	415pF	G3
C13	L.W. osc. track	47pF	F3
C14	Osc. anode coup.	470pF	F3
C15	H.T. decoupling	0·0018μF	E3
C16	S.G. decoup.	0·1μF	E3
C17	S16 spark quench	0·0027μF	F4
C18	2nd I.F. trans. tun.	115pF	B2
C19	2nd I.F. trans. tun.	115pF	B2
C20	I.F. by-pass	82pF	F4
C21	Tone compensator	0·0015μF	D4
C22	A.F. coupling	0·0082μF	D4
C23	H.T. decoupling	0·1μF	E3
C24	A.F. coupling	0·0033μF	E4
C25	Tone corrector	0·0068μF	B1
C26	Part tone control	0·012μF	E4
C27*	H.T. smoothing	50μF	A2
C28*	H.T. smoothing	50μF	A2
C29‡	M.W. aerial trim.	30pF	B2
C30†	Aerial tuning	500pF	A2
C31‡	M.W. osc. trim.	30pF	A1
C32‡	S.W. osc. trim.	30pF	A1
C33†	Oscillator tuning	500pF	A1

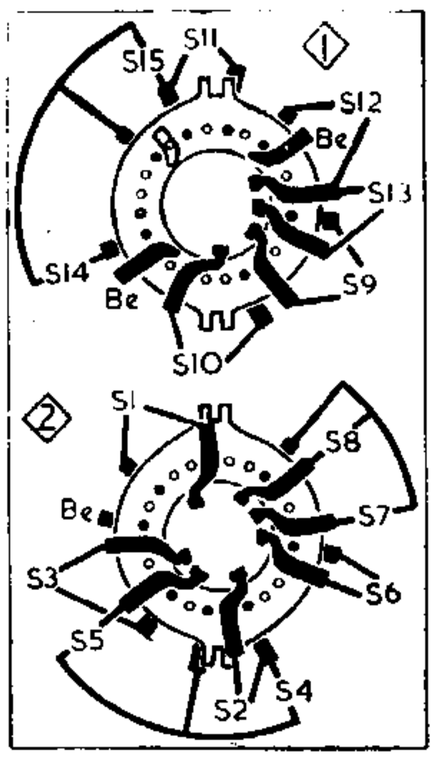
* Electrolytic. † Variable. ‡Pre-set.



Circuit diagram of the Philips 310A.

	OTHER COMPONENTS		Approx. Values (ohms)	Locations
L1	I.F. filter		8·0	A2
L2	Aerial coupling coils		1·5	A2
L3			41·0	A2
L4	Aerial tuning coils		0·2	A2
L5			3·1	A2
L6			48·0	A2
L7	Oscillator reaction coils		0·5	A1
L8			0·3	A1
L9			4·0	A1
L10	Oscillator tuning coils		0·6	A1
L11			11·0	A1
L12	1st I.F. trans.	Pri.	8·0	A2
L13		Sec., total	8·0	A2
L14	2nd I.F. trans.	Pri.	8·0	B2
L15		Sec., total	8·0	B2
L16	Speech coil ...		2·6	— —
T1	O.P. trans.	a-b	780·0	
		c-d	0·6	B1
		d-e	—	
T2	Mains trans.	Pri., total	64·1	
		H.T. sec., total	320·0	C1
		Htr. sec.	0·1	
S1-S15	Waveband switches		—	F3
S16, S17	Radiogram switches		—	D3
S18, S19	Mains sw., g'd R10		—	D3





Plan view of the chassis (above) in which the output transformer windings are coded to agree with the circuit diagram overleaf. On the right are diagrams of the waveband switch units, as seen from the rear of an inverted chassis, and below them is the associated switch table.

GENERAL NOTES

Switches.—**S1-S15** are the waveband switches, ganged in two rotary units beneath the chassis. They are indicated in our underside view of the chassis, and shown in detail in the diagrams inset beside the plan view, where they are viewed from the rear of an inverted chassis. The table below them gives the action for the three control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

S16-S17 are the radio/gram change-over switches, ganged in a 2-position Q.M.B. unit mounted concentrically with the volume control spindle. In the anti-clockwise position of the control **S16** is closed, and **S17** is open, for radio operation.

Scale Lamp.—This is a Philips type 8028D-00, with a clear tubular bulb and an M.E.S. base, rated at 6.5 V, 0.3 A.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low impedance (about 5-7 Ω) external speaker.

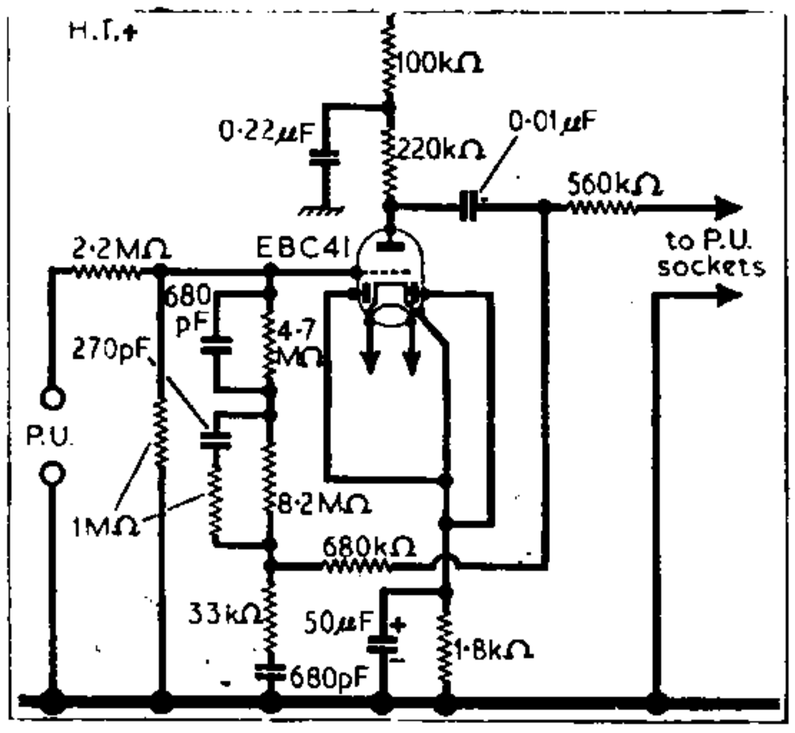
Drive Cord Replacement.—The drive cord system on this receiver is rather complex, and requires more space than is available here to explain it. A full description of a similar system is given in *Service Sheet* 973, where the only differences are in the position of the tuning scale run relative to the drive, and the lengths of the various cables. The cord lengths are: 960 mm overall, divided by the collar to 440 mm+520 mm; outer casings: 65 mm+77 mm; wire cables 410 mm+680 mm overall. Start the shorter wire cable from the slot at 4 o'clock, and the longer one at 12 o'clock.

Temperature Fuse.—This consists of a soft-metal link normally looped over two hooks, one of which is embedded in the transformer windings. When the link melts, the outer hook springs away, opening the mains circuit. Replacements are made with a type 08.100.99 fuse.

CIRCUIT ALIGNMENT

All the R.F. and I.F. adjustments are accessible with the chassis in its cabinet.

I.F. Stages.—Switch receiver to M.W. and turn gram switch to the "radio" position. Unscrew the dust-iron cores of both I.F. transformers and turn volume control to maximum. Connect output of signal generator, via an 0.047 μF capacitor in the "live" lead, to control grid (pin 6) of **V1** and chassis, feed in a 470 kc/s



The pre-amplifier circuit in the 622A.

(638.3 m) signal and adjust the cores of **L15, L14, L12** and **L13** (location references B2, A2) for maximum output, reducing the input as the circuits come into line to avoid A.G.C. action.

I.F. Filter.—Transfer signal generator leads to **A** and **E** sockets, feed in a 470 kc/s signal and adjust the core of **L1** for minimum output, using the first minimum reached, starting with the core fully out **(G4)**.

R.F. and Oscillator Stages.—The high-frequency trimming point on S.W. and M.W. is with the gang at minimum capacitance, when the cursor should coincide with the letter "M" in the left-hand end of the tuning scales.

M.W.—Switch receiver to M.W., tune to 550 m, and with the output leads of the signal generator connected to the **A** and **E** sockets via a dummy aerial, feed in a 550 m (545.5 kc/s) signal and adjust the cores of **L11** (A1) and **L5** (A2) for maximum output. Tune receiver to 184 m ("M" on scale), feed in a 184 m (1,630 kc/s) signal and adjust **C31** (A1) and **C29** (B2) for maximum output. Repeat these adjustments until no further improvement results.

L.W.—Switch receiver to L.W., tune to 1,900 m, feed in a 1,900 m (157.8 kc/s) signal and adjust **L6** (A2) for maximum output.

S.W.—Switch receiver to S.W., tune to 50 m, feed in a 50 m (6 Mc/s) signal and adjust the cores of **L10** (A1) and **L4** (A2) for maximum output. Tune receiver to 14.92 m ("M" on scale), feed in a 14.92 m (20.1 Mc/s) signal and adjust **C32** (A1) for maximum output. Repeat these adjustments until no further improvement results.

Switch	S.W.	M.W.	L.W.
S1	C	—	—
S2	—	—	C
S3	C	—	C
S4	—	C	—
S5	C	C	—
S6	C	—	—
S7	—	C	—
S8	—	—	C
S9	C	—	—
S10	—	C	C
S11	—	—	C
S12	—	C	—
S13	—	—	C
S14	C	—	—
S15	—	C	C

VALVE ANALYSI

Valve voltages and currents given in the table below are those derived from the manufacturers' information, and are the average of measurements made on a number of receivers operating from 220 V A.C. mains. The volume controls were turned to maximum, the gangs to minimum capacitance and the tone controls to maximum "top" setting, but there was no signal input.

Voltage readings were measured with a 20,000 ohms-per-volt meter, and allowance should be made for the current drawn by meters with a lower internal resistance. Chassis was the negative connection.

Total consumption on 220 V, 50 c/s mains, using the 220 V adjustment setting, is quoted as 210 mA; at 245 V, 50 c/s, using the 245 V setting, consumption is 190 mA.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 ECH42	250	1·6	54	2·5	—
	Oscillator				
	107	4·2			
V2 EAF42	250	3·5	54	1·0	—
V3 EBC41	111	0·6	—	—	1·3
V4 EL41	244	35·0	250	4·5	6·5
V5 EZ40	*251	—	—	—	†270·0

*Each anode, A.C. †Cathode current 53 mA.

Underside view of the chassis.

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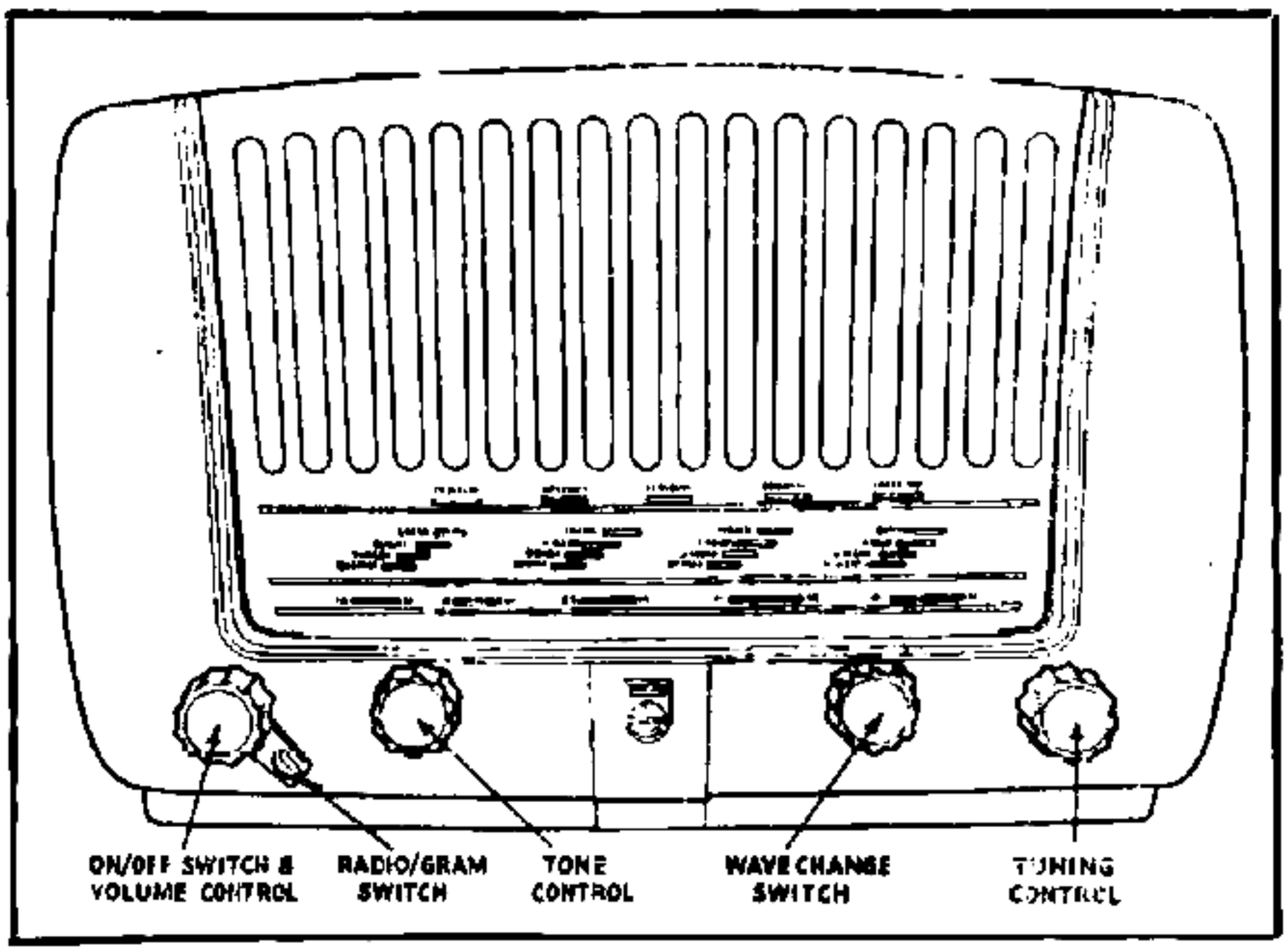
SERVICE MANUAL FOR

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

~~470 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

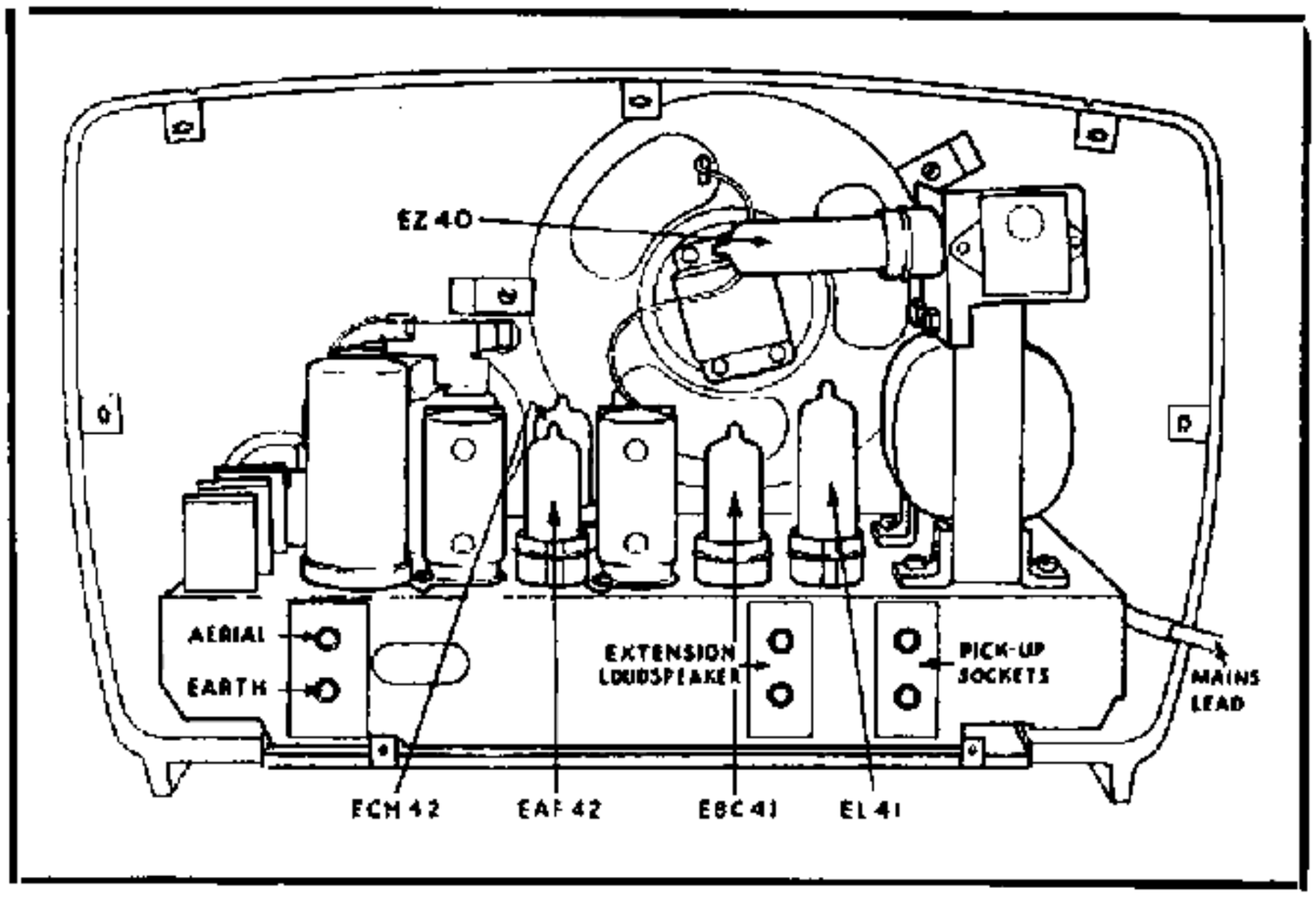
With 220 V. 50 c/s applied to the 220 V. tapping, consumption = 210 mA.
With 245 V. 50 c/s applied to the 245 V. tapping, consumption = 190 mA.

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 $2\frac{1}{4}$ 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.

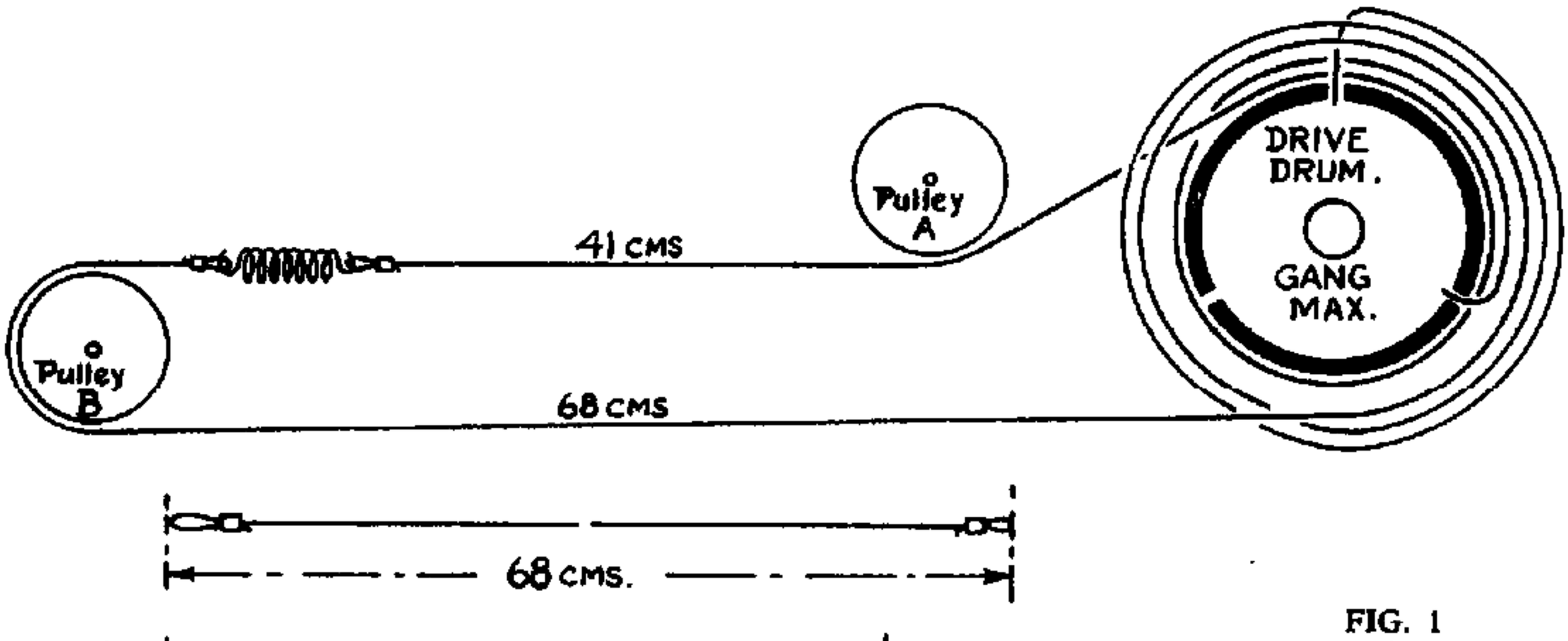
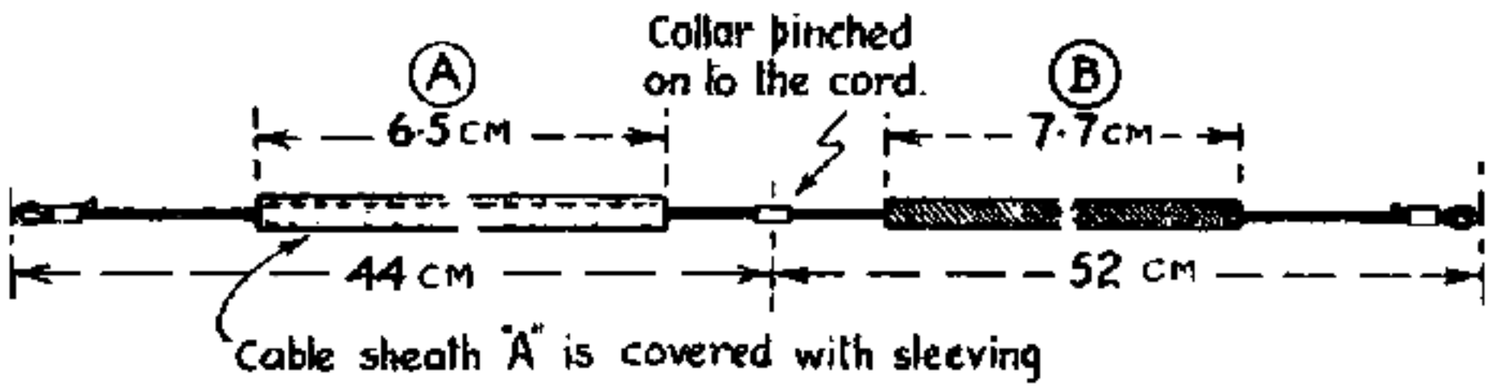


FIG. 1



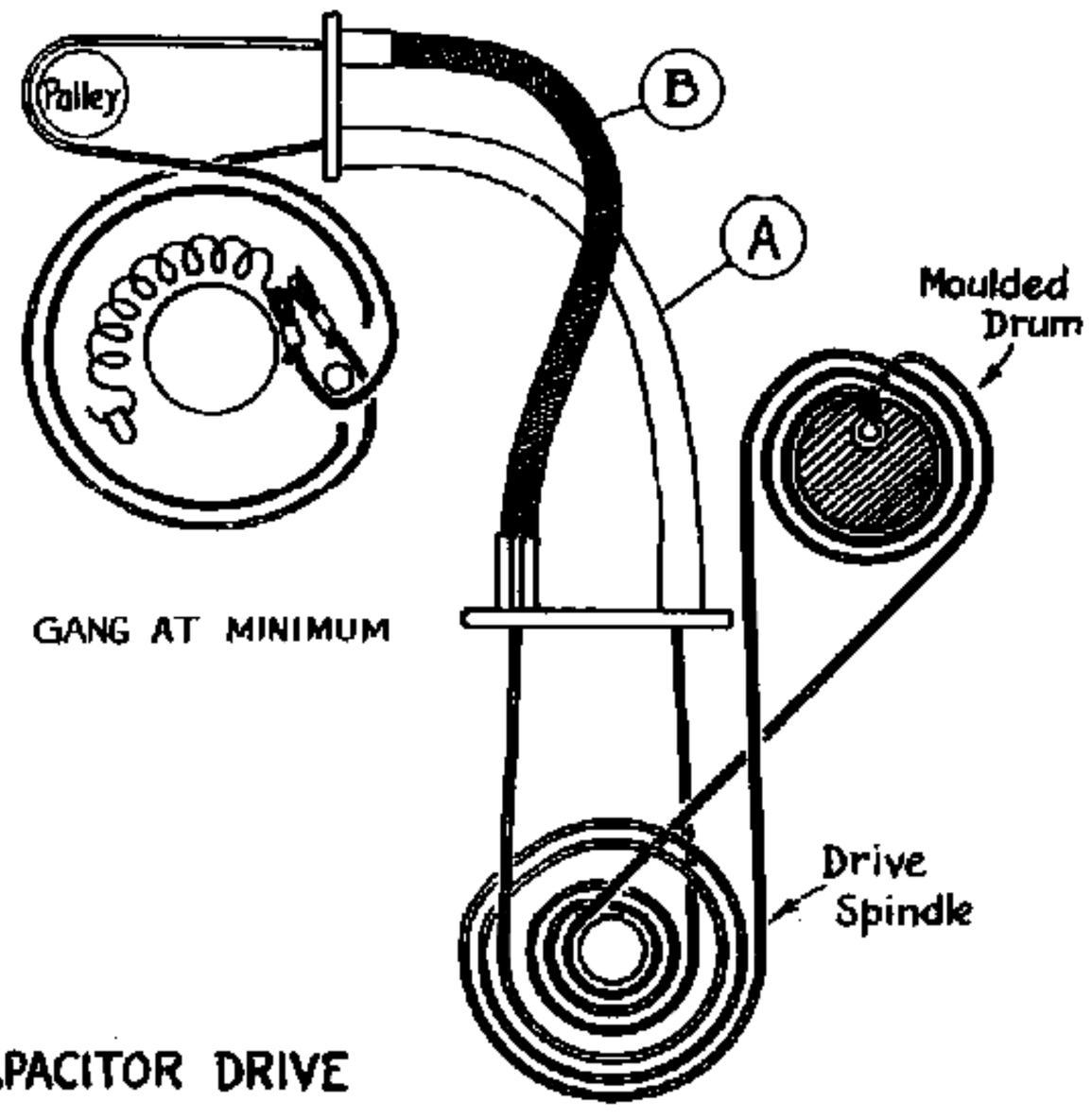
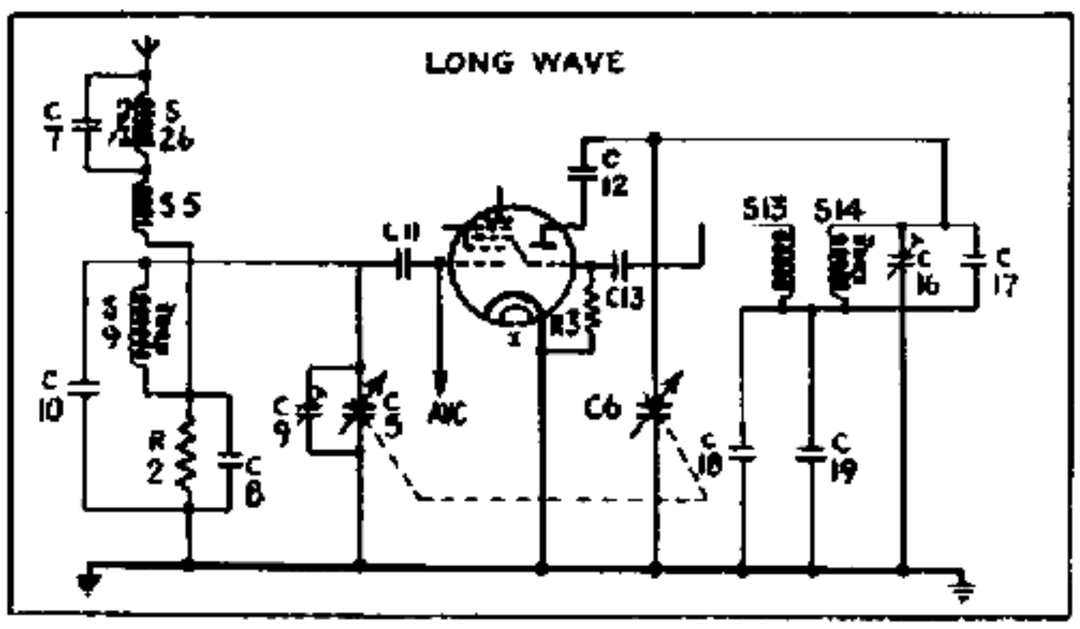


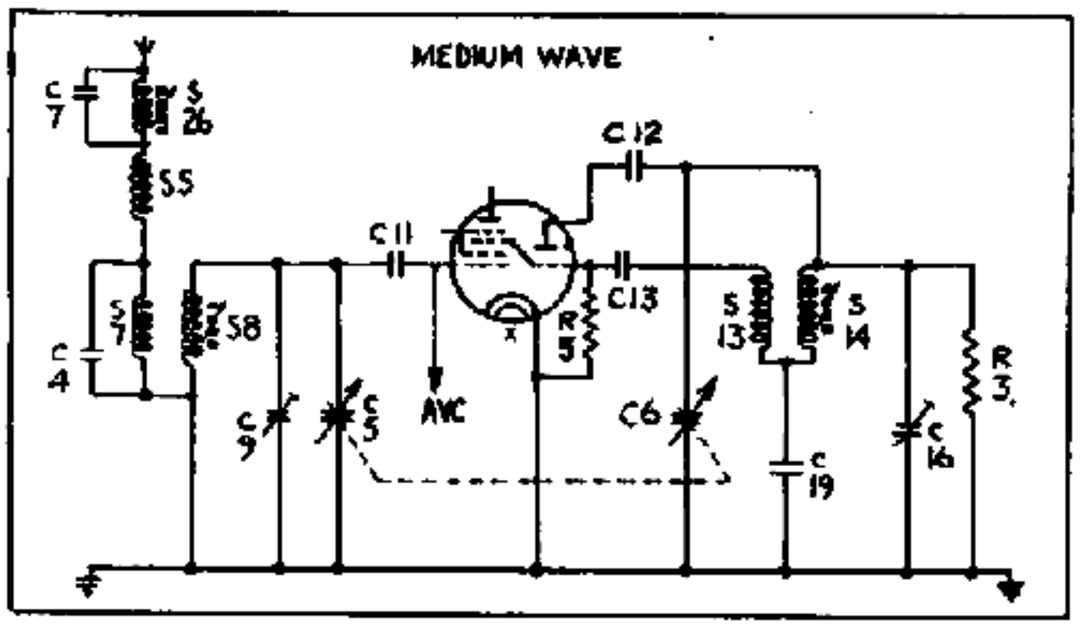
FIG. 2

CAPACITOR DRIVE

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.





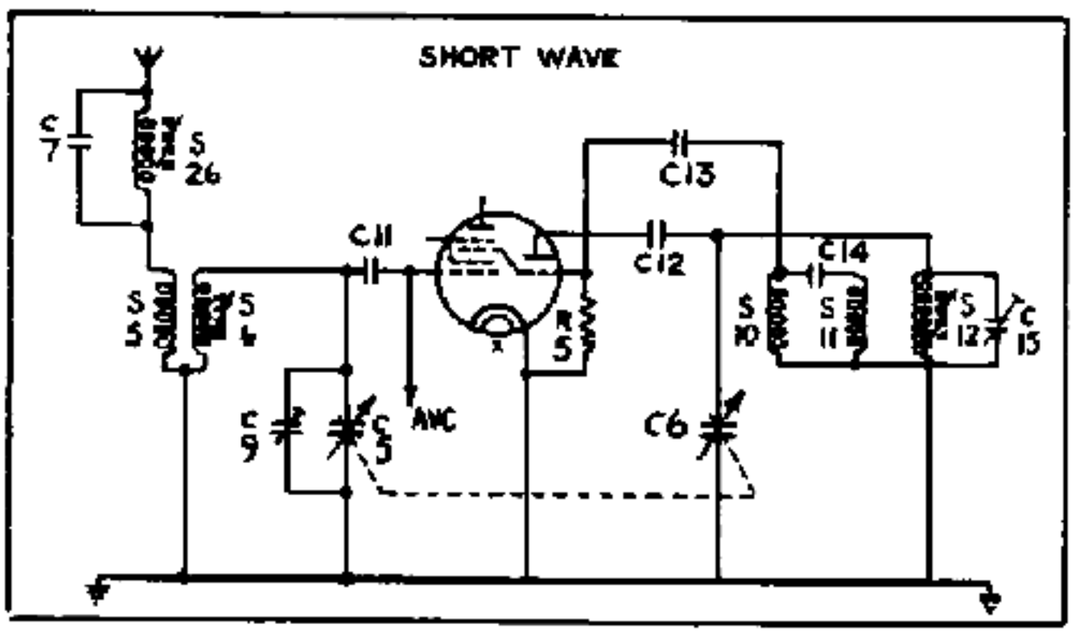


FIG. 3

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 gl 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 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	23.952.88/BR.GP1
Control knob—Waveband ...	23.952.89/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	A3.693.66
Rec. head fixing screws (No. 7 × 3/16") ...	G7.969.43
Valve position label	PG.001.82
Limited licence plate	PG.001.85
METALLISED BASEPLATE complete...	A3.385.98

SCALE ASSEMBLY

Station scale (plastic)	MK.703.47
Support springs for above	A3.649.40
Paxolin light screen	A3.386.71
POINTER ASSEMBLY	A3.693.16
Felt ring for above	A3.575.87
LOUDSPEAKER complete	MK.860.94
Speaker holding clamps	A3.446.20

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...	A3.662.23
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 7/32"	89.205.05
PILOT LAMP HOLDER	A3.359.07
Spring for above	28.730.43
Bracket for lampholder	A3.455.30
TONE CONTROL	49.470.45
Control spindle	MK.002.94
Bearing bracket for above...	MK.035.84
VOLUME CONTROL & SWITCH ...	49.500.34
Volume control only	MK.810.07
Mains switch	08.529.38
Switch mounting screws	07.800.10
Insulator between switch and control ...	28.315.23
Control spindle ... (Up to S/N 19,000 approx. only) ...	A3.431.40
Distance pieces for V/c (Up to S/N 19,000 approx. only) ...	07.005.31
Control spindle ... (From S/N 19,001 approx. onwards) ...	MK.003.02
Distance pieces for V/c (From S/N 19,001 approx. onwards) ...	MK.116.25
Screws for above (3 × 30mm.)	07.803.30
Bearing plate for spindle	A3.615.12

SPARE PARTS LIST—TYPE 310A (Contd.)

GRAM SWITCH	A3.402.44
Distance pieces for above	07.005.22
Metal operating sleeve	A3.674.02
Circlip for above	A3.562.12
COMPONENT RACK FOR MOUNTING RESISTORS, etc.	MK.888.73

MISCELLANEOUS

Voltage adjustment plate	A3.228.39
Mounting bracket for above	A3.455.31
Voltage adjustment disc	A3.228.43
Cover plate for above	A3.438.72
Socket plate—Aerial/Earth	A3.381.10
Socket plate—Extension speaker	A1.340.42
Socket plate—Pick-up	A1.340.92
Single-pin plugs	08.281.72
Valve holders	49.232.02
Coil fixing clips	28.084.83
Mounting bracket for trimmers C15/C16...	MK.062.44
Mounting bracket for trimmer C9 ...	MK.062.43
Mains lead only	K3.976.78
Fixing clip for above	A3.469,42
Chassis fixing bolts (4 × 20mm.) ...	07.804.20
Rubber bushes for chassis	A3.327.14
Distance pieces for above	07.007.46
Plate washers for above	07.025.14
Spring washers for above	07.041.40
Type plate	A1.872.23
Rivet caps for above	07.067.06
"A6" licence plate	MK.699.15

GENERAL (Screws, Nuts, etc.)

CHEESEHEAD SCREWS

3 × 5mm.	07.803.05	4 × 6mm. ...	07.804.06
3 × 6mm.	07.803.06	4 × 8mm. ...	07.804.08
3 × 8mm.	07.803.08	4 × 10mm. ...	07.804.10
3 × 10mm.	07.803.10	4 × 20mm. ...	07.804.20

WASHERS

3mm.	07.035.30	4mm. ...	07.014.40

NUTS

3mm.	07.104.30	4mm. ...	07.014.40

VALVES AND PILOT LAMPS

V1	Valve	ECH42
V2	Valve	EAF42
V3	Valve	EBC41
V4	Valve	EL41
V5	Valve	EZ40
L1	Pilot Lamp	00.080.28D-00

FUSE

Z1	08.100.99

TRANSFORMERS AND COILS

S1/2 & S4	Mains transformer	MK.513.56
S5-8	Aerial coil S.W. & M.W. ...	MK.564.26
S10.14	Oscillator coil	MK.564.25
S9/S26	L.W. Aerial & I.F. Filter ...	MK.564.27
S15-18	1st I.F. coil	MK.564.56
S19-22	2nd I.F. coil	MK.564.56
S23/24 & S27	Speaker transformer ...	A3.152.18
S25	Loudspeaker	MK.860.94

CORES for S6, S12, S14	23.643.06
Core for S8	A3.367.33
Cores for S9/S26	A3.367.32
Cores for I.F. coils	23.644.67
WAX for air capacity trimmers ...	GBX.008.13/01
Wax for I.F. coils	GBX.009.47

SPARE PARTS LIST—TYPE 310A (Contd.)

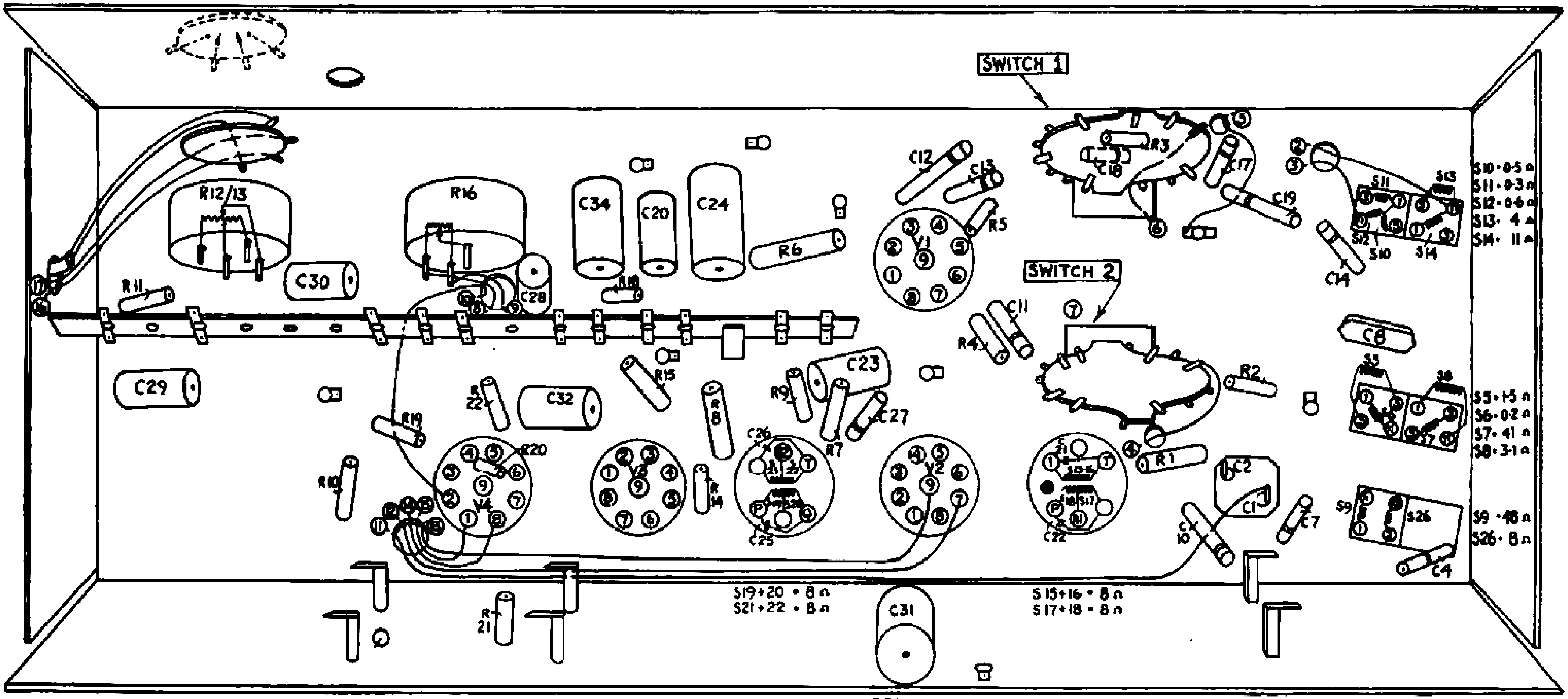
CAPACITORS

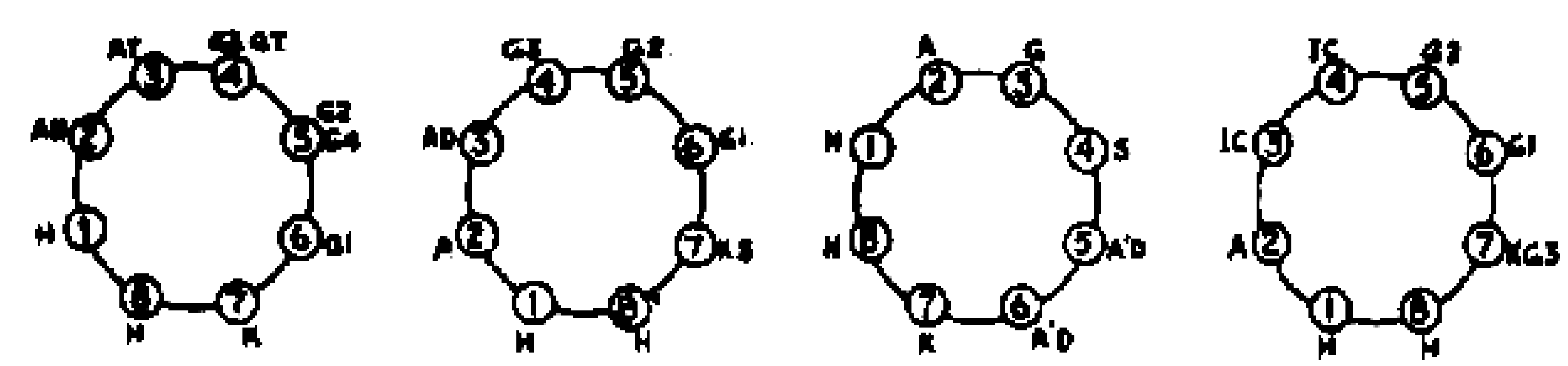
				Working Voltage	Permitted Tolerance	
C1/2	Electrolytic	50 + 50 uF	...	350V		MK.182.35/50+50
C4	Ceramic	39 pF	...		10%	48.406.10/39E
C5/6	Gang	11-500 pF	...			49.001.42
C7	Ceramic	270 pF	...		5%	48.406.05/270E
C8	Mica	1,780 pF	...		2%	MK.193.02/1K78
C9	Trimmer	3-30 pF	...			28.212.36
C10	Ceramic	72 pF	...		2%	48.406.02/72E
C11	Ceramic	220 pF	...		20%	48.406.10/220E
C12	Ceramic	470 pF	...		10%	48.406.10/470E
C13	Ceramic	56 pF	...		10%	48.406.10/56E
C14	Ceramic	68 pF	...		2%	48.406.02/68E
C15	Trimmer	3-30 pF	...			28.212.36
C16	Trimmer	3-30 pF	...			28.212.36
C17	Ceramic	370 pF	...		1%	48.406.01/370E
C18	Ceramic	47 pF	...		2%	48.406.02/47E
C19	Ceramic	415 pF	...		1%	48.406.01/415E
C20	Paper	1,800 pF	...	400V	20%	48.751.10/1K8
C21	... ...	115 pF	...			In 1st I.F. coil
C22	... ...	115 pF				
C23	Paper	47,000 pF	...	125V	20%	48.750.10/47K
C24	Paper	0.1 uF	...	400V	20%	48.751.10/100K
C25	... ...	115 pF	...			In 2nd I.F. coil
C26	... ...	115 pF				
C27	Ceramic	82 pF	...		10%	48.406.10/82E
C28	Paper	12,000 pF	...	125V	10%	48.750.10/12K
C29	Paper	15,000 pF	...	125V	20%	48.750.10/15K
C30	Paper	8,200 pF	...	125V	20%	48.750.10/8K2
C31	Paper	2,700 pF	...	400V	20%	48.751.10/2K7
C32	Paper	3,300 pF	...	400V	20%	48.751.10/3K3
C33	Paper	6,800 pF	...	1,000V	20%	48.758.20/6K8
C34	Paper	0.1 uF	...	400V	20%	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	10%	48.427.10/1K2
R2	... ...	12,000 Ohm	...	½ watt	20%	48.426.10/12K
R3	... ...	8,200 Ohm	...	½ watt	10%	48.426.10/8K2
R4	... ...	0.82M Ohm	...	½ watt	10%	48.426.10/820K
R5	... ...	33,000 Ohm	...	½ watt	10%	48.426.10/33K
R6	... ...	33,000 Ohm	...	1 watt	10%	48.427.10/33K
R7	... ...	1.5M Ohm	...	½ watt	10%	48.426.10/1M5
R8	... ...	56,000 Ohm	...	1 watt	10%	48.427.10/56K
R9	... ...	47,000 Ohm	...	½ watt	10%	48.426.10/47K
R10	... ...	1.0M Ohm	...	½ watt	10%	48.426.10/1M
R11	... ...	27,000 Ohm	...	½ watt	10%	48.426.10/27K
R12/13	Potentiometer ...	0.05+0.45M Ohm	...	Log law		49.500.34
R14	... ...	1,800 Ohm	...	½ watt	10%	48.426.10/1K8
R15	High Stability	0.12M Ohm	...	½ watt	5%	MK.770.73
R16	Potentiometer	50,000 Ohm	...	Linear law		49.470.45
R18	... ...	0.1M Ohm	...	½ watt	10%	48.426.10/100K
R19	... ...	0.68M Ohm	...	½ watt	10%	48.426.10/680K
R20	... ...	1,000 Ohm	...	½ watt	20%	48.426.10/1K
R21	... ...	180 Ohm	...	½ watt	10%	48.426.10/180E
R22	High Stability	43,000 Ohm	...	¼ watt	5%	MK.771.07

S	21.22.19.20 15.16.18.17. 9.12.11.10.5.6.26.7.8.14.13.
C	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.





V1. ECH42 + ECH81 i.e. 341A.

V2. EAF42

V3. EBC41

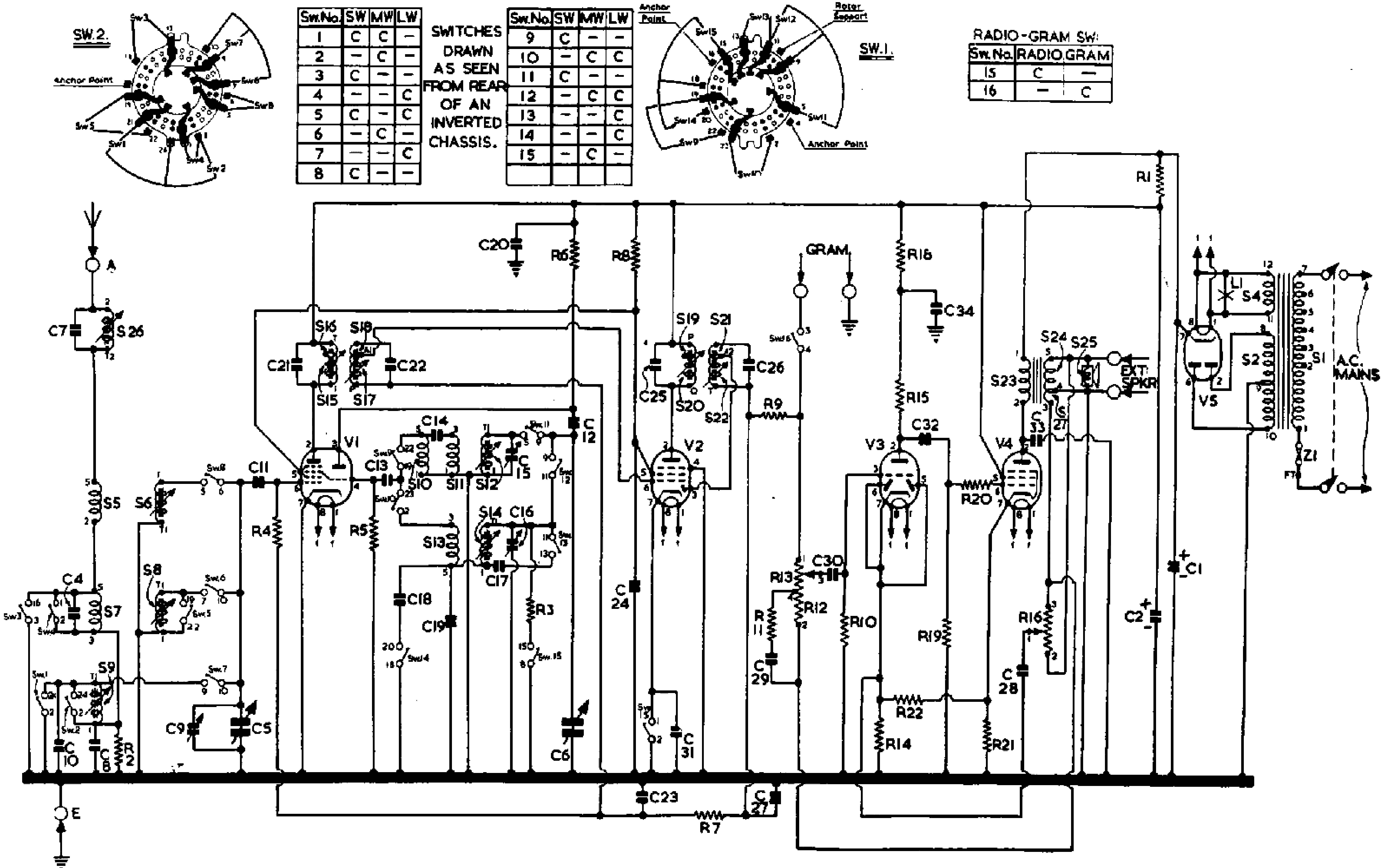
V4. EL41.

CURRENTS AND VOLTAGES.

Conditions	V.1.		V.2.		V.3		V.4		V.5.	
220v input to 220v tap. M.W. Radio, gang at minimum, volume control at maximum, tone control at brilliant. No signal applied. Voltages are at valve sockets with respect to chassis, using a 20,000 Ω/V Meter.	Vah	250v dc	Va	250V dc	Va	111 v dc	Va	244v dc	Va1	251 v dc
	Vat	107 "	Vg2	54 "	Vk	1·3 "	Vg2	250 "	Va2	251 "
	Vg1+3	-0·5 "	Vg1	-0·4 "	Ia	0·6 mA	Vk	6·5 "	Vk	270 "
	Vg2+4	54 "	Ia	3·5 mA			Ia	35·0 mA		
	Vg1	-0·5 "	Ig2	1·0 mA			Ig2	4·5 mA		
	Iah	1·6 mA	A.V.C. VOLTAGE. With a signal (857 Kc/s-350m) of 150 mV applied to the aerial socket, the A.V.C voltage at the junction of R7/C27 = -18·5v, and at the junction of C11/R4 = -8v. (Measured on a valve voltmeter.)						VC1	270 v dc
	Iat	4·2 mA							VC2	250 "
	Ig2+4	2·5 mA							I total	53·0 mA

UNDER VIEW OF CHASSIS

S.	5, 9, 7, 26,	6, 8,	15, 16,	17, 18,	10,	11, 13,	12, 14,	19, 20,	21, 22,	23,	24, 27,	25,	4, 2,	1,							
C.	10, 7, 4, 8,	9,	5,	11,	21,	22, 13, 18,	14,	15, 20, 17, 16,	12, 6,	24, 25, 23,	31,	26,	29, 27,	30,	34, 32,	28, 33,	2, 1,				
R.	2,	4,	5,	3,	6,	8,	7,	9, 11,	13, 12,	10,	14, 18, 22, 15,	19,	20, 21,	16,	1,						



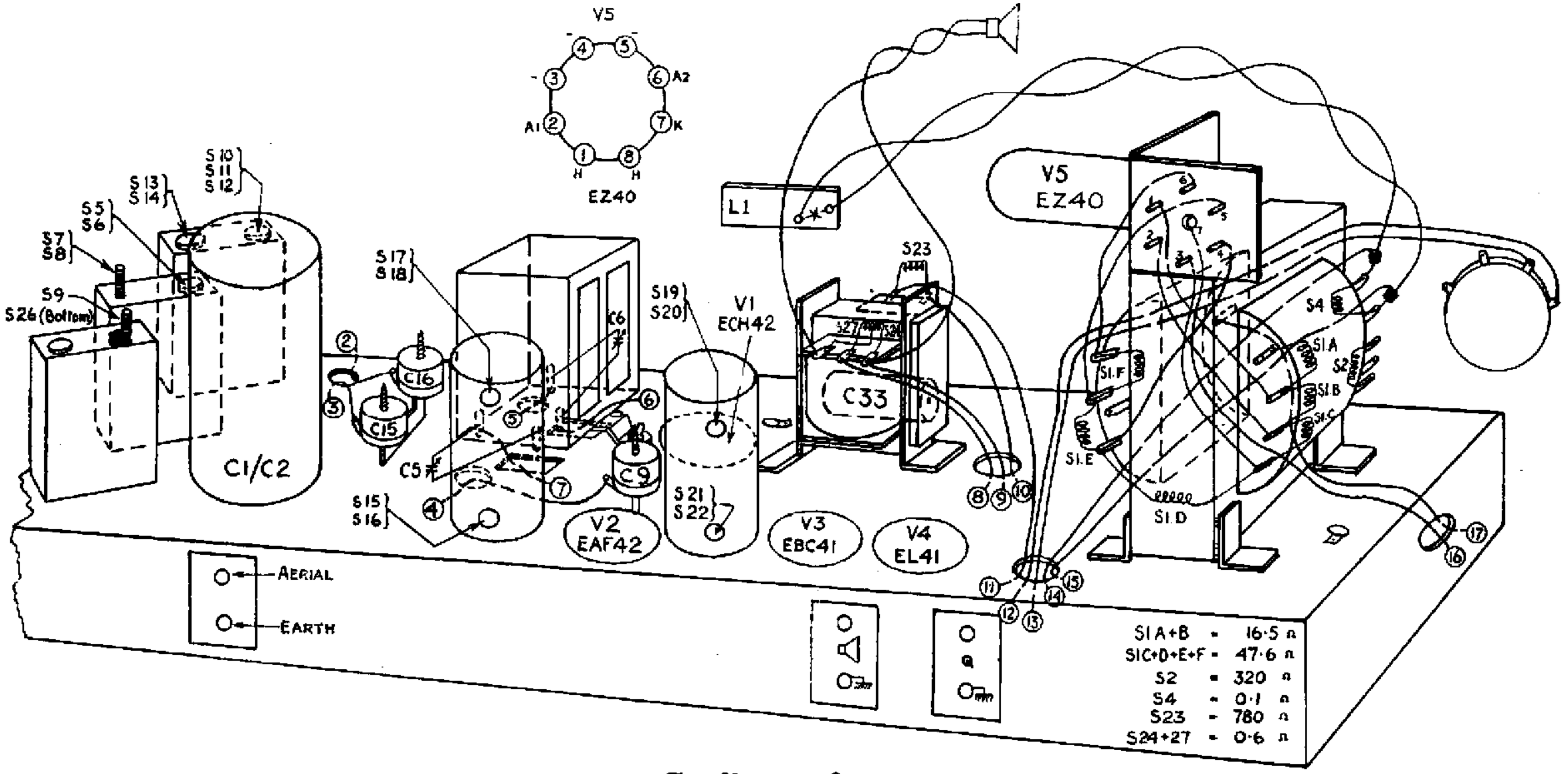
Sw. No.	SW	MW	LW
1	C	C	—
2	—	C	—
3	C	—	—
4	—	—	C
5	C	—	C
6	—	C	—
7	—	—	C
8	C	—	—

Sw. No.	SW	MW	LW
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



TOP VIEW OF CHASSIS