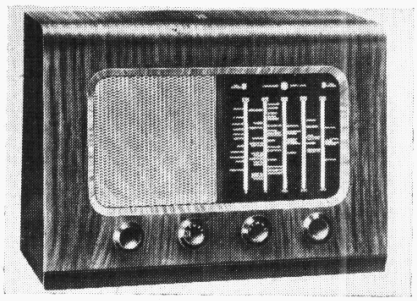
"TRADER" SERVICE SHEET

1085

PYE P45 & P46

Covering also Autoradiogram P45RG



The appearance of the Pye P45. This model has a wooden cabinet, but is otherwise the same as P46.

EQUIPPED with three band-spread S.W. ranges, the Pye P46 is a 3-valve (plus rectifier) 5-band superhet designed to operate from A.C. mains only of 200-250 V, 40-100 c/s. It employs a double-wound mains transformer, and the chassis may be earthed directly. The waveband ranges are approximately 184-550 m, 1,000-2,000 m and the 16 m, 31 m and 49 m S.W. bands.

An identical chassis is employed in the P45, but it is housed in a wooden cabinet. A basically similar chassis is employed also in the P45RG, but the I.F. and audio frequency circuits are considerably modified to permit the use of the I.F. amplifier as a pick-up pre-amplifier. All three models are fully covered in this *Service Sheet*. but our sample receiver was a P46.

Release dates and original prices: P45, September 1950, £19 5s 3d; *P45RG, August* 1951, £45 11s 11d; *P46, August* 1952, £15 8s 11d. *Purchase tax extra.*

CIRCUIT DESCRIPTION

On the two normal tuning bands the aerial is coupled by **L1** (M.W.) and **C2** (L.W.) to single-tuned circuits **L3, C36** (M.W.) and **L2, C36** (L.W.), which precede triode hexode valve **(V1, Mullard ECH42)** operating as frequency-changer with internal coupling. **S13** closes on these bands to connect the aerial section of the gang **C36. S11** also closes on both bands to shunt **C3** across the aerial input and **C4** across the tuning circuit. **S12** closes on L.W. to shunt **C5** across **L2** as an additional trimmer.

On the three band-spread ranges **S13** opens and **S12** closes to connect the fixed capacitor **C5** in place of **C36**, the aerial circuit then being fixed-tuned to the centre of each band. **S11** also opens on the band-spread ranges and the aerial is coupled by **C3, C4** to single-tuned circuits **L4, C5** (49 m band), **L5, C5** (31 m band) and **L6, C5** (16 m band).

On the two normal tuning bands, triode oscillator coils **L8** (M.W.) and **L7** (L.W.) are connected in a Colpitts circuit with **C12, C37** and **C13, C14,** and are tuned by **C38** via **S35,** which closes on these bands.

For band-spread operation, **S35** opens and **S36** closes. The band-spread oscillator coils **L9** (49 m band), **L10** (31 m band) and **L11** (16 m band) are arranged in a Colpitts circuit with **C11, C17, C18** and **C38.** Tuning is performed by **C38** via band-spreading capacitors **C17, C18.**

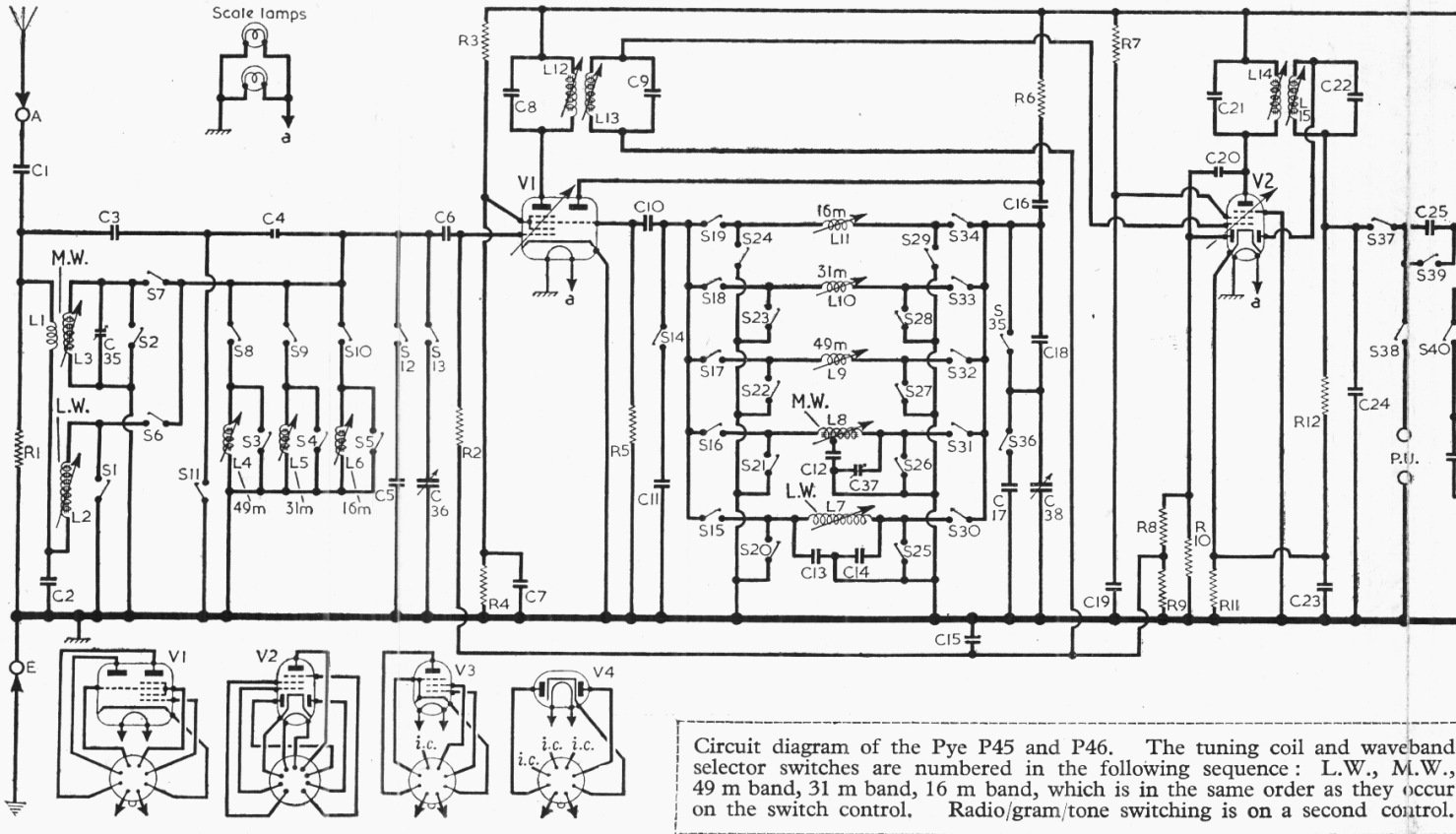
Second valve **(V2, Mullard EBF80)** is a double diode R.F. pentode, its pentode section operating as intermediate frequency amplifier, with tuned transformer couplings **C8, L12, L13, C9** and **C21, L14, L15, C22.**

Intermediate frequency 470 kc/s.

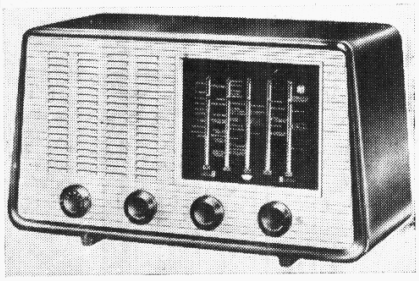
One diode section of **V2** operates as signal detector, and the audio frequency component in its rectified output is developed across load resistor **R12** and passed via **C30** and volume control **R15** to control grid of pentode output valve **(V3, Mullard EL41).**

Second diode of **V2** is fed via **C20** from **V2** pentode anode, and the resulting D.C. potential, developed across load resistor **R10,** is fed back via step-down potential divider **R8, R9** to **V1** and **V2,** giving automatic gain control.

Six-position tone control switching (four on radio, two on gram) **S39-S41** gives bass cut via **C25,** and varies the frequency response of the negative feed-back circuit **C28, C29, C26, C27, R13** and **R14,** between **V3** anode and grid circuits. Provision is made for the connection of a gramophone pick-up across the volume control circuit via **S38,** which together with radio muting switch **S37** forms part of the tone control switching. Radio/gram change-over switching is performed automatically by the operation of the tone switch control. Provision is made for the con-



Circuit diagram of the Pye P45 and P46. The tuning coil and waveband selector switches are numbered in the following sequence: L.W., M.W., 49 m band, 31 m band, 16 m band, which is in the same order as they occur on the switch control. Radio/gram/tone switching is on a second control.



Photograph showing the appearance of the Pye P46, which is housed in a plastic cabinet.

nection of a low impedance external speaker across **T1** secondary winding.

In the gram model the tone switch control has three radio and three gram positions. The audio frequency component in the three radio positions is developed across **R12**, as in the table model, and is passed via **C44** and volume control **R15** to the output valve. In the three gramophone positions of the tone switch control, the cathode, control grid and screen grid of **V2** are used as a triode pick-up pre-amplifier, the pick-up being connected to **V2** control grid via **L13**. The amplified output, developed across **R23**, is passed via **C43** to the volume control, switches **S45, S49** closing on gram and opening on radio, and switches **S44, S46, S48, S50** opening on gram and closing on radio.

Tone control switches **S51, S52**, which are ganged to the radio/gram switches **S44-S50**, shunt **C46** and **R24**, giving bass boost and top cut respectively when they close.

H.T. current in all three models is supplied by I.H.C. full-wave rectifying valve **(V4, Mullard EZ40)**. Smoothing by **R18** and electrolytic capacitors **C32, C33** and **C34**. The heaters of all the valves, including **V4**, are fed from winding **a** on mains transformer **T2**.

COMPONENT VALUES AND LOCATIONS

	RESISTORS	Values	Locations
R1	Aerial shunt ...	22kΩ	G4
R2	V1 C.G.	1MΩ	F4
R3	V1 S.G. pot. divider ...	22kΩ	F4
R4		33kΩ	F4
R5	V1 osc. C.G. ...	47kΩ	F3
R6	Osc. anode feed ...	10kΩ	F3
R7	V2 S.G. feed ...	33kΩ	F3
R8	A.G.C. pot. divider	2·2MΩ	E4
R9		2·2MΩ	F4
R10	A.G.C. diode load	1MΩ	E4
R11	V2 G.B.	680Ω	E4
R12	Signal diode load ...	470kΩ	F4
R13	Parts tone control	220kΩ	E4
R14		4·7kΩ	E3
R15	Volume control ...	1MΩ	E3
R16	V3 C.G. stopper ...	*2·2kΩ	E4
R17	V3 G.B.	180Ω	F4
R18	H.T. smoothing ...	†1kΩ	D4
R19	Parts P.U. tone correction	100kΩ	—
R20		1MΩ	—
R21	A.G.C. decoupling	470kΩ	—
R22	H.T. decoupling ...	10kΩ	—
R23	V2 S.G. load ...	22kΩ	—
R24	Part tone control	15kΩ	—

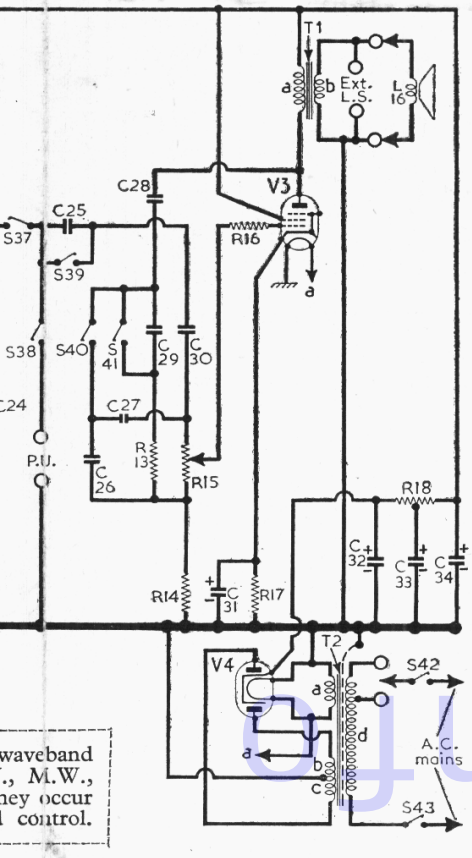
* Changed to 47kΩ on gram. model.
† Centre tapped.

	CAPACITORS	Values	Locations
C1	Aerial coupling ...	470pF	G4
C2	L.W. aerial coup. ...	0·0024μF	G4
C3	Bandspread aerial coupling ...	100pF	G4
C4		5·6pF	G4
C5	Bandspread tuner	100pF	G4
C6	V1 C.G.	100pF	F4
C7	V1 S.G. decoup. ...	0·1μF	F4

(*Continued next column*)

	CAPACITORS (*continued*)	Values	Locations
C8	1st I.F. trans. tun.	100pF	B1
C9		100pF	B1
C10	V1 osc. C.G. ...	100pF	F3
C11	Bandspread trimmer	180pF	F3
C12	M.W. osc. trim. ...	510pF	G3
C13	L.W. osc. trimmers	150pF	F3
C14		150pF	G4
C15	A.G.C. decoupling	0·02μF	E4
C16	Osc. anode coupling	100pF	G4
C17	Bandspread capacitors ...	270pF	G3
C18		150pF	G3
C19	V2 S.G. decoupling	0·1μF	F4
C20	A.G.C. coupling ...	10pF	E4
C21	2nd I.F. trans. tun.	100pF	B2
C22		100pF	B2
C23	V2 cath. by-pass ...	0·1μF	E4
C24	I.F. by-pass ...	470pF	E4
C25	Part tone control ...	0·005μF	D3
C26		0·002μF	E3
C27		15pF	E3
C28		0·05μF	E4
C29		0·01μF	E4
C30	A.F. coupling ...	0·01μF	D3
C31*	V3 cath. by-pass ...	25μF	E4
C32*	H.T. smoothing ...	24μF	C2
C33*		24μF	C2
C34*		24μF	C2
C35‡	M.W. aerial trim. ...	50pF	G4
C36†	Aerial tuning ...	§528pF	A2
C37‡	M.W. osc. trim. ...	50pF	G3
C38†	Oscillator tuning ...	§528pF	A1
C39	P.U. coupling ...	0·02μF	—
C40	P.U. tone corrector	0·002μF	—
C41*	V2 cath. by-pass ...	50μF	—
C42	V2 S.G. decoup. ...	0·002μF	—
C43	A.F. coupling ...	0·1μF	—
C44		0·01μF	—
C45*	H.T. decoupling ...	16μF	—
C46	Parts tone control	500pF	—
C47		0·02μF	—
C48	Tone corrector ...	0·002μF	—

* Electrolytic. † Variable. ‡ Pre-set.
§ "Swing" value, min. to max.



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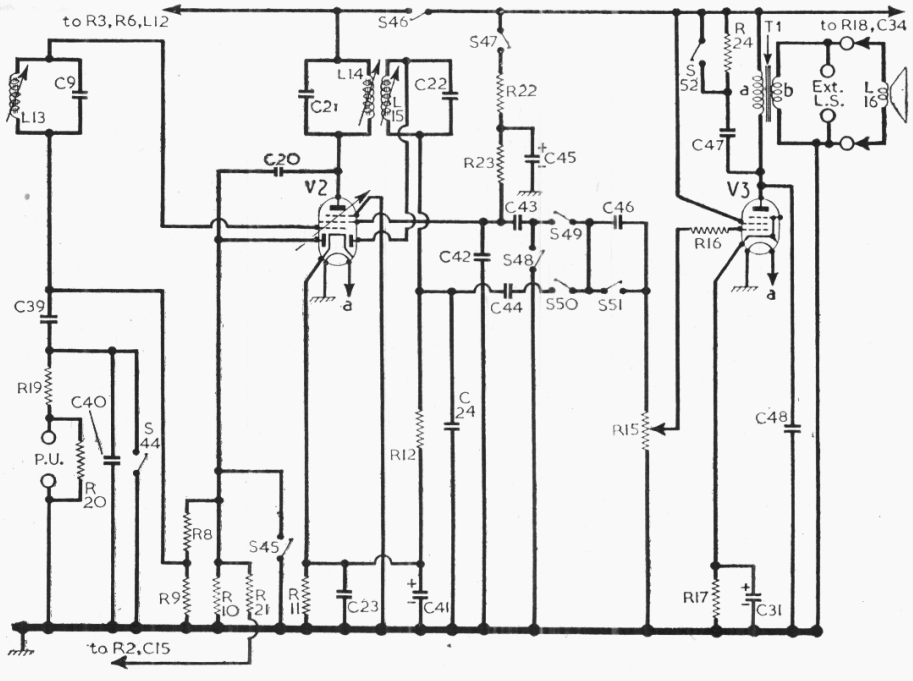


Diagram of the I.F. and output stages of the P45RG, which are quite different from those in the P45, P46. **V2** is used as a gramophone pre-amplifier, the pick-up being connected in its control grid circuit. Most of the switches in the diagram are concerned with the radio/gram switching, only **S51, S52** being used for tone control.

OTHER COMPONENTS			Approx. Values (ohms)	Locations
L1	M.W. aerial coup.		30·0	G4
L2	L.W. aerial tuning		50·0	G4
L3	M.W. aerial tuning		2·3	G4
L4	Band-spread aerial tuning coils		—	G4
L5			—	G4
L6			—	F4
L7	L.W. osc. tuning		3·5	G3
L8	M.W. osc. tuning		1·5	G3
L9	Band-spread osc. tuning coils		—	G4
L10			—	F4
L11			—	F3
L12	1st I.F. trans.	Pri.	12·2	B1
L13		Sec.	12·2	B1
L14	2nd I.F. trans.	Pri.	12·2	B2
L15		Sec.	12·2	B2
L16	Speech coil		2·3	—
T1	O.P. trans.	a	500·0	C2
		b	—	
T2	Mains trans	a	—	C2
		b	285.0	
		c	305.0	
		d, total	38.0	
S1-S36	Waveband switches		—	G4
S37-S41	Tone/gram switches		—	D3
S42, S43	Mains sw, g'd tone sw		—	D3
S44-S52	Tone/gram switches		—	—

VALVE ANALYSIS

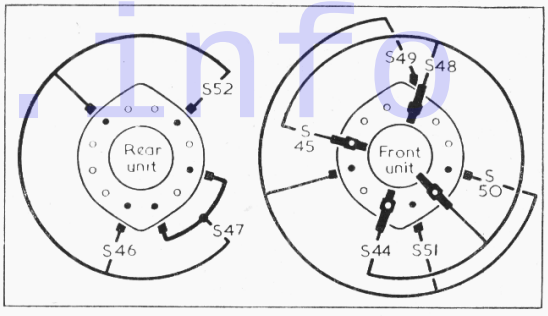
Valve voltages and currents given in the table below are those quoted by the manufacturers. They were measured with the receiver operating from 212 V A.C. mains, the voltage adjustment being set to the 200-220 V tapping. The receiver was switched to L.W. and the gang turned to maximum, but there was no signal input.

Voltage readings were measured with a Model 7 Avometer, chassis being the negative connection except where otherwise indicated.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 ECH42	220	2·5	75	3·5	—
	Oscillator				
	150	6·0			
V2 EBF80	220	4·8	130	2·2	4·4
V3 EL41	205	29·0	220	5·0	6·3
V4 EZ40	510*	—	—	—	275·0†

* A.C. reading, anode to anode.
† Cathode current 53·0 mA.

Diagrams of the tone-control and radio/gram change-over switch units as they are in the P45RG, derived from the diagrams shown in the makers' service manual. They are drawn as they would be seen when viewed from the rear of an inverted chassis, front and rear units being identified. Below them is the associated table.



Switch	Off	Radio F	Radio B	Radio M	Gram F	Gram B	Gram M
S44 ...	—	C	C	C	—	—	—
S45 ...	C	—	—	—	C	C	C
S46 ...	—	C	C	C	—	—	—
S47 ...	—	C	C	C	C	C	C
S48 ...	—	C	C	C	—	—	—
S49 ...	C	—	—	—	C	C	C
S50 ...	—	C	C	C	—	C	C
S51 ...	C	C	—	C	C	—	C
S52 ...	—	—	—	C	—	—	C

GENERAL NOTES

Switches.—**S1-S36** are the waveband switches, ganged in two rotary units beneath the chassis. These are indicated in our underside illustration of the chassis, where they are identified by the numbers **1** and **2** in diamond surrounds. The arrows there indicate the direction in which the units are viewed in the diagrams in col. 4, where they are shown in detail.

The table beside them gives the switch positions for the five control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

S37-S41 in the P45 and P46 are the tone control and radio/gram change-over switches, ganged in a single seven-position unit beneath the chassis. The unit is indicated in our underside illustration of the chassis, and it is shown in detail in the diagram in col. 3, where it is drawn as seen from the rear of an inverted chassis.

Ganged with this unit is the Q.M.B. double-pole mains switch unit **S42, S43,** which opens in the "off" position of the control. The action of the **S37-S41** switches is shown in the accompanying table, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

S44-S52 are the tone control switches in the P45RG. These are ganged in two rotary units in the same position as we show **S37-S41** in the P45,P46 chassis, **S42, S43** still being operated by the same spindle. This tone control unit still has six positions and "off," but they are now divided into three radio and three gram positions.

A detailed diagram of the two switch units, drawn as seen from the rear of an inverted chassis, shown at head of col. 3, is derived from information given in the makers' service manual, as our sample receiver was a P46. The table associated with it gives the switch positions for the seven control settings (including "off"), starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

Scale Lamps.—These are two lamps with M.E.S. bases and large spherical bulbs painted white, rated at 6.5 V, 0.3 A.

Capacitors C8, C9, C21, C22.—These are the fixed tuning capacitors for the I.F. transformers. They are contained within the screening cans, but they may not be visible even when the cans are removed, as they form an integral part of the transformer construction.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low impedance (about 2-4 Ω) external speaker. Beside them is another pair of sockets for the internal speaker, which may be muted by removing one of the plugs.

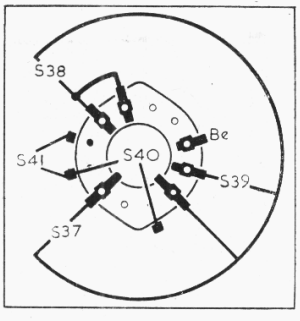
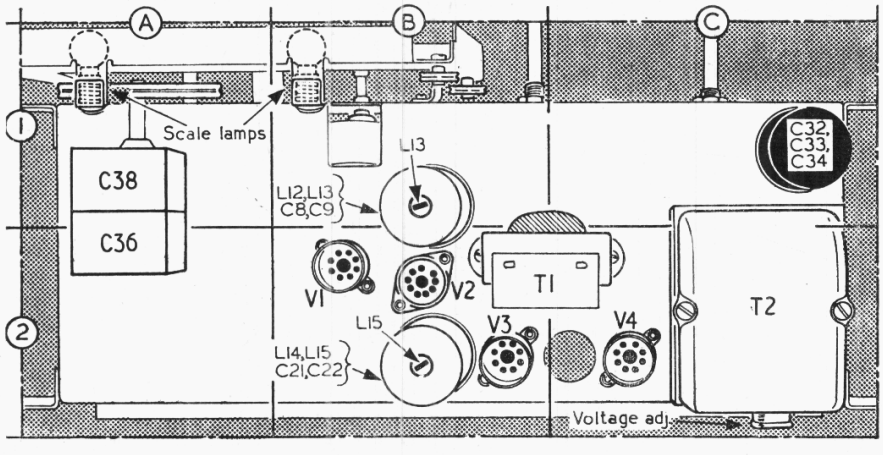


Diagram of the tone control and radio/gram change-over switch unit as it is in the P46. It is drawn as seen from the rear of an inverted chassis. Below is the associated table.

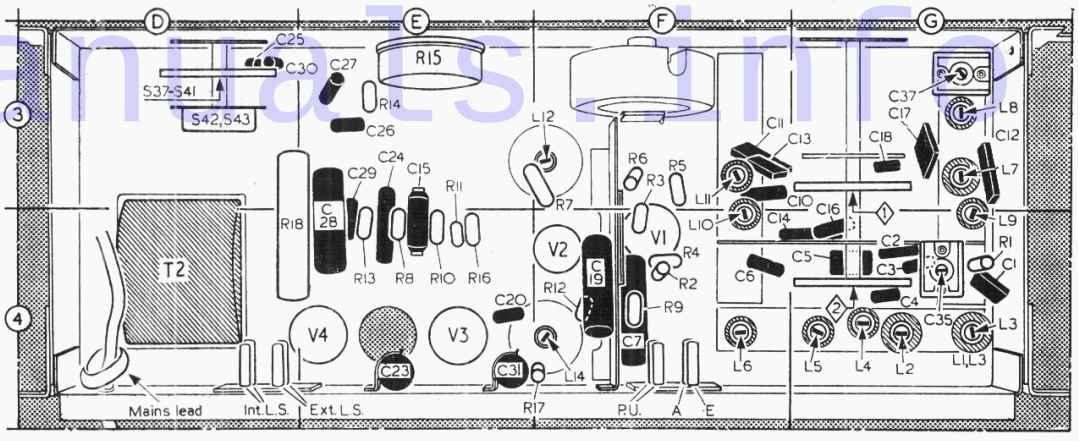
Switch	Off	Radio F	Radio B	Radio M	Radio S	Gram F	Gram M
S37 ...	C	C	C	C	C	—	—
S38 ...	—	—	—	—	—	C	C
S39 ...	—	C	—	C	—	C	C
S40 ...	—	—	—	C	C	—	C
S41 ...	C	—	C	—	C	—	—



Plan view of the chassis of the P46. In the P45RG **V3** occupies the vacant hole stamped in the chassis near **V4.** The scale assembly is a different shape, too, and is disposed symmetrically on the chassis.

CIRCUIT ALIGNMENT

I.F. Stages.—Remove chassis from cabinet and stand it on the bench so that adjustments above and below chassis are accessible. Connect signal generator output, via an 0.1 μF capacitor in the "live" lead, to control grid (pin 6) of **V1** and chassis. Switch receiver to L.W. and tune to high wavelength end of band. Feed in a 470 kc/s

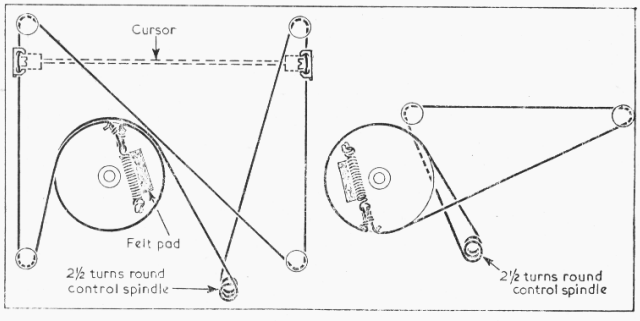


Underside view of the chassis of the P46. Detailed diagrams of the waveband switch units, indicated here by numbers 1 and 2 in diamond surrounds, appear in col. 4 below. A diagram of the tone control switch unit appears near the foot of col. 3. At the head of col. 3 are the diagrams of the two tone control switch units as used in the P45RG.

(638.3 m) signal and adjust the cores of **L15** (location reference B2), **L14** (F4), **L13** (B1) and **L12** (F3) for maximum output. Repeat these adjustments until no further improvement results.

R.F. and Oscillator Stages.—As the tuning scale remains fixed to the cabinet when the chassis is withdrawn, reference must be made, during the following alignment, to the substitute tuning scale printed on the left-hand side of the scale backing plate (viewed from front). Readings on this scale are taken against the lower horizontal edge of the cursor carriage. Check that with the gang at maximum capacitance the substitute scale reading is 100. Transfer signal generator leads, via a standard dummy aerial, to **A** and **E** sockets.

In the gram model, the substitute scale is calibrated 0-50, and when carrying out the following alignment the receiver must be tuned to the substitute scale reading, quoted in each case, after dividing it by two.



Sketches showing the drive cord systems in the P45 and P46 (left) and the P45RG (right). They are drawn as seen when viewed from the rear with the gang at maximum capacitance. The P45RG drawing is reproduced from the makers' service manual.

L.W.—Switch receiver to L.W., tune to 52 on substitute scale, feed in a 214 kc/s (1,400 m) signal and adjust the cores of **L7** (G3) and **L2** (G4) for maximum output. Repeat these adjustments.

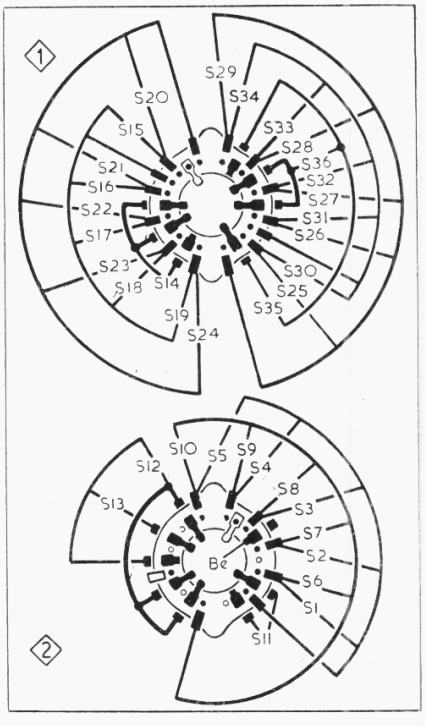
M.W.—Switch receiver to M.W., tune to 85 on scale, feed in a 600 kc/s (500 m) signal and adjust the cores of **L8** (G3) and **L3** (G4) for maximum output. Tune receiver to 15 on scale, feed in a 1,500 kc/s (200 m) signal and adjust **C37** (G3) and **C35** (G4) for maximum output. Repeat these adjustments until no further improvement results.

49 m band.—Switch receiver to 49 m, tune to 50 on scale, feed in a 6.1 Mc/s (49.18 m) signal and adjust the cores of **L9** (G4) and **L4** (G4) for maximum output.

31 m band.—Switch receiver to 31 m, tune to 50 on scale, feed in a 9.6 Mc/s (31.25 m) signal and adjust the cores of **L10** (F4) and **L5** (G4) for maximum output.

16 m band.—Switch receiver to 16 m, tune to 50 on scale, feed in a 17.8 Mc/s (16.85 m) signal and adjust the cores of **L11** (F3) and **L6** (F4) for maximum output.

Waveband Switch Diagrams and Table



Switch	L.W.	M.W.	49 m	31 m	16 m
S1	—	C	C	C	C
S2	C	—	C	C	C
S3	C	C	—	C	C
S4	C	C	C	—	C
S5	C	C	C	C	—
S6	C	—	—	—	—
S7	—	C	—	—	—
S8	—	—	C	—	—
S9	—	—	—	C	—
S10	—	—	—	—	C
S11	C	C	—	—	—
S12	C	—	C	C	C
S13	C	C	—	C	C
S14	—	—	C	C	C
S15	C	—	—	—	—
S16	—	C	—	—	—
S17	—	—	C	—	—
S18	—	—	—	C	—
S19	—	—	—	—	C
S20	—	C	C	C	C
S21	C	—	C	C	C
S22	C	C	—	C	C
S23	C	C	C	—	C
S24	C	C	C	C	—
S25	—	C	C	C	C
S26	C	—	C	C	C
S27	C	C	—	C	C
S28	C	C	C	—	C
S29	C	C	C	C	—
S30	C	—	—	—	—
S31	—	C	—	—	—
S32	—	—	C	—	—
S33	—	—	—	C	—
S34	—	—	—	—	C
S35	C	C	—	—	—
S36	—	—	C	C	C

Diagrams of the two waveband switch units as they appear in all three models when viewed from the rear of an inverted chassis. On the right is the associated switch table.

DRIVE CORD REPLACEMENT

About five feet of nylon braided glass yarn is required for a new drive cord in the table models, this length leaving an ample margin for tying off. The makers quote the exact length of the made-up cord as 50in between the centres of the end-loops.

The cord should be run as shown in the left-hand sketch, seen above in cols. 5 and 6, where the system is drawn as seen when viewed from the rear of the chassis when the gang is at maximum capacitance. Both ends of the cord are looped on to the same end of the tension spring, and may be made up like that in advance and fitted as a complete loop if desired.

Four feet is sufficient for the cord in the P45RG, whose exact length the makers give as 42⅜in. The system as seen from the rear is shown in the right-hand sketch.

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