"TRADER" SERVICE SHEET
1134

DECCA PORTROLA

A.C. Transportable Radiogram

THE Decca "Portrola" is a 4-valve (plus rectifier) 3-speed 2-band transportable radiogram designed to operate from A.C. mains of 200-250 V 50 c/s in 3 steps. An alternative speed change pulley can be obtained for the gram unit for operation from mains of 60 c/s. The waveband ranges are 190-550 m and 1,000-2,000 m.

Release date and original price: July 1952; £27, plus purchase tax.

CIRCUIT DESCRIPTION

Tuned frame aerial inputs **L1,** loading coil **L2, C31** (M.W.) and **L1,** loading coil **L3, C31** (L.W.) precede triode hexode valve **(V1, Mullard ECH42).** Provision is made for the connection of an external aerial via frame aerial coupling winding **L1a.**

Oscillator anode coils **L6** (M.W.), **L7** (L.W.) are tuned by **C34.** Parallel trimming by **C32** (M.W.) and **C33** (L.W.); series tracking by **C7** (M.W.) and **C8** (L.W.). Reaction coupling via **L4** (M.W.), **L5** (L.W.) and the common impedance of the trackers.

Second valve **(V2, Mullard EBF80)** is a double diode pentode valve, its pentode section operating as intermediate frequency amplifier with tuned transformer couplings **C3, L8, L9, C4** and **C13, L10, L11, C14.**

Intermediate frequency 380 kc/s.

One diode section of **V2** operates as signal detector, the audio frequency component in its rectified output being developed across diode load **R8** and passed via **R9, C17, S7** and volume control **R15** to grid of **V3b (one-half of Brimar 6SL7GT).** I.F. filtering by **C15, R9** and the capacitance of the screened leads.

Second diode of **V2** is fed via **C12** from **V2** anode, the resulting D.C. potential developed across diode load **R6** being fed back as bias to **V1** and **V2,** giving automatic gain control.

Section **a** of **V3** operates as pick-up preamplifier, the pick-up head (L.P. or standard) being connected in its grid circuit, and its output being passed via **C22** and **S8** to the top of the volume control. For gram operation switches **S6, S7** open to mute the radio, and **S8** closes. **R10** is shunted across the pick-up tone corrector circuit **C18, C19, R11** by a shorting link in the L.P. pick-up head, thus automatically modifying the input frequency response for L.P. operation.

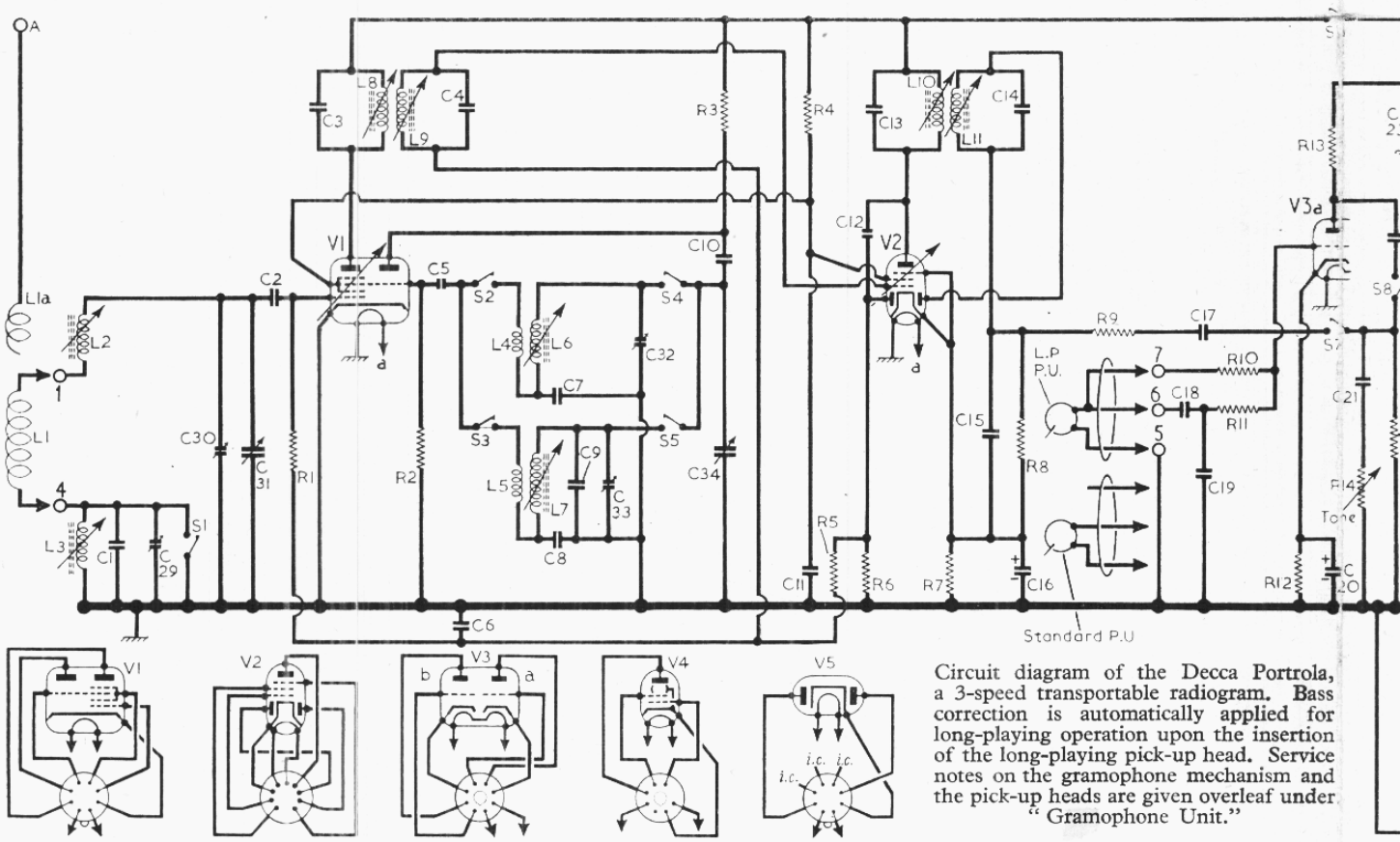
Resistance-capacitance coupling by **R17, C24** and **R20** between **V3b** and beam pentode output valve **(V4, Brimar 6V6GT).** A proportion of the speech coil voltage, that developed across **R23** in the potential divider **R22, R23,** is fed back to **V3b** cathode circuit giving negative feed-back tone correction. Variable tone control by **C21, R14** across **V3b** grid circuit.

H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Mullard EZ41),** whose anodes are strapped together to form a half-wave rectifier. Smoothing by **R19, R24** and electrolytic capacitors **C25, C27** and **C28.** A single heater winding **a** on the mains transformer **T2** feeds the heaters of all the valves, including the rectifier **V5.**

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 4) are those measured in our receiver when it was operating from A.C. mains of 230 V. The receiver was tuned to the highest wavelength end of the M.W. band and there was no signal input.

Voltages were measured with an Avo



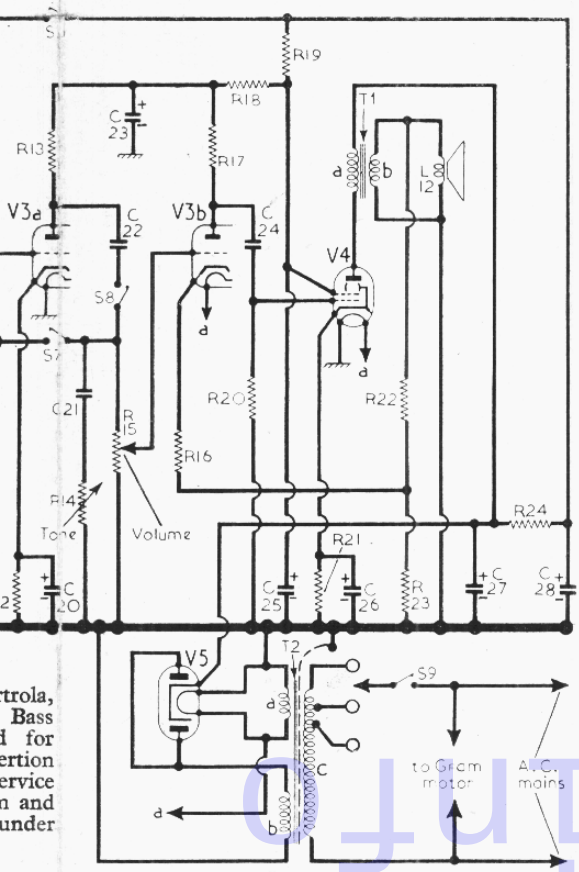
Circuit diagram of the Decca Portrola, a 3-speed transportable radiogram. Bass correction is automatically applied for long-playing operation upon the insertion of the long-playing pick-up head. Service notes on the gramophone mechanism and the pick-up heads are given overleaf under "Gramophone Unit."

Appearance of the Decca Portrola.

Electronic Testmeter and as this instrument has a high internal resistance, allowance should be made for the current drawn when using other types of meter. Chassis was negative in every case.

Valve	Anode V	Anode mA	Screen V	Screen mA	Cath. V
V1 ECH42	200	2·0	65	3·7	—
	Oscillator				
	100	3·9			
V2 EBF80	200	0·9	65	0·3	3·3
V3 a	75	0·26	—	—	0·6
6SL7GT b	75	0·26	—	—	1·4
V4 6V6GT	223	26·0	165	2·7	7·5
V5 EZ40	200†	—	—	—	235·0*

† A.C. reading. * Cathode current, 40 mA.



COMPONENTS AND VALUES

	RESISTORS	Values	Locations
R1	V1 C.G.	1M	D3
R2	V1 osc. C.G. ...	50kΩ	D3
R3	V1 osc. anode feed	27kΩ	D3
R4	S.G. H.T. feed ...	39kΩ	E3
R5	A.G.C. decoupling	470kΩ	D3
R6	A.G.C. diode load...	1·5MΩ	E3
R7	V2 G.B.	3·3kΩ	E3
R8	Signal diode load ...	220kΩ	E3
R9	I.F. stopper ...	91kΩ	E3
R10	P.U. tone correctors	68kΩ	F3
R11		5kΩ	F3
R12	V3a G.B.	2·2kΩ	F4
R13	V3a anode load ...	220kΩ	F3
R14	Tone control ...	1MΩ	C1
R15	Volume control ...	1MΩ	C1
R16	V3b G.B.	5kΩ	F3
R17	V3b anode load ...	220kΩ	F3
R18	H.T. smoothing ...	40kΩ	E3
R19		10kΩ	E4
R20	V4 C.G.	1MΩ	F3
R21	V4 G.B.	270Ω	F4
R22	Neg. feed-back pot.	5kΩ	F3
R23	divider	500Ω	F4
R24	H.T. smoothing ...	2·2kΩ	E4

	CAPACITORS	Values	Locations
C1	L.W. aerial trim....	100pF	D4
C2	V1 C.G.	150pF	D3
C3	1st I.F. trans.	100pF	A1
C4	tuning	100pF	A1
C5	V1 osc. C.G. ...	47pF	D3
C6	A.G.C. decoupling	0·1μF	D3
C7	M.W. osc. tracker	670pF	A2
C8	L.W. osc. tracker...	260pF	A2
C9	L.W. osc. trimmer	150pF	A1
C10	Osc. anode coup. ...	275pF	D3
C11	S.G. decoupling ...	0·02μF	E3
C12	A.G.C. coupling ...	60pF	E3
C13	2nd I.F. trans.	100pF	B1
C14	tuning	200pF	B1
C15	I.F. by pass ...	150pF	E3
C16*	V2 cath. by pass ...	20μF	E3
C17	A.F. coupling ...	0·02μF	E4
C18	P.U. tone correctors	0·05μF	F3
C19		0·05μF	F4
C20*	V3a cath. by-pass	25μF	F4
C21	Part tone control...	0·001μF	F4
C22	P.U. pre-amp coup.	0·05μF	E3
C23*	H.T. smoothing ...	16μF	B2
C24	A.F. coupling ...	0·05μF	F3
C25*	H.T. smoothing ...	16μF	B2
C26*	V4 cath. by-pass ...	25μF	F4
C27*	H.T. smoothing ...	16μF	B1
C28*		16μF	B1
C29‡	L.W. aerial trim. ...	45pF	A1
C30‡	M.W. aerial trim....	45pF	A1
C31†	Aerial tuning ...	—	A2
C32‡	M.W. osc. trim. ...	45pF	A1
C33‡	L.W. osc. trim. ...	45pF	A1
C34†	Osc. tuning ...	—	A1

* Electrolytic. † Variable. ‡ Pre-set.

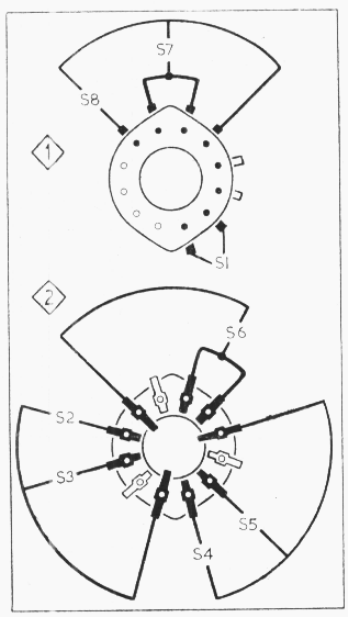
	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	Frame aerial ...	1·5	—
L1a	Frame aerial coup.	—	—
L2	M.W. loading coil...	1·0	D4
L3	L.W. loading coil...	6·0	D4
L4	Oscillator reaction	1·0	A2
L5	coils	1·5	A1
L6	Oscillator tuning	4·0	A2
L7	coils	8·0	A1
L8	1st I.F. trans. Pri.	5·0	A1
L9	Sec.	5·0	A1
L10	2nd I.F. trans. Pri.	5·0	B1
L11	Sec.	5·0	B1
L12	Speech coil ...	2·5	F4
T1	O.P. trans. a ...	370·0	B2
	b ...	—	
	a ...	—	
T2	Mains trans. b ...	200·0	G4
	c, total	54·0	
S1-S8	Waveband switches	—	A1
S9	Mains, sw., g'd R15	—	C1
P.U.	Long-playing ...	2,900	—
P.U.	Standard	3,400·0	—
Motor	200-250 V setting...	450·0	—

GENERAL NOTES

Switches.—**S1-S8** are the waveband and radio/gram change-over switches, ganged in two rotary units beneath the tuning scale backing plate. These units are indicated in our plan illustration of the chassis and shown in detail below.

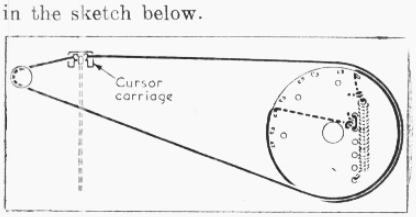
The associated switch table appears below, where a dash indicates open and **C** closed.

Switch	M.W.	L.W.	Gram.
S1 ...	C	—	—
S2 ...	C	—	—
S3 ...	—	C	—
S4 ...	C	—	—
S5 ...	—	C	—
S6 ...	C	C	—
S7 ...	C	C	—
S8 ...	—	—	C



Diagrams of the waveband and gram switch units.

Drive Cord Replacement.—About 26 inches of good-quality flax fishing line, plaited and waxed, is required for a new drive cord which should be run as shown in the sketch below.



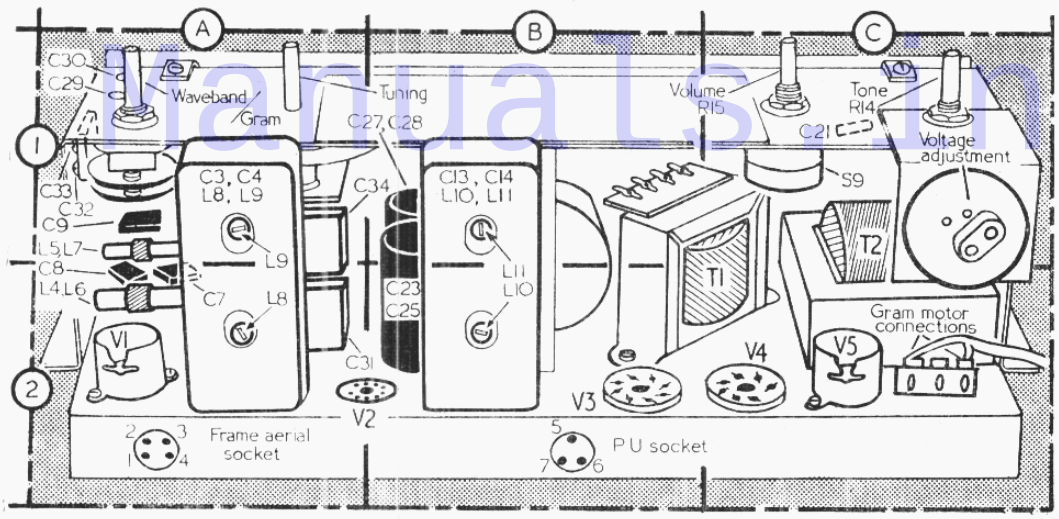
Sketch of the tuning drive system.

CIRCUIT ALIGNMENT

The chassis should be withdrawn from the carrying case for the following adjustments, but the frame aerial should be left connected.

I.F. Stages.—Switch receiver to M.W. and turn gang to maximum. Connect output of signal generator, via a 0.01μF capacitor in the "live" lead, to control grid (pin 6) of **V1** and chassis. Feed in a 380 kc/s (789.4 m) signal and adjust the

(*Continued* col. 1 *overleaf*)



Plan view of the chassis showing the waveband/gram switch units in location A1. These units are shown in detail overleaf in column 6, that labelled 1 referring to the upper unit in the chassis illustration, and that labelled 2 referring to the lower unit, both units being drawn as seen from below the chassis.

Circuit Alignment—*Continued*

cores of **L11** (location reference B1), **L10** (B2), **L9** (A1) and **L8** (A2) for maximum output. Repeat these adjustments until no further improvement results.

R.F. and Oscillator Stages.—Check that with gang at maximum capacitance the cursor coincides with the red and green vertical lines at the high-wavelength end of the tuning scale. Transfer "live" signal generator lead to "A" socket at rear of carrying case.

M.W.—Switch receiver to M.W., tune to 200 m, feed in a 200 m (1,500 kc/s) signal and adjust **C32** (A1) and **C30** (A1) for maximum output. Tune receiver to 500 m, feed in the 500 m (600 kc/s) signal and adjust the cores of **L6** (A2) and **L2** (D4) for maximum output. Repeat these adjustments until no further improvement results.

L.W.—Switch receiver to L.W., tune to 1,100 m, feed in a 1,100 m (272.7 kc/s) signal and adjust **C33** (A1) and **C29** (A1) for maximum output. Tune receiver to 1,800 m, feed in a 1,800 m (166.7 k/s) signal and adjust the cores of **L7** (A1) and **L3** (D4) for maximum output. Repeat these adjustments until no further improvement results.

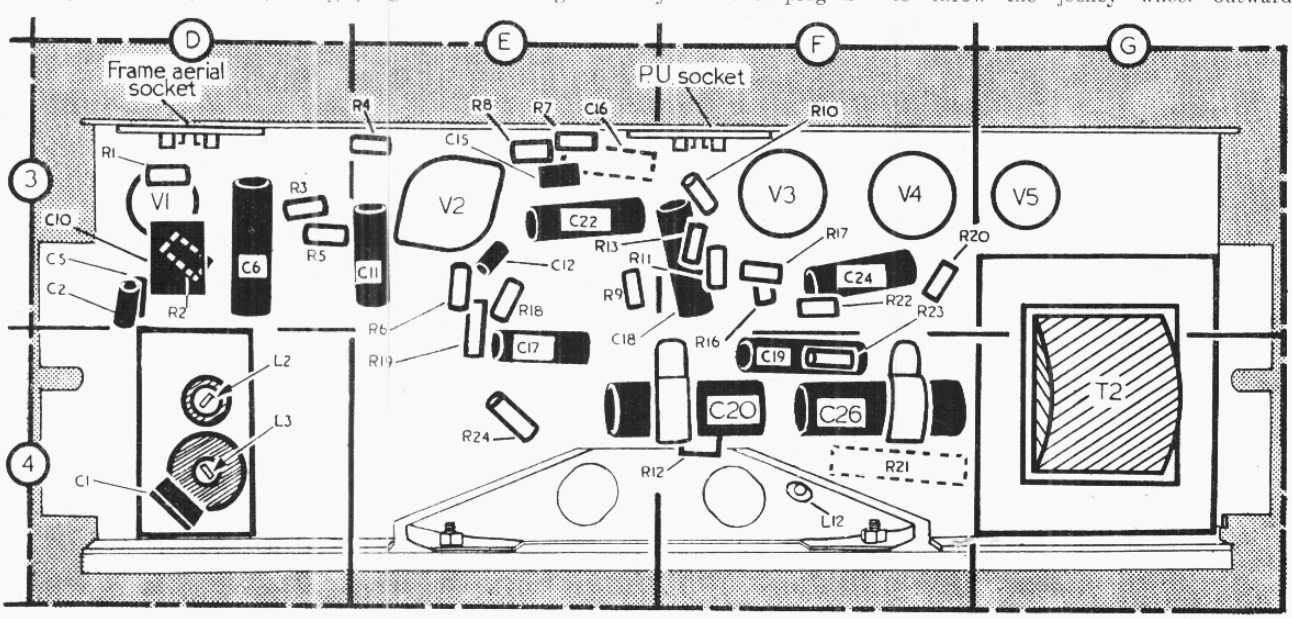
GRAMOPHONE UNIT

A B.S.R. type GU4A 3-speed gram motor unit is fitted in the Portrola, together with two Decca plug-in pick-up heads, type "C" for standard (78 r.p.m.) operation and type "D" for long-playing ($33\frac{1}{3}$, 45 r.p.m.) operation. Both the heads are of the magnetic variety, the plug connections of the long-playing one being arranged to bring a bass compensation circuit into operation automatically in the receiver chassis as indicated in the circuit diagram overleaf.

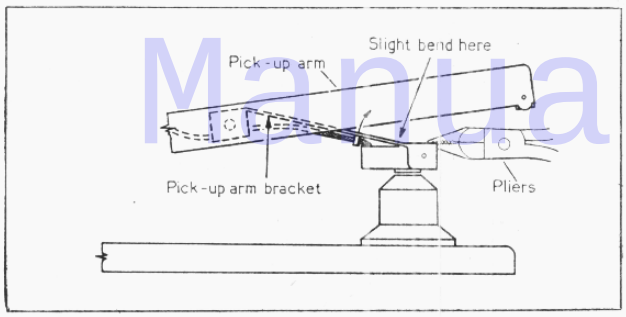
Voltage Adjustment.—The gram motor is designed to operate between the limits of 100-125 V and 200-250 V, from 50 c/s A.C. mains supply (an alternative speed change pulley is available for operation from 60 c/s mains), voltage adjustments being made by means of plug-in links in a terminal box located on the underside of the motor plate. A diagram showing the terminal box, together with the motor and pick-up leads is shown at the foot of col. 6. The solid line links show the positions for 200-250 V operation, and the broken line links show the 100-125 V positions.

Speed Change Control.—This control should never be operated when the motor is stationary as the rubber jockey wheel may jam against the flanges of the triple-diameter speed change pulley and strain the mechanism. The control knob should be turned smartly from one setting to the next when changing speed in order to facilitate the vertical movement of the jockey wheel as it changes levels against the pulley.

If mechanical vibration occurs, it is caused by the jockey wheel running permanently against the small cam on the speed change pulley (indicated in the sketch of the mechanism at the head of col. 6), the purpose of this cam being to throw the jockey wheel outwards



Underside view of the chassis. The frame aerial and P.U. sockets indicated here are individually numbered in the plan view above.



Sketch showing the pick-up height adjustment.

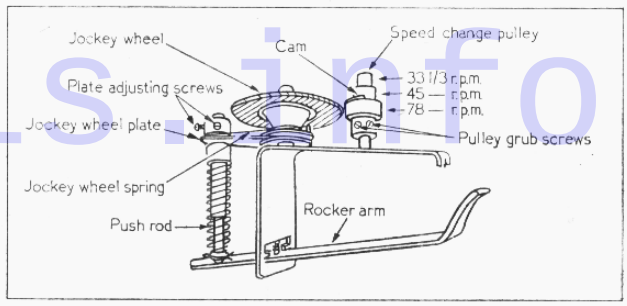


Diagram of the speed change mechanism.

during the speed change operation in order to disengage it from the speed change pulley.

If the speed change mechanism is not operating correctly, or severe vibration occurs after changing speeds, the following adjustment should be made.

Set the speed change operating control to 78 r.p.m. and with the push rod (see speed change mechanism sketch) resting on the rocker arm, slacken the fixing screws on the jockey wheel plate and adjust the plate so that it sits as close to the motor plate surface as possible.

Tighten up the fixing screws and then set the speed change control to 45 r.p.m. Slacken off the grub screws securing the speed change pulley to the motor spindle and adjust the height of the pulley until the tyre on the jockey wheel sits in the centre of the middle "step" on the pulley, watching to see that the tyre is clear of the cam at the bottom of this "step." Finally, tighten up the grub screws and check that the jockey wheel spring is coupled to the jockey wheel slide plate, and that the push rod is free to move up and down.

Lubrication.—The motor bearings are of the self-oiling type and lubrication should only be necessary after about every 1,000 hours of running. When lubricating, a drop of fine machine oil should be inserted in the bearings at each end of the motor. The bearing of the jockey wheel should also be oiled in a similar manner, taking great care to keep the oil away from its rubber tyre. The turntable spindle should be removed, after slackening the screw indicated in the voltage adjustment sketch below, and lightly smeared with grease. It is important that the oil and grease used in the foregoing are of the non-vegetable variety.

Auto-stop Mechanism.—The adjustment of this mechanism is not critical as with older types of motor and in the event of failure to switch off at the end of a record it should be set up in the following way.

Slacken off the screw securing the auto stop lever on the pick-up spindle (see voltage adjustment sketch (on right) and reset it so that the pick-up stylus can swing to within $1\frac{3}{8}$ inches from the centre of the turntable, and no farther, before it is brought to a halt by the auto stop lever. When this has been carried out, tighten up the lever clamping screw. Should the auto switch still not operate, check that the lugs on the auto stop lever engage in the switch bar and that the motor switch contacts are not sticking. These contacts can be seen through the inspection holes in the terminal box and may be oiled sparingly.

Tracking Faults.—If the pick-up consistently jumps grooves when playing, the following points should be checked.

Make sure that the pick-up arm is perfectly free to swing horizontally and vertically (oiling the pick-up spindle and pivot if any friction exists) and check that the moving parts are not being fouled by leads.

A spirit level should be used to ensure that the motor plate is on a horizontal plane, as a slight tilt will be sufficient to cause the light-weight type pick-ups employed to jump grooves on loud passages.

Check that the auto stop lever beneath the motor plate moves freely, and lightly smear with oil all parts where friction occurs. Finally, make sure that the correct pick-up stylus is in use (see "Pick-up Stylus"), and that it is absolutely perpendicular to the record surface.

Turntable "Wow."—If the turntable runs slow or "wow" is experienced, the turntable should be removed and the spindle checked for ease of rotation. The spindle should be capable of a $\frac{1}{16}$in vertical movement in its bearing, and if it appears restricted should be removed, cleaned thoroughly and greased as instructed under "Lubrication." The jockey wheel should also be checked for ease of rotation and for ease of movement in its slide.

Pick-up Height. — Owing to rough handling in transit, it is possible that the pick-up arm bracket may have been bent downwards causing the rear-end of the pick-up arm to catch on the edge of a 12in record when being played. This fault may be easily removed by bending the bracket upwards slightly with a pair of pliers as indicated in the pick-up sketch (head of col. 3). The bend should be sufficient to enable the rear of the pick-up arm to clear a 12in record by approximately $\frac{3}{16}$in.

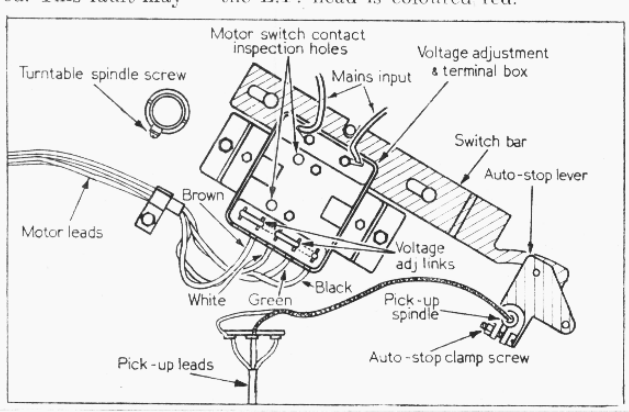
Pick-up Stylus.—When changing the stylus, the pick-up head should first be unplugged from the arm. Next remove the two 6BA instrument head screws securing the metal base plate. This will release the base plate, the top cover of the pick-up head, and the latex seal through which the stylus point sticks. Holding the pick-up head in one hand, the armature complete with stylus should be withdrawn with a pair of tweezers, taking care not to damage the coil or its fine connecting leads.

When the new armature and stylus is inserted, ensure that the stylus shank is central in the hole in the pick-up body, and that it is firmly bedded in the moulded socket. Replace the top cover, holding it firmly in position so that the armature cannot move, replace the latex seal, the metal base plate and finally the fixing screws. Make sure that the stylus point passes through the original hole in the latex seal and does not pierce it afresh.

A variety of styli are available for the standard and L.P. heads, and are colour coded by means of a spot of paint on the armatures and the colour of their containers. The colour code is as follows.

Red, 78 r.p.m. sapphire; **Green,** 78 r.p.m. diamond; **White,** long-playing (45, $33\frac{1}{3}$ r.p.m.) sapphire; **Brown,** long-playing (45, $33\frac{1}{3}$ r.p.m.) diamond.

It is important to note that the standard 78 pick-up head is coloured brown, and the L.P. head is coloured red.



Sketch showing the positions of adjusting screws, etc., referred to under "Gramophone Unit." The voltage adjustment links are indicated by solid line for 200 V, and broken line for 100 V.

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