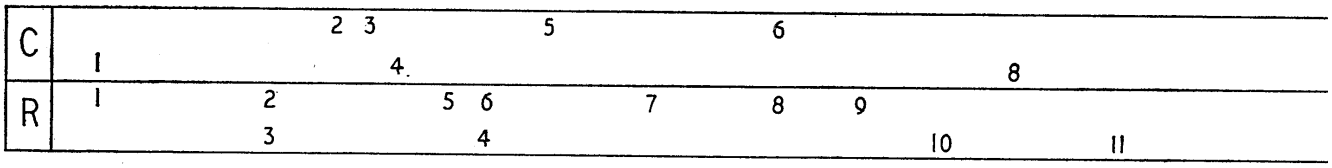
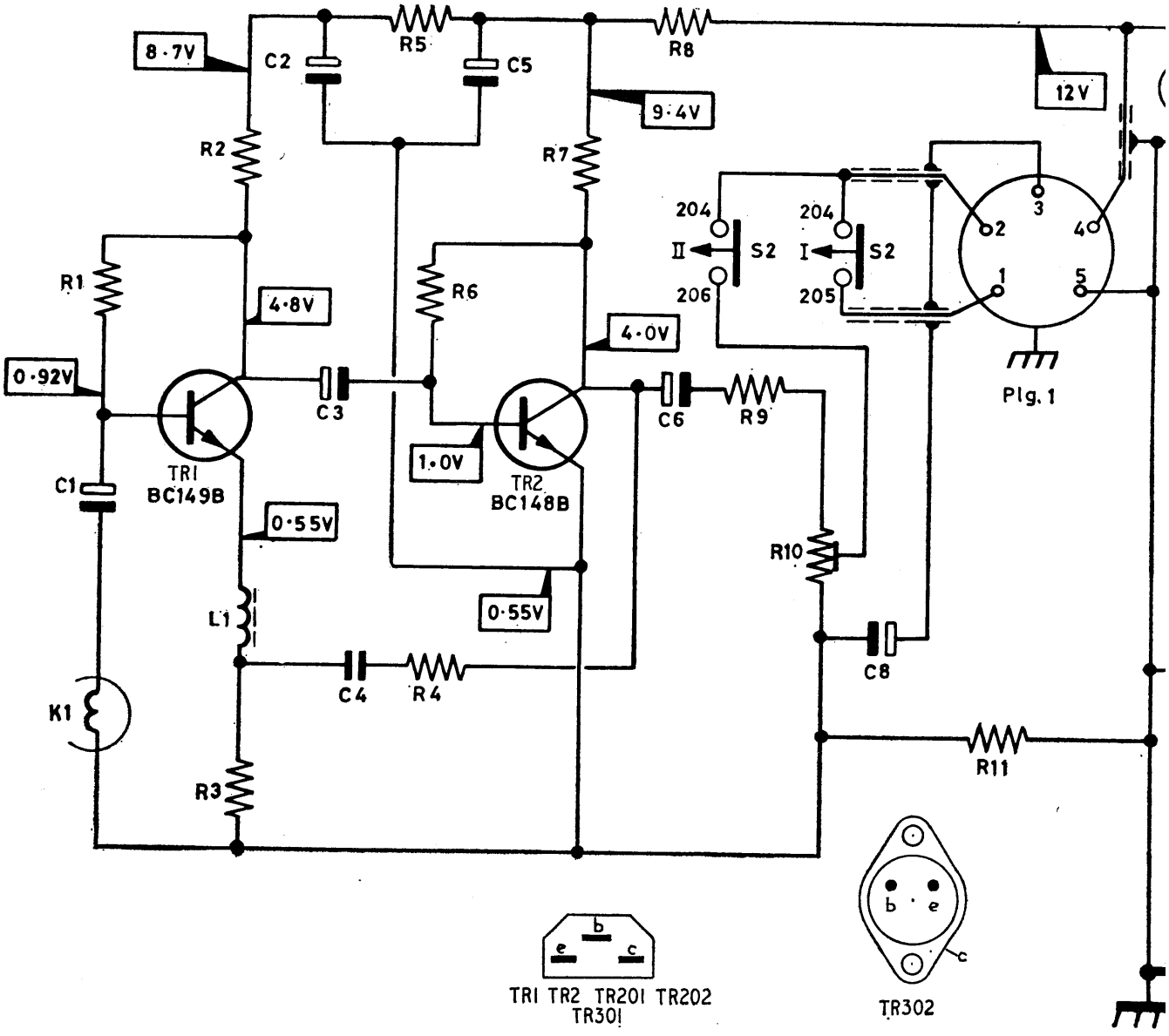
Supplement to Electrical and Electronic Trader
21 August, 1970

Philips N2600

1948

Car cassette tape player





Plg. 1

Appearance of the Philips N2600.

Resistors

R1	2·2MΩ	A
R2	7·5kΩ	A
R3	15Ω	A
R4	24kΩ	A
R5	1·2kΩ	A
R6	1·2MΩ	A
R7	10kΩ	A
R8	2·2kΩ	A
R9	18kΩ	A
R10	100kΩ	A
R11	470Ω	A
R201	2kΩ	B
R202	2·2MΩ	B
R203	4·7kΩ	B
R204	4·7MΩ	B
R301	3kΩ	B
R302	1kΩ	B
R303	16kΩ	B
R304	4·7kΩ	B
R305	2kΩ	B
R306	9·1Ω	B
R307	—	B

Capacitors

C1	2·5μF	A
C2	12·5μF	A
C3	2·5μF	A
C4	4,700pF	A
C5	125μF	A
C6	2·5μF	A
C8	80μF	A
C201	0·22μF	B
C202	0·22μF	B

Inductors

L1	—	A
L301	4·6Ω	B
L302	—	B
L303	—	B
L304	82Ω	B
K1	33Ω	C

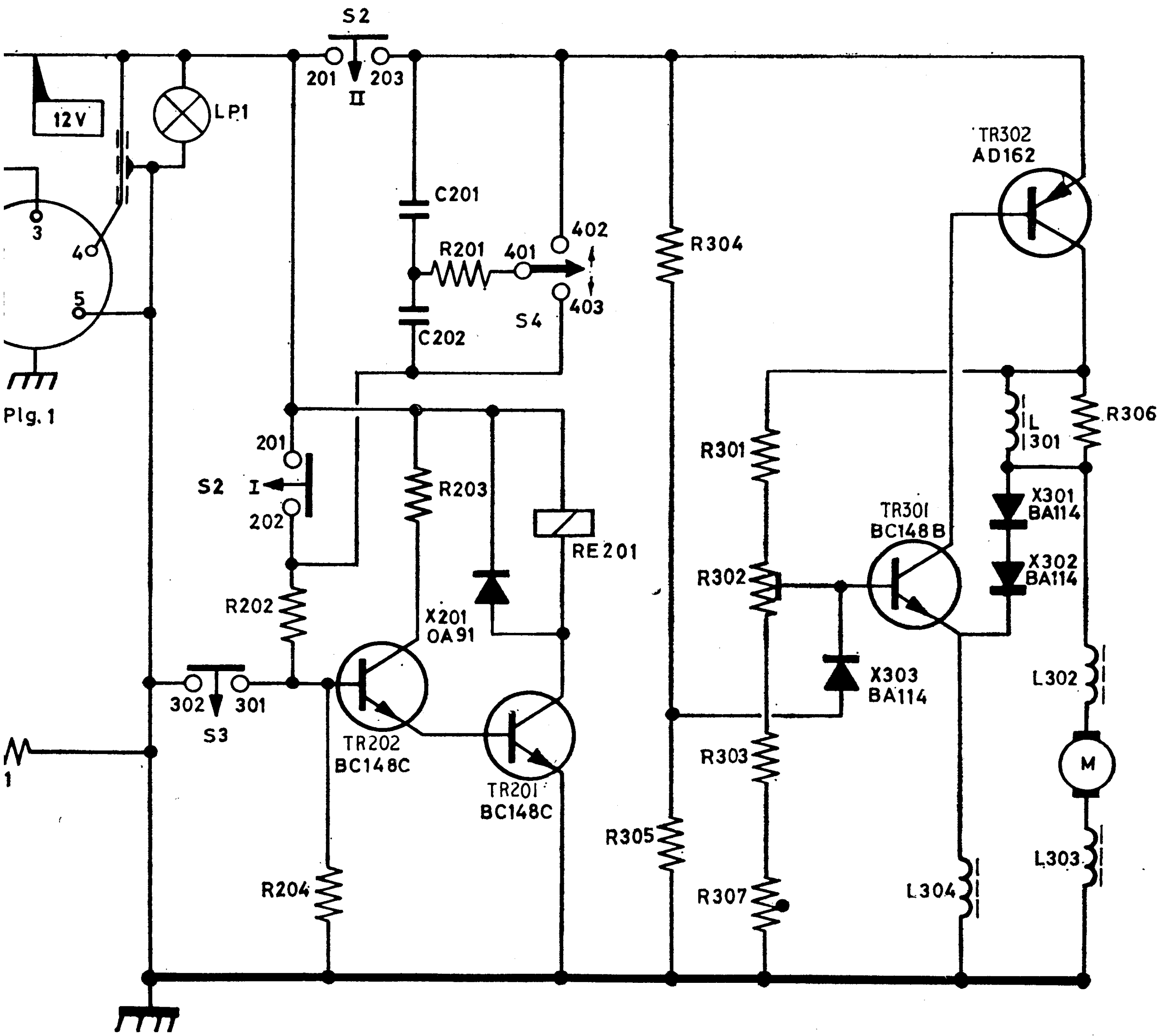
Semiconductors

TR1	BC149B	A
TR2	BC148B	A
TR201	BC148C	B
TR202	BC148C	B
TR301	BC148C	B
TR302	AD162	C
X201	OA91	B
X301	BA114	B
X302	BA114	B
X303	BA114	B

Miscellaneous

RE201	190Ω	C
S2	—	C
S3	—	C
S4	—	C
Plg1	—	C
LP1	19V 50mA	C

201 202	C
201 304 301 306 202 204 203 305 302 303 307	R



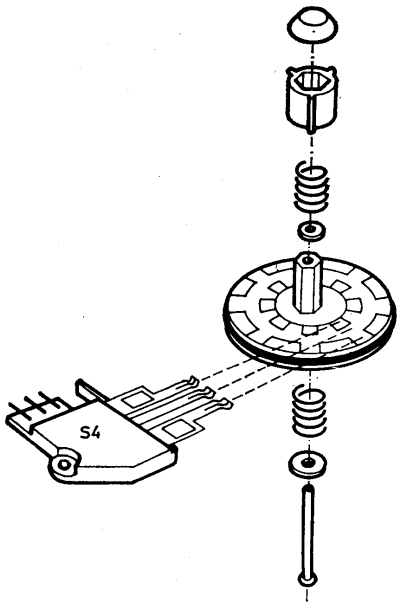
1948
Philips N2600

Introduction

Philips N2600 is a twin track tape cassette player for use in a car, incorporating six transistors and four diodes. The unit is designed to be used in combination with a car radio, audio amplification of the tape recording being carried out by the a.f. stages of the radio, for reproduction by the radio loudspeaker. Automatic switching from cassette reproduction to normal radio output is featured, operated by the cassette position. A notable feature is the circuit incorporated for regulating the motor speed against changes in supply voltage. Tape speed is 4·75cm/sec (1⅞in/sec). Supply voltage is 11-16V with negative earth, maximum current consumption is 140mA.
Output voltage is 500mV into 20kΩ and frequency range is 60Hz to 10kHz ±3dB. An automatic stop mechanism is fitted which has been re-designed since the model was released, to prevent tape spillage. The circuit and description are for the modified model which is factory coded WRO2. This *Service Sheet* should be used in conjunction with *Service Sheet* 1952.

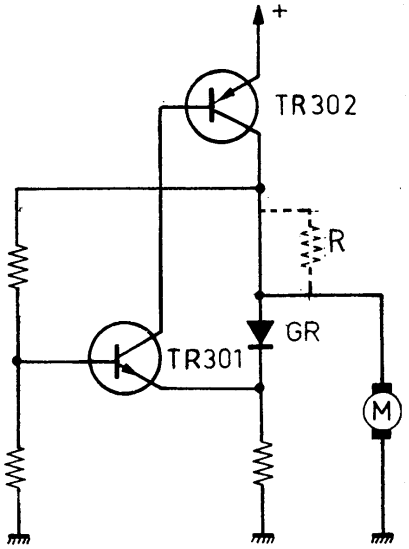
Circuit operation *with tape cassette down*

When the cassette is placed into position contacts **201** and **203** of **S2** are closed and a 12V supply is fed to both pre-amplifiers **TR1** and **TR2,** and also to the motor and associated speed regulator circuit.
Signals induced into the play-back head **K1** are fed via capacitor **C1** (2·5μF) to the base of the first pre-amplifier transistor **TR1.**
Audio voltages developed across **R2** are coupled by **C3** (2·5μF) to the base of the second pre-amplifier transistor **TR2.** Signals across collector load resistor **R7** are fed via **C6, R9** and pre-set sensitivity control **R10** to **C8** which

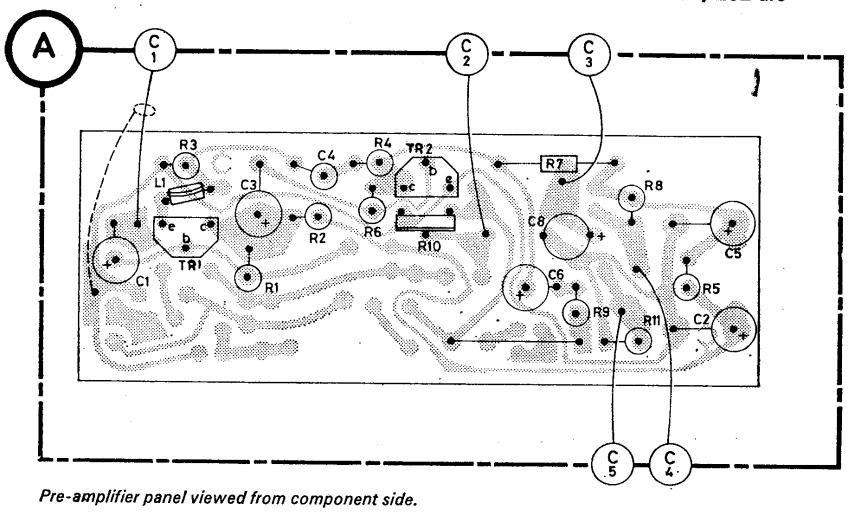


connects to the bottom end of the radio volume control via Pin 3 of the five pin **DIN plug 1.** Frequency compensation is effected by selective feedback loop **R4, C4** and **L1.** The wiper of **R10** is connected via contacts **204** and **206** of **S2** to the top of the volume control via **Pin 2** of **Plug 1.** The signal is then amplified by the a.f. circuits of the radio and fed to the loudspeaker in the normal way.

Automatic stop circuit. – A printed track is fitted to the right-hand turntable. **S4** is mounted so that its three contact blades press on this track and contact **401** is connected to contacts **402** and **403** alternately as the turntable rotates. With the unit connected to a supply and the cassette carrier up, contacts **201, 202** of **S2** are closed. The base of transistor **TR202** receives a positive potential causing **TR202** and **TR201** to conduct, and relay **RE201** is energized. If now the cassette carrier is depressed the motor supply is completed via contacts **201, 203** of **S2** and contacts **201, 202** are opened. The revolving turntable switches contact **401** of **S4** between contacts **402** and **403.** When **401, 402** are made, **C202** is charged via **R201** and **R202,** keeping the base of **TR202** sufficiently positive to maintain **RE201** in its closed position. At the same time **C201** will discharge via **R201.** Next, contacts **401, 403** are connected. **C201** is charged via **R201** and **R202, C202** is discharged via **R201,** again maintaining **RE201** in its closed state. Since **S4** operates quickly, the base of **TR202** remains virtually at a constant positive potential while the tape is revolving, and **RE201** remains energized, latching the cassette carrier down in the playing position. Should the turntable (67) stop revolving, because of jamming due to tape spillage, or because the end of the tape is reached, **S4** will remain in one of two positions. Depending on the position the charge on **C201** or **C202** will leak away in approximately one second and the potential at the base of **TR202** fall proportionally so that relay **RE201** becomes de-energized and the cassette carrier is released. As a result contacts **201** and **202 (S2)** are closed so that relay **RE201** is again energized and another cassette can be played immediately.



The cassette carrier can be released at any time by pressing the lever situated beneath the carrier holder, thus actuating switch **S3.**
Contacts **301/301** of **S3** are closed thereby earthing the base of transistor **TR202.** This discharges the base potential on **TR201** sufficiently for relay **RE201** to become de-energized, releasing the cassette holder. When the motor load increases, the motor current also increases, thus causing a larger voltage drop across the motor. If the voltage across the motor does not increase, the counter-e.m.f. will decrease, resulting in a lower speed. To counteract this, the voltage across the motor will have to increase, depending on the motor load. This is effected by adding a resistor **R,** as shown in the illustration, and removing the link.



Pre-amplifier panel viewed from component side.

Circuit Adjustments

Equipment required. – An electronic voltmeter to read up to 1000mV at 10kHz and 25V dc. An audio signal generator covering the frequency range 0-10kHz at 500mV. Two 100kΩ and one 100Ω resistors.

Playback sensitivity – to check proceed as follows:

1. – Turn **R10** to maximum.

2. – Unsolder the sheath of the screened lead to the playback head.

3. – Connect a 100Ω resistor in series with the sheath and the playback head.

4. – Connect a 100kΩ resistor across pins 2 and 3 of the DIN output plug.

5. – Couple an electronic voltmeter set to read 1000mV across pins 2 and 3 of the DIN plug.

6. – Feed in a 250Hz signal at 180mV via a 100KΩ to the junction of the 100Ω resistor and the playback head.

7. – The output on the electronic meter should be not less than 650mV.

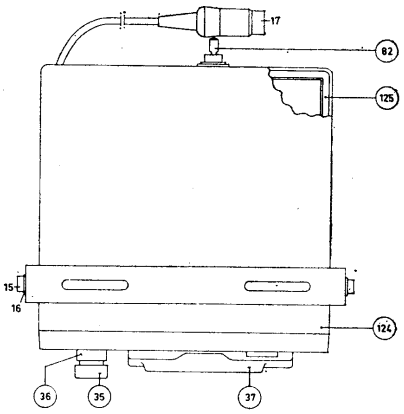
Frequency response check – proceed as in 1 to 5 above. Apply a 1kHz signal of 50mV±1dB via a 100kΩ resistor to the junction of the 100Ω resistor and the playback head. The output should be 85mV. Outputs at other frequencies should be as tabled:

Frequency Setting	Output voltage
62·5Hz	320mV±2dB
125Hz	285mV±1·5dB
250Hz	215mV±1dB
4kHz	55mV±1dB
10kHz	45mV±1dB

Note: – all voltages were measured with respect to battery negative and an input voltage of 12V.

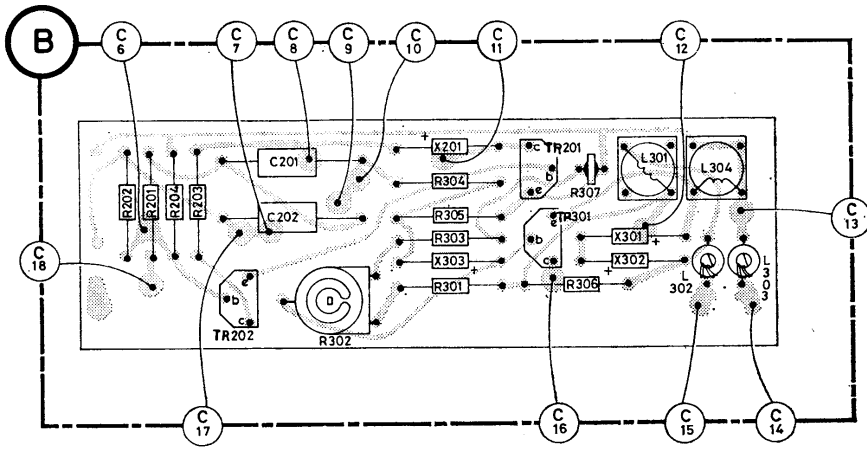
Transistor analysis

Voltages shown on the circuit diagram were obtained from information supplied by the manufacturers. They were measured with a 100kΩ/V sensitivity meter and are positive with respect to chassis.

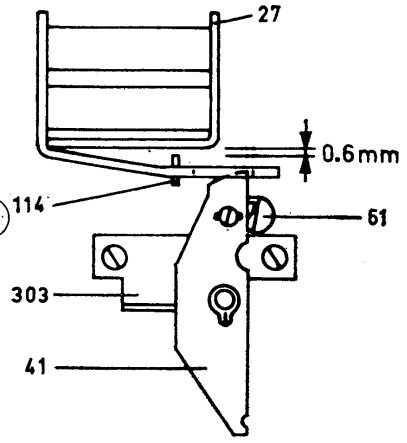


Dismantling procedure

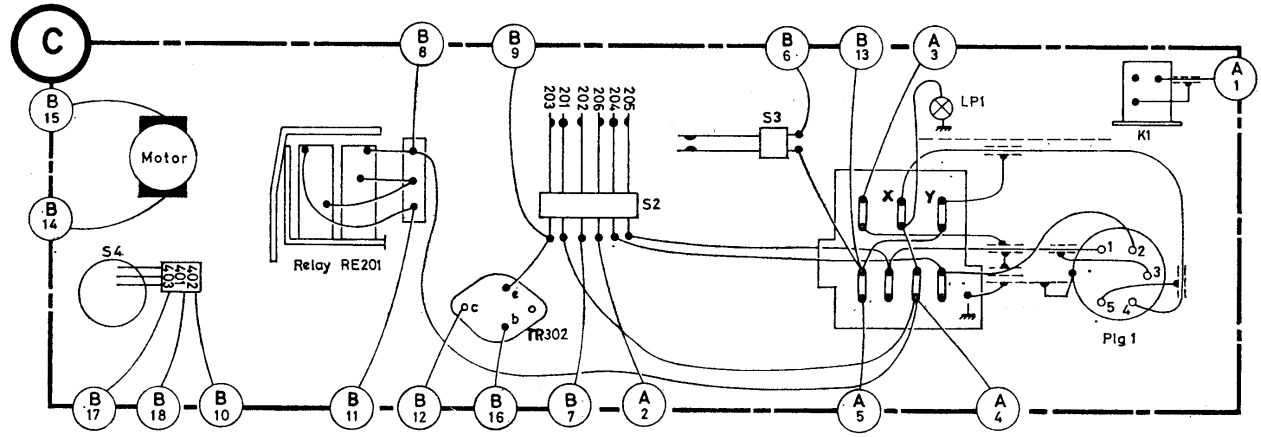
Disconnect the main lead and remove the mounting bracket by loosening the 4 screws (Item 15). Pull off control knobs (items 35, 36). Loosen the two screws (item 38) and remove cover (item 37). Loosen screw (item 120) and nut (item 34) so that front plate (item 122) can be removed. Loosen the three clamping rings (item 121) holding cabinet halves together, then separate halves.



Motor control and automatic stop panel viewed from component side.



Relay adjustment.



Note: for positive chassis operation connections X and Y should be transposed.

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Supplement to Electrical and Electronic Trader
18 September 1970

Philips N2600

1952

Car cassette tape player

Introduction

Mechanical details and adjustments applicable to the Philips N2600 are given in this *Service Sheet*, which is a continuation of, and should be used in conjunction with, *Service Sheet* 1948.

Replacement of cord 31. – Remove cover plate 322 from the motor housing by loosening the two screws 33. Remove lower-bearing bracket 314 by loosening the two screws 33 (watch thrust bearing 73). The cord can then be replaced. When refitting the cord, make sure that it does not become greasy.

Replacement of cord 104. – Remove the lower-bearing bracket 314 by loosening screw 33 (watch thrust bearing 73), remove tension spring 49 and disconnect cord 31 from the flywheel. The cord 31 can now be pulled out from underneath bracket 101.

Replacement of flywheel 72 – Remove lower-bearing bracket 314 by loosening the screw 33 (watch thrust bearing 73) then disconnect both cords from the flywheel. The flywheel can then simply be replaced.

Checking the height adjustment of the flywheel. – When mounting lower-bearing bracket 314, make sure that the cord grooves of the flywheel are level with those of the motor pulley and drive roller 93. The height of the flywheel can be adjusted with the aid of screw 75.

Replacement of drive roller 93. – Remove ring 48 for fixing bracket 101, disconnect tension spring 49 then remove ring 68 for fixing drive roller 93. Bracket 101 can now be removed. Disconnect cord 104 from the drive roller and remove drive roller (take out via opening between brackets 312 and 319).

Replacement of idler wheel 96. – Remove ring 48 for fixing bracket 101, rings 68 for fixing 93 and 96. Disconnect tension spring 49 then remove bracket 101 and bracket 97. Idler wheel 96 can then be replaced.

Replacement of rubber idler 108. Remove the flywheel, unhook tension spring 91 and loosen clamping ring 3 for fixing lever 111. Lever 111, bracket 110 and idler 108 can all be removed together. Remove ring 109, idler 108 can now be replaced.

Replacement of control bracket 88. – Remove cover plates 57 and 58 from the cassette compartment, and metal strip 320. Disconnect clamping spring 8, remove spring 87 and guide 60. The complete bracket with pressure roller, playback head and brake spring can now be taken out of the recorder.

Replacement of brake spring 81 (Fig. 2) – Remove the complete control bracket 88 from the recorder, then cut off the old and the new brake spring as shown in Fig. 2. The brake spring is provided with two holes. Place the new spring on the old one so that the holes coincide exactly. The old and the new spring can now be soldered together.

Replacement of slide 42, spring 43 and disc 44. – Remove tension spring 40, clamping ring 3 and tension spring 62. Lever 41 can now be removed. Loosen screws 33 so that bracket 303 can be removed. After this, 42, 43 and 44 can be replaced.

Replacement of the turntables 64 and 67. – Remove cover plates 57 and 58 from the cassette compartment and the covers 66. The turntables can now be replaced.

Replacement of the flywheel bearing 90. – Remove the flywheel, then loosen screws 89 and 7 then remove rings 18 and neoprene ring 84. The flywheel bearing can now be removed. After refitting the bearing readjust it so that the shaft of the flywheel is perpendicular to the direction of tape transport. The front of the bearing bushing is ground off slightly at the bottom so that the bushing will be slanted slightly when screw 7 is tightened.

With the aid of screw 89, the bushing can be positioned straight again because the neoprene ring 84 can be pushed in.

For further adjustment of the flywheel, see Mechanical adjustments.

Mechanical checks and adjustments

Pressure roller lever (Fig. 4). – The force required for pulling pressure roller 83 just clear of the capstan in position playback should be between 150 and 190gm.
This force can be adjusted by hooking the end of torsion spring 86 into a different hole.
In position playback, the clearance between pressure-roller lever 85 and tag A should be approximately 0·3mm. This can be adjusted by bending the bracket 312. The pressure roller should come 1 to 2mm clear of the capstan in case of fast winding.
This clearance can be adjusted with the aid of bracket 312.

Rubber idler 108 (Fig. 5). – Before carrying out this check, check the previous adjustment. In position playback, the clearance between lever 111 of the rubber idler and the tag 88 should be 1 to 2mm. This can be adjusted by bending the tag.
In case of fast winding, lever 111 of the rubber idler should turn more than 1mm in the direction of the arrow.
Brake bracket 81 (Fig. 6). – In position playback, the felt on the brake bracket should press against the front turntable with a force of approximately 30gm
This can be adjusted by bending the brake bracket.

Friction clutch. – It may occur that the tape is wound irregularly or not wound at all in the cassette. The tape coming from the capstan may then be damaged. This fault may be due to one, or both, of the following two causes:
a. Insufficient winding friction, or
b. excessive friction in the cassette.
To establish the cause of the fault, first measure the torque of the winding friction. Insert a test cassette into the recorder. Switch on the recorder and check that the torque of the friction clutch is between 30 and 50gm/cm.
If the torque of the friction clutch is too low, first measure the force of pulley 108 against turntable 67.
This force, measured at the spindle of the pulley, should be between 90 and 110gm.
If this force is correct, while the torque of the friction clutch still is too low, replace the friction clutch.
After replacement, check the friction clutch again.

Flywheel adjustment. – Because the tape guide, the playback head and the pressure roller of the N2600 are always

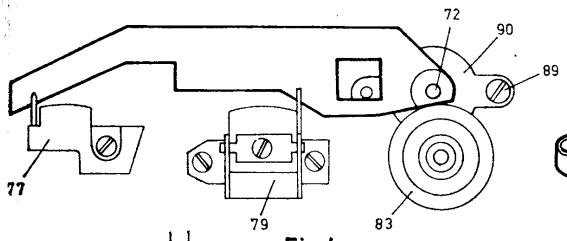


Fig.1

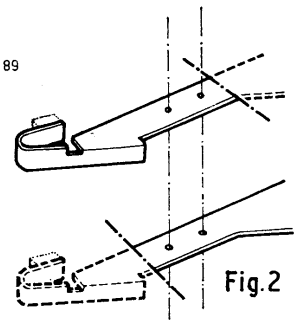


Fig.2

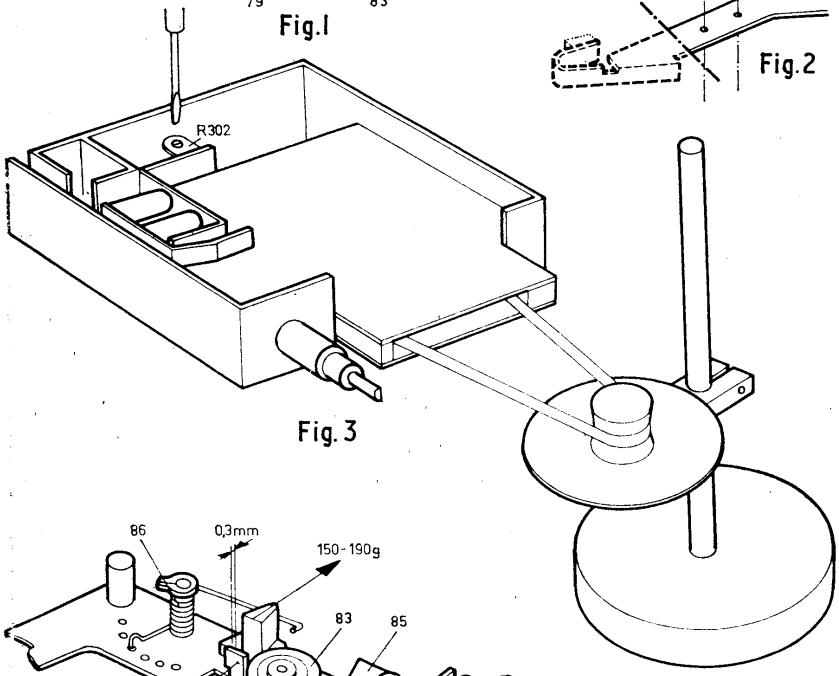


Fig.3

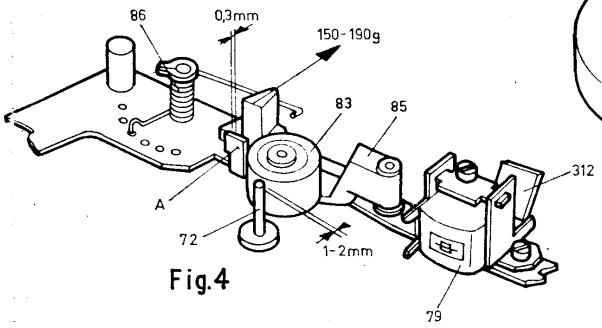


Fig.4

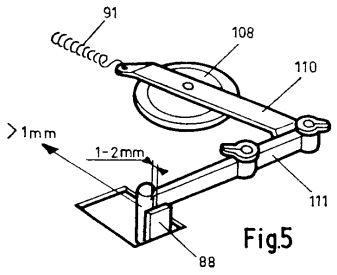


Fig.5

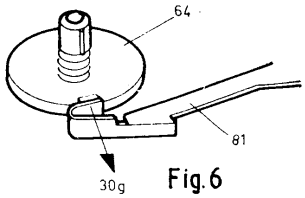


Fig.6

aligned, the capstan is the only component for adjusting tape transport. This capstan should be perpendicular to the direction of tape transport. This is effected by means of an adjusting jig available from Philips, part No. 4822 402 60245.

Adjustment. – Remove the cover 57 from the cassette compartment and set the recorder to position playback. While pulling back the pressure roller, slide the jig over the capstan. The jig should then slide into the tape guides without any friction (see Fig. 1). If this is not so, the position of the capstan can be readjusted with the aid of screw 89.

Tape-speed check 1

The tape-speed should be checked with the aid of a test tape on which a 400Hz signal is modulated at intervals of 4·75 meters.

Insert the cassette with test tape. Set the recorder to position playback. The time lapsing between two 400Hz signals should be between 98 and 102 secs. If this time is less than 98sec, the speed is too high, while it is too low if this time exceeds 102secs.

In the latter case, the friction of one or more of the recorder parts probably is too high, i.e. the pressure roller, winding friction, flywheel or turntable. These parts should then be cleaned and lubricated again.

If the speed is still too high or too low after that, adjust with **R302.**

This method of checking is rather time-consuming, so the following method is recommended.

Tape-speed check 2 (Fig. 3)

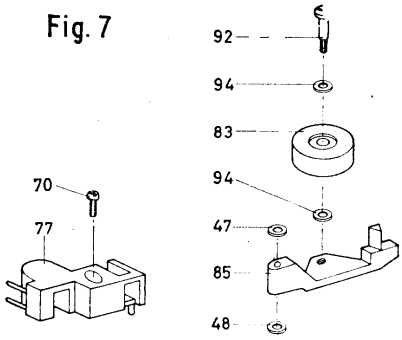
Open a cassette at one side, pull out the tape via this opening. Take the recorder out of the cabinet and insert the cassette. Position a stroboscopic disc (code number 4822 395 90001 for 50Hz and 4822 395 90002 for 60Hz) next to the recorder and feed the tape alongside the disc.

If the recorder is switched on, it can be read direct from the disc whether the speed is too high or too low.

If the speed is too low, it may be due to excess friction of the pressure roller, winding friction, flywheel or turntables. Clean and lubricate these parts again.

If the speed is still not correct, it can be adjusted with **R302.** The time required for fast rewinding of a full cassette should be less than 60secs.

Fig. 7



Production changes

1. – Neoprene ring 84, which serves for the adjustment of the flywheel, has been replaced by a pressure spring. Fixing screw 7 for bearing 90 is changed to 2 x 8mm.
2. – Slide 76 was secured with stud 71.
3. – Turntables 64 and 67 will be supplied without pressure spring 63 and locating spigot 59. These parts are available separately.
4. – The pressure roller 83 and pressure roller lever 85 have been modified to enable the roller to be secured with a special screw 92 and washer 94, see Fig. 7. The original type rollers and levers are no longer available; consequently, if an old type roller or lever is required, both items must be replaced.
5. – The hinge brackets for the cassette compartment, 301 and 317 will be secured with special screws 51 and 54, see Fig. 8.

On models with factory coding 'WR02': **SK4** is a different type and is not supplied with or fitted to tape guide 77. The fixing screw for **SK4** is 2·5 x 4mm.

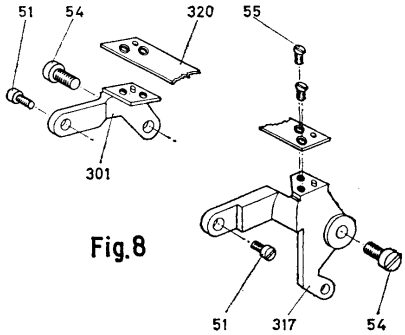
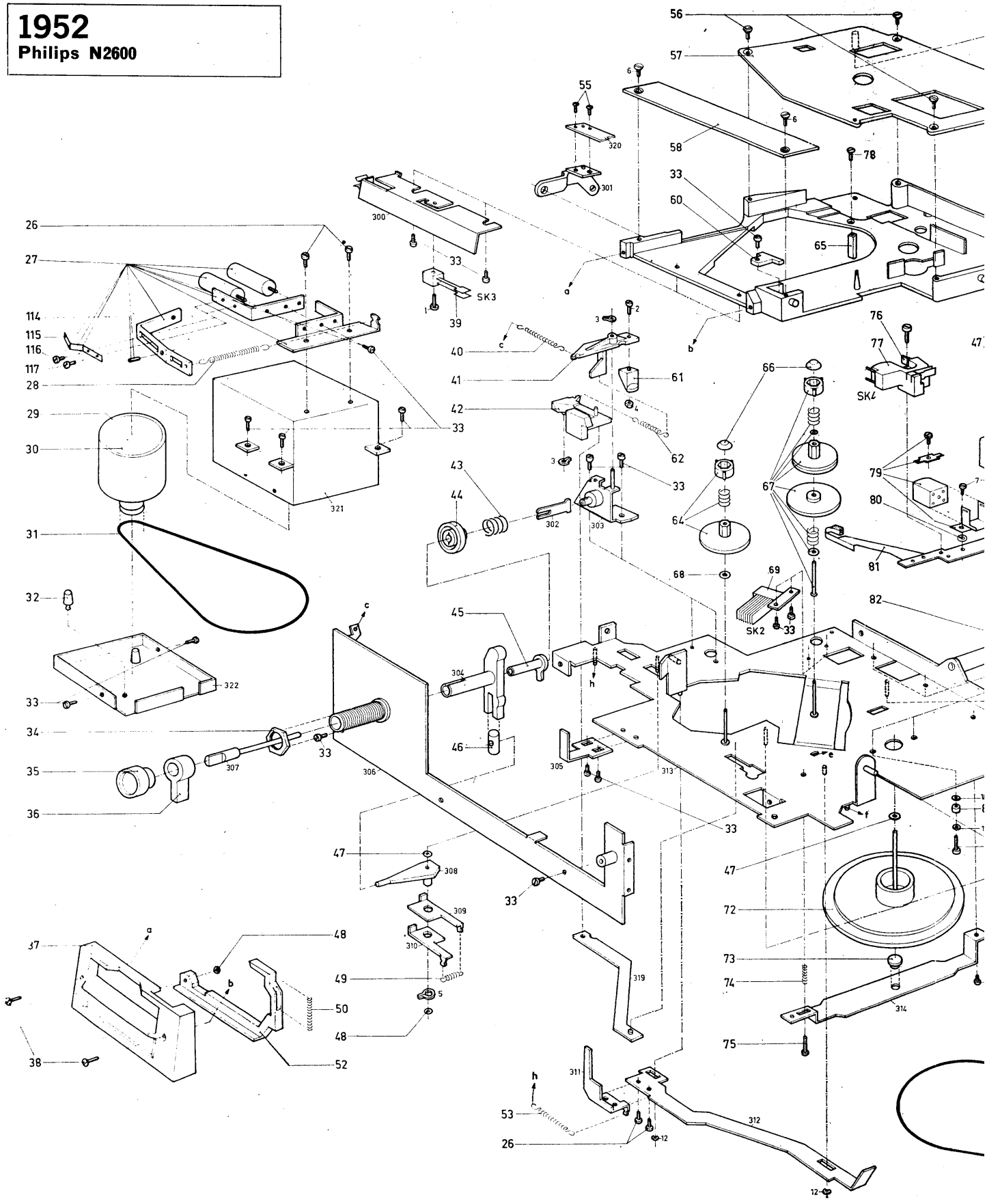


Fig.8

1952
Philips N2600



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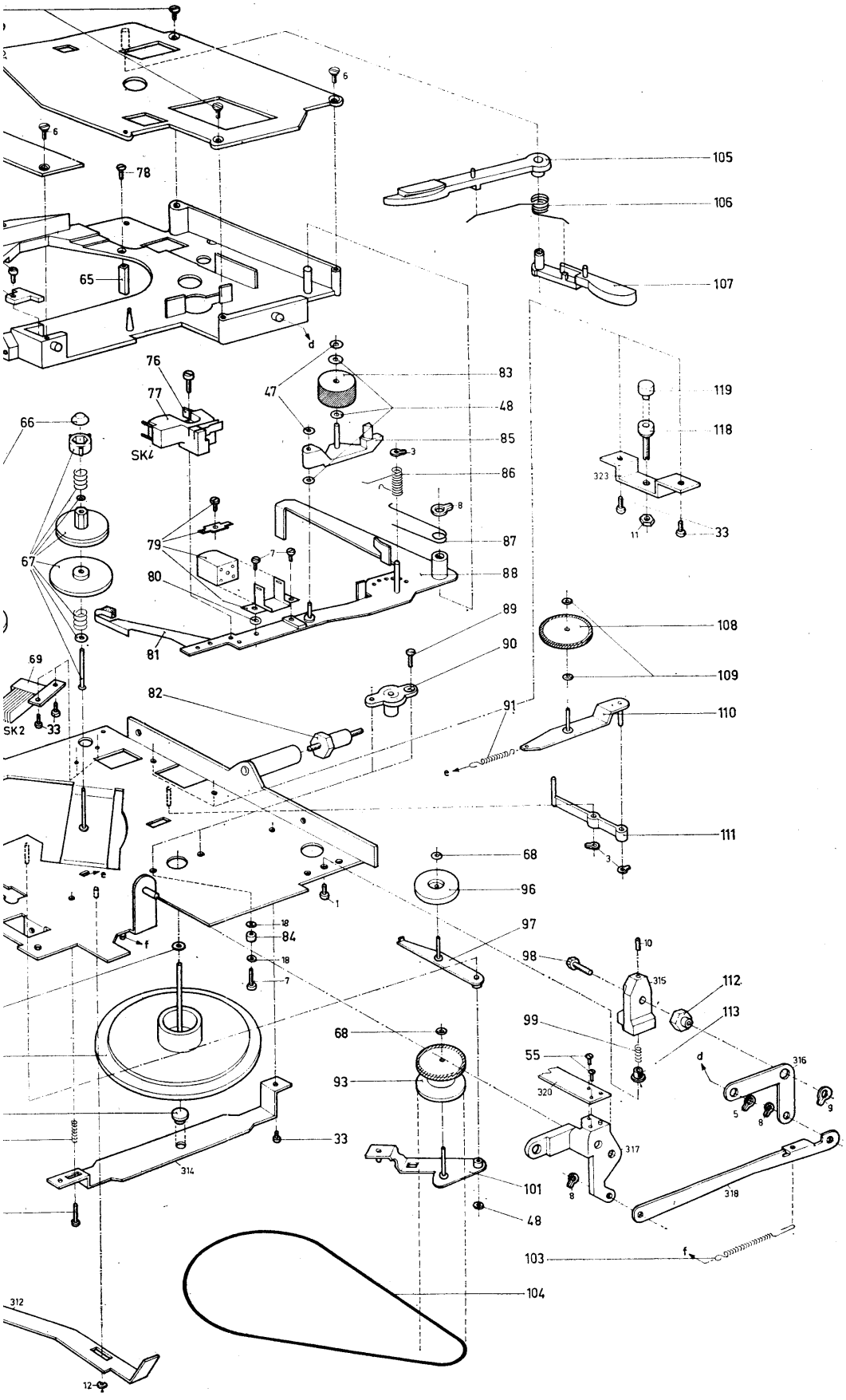

Item	Description
1	screw (3 x 10mm)
2	screw (2 x 8 mm)
3	clamping ring (3mm)
4	nut (M2)
5	clamping ring (5mm)
6	counter-sunk screw (2 x 6mm)
7	screw (2 x 6mm)
8	clamping ring (4mm)
9	clamping ring (6mm)
10	screw (3 x 10mm)
11	nut (M3)
12	clamping ring
15	screw (5 x 8mm)
16	circlip (5mm)
17	plug (6-pole)
18	ring (2mm)
26	screw (2·5 x 6mm)
27	direct current relay
28	tension spring
29	rubber grommet
30	motor
31	drive cord
32	spacer for lid
33	screw (2·5 x 4mm)
34	nut (M10)
35	knob
36	knob
37	cover
38	ornamental screw
39	switch (SK3)
40	tension spring
41	lever
42	slide
43	pressure spring
44	disc
45	pipe
46	guide pin
47	ring
48	ring
49	tension spring
50	pressure spring
52	ejector button
53	tension spring
55	counter-sunk screw (2·5 x 4mm)
56	counter-sunk screw (2·5 x 6 mm)
57	lid for cassette compartment
58	lid
60	guide
61	cam
62	tension spring
64	turntable
65	cam for switch
66	cap for turntable
67	turntable
68	ring
69	switch (SK2)
72	flywheel
73	thrust bearing
74	pressure spring
75	screw (2·5 x 10mm)
76	slide in tape guide
77	tape guide with switch (SK4)
78	self-tapping screw (2 x $\frac{3}{32}$in)
79	playback head
80	ring
81	brake spring with felt
82	spacing bolt
83	pressure roller
84	ring
85	pressure-roller lever
86	torsion spring pressure-roller lever
87	torsion spring
88	lever
89	set-screw for flywheel (2·5 x 4mm)
90	flywheel bearing
91	tension spring
93	drive roller
96	idler wheel
97	bracket
98	screw
99	pressure spring
101	bracket
103	tension spring
104	cord
105	lever
106	torsion spring
107	lever
108	idler wheel
109	ring
110	bracket
111	lever
112	nut
113	nut
114	screw (2·5 x 10mm)
115	bracket
116	screw (1·6 x 3mm)
117	screw (1·6 x 3mm)
118	set-screw
119	buffer
120	screw

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