

# Dual

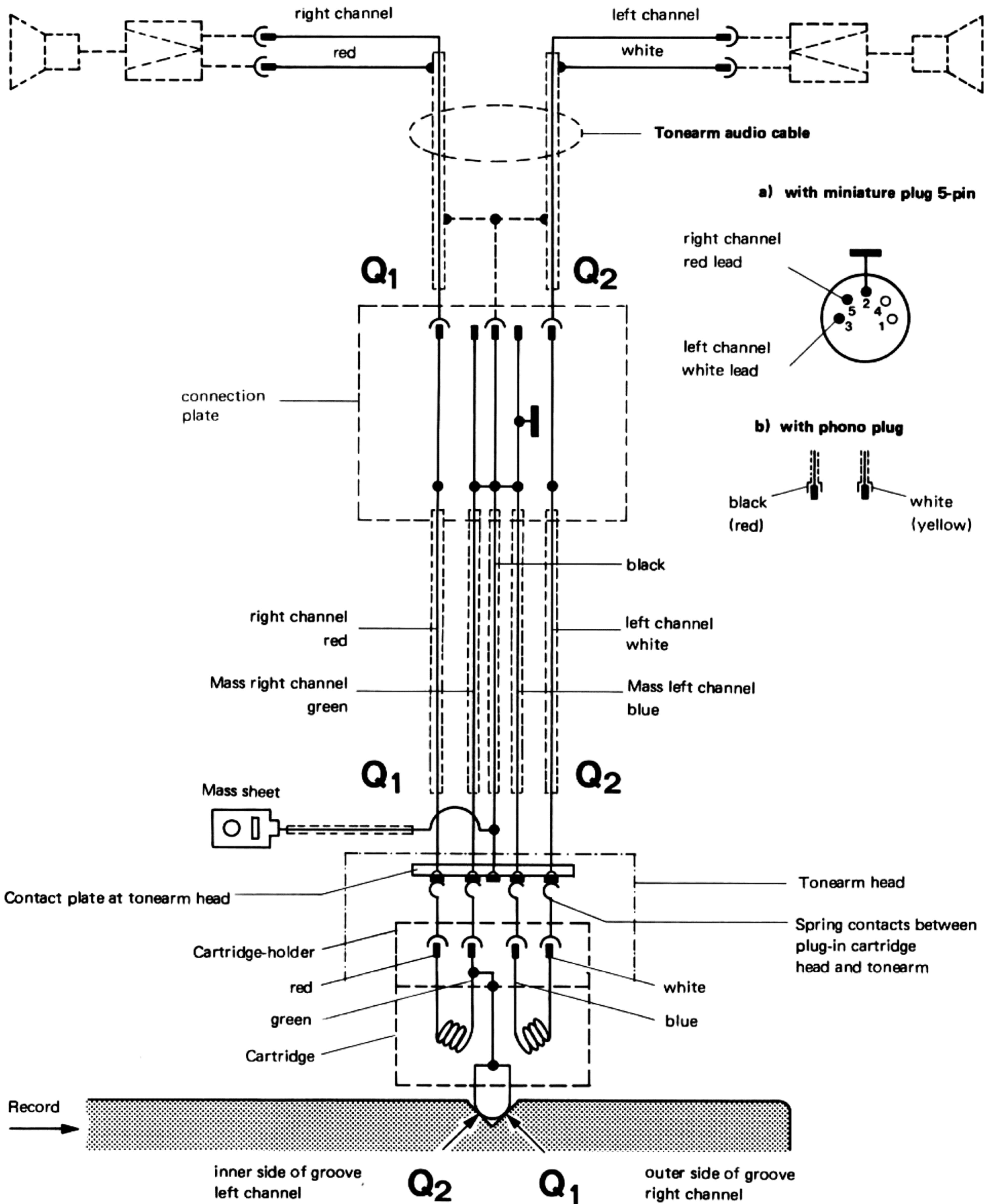
# 510



## Service Manual

Dual Gebrüder Steidinger · 7742 St. Georgen/Schwarzwald

Fig. 1 Pick-up Connection Diagram





# Contents

	Page
Pick-up Connection Diagram	2
Specification	3
Motor and Pulley	4
Replacement of Motor Pulley	4
Stroboscope	5
Pitch Control	6
Nominal speed is at the edge of the control range of the pitch control	6
Platter does not run after the line voltage cord of the unit has been plugged into the receptacle and the master operating switch moved to „start“.	6
Platter does not come up to its required speed.	6
Pick-up head not parallel to platter	6
Tonearm and Tonearm Bearing	7
Adjustment of Tonearm Bearing	7
Anti-skating Device	8
Stylus skips out of playing groove	8
Vertical tonearm movement shows resistance during set down	8
Tonearm set-down Mechanism	9
Cue Control	9
Replacement of Lift Tube	10
Tonearm does not set down at the edge of the record	10
Tonearm does not set down on record after operating cue control	10
Tonearm lowers onto record too quickly when cue control is operated	10
With tracking force and anti-skating in 0-position tonearm moves	10
Motor switches off when tonearm sets down on rest	10
Acoustic feedback	11
Starting and shut off	11
Horizontal tonearm movement shows resistance	11
Replacement Parts with Exploded views	12 - 16
Replacement Parts, Connection plate	17
Replacement Parts, power switch	17
Lubrication	18

## Specification

<b>Current Type</b>	AC 50, 60 Hz, selected by exchanging drive pulley
<b>Line Voltages</b>	110 – 130 volts, 220 – 240 volts
<b>Motor and Drive</b>	8-pole/synchronous motor with belt drive system
<b>Power Consumption</b>	approx. 10 watts
<b>Current Consumption</b>	with 220 V 50 Hz approx. 72 mA with 110 V 60 Hz approx. 135 mA
<b>Platter</b>	Non-magnetic, dynamically-balanced, detachable, 1,3 kg, 300 mm dia
<b>Platter Speeds</b>	33 1/3 and 45 rpm
<b>Pitch Control</b>	Range of adjustment approx. 1 semitone (6 %) at 33 1/3 rpm
<b>Speed Check</b>	with light stroboscope for platter speeds of 33 1/3 rpm, for 50 and 60 Hz
<b>Overall Speed Variation</b>	(assessed in accordance with DIN 45 507) $< \pm 0.08$
<b>Signal-to-Noise Ratio</b>	Rumble weighted signal-to-noise ratio $> 63$ dB (in accordance with DIN 45 500) Rumble unweighted signal-to-noise ratio $> 42$ dB
<b>Tonearm</b>	Torsion resistant, tubular aluminum tonearm in universal four-point gimbal suspension
<b>Tonearm Bearing Friction</b> (related to stylus point)	vertical $< 0.007$ p horizontal $< 0.015$ p
<b>Pick-up Head</b>	Detachable, suitable for all pick-up cartridges with Dual catch mounting and 1/2" mounting and a deadweight of 5.5 – 10 g (including mounting material)
<b>Tracking Force</b>	0 – 3 p continuously variable, with 1/10 p calibration in the range from 0 – 1.5 p, reliable as from 0.5 p tracking force
<b>Weight</b>	approx. 4.3 kg For dimensions and cutout refer to Installation Instructions



Fig. 2 Motor and Drive

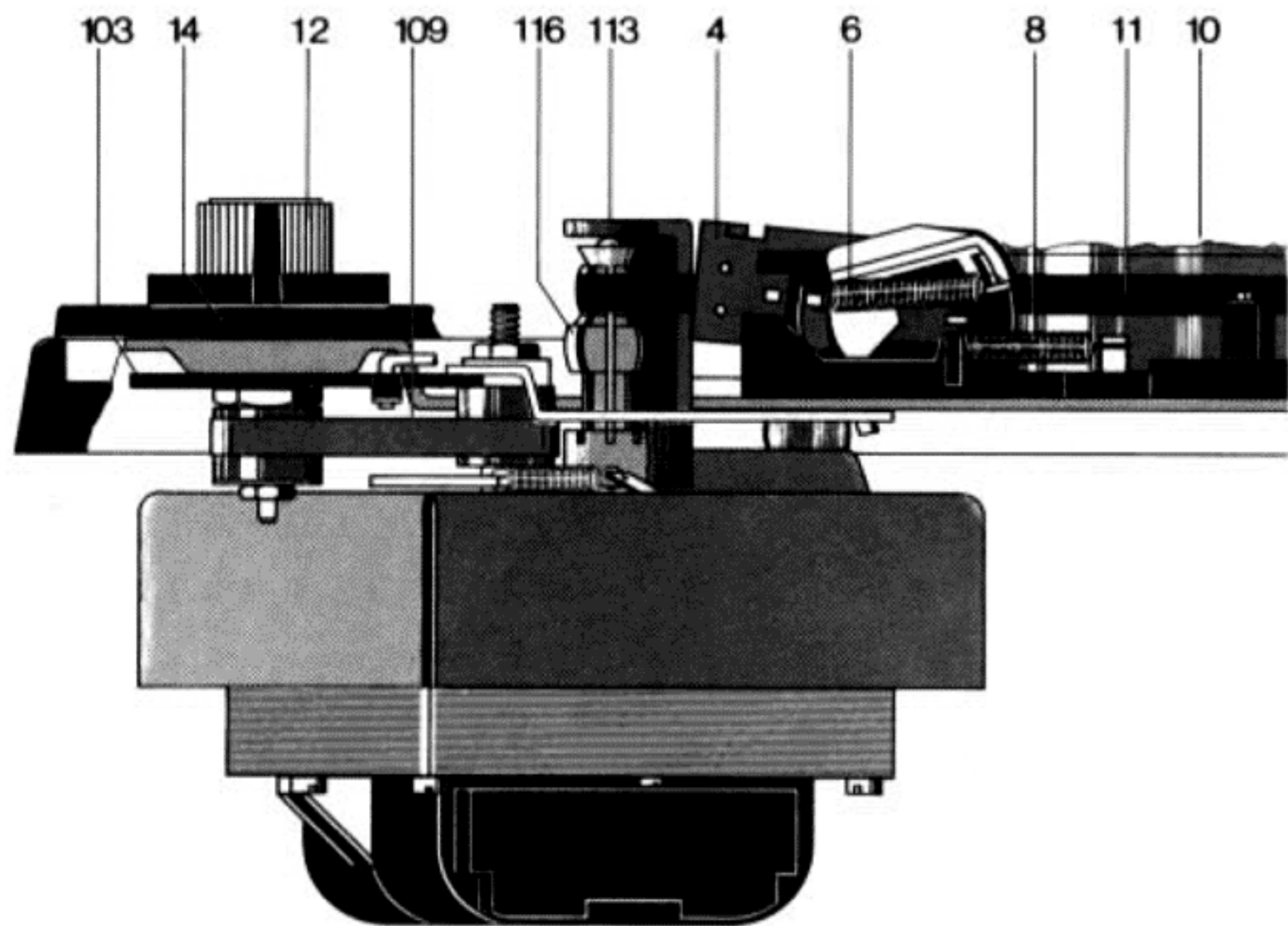


Fig. 3

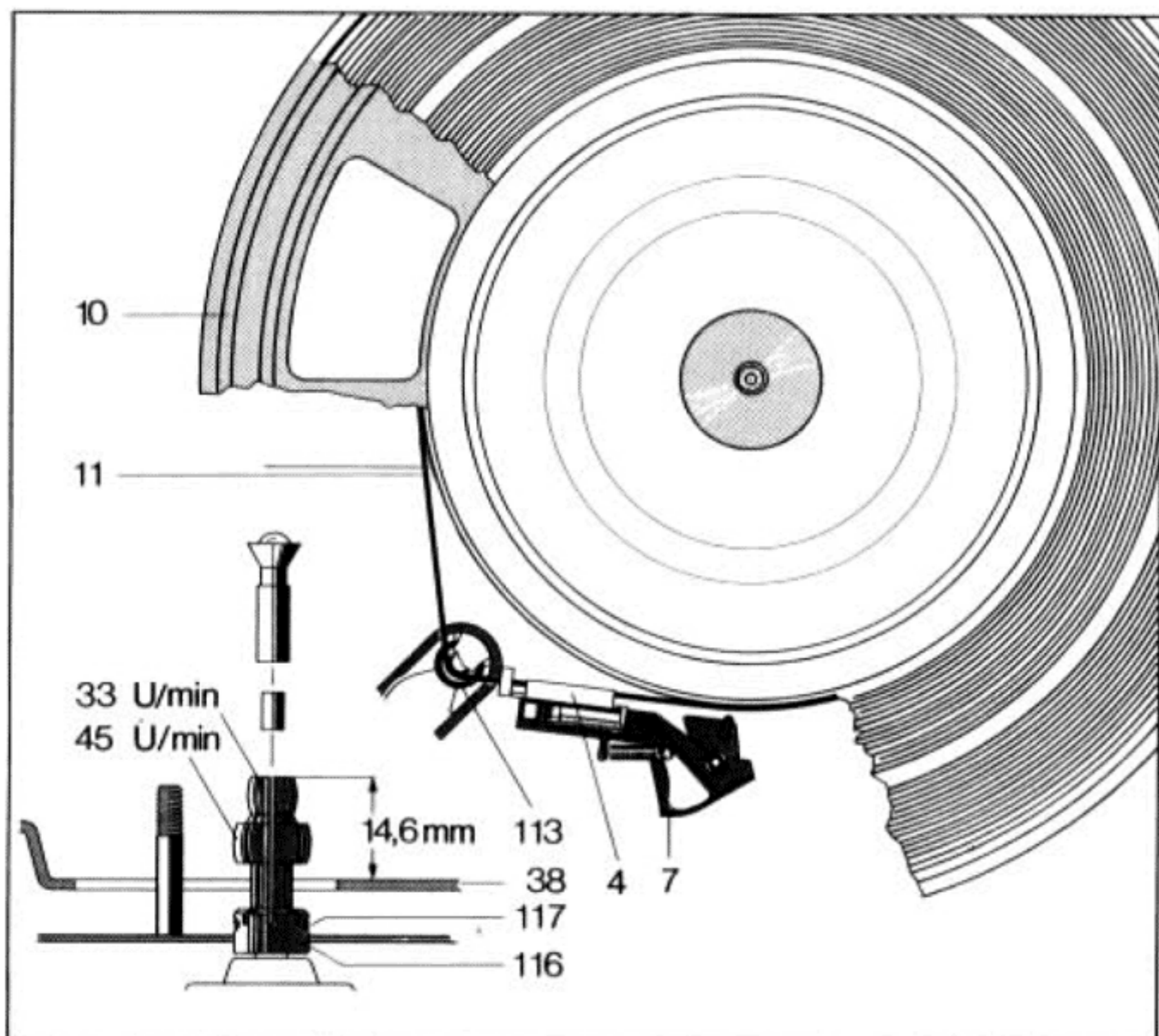
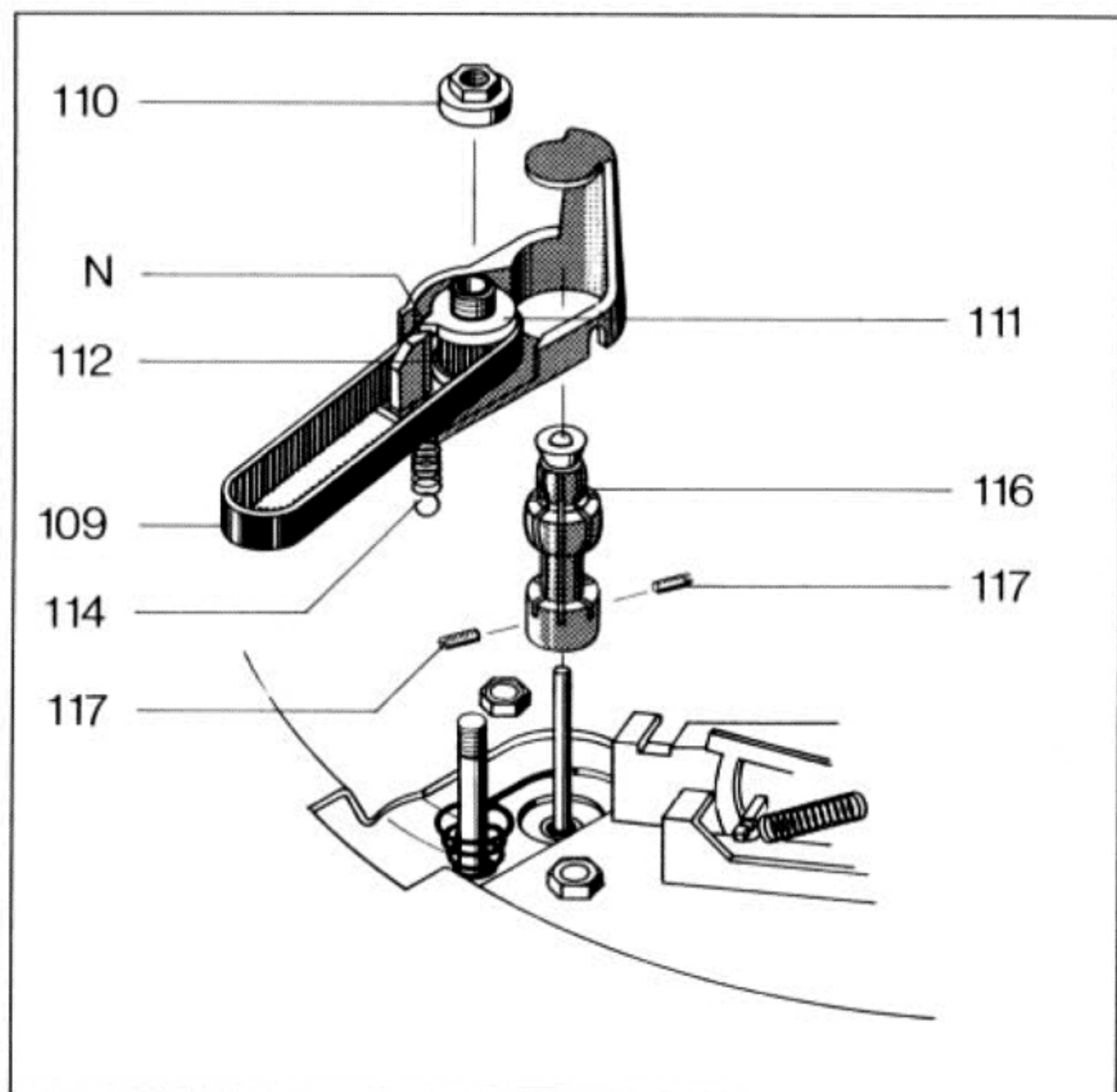


Fig. 4



**Note:** The position numbers indicated refer to the Replacement Parts List and exploded views.

## Motor and Pulley

The turntable platter and the gear are driven by an eight-pole, synchronous (132) motor suspended by radially located elastic mounts and having a very small stray magnetic field as well as little vibration.

The speed of the motor is a function of line voltage, temperature and load variations. Speed is dependent on and proportional to line frequency. The motor is adapted to 50 or 60 Hz power line frequencies by the correct choice of motor pulley.

Pulley for 50 Hz Part.-No. 234 453

Pulley for 60 Hz Part.-No. 234 454

The drive is linked to a flywheel rotor beneath the platter by a precision-ground belt (11). When replacing the flat belt (11) be sure that the precision-ground surface of the belt (dull finish) closely contacts pulley (116) and the flywheel rotor.

Platter speeds of 33 1/3 and 45 rpm are adjusted by linking the flat belt (11) to the corresponding step of the drive pulley (116) (Fig. 3).

Corresponding to the actuation of the left speed selector (14) the changeover lever is brought to the appropriate position of nominal speeds (33 or 45 rpm) via lever (101). When the unit is electrically shut off the changeover lever is blocked by locking bar (4). Consequently, the speed is only preselected. After switching on the unit and turning the platter (10) the disengages the changeover lever, thus guiding the flat belt (11) to appropriate step of the pulley (116).

## Replacement of Motor Pulley

1. Remove flat belt (11) from motor pulley (116) toothed belt (109) from toothed belt pulley II (105).
2. Disengage tension spring (114) at shield (121).
3. Undo adjusting nut (110).
4. Pull-off the counter bearing assembly consisting of the counter bearing, toothed belt pulley I (112), stop disk (111) and toothed belt (109).

### Attention:

Do not remove stop disk (111) from toothed belt pulley I. For correct adjustment of stop disk proceed as follows: Turn toothed belt pulley I (112) with toothed belt (11) counterclockwise until it stops at the counter bearing (113). Then turn quarter to half turn clockwise. Place stop disk (111) such that the nose (N) touches the stop as shown in Fig. 114.

5. Loosen set screws (114) and remove motor pulley (116).
6. Place complete replacement motor pulley on motor axle. Remove conical sleeve. Be careful with the interior distance bushing. Adjust motor pulley vertically (see Fig. 3) and tighten set screws (117) uniformly. Place conical sleeve into the Motor pulley (116).
7. Mount the complete bearing assembly, and attach flat belt (11), toothed belt (109) and tension spring. Mount adjusting nut (110).



8. Setting of nominal speed  
 To bring stop disk (110) into center position turn adjustment knob (12) correspondingly. (The nose of the stop disk should show to the motor pulley center). Adjust nominal speed by turning adjusting nut (110) counterclockwise the speed is reduced. When turning it clockwise the speed is increased.

### Stroboscope

Accurate setting of the platter speeds 33 1/3 rpm can be checked during play with the aid of the stroboscope device.

When the platter (10) is rotating at exactly 33 1/3 rpm the lines of the stroboscope appear to stand still. If the lines of the stroboscope move in the direction of rotation of the platter, the platter speed is too high. If the lines move backwards, the platter is rotating more slowly than the nominal speed.

Adjustment is carried out with the "pitch" knob (12).

Fixed tremen! Strobe markings for 50 or 60 Hz are provided on the platter rim.

### Defect

After switching the unit on the glow lamp (202) of the stroboscope does not come on.

### Cause

- a) Glow lamp (202) defective
- b) Power supply interrupted

### Remedy

- a) Renew glow lamp (202). In the case of glow lamps with red spot, ensure that the red spot (anode) faces the C 1 capacitor.
- b) Check connections at power pack, check components.

Fig. 5 Connection of field coils

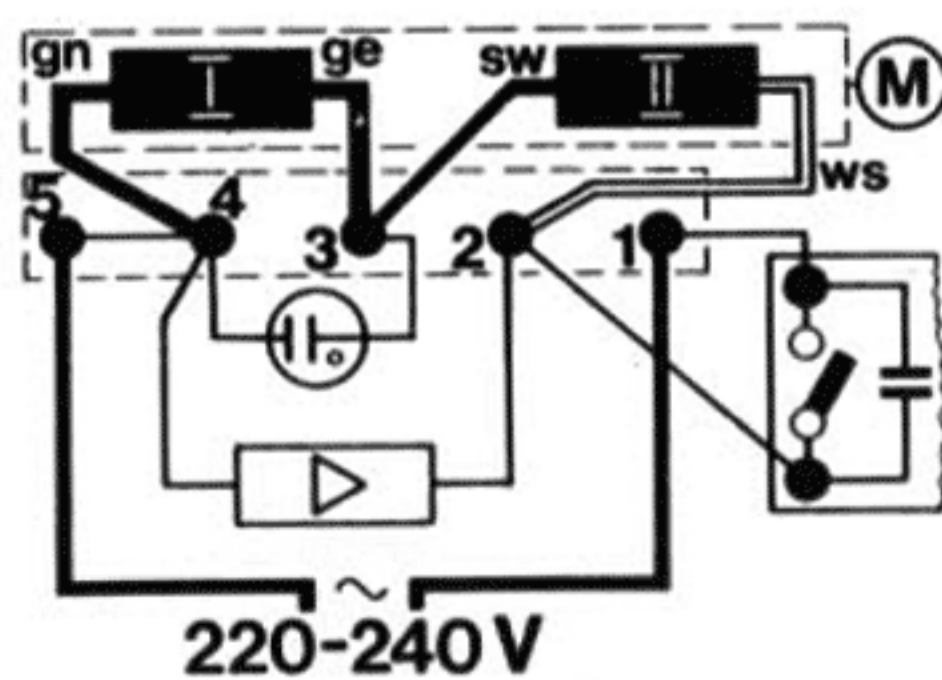
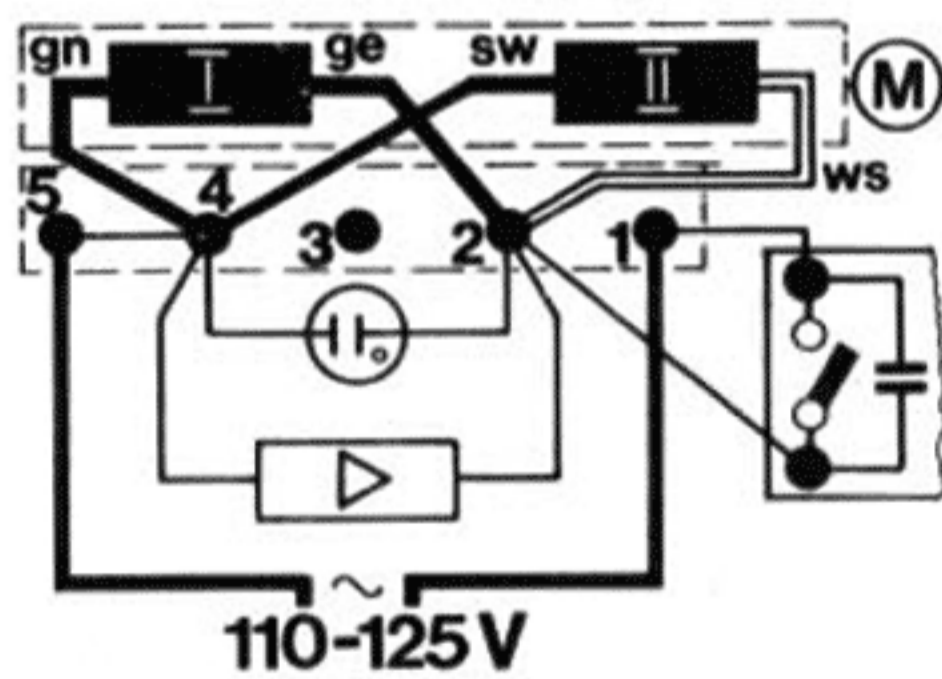


Fig. 6

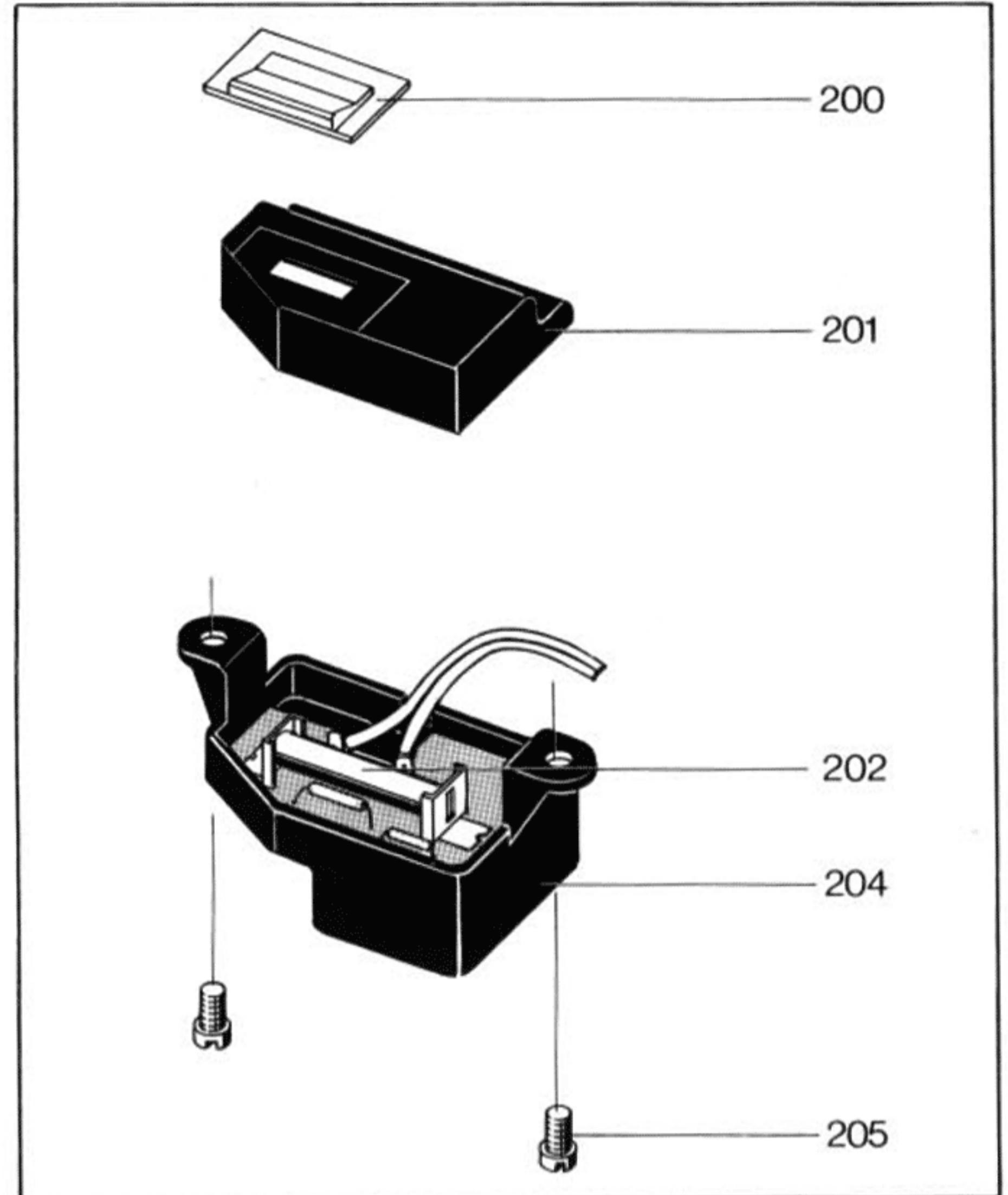


Fig. 7 Stroboscope (wiring diagram)

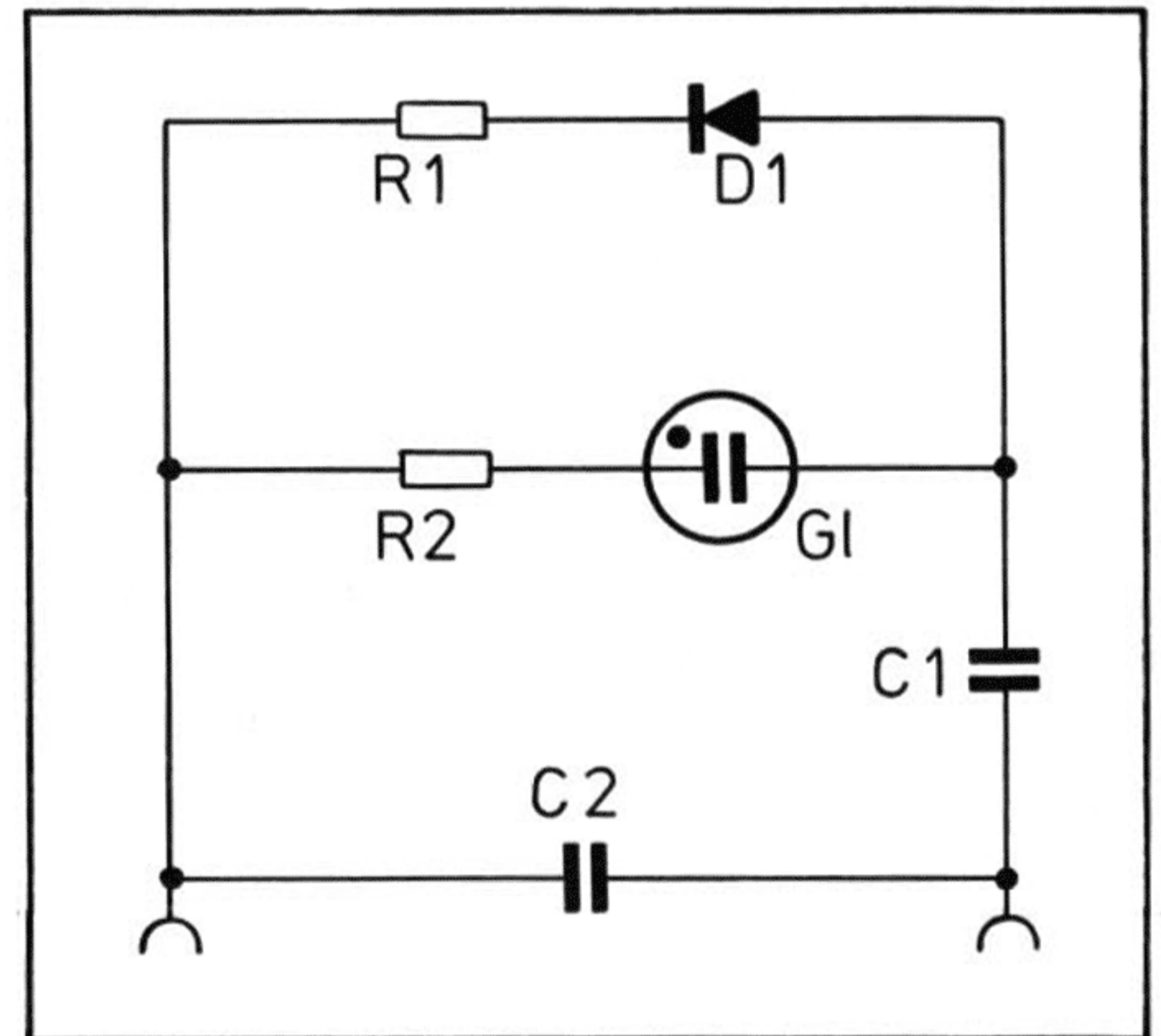


Fig. 8 Complement (conductors side)

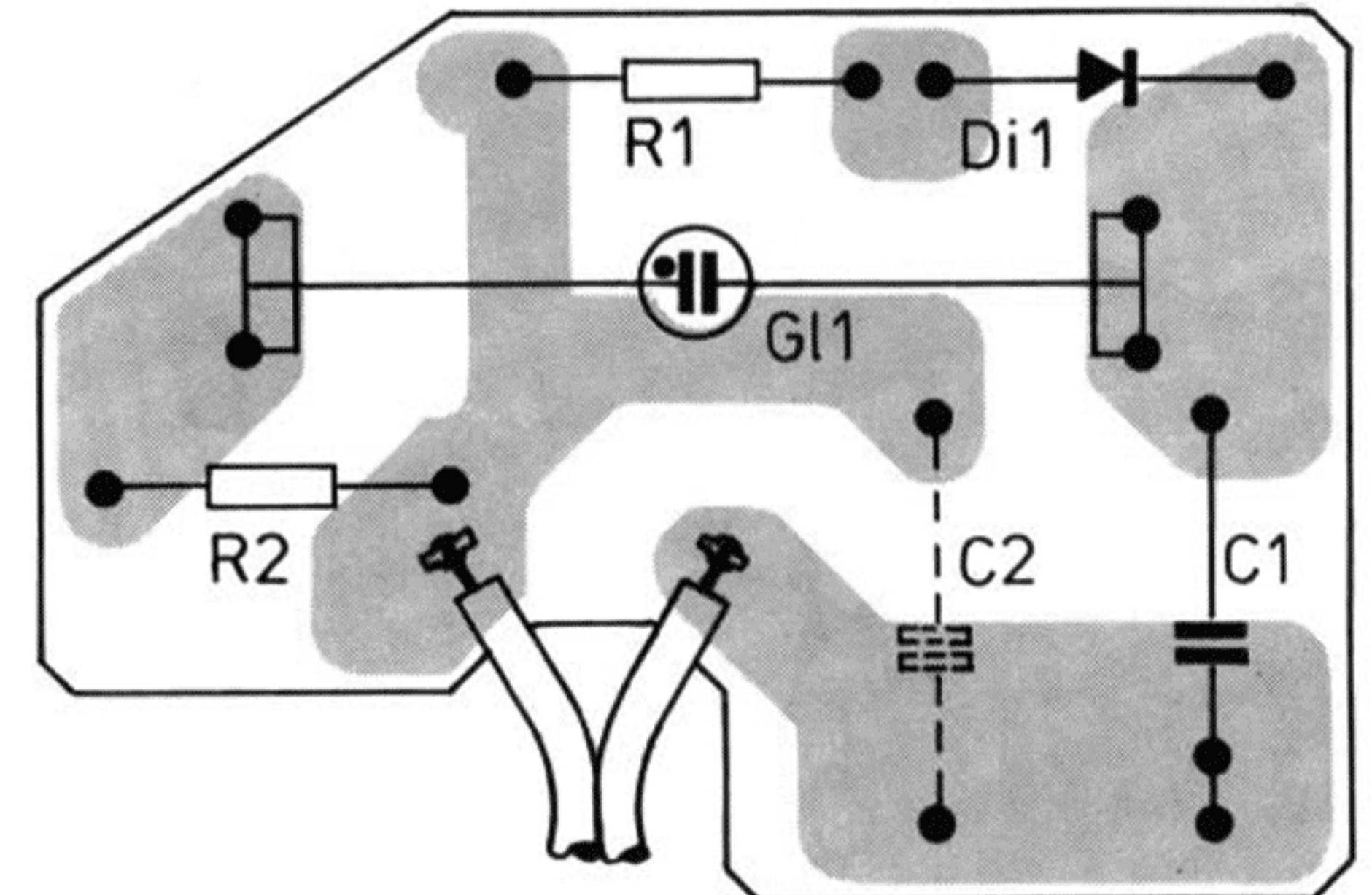
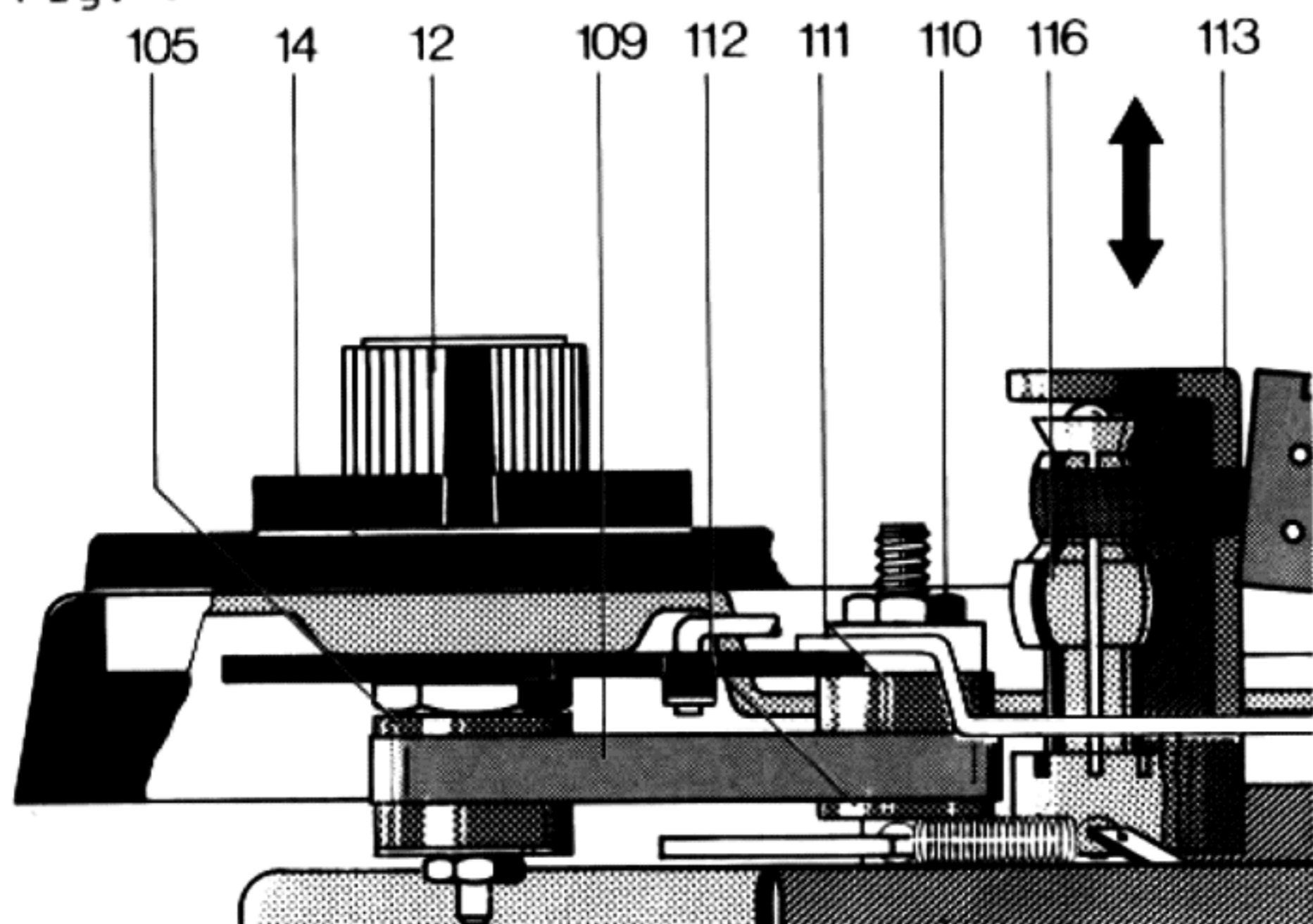




Fig. 9



**Defect**  
Nominal speed is at the edge of the control range of the pitch control.

**Cause**  
Position of toothed belt pulley I inaccurate.

Platter does not run after the line voltage cord of the unit has been plugged into the receptacle and the master operating switch moved to "start".

a) Belt not properly put on  
b) Power supply to motor interrupted  
c) Drive pulley slackened

Platter does not come up to its required speed.

a) Drive pulley is not correct for local line frequency  
b) Slippage between flat belt and drive pulley or between flat belt and flywheel rotor  
c) Excessive friction in motor bearing or flywheel rotor bearing assembly

## Pitch Control

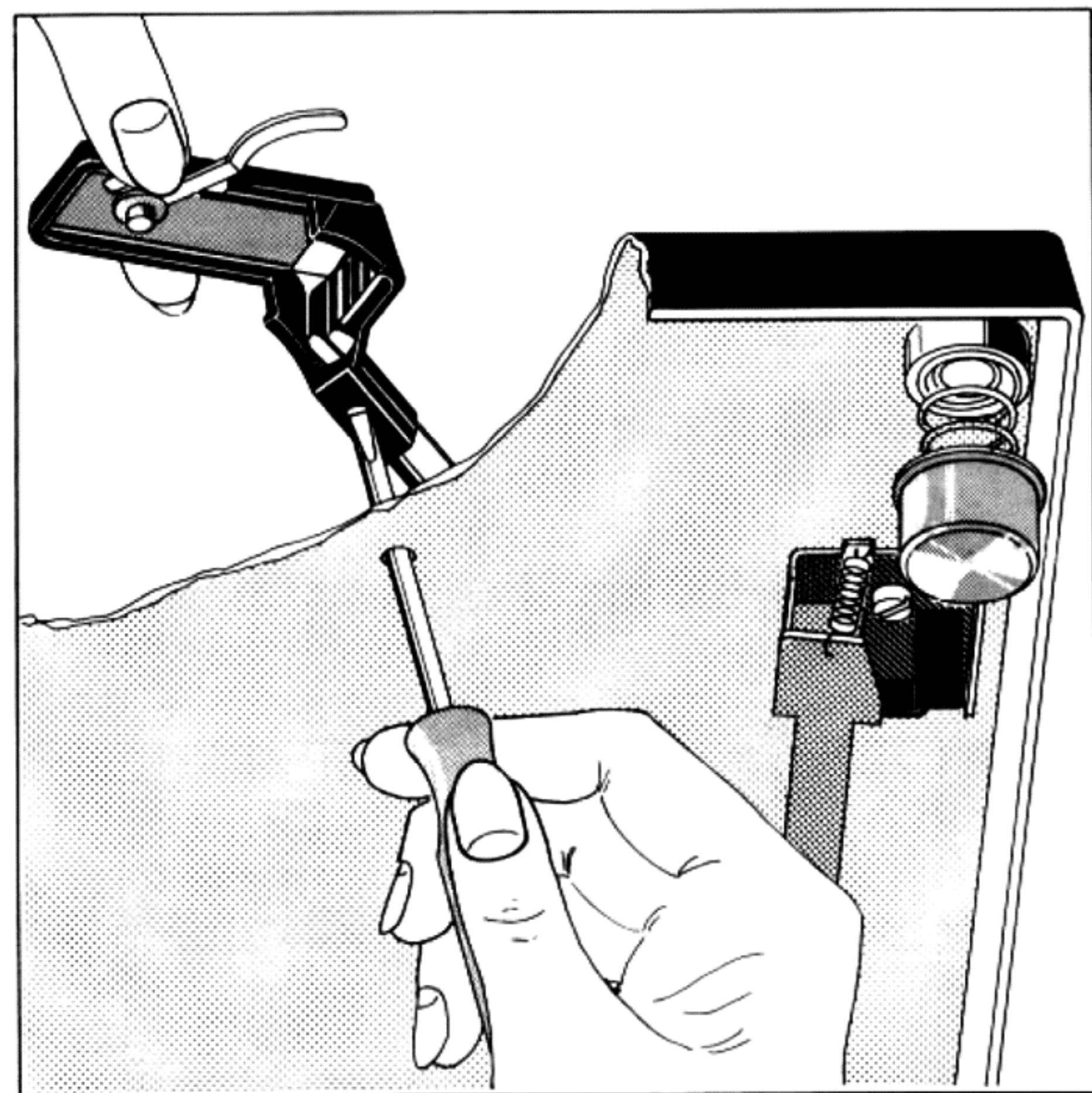
The unit has a separately adjustable pitch control by which the two standard speeds 33 1/3 and 45 rpm can be varied by approximately 6% (1 semitone).

The toothed belt pulley I (112) is moved by turning adjustment knob (12). Turning movement is transmitted to belt pulley I (112) by means of the toothed belt (109) (Fig. 9) thus sliding the counter bearing (113) and the tapered bush of the drive pulley (116) downwards or upwards. The taper bush of the drive pulley (116) is designed to vary the diameter of the drive Pulley (116) thus varying the nominal speed with the tolerance of  $\pm 3\%$ .

**Remedy**  
By turning fine speed adjustment knob (12) move stop disk (111) to its center position (The dog of the stop disk should face the center of the drive pulley). Using adjusting nut (110) adjust for nominal speed. The nominal speed is increased by turning the adjusting nut clockwise and decreased by turning the set screw counterclockwise.

- a) Install belt properly put on  
b) Check connection at switch plate and power supply plug.  
c) Retighten drive pulley
- a) Renew drive pulley  
b) Clean friction surfaces of flat belt, drive pulley and flywheel rotor. Renew flat belt if necessary.  
c) Clean and oil bearings

Fig. 10



**Defect**  
Pick-up head not parallel to platter.

**Cause**  
The pick-up head has been moved out of position on the tonearm tube during transport.

**Remedy**  
Remove platter. Using a screwdriver slacken screw on the pick-up head through the hole provided for this purpose in the chassis plate. After aligning the pick-up head retighten screw.



## Tonearm and Tonearm Bearing

The Dual 510 has a feather-light, extremely torsion-resistant all-metal tonearm which is suspended in a gimbal. Suspension is by means of 4 hardened and precision polished steel points which rest in precision ball bearings. Tonearm bearing friction is thus reduced to a minimum.

Bearing friction vertical  $\cong 0.07 \text{ mN}$  (0.007p)  
Bearing friction horizontal  $\cong 0,16 \text{ mN}$  (0.016p)  
related to stylus point

As a result, it ensures extremely favourable pick-up conditions. The pick-up head is removable. Before adjusting the pick-up force to suit the built-in pick-up cartridge the tonearm is balanced with the scale set to 0. Coarse adjustment is carried out by moving the stem (50), the subsequent fine adjustment by turning the knurled ring of the weight.

The balance weight is designed so that pick-up cartridges with a deadweight of 5.5 - 10 g can be balanced. The pickup cartridges whose type of mounting conforms with the international standard 1/2 inch mounting and whose deadweight incl. mounting hardware does not exceed 10 g. The tracking force is adjusted by turning the graduated spring housing (62) and thus tensioning or releasing the coil spring mounted inside.

The scale is provided with markings (0 - 30 mN/0 - 3 p) which allow precise setting of tracking force. One division corresponds to 1 mN (0.1 p) within the range of 2 - 15 mN (0.2 - 15 p), 15 - 30 mN (1.5 - 3 p), and 2,5 mN (0.25 p)

To change the tonearm complete with tonearm suspension we recommend proceeding as follows:

1. Secure unit in repair jig, set tracking force to 0, and arrest tonearm.
2. Move unit into head position and unsolder tonearm leads at the connecting plate.
3. Remove safety washer (197), washer (196), and bearing (195). Disengage tension spring (226). Undo safety washer (231), remove bar (194)
4. Disengage tension spring, undo safety washer (210) and remove skating lever (207). Be careful with compression spring (208) as it may drop out.
5. After removing washer (216) and sliding washer (217), detach shut-off bar (215) from segment (211).
6. Undo hexagon nuts (213) and pull off segment (211).
7. Remove hexagon nut (206), then with draw tonearm complete with suspension.

When inserting the tonearm complete with suspension proceed in reverse order. Make sure that the segment (211) is properly adjusted when mounting it (refer to page 11).

To remove the tonearm from the bearing race the tracking force scale should first be set to zero position after unsoldering the tonearm leads. Remove balance weight (50), tighten the two mounting screws (55) onto the stop of the tonearm tube.

Attention: Observe slide mounting. Slide tonearm rearwards and remove it from the bearing race (60). When inserting proceed in reverse order.

## Adjustment of Tonearm Bearing

Both bearings must have slight, just perceptible play. Adjustment of the vertical bearing should only be carried out by means of the left mounting screw (grub screw 56), that of the horizontal bearing by means of grub screw (44). The horizontal tonearm bearing is correctly adjusted when at antiskating setting "0.5" (tonearm previously balanced exactly) the tonearm slides in without resistance.

Fig. 11 Tonearm bearing assembly

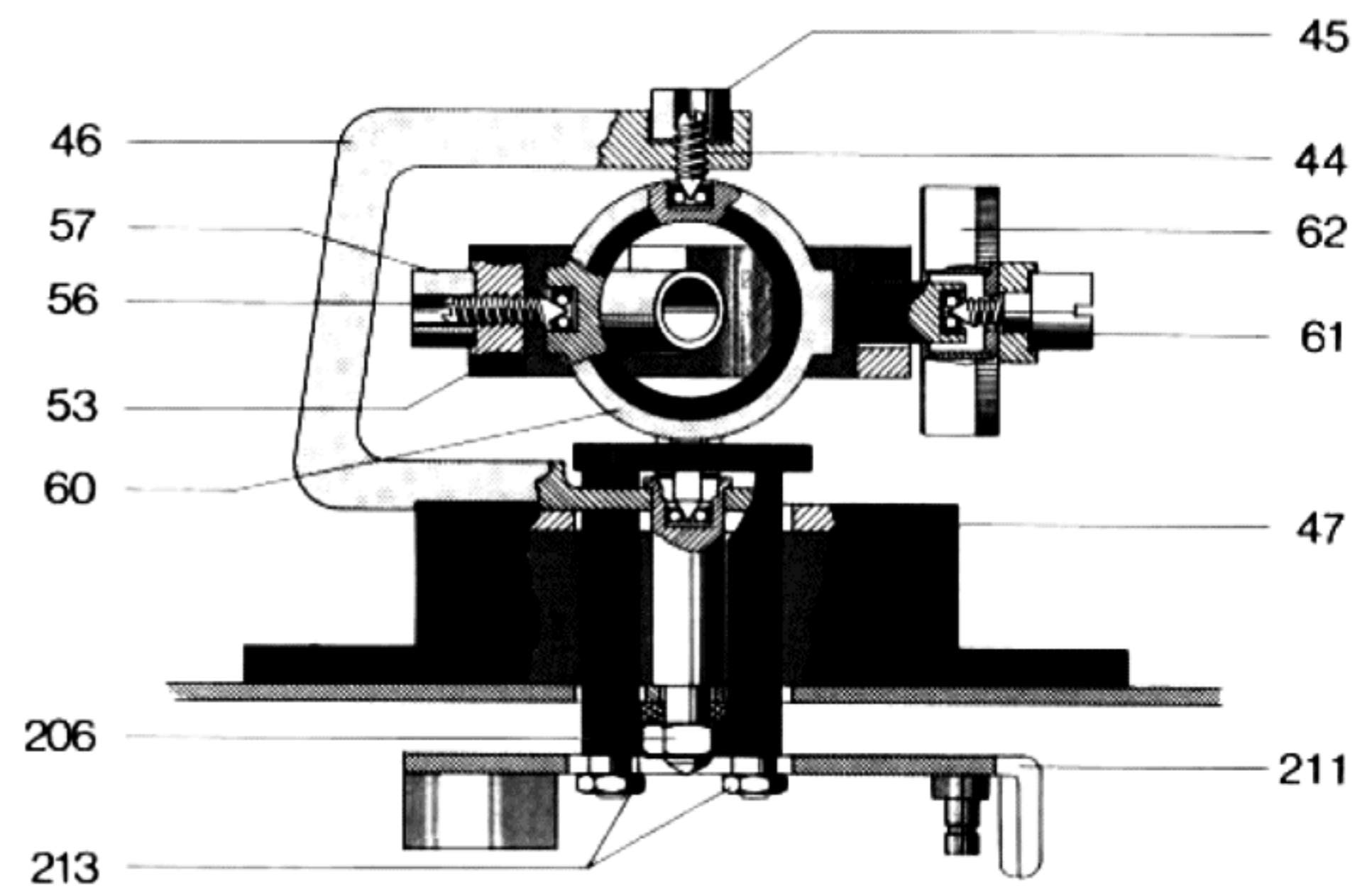


Fig. 12 Tonearm bearing assembly (view from underneath)

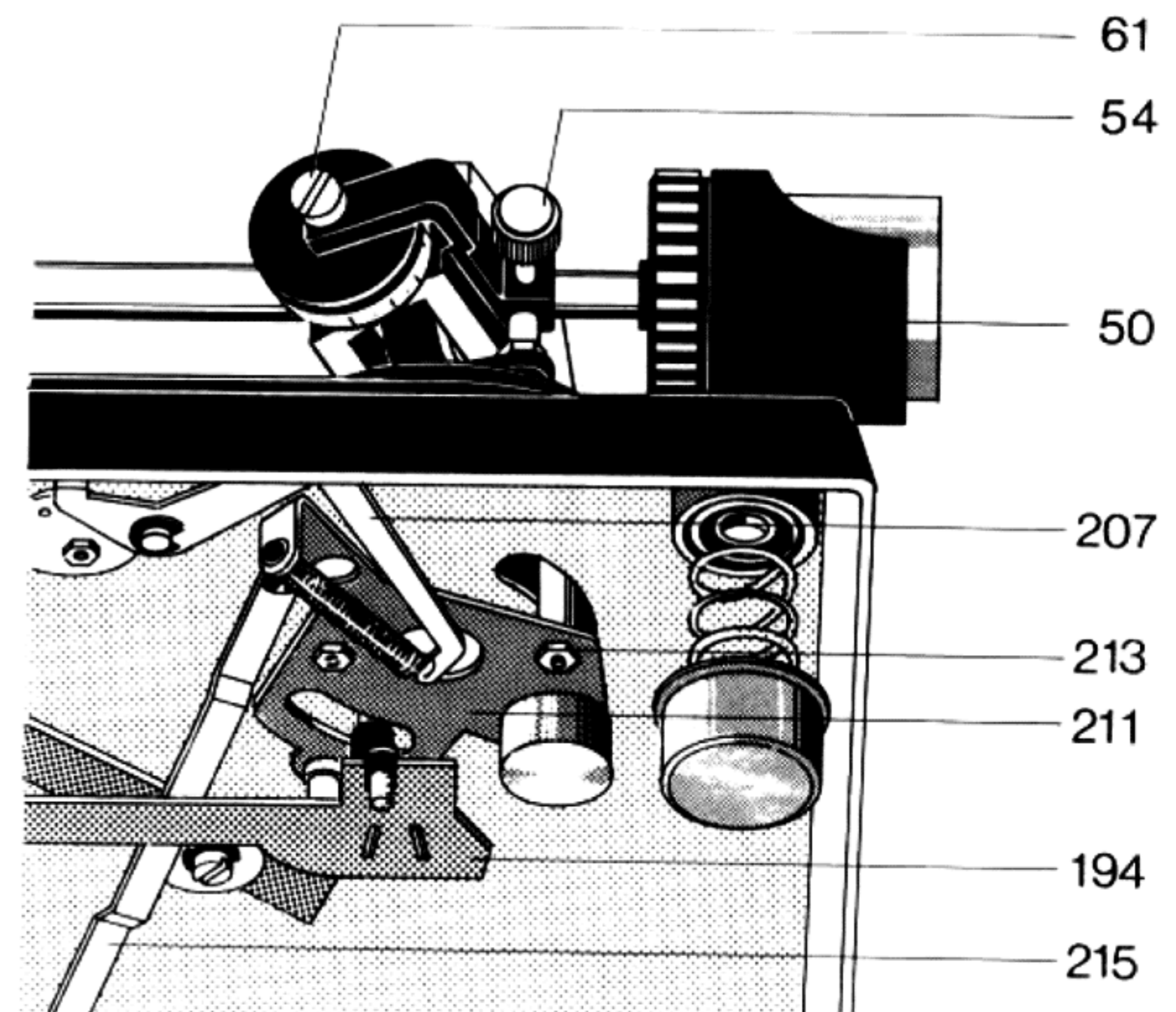
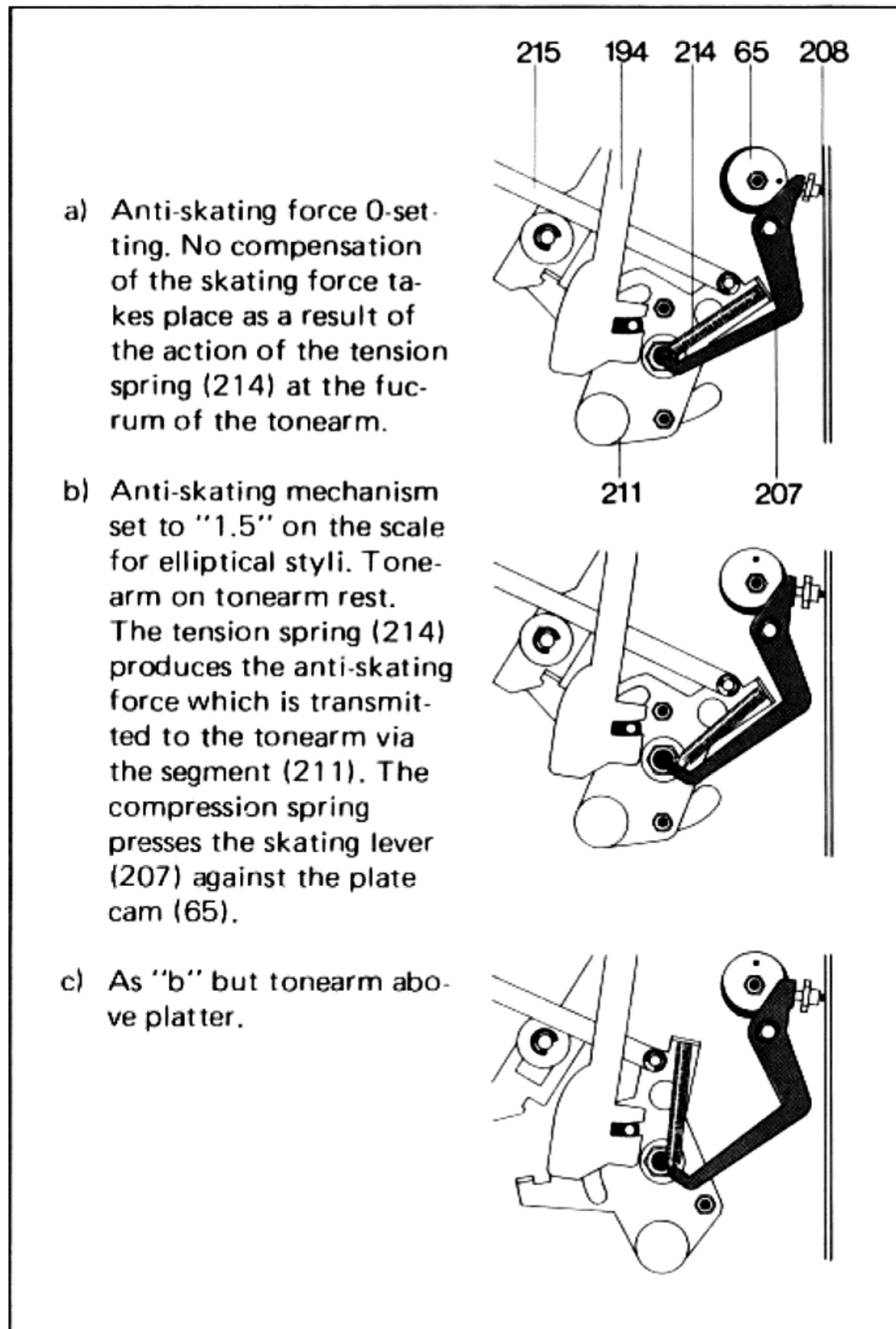




Fig. 13 Anti-skating force



a) Anti-skating force 0-setting. No compensation of the skating force takes place as a result of the action of the tension spring (214) at the fulcrum of the tonearm.

b) Anti-skating mechanism set to "1.5" on the scale for elliptical styli. Tonearm on tonearm rest. The tension spring (214) produces the anti-skating force which is transmitted to the tonearm via the segment (211). The compression spring presses the skating lever (207) against the plate cam (65).

c) As "b" but tonearm above platter.

## Anti-Skating Device

The geometrical skating force acting on every tonearm is eliminated by means of a precision anti-skating device. The skating force is dependent on the geometry of the tonearm, on the tracking force and on the tip curvature of the stylus of the pick-up cartridge. The pull on the tonearm to the center of the platter caused by the skating effect leads not only to troublesome jumping of the tonearm when lowered manually, but also the uneven flank loading of the sound groove with the resultant effects which have to be eliminated on a hifi record player with the aid of the anti-skating device.

Turning the Knurled (63) of the anti-skating device on the mounting plate moves the asymmetrical plate cam (65). This plate cam has two different curves which, according to use of the red anti-skating scale for the different styli as well for CD 4 pick-up cartridges move the skating lever (207) from its neutral position and transmit the counter force to the tonearm by means of tension spring (214)

Optimum adjustment is carried out at the works for styli with a tip radius of  $15 \pm 2 \mu\text{m}$  (conical) and  $5/6 \times 18/22 \mu\text{m}$  (elliptical) as well as for CD 4 pick-up cartridges. Alteration can only be carried out with the aid of the Dual Skate-0-Meter and test record L 096 and should only be done by an authorised service station.

### Defect

Stylus slips out of playing groove

### Cause

- a) Tonearm is not balanced
- b) Tonearm tracking force is too low
- c) Anti-skating setting incorrect
- d) Stylus tip worn or chipped
- e) Excessive bearing friction in tonearm bearing

### Remedy

- a) Balance tonearm
- b) Check tonearm balance, adjust tracking force to the value stated by the cartridge manufacturer
- c) Correct anti-skating setting
- d) Renew stylus
- e) Check tonearm bearings. Both bearings must have slight, just perceptible play. The adjustment of the vertical bearing should only be carried out with the left-hand bearing screw (grub screw 56), that of the horizontal bearing by means of grub screw (44). The horizontal bearing is correctly adjusted when at anti-skating setting "0.5" (tonearm previously balanced exactly) the tonearm slides in without resistance.
- f) Renew steel ball (166)

Vertical tonearm movement shows resistance during set-down

- a) Bearing friction excessive
- b) Lift pin (185) sticks in guide tube

- a) Eliminate friction by adjusting the bearing screw (grub screw 56) and check balance
- b) Remove lift tube assembly as described on page 10. Remove guide (181) on lift pin (185) Remove tension spring (184). Withdraw lift pin evenly with "Wacker Silicone Oil AK 500 000". Reassemble components. Clean parts from Silicone Oil, if necessary.



## Tonearm set-down Mechanism

When turning knob (68) to "V" position the recesses of slide bar (194) are positioned in the area of the spring pin (F) of segment (211).

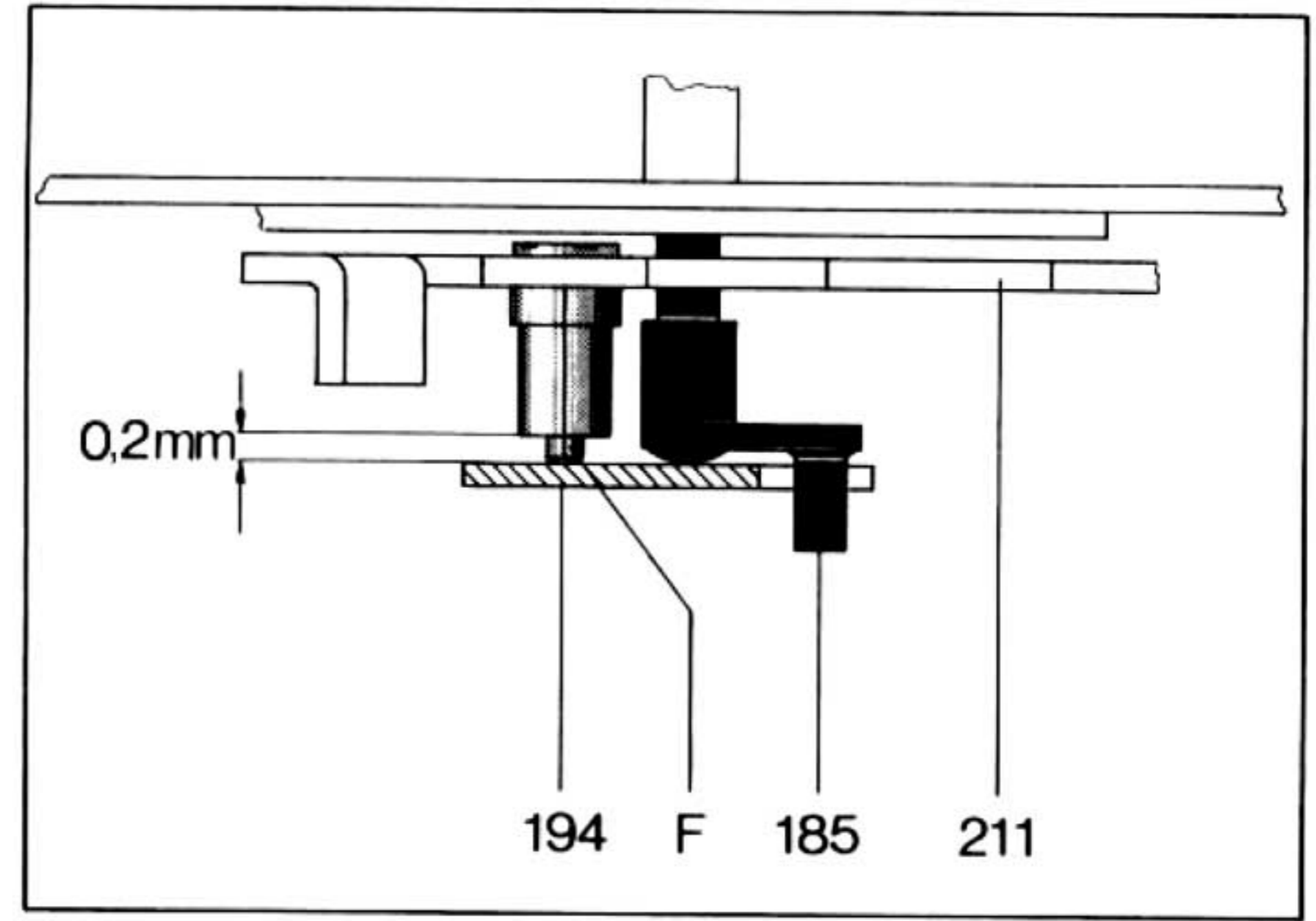
When moving slowly the tonearm with tonearm cue control in  $\Sigma$  position the spring pin (F) is arrested in the recesses of slide bar (211) thus designing the set-down point of stylus for 30 cm and 17 cm recordings.

To enable set-down in the catching range of the arresting point of the appropriate set-down position, the tonearm set-down mechanism can be disengaged.

When repairing the unit observe the following adjustment:

The play between sliding bar (194) and the guide bush of the spring pin (F) should be 0.2 mm (Fig. 14). Bring lever (219) into  $\Sigma$  position. Adjust by turning spring pin (198).

Fig. 14



## Cue Control

The cue control permits gentle set-down of the tonearm at any desired point (outside the shut-off range) on the record.

By moving the lever (219) (moving forwards) lift cam (249) rotates. The slide bar (194) connected to it transmits this movement to the lift pin which then raises the tonearm. After moving the tonearm into the required position on the record, the lever is re-

leased by gently moving to the rear. As a result, slide bar (194) is released and the

tonearm lowers slowly. Lowering of the tonearm is damped by silicone oil in the lift pin.

The height of the stylus above the record can be varied by turning adjusting screw (181). The distance is increased by turning clockwise and the distance between record and stylus can be reduced by turning anti-clockwise. The distance preset by the factory is approx. 8 mm.

Fig. 15 Tonearm lift

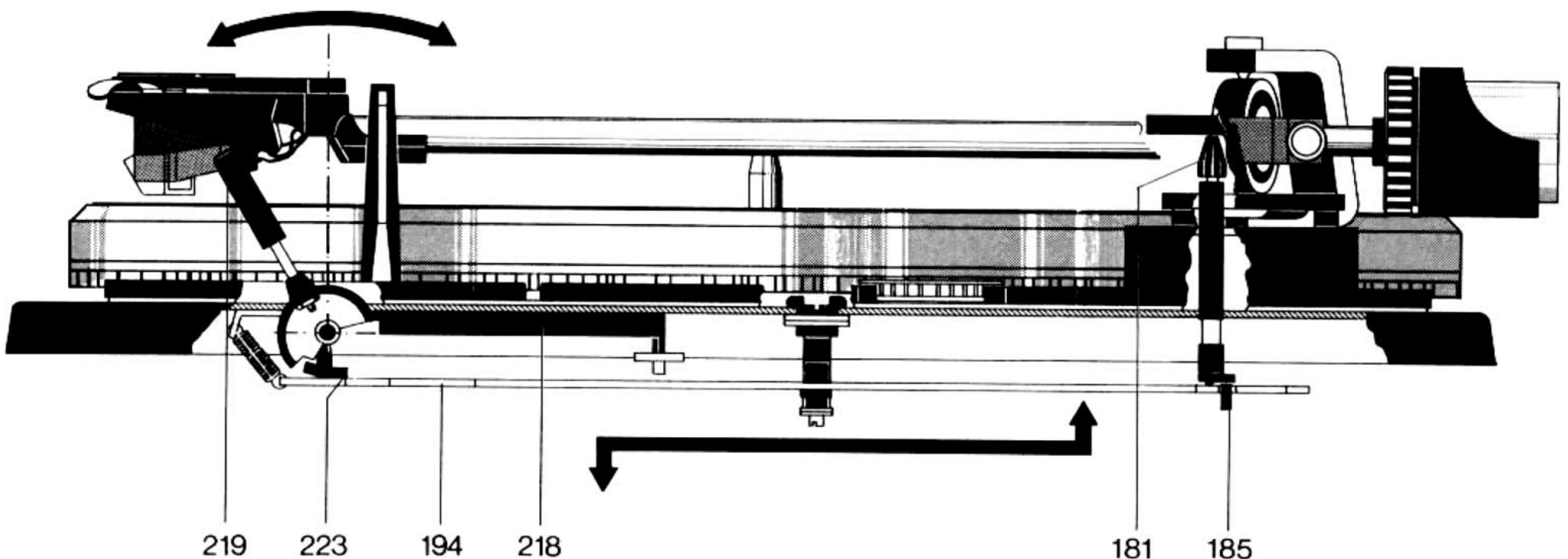
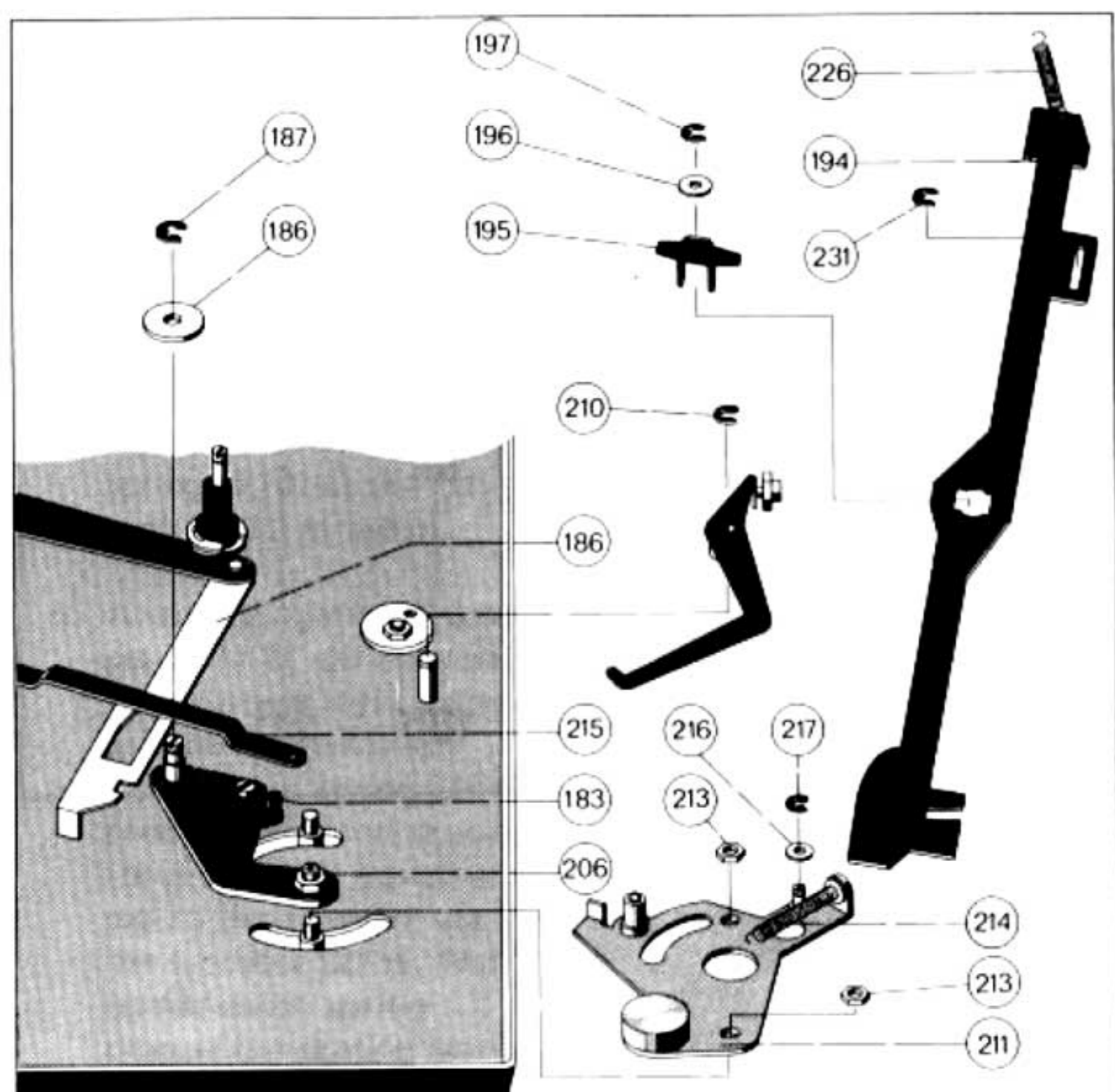




Fig. 16



## Replacement of Lift Tube

1. Secure unit in repair jig, and lock tonearm.
2. Move unit into head position.
3. Remove lockwasher (197), washer (196), and bearing (195). Disengage tension spring (226), loosen lockwasher (231), and remove slide bar (194).
4. Disengage tension spring (214), undo lockwasher (210), and remove skating lever (207). Be careful with compression spring (208) as it may drop out.
5. Remove lockwasher (216) and slide washer (217). Remove shut-off bar (215) from segment (211).
6. Undo hex nut (213). Remove segment (211).
7. Remove lockwasher (188), remove washer (187), disengage catch (186).
8. Remove machine screw (183). Hold tonearm bearing. Unscrew hex nut (206) and remove lift tube assembly.
9. Secure tonearm against dropping out using hex nut (206).

For installation of the lift tube assembly (182) proceed in the reverse order.

### Defect

Tonearm does not set down at the edge of the record.

### Cause

- a) Tonearm set-down point is incorrectly set.
- b) Anti-skating setting is incorrectly set.

Tonearm does not set down on record after operating cue control.

Excessive damping in the lift tube as a result of contamination of the silicone oil.

Tonearm lowers onto record too quickly when cue control is operated.

Damping insufficient as a result of unsuitable addition of lubricant to damping compound.

With tracking force and anti-skating in 0 position tonearm moves  
a) outwards  
b) inwards

- a) Anti-skating device maladjusted
- b) Tight tonearm leads produce a torque

Motor switches off when tonearm sets down on rest.

Capacitor type suppressor (in power switch) defective (short circuit).

Acoustic feedback

- a) Chassis components (e.g. connecting leads) rubbing on board cut out.
- b) Connecting leads too tight.

### Remedy

- a) Readjust tonearm set-down point using adjusting screw (48). If the stylus sets down too far in, the adjusting screw should be turned counter-clockwise, if the stylus sets down too far out, the screw should be turned clockwise.
- b) Correct anti-skating setting

Remove lift tube as described above. Detach adjusting sleeve (181) and remove lift pin. Remove compression spring (184). Clean lift tube and lift pin, smear lift pin evenly with "Wacker Silicone Oil AK 500 000". Reassemble components. Wipe off excessive silicone oil after assembly.

Remove lift tube as described above. Detach adjusting sleeve (181) and remove lift pin (185). Remove compression spring (184). Clean lift tube and lift pin and smear evenly with "Wacker Silicone Oil AK 500 000". Reassemble components. Wipe off excessive silicone oil after assembly.

- a) Adjust skating lever that the skating spring touches the pivot of the tonearm
- b) Slacken tonearm leads

Replace capacitor type suppressor in power switch.

- a) Line up mounting board cut-out according to installation instructions.
- b) Slacken or lengthen leads.



## Starting and shut off

Turning the tonearm (49) rotates the segment (211) thus actuating the power switch (143) via catch (186) and shift arm (172) and starting motor (132) and platter (10) rotating.

The shut-off cycle after playing a record is initiated by the dog (M) of the platter (10) and shut-off lever (34).

The shut-off lever (34) is guided onto the dog by the movement of the tonearm when playing the record with the aid of the shut-off bar (215) proportionate to the groove lead. The eccentrically-mounted dog forces the shut-off lever (34) back with each revolution as long as the advance of the tonearm only amounts to the width of one groove (Fig. 17 b)

Only the run-out groove with its increased lead guides the shut-off lever (34) onto the dog at a higher rate so that the shut off lever is picked up and moved along (Fig. 17 c)

As a result the shift arm is brought into its neutral position the power switch interrupting power supply. Simultaneously, the lift actuating lever (218) coupled to the shift arm (172) is actuated and the tonearm (49) lifted.

Fig. 17

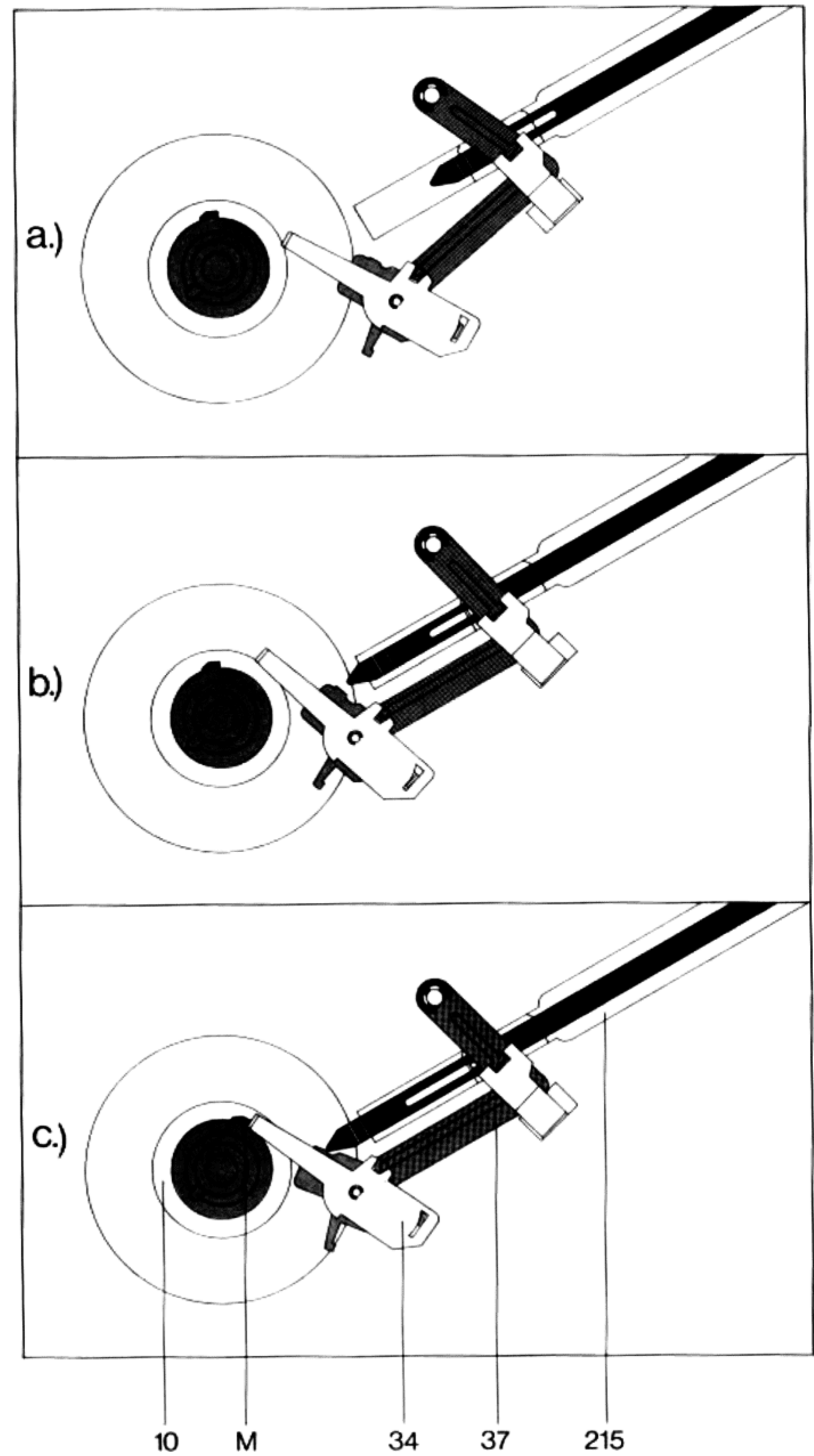
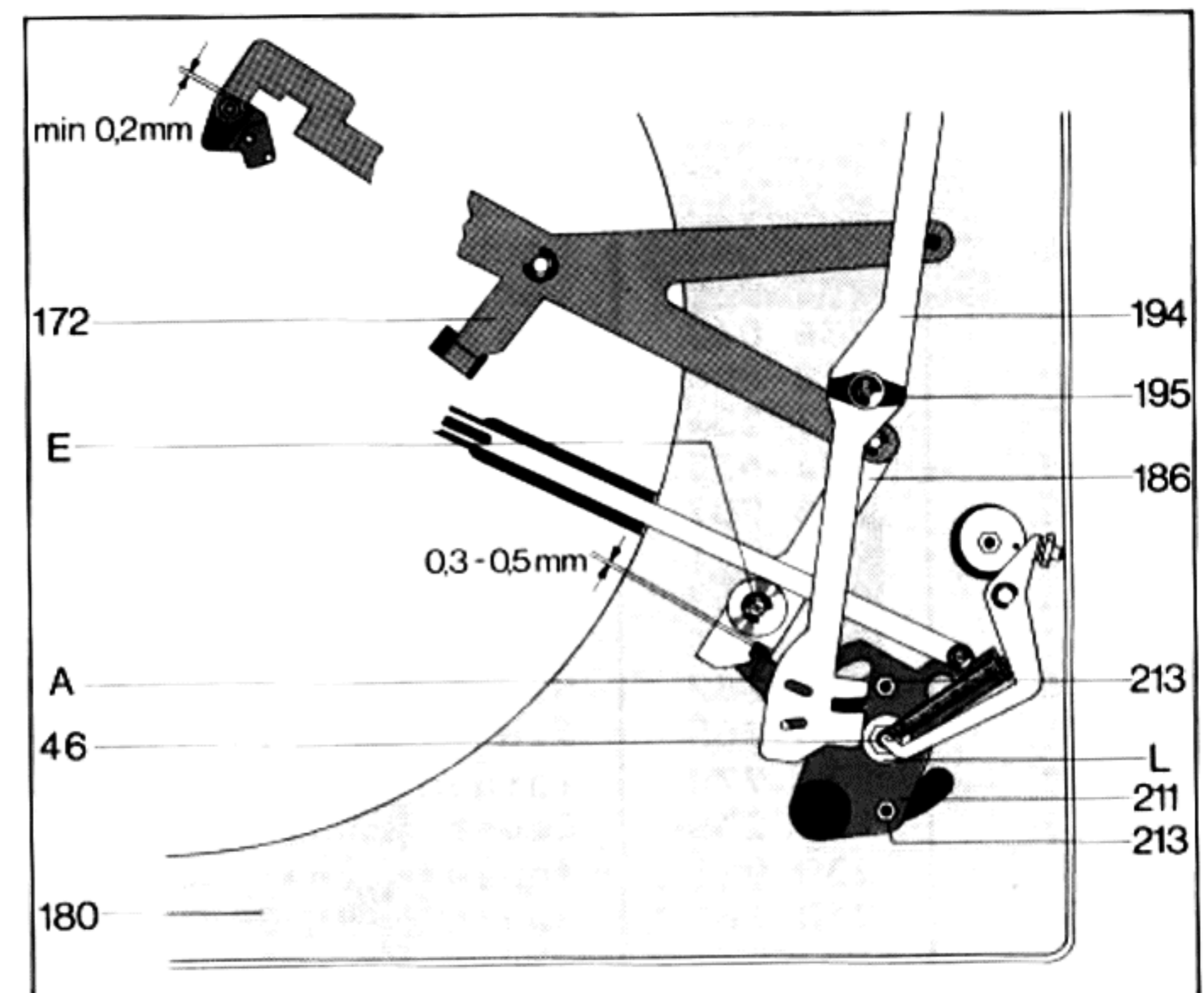


Fig. 18



### Defect

Horizontal tonearm movement shows resistance. Catch (186) does not release segment (211).

### Cause

- b) Incorrect position of segment (211).
- a) Catch setting (186) is out of adjustment

### Remedy

- b) Move tonearm (49) inwards. By rotating eccentric (E) adjust setting for a play of 0.2 mm min. between the stop pin of shift arm (172) and the installation plate (180).
- a) Lock tonearm (49). Turn unit upside down. Undo hex nuts (213). Center hole (L) of segment (211) should be aligned to the frame (46) axis. Align for a play of 0.3 - 0.5 mm between catch (186) and stop (A). Tighten hex nuts.



# Replacement parts

Pos.	Part.-No.	Description	Qty.
1	220 213	Centering piece .....	1
2	236 036	Washer .....	1
3	237 218	Platter mat compl. ....	1
4	234 428	Support assembly .....	1
5	210 472	Machine screw AM 3 x 4 .....	5
6	232 086	Tension spring .....	1
7	237 220	Locking bar .....	1
8	234 814	Tension spring .....	1
9	210 194	'C' clip G 2 x 6 .....	1
10	237 221	Platter compl. with mat .....	1
11	234 435	Flat belt .....	1
12	234 912	Adjustment knob .....	1
13	232 078	Bearing bush .....	1
14	234 910	Speed control lever .....	1
15	237 222	Speed control blind compl. ....	1
16	213 260	Pin 2 x 6 .....	8
17	214 210	Shipping screw compl. ....	3
20	210 146	Lock washer 3,2 .....	3
21	201 632	Rubber washer .....	3
22	237 117	Washer .....	3
23	237 118	Lock washer .....	3
25	237 116	Special screw .....	3
26	237 223	Contact plate compl. ....	1
27	234 611	Handle .....	1
28	210 182	Bowed lock washer .....	1
29	210 630	Washer 4.2/8/0.5 St. ....	1
30	210 197	'C' clip G 4 x 8 .....	1
31	237 224	Tonarm head compl. ....	1
32	236 242	TK 24 cartridge mount .....	1
33	210 142	Lock washer 1.2 .....	1
34	234 766	Shut-off lever .....	1
35	210 146	Lock washer 3.2 .....	5
36	234 764	Friction plate .....	1
37	234 762	Support .....	1
38	237 225	Chassis compl. ....	1
39	230 529	Threaded piece .....	4
40	236 710	Compression spring green (Motor side rear) .....	1
	236 711	Compression spring withe (Motor side front) .....	1
	236 712	Compression spring blue (Tonearm side rear) ....	1
	236 713	Compression spring yellow (Tonearm side front) ..	1
41	237 226	Spring mount compl. (Motor side rear) .....	1
	237 227	Spring mount compl. (Motor side front) .....	1
	237 228	Spring mount compl. (Tonearm side rear) .....	1
	237 229	Spring mount compl. (Tonearm side front) .....	1
42	200 723	Rubber damping block .....	4
43	200 722	Steel cup .....	4
44	234 651	Grub screw .....	1
45	234 635	Lock nut .....	2
46	237 230	Frame compl. ....	1
47	237 231	Cover rear compl. ....	1
48	234 781	Adjustment screw .....	1
49	237 232	Tonearm compl. ....	1
50	236 904	Weight compl. ....	1
51	234 636	Needle .....	1
52	236 160	Supporting plate .....	2
53	237 233	Bearing rock .....	1
54	236 051	Clamp bolt .....	1
55	234 617	Fixing screw .....	2
56	234 634	Grub screw .....	1
57	234 635	Lock nut .....	2
58	236 049	Set screw .....	1
59	218 894	Bower lock washer .....	1
60	237 234	Bearing compl. ....	1
61	234 637	Bearing screw .....	1
62	236 907	Spring housing compl. ....	1
63	236 081	Knurled ring .....	1
64	216 867	Bower lock washer .....	1
65	225 176	Curve washer .....	1
66	210 362	Hex nut BM 3 .....	5
67	213 260	Pin 2 x 6 .....	8
68	234 770	Turning knob .....	1
69	237 235	Cover front compl. ....	1
70	236 911	Tonearm rest compl. ....	1
71	210 362	Hex nut BM 3 .....	5

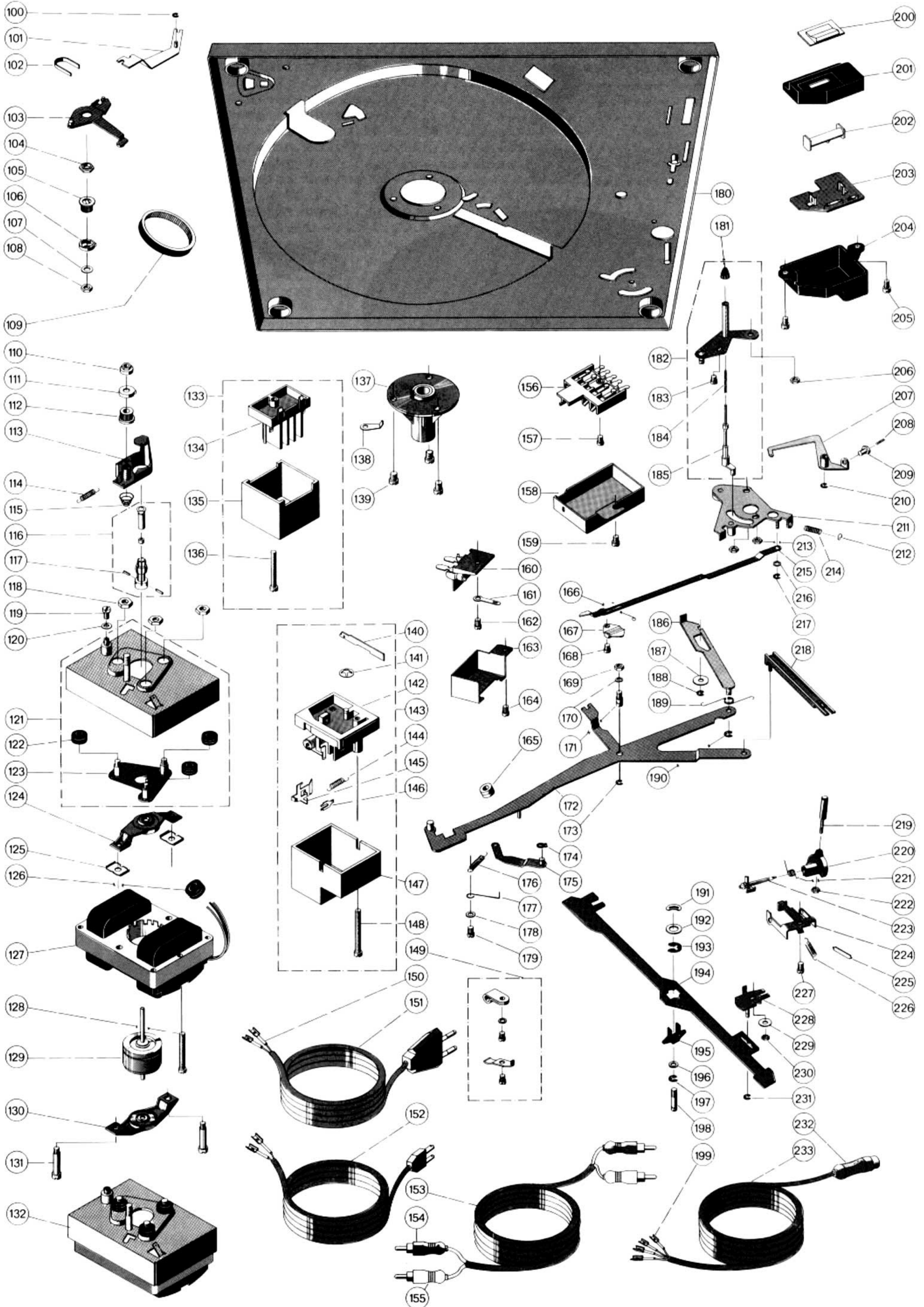


Fig. 19 Exploded view above chassis





Fig. 20 Exploded view below chassis





Pos.	Part.-No.	Description	Qty.
100	210 145	Lock washer 2.3	2
101	234 824	Switch lever	1
102	236 374	Yoke spring	1
103	232 094	Connecting part	1
104	232 079	Joining nut	1
105	232 097	Toothed belt pulley II	1
106	232 049	Stop disk	2
107	210 607	Washer 3.2/10/0.5 St	1
108	210 362	Hex nut BM 3	5
109	232 076	Toothed belt	1
110	232 099	Adjustment nut	1
111	232 049	Stop disk	2
112	232 098	Toothed belt pulley I	1
113	232 137	Counter bearing compl.	1
114	233 777	Tension spring	1
115	232 615	Compression spring	1
116	234 453	Motor pulley 50 Hz with conical sleeve compl.	1
	234 454	Motor pulley 50 Hz with conical sleeve compl.	1
117	233 137	Set screw M 2.5 x 3	1
118	210 366	Hex nut BM 4	2
119	210 480	Machine screw AM 3 x 6	1
120	210 609	Washer 3.2/10/1	1
121	232 856	Screen plate compl.	1
122	232 841	Rubber damping block	3
123	232 840	Inlayer compl.	1
124	234 447	Top bearing compl.	1
125	232 855	Spacer	2
126	209 939	Cable grommet	1
127	234 449	Stator 110/220 V compl.	1
128	233 815	Machine screw AM 2.5 x 18	1
129	234 450	Armature compl.	1
130	234 451	Bottom bearing bracket compl.	1
131	232 851	Centering screw	2
132	234 452	8-pole Motor SM 840 compl.	1
133		Connecting plate compl. with cover	} For spare parts of connecting plate see page 17
134		Connecting plate compl.	
135		Cover	
136		Machine screw M 3 x 35	
137	237 236	Support housing compl.	1
138	236 759	Earth spring	1
139	210 515	Machine screw M 4 x 6	3
140		Slide	} For spare parts of power plate see page 17
141		Spring washer	
142		Switch plate compl.	
143		Power plate compl.	
144		Tension spring	
145		Switch slide	
146		Snob spring	
147		Cover	
148		Machine screw M 3 x 28	
149	231 079	Cable holder compl.	1
150	214 602	AMP-connector	4
151	232 996	Power lead Europe compl.	1
152	232 995	Power lead US compl.	1
153	226 817	Pick-up lead compl. with cynch plug	1
154	209 426	Cynch plug black	2
155	209 425	Cynch plug white	2
156	237 238	TA-connecting plate compl.	1
157	210 480	Machine screw AM 3 x 6	1
158	236 080	Shield	1
159	210 472	Machine screw AM 3 x 4	5
160	236 219	Cinch socket plate compl.	1
161	209 975	Soldering lug	1
162	210 475	Machine screw AM 3 x 5	1
163	236 195	Shield	1
164	210 472	Machine screw AM 3 x 4	5
165	236 950	Stop	1
166	209 357	Steel ball 3.2	1
167	232 104	Ball bearing (bead)	1
168	210 469	Machine screw AM 3 x 5	3
169	210 362	Hex nut BM 3	5
170	210 586	Washer 3.2/7/0.5 St	3
171	234 759	Screw pin	2
172	234 756	Shiftarm	1
173	210 146	Lock washer 3.2	5
174	210 196	Ring G 3 x 6	1



Pos.	Part.-No.	Description	Qty.
175	234 760	Stop lever .....	1
176	234 799	Tension spring .....	1
177	237 785	Wire spring .....	1
178	210 586	Washer 3.2/7/0.5 St. ....	3
179	234 759	Screw bolt .....	2
180	237 225	Installation plate compl. ....	1
181	234 800	Adjustment sleeve .....	1
182	237 239	Lift plate compl. ....	1
183	210 472	Machine screw AM 3 x 4 .....	5
184	234 798	Compression spring .....	1
185	234 795	Lifting bolt compl. ....	1
186	234 786	Catch .....	1
187	210 643	Washer 4.2/12/1 St. ....	1
188	210 146	Lock washer 3.2 .....	5
189	234 789	Post spring .....	1
190	210 145	Lockwasher 2.3 .....	2
191	234 782	Lockwasher .....	1
192	210 713	Washer 9.1/15/1 St. ....	1
193	210 151	Lockwasher 7 .....	1
194	234 783	Slide bar .....	1
195	234 784	Bearing .....	1
196	210 586	Washer 3.2/7/0.5 St. ....	3
197	210 146	Lockwasher 3.2 .....	5
198	234 818	Pin screw .....	1
199	209 436	Socket for flat prong .....	4
200	234 700	Stroboscope plate .....	1
201	236 316	Stroboscope housing .....	1
202	225 321	Glow lamp .....	1
203	236 917	Wiring board compl. ....	1
C 1	225 322	Foil capacitor 68 nF/400 V/10 % .....	1
C 2	224 886	Foil capacitor 47 nF/250 V/20 % .....	1
D 1	225 247	Diode BY 183/300 .....	1
R 1	232 402	Carbon resistor 22 kΩ/0.25 W/5 % .....	1
R 2	232 401	Carbon resistor 12 kΩ/0.125 W/5 % .....	1
204	236 918	Cover .....	1
205	210 469	Machine screw AM 3 x 3 .....	3
206	210 366	Hex nut BM 4 .....	2
207	236 948	Skating lever compl. ....	1
208	227 077	Compression spring .....	1
209	236 949	Adjustment screw .....	1
210	210 146	Lock washer .....	5
211	237 240	Segment compl. ....	1
212	201 184	Adjustment washer .....	1
213	210 362	Hex nut BM 3 .....	5
214	218 591	Tension spring .....	1
215	234 807	Shut-off bar .....	1
216	201 187	Sliding washer .....	1
217	210 145	Lock washer 2.3 .....	2
218	234 780	Lift actuating lever .....	1
219	236 031	Lever compl. ....	1
210	234 779	Lift mave .....	1
221	234 778	Torsion spring .....	1
222	210 353	Hex nut BM 2 .....	2
223	234 777	Lift cam .....	1
224	234 776	Support bracket .....	1
225	232 545	Laminated spring .....	1
226	233 710	Tension spring .....	1
227	210 472	Machine screw AM 3 x 4 .....	5
228	234 773	Rotary lever .....	1
229	203 477	Washer 2.7/8/1 St. ....	1
230	210 353	Hex nut BM 2 .....	2
231	210 146	Lock washer .....	5
232	209 424	Miniature plug .....	1
233	207 303	Pick up lead with miniature and flat plug compl. ....	1
***	214 120	Hardware for cartridge mounting .....	1
***	236 186	Operating instruction .....	1
***	229 321	Shipping carton 510 compl. ....	1
***	236 920	Shipping carton CS 510 compl. ....	1
***	236 283	Mounting instructions .....	1
***	236 251	Operating instructions UAP .....	1

\*\*\* Not illustrated



# Replacement parts

Pos.	Part.-No.	Description	Qty.
<u>Connection plate</u>			
1	210 501	Machine screw M 3 x 35 .....	1
2	233 423	Plug, unipolar .....	2
3	217 072	AMP-plug socket .....	2
4	233 006	Cover .....	1
5	233 422	Cover (for plug unipolar) .....	1
6	233 005	Connection plate complete with cover .....	1
7	236 997	Connection plate complete with cover (for plug, unipolar) .....	1
8	233 007	Connection plate complete .....	1
<u>Power switch</u>			
1	210 498	Machine screw 3 x 28 .....	1
2	217 072	AMP-plug socket .....	2
3	233 423	Plug, unipolar .....	2
4	233 010	Cover (for direct connection) .....	1
5	233 011	Cover (for plate-connection) .....	1
6	233 421	Cover (for plug, unipolar) .....	1
7	209 505	Capacitor 10 nF/1000 V/10 % .....	1
	230 355	Special capacitor 68 nF/ 150 V/20 % .....	1
8	230 148	Switch slide .....	1
9	230 296	Tension spring .....	1
10	219 200	Snap spring .....	1
11	233 012	Switch plate compl. .....	1
12	233 013	Switch plate UL compl. .....	1
13	236 605	Switch plate with spec.-c. compl. .....	1
14	236 335	Slide .....	1
15	200 444	Spring washer .....	1
16	233 009	Power switch compl. (for direct connection) .....	1
17	236 607	Power switch with spec.-c. compl. (for direct connection) .....	1
18	234 816	Power switch compl. (for plate connection) .....	1
19	233 008	Power switch UL compl. (for plate connection) .....	1
20	236 606	Power switch compl. with spec.-c. (for plate connection) .....	1
21	236 999	Power switch compl. (for plug, unipolar) .....	1
22	236 998	Power switch compl. with spec.-c. (for plug, unipolar) .....	1

Modification reserved!

Fig. 22 Power switch

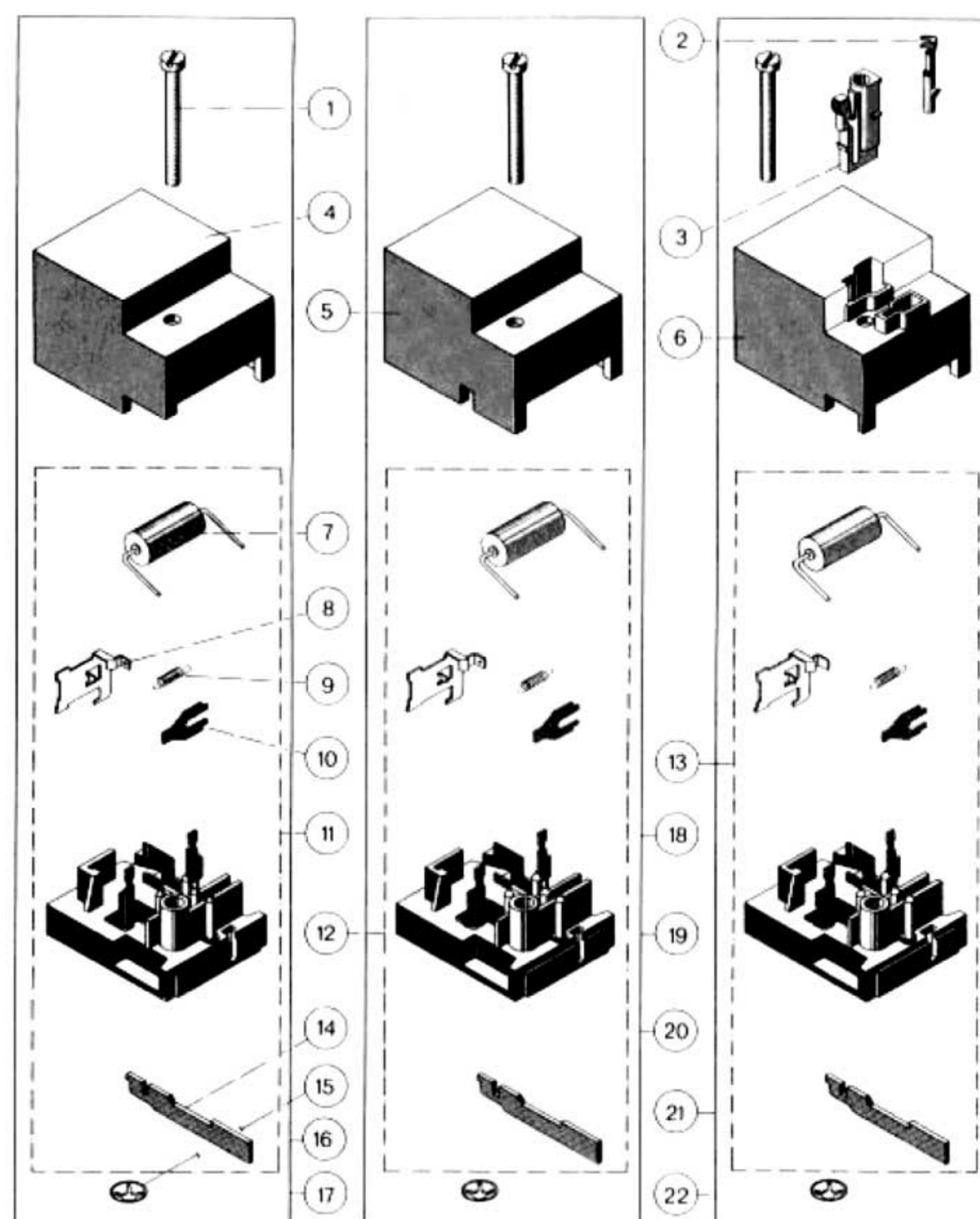
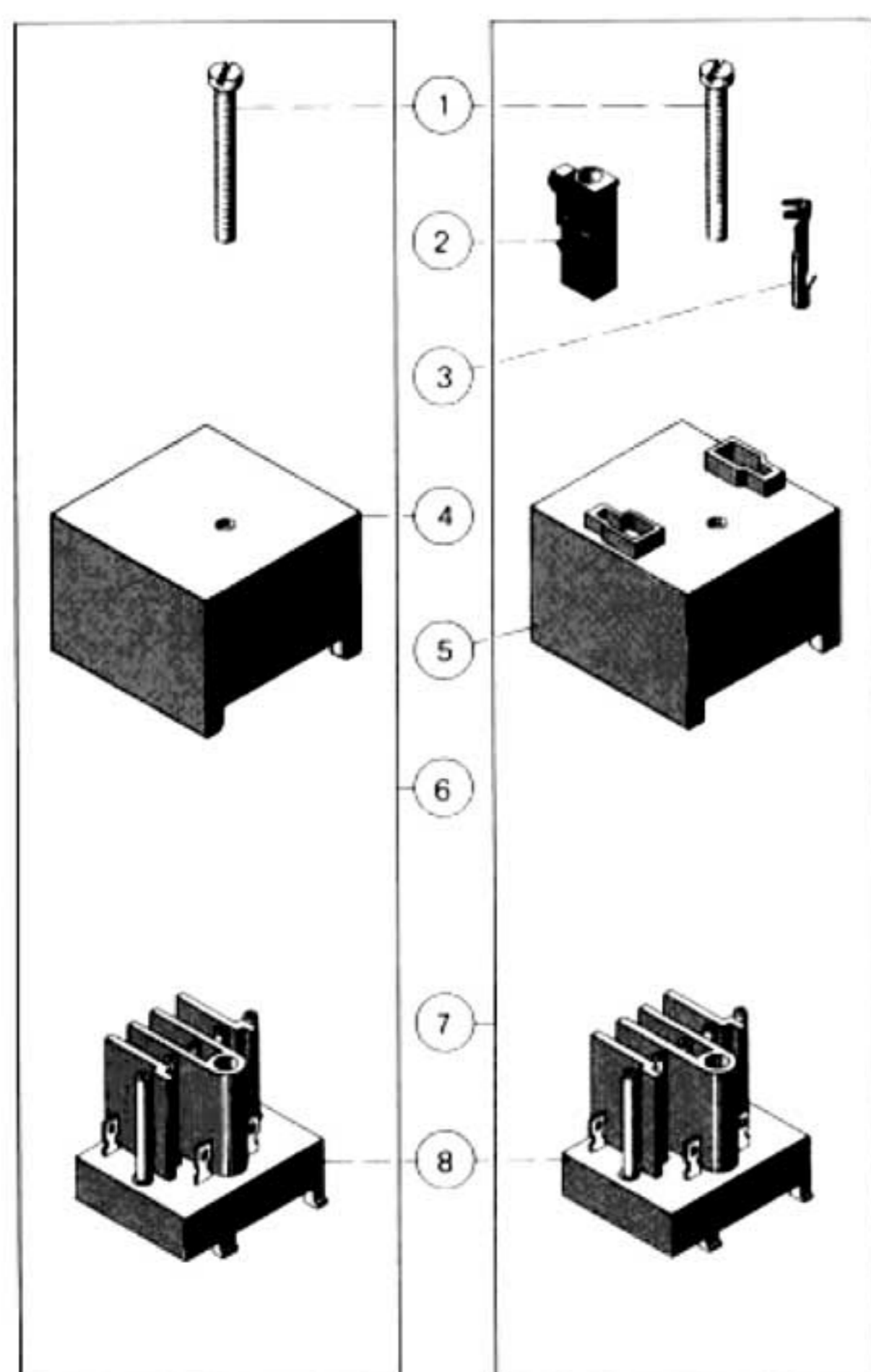


Fig. 21 Connection plate





## Lubrication

Fig. 23

All bearing and friction points of the unit are adequately lubricated at the works. Replenishment of oil and grease is only necessary after approximately 2 years of normal use of the record player as the most important bearing points (motor bearings) have sintered metal bushes.

Bearing points and friction faces should be lubricated sparingly rather than generously.

It is important that no oil grease should come in contact with the friction faces of the flat belt, drive pulley and flywheel rotor, otherwise slip will occur.

When using different lubricants, chemical decomposition can often take place. To prevent lubrication failure we recommend using the original lubricants stated below.

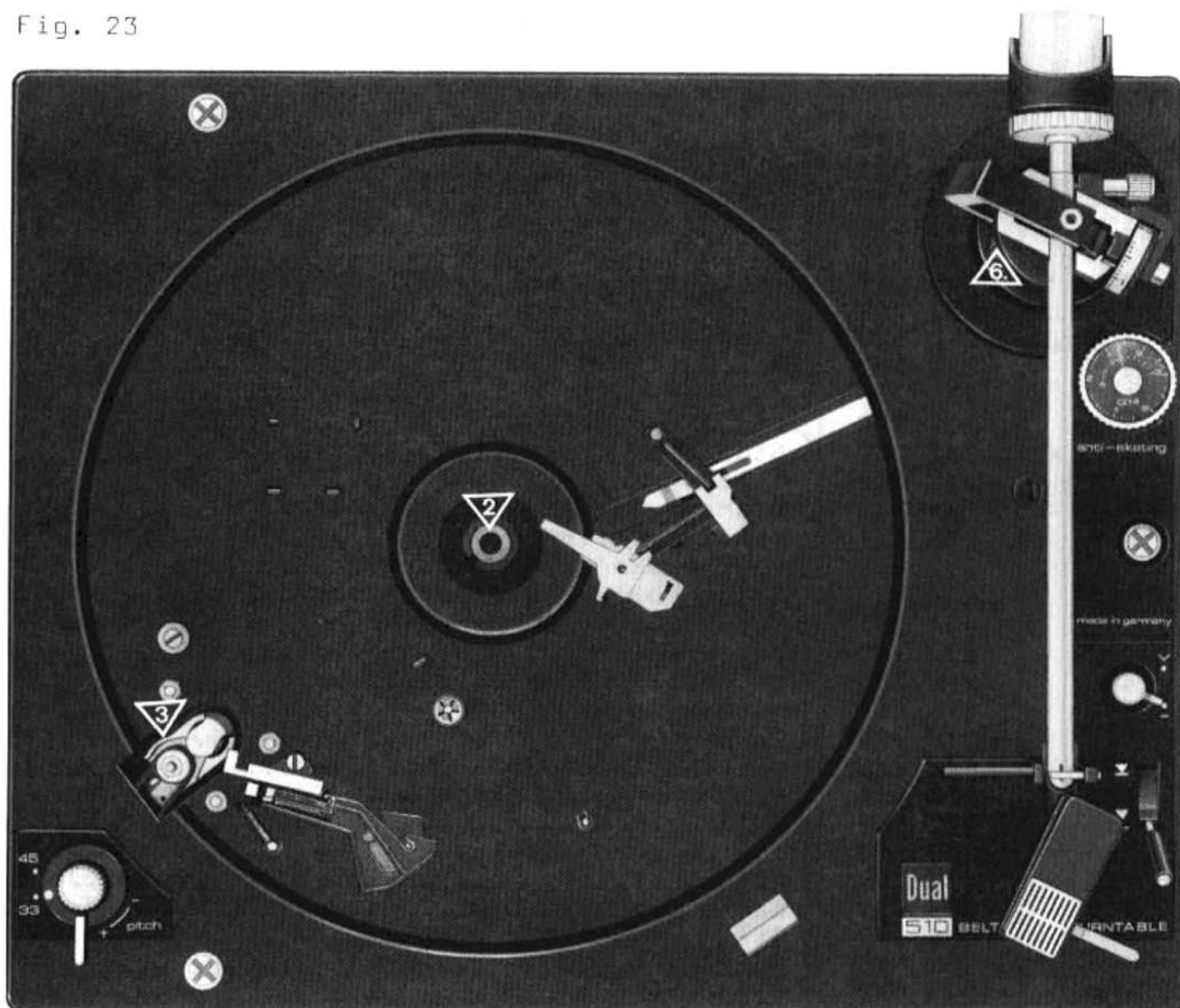



Fig. 24

-  Renotac No. 342 adhesive oil
-  BP Super Visco-static 10 W/30
-  Shell Alvania No. 2
-  Isoflex PDP 40
-  Silicone oil AK 500 000

