

Dual

Edition April 1971

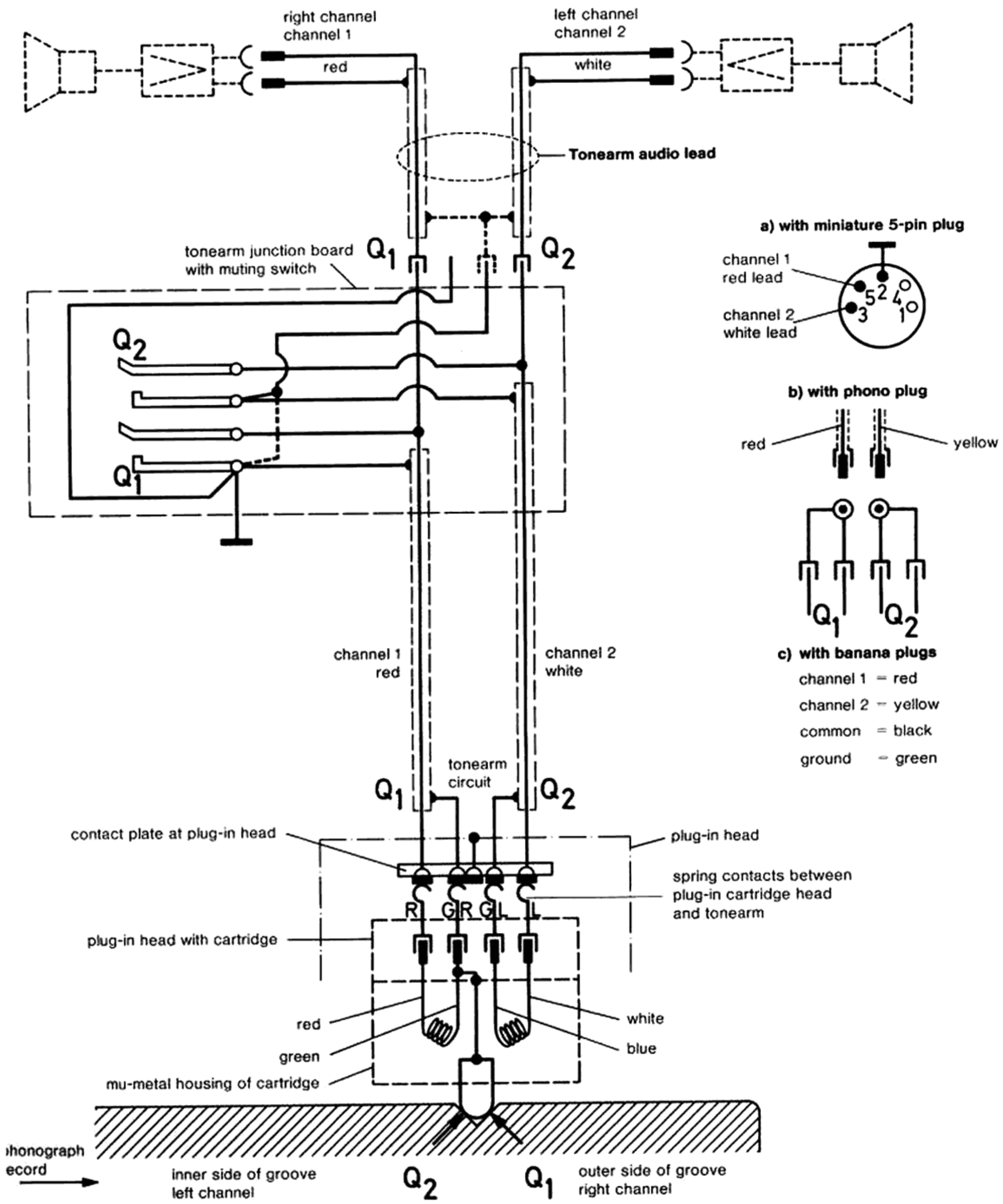
Dual 1214 Service Manual



Technical data

| | |
|----------------------------------|---|
| Line frequency: | alternating, 50 or 60 cycle, with appropriate motor pulleys |
| Line voltage: | selector for 110 or 220 volts |
| Drive: | 2-pole Dual single-phase induction motor or 4-pole asynchronous motor with radialelastic suspension |
| Power consumption: | 10 watts approximately at 220 V, 50 cycle |
| Current requirements: | 60 ma. maximum at 220 V, 50 cycle; 115 ma. maximum at 117 V, 60 cycle |
| Turntable speeds: | 33 1/3, 45 and 78 r.p.m. |
| Speed adjustment: | adjustment range of 1 semitone (6 %) at all three turntable speeds |
| Turntable: | weight 3.2 lbs. |
| Wow and flutter: | less than ± 0.15 % |
| Rumble: | less than 35 dB below signal level } in accordance with |
| Signal-to-noise ratio: | less than 55 dB below signal level } DIN 45 500 |
| Tonearm: | torsionally rigid, tubular metal arm, with vertical needle bearings, horizontal 2-layer precision ball bearings. Min. stylus force: 1.5 p |
| Cartridge holder: | removeable, suitable for acceptance of cartridges having 1/2" mounting and possessing a weight of 1-10 grams |
| Weight: | 9.7 lbs. without packing |
| Dimensions and mounting cutouts: | see installation instructions |

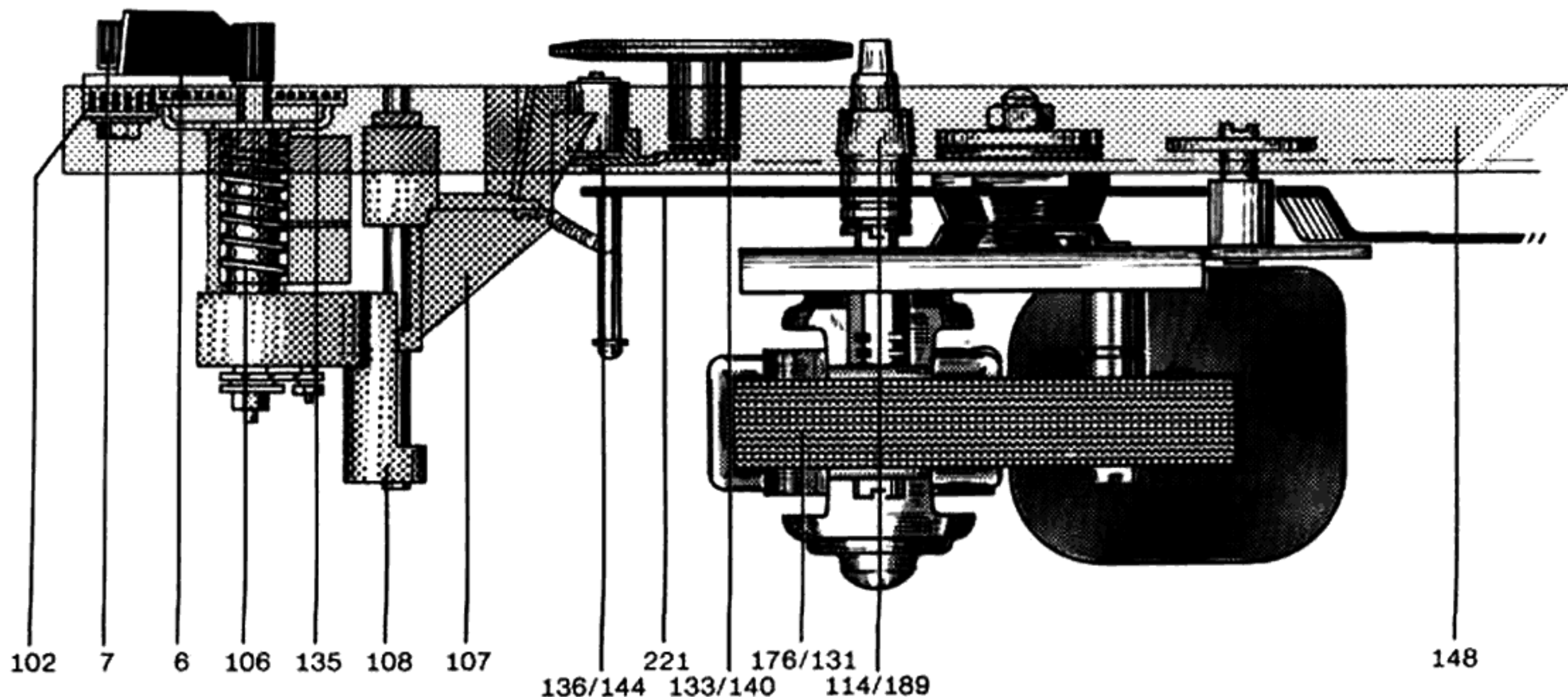
Dual Gebrüder Steidinger · 7742 St.-Georgen/Schwarzwald



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Fig. 2 Motor suspension and turntable drive



Motor and drive

The turntable platter and the mechanism are driven by either a 4-pole (131) or a 2-pole (176) induction motor. Both motors have a balanced armature, polished bearing surfaces and are guaranteed vibration-free. The 4-pole motor has the additional advantage of a very small stray magnetic field.

The speed of the motors is constant over a supply voltage range of $\pm 10\%$. Deviations in speed depend on, and are proportional to, line frequency. Adaptation of the motor to 50 or 60 Hz power is accomplished by changing the motor pulley (114/189).

2-pole motor:

| | | |
|------------------|----------|---------|
| pulley for 50 Hz | part no. | 212 135 |
| pulley for 60 Hz | part no. | 212 136 |

4-pole motor:

| | | |
|------------------|----------|---------|
| pulley for 50 Hz | part no. | 220 970 |
| pulley for 60 Hz | part no. | 220 971 |

The motor pulley is secured to the motor shaft by a setscrew. When a pulley is replaced or exchanged, it must be set at the correct height (see Figs. 5 and 6).

The turntable platter is driven by the idler wheel (133/140) which is automatically disengaged from the motor pulley when the unit is shut off, in order to protect its driving surface.

Turntable speeds of $33 \frac{1}{3}$, 45 78 rpm are selected by raising or lowering the idler wheel (133/140) to the appropriate step on the motor pulley.

When the selector lever (6) is moved, the selector segment (105) rotates. This causes the lever (107) fitted in the slot of the selector segment to move in a vertical direction. The idler wheel (133/140) mounted on the swinging arm (136) is lifted off the motor pulley and set down again on the motor pulley step for the adjacent speed.

Fig. 3 Motor field connections (less voltage selector)

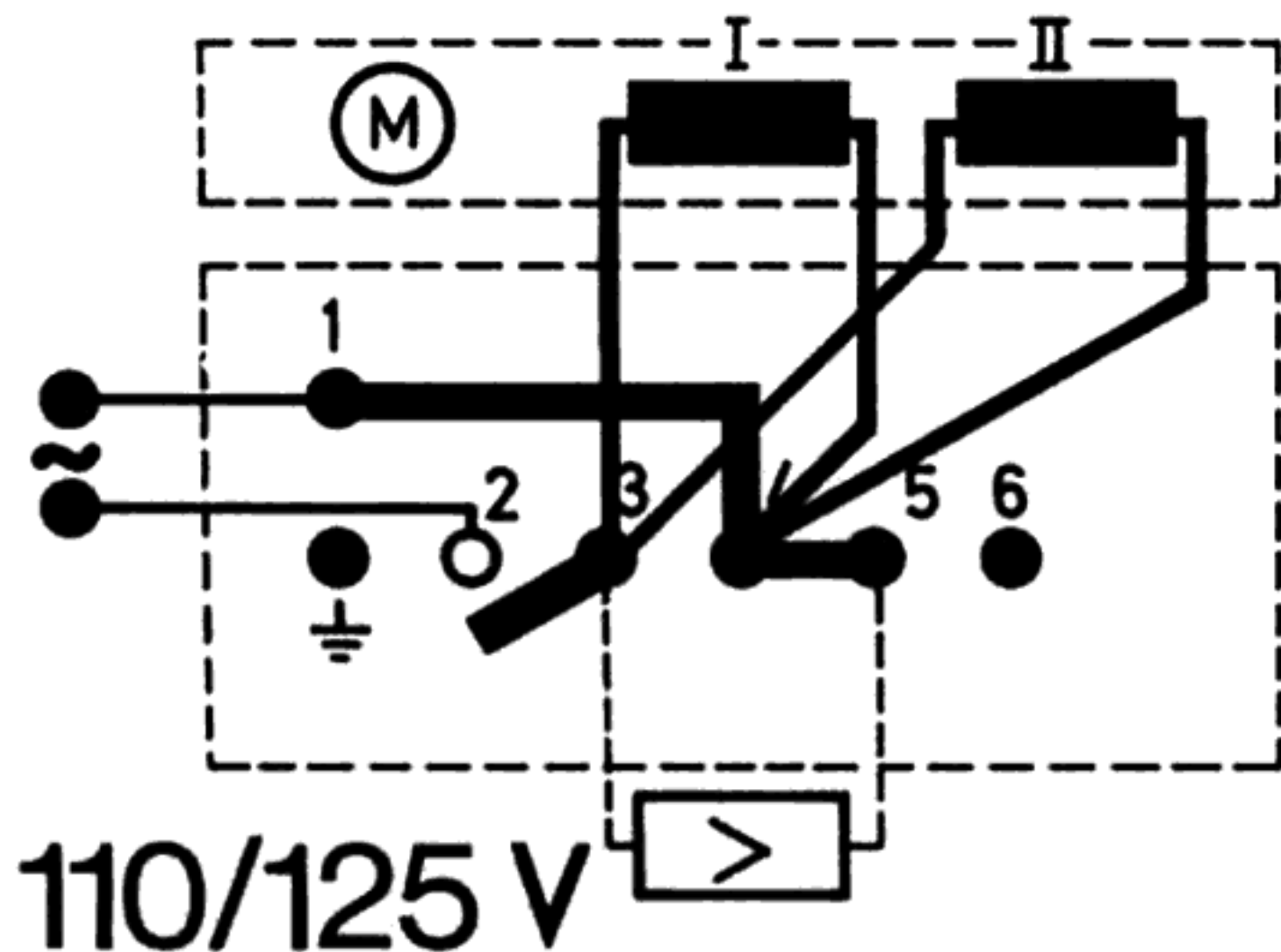
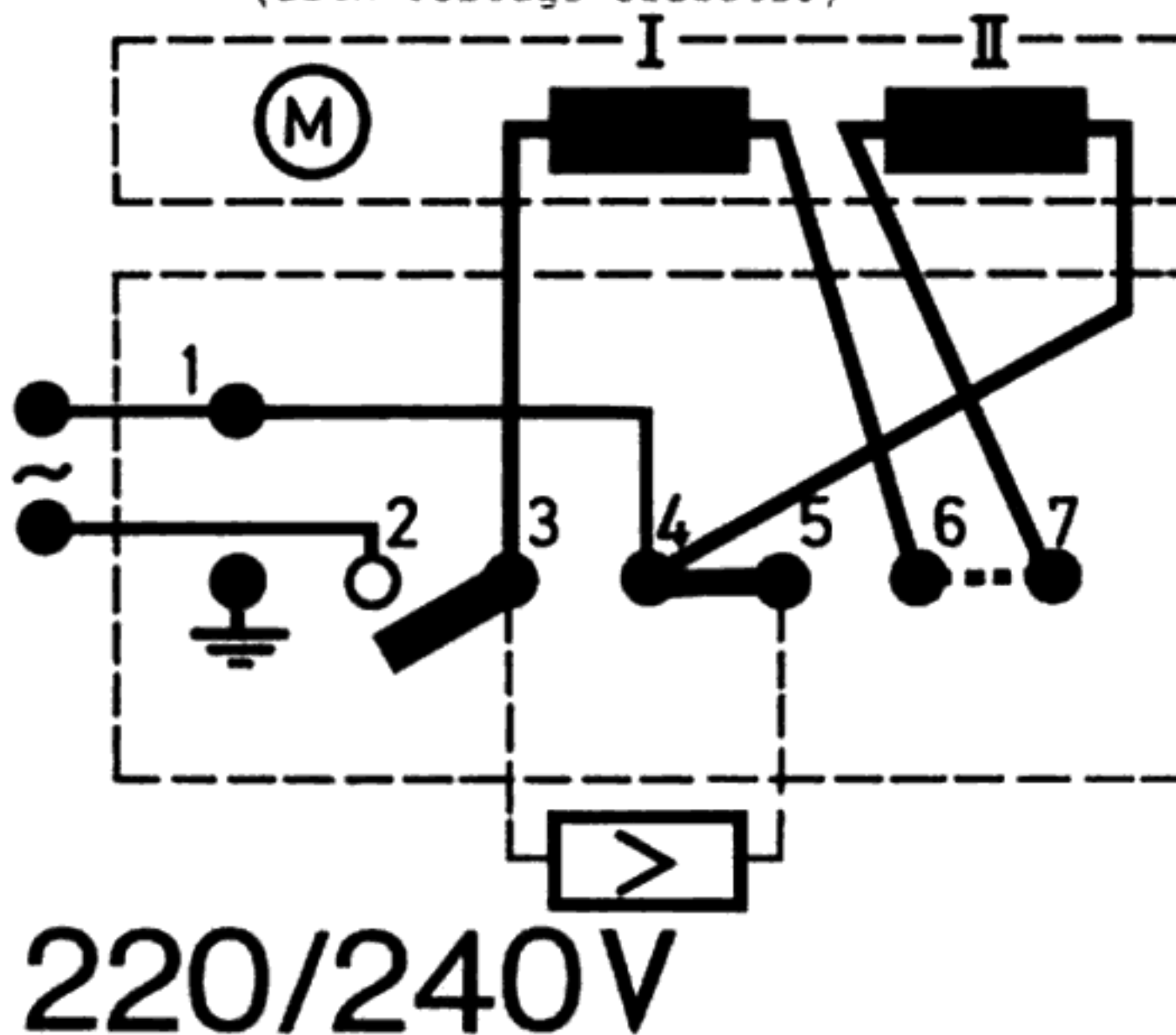


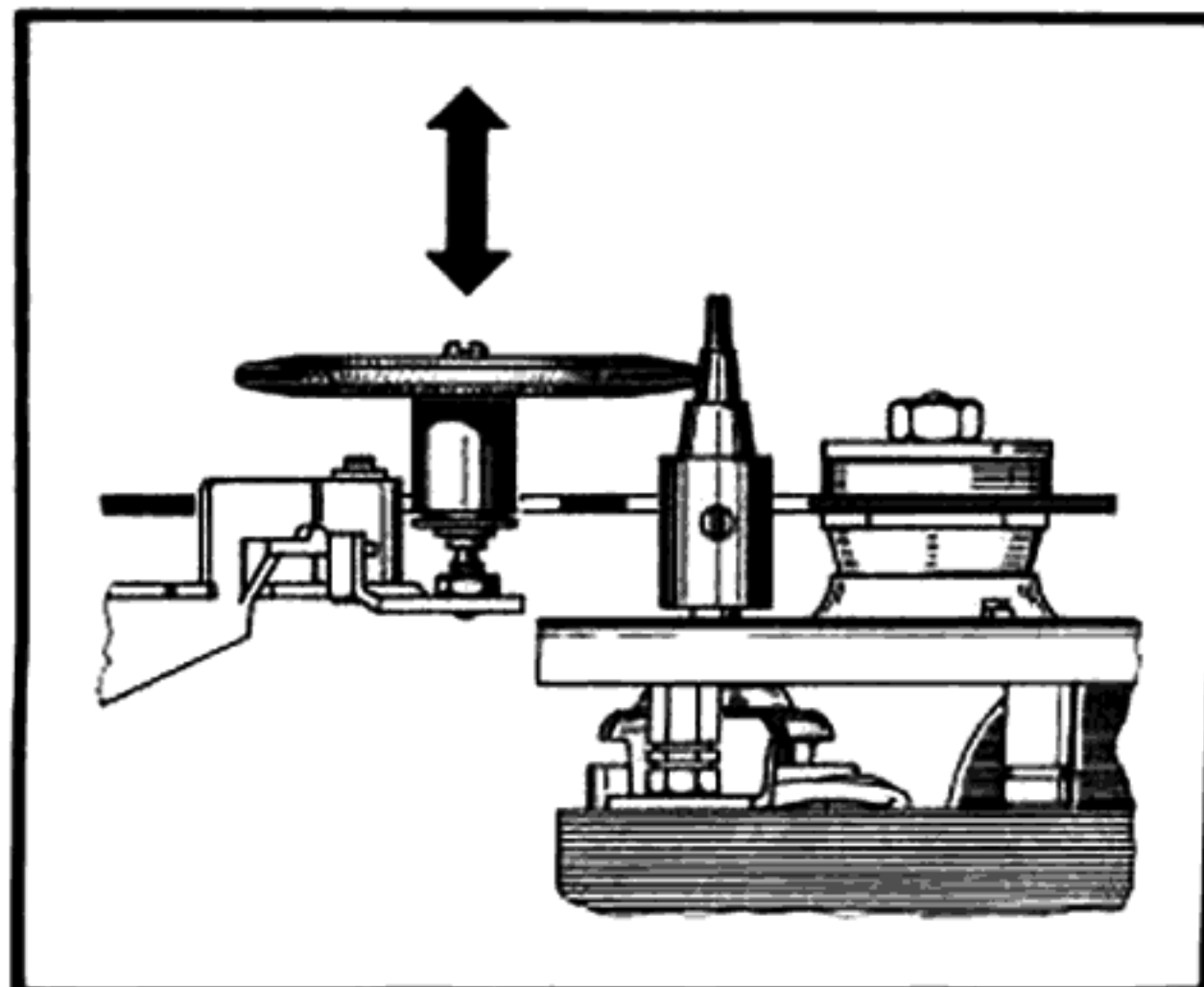
Fig. 4 Motor field connections (with voltage selector)



Pitch Control

For turntable speeds 33 1/3, 45 and 78 rpm, the unit incorporates a voltage-independent pitch control, which permits a turntable speed variation of up to 6% (approximately one semitone). When the pitch control knob (7) is turned, the switch segment (105) and the switch lever (107) attached to it are moved up or down. This vertical displacement changes the position of the idler wheel on whatever step of the motor pulley it has been placed on (by the speed selector), and, due to the tapered shape of the pulley, effects approximately $\pm 3\%$ variation in speed.

Fig. 5 Motor pulley position (2-pole motor)



Symptom

Cause

Remedy

Turntable does not run when unit is plugged in and start switch operated

- a) Current path to motor interrupted
- b) Idler wheel (133/140) not in contact with platter
- c) Motor pulley loose

- a) Check connection at switch plate and voltage selector
- b) Check switch lever assembly (107)

Turntable does not come up to speed

- a) Motor pulley is not correct for local line frequency
- b) Slippage between idler wheel (133/140) and motor pulley or platter
- c) Excessive friction in motor, drive wheel or platter bearings

- c) Tighten motor pulley
- a) Change motor pulley
- b) Clean friction surfaces of idler wheel, motor pulley and turntable platter. If necessary, replace drive wheel. Once the drive surface of the platter has been cleaned, do not touch it with your fingers
- c) Clean and oil bearings

Rumble in reproduction

Worn idler wheel

Replace idler wheel (133/140) and clean platter drive surface and motor pulley with greaseless solvent. Once surface are cleaned, do not touch them with your fingers.

Symptom

Correct nominal speed obtained only at extreme settings of pitch control

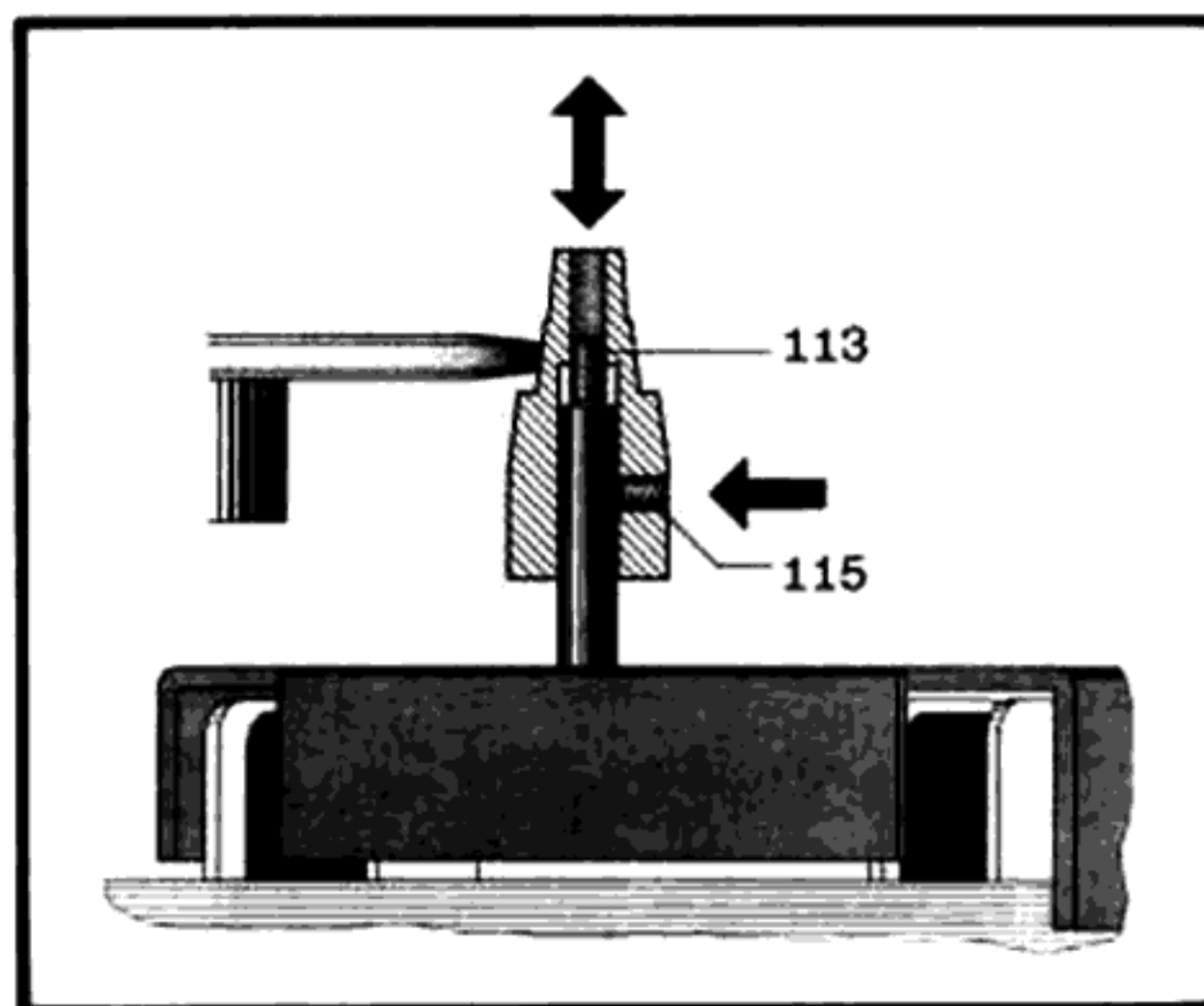
Cause

Idler wheel does not contact motor pulley correctly

Remedy

- a) 4-pole motor
Loosen setscrew (115) and by means of setscrew (113) adjust the motor pulley on the motor shaft so that when the fine speed adjustment knob is in the center of its range, the idler wheel is positioned in the center of the appropriate motor pulley step. (Fig. 6). When adjustment is completed, tighten setscrew (115).
- b) 2-pole motor
After loosening locknut (143), correct the idler wheel position by turning its shaft (142) so that when the fine speed adjustment knob (7) is in the center of its range, the idler wheel is centered in the appropriate step of the motor pulley (Fig. 5). After adjustment, tighten locknut.

Fig. 6 Motor pulley position (4-pole motor)



Tonearm and tonearm bearing

The tonearm of the Dual 1214 is counter-balanced and pivots vertically and horizontally on precision ball bearings. This approach gives highly favorable tracking characteristics. The tonearm head is removable. To aid in replacing or adjusting the tonearm head, a hole is provided in the turntable base to facilitate mounting the tonearm head without first removing the tonearm. Before setting the correct stylus force for the cartridge that has been installed, the tonearm should be balanced with the stylus-force setting at zero.

Fig. 7 Tonearm bearing assembly

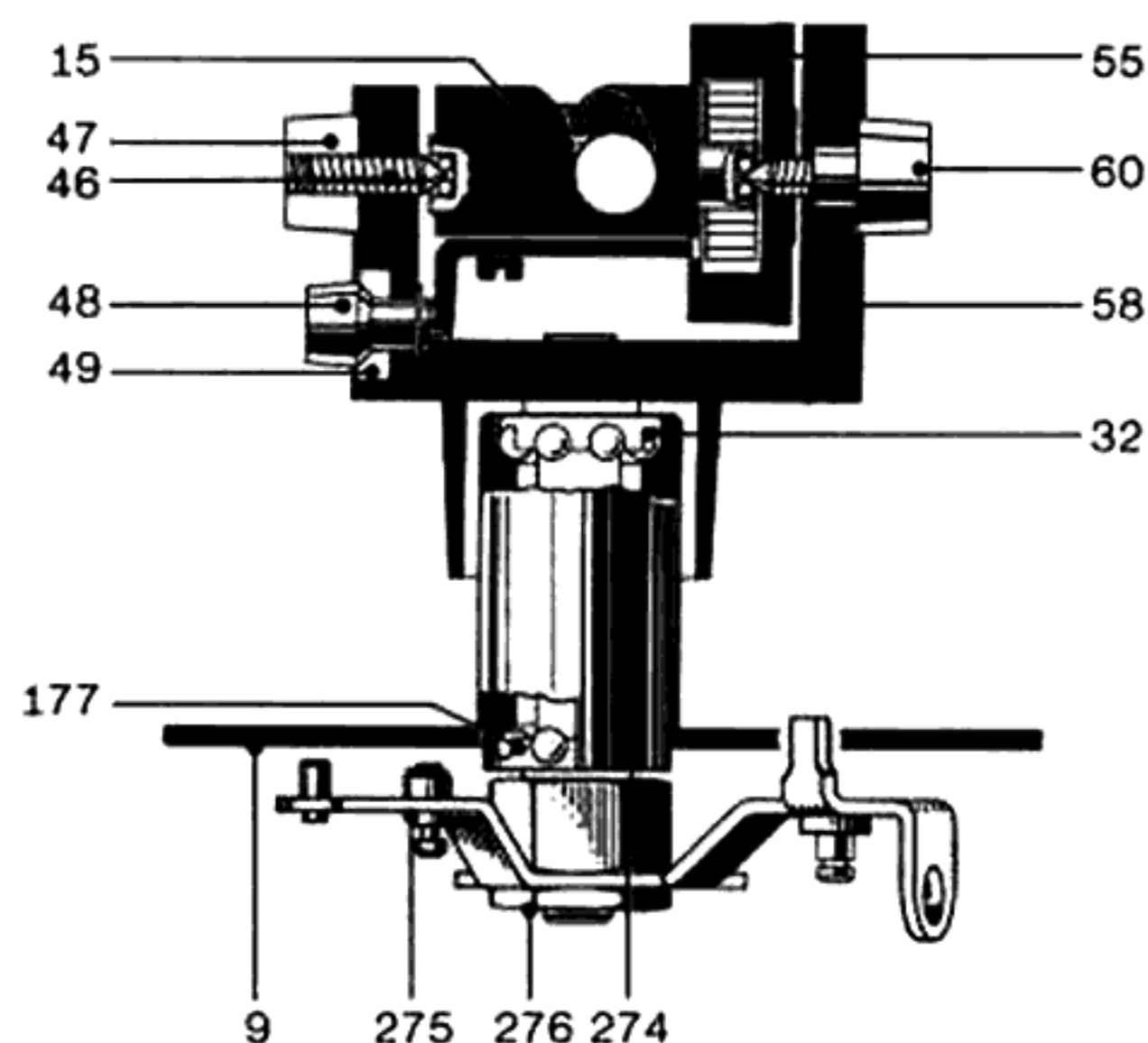
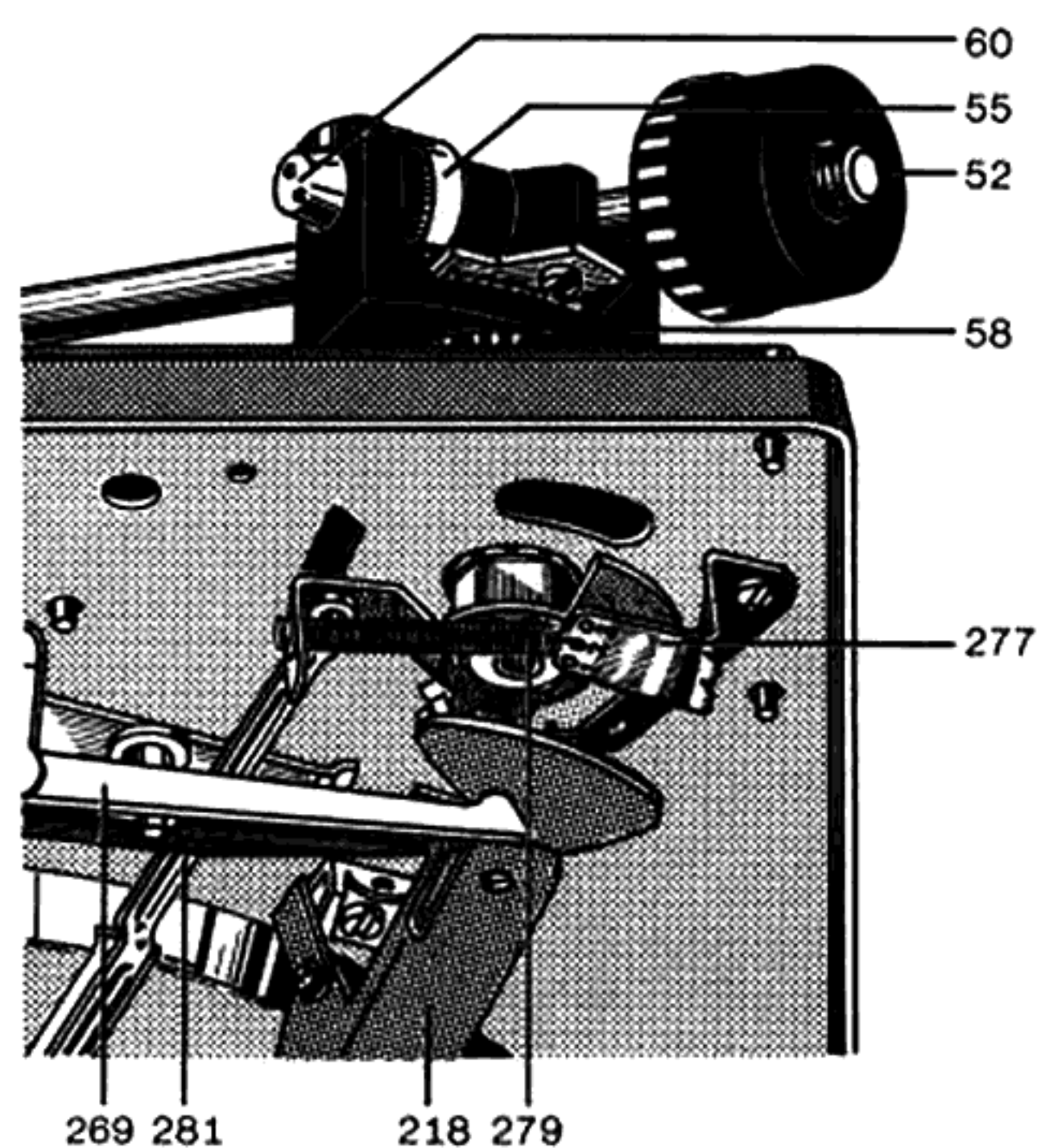


Fig. 8 Tonearm bearing assembly (under view)



Because the Dual 1214 has a predetermined anti-skating compensation arrangement, it is recommended that the balancing operation be carried out with the tonearm immediately next to the tonearm rest. Balancing is done by turning the counterweight.

The counterweight is so designed that it can balance cartridges with weights from 1 to 10 grams.

For shock absorption (the absorption of short, rapid jolts) the counterweight is elastically mounted on the tonearm and bracked to prevent unintended rotation. The tonearm head is designed to accept all cartridges with internationally standard 1/2 inch mounting centers and with a weight not exceeding 10 grams. The model with a 2-pole motor is intended for use with piezoelectric cartridges. Stylus force is set by turning a calibrated spring housing (55), thus tensioning or slackening the spiral spring it contains. The scale is calibrated over a range of 0 to 5.5 grams, allowing an exact setting of stylus within that range in 0.5 gram steps. Minimum recommended tracking force: 1.5 grams.

To replace the tonearm with its bearing assembly, the following procedure is recommended:

1. Secure the unit in the repair jig, set the stylus force to zero and lock the tonearm in place.
2. Turn the unit upside down and unsolder the tonearm leads.
3. Remove main lever (218) and linking lever (272).
4. Remove C-ring (283) and washer (282) and remove the shutoff track from the eccentric bolt on the segment.
5. Unhook spring (279) and unscrew bracket (277).
6. Loosen nut (276), holding adjusting nut (274) with an SW 14 hex wrench.
7. Remove segment (275) with lift bolt (250).
8. Unscrew positioning nut (274).
9. Remove bearing race (177) with 5 balls.
10. Return unit to upright position and remove tonearm.

To reinstall the tonearm with bearing assembly, first insert the bearing race (32) with 5 balls. Then insert the tonearm and replace the lower bearing (race and 5 balls, 177). Run up positioning nut (274) lightly onto threads by hand until you feel slight resistance. Then turn it back (loosen it) by a quarter turn. Replace segment and hex nut (276). When you tighten hex nut (276) hold positioning nut (274) with a second wrench. After tightening you must still just be able to feel a slight play in the bearing. After tightening the nuts, check the position of the tonearm over the tonearm rest. This is correct when it descends to the tonearm rest without binding. Be careful that when the spring bracket (277) is fastened, the tonearm leads do not hinder the motion of the segment.

To remove the tonearm from its bearing frame, unsolder the tonearm leads, then set the stylus-force adjustment to zero. Unscrew locknut (47) with setscrew (46) and bearing screw (60) (left-hand thread). Carefully lift the tonearm free from the bearing frame.

Antiskating adjustment

The skating force that tends to pull the tonearm toward the center of the record causes increased stylus force on the left (inner) groove wall and decreased force on the right (outer) wall. To compensate for skating force and its undesirable effects in playing stereo records, the unit includes an anti-skating device.

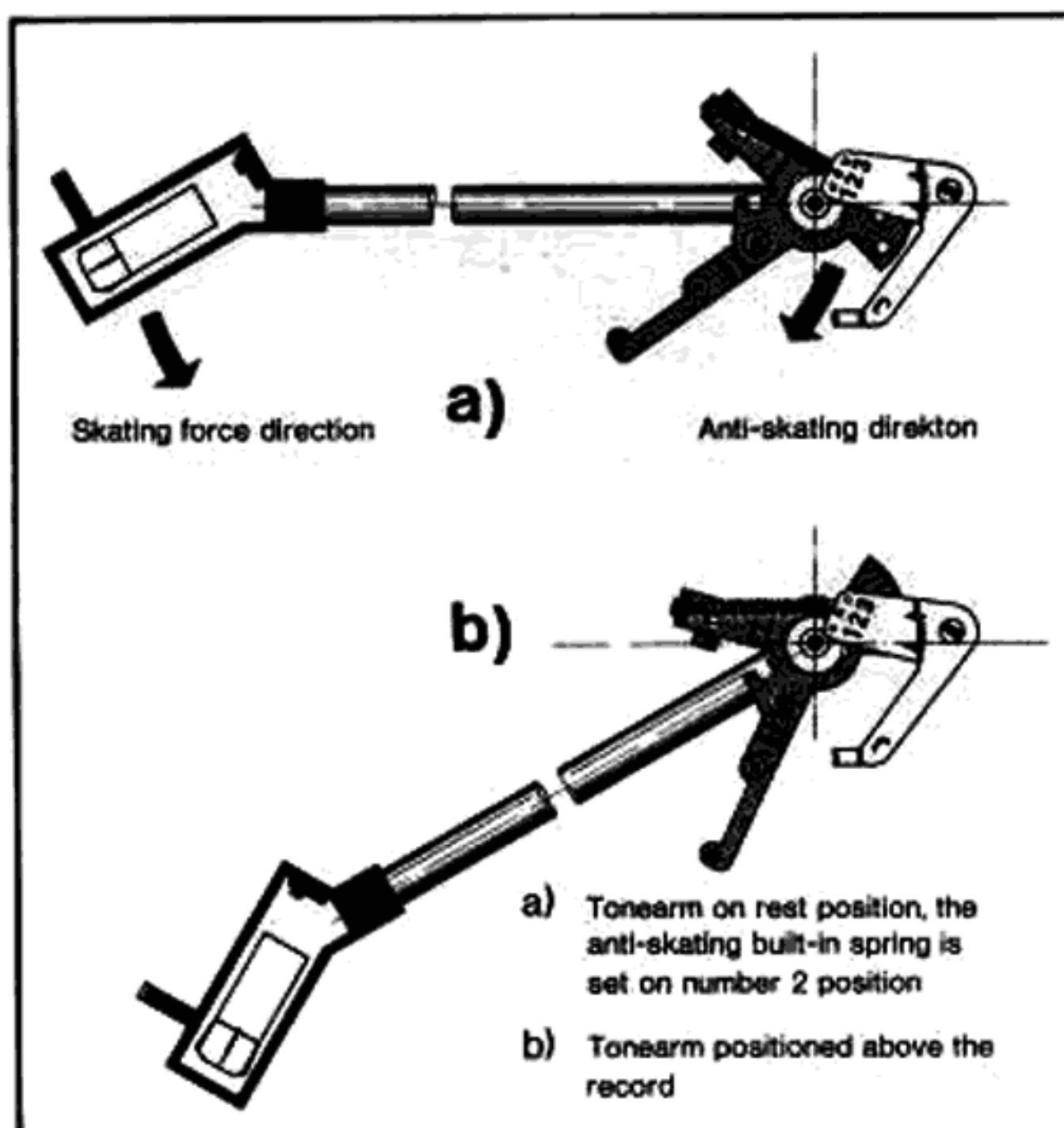
Skating force is a consequence of the geometry of the tonearm, and is proportional to stylus force. Matching of the anti-skating force to the stylus force selected for the cartridge that has been installed is accomplished by moving tension spring (279) on its bracket (277).

Hole 1:
For cartridges with recommended stylus force \cong 2.5 grams

Hole 2:
For cartridges with recommended stylus force \cong 3.5 grams

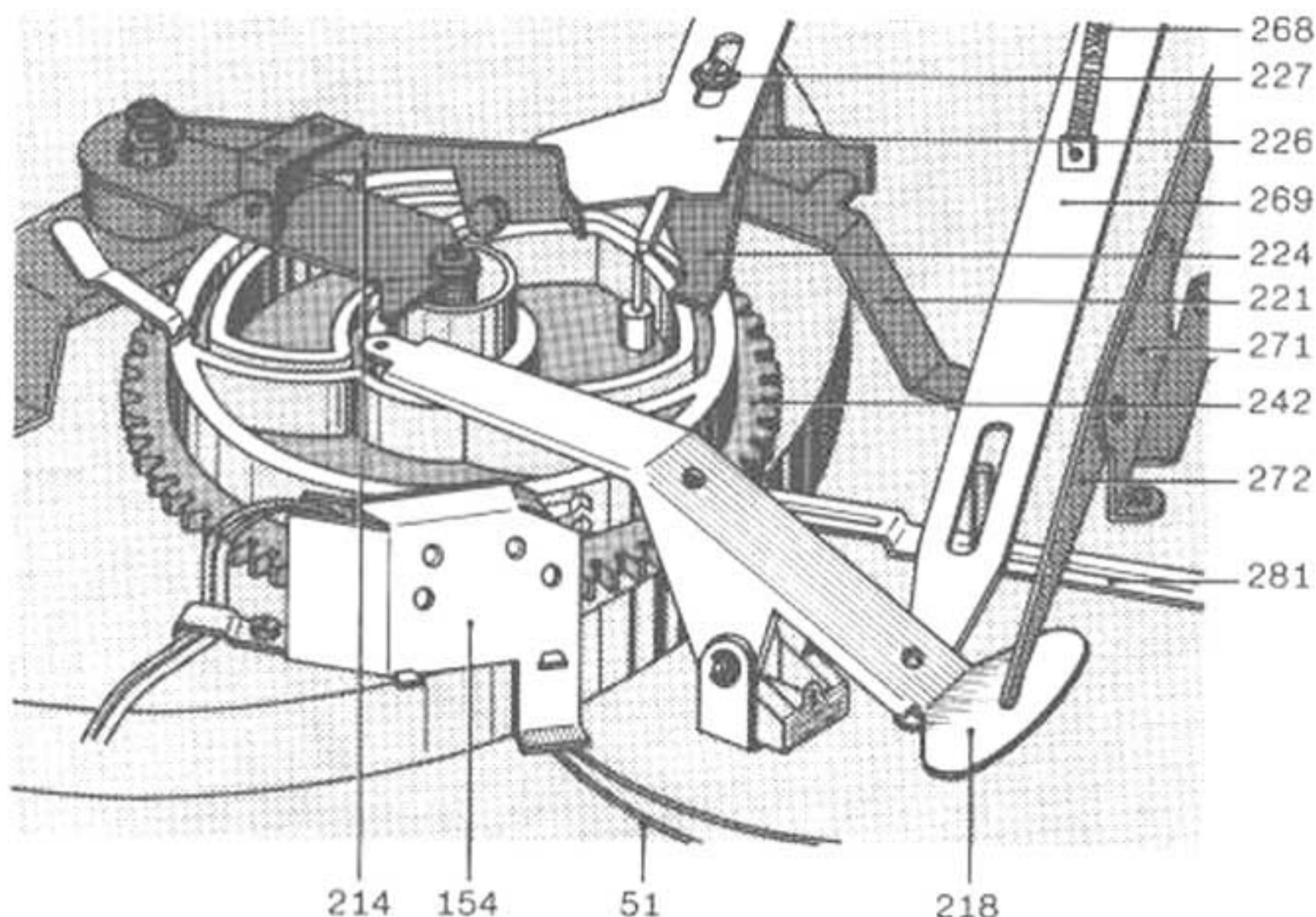
Hole 3:
For cartridges with recommended stylus force \cong 4 grams

Fig. 9 Anti-skating



| Symptom | Cause | Remedy |
|---|---|---|
| Stylus skips | a) Tonearm not balanced | a) Balance tonearm according to operating instructions |
| | b) Stylus force too low | b) Set stylus force to cartridge manufacturer's recommended value |
| | c) Stylus worn or chipped | c) Replace stylus |
| | d) Excessive friction in tonearm bearing | d) Check tonearm horizontal pivot. Should have barely noticeable play. Adjust vertical bearing only with the left bearing screw (46) and the horizontal bearing with nut (274). Horizontal bearing is correctly adjusted when the tonearm, with anti-skating 0.5 g, swings freely from center to rest |
| | e) Ball (255) missing from shut-off rail | e) Replace ball (255) |
| | f) Anti-skating compensation spring hooked into wrong hole | f) Hook spring into hole corresponding to stylus force. (See page 7) |
| Tonearm sets down beside tonearm rest | Arm segment (275) incorrectly adjusted | Correct segment positioning: after loosening nut (276) rotate segment (275). When loosening adjusting nut (274), hold parts firmly. Adjustment is correct when the tonearm descends to the tonearm rest without binding. After adjustment, check bearing friction |
| Horizontal pivot friction too high | Tonearm is set too high on tonearm lift. Main lever jams against guide pin of lift screw assembly | Stylus should be no farther from record surface than 1/4". Adjust by turning screw (231). |
| Vertical movement of tonearm is impeded during set-down cycle | a) Bearing friction too high | a) Check bearing screw (46) and arm balance |
| | b) Lift screw (250) jams in guide sleeve of arm segment (255) | b) Remove and clean lift screw |

Fig. 10 Tonearm guide mechanism



lift and lowering are controlled by the main lever (218) and the lift screw (250). Horizontal movements are controlled by the main lever (218) and the segment (275). Setting the changer for playback of 7", 10" or 12" discs is done with the indexing lever (24). Setdown points are determined by the eccentric portion of the arm positioning slide (269) and the indexing lever (267).

Horizontal movement of the tonearm is limited by the arm segment striking the arm positioning slide (269). During the change cycle, the main lever (218) raises the arm positioning slide, bringing it within reach of the spring stud. On completion of the change cycle (setdown of the tonearm on the record), the arm positioning slide (269) is again released and returns to its normal position. It thus moves out of reach of the spring stud, permitting the tonearm to move horizontally without hindrance, while playing the record.

Tonearm movements

A guide groove located on the underside of the main cam (242) controls the automatic lift and set-down of the tonearm as the cam rotates through 360°. Tonearm

Tonearm lift (Cue control)

The tonearm lift permits the tonearm to be set down on the record safely at any desired point except the shut-off area (near the record label).

Pulling the tonearm lift towards the front turns the drive washer (261). This moves the connecting lever (272), main lever (218) and lift screw (250) to raise the tonearm.

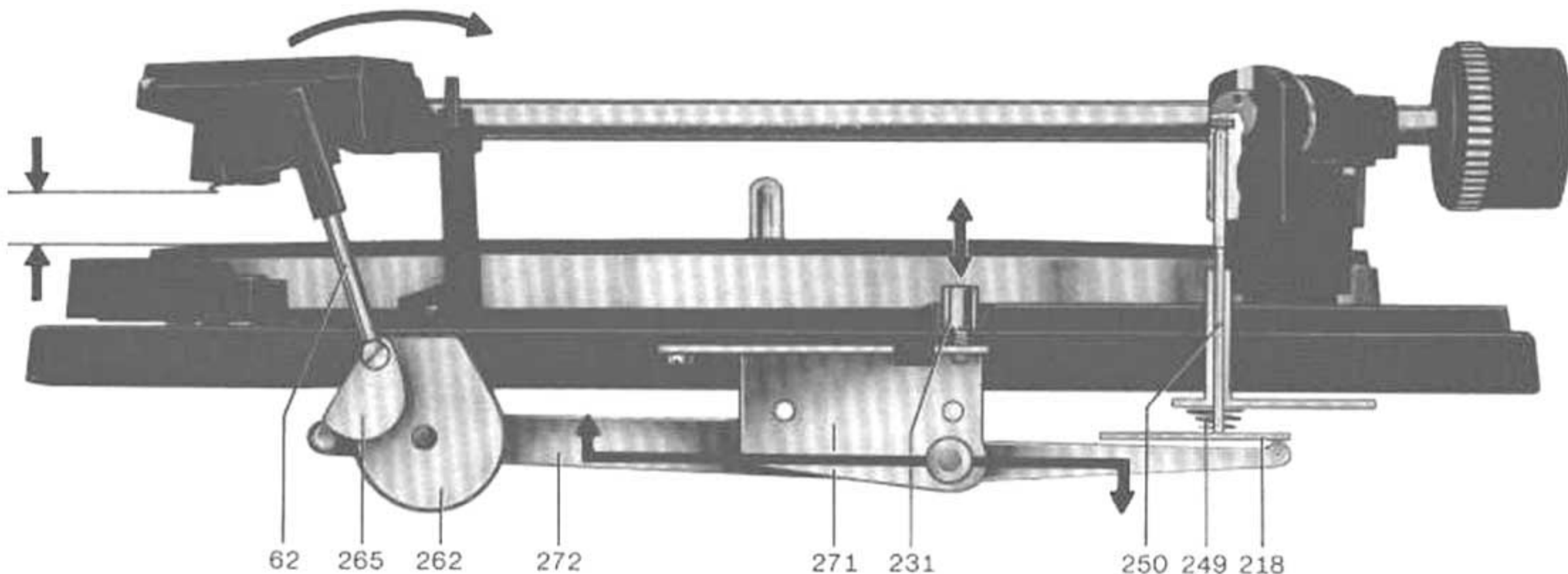
After the tonearm is moved (by hand) to the desired spot on the record, the tonearm lift handle is lightly tapped towards the rear to

release the mechanism. The connecting lever (272) and the leaf spring (215) of the main lever (193) are freed, allowing the tonearm to fall. The rate of fall is controlled by silicone grease on the drive washer (261).

The height of the stylus above the record can be varied from zero to about 1/4" by adjusting setscrew (231).

Turning it to the right increases the height, turning it to the left decreases the height.

Fig. 11 Tonearm lift (tonearm raised)



| Symptom | Cause | Remedy |
|---|--|--|
| Stylus jumps out of record groove | Anti-skating adjustment incorrect | See operating instructions |
| Tonearm misses edge of record | a) Set-down incorrectly adjusted | a) Adjust set-down with a 12" record so that stylus touches record approximately 1/16" inside edge of record. Adjustment will be correct for other sizes |
| | b) Record not standard size | b) Use standard records |
| | c) Friction surfaces of tonearm clutch dirty | c) Clean clutch surfaces |
| | d) Anti-skating spring hooked in wrong hole | d) Hook spring in hole corresponding to stylus force. (See page 7) |
| Tonearm strikes record during change cycle | Tonearm height incorrectly set | Adjust arm height with screw (48). Height is correct when stylus tip is 1/16" to 1/8" above start switch (25) when arm is removed from rest lowered |
| Tonearm does not move on to record when drop cycle is started | Damping too great, drive washer dirty | Loosen nut (229) and washer (230) and coat both sides evenly with silicone grease. Reassemble and wipe off excess grease |
| Tonearm lowers too quickly when drop cycle is started | Too little damping | Loosen nut (229) and washer (230) and drive washer (261). Clean thoroughly. Coat both sides evenly with silicone grease, re-assemble and wipe off excess |
| Tonearm returns to rest immediately after being placed on record manually | Shut-off mechanism has shifted out of position during shipping | Before using changer after moving, run it through start cycle with tonearm locked on rest |

Start cycle

Moving the start switch (25) moves the switch lever (224) towards the main cam (242), initiating the following sequence.

- a) The set screw of the switch lever assembly (224) turns the switch arm (221) mounted on the grooved shaft (227). Via a tension spring, this actuates the rocker assembly (107) and engages the idler (133/140) between the platter (5) and the motor pulley (114/189). At the same time, the power switch (151) is actuated by the switch slide (184) through the switch arm, and the turntable begins to rotate.
- b) The switch lever (224) is brought within reach of the cam follower lever (245), so that it is pushed into the change position after the rotation of the main cam.

Fig. 12 Start position

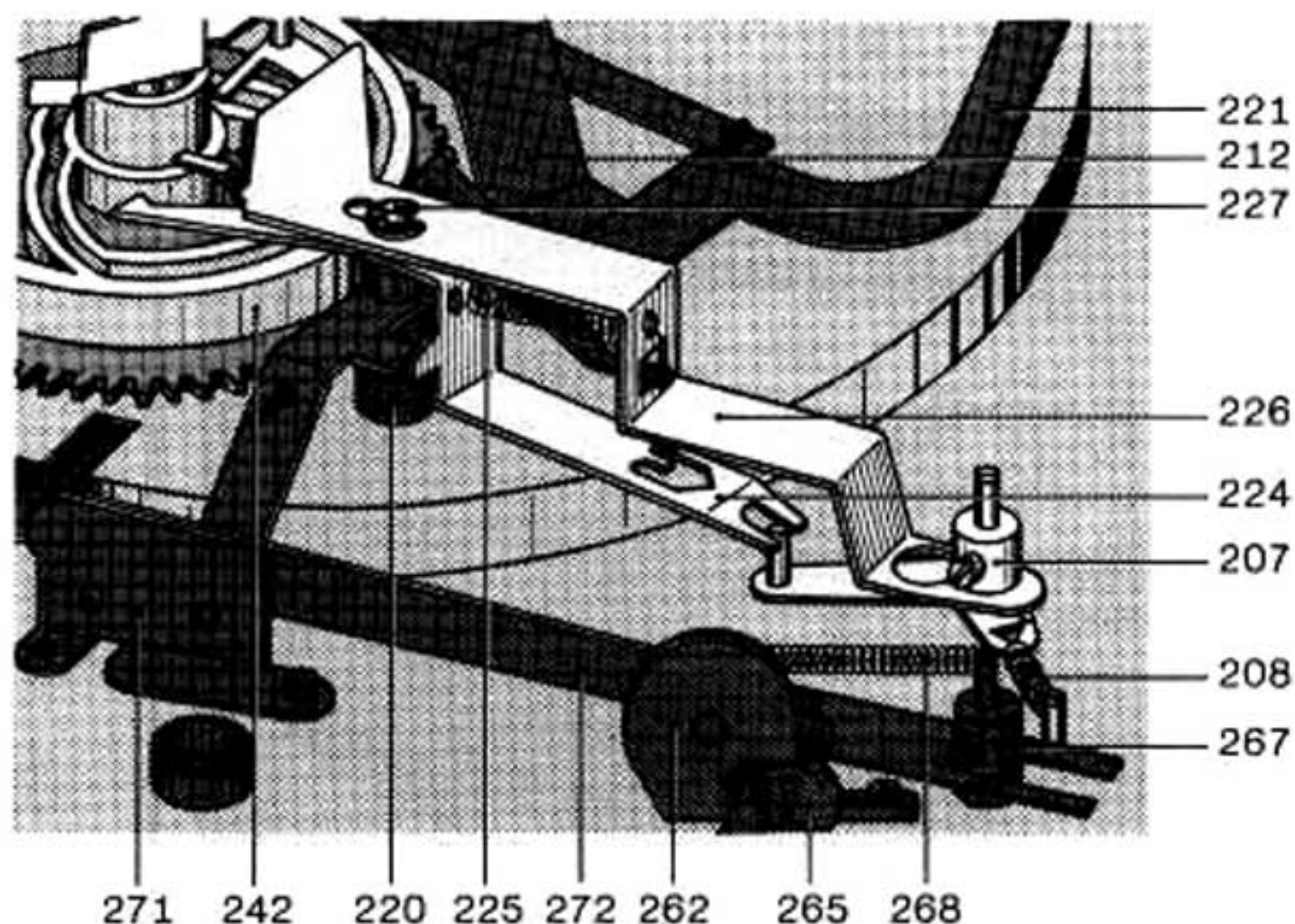
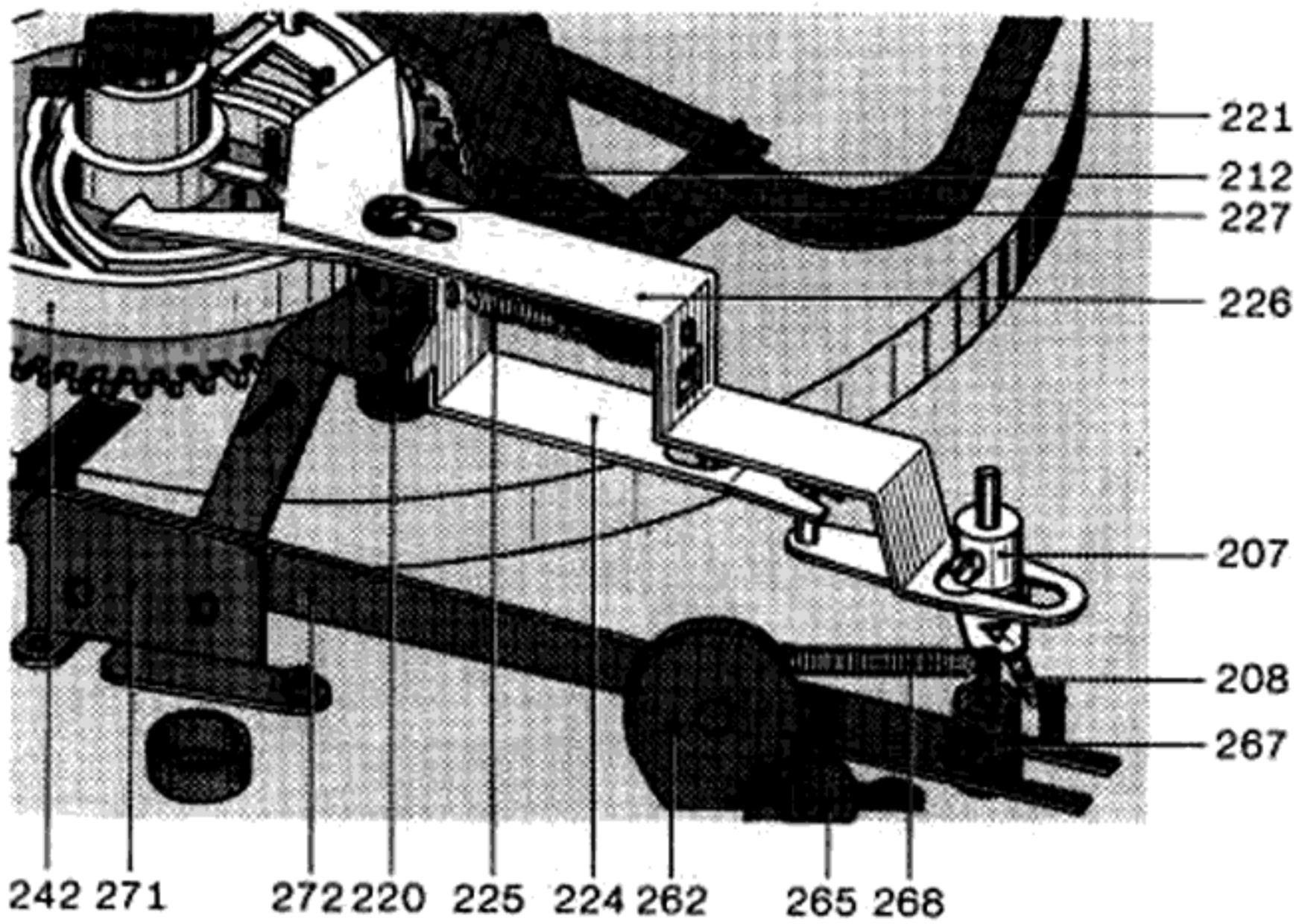


Fig. 13 Stop position

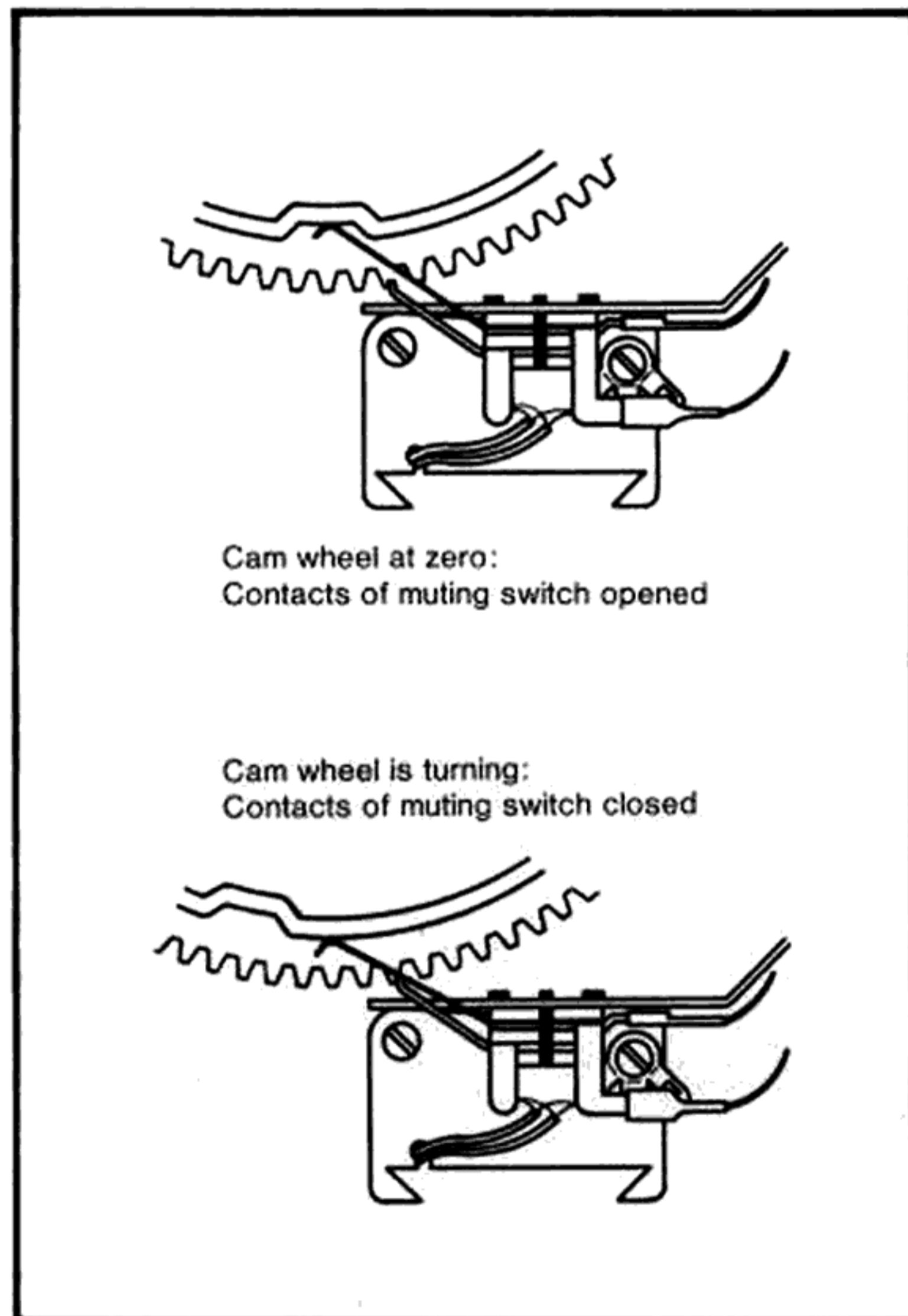


Moving the operating switch also releases the start lever (226), pulling it towards the main cam by means of the tension spring (225). This causes coil spring to bring the shut-off lever (238) within range of the main cam dog. Thus the shut-off lever drives the main cam.

To prevent malfunctioning, the operating switch is locked during the start cycle (that is, while the main cam is turning). Just before the main cam reaches its neutral position (at the end of the change cycle), the start lever is pushed clear of the main cam by the start pin of the main cam. This restores the switch lever and operating switch to their original positions.

After installation and also after moving the changer, the unit should be started with the tonearm locked on the rest. This will automatically re-adjust the shut-off lever, which may have shifted out of position.

Fig. 14 Muting switch



Manual start

When the tonearm (15) is swung inward by hand, the pawl on the switch arm drops into a support on the base plate, holding the switch arm in this position and the idler wheel (133/140) in contact with the platter. The slide (184) linked with the switch arm actuates the power switch and sets the turntable platter rotating.

On reaching the run-out groove, the tonearm automatically returns to its rest position and the unit shuts itself off. (See shut-off mechanism, next side). However, if the tonearm is lifted off the record manually and returned to the rest, the tabs of the arm segment (275) release the pawl. The torsion spring (220) then returns the switch arm to its initial position, opening the power switch and disengaging the idler wheel.

Stop switching

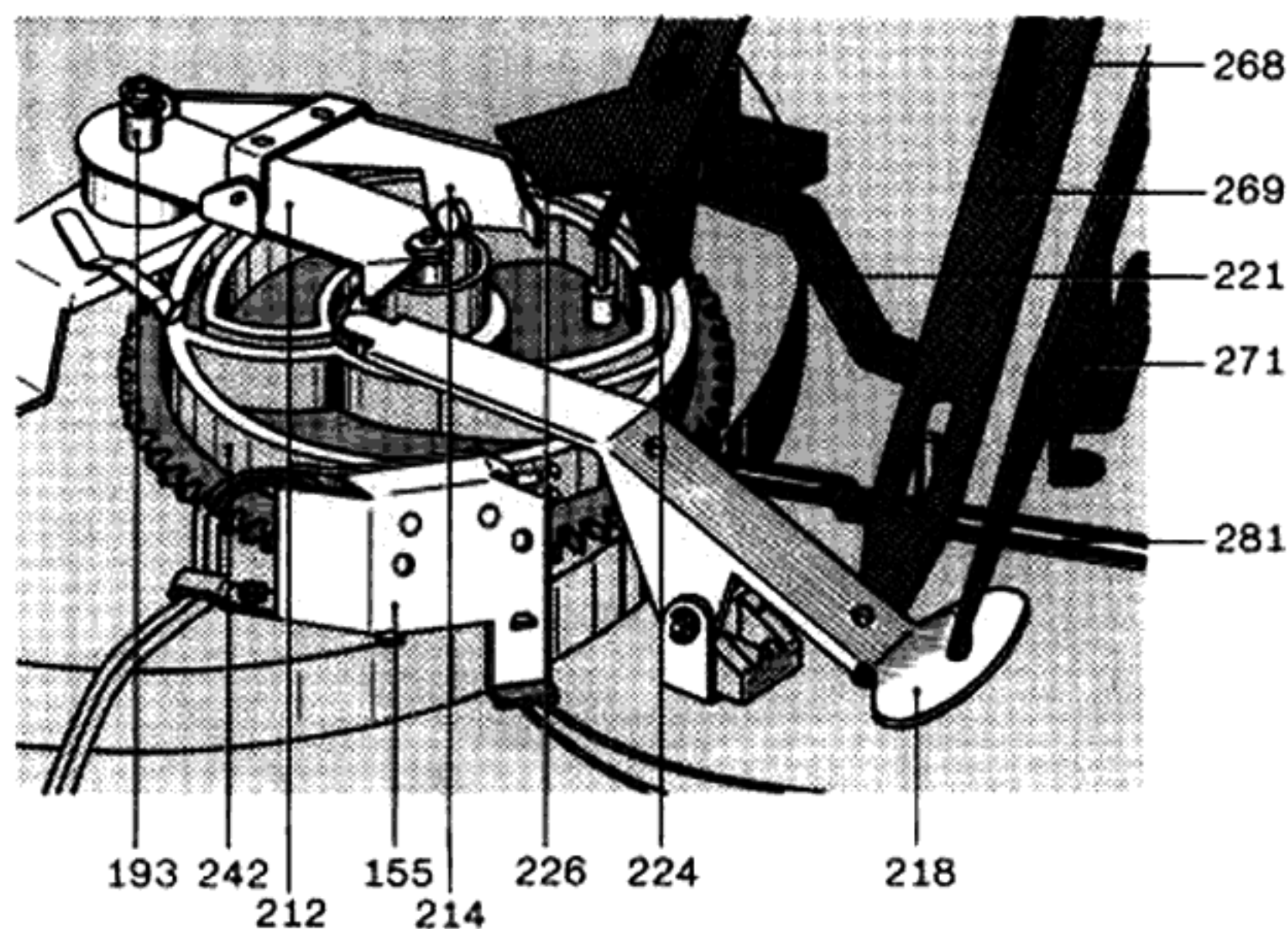
When the operating lever is moved to "stop", the starting lever (226) is pushed forward. As a result the shut-off linkage comes into contact with the main cam. The swinging lever (245) remains in its stop position.

When the tonearm is on its rest and the operating lever is pushed to "stop", the operating lever must not jam.

Muting switch

To prevent the noises of the change cycle from being sent through the audio system, the apparatus is fitted with a short-circuiting (muting) switch (155). The switch springs for both channels are actuated by the main cam (242). In the tonearm rest position, the muting switch is opened.

Fig. 15 Record drop

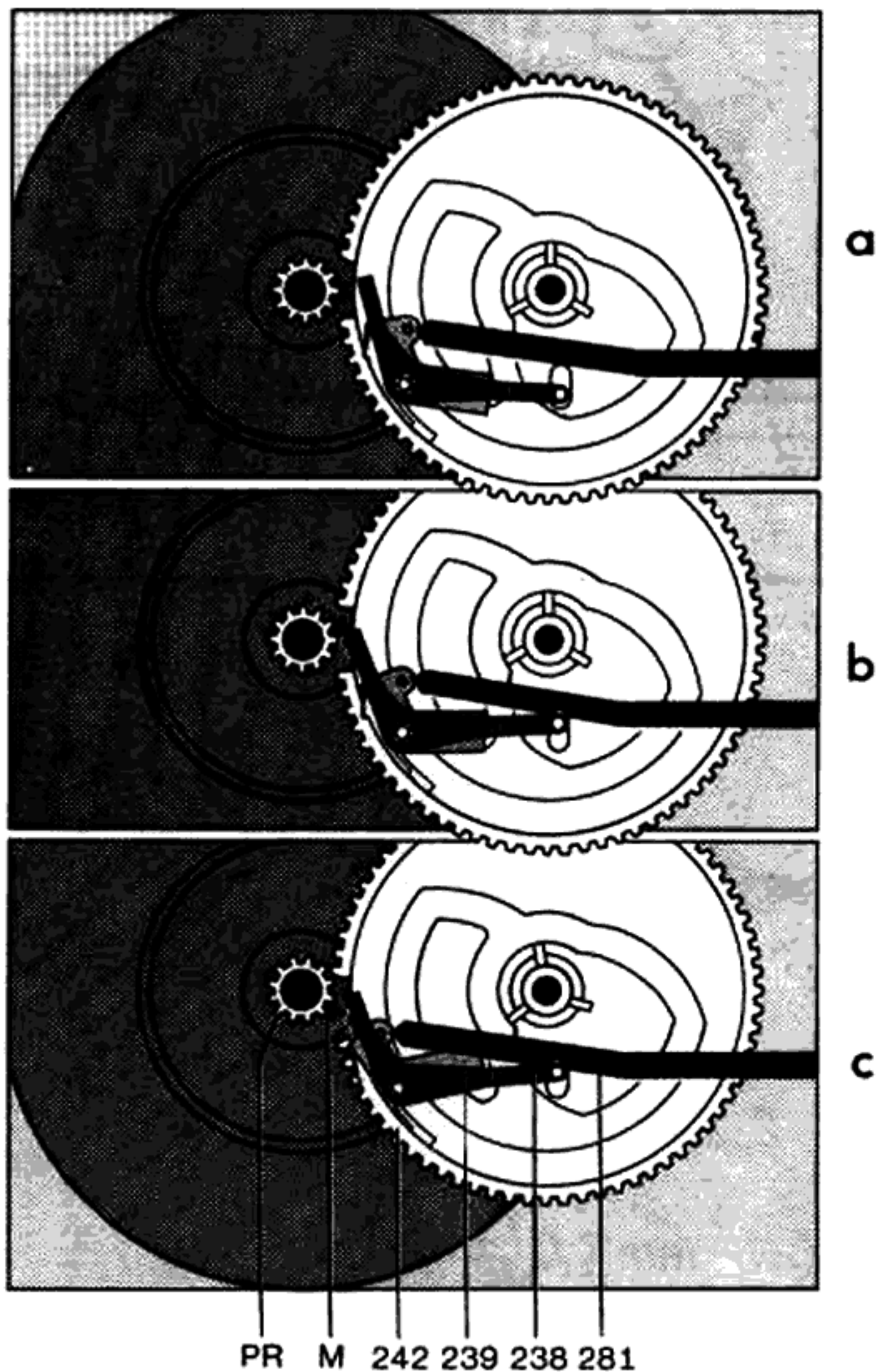


Record drop

Insert the appropriate spindle - AW 3 for standard records (7 mm center hole) or AS 12 for 45 rpm records (38 mm center hole).

Record-drops is initiated by the rotation of cam, whose cam surface guides the cam rocker, pushing the change actuator stud and releasing a record by means of the automatic spindle. The main cam is designed so that a record can drop only when the tonearm is above the tonearm rest and thus out of the reach of the largest possible records (12" diameter).

Fig. 16 Actuating "change" or "shut-off"



Shut-off and change cycle

The dog (M) on the turntable platter gear (PR) and the shut-off lever (238) actuate both the change cycle at the end of the record as well as the shut-off after the last record in a stack is played.

At the end of a record, the tonearm moves towards the center at an accelerated rate due to the increased pitch of the grooves. This motion carries the shut-off lever (238) towards the dog by means of the shut-off slide (281). The eccentric dog pushed the shut-off lever (238) back at each revolution as long as the tonearm advance is only one normal record groove.

The run-out groove with its steeper pitch moves the shut-off lever against the dog with greater force, engaging the shut-off lever (238) and causing the main cam (242) to be driven out of its neutral position by the turntable platter gear.

Fig. 17 Change cycle

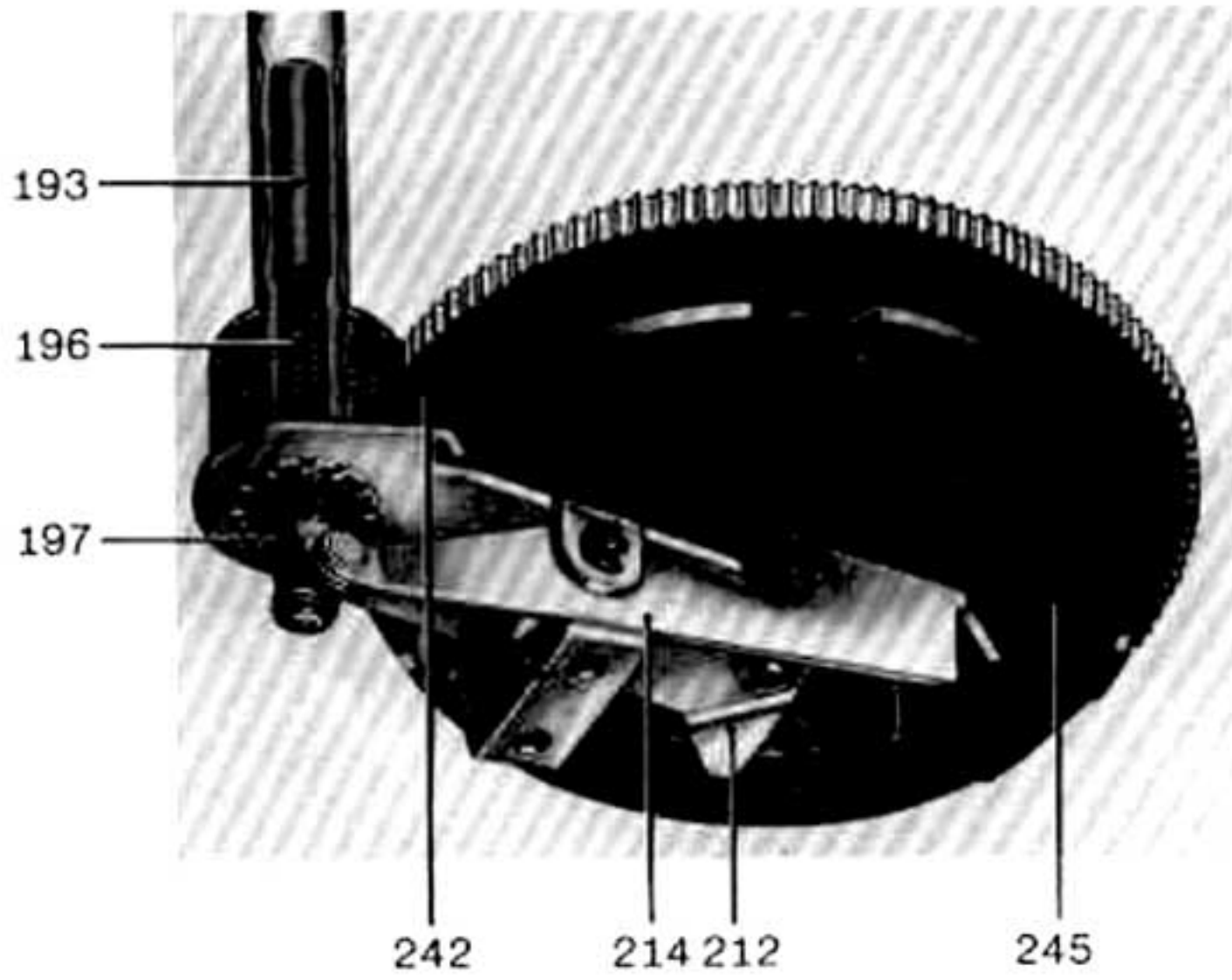


Fig. 18

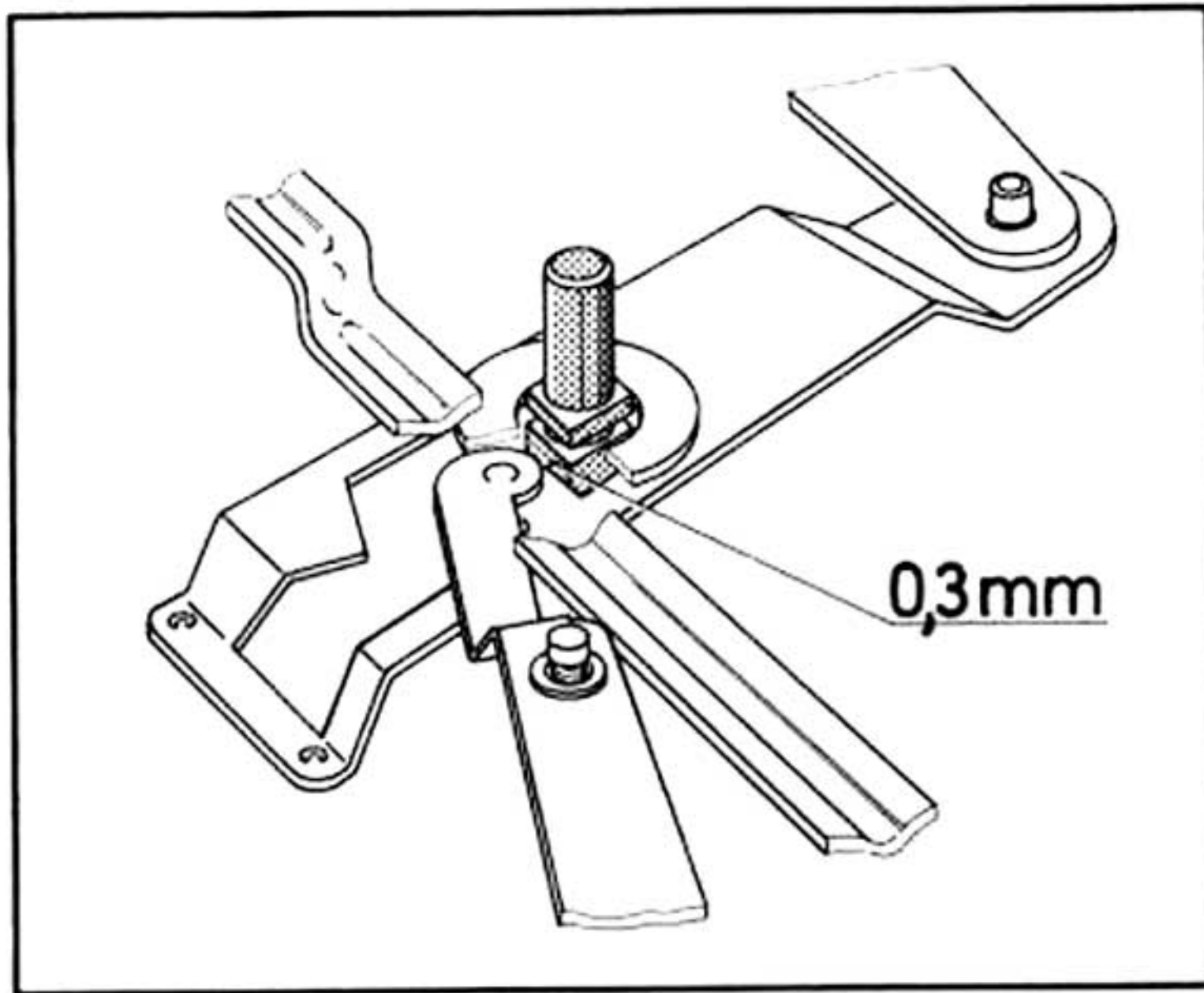
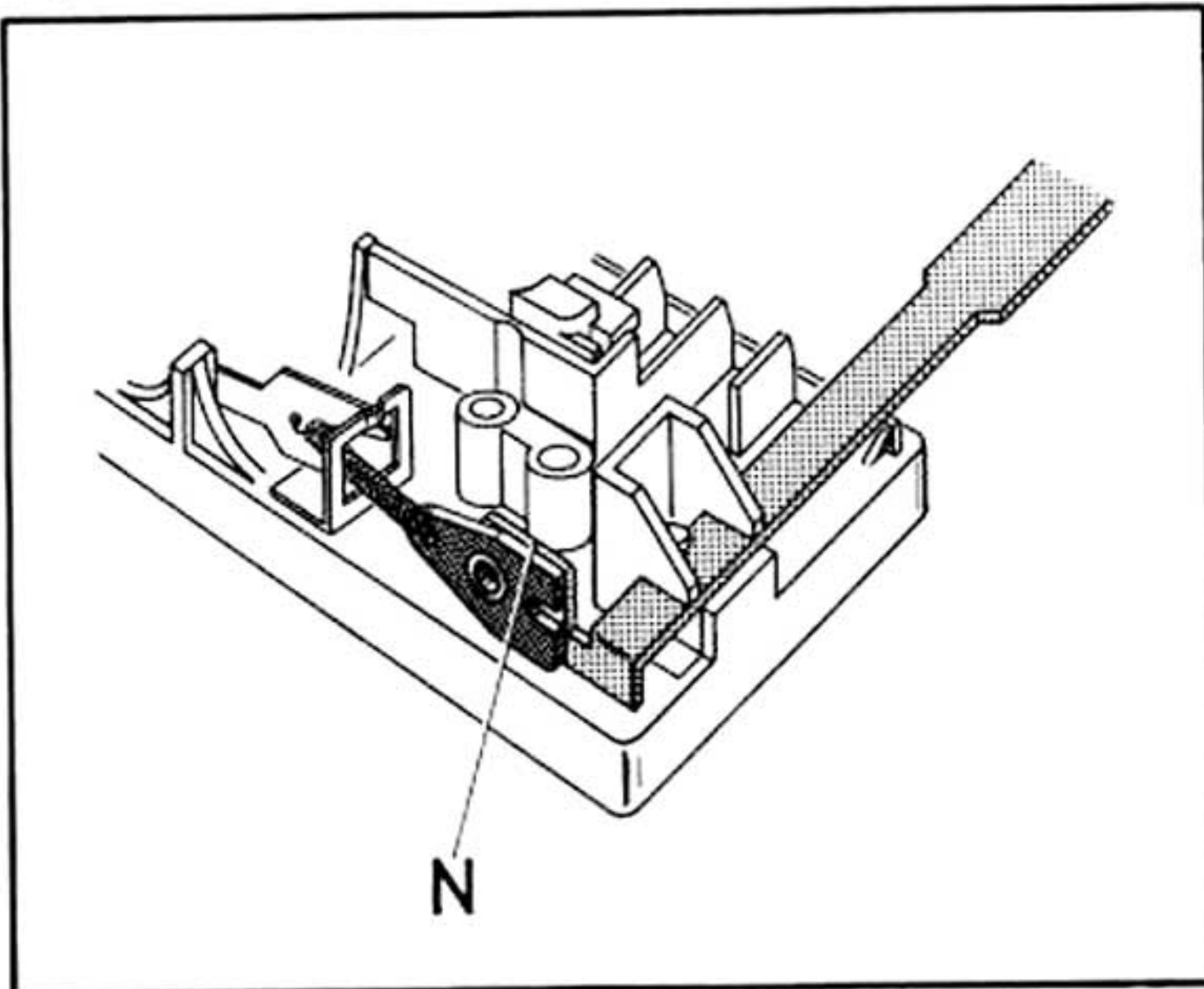


Fig. 19



Shut-off mechanism

Shut-off and change functions are determined by the position of the cam follower lever (245). After every start or record-drop, the cam follower lever is brought to its stop position by the main lever (218) (longer end towards the center of the main cam). As the record is dropped the cam follower lever (245) is turned to its start position by the cam rocker (214), so that the tonearm can swing in toward the record and be lowered on to it. If there are no more records on the spindle, and the cam rocker cannot turn the cam follower lever, the lever remains in its stop position and allows the tonearm to swing to its rest position.

When the main cam (242) returns to its neutral position, the switch arm (221) drops into a cut-out in the main cam, opening the power switch (151) and disengaging the drive idler (133/140).

Symptom

Turntable stops after automatic setdown of the tonearm

Cause

- a) Switch arm (221) is not latched by paul (234)
- b) Power switch opens

Remedy

- a) Loosen screw and turn the short arm piece on the long switch-arm piece. Move the tonearm in and turn the main cam to its neutral position and adjust for about 1/64" play between cam and rectangular bolts riveted into the chassis.
- b) As the tonearm moves in, switch slide (184) must overtravel by about 1/64". Its tab must engage the switch.

Symptom

Last record keeps repeating

Cause

Defective spindle

Remedy

Replace spindle

Symptom

Record does not drop when unit is switched to "start"

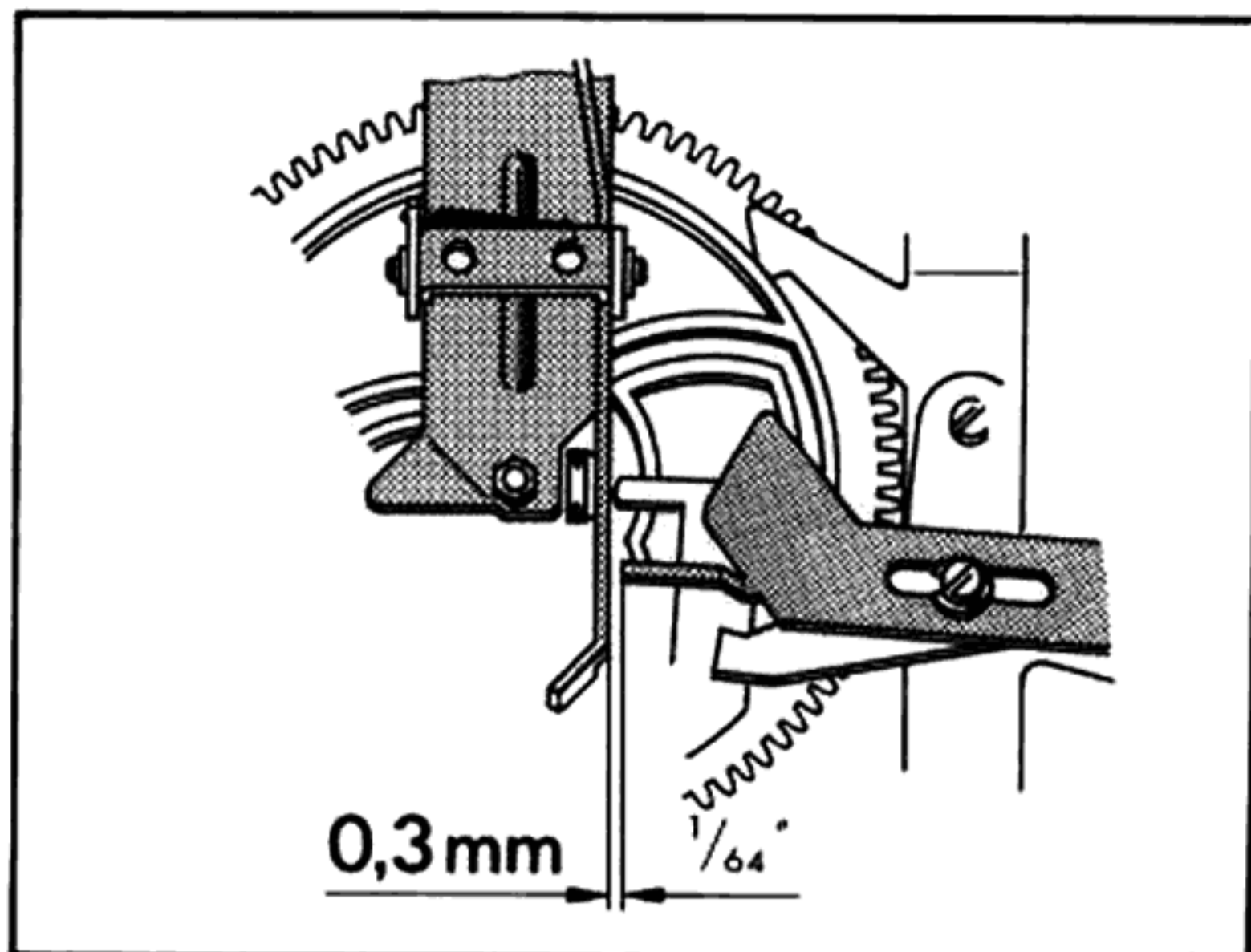
Cause

Inadequate engagement between change lever and cam rocker (214)

Remedy

Adjust clearance between change lever and cam rocker to $1/64$ " minimum with apparatus in "start" position.

Fig. 20



Symptom

Record drops when unit is switched to "stop"

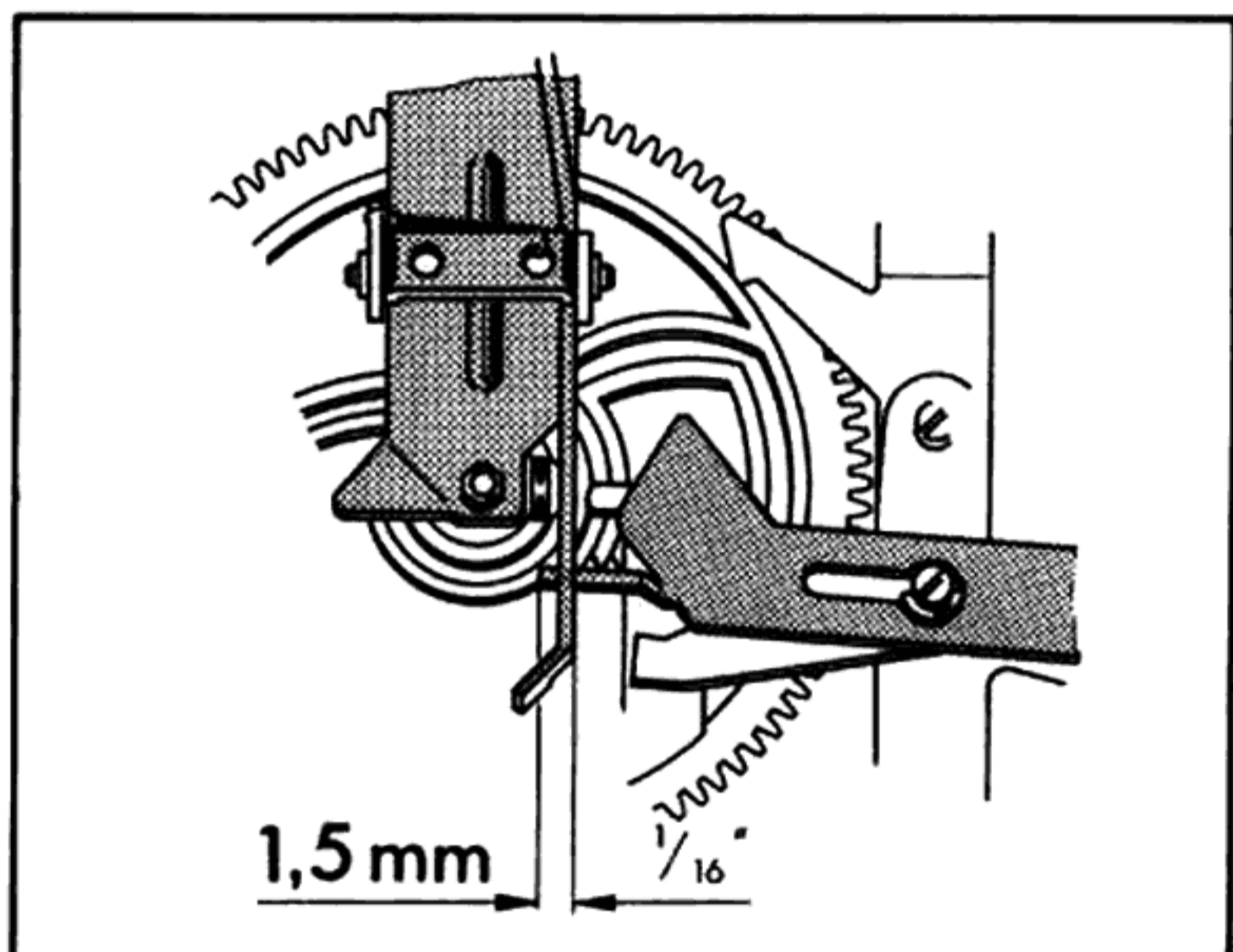
Cause

Cam rocker (214) not caught by start lever

Remedy

Adjust cam rocker so that at the conclusion of the "stop" function the start lever runs about $1/16$ " under the follower.

Fig. 21



Symptom

Records do not drop

Cause

Cam rocker (214) has too little force (travel)

Remedy

Re-adjust eccentric so that when the three supports in the automatic spindle are held in and the main cam is at its neutral, pressing the change screw moves the support about $1/64$ ".

Fig. 22

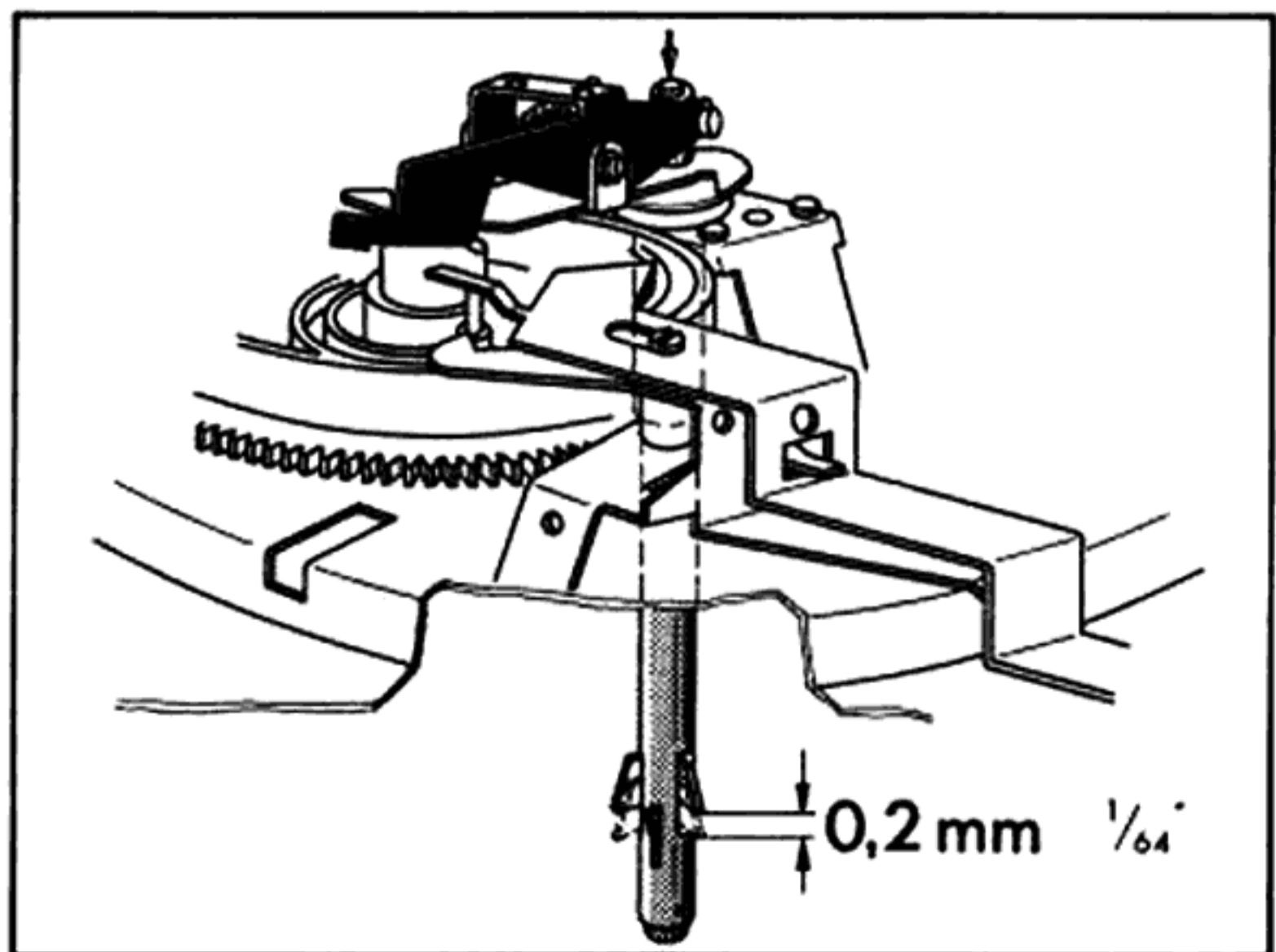
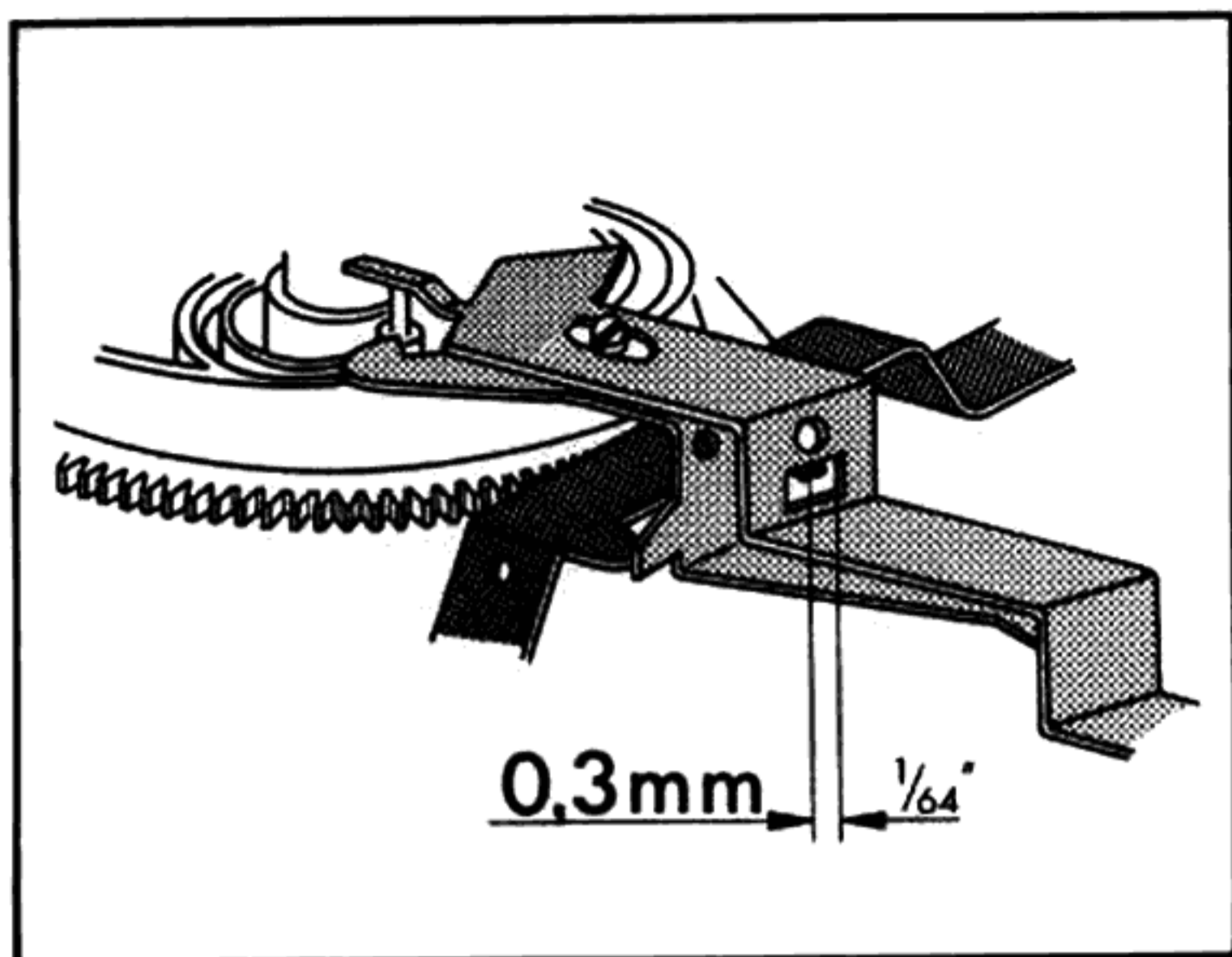


Fig. 23



Symptom

Switch latches into "stop" position when tonearm is at rest.

Cause

Too much clearance between tab on switch arm (221) and start lever (226).

Remedy

Adjust tab on switch arm so that it clears start lever by 1/64" when main cam is in neutral position.

| Symptom | Cause | Remedy |
|--|---|--|
| During change, stop and start operations, noises from the mechanism can be heard in system speaker | Muting switch misadjusted. Distance between contact springs and shorting contact is too great | Bend contacts so that, in the neutral position of the main cam the spacing between contacts is about 0.02 inch. Clean contacts |
| No sound | Spacing too small | See above |
| Motor will not shut off when tonearm is on arm rest | Capacitor across power switch is shorted | Replace capacitor (0.1 μ F, 700 V) |
| Acoustic feedback | a) Chassis parts (for example leads) are touching base cut-out b) Connecting cables are too taut | a) Correct cut-out according to instructions supplied with unit. Move cables b) Allow more slack in cables |

Replacement parts

| Ref.No. | Part.-No. | Description | Quantity |
|---------|-----------|---|----------|
| 1 | 215 470 | Automatic spindle AS 12 | 1 |
| 2 | 213 895 | Changing spindle AW 3 | 1 |
| 3 | 201 452 | Facing ring 170 mm Ø | 1 |
| 4 | 218 667 | Turntable mat complete, with facing ring 170 mm Ø | 1 |
| | 214 213 | Turntable mat | 1 |
| 5 | 218 666 | Turntable complete, with turntable mat and facing ring 170 mm Ø | 1 |
| | 214 212 | Turntable complete, with mat | 1 |
| 6 | 219 952 | Speed change lever, left | 1 |
| 7 | 219 965 | Speed regulator knob complete | 1 |
| 8 | 223 015 | Blind (cm) | 1 |
| | 223 016 | Blind (inch) | 1 |
| 9 | 223 010 | Chassis complete | 1 |
| 10 | 214 210 | Shipping screw assembly complete | 2 |
| 11 | 220 213 | Centering disc for single discs | 1 |
| 12 | 200 709 | Single play spindle | 1 |
| 13 | 214 054 | Washer | 1 |
| 14 | 200 543 | Retaining ring | 1 |
| 15 | 223 017 | Tonearm complete | 1 |
| 16 | 223 011 | Tonearm rest assembly complete | 1 |
| 17 | 210 362 | Hex nut BM 3 | 2 |
| 18 | 223 001 | Tonearm head complete | 1 |
| 19 | 201 132 | Grip | 1 |
| 20 | 210 182 | Bowed lockwasher | 1 |
| 21 | 210 630 | Washer 4.2/8/0.5 St | 1 |
| 22 | 210 197 | "C" clip 4 x 0.8 | 2 |
| 23 | 215 430 | Cartridge mount TK 14 | 1 |
| 24 | 219 954 | Change lever right | 2 |
| 25 | 219 954 | Change lever right | 2 |
| 26 | 210 816 | Machine screw M 4 x 4 | 1 |
| 27 | 216 936 | Spacer (50 Hz) | 1 |
| 28 | 210 184 | Bowed lockwasher (50 Hz) | 3 |
| 29 | 218 155 | Machine screw M 4 x 6 (50 Hz) | 1 |
| | 217 374 | Centering screw (60 Hz) | 1 |
| 30 | 210 366 | Hex nut BM 4 | 7 |
| 31 | 210 362 | Hex nut BM 3 | 2 |
| 32 | 223 051 | Bearing race complete | 2 |
| | 211 718 | Steel balls, 3 mm Ø | 10 |
| 33 | 200 579 | Spring mounted footing (1 set = 3 pieces) | 1 |
| 34 | 210 366 | Hex nut BM 4 (4-pole-motor) | 7 |
| 35 | 200 721 | Bushing isolation mount | 3 |
| 36 | 200 728 | Compression spring | 3 |
| 37 | 200 723 | Rubber insert isolation mount | 3 |
| 38 | 200 722 | Steel cup | 3 |
| 39 | 210 624 | Washer 4.2/7/0.3 St | 4 |
| 40 | 201 623 | Rubber washer | 2 |
| 41 | 200 713 | Washer | 2 |
| 42 | 200 712 | Spring cup | 2 |
| 43 | 200 711 | Lockwasher | 2 |
| | 210 366 | Hex nut BM 4 | 4 |
| 44 | 210 624 | Washer 4.2/7/0.3 St | 4 |
| 45 | 200 718 | Compression spring | 2 |
| 46 | 217 438 | Threaded pin | 1 |
| 47 | 200 829 | Stop nut | 1 |
| 48 | 218 636 | Set screw | 1 |
| 49 | 207 839 | Damping ring | 1 |
| 50 | 210 146 | "C" ring 3.2 | 3 |
| 51 | 223 005 | Contact plate complete | 1 |
| 52 | 223 018 | Weight complete | 1 |
| 53 | 221 511 | Threaded pin | 1 |
| 54 | 223 003 | Tonearm bearing complete | 1 |
| 55 | 217 894 | Spring barrel complete | 1 |
| 56 | 221 510 | Stop plate | 1 |
| 57 | 210 486 | Machine screw AM 4 x 8 | 1 |
| 58 | 223 004 | Tonearm bearing support | 1 |
| 59 | 216 504 | Indicator | 1 |
| 60 | 217 436 | Bearing screw complete | 1 |
| 61 | 223 009 | Dress-up plate complete | 1 |
| 62 | 216 881 | Lift lever complete | 1 |
| 63 | 210 353 | Hex nut BM 2 | 1 |
| 64 | 217 905 | Damping piece | 1 |
| 65 | 213 260 | Pin 2 x 6 | 4 |
| 66 | 214 047 | Special screw (pierced) | 2 |
| | 214 211 | Special screw (threaded) | 2 |

Fig. 24 Exploded view, parts above chassis

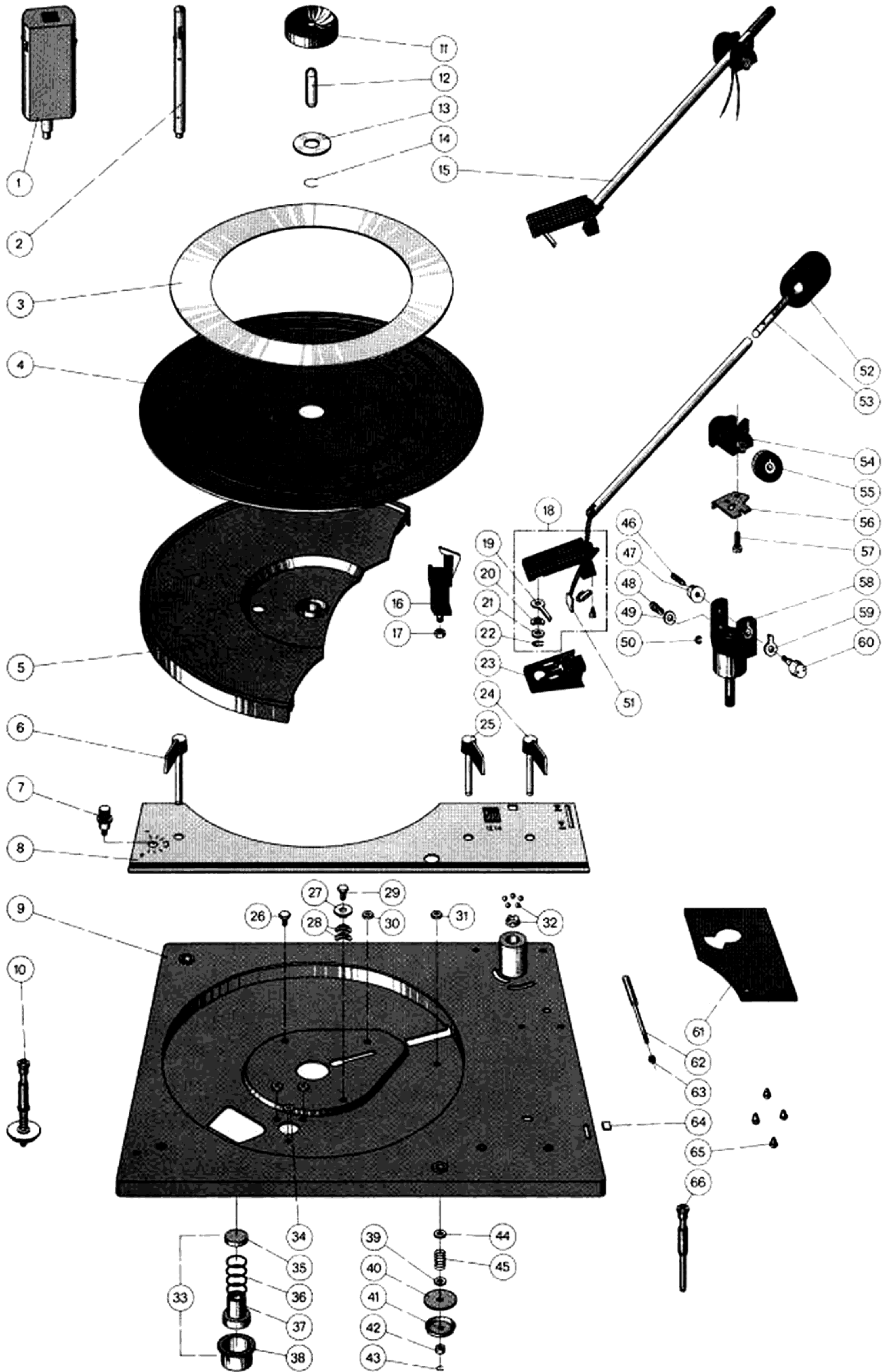
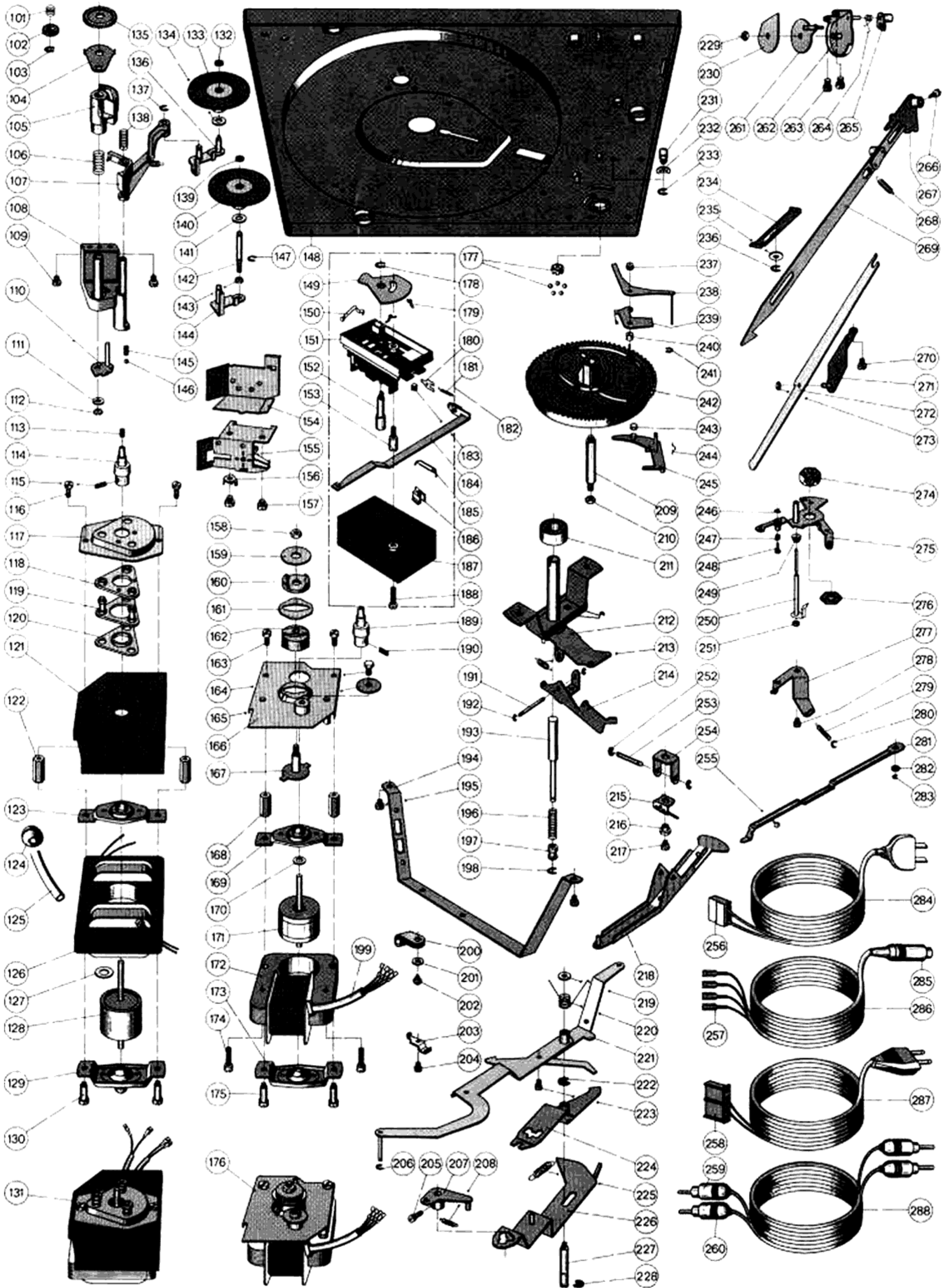


Fig. 25 Exploded view, parts below chassis



| Ref.No. | Part.-No. | Description | Quantity |
|---------|-----------|--|----------|
| 101 | 217 376 | Compression spring | 1 |
| 102 | 217 026 | Cam wheel | 1 |
| 103 | 210 146 | "C" clip 3.2 | 3 |
| 104 | 217 233 | Speed regulator detent | 1 |
| 105 | 217 028 | Switching segment | 1 |
| 106 | 216 736 | Compression spring | 1 |
| 107 | 219 987 | Switch lever complete (2-pole-motor) | 1 |
| | 217 234 | Switch lever complete (4-pole-motor) | 1 |
| 108 | 216 558 | Support complete | 1 |
| 109 | 210 475 | Machine screw AM 3 x 5 | 9 |
| 110 | 217 239 | Groove detent complete | 1 |
| 111 | 210 642 | Washer 4.2/10/1.5 St | 1 |
| 112 | 210 361 | Hex nut M 3 | 2 |
| 113 | 217 751 | Threaded pin M 2.6 x 8 | 1 |
| 114 | 220 970 | Motor pulley, 50 Hz, complete (4-pole-motor) .. | 1 |
| | 220 971 | Motor pulley, 60 Hz, complete (4-pole-motor) .. | 1 |
| 115 | 210 220 | Threaded pin 2.6 x 3.5 | 1 |
| 116 | 210 509 | Machine screw AM 3.5 x 8 | 2 |
| 117 | 204 669 | Dress-up plate | 1 |
| 118 | 221 386 | Isolation mount plate | 1 |
| 119 | 215 846 | Mounting bracket complete | 1 |
| 120 | 221 385 | Isolation washer lower | 1 |
| 121 | 204 665 | Motor shield | 1 |
| 122 | 200 167 | Bearing spacer | 2 |
| 123 | 204 686 | Motor bearing top, complete | 1 |
| 124 | 209 939 | Sleeving | 1 |
| 125 | 217 727 | Isolation sleeve | 1 |
| 126 | 217 591 | Stator complete 110/220 V | 1 |
| | 220 196 | Stator complete 150 V | 1 |
| 127 | 220 807 | Washer 4.5/9/1.2 F | 1 |
| 128 | 204 687 | Rotor complete | 1 |
| 129 | 204 685 | Motor bearing lower, complete | 1 |
| 130 | 204 468 | Screw bolt | 2 |
| 131 | 220 973 | Motor 110/220 V, complete | 1 |
| | 220 972 | Motor 150 V, complete | 1 |
| 132 | 200 633 | Lockwasher | 1 |
| 133 | 217 888 | Idler wheel complete | 1 |
| 134 | 200 110 | Washer | 1 |
| 135 | 217 027 | Speed regulator wheel | 1 |
| 136 | 217 244 | Idler arm complete (4-pole-motor) | 1 |
| 137 | 210 146 | "C" ring 3.2 | 3 |
| 138 | 216 737 | Compression spring | 1 |
| 139 | 200 633 | Lockwasher | 1 |
| 140 | 217 888 | Idler wheel complete | 1 |
| 141 | 200 110 | Washer | 1 |
| 142 | 212 125 | Idler wheel shaft (2-pole-motor) | 1 |
| 143 | 210 361 | Hex nut BM 3 (2-pole-motor) | 2 |
| 144 | 221 378 | Idler arm complete with idler wheel shaft (2-pole-motor) | 1 |
| 145 | 218 629 | Compression spring | 1 |
| 146 | 209 358 | Steel ball 4 mm ϕ | 2 |
| 147 | 210 145 | "C" washer 2.3 (2-pole-motor) | 10 |
| 148 | 223 010 | Chassis complete | 1 |
| 149 | 214 174 | Contact support | 1 |
| 150 | 214 176 | Screen spring | 1 |
| 151 | 217 060 | Switch plate, complete, with voltage selector .. | 1 |
| | 214 206 | Switch plate, complete, less voltage selector .. | 1 |
| | 223 006 | Switch plate, complete, with voltage selector and SEMKO capacitor | 1 |
| 152 | 214 173 | Spindle | 1 |
| 153 | 214 181 | Screw bolt | 1 |
| 154 | 201 240 | Shield | 1 |
| 155 | 207 447 | Muting switch | 1 |
| 156 | 211 614 | Solder lug | 1 |
| 157 | 210 475 | Machine screw AM 3 x 5 | 9 |
| 158 | 210 369 | Hex nut M 5 | 1 |
| 159 | 222 185 | Washer | 1 |
| 160 | 222 187 | Damping piece (50 Hz) | 1 |
| | 222 188 | Damping piece (60 Hz) | 1 |
| 161 | 204 607 | Washer | 1 |
| 162 | 222 186 | Spacer | 1 |
| 163 | 210 507 | Machine screw AM 3.5 x 6 | 2 |
| 164 | 210 472 | Machine screw AM 3 x 4 | 1 |
| 165 | 210 615 | Washer 3.2/20/1.5 St | 1 |
| 166 | 204 372 | Shield complete | 1 |
| 167 | 221 675 | Holding disc | 1 |
| 168 | 204 476 | Bearing spacer | 2 |

| Ref.No. | Part.-No. | Description | Quantity |
|---------|-----------|--|----------|
| 169 | 204 686 | Motor bearing top complete | 1 |
| 170 | 220 807 | Washer 4.5/9/1.2 F | 1 |
| 171 | 220 461 | Rotor complete | 1 |
| 172 | 217 593 | Stator 110/120 V complete | 1 |
| | 220 200 | Stator 150 V complete | 1 |
| | 202 992 | Stator 110 V complete | 1 |
| 173 | 204 685 | Motor bearing lower complete | 1 |
| 174 | 210 522 | Machine screw AM 4 x 18 | 2 |
| 175 | 204 468 | Screw bolt | 2 |
| 176 | 223 012 | Motor 110/220 V complete | 1 |
| | 223 013 | Motor 150 V complete | 1 |
| | 223 014 | Motor 110 V complete | 1 |
| 177 | 223 051 | Bearing race complete | 2 |
| | 211 718 | Steel ball 3 mm ϕ | 10 |
| 178 | 210 196 | "C" clip G 3 x 0.6 | 1 |
| 179 | 214 175 | Contact spring | 2 |
| 180 | 213 966 | Snap spring | 1 |
| 181 | 213 968 | Tension spring | 1 |
| 182 | 217 059 | Power switch complete with voltage selector | 1 |
| | 214 205 | Power switch complete less voltage selector | 1 |
| | 222 997 | Power switch complete with voltage selector and SEMKO capacitor | 1 |
| 183 | 218 986 | Roller for switch slide | 1 |
| 184 | 213 970 | Switch slide complete | 1 |
| 185 | 203 725 | Suppressor capacitor | 1 |
| | 221 186 | SEMKO capacitor | 1 |
| 186 | 213 978 | Locking device, small | 1 |
| | 213 979 | Locking device, large | 1 |
| 187 | 217 062 | Cover for power switch with voltage selector | 1 |
| | 214 207 | Cover for power switch less voltage selector | 1 |
| | 223 007 | Cover for power switch with voltage selector and SEMKO capacitor | 1 |
| 188 | 210 492 | Machine screw AM 3 x 15 | 1 |
| 189 | 212 135 | Motor pulley 50 Hz complete (2-pole-motor) | 1 |
| | 212 136 | Motor pulley 60 Hz complete (2-pole-motor) | 1 |
| 190 | 210 220 | Threaded pin M 2.6 x 3.5 | 1 |
| 191 | 217 813 | Shaft | 1 |
| 192 | 210 145 | "C" washer 2.3 | 10 |
| 193 | 213 918 | Change actuator complete | 1 |
| 194 | 220 165 | Stand (2-pole-motor) | 1 |
| | 217 617 | Stand (4-pole-motor) | 1 |
| | 221 309 | Stand complete with RCA type jacks | 1 |
| 195 | 210 475 | Machine screw AM 3 x 5 | 9 |
| 196 | 213 920 | Compression spring | 1 |
| 197 | 213 921 | Bushing | 1 |
| 198 | 210 145 | "C" washer 2.3 | 10 |
| 199 | 210 731 | Isolation sleeve | 1 |
| 200 | 210 099 | Plastic clamp for motor line | 1 |
| | 220 152 | Plastic clamp for power line | 1 |
| 201 | 210 586 | Washer 3.2/7/0.5 St | 3 |
| 202 | 210 475 | Machine screw AM 3 x 5 | 9 |
| 203 | 200 447 | Cable clamp | 1 |
| 204 | 210 475 | Machine screw AM 3 x 5 | 9 |
| 205 | 218 583 | Machine screw M 3 x 4 | 2 |
| 206 | 210 145 | "C" washer 2.3 | 10 |
| 207 | 216 773 | Switch-on lever | 1 |
| 208 | 216 777 | Tension spring | 1 |
| 209 | 200 519 | Bearing post for cam wheel | 1 |
| 210 | 210 366 | Hex nut BM 4 | 7 |
| 211 | 200 554 | Ball bearing | 1 |
| 212 | 214 201 | Bearing support complete | 1 |
| 213 | 213 925 | Tension spring | 1 |
| 214 | 213 922 | Cam rocker complete | 1 |
| 215 | 201 186 | Leaf spring | 1 |
| 216 | 200 458 | Spacer | 1 |
| 217 | 210 480 | Machine screw AM 3 x 6 | 1 |
| 218 | 201 094 | Main lever complete | 1 |
| 219 | 210 586 | Washer 3.2/7/0.5 St | 3 |
| 220 | 213 940 | Torsion spring | 1 |
| 221 | 217 889 | Switch arm complete | 1 |
| 222 | 210 147 | "C" washer 4 | 3 |
| 223 | 210 475 | Machine screw AM 3 x 5 | 9 |
| 224 | 218 538 | Switch lever complete | 1 |
| 225 | 200 103 | Tension spring | 1 |
| 226 | 217 258 | Start lever complete | 1 |
| 227 | 217 334 | Grooved shaft | 1 |
| 228 | 210 147 | "C" washer 4 | 3 |

| Ref.No. | Part.-No. | Description | Quantity |
|---------|-----------|---|----------|
| 229 | 210 366 | Hex nut BM 4 | 7 |
| 230 | 201 195 | Cover washer | 1 |
| 231 | 220 167 | Set screw | 1 |
| 232 | 210 187 | Bowed lockwasher | 1 |
| 233 | 210 147 | "C" washer 4 | 3 |
| 234 | 213 942 | Latch complete | 1 |
| 235 | 202 043 | Washer 5.8/12/0.5 St | 1 |
| 236 | 210 146 | "C" washer 3.2 | 4 |
| 237 | 220 235 | Stop nut | 1 |
| 238 | 220 232 | Shut-off lever complete | 1 |
| 239 | 222 690 | Friction plate complete | 1 |
| 240 | 221 935 | Bushing | 1 |
| 241 | 210 145 | "C" washer 2.3 | 10 |
| 242 | 220 332 | Cam wheel complete | 1 |
| 243 | 200 650 | Sleeve | 1 |
| 244 | 200 522 | Snap spring | 1 |
| 245 | 214 203 | Cam follower lever complete with sleeve | 1 |
| 246 | 210 143 | "C" washer 1.5 | 1 |
| 247 | 201 174 | Compression spring | 1 |
| 248 | 200 686 | Spring pin | 1 |
| 249 | 221 525 | Conical spring | 1 |
| 250 | 218 703 | Lift rod complete | 1 |
| 251 | 200 527 | Shaft pin | 1 |
| 252 | 210 145 | "C" washer 2.3 | 10 |
| 253 | 200 528 | Shaft | 1 |
| 254 | 201 185 | Main lever bracket | 1 |
| 255 | 209 358 | Steel ball 4 mm ϕ | 2 |
| 256 | 209 457 | Inner casing for AMP plug | 1 |
| | 209 458 | AMP plug | 3 |
| 257 | 209 436 | Flat prong socket | 4 |
| 258 | 213 980 | Input jack housing | 1 |
| | 213 982 | AMP-plug | 2 |
| 259 | 209 425 | RCA type plug, yellow | 2 |
| 260 | 209 426 | RCA type plug, red | 2 |
| 261 | 217 290 | Drive washer complete | 1 |
| 262 | 217 286 | Support bracket complete | 1 |
| 263 | 210 469 | Machine screw AM 3 x 3 | 3 |
| 264 | 217 296 | Torsion spring | 1 |
| 265 | 221 527 | Drive cam | 1 |
| 266 | 218 583 | Machine screw M 3 x 4 | 2 |
| 267 | 217 264 | Record size selector lever complete | 1 |
| 268 | 200 453 | Tension spring | 1 |
| 269 | 217 276 | Arm positioning slide complete | 1 |
| 270 | 210 511 | Machine screw AM 4 x 4 | 1 |
| 271 | 217 297 | Main lever bracket complete | 1 |
| 272 | 217 300 | Connecting lever | 1 |
| 273 | 210 145 | "C" washer 2.3 | 10 |
| 274 | 221 518 | Stop nut | 1 |
| 275 | 223 000 | Segment complete with spring pin | 1 |
| 276 | 221 524 | Hex nut | 1 |
| 277 | 221 526 | Cranked spring lever | 1 |
| 278 | 210 469 | Machine screw AM 3 x 3 | 3 |
| 279 | 218 591 | Tension spring | 1 |
| 280 | 201 184 | Stop washer | 1 |
| 281 | 200 688 | Shut-off slide | 1 |
| 282 | 201 187 | Friction disc | 1 |
| 283 | 210 145 | "C" washer 2.3 | 10 |
| 284 | 213 984 | Power cord complete with ground connection and U. S. type plug | 1 |
| | 207 311 | Power cord complete with ground connection and AMP plug | 1 |
| 285 | 209 424 | Miniatur plug for audio cable | 1 |
| 286 | 207 303 | Audio cable complete with miniatur plug | 1 |
| 287 | 220 142 | Power cord complete | 1 |
| 288 | 207 299 | Audio cable complete with RCA type plug | 1 |
| ** | 201 229 | Cover pin | 1 |
| ** | 214 120 | Mounting hardware for cartridge | 1 |
| ** | 211 473 | Stroboscope disc 50/60 Hz | 1 |
| ** | 214 219 | Packing carton complete | 1 |
| ** | 222 331 | Operating instructions, 4 languages | 1 |
| ** | 222 673 | Operating instructions UAP | 1 |
| ** | 222 670 | Operating instructions english | 1 |
| ** | 222 330 | Mounting instructions | 1 |

Fig. 26 Chassis, viewed from above

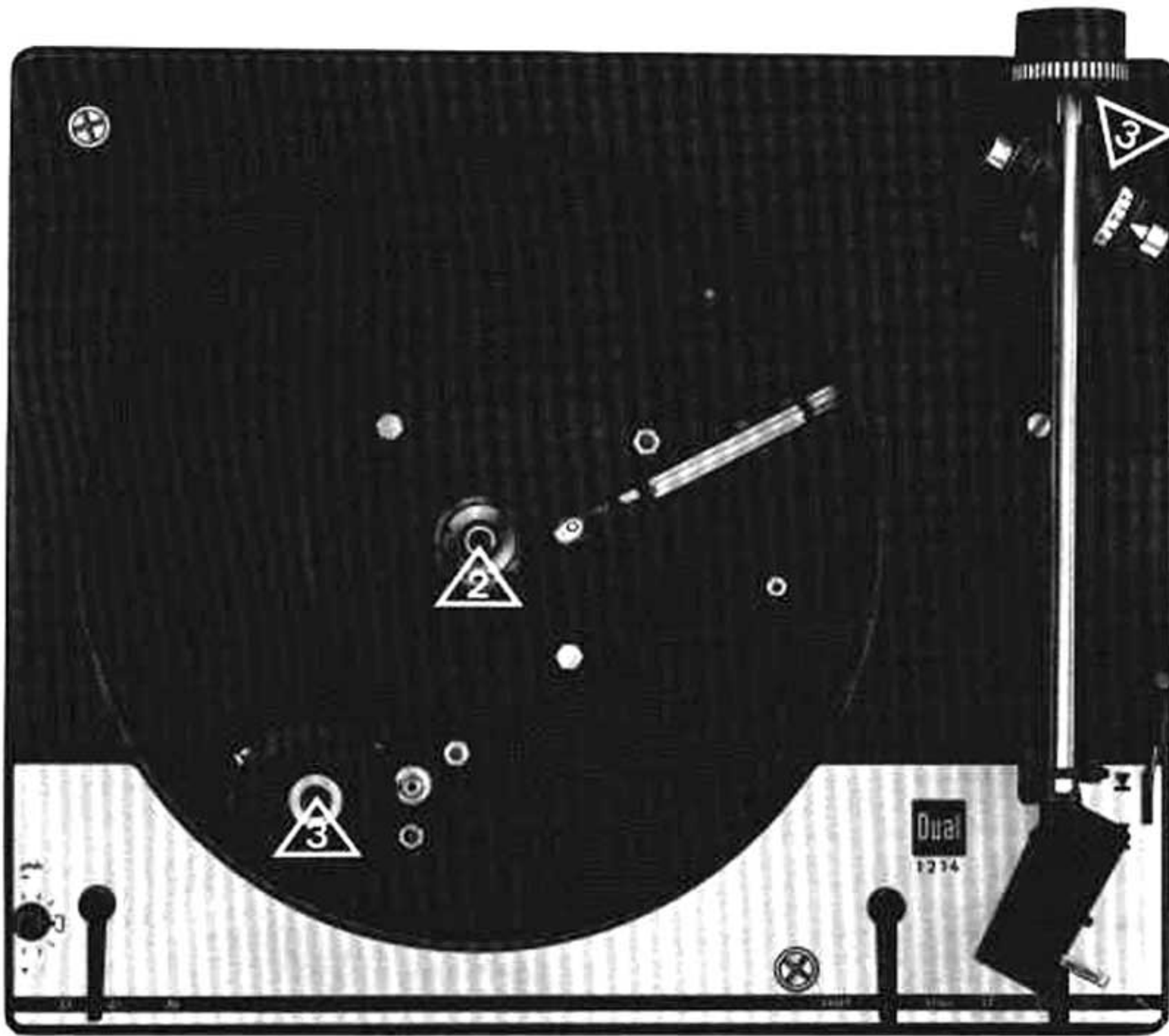
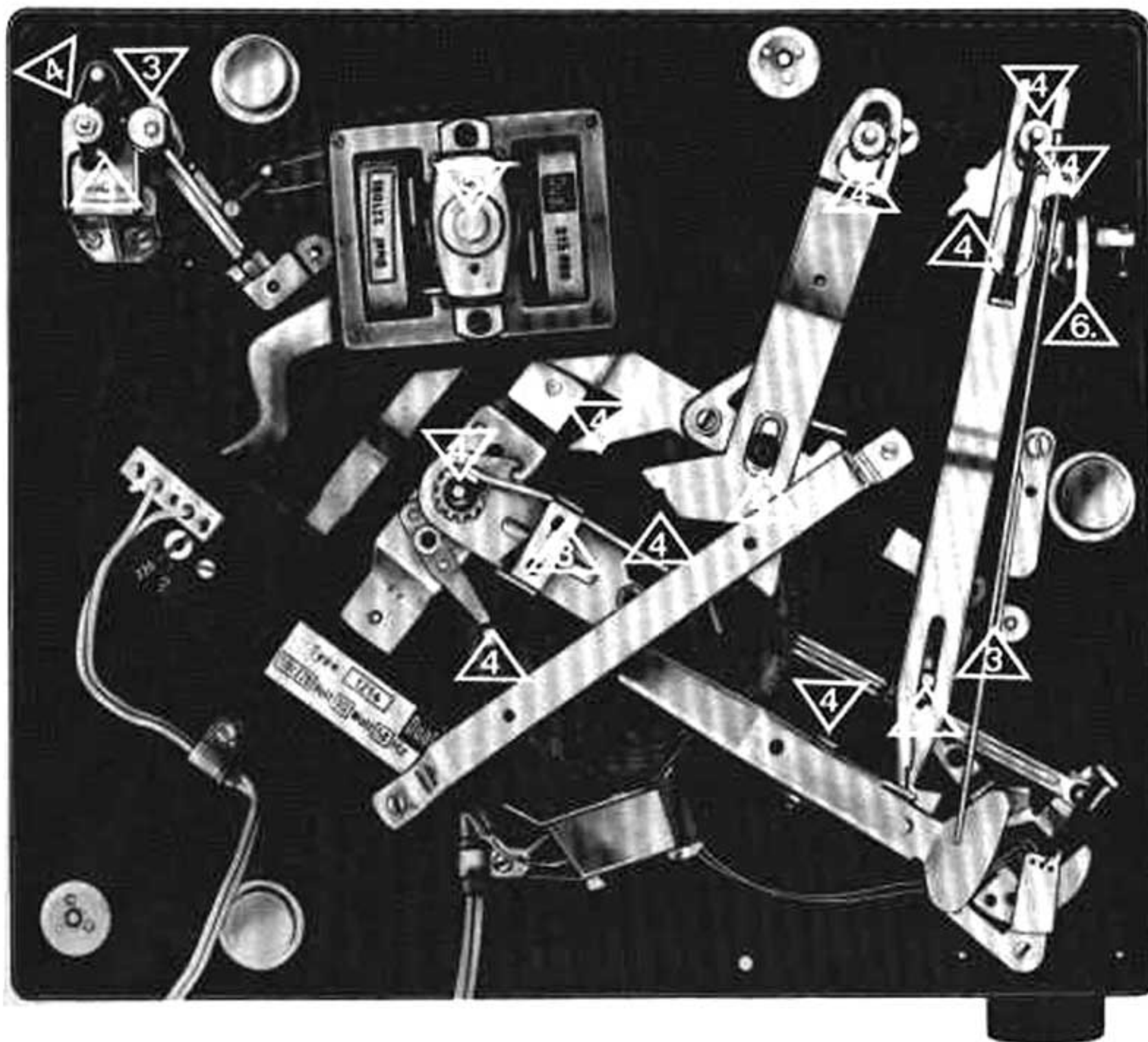


Fig. 27 Chassis, viewed from below



Lubrication

All bearings and sliding points have been properly lubricated during assembly. Re-lubrication is normally not necessary for about two years since all important bearings are provided with oil retainers and sintered bearings.

Lubrication should be applied sparingly. It is of primary importance that no oil grease should get onto the friction surfaces of the drive wheel, motor pulley or turntable, to avoid slippage. For the same reason, avoid touching these parts.

Use the following lubricants:

- △ 2 Adhesive oil, Renotac No. 342
- △ 3 BP oil, Super Viscostatic 10 W/30
- △ 4 Shell Alvania No. 2
- △ 5 Isoflex PDP 40
- △ 6 Wacker siliconoil AK 500 000



Dual Gebrüder Steldinger · 7742 St. Georgen/Schwarzwald