

Dual

Edition June 1974

Dual 1229 Q Service Manual

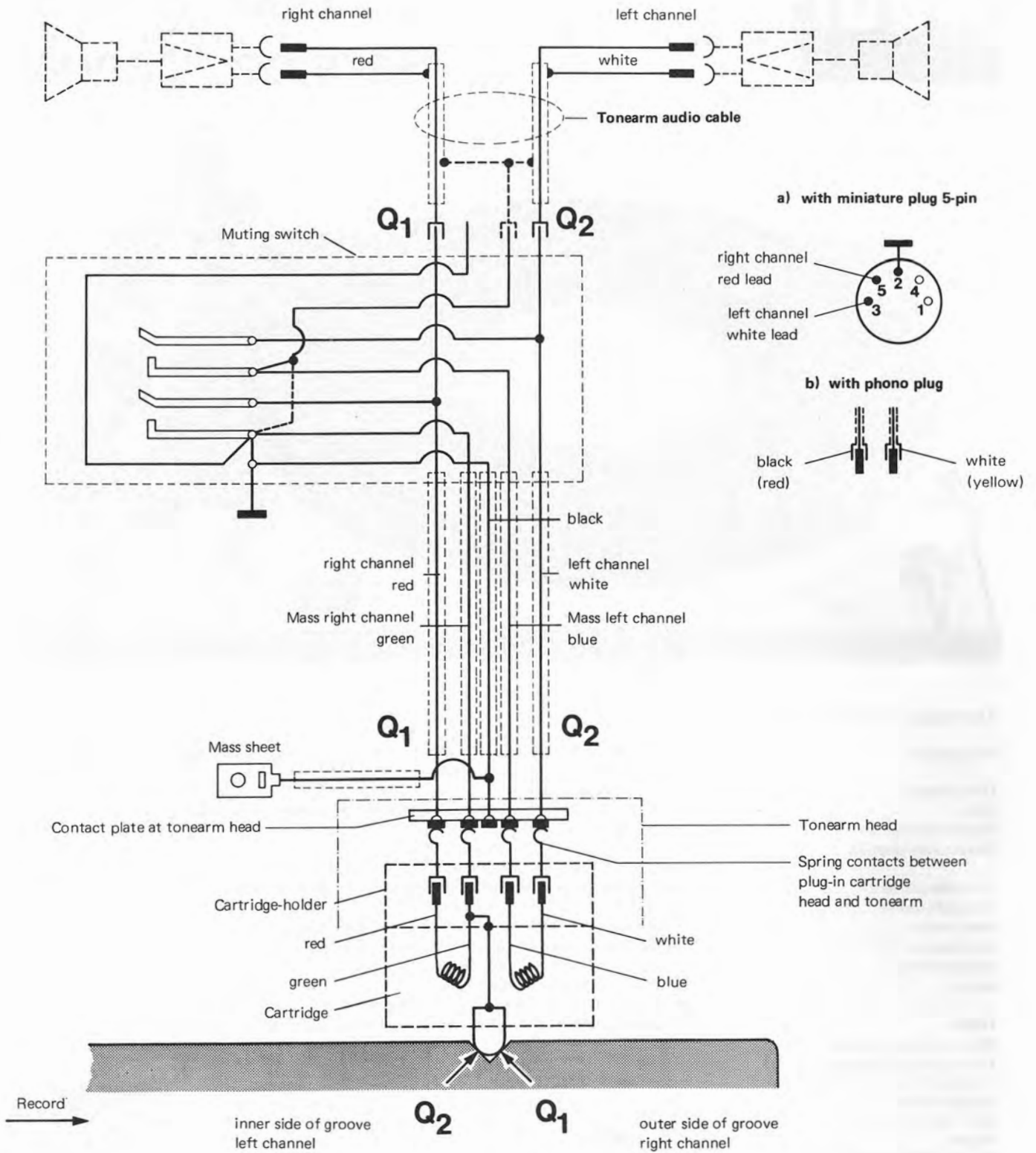


Technical specifications

Power source	50 or 60 Hz alternating current, selected by exchanging motor pulley and resetting stroboscope
Line voltages	110 – 130 volts or 220 – 240 volts, switchable
Drive	Dual synchronous/continuous-pole motor, with radial elastic suspension
Power consumption	approx. 10 W
Current consumption	at 220 volts, 50 Hz approx. 62 mA at 117 volts, 60 Hz approx. 115 mA
Turntable platter	nonmagnetic, dynamically balanced, weight 3.1 kg, diam. 305 mm
Turntable speeds	33 1/3, 45 and 78 rpm
Pitch control	Range of variation, one semitone (6%), on all three speeds
Stroboscope	For 33 1/3 and 45 rpm speeds. Illuminated by special neon glow lamp
Speed variation	< ± 0.06% according to DIN 45 507
Noise	Rumble 42 dB below standard signal Weighted audible rumble 63 dB below standard signal Measured according to DIN 45 500
Tonearm	Torsionally rigid, extra-long tubular tonearm in four-point gimbal type bearing
Maximum tracking error	0.16°/cm
Tonearm bearing friction (referred to stylus tip)	vertical < 0.007 gram horizontal < 0.015 gram
Tonearm head (cartridge holder)	Removable, accepts all cartridges weighing 2 to 10 grams and having standard 1/2" mounting centers
Weight	7.2 kg unpacked
Mounting dimensions and mounting board cut-out	see installation instructions

Dual Gebrüder Steidinger · 7742 St. Georgen/Schwarzwald

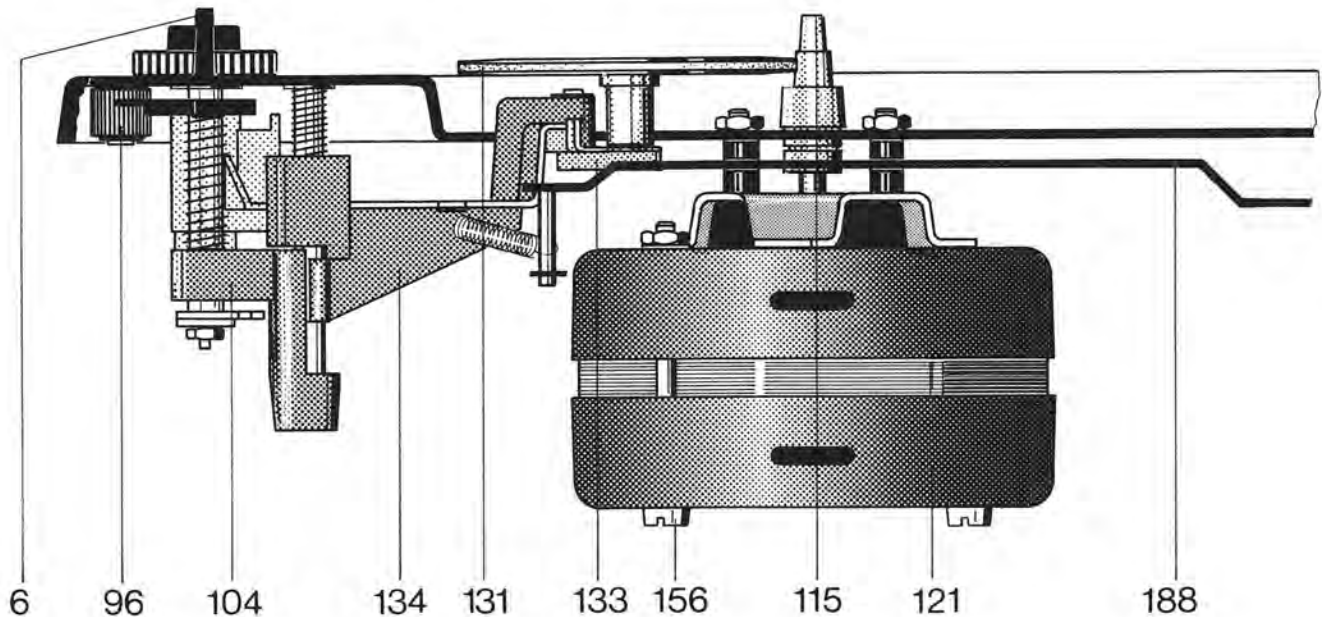
Fig. 1 Tonearm connections



Contents

	Page
Technical specifications	1
Head connecting diagram	2
Motor and drive	4
Stroboscope	5
Stroboscope bulb not illuminated	5
Fine-speed adjustment	6
Turntable does not run when start switch is operated	6
Turntable does not come up to speed	6
Rumble affecting reproduction	6
Correct nominal speed obtained only at extreme settings of pitch control	6
The tonearm and its suspension	7
Anti-skating adjustment	8
During change cycle, tonearm is restricted horizontally	9
Stylus skips	9
Vertical movement of tonearm is impeded during set-down cycle	9
Tonearm movements	10
Tonearm lift	10
Tonearm misses edge of record	11
Tonearm strikes record during change cycle	11
Tonearm does not move on to record when drop cycle is started	11
Tonearm is lowered too quickly when drop cycle is started	11
Sleeve movement not damped when tonearm lift handle is moved back	11
Tonearm returns to rest immediately after being placed on record manually	11
Start cycle	11
Manual start	12
Stop switching	12
Muting switch	12
Record drop	13
Shut-off and change cycle	13
Shut-off mechanism	13
Turntable stops after automatic set-down of tonearm	14
Tonearm misses 12" record during cycling when moving in or out	14
Last record keeps repeating	15
Records do not drop	15
Switch locks into "stop" position when tonearm is at rest	15
Tonearm will not lift away from tonearm rest with mode selector in "multi" position	15
Tonearm moves although stylus force and anti-skating force are at zero	16
During change movements noises from the mechanism can be heard in the speaker system	16
No replay sound	16
Motor does not shut off when tonearm is on rest	16
Acoustic feedback	16
With mode selector at "single", tonearm does not move in toward record on automatic single-play operation	16
Record does not drop with changer spindle in position	16
Spare parts	16 - 17
Exploded view, above chassis	18
Exploded view, below chassis	19
Spare parts	20 - 22
Lubrication	23

Fig. 2 Motor suspension and turntable platter drive



Motor and Pulley

Power for the turntable platter and the changing mechanism is supplied by a four-pole Dual continuous pole synchronous motor suspended by radially located elastic mounts and having a very small stray magnetic field and little vibration. The speed of the motor is independent of line voltage, temperature or load variations. Speed is dependent on, and proportional to power-line frequency. The motor is adapted to 50 or 60 cycle (Hz) power-line frequencies by the correct choice of motor pulley.

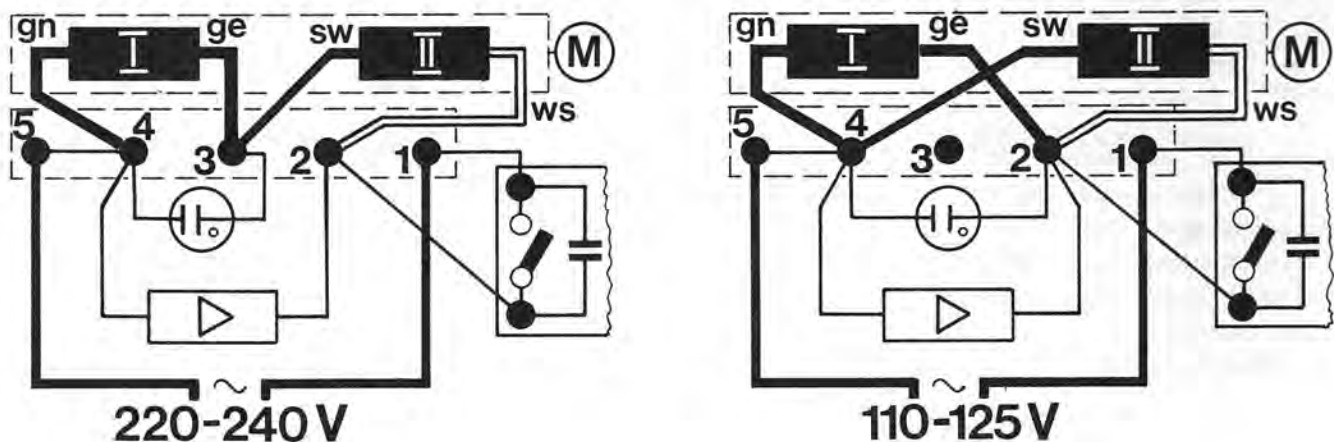
Motor pulley for 50 Hz operation:	Part.-No. 218 275
Motor pulley for 60 Hz operation:	Part.-No. 218 276

The motor pulley (115) is fastened to the motor shaft by a setscrew. When you change pulleys, be sure that the new pulley is set at the correct height (see page 6).

The turntable platter is driven by the idler wheel (131), which, to prevent damage to its friction surfaces, is automatically disengaged when the unit is shut off. Setting the turntable speed to 33 1/3, 45 or 78 rpm is done by raising or lowering the idler to bear against the proper step of the motor pulley.

Upon actuation of the switch (6), the switch segment (102) rotates. This causes the lever (134) fitted into a slot on the segment to move vertically. The drive wheel (131) carried on the swinging arm (133) is then lifted off the motor pulley, moved and replaced on the motor pulley step corresponding to the selected speed.

Fig. 3 Motor field connections



Stroboscope

The exact adjustment for 33 1/3 and 45 r.p.m. can be controlled with the help of the stroboscope, including when a disc is being played.

The ring of lines on the strobe will appear to stand still when the turntable (4) rotates at the correct speed (33 1/3 or 45 r.p.m.). If the ring of lines turns in the same direction as the turntable platter, the speed of the platter is too fast; when the lines move in the opposite direction to the platter, then the platter is rotating slower than the chosen speed.

The adjustment is made with the "pitch" knob (8).

The view angle of the stroboscope can be rotated by turning the knurled ring.

To change the angle, loosen the machine screws, slide the stroboscope housing (85) "50" or "60" and tighten the screws again.

The neon lamp (93) can be changed after removing the top part of the housing (90). When replacing the neon lamp, be sure that the red point (P) (Anode) is located on the right contact spring (unit viewed from front).

Trouble

The stroboscope neon lamp (93) does not light up when the unit is turned on.

Cause

- a) Defective neon lamp (93)
- b) Current path is interrupted

Remedy

- a) Replace the neon lamp (93). Make sure that the red point (Anode) of the neon lamp is located on the right contact spring (front view of unit). Fig. 4
- b) Check the connections on the power supply switch and other components.

Fig. 4 Stroboscope

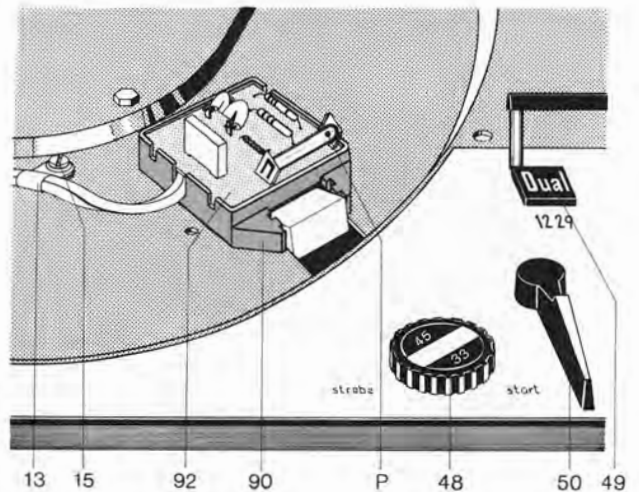


Fig. 5 Wiring diagram

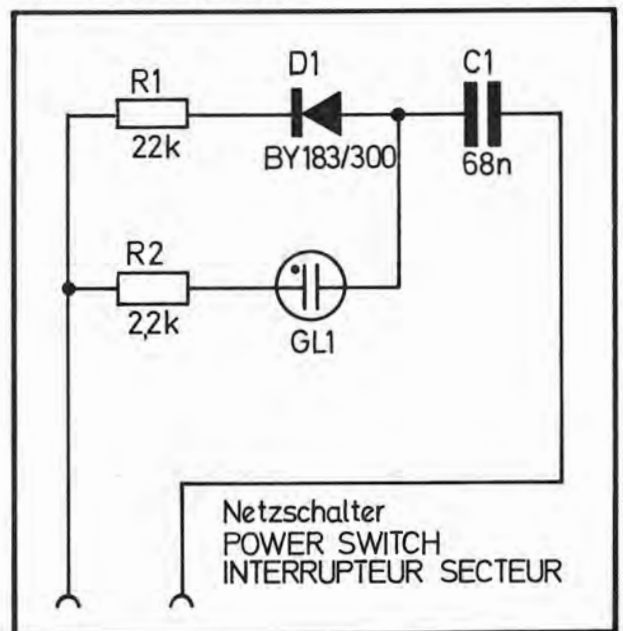


Fig. 6 Circuit board (output stages)

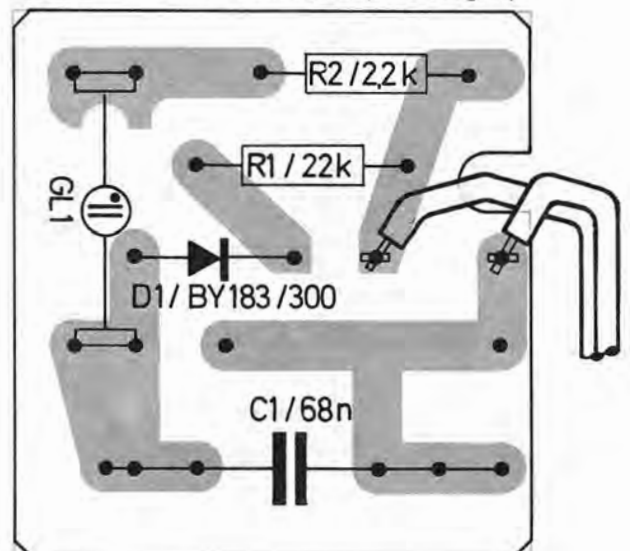
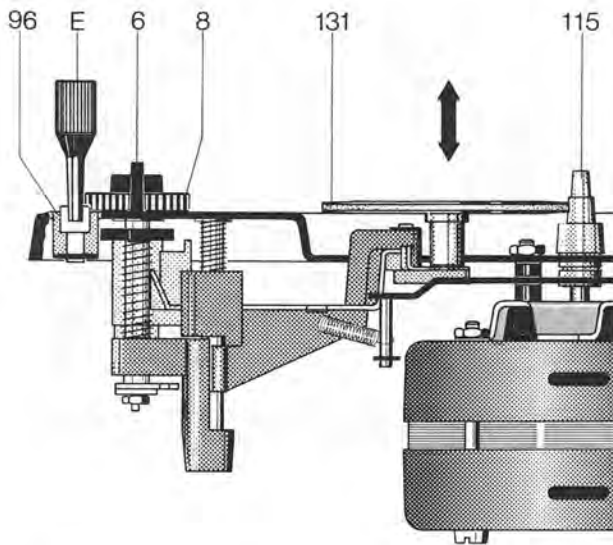


Fig. 7



Trouble

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

Cause

- a) Current path to motor interrupted
- b) Idler wheel (131) not in contact with platter
- c) Motor pulley loose

Turntable does not come up to speed

- a) Motor pulley is not correct for local line frequency
- b) Slip between idler wheel (131) and motor pulley or platter
- c) Excessive friction in motor, drive wheel or platter bearings

Rumble affecting reproduction

Worn idler wheel

Pitch Control

A fine-speed adjustment for all three speeds (33 1/3, 45 and 78 r.p.m.) permits a platter speed variation of max. 6% (1 semitone), independent of supply voltage.

Turning the pitch-control disc (8) causes the selector segment (102) to rotate. The switch lever assembly (134) moves up and down, changing the position of the idler wheel on whatever motor pulley step it has been placed on. The tapered shape of the motor pulley gives an adjustment range of $\pm 3\%$ from the nominal speed.

The motor pulley (115) should be adjusted in such a way that on 33 1/3 r.p.m. (checked with the stroboscope), the markings on the adjusting disc (8) should be between the two middle lines. Due to production tolerances, the 45 r.p.m. rated speed may differ from the 33 1/3 r.p.m. by up to two scale markings on either side.

Remedy

- a) Check connections at switch plate and voltage selector
- b) Check switch lever assembly (134)

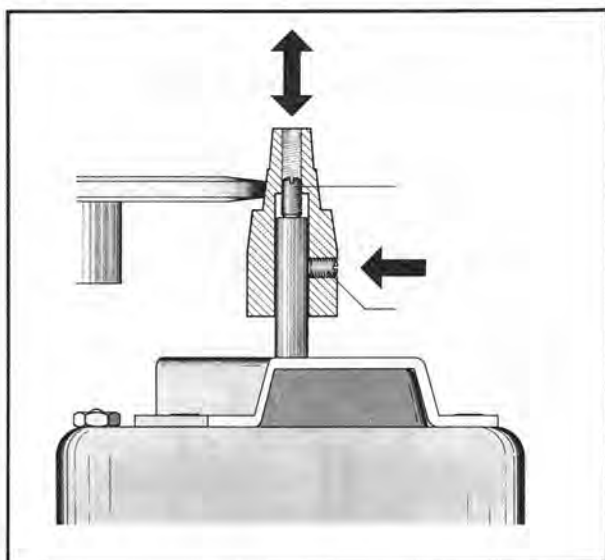
c) Tighten motor pulley

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

Replace idler wheel (131). Clean platter drive surface and motor pulley with grease solvent. Once surfaces are cleaned, do not touch them with your fingers.

Fig. 8



Trouble

Correct nominal speed obtained only at extreme settings of pitch control

Cause

- a) Idler wheel does not contact motor pulley accurately
- b) Motor pulley out of adjustment

Remedy

- a) With adjuster (E) turn alignment screw (95) (Fig. 7) until rated speed is obtained at central setting of pitch control (8)
- b) Move pitch control (8) and alignment disc (101) to center settings (1 mm dia. hole on disc opposite alignment wheel). Adjust the motor pulley vertically after loosening its setscrew (116) by turning screw (114). The correct position for the idler is in the center of each motor pulley step, when the pitch control is centered in its range (Fig. 8). Retighten setscrew (116) after adjustment.

Tonearm and Tonearm Bearing

Tubular tonearm, extra lightweight, torsionally rigid tonearm of the Dual 1229 Q pivots both horizontally and vertically on needle bearings and precision ball bearings in hardened and polished races. It is suspended in a gimbal arrangement. This keeps friction to a minimum.

Vertical pivot friction = 0.007 gram
Horizontal pivot friction = 0.015 gram
referred to stylus tip

The arm is thus able to track extremely well. The tonearm head is removable. Before setting the tracking force for the cartridge being used, set the tracking-force scale to zero and balance the tonearm. Initial balance is by sliding the counterweight (74). Final adjustment is by turning the weight.

You can balance cartridges with a weight of 1 to 10 grams.

To reduce the effects of small shock impulses on the arm, the counterbalance weight is resiliently mounted on a threaded spindle, and friction-braked to prevent accidental rotation. The cartridge holder will accept all cartridges with international standard mounting centers of 1/2 inch. Stylus force is set by turning a calibrated housing (78), which stresses or releases a spiral spring contained inside. The scale adjustment is calibrated from 0 - 3 p, from 0 - 1.5 p at 1/10 p and from 1.5 - 3 p at 1/4 p intervals.

Tracking forces of more than 3 p can be adjusted with the help of the counter-weight on the tonearm; turning left (counter-clockwise) increases the tracking force by 1/2 p per complete turn.

To replace the tonearm and bearing assembly, follow these steps:

1. Set stylus force dial to zero and mode selector to "single".
2. Fasten unit in repair jig and turn upside down.
3. Unsolder tonearm leads.
4. Remove main lever (184) and linking lever (270).
5. Unhook springs (237, 241, 265) and unscrew protective plate (233).
6. Remove washer (266) and skating lever (267).
7. After removing lock washer (272) and sliding disc (271), remove shut-off slide (253) from segment (201).
8. Loosen hex nut (236). Pull off guide (198) and lock washer (199). After unscrewing positioning sleeve (200), lift plate with lifting pin (203) and segment (201) can be removed.
9. Turn the unit back in its normal position.
10. Set mode selector on "multi", then rotate the tonearm bearing frame (58) counter-clockwise until it cannot turn anymore. The tonearm can then be lifted out.

Fig. 9 Tonearm bearing assembly

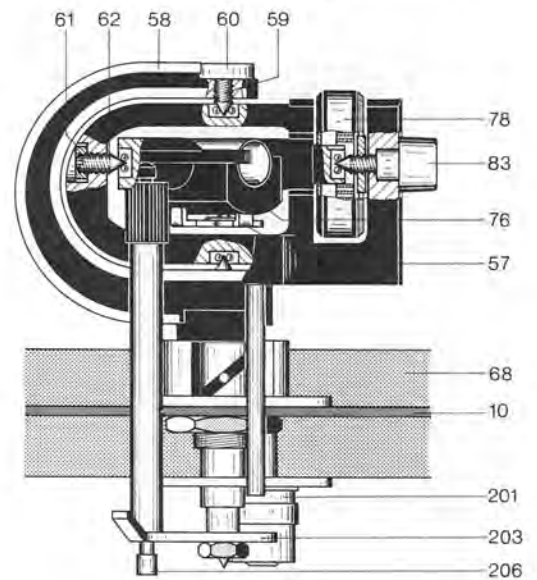


Fig. 10 Tonearm assembly sequence

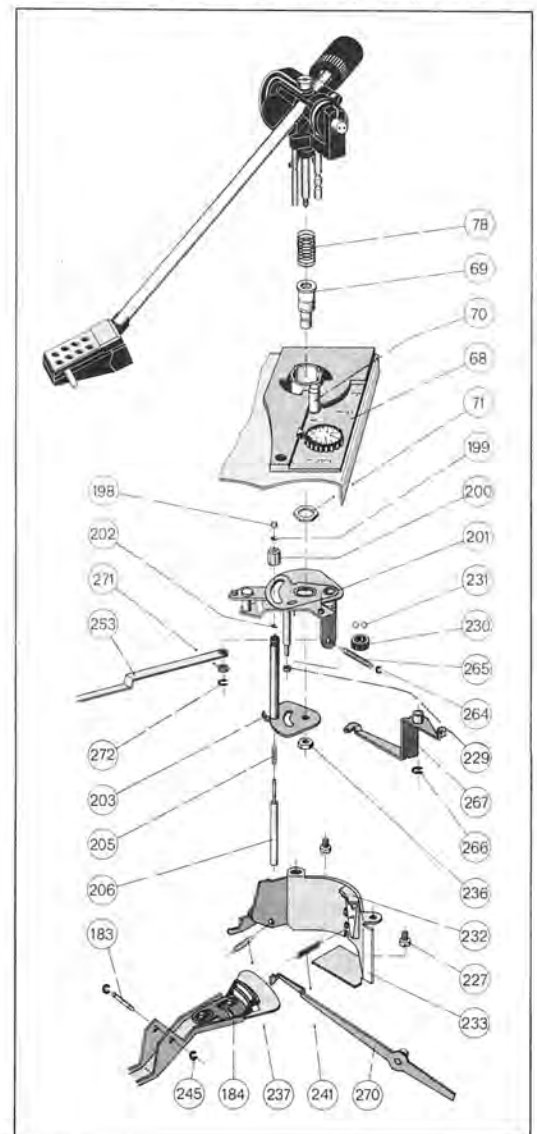


Fig. 11 Tonearm bearing assembly viewed from underneath

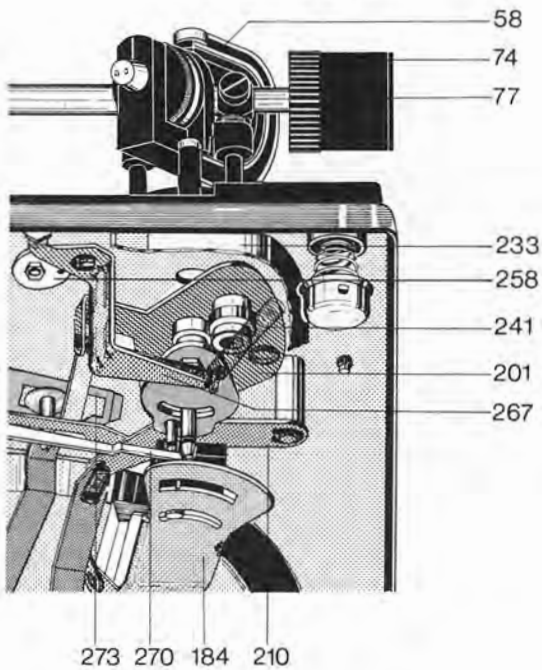
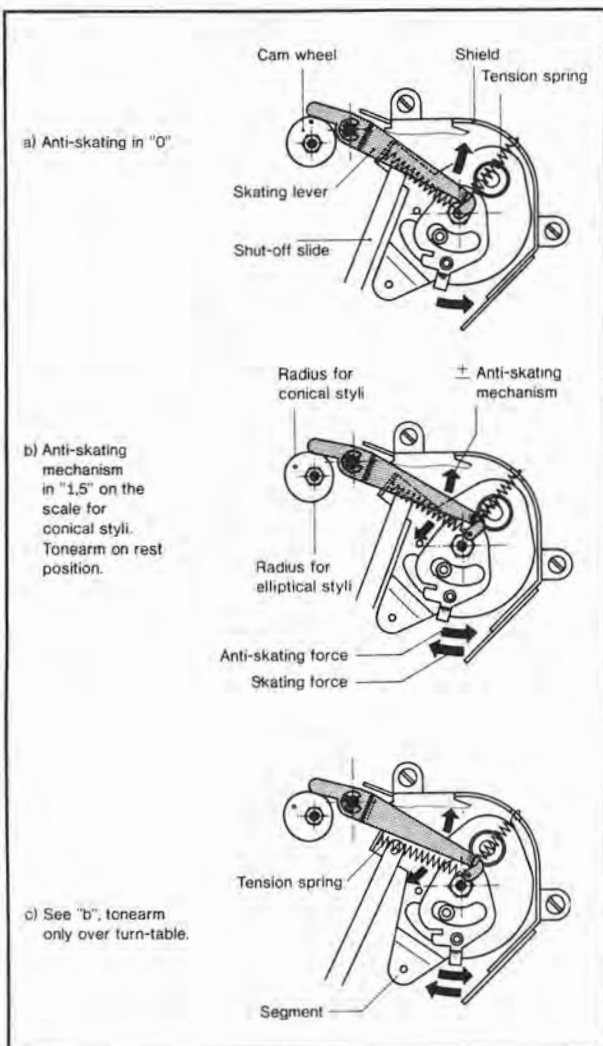


Fig. 12 Anti-skating force



To replace the tonearm bearing assembly, hold it with a suitable tool (such as a pair of flat-nose pliers) and loosen hex nut (71) with an open-end wrench. Be sure to secure the bearing socket with a 5 mm rod to prevent its being pinched together. Reverse the procedure to reassemble the tonearm and bearing. The unit must be right-side-up. After assembly, immediately place the mode selector at "single". This prevents the tonearm from falling out when the unit is turned upside down again. Do not omit spring (78).
 Install segment (201) and lift plate (203). Tighten the positioning sleeve (200) on the lift tube. Insert lock washer in recess on lifting pin and mount the guide again. Before tightening hex nut (236), rotate outer bearing frame (58) counter-clockwise until you feel slight resistance. This puts the forward edge of the outer bearing frame approximately at the center line of the inner tonearm bearing screw, and represents the correct tonearm position.
 After reinstalling the protective plate, ensure that the segment (201) moves freely and without rubbing in its guide (232) and is not hindered in its movement by the tonearm wires. Adjust tonearm height with positioning sleeve (200) and locating screw (79) in "multi" position at the mode selector. Correct position with main lever pressed up is approx. 0.5 mm play remaining measured at tonearm head, see Fig. 13.

Anti-Skating Device

The tendency of a tonearm with an offset (angled) head to "skate" inward across the record is eliminated in the Dual 1229 Q by a precision anti-skating mechanism. Skating force depends on tonearm geometry, stylus force and the tip radius of the stylus. The inward pull on the tonearm caused by the skating effect gives rise not only to an undesirable jumping of the tonearm when set down on the record, but also to unequal forces on the two opposite groove walls, with corresponding ill effects. This can be corrected by proper anti-skating adjustment as provided on a high-grade HiFi record player.

By turning the anti-skating adjustment knob (84) on the chassis, an asymmetrical curved surfaces corresponding to the red and white scales on the antiskating dial. The red scale is for conical (spherical tip) styli, the white for elliptical (bi-radial) styli and for CD-4 quadrophonic cartridges. When the knob is turned, the curved surfaces push the anti-skating lever (267) away from its rest position so that it applies a suitable counter-force via a spring (265). Skating compensation is set at the factory for conical styli with a tip radius of $15 \pm 2 \mu\text{m}$, and for elliptical styli with measurements of $5/6 \times 18/22 \mu\text{m}$. The adjusting hex nut (259) is tightened and sealed. Readjustments should be attempted only with the help of the Dual Skate-0-Meter and test record L 096. This work should be done by an authorized Dual service agency.

Trouble

During change cycle, tonearm is restricted horizontally.

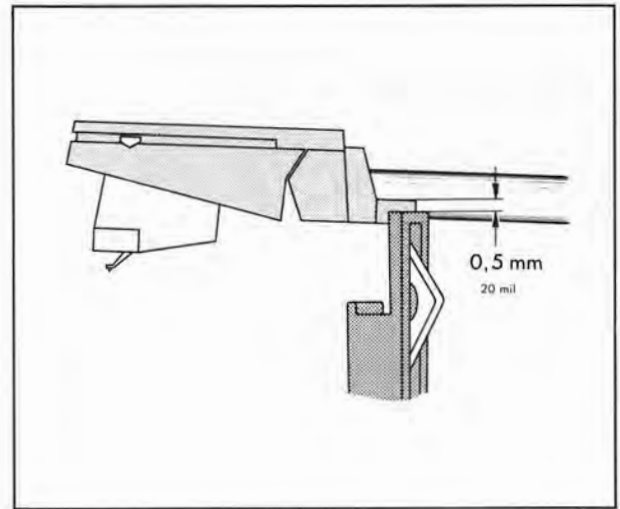
Cause

Positioning sleeve or locating screw out of adjustment.

Remedy

With main lever (184) pressed up, adjust positioning sleeve so that, with the tonearm unlocked and over the rest, the upper edge of the tonearm rest piece and the above edge of the tonearm rest are at the same height. Now adjust to a play of 0.1 - 0.2 mm between guide and tonearm rest surface by means of the locating screw (79). (Approx. 0.5 mm measured at tonearm head).

Fig. 13

**Trouble**

Stylus skips

Cause

- a) Tonearm not balanced
- b) Stylus force too low
- c) Anti-skating wrongly adjusted
- d) Stylus worn or chipped
- e) Excessive friction in tonearm bearing
- f) Steel ball (254) missing from shut-off rail
- g) Segment (201) rubs in guide

Remedy

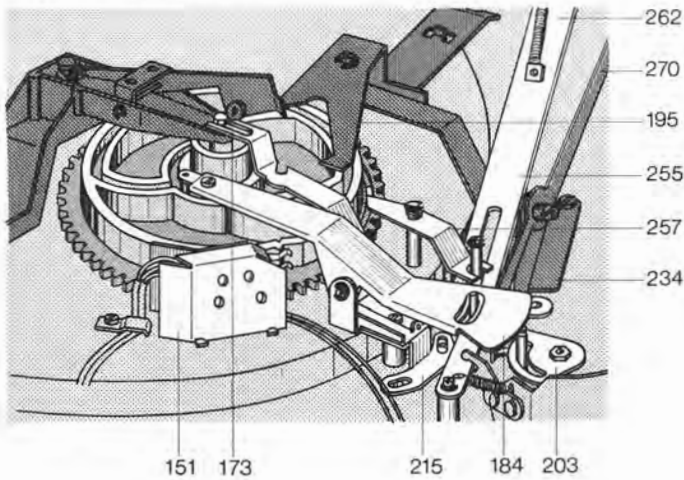
- a) Balance tonearm
- b) Set stylus force to cartridge manufacturer's recommended value
- c) Correct anti-skating setting
- d) Renew stylus
- e) Check tonearm pivot. Both bearings should have barely noticeable play. Adjust vertical bearing only with the left bearing screw (62) and horizontal bearing with nut (59). Horizontal bearing is correctly adjusted when the tonearm, with anti-skating set at 0.5 gram, swings freely from center to rest (first balance tonearm accurately).
- f) Replace steel ball (254)
- g) Adjust guide (232). Adjustment is correct when the tonearm moves freely in the horizontal plane at both settings of the mode selector

Vertical movement of tonearm is impeded during set-down cycle

- a) Bearing friction too high
- b) Lift screw (206) jams in guide tube of lift plate

- a) Adjust at bearing screw (62), and check arm balance
- b) Remove and clean lift screw. Clean lift tube and fill with "Wacker Silicon Oil AK 500 000".

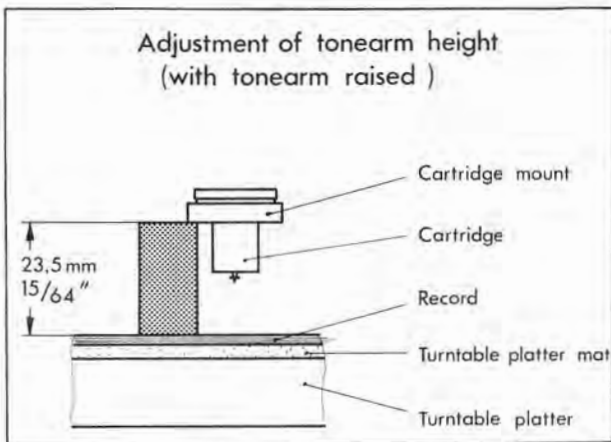
Fig. 14 Tonearm control mechanism



Tonearm Movement

A guide groove located on the underside of the main cam (165) controls automatic lift and set-down of the tonearm as the cam rotates through 360°. Tonearm lift and lowering are controlled by the main lever (184) and the lift screw (206). Horizontal movements are controlled by main lever (184) and the segment (201). Setting the changer for playback of 7", 10" or 12" discs is done with the indexing lever (49). Set-down points are determined by the eccentric portion of the arm positioning slide (225) and the indexing lever (267). Horizontal movement of the tonearm is limited by the arm segment striking the arm positioning slide (255). During the change cycle, the main lever (184) raises the arm positioning slide, bringing it within reach of the spring stud. On completion of the change cycle (set-down of the tonearm on the record), the arm positioning slide (255) 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.

Fig. 15



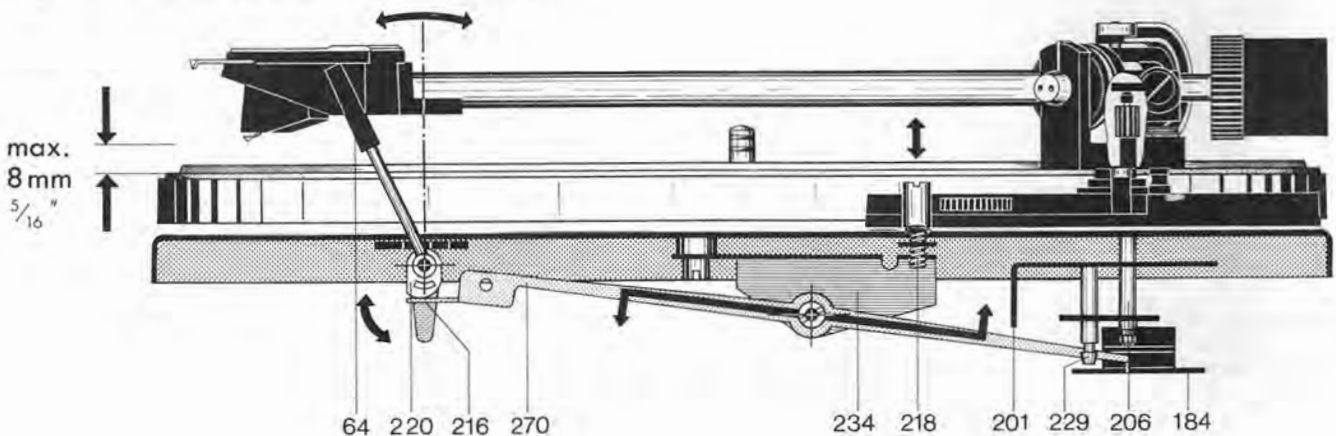
Tonearm Lift

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 control towards the front turns the drive cam (220). This moves the connecting lever (270), and lift screw (206), to raise the tonearm.

After the tonearm has been 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 (270) and spring (205) of the lift screw (206) are freed, allowing the tonearm to fall. The rate of fall is controlled by silicone oil in the lift tube. The height of the stylus above the record can be varied by adjusting setscrew (218). Turning it to the left decreases the height, turning it to the right increases the height. Units leaving the factory are adjusted so that the tonearm still lifts reliably off the fifth record on the platter.

Fig. 16 Tonearm lift with tonearm raised



Trouble	Cause	Remedy
Tonearm misses edge of record	a) Record size incorrectly set b) Set-down point incorrectly adjusted c) Record not standard size d) Friction surfaces of tonearm clutch dirty	Set record size selector 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. c) Use standard records d) Clean clutch surfaces
Tonearm strikes record during change cycle	Tonearm height incorrectly set	Adjust it by turning rear adjustment screw (79). Adjustment is correct when in "multi" position, with tonearm unlocked and on its rest, the upper edge of the tonearm support is about 0.5 mm (02 in.) above the upper edge of the tonearm bracket. (see fig. 13)
Tonearm does not descend on to record when drop cycle is started	Damping too great; dirty silicone oil in lift tube	Remove lift plate according to instructions in the section "Tonearm and suspension". Clean lift tube and bolt and fill tube with "Wacker Silicone Oil AK 500 000".
Tonearm descends too quickly when drop cycle is started	Too little damping; incorrect lubricant added to silicone oil	Follow instructions above for too great damping
Sleeve (64) movement not damped when tonearm lift handle is moved back	Too little or the wrong lubricant used when damping the tonearm lift	Remove lift plate (221). Clean and smear it with Wacker Silicon Oil AK 500 000. After inserting again, clean off any lubricant that has overflowed
Tonearm returns to rest immediately after being placed on record manually	Shut-off mechanism has shifted out of position in transit from factory	Before using changer and after moving, run it through start cycle with tonearm locked on rest (automatic alignment of shut-off mechanism).

Start Cycle

Moving the start switch (48) first turns the switch lever (195) clockwise, initiating the following sequence.

- a) The tug on the switch lever assembly (195) turns the switch arm (188) mounted on the grooved shaft (192). Via a tension spring, this actuates the rocker assembly (134) and engages the idler (131) between the platter (4) and the motor pulley (115). At the same time, the power switch (129) is actuated by the switch slide (167) through the switch arm, and the turntable begins to rotate.
- b) The switch lever (195) is brought within reach of the cam follower lever (207), so that it is pushed into the change position as the main cam rotates.

Moving the operating switch, also releases the start lever (248), pulling it towards the main cam by means of the tension spring (251).

Fig. 17 Start position

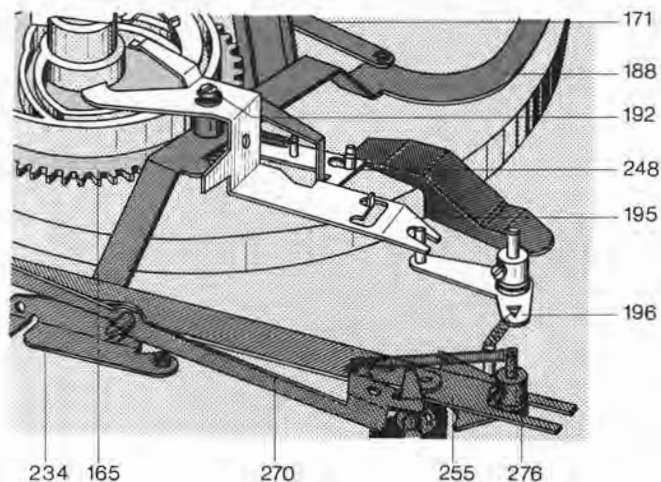
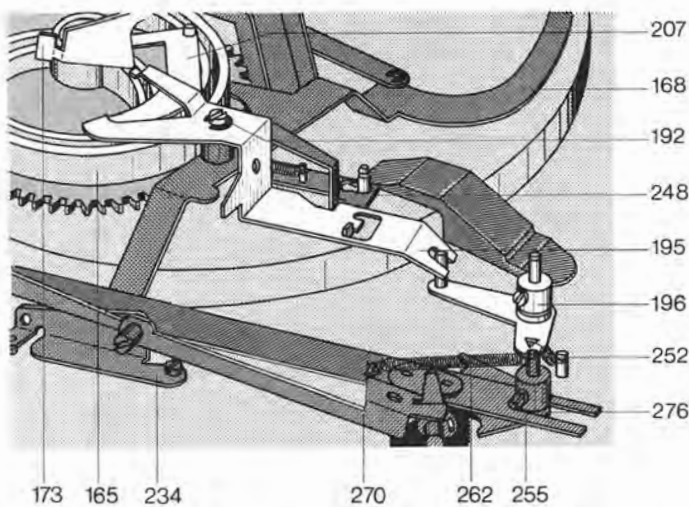


Fig. 18 Stop position



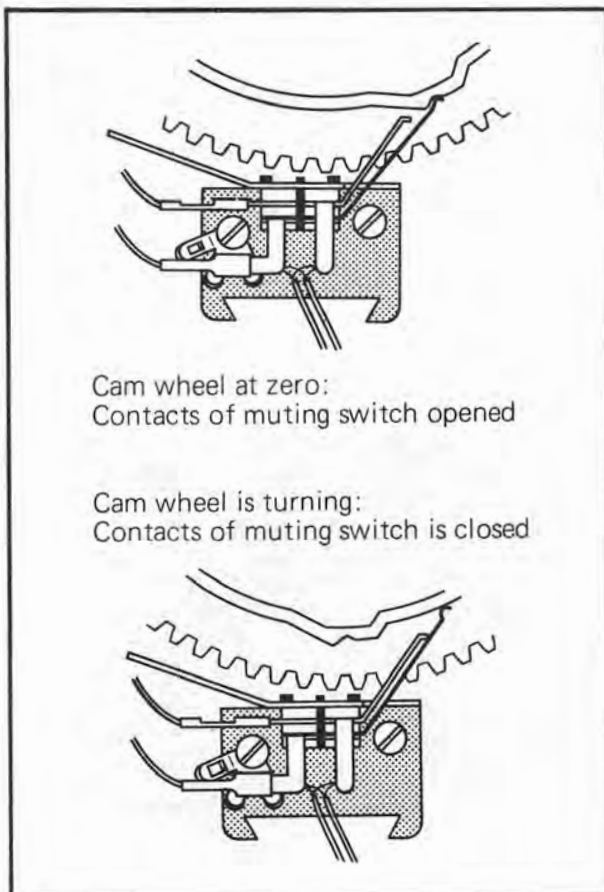
To prevent malfunctioning, the operating switch is locked during the start cycle (that is, while the main cam is turning). Just before the main cam reaches its neutral position (at the end of the change cycle), the start lever (248) is pushed clear of the main cam by the angular part of the main cam. 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 readjust the shut-off lever, which may have shifted out of position.

Manual Start

When the tonearm is swung inward by hand, the pawl (273) on the switch arm (188) drops into a square bolt on the base plate, holding the switch arm in this position and the idler wheel (131) in contact with the platter. The slide (167) linked with the switch actuates the power switch and starts the turntable platter rotating.

On reaching the run-out groove, the tonearm automatically returns to its rest position and the unit shuts itself off. However, if the tonearm is lifted off the record manually and returned to the rest, the tabs of the arm segment (201) release the pawl (273). The torsion spring (187) then returns the switch arm to its initial position, opening the power switch and disengaging the idler wheel.

Fig. 19 Muting switch



Stop Switching

When the operating lever is moved to "stop", the starting lever is pushed forward. As a result, the shut-off linkage comes into contact with the gear pinion on the turntable, and the cam is rotated. The swinging lever 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.

Short Circuiter

To prevent the noise of the change and start/stop cycles from being sent through the audio system, the apparatus is fitted with a short-circuitin (muting) switch. The switch springs for both channels are actuated by the main cam. In the tonearm rest position, the muting switch is opened.

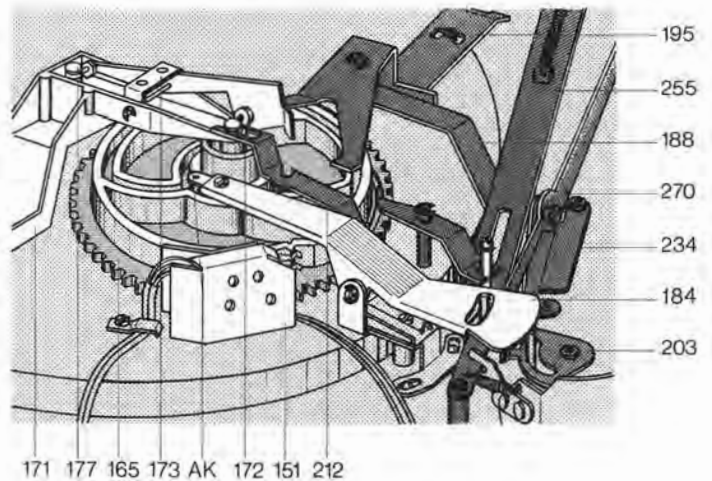
Record Drop

Insert the appropriate spindle - AW 3 for standard records (7 mm or 1/4" center hole) or AS 12 for 45 rpm records (38 mm or 1 1/2" center hole).

To prevent faulty operation, automatic record-changing operation is possible only when the mode selector is in the "multi" position.

Record drop is initiated by the rotation of cam (165), whose cam surface (AK) guides the cam rocker (173), pushing the change actuator stud (206) and releasing a record by means of the automatic spindles. 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 record (12" diameter).

Fig.20 Record drop



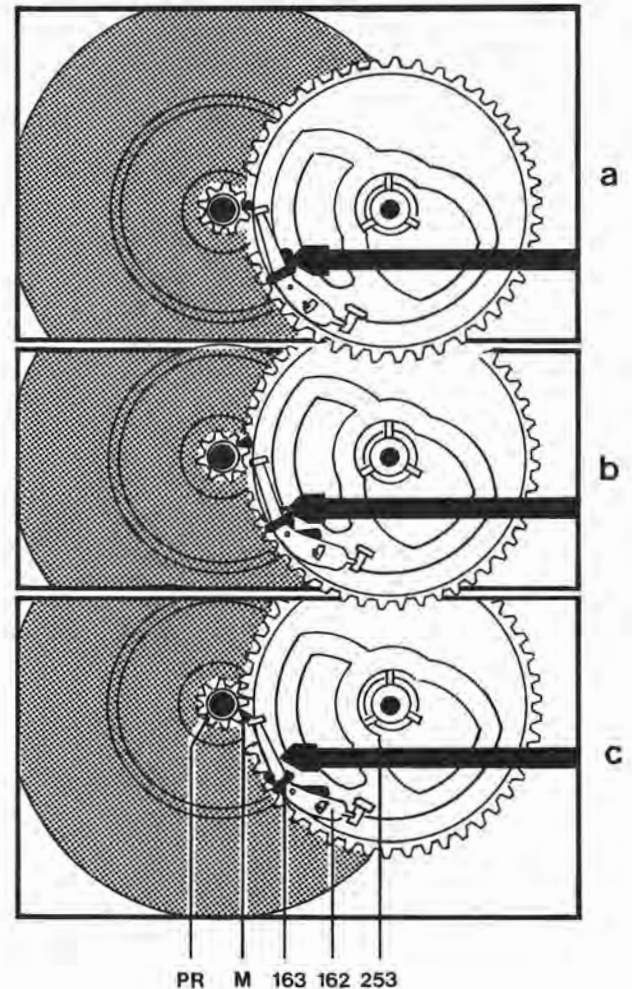
Shut - off and Change Cycle

The dog (M) on the turntable platter gear (PR) and the shut-off lever (162) 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 (162) towards the dog by means of the shut-off slide (253). The eccentric dog pushes the shut-off lever (162) 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 (162) and causing the main cam (165) to be driven out of its neutral position by the turntable platter gear.

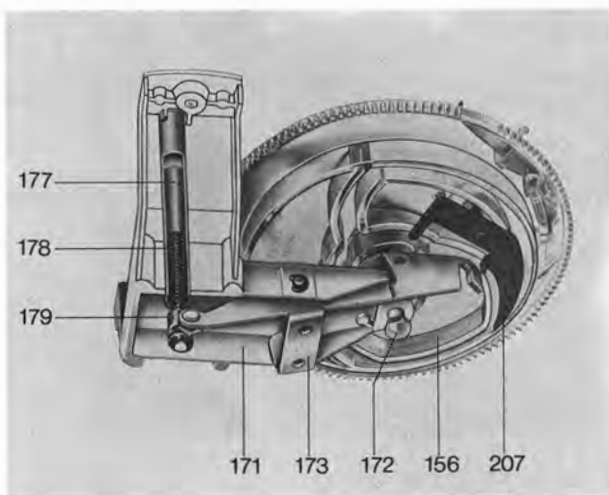
Fig.21 Actuating change or shut-off operations



Shut-off Mechanism

Shut-off and change functions are determined by the position of the cam follower lever (207). After every start or record drop, the cam follower lever is brought to its stop position by the main lever (184) (longer end towards the center of the main cam).

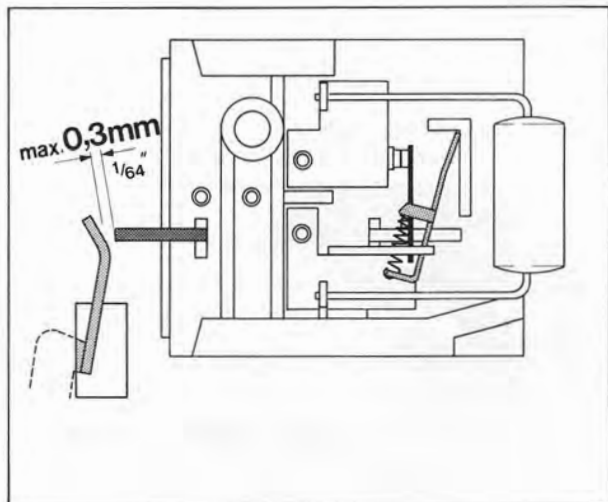
Fig.22 Change cycle



As the record is dropped the cam follower lever (207) is turned to its start position by the cam rocker (173), 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 (165) returns to its neutral position, the switch arm (188) drops into a cut-out in the main cam, opening the power switch (129) and disengaging the drive idler (131).

Fig. 23



Trouble

Turntable stops after automatic setdown of the tonearm

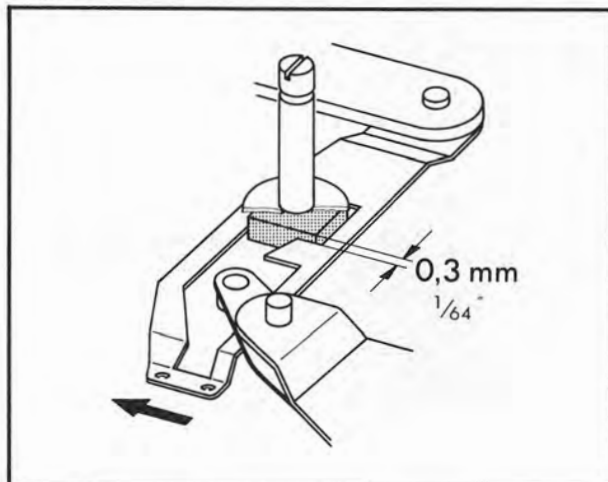
Cause

- a) Switch arm (188) is not latched by pawl (273). Bolt of segment slips over pawl instead of engaging it.
- b) Power switch opens
- c) Square bar not properly screwed in. Pawl can escape.

Remedy

- a) Adjust segment (201) so that bolt catches pawl in both positions of mode selector.
- b) By aligning angle lever (145) (play between angle lever and slide (140) max. 0.3 mm).
- c) Loosen screw (256). Press pawl against square bar (274) (arrow in Fig. 24) and fasten screw.

Fig.24



Trouble

Tonearm misses 1/2 inch. record during cycling moving in or out.

Cause

Switch arm maladjusted. Pawl touches square bar.

Remedy

After loosening screw (189), twist short part of the switch arm on the long part. Adjustment is correct, when the distance between pawl and square bolt (274, mounted on chassis plate) is 0.3 mm after the tonearm has moved in and the main cam was turned manually.

Trouble
Last record of stack keeps repeating

Cause
Defective spindle

Remedy
Replace spindle

Trouble
Records do not drop

Cause
Cam rocker has too little travel

Remedy
Adjust eccentric so that when the three supports in the automatic spindle are held in and the main cam is at neutral, pressing the change screw moves the support about 0.2 mm (1/64").

Trouble
Switch locks into "stop" position when tone-arm is at rest.

Cause
Too much clearance between tab on switch arm (188) and start lever (248)

Remedy
Adjust tab on switch arm so that it clears start lever by 0.1 - 0.2 mm or 1/64" when main cam in neutral position

Trouble
Tonearm will not lift away from the tonearm rest with mode selector in "multi" position

Cause
Equalizing arm (210) maladjusted. Balance plate (243) at the main lever (184) does not contact with the lifting bolt

Remedy
Adjust equalizing arm on the eccentric piece of the protecting plate so that with the main lever pushed down, the balance plate rests by a minimum of 0.6 - 0.8 mm on the lift bolt. In the "single" position, the lift bolt must slide along the balance plate without hindrance.

Fig.25

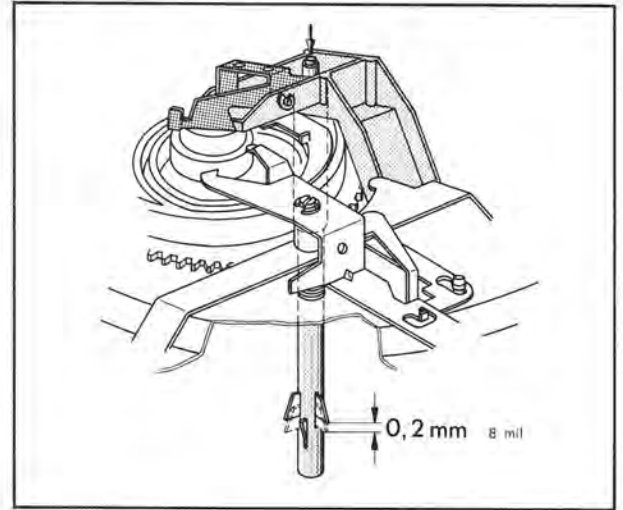


Fig.26

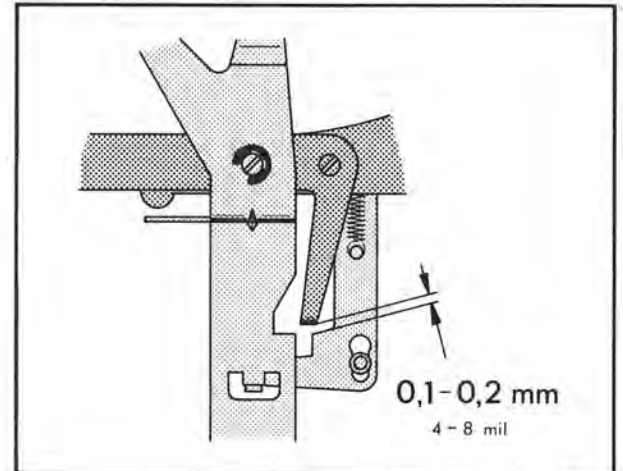
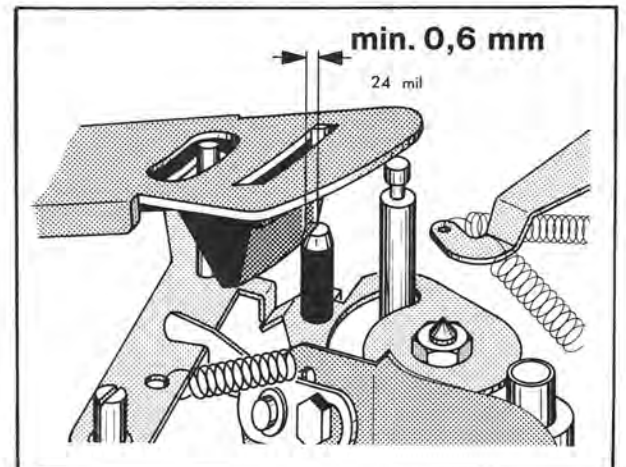


Fig. 27



Trouble	Cause	Remedy
Tonearm moves although stylus force and antiskating force are at zero:		
a) outward	Anti-skating out of adjustment	Adjust skating lever so that skating spring applies force exactly at tonearm pivot.
b) inward	Too taut tonearm leads produce a twisting force	b) Allow some slack in tonearm leads.
During change, stop and start operations, noise from the mechanism can be heard in the speaker system	Muting switch maladjusted. 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 contact is about 0.5 mm or 0.02 inch. Spray contacts with preservative (e.g. "Kontakt 61") and check alignment of short-circuit contacts.
No sound; muting short circuit across pick-up leads is not opened	Muting switch contact spring spacing too small	Bend contacts so that, in the neutral position of the main cam the spacing between contacts is about 0.5 mm or 0.02 inch.
Motor will not shut-off when tonearm is on arm rest	Capacitor across power switch is shorted	Replace capacitor in power switch.
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, or lengthen.
With mode selector in "single" and short spindle in place, tonearm does not move in toward record on automatic single-play operation	Switch spring on locking slide (212) is out of adjustment	With the unit in normal upright position, adjust spring so that when the main cam is rotated the raised tab on the switch lever is just cleared.
Records do not drop with changer spindle in place	Mode selector is set to "single"	This is normal

Replacement Parts

No.	Part.No.	Description	Quantity
1	215 470	Automatic spindle AS 12	1
2	213 895	Automatic spindle AW 3	1
3	227 001	Turntable mat complete with washer	1
4	227 003	Turntable complete with mat and stroboscope ring .	1
6	224 805	Speed change lever left complete	1
7	216 740	"C" washer H 7 x 0.8	1
8	225 209	Control washer complete	1
9	218 480	Bowed lockwasher	1
10	133 734	Chassis complete	1
11	214 047	Special screw, pierced	3
12	214 210	Shipping screw assembly	3
13	220 152	Plastic clamp	3
14	210 586	Washer 3.2/7.0/0.5 St	3
15	210 472	Machine screw AM 3 x 4	3
16	213 512	Hex screw M 4 x 8	2
17	210 366	Hex nut BM 4	7
18	210 362	Hex nut BM 3	5
19	210 362	Hex nut BM 3	1
20	233 742	Blind (cm), complete	1
	233 743	Blind (inch), complete	1
21	213 512	Hex screw M 4 x 8	2

No.	Part.-No.	Description	Quantity
22	210 624	Washer 4.2/7.0/0.3	5
23	210 624	Washer 4.2/7.0/0.3	5
24	200 713	Washer	3
25	200 711	Lockwasher	3
26	209 934	Sleeving	1
27	200 718	Compression spring	3
28	201 632	Rubber washer	3
29	200 712	Spring mounting	1
30	210 366	Hex nut BM 4	7
31	224 947	Rest ring	1
32	200 721	Threaded piece	4
33	200 728	Compression spring, tonearm side	2
	230 406	Compression spring (yellow), motor side	2
34	200 723	Rubber damping block	4
35	200 722	Steel cup	4
36	220 163	Spring mounted footing complete (1 set = 4 pieces)	4
37	220 213	Centering disc	1
38	201 101	Centering pin	1
39	225 108	Washer	1
40	200 543	Retaining ring	1
41	233 738	Tonearm head complete	1
42	231 992	Contact plate complete	1
43	201 132	Lift	1
44	210 182	Bowed lock washer	1
45	210 630	Washer 4.2/8/0.5 St	1
46	210 197	Ring G 4 x 0.8	1
47	215 430	Mounting TK 14	1
48	227 007	Ring, complete	1
49	225 096	Dual emblem	1
50	225 197	Switch lever right complete	2
51	225 197	Switch lever right complete	2
52	217 504	Stud	1
53	210 362	Hex nut BM 3	5
54	217 439	Web	1
55	230 859	Square-end nut, M 2.5	1
56	230 917	Shouldered screw	1
57	230 916	Clamp piece	1
58	233 732	Frame, complete	1
59	221 486	Threaded rod	1
60	227 589	Locknut	1
61	216 831	Locknut	1
62	230 063	Threaded rod	1
63	218 827	Compression ring	1
64	216 881	Lever complete	1
65	210 353	Hex nut BM 2	1
66	227 000	Rest complete	1
67	210 362	Hex nut BM 3	5
68	233 736	Cover, complete	1
69	216 810	Bearing for tonearm	1
70	217 601	Locating lever	1
71	218 321	Hex nut	1
72	210 469	Machine screw AM 3 x 3	8
73	233 737	Tonearm complete	1
74	233 731	Weight, complete	1
75	225 145	Stud	1
76	233 741	Bearing complete	1
77	227 569	Clamp bolt	1
78	233 735	Spring housing, complete	1
79	217 600	Setscrew	1
80	218 894	Lock washer, dished 3.2/8	1
81	233 733	Bearing frame, complete	1
82	229 720	Pointer	1
83	229 738	Bearing screw, complete	1
84	231 775	Knob complete	1
85	217 386	Tension spring	1
86	217 381	Rest lever, complete	1
87	217 385	Roller	1
88	213 260	Pin 2 x 6	2
89	213 471	Machine s/t screw B 2.9 x 6.5	2
90	227 014	Case, upper part	1
91	227 012	Case, complete	1
92	227 013	Wiring board	1
93	225 321	Glow lamp	1
94	227 015	Case, lower part	1
R 1	225 916	Carbon resistor 22 k Ω /0.25 W/10 %	1
R 2	225 915	Carbon resistor 2.2 k Ω /1.80 W/ 5 %	1

Fig.28 Exploded view, above chassis

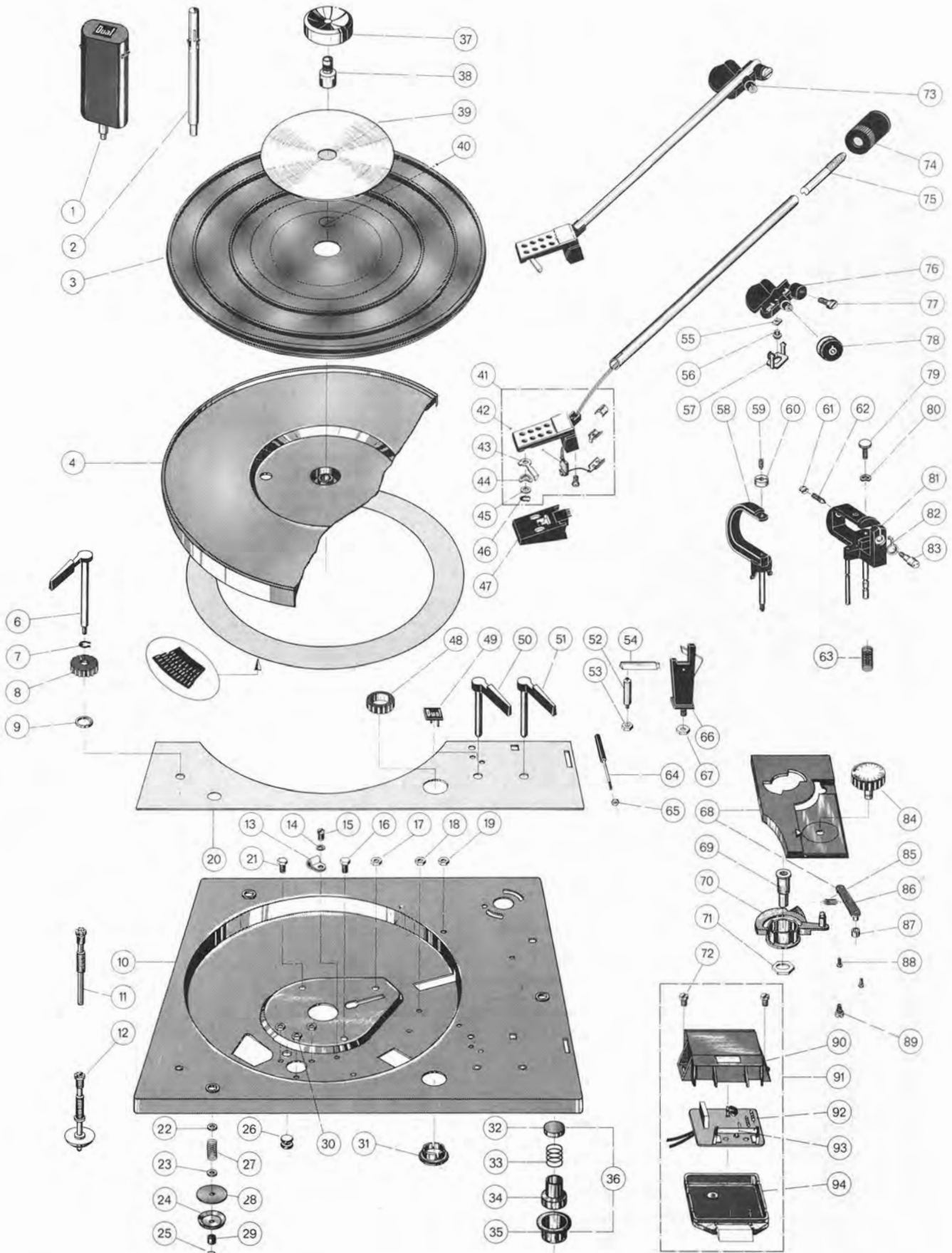
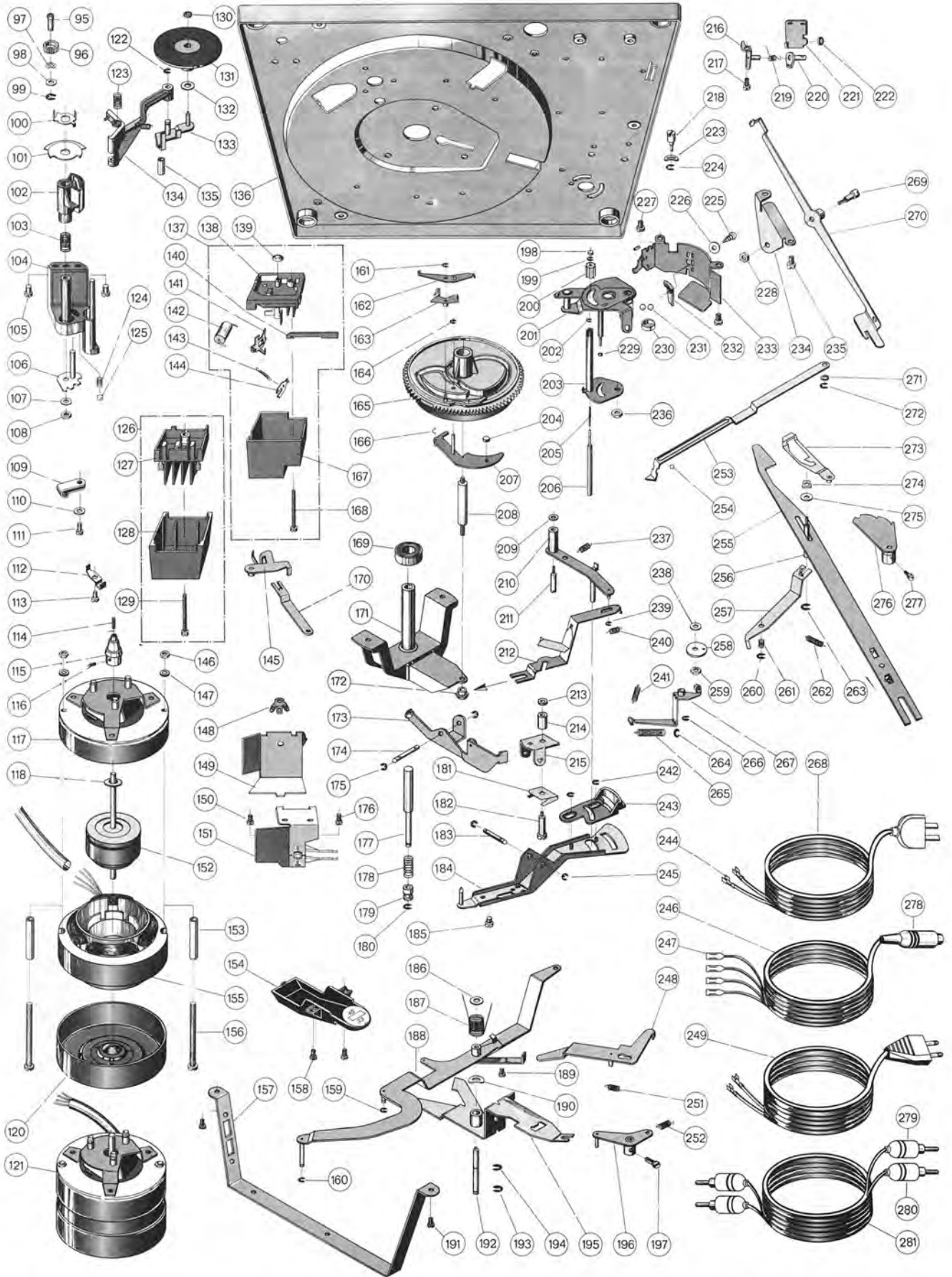


Fig.29 Exploded view, below chassis



No.	Part.No.	Description	Quantity
C 1	225 322	Foil capacitor 68 nF/400 V/10 %	1
D 1	225 247	Silicon diode BY 183/300	1
95	228 111	Adjusting screw	1
96	228 112	Adjusting wheel	1
97	210 182	Lock washer, dished	1
98	228 113	Washer, 4.2/8.1	1
99	210 146	Lock washer, 3.2	4
100	228 116	Regulating plate	1
101	228 110	Speed regulator detent	1
102	228 115	Switching segment	1
103	216 736	Compression spring	1
104	225 193	Support complete	1
105	210 475	Machine screw AM 3 x 5	7
106	216 746	Groove detent complete	1
107	210 642	Washer 4.2/10.0/1.5 St	1
108	210 361	Hex nut M 3	2
109	220 152	Plastic clamp	1
110	210 586	Washer 3.2/7.0/0.5 St	3
111	210 475	Machine screw AM 3 x 5	7
112	200 447	Cable clamp	1
113	210 475	Machine screw AM 3 x 5	7
114	217 751	Threaded pin M 2.6 x 8	1
115	218 275	Motor pulley complete 50 Hz	1
	218 276	Motor pulley complete 60 Hz	1
116	210 220	Threaded pin M 2.6 x 3.5	1
117	216 278	Upper housing complete	1
118	220 806	Washer 4.1/12/0.7 F	1
120	216 276	Lower housing complete	1
121	218 326	Motor complete	1
122	210 146	"C" Washer 3.2	4
123	216 737	Compression spring	1
124	218 629	Compression spring	1
125	209 358	Ball 4 mm Dia.	2
126	233 005	Wiring board complete with cover	1
127	233 007	Wiring board complete	1
128	233 006	Cover for wiring board	1
129	210 501	Screw bolt, M 3 x 35	1
130	200 633	Lock washer	1
131	218 237	Drive pulley	1
132	200 100	Slide washer	1
133	218 700	Swing lever	1
134	217 596	Switch lever, complete	1
135	218 702	Silicon tube	1
136	233 734	Installation plate, complete	1
137	233 008	Mains switch UL Cpl. W. special capacitor	1
138	233 013	Switch plate UL cpl. W. special capacitor	1
139	223 625	Lock washer 3.2	1
140	230 151	Slide	1
141	230 148	Switch angle	1
142	230 355	Capacitor, 68 nF/250 V/20 %	1
143	230 296	Tension spring	1
144	219 200	Spring catch	1
145	232 248	Angle lever	1
146	210 366	Hex nut BM 4	1
147	210 161	Toothed washer, 4.3	2
148	211 614	Solder lug	1
149	216 901	Shield	1
150	210 475	Machine screw AM 3 x 5	7
151	218 242	Muting switch complete	1
152	218 322	Rotor complete	1
153	213 510	Insulating tubing	2
154	227 010	Cover with deviating prism	1
155	218 323	Stator complete	1
156	211 553	Machine screw AM 4 x 48	2
157	217 530	Stand	1
	217 801	Stand complete with phone jacks	1
158	210 469	Machine screw AM 3 x 3	8
159	210 145	"C" Washer 2.3	14
160	210 145	"C" Washer 2.3	14
161	210 142	"C" Washer 1.2	1
162	218 787	Shut-off lever	1
163	216 765	Friction plate	1
164	210 145	"C" Washer 2.3	14
165	218 295	Cam wheel complete	1
166	200 522	Snap spring	1
167	233 011	Cover UL cpl. (for KS 4 w. connection plate)	1
168	210 498	Machine screw M 3 x 28	1

No.	Part.No.	Description	Quantity
169	200 554	Ball bearing, complete	1
170	232 251	Switch rail	1
171	219 096	Bearing support, complete	1
172	218 150	Joining nut	1
173	216 758	Cam rocker	1
174	217 813	Spindle	1
175	210 145	"C" Washer 2.3	14
176	210 475	Machine screw AM 3 x 5	7
177	216 756	Change bolt, complete	1
178	213 920	Compression spring	1
179	213 921	Bushing	1
180	210 145	"C" Washer 2.3	14
181	216 858	Leaf spring	1
182	219 074	Joining screw	1
183	216 864	Shaft	1
184	220 933	Main lever	1
185	210 469	Machine screw AM 3 x 3	8
186	210 586	Washer 3.2/7.0/0.5 St	3
187	216 787	Torsion spring	1
188	218 308	Switch arm, complete	1
189	210 475	Machine screw AM 3 x 5	7
190	210 184	Bowed lock washer	1
191	210 472	Machine screw AM 3 x 4	3
192	216 778	Grooved shaft	1
193	210 147	"C" Washer 4	3
194	210 147	"C" Washer 4	3
195	216 788	Switch lever, complete	1
196	216 773	Start lever, complete	1
197	218 583	Machine screw AM 3 x 4 with ring edge	2
198	216 844	Guide	1
199	210 143	"C" Washer 1.5	2
200	218 318	Positioning sleeve	1
201	218 240	Segment complete	1
202	210 143	"C" washer 1.5	2
203	220 934	Lift plate complete with lifting bolt	1
204	200 650	Rubber sleeve	1
205	216 853	Compression spring	1
206	220 902	Lifting bolt complete	1
207	214 203	Cam follower lever, complete with rubber sleeve	1
208	216 761	Bearing pillar	1
209	210 609	Washer 3.2/10.0/1.0	1
210	219 077	Equalizing arm, complete	1
211	219 073	Shaft	1
212	218 151	Locking slide, complete	1
213	210 586	Washer 3.2/7.0/0.5 St	1
214	221 463	Bushing	1
215	221 462	Connecting lever bracket	1
216	216 875	Connecting lever bracket, complete	1
217	210 469	Machine screw AM 3 x 3	8
218	220 935	Adjusting screw	1
219	220 900	Torsion spring	1
220	220 790	Lift cam	1
221	225 214	Damping plate	1
222	200 650	Rubber sleeve	1
223	210 187	Bowed lock washer	1
224	210 147	"C" Washer 4	3
225	210 286	Sheet-metal screw B 2.9 x 9.5	1
226	210 607	Washer 3.2/10/0.5 St	1
227	210 469	Machine screw AM 3 x 3	8
228	210 362	Hex nut BM 3	5
229	223 777	Guide	1
230	216 845	Rubber washer	1
231	211 718	Ball 3 mm dia.	2
232	218 485	Guide piece	1
233	225 924	Protecting plate, complete	1
	225 210	Compression piece	1
234	216 886	Bearing bracket for linking lever	1
235	210 512	Machine screw AM 4 x 4	1
236	210 366	Hex nut BM 4	7
237	216 777	Tension spring	2
238	216 867	Bowed lock washer	1
239	210 145	"C" Washer 2.3	14
240	218 154	Tension spring	1
241	216 796	Tension spring	2
242	210 145	"C" Washer 2.3	14
243	220 789	Equalizing plate	1
244	214 602	Socket for AMP-plug	4

No.	Part.-No.	Description	Quantity
245	210 145	"C" Washer 2.3	14
246	207 303	Audio cable complete with miniature plug and flat pin sockets	1
247	209 436	Flat pin socket	4
248	216 793	Start bracket, complete	1
249	232 996	Power cord, Europe, complete	1
251	216 796	Tension spring	2
252	216 777	Tension spring	1
253	217 216	Shut-off slide	1
254	209 358	Ball 4 mm dia.	2
255	216 803	Locating slide complete	1
256	219 050	Threaded bolt	1
257	217 547	Rocker	1
258	225 176	Curve washer	1
259	210 361	Hex nut M 3	1
260	210 145	"C" Washer 2.3	14
261	218 834	Compression spring	1
262	200 453	Tension spring	1
263	210 146	"C" Washer 2.3	2
264	201 184	Adjusting washer	1
265	201 183	Tension spring for anti-skating	1
266	210 146	"C" Washer 3.2	2
267	222 692	Skating lever complete	1
268	232 995	Power cord, America, complete	1
269	217 227	Joining screw	1
270	225 212	Linking lever complete	1
271	201 187	Slip washer	1
272	210 145	"C" washer 2.3	14
273	216 791	Pawl complete	1
274	219 049	Square piece	1
275	219 083	Washer 3.2/13/0.5 St	1
276	216 800	Positioning lever, complete	1
277	218 583	Machine screw AM 3 x 4 with set screw	2
278	209 424	Miniature 5-pin audio plug	1
279	209 425	RCA-type plug white	2
280	209 426	RCA-type plug black	2
281	226 817	Audio cable complete with RCA-type plugs	1
**	214 120	Hardware for cartridge mounting	1
**	201 245	Cone for retaining ring mounting	1
**	218 320	Packing carton complete	1
**	231 790	Mounting instructions	1
**	228 114	Adjusting handle	1
**	231 791	Operating instructions, 4-language	1
**	232 424	Operating instructions, UAP	1
**	201 245	Cone for retaining ring (Pos.No. 40) mounting ..	1

** Not illustrated

Subject to alteration

Fig. 30 Lubrication points above the chassis



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 (motor bearings) are provided with oil retainers and sintered bearings.

Lubrication should be applied sparingly. It is of primary importance that no oil or 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.

If lubricants are varied, they may interact chemically and break down. To avoid this risk, we recommend use of the products below for subsequent lubrication:





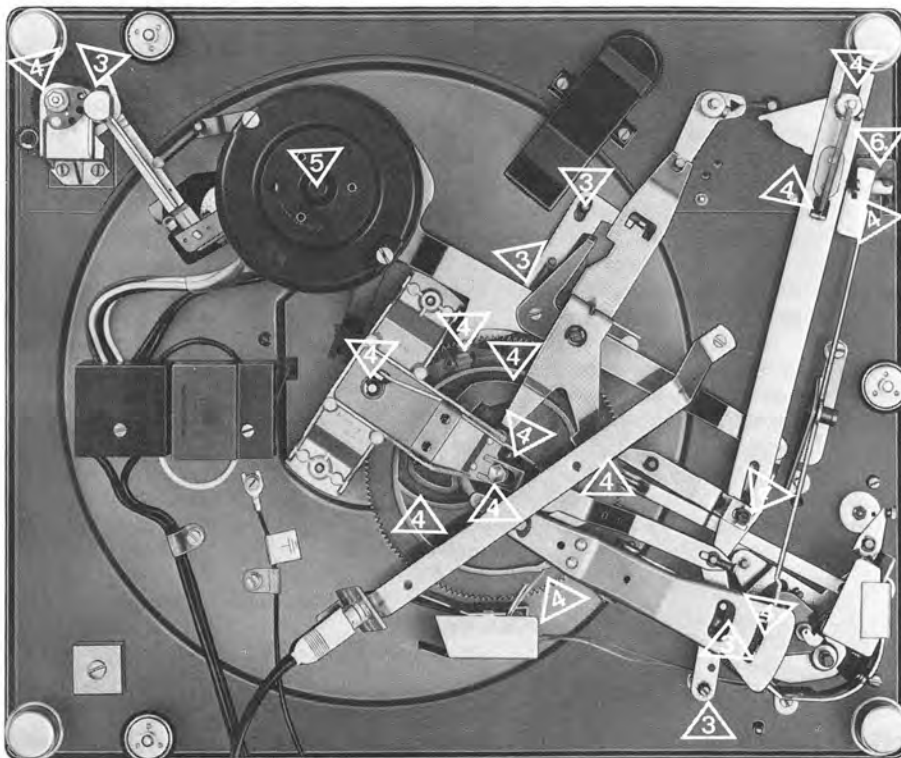
-  High-adhesion oil
Renotac No. 342
-  BP oil Super Vico-
statik 10 W/30
-  Shell Alvania No. 2
-  Isoflex PDP 40
-  Wacker silicone oil
AK 500 000

Fig. 31 Lubrication points below the chassis





Dual

Dual Gebrüder Steidinger · 7742 St. Georgen/Schwarzwald