

**Dual**

Edition February 1978

# 604



## Service - Manual

Dual Gebrüder Steidinger · 7742 St. Georgen/Schwarzwald

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## Technical data

<b>Current</b>	AC 50 to 60 Hz
<b>Line voltage</b>	110 to 125 V, 220 to 240 V
<b>Drive</b>	electronically-regulated direct-drive system, Dual EDS 500
<b>Power input</b>	approximately 2 watts, Motor at playing operation < 50 mW
<b>Power consumption</b>	220 V 50 Hz: at start 25 mA 110 V 60 Hz: at play 15 mA at start 65 mA at play approximately 25 mA
<b>Time from start to rated speed</b>	2 – 2.5 s at 33 1/3 rpm
<b>Platter</b>	non-magnetic, dynamically balanced, detachable 1.3 kg, 300 mm diameter
<b>Platter speeds</b>	33 1/3 and 45 rpm, electronically adjustable
<b>Pitch control</b>	Separate for both speeds, each adjustable by means of variable resistor, with calibration scale; range of regulation: 10 %
<b>Speed control (monitoring)</b>	with illuminated stroboscope for platter speeds 33 1/3 and 45 rpm, adjustable to 50 or 60 Hz.
<b>Sensitivity of the illuminated strobe</b> (for 0.1 % speed deviation)	6 division markings per minute at 50 Hz, 7.2 division markings per minute at 60 Hz.
<b>Total wow and flutter</b>	according to DIN 45 507 (German Industry Standard) < ± 0.06 %
<b>Rumble</b> (according to DIN 45 500)	Unweighted: > 45 dB > 65 dB
<b>Tonearm</b>	Torsionally rigid tubular aluminum tonearm in low-friction four-point gimbal suspension, tonearm counterbalance with two mechanical anti-resonance filters.
<b>Effective length of tonearm</b>	222 mm
<b>Offset angle</b>	25° 20'
<b>Tangential tracking error</b>	0.16°/cm
<b>Tonearm bearing friction</b>	vertical < 0.07 mN (0.007 g) (related to stylus tip) horizontal < 0.16 mN (0.016 g)
<b>Stylus pressure</b>	from 0 to 30 mN (0 to 3 g) infinitely variable with 1 mN- (1/10 g) calibrations
<b>Weight</b>	from 0 to 15 mN (0 to 1.5 g), operable from 2.5 mN (0.25 g) stylus pressure up. 4.6 kg

Dimensions and Cutout Required refer to Installation Instructions.



Fig. 2 TA-Anschlußschema / Audio Connection Diagram / Schema de branchement / Esquema de conexi6n del fono captor

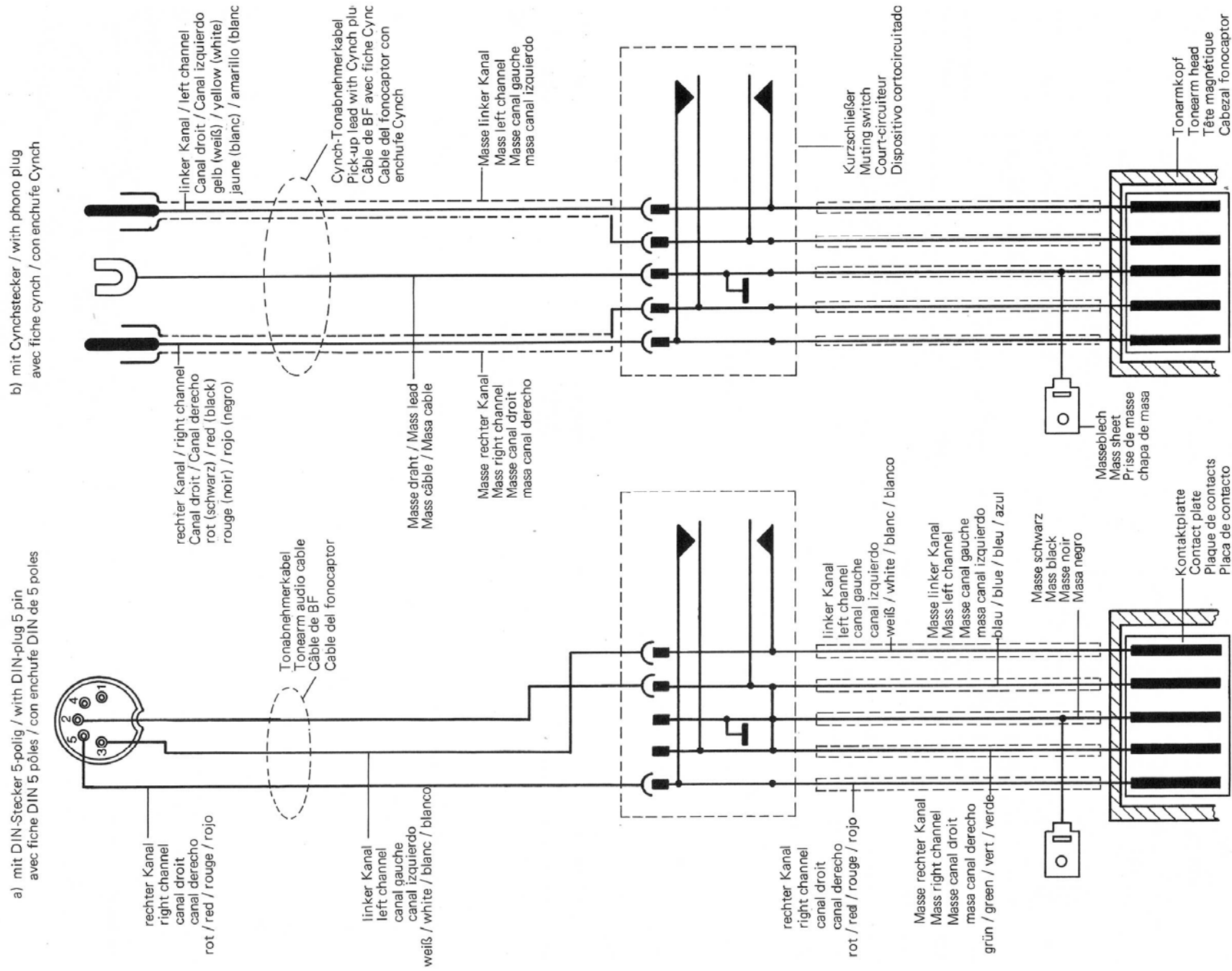
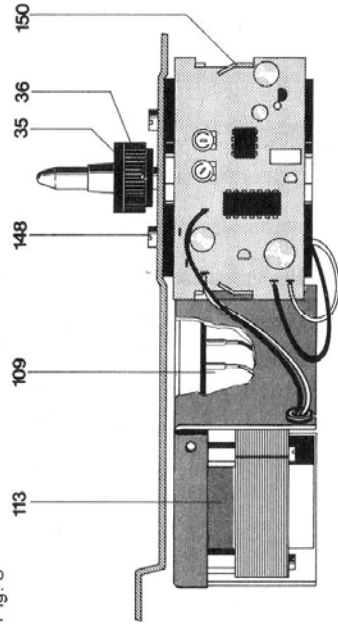


Fig. 3



## Direct Drive System Dual EDS 500

For repair of the Dual EDS 500 special tools and measuring means are required. Work on the motor or motor electronics system should, therefore, only be carried out by an authorized Dual service station.

### Removal

1. Extract unit plug from power line. Lift off platter (4). Bring unit into head position.
2. Remove machine screws (112) and cover of power part (113).
3. Unsolder connecting leads to motor and generator. Open twists of holding angle (150) with pliers. Remove motor electronics (152), screws (151) and holding angle (150).
4. Pull off motor electronics (152) system from motor (18) carefully.
5. Fix replacement motor electronics.
6. Solder connecting cables (see connection diagram Fig. 4).
7. Slide cover over power part and fix it by means of machine screws (112).
8. With the unit in normal position connect it to power line. Switch on unit and check power consumption on operation:

220 V/50 Hz approx. 15 mA  
110 V/60 Hz approx. 25 mA

Check nominal speeds. If necessary, readjust as described below.

### Replacement of Motor Mechanics

1. Extract unit plug from power line. Remove platter (4).
2. With the unit in head position remove machine screws (174) and washers (173). Pull off motor electronics board (172) together with cover (175) carefully from the motor (18).

Fig. 4

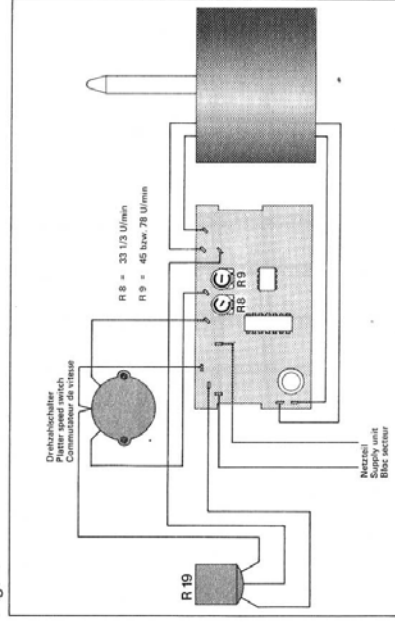
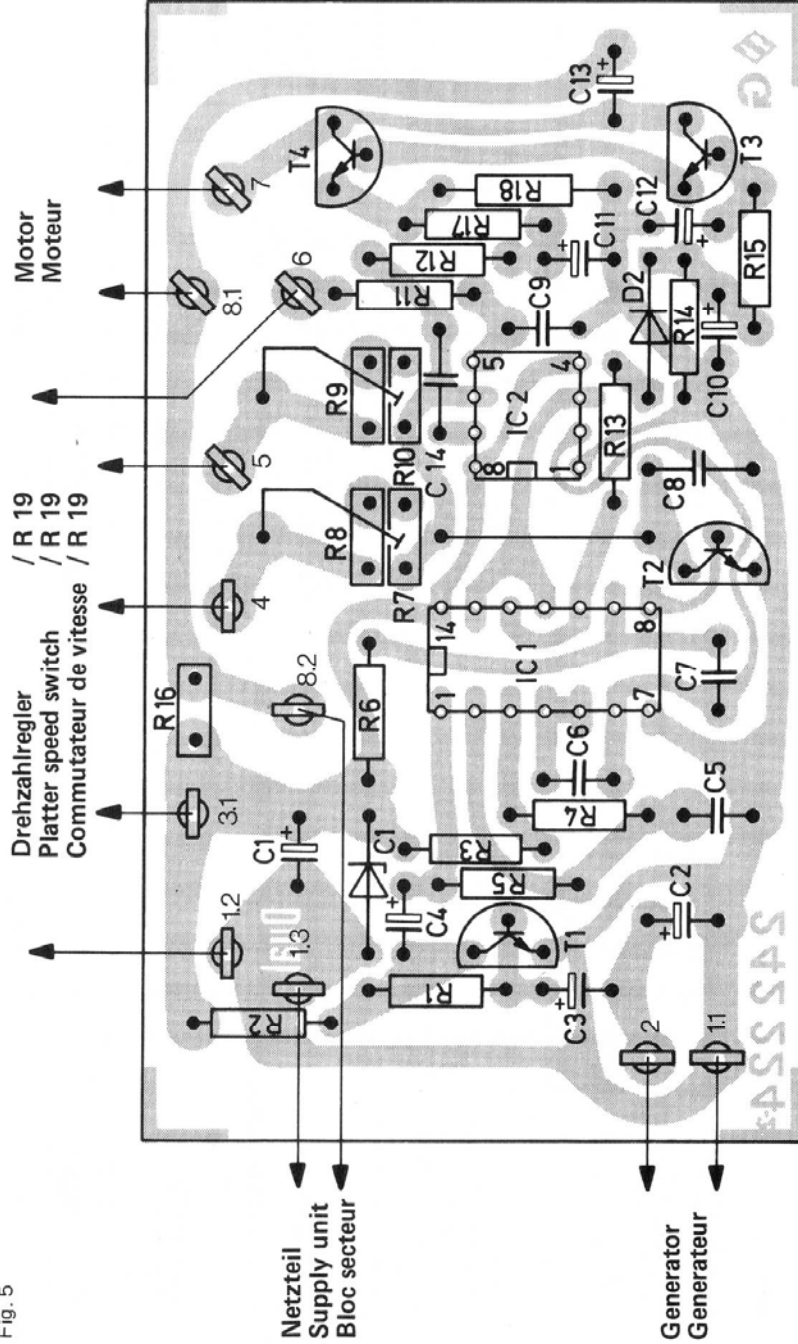


Fig. 5





- Loosen connection for operating voltage at het plate (109). Unsolder connecting leads to speed fine adjustment (129), rotary switch (5) and the generator. Open twists of holding angle (152) with pliers.
- Loosen threaded pins (36) and remove platter cone (35). Remove the three screws (148). Lift off motor mechanics (149).
- Put platter cone (35) on new motor mechanics and fix it. Fix new motor mechanics with the three screws (148). Fix holding angle (150) with screws (151). Insert motor electronics (152) and twist holding pieces.  
Solder on resp. plug connecting leads (Fig. 4).  
Push cover on power part and fix it with screws (112).
- With the unit in normal position connect it to the power line. Switch on unit and check power consumption when operating:

220 V/50 Hz approx. 15 mA  
110 V/60 Hz approx. 25 mA

Check nominal speeds. If necessary, readjust as described below.

#### Setting nominal speeds

With knob (7) bring the fine speed control (129/R 19) into center position. With controls (R 8) and (R 9) on the motor electronic system adjust nominal speeds. Control (R 8) is used for 33 1/3 rpm, R 9 for 45 rpm. Check with strobe disk.

#### Changeover to 78 rpm nominal speed

Instead of 45 rpm the Dual 604 can be changed to a nominal speed of 78 rpm.

To change the speed bring the fine speed control (129/R 19) in center position using knob (7). Using control R 9 on the motor electronics board (172) adjust for 78 rpm. Check with strobe disk.

#### Pitch Control

Each of the two standard speeds 33 1/3 and 45 rpm (78 rpm) can be varied by about 10 %. The variable speed control (129/R 19) located in the voltage divider is adjusted by turning the pitch control knob (7). By this the differential amplifier is altered and the motor speed accordingly.

Fig. 6

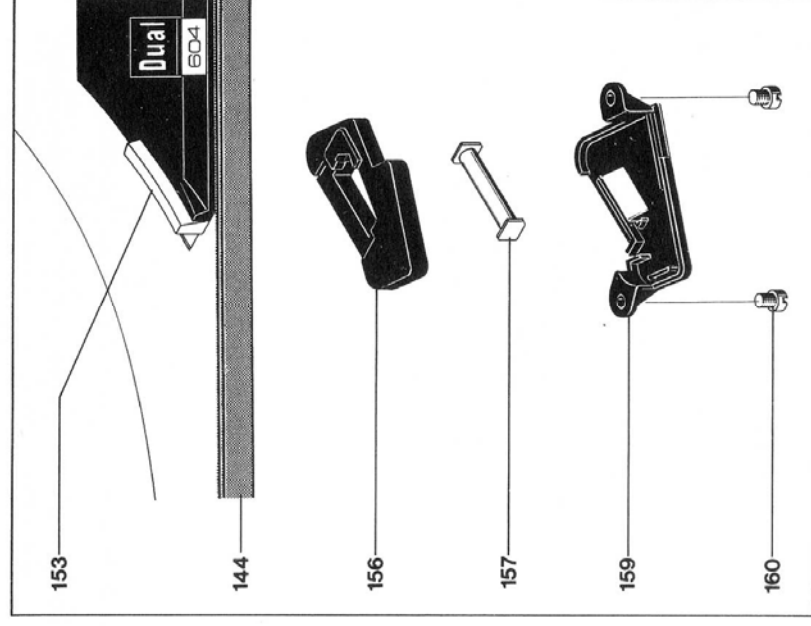
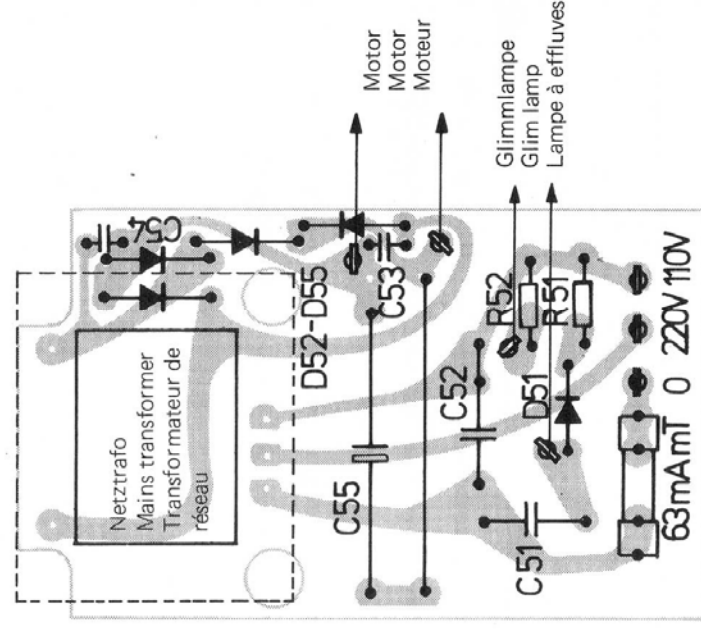


Fig. 7



#### Stroboscope

Accurate setting of the platter speeds 33 1/3 and 45 rpm can be checked during play with the aid of the stroboscope.

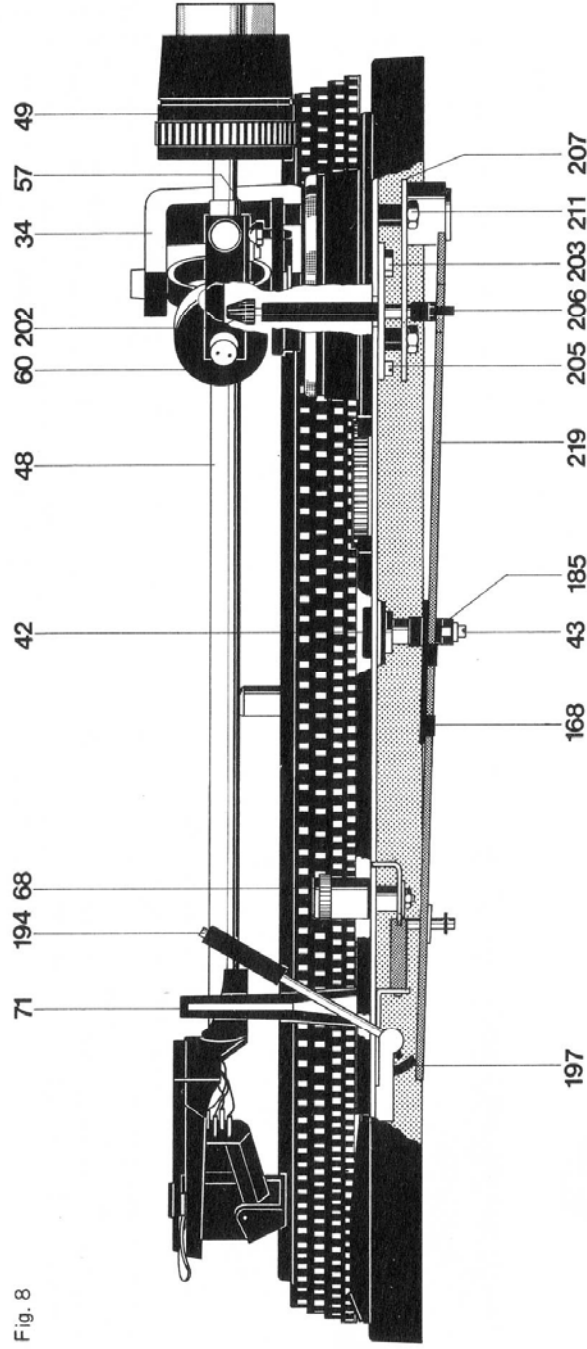
When the platter (4) is rotating at exactly 33 1/3 or 45 rpm the lines of the stroboscope appear to stand still. If the lines move in the direction of rotation of the platter, the platter speed is too high. If the lines move backwards, the platter is rotating more slowly than the nominal speed. Adjustment of platter speeds 33 1/3 and 45 rpm is carried out separately with the "pitch" controls (7).

Strobe markings are provided on the outer edge of the platter for 50 and 60 Hz line frequencies.

To replace glow lamp (157) remove machine screws (160) and remove strobe cover (156).

It can happen that the stroboscope lines appear to move slightly although the exact speed setting with stroboscope stationary has not been altered. This apparent contradiction is explained by the fact that the electronic central drive motor operates fully independently of line frequency whilst the only relatively accurate line frequency of the AC current supply is used for speed measurement with the light stroboscope. The constantly detectable fluctuations of line frequency by  $\pm 2\%$  according to the information of the electricity supply companies brief frequency fluctuations up to 1% are possible — only effect the stroboscope indication and can cause the lines to "wander" although the platter speed is as constant and absolutely accurate as before.

Fig. 8



### Tonearm and Tonearm Suspension

The feather-light, extremely torsion resistant all-metal tonearm 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 0.07 mN (0.007 p)

Bearing friction horizontal 0.16 mN (0.016 p)

as related to stylus point.

As a result, it ensures most favourable pick-up conditions. Before adjusting the tracking force to suit the built-in pick-up cartridge the tonearm is balanced with the scale set to zero. Coarse adjustment is carried out by moving the weight with the stem (49), the subsequent fine adjustment by turning the weight. The balance weight is designed such that pick-up cartridges having a dead-weight of 4.5 – 10 g can be balanced.

The tracking force is adjusted by turning the graduated spring housing (60) incorporating a coil spring. The scale has markings for a range of adjustment from 0 to 30 mN (0 to 3 p) which permit accurate adjustment of the tracking force. One graduation in the range of 2 – 15 mN (0.2 – 1.5 p) corresponds to 1 mN (0.1 p), in the range of 15 – 30 mN (1.5 – 3 p) to 2.5 mN (0.25 p).

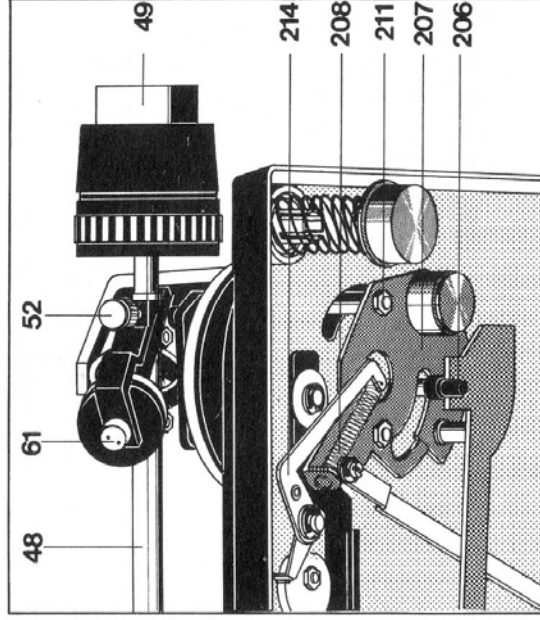
### Removing the tonearm from the bearing frame

We recommend the following procedure:

1. Clamp unit in the repair stand. Set spring housing scale (60) to zero. Lock tonearm (48). Remove weight (49).
2. Turn unit over and remove the screening sheet (140). Unsolder the tonearm connections on the muting switch (137).
3. Remove safety washer (187), washer (186) and bearing (185). Move positioning bar (219) towards muting switch (137).
4. Unlock tension spring (208), loosen safety washer (215) and remove skating lever (214).
5. Remove safety washer (212) and sliding washer (210) and take shut-off bar (161) from segment.
6. Remove hex nuts (210) and segment (207).
7. Hold tonearm (48). Remove hex nut (203) and tonearm cpl. with tonearm bearing.

Reverse this procedure when reassembling.

Fig. 9



### Removal of tonearm assembly with tonearm bearing

1. Secure unit in repair jig. Remove weight (49) and undo fixing screw (52). Set tracking force scale (60) to zero.
2. Move unit into head position. Remove screening plate (140). Unsolder tonearm connecting on muting switch (137).
3. Move unit into normal position. Remove both mounting screws – SW 4.5 (54).  
For installation proceed in the reverse order.

### Replacing spring housing

Remove tonearm (48) from bearing frame (51) as described above. Loosen lock nut (55) and threaded pin (56). Unscrew bearing screw (61). Lift bearing frame (59). Remove spring housing (60). When installing note that the helical spring catches the bearing frame. Slide in washer (60) and tighten bearing screw (61). Reinstall tonearm (48). Set bearing play as described below using threaded pin (56) and lock nut (55).

### Adjusting the tonearm bearing

First balance tonearm exactly. Both bearings must have slight, just perceptible play. The horizontal tonearm bearing is correctly adjusted when at anti-skating settings "0.5" and being touched it slides in without resistance. The vertical tonearm bearing is correctly adjusted when it swings in after being touched. The play of the horizontal tonearm bearing should be adjusted with threaded pin (33) and mat of the vertical tonearm bearing with threaded pin (56).

### Anti-skating Device

To compensate for skating force use the knurled ring (66). The asymmetric cam plate (217) displaces the skating lever (214) from the tonearm pivoting point. The anti-skating force is transmitted to the segment (207) and to the tonearm (48) by tension spring (209).

Optimum adjustment is carried out at the works for styli having a tip radius of  $15\ \mu\text{m}$  (conical),  $5/6$  and  $18/22\ \mu\text{m}$  (elliptical), and CD 4-cartridges.

Any alteration can only be carried out with the aid of a Dual-Skate-0-Meter and a test record and should only be done by an authorized service station.

Recheck as follows:

Balance tonearm (48) correctly. Set knurled ring (66) to 0. The tonearm should remain at any desired point within its turning range. The hole of the skating lever (214) should be in alignment with the center line of the tonearm. Adjustment is made by the eccentric pulley (E) which is accessible through the hole in the installation plate (23) between the knurled ring (68) and the tonearm.

Then set knurled ring (66) to "0.5". The tonearm should now smoothly rotate from the platter center to its rest (71).

### Cue Control

By moving the lever (194) forward (▲) lift cam (197) rotates. The slide bar (219) connected to it transmits this movement to the lift pin (206) (via the compensating cam which then raises the tonearm. As a result, the cue control permits setdown of the tonearm at any desired point.

The lever (194) is released by moving the cue control lever rearwards (▼). As a result of the action of compression spring (204) the lift pin (201) is brought back to its normal position and the tonearm lowered slowly. Lowering of the tonearm is damped by silicone oil in the lift tube.

### Adjustment Point

The lift height may be varied by turning the sleeve (202). The distance between the record and the needle is to be 5 - 7 mm with the tonearm (48) having a height play of 1 - 2 mm. Make adjustment by means of set screw (57).

### Replacement of Cue Control Plate

Replace cue control plate (201) as follows:

1. Clamp unit in the repair stand and lock tonearm. Turn unit over.
2. Remove safety washer (187), washer (186) and bearing (185). Lift positioning bar (219) and move towards muting switch (137).
3. Unlock tension spring (208). Loosen safety washer (215) and lift skating lever (214). Remove safety washer (213) and sliding bar (212). Lift shut-off bar (161) from segment (207).
4. Remove hex nuts (211) and segment (207).

Fig. 10

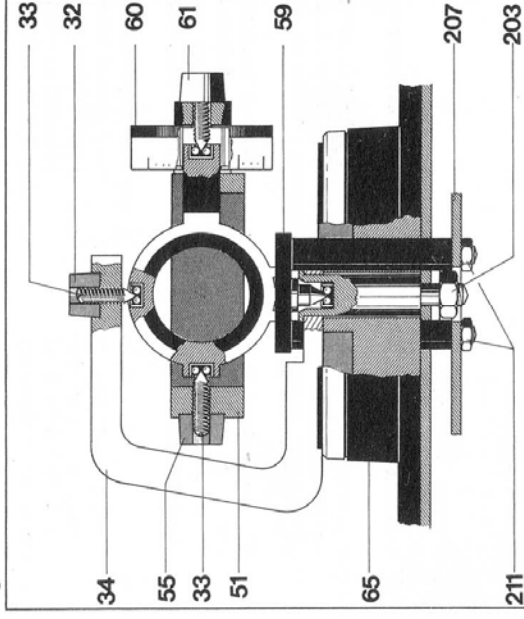


Fig. 11

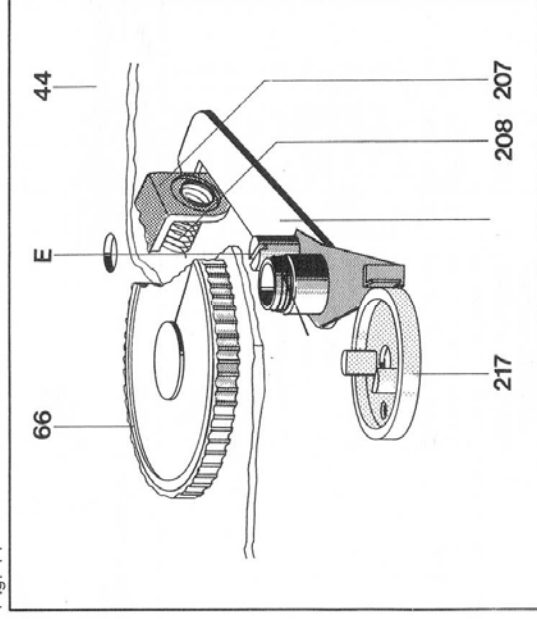
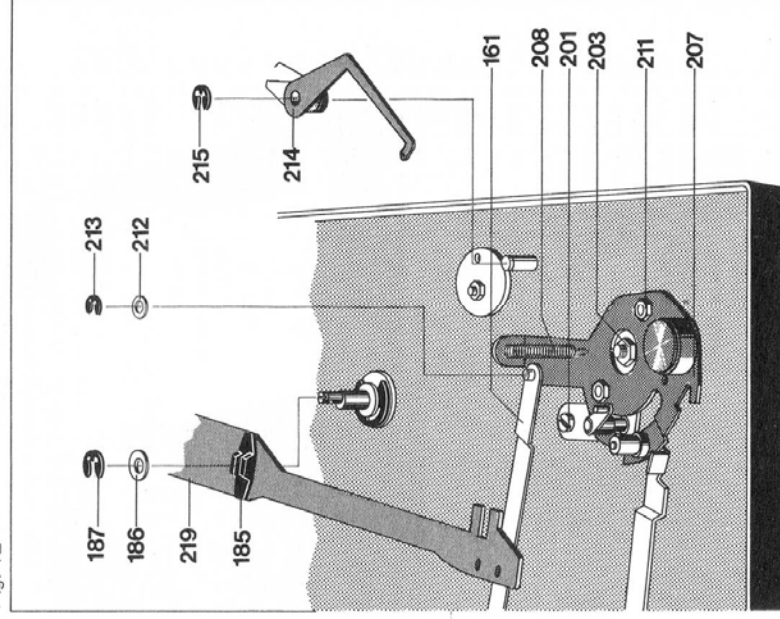


Fig. 12





5. Remove machine screws (205). Hold tonearm bearing. Unscrew hex nut (203) and remove lift plate (201).
6. Secure tonearm with hex nut (203) against falling out. Reverse this procedure when reassembling.

### Tonearm set-down mechanism

When turning knob (68) to "V" position the recesses of slide bar (219) are positioned in the area of the spring pin (F) of segment (207).

When moving slowly the tonearm with tonearm cue control in  $\nabla$  position the spring pin (F) is arrested in the recesses of slide bar (217) thus designing the set-down point of stylus for 30 cm and 17 cm records.

To enable set-down in the catching range of the arresting point of the appropriate setdown position, the tonearm set-down mechanism can be disengaged with the knob (68) in "—" position.

### Adjustment Points

- a) Balance tonearm (48) exactly. Bring knob (68) into " " position. Let tonearm catch in catch point for tonearm set-down point. Check catch force by means of a spring balance. It should read 10 – 20 p. The force is adjustable by means of a threaded pin.
- b) The tonearm set-down point can be adjusted by turning set screw (42). Adjustment can be made for 17-cm- and 30-cm records.

### Short Circuiter

To prevent disturbing noises during automatic operation of the tonearm the unit is fitted with a short circuiter. Control of the switch springs for both channels is effected by the camwheel. With the unit in neutral state the short circuit of the pick-up leads is eliminated.

### Adjustment

In zero position of the cam there should be a clearance of approximately 0.5 mm between the contacts of the short circuiter. This clearance should be adjusted by bending the short circuit contact. The contacts should be sprayed with a suitable cleaning agent.

### Starting and shut off

Swinging in the tonearm (48) rotates the segment (207) thus actuating the power switch (116) and shift arm (146) and starting motor (149) and platter (4) rotating.

The shut-off cycle after playing a record is initiated by the dog (M) of the platter (4) and shut-off lever (A).

The shut-off lever (A) is guided onto the dog by the movement of the tonearm when playing the record with the aid of the shut-off bar (161) proportionate to the groove lead (Fig. 13 a). The eccentrically-mounted dog forces the shut-off lever (A) back with each revolution as long as the advance of the tonearm only amounts to the width of one groove.

The cam wheel (37) is thus guided to the pinion range of the platter. The tonearm is lifted and the resetting bar (188) transports it back to the rest. The power switch is operated, thus switching the unit off.

Fig. 13

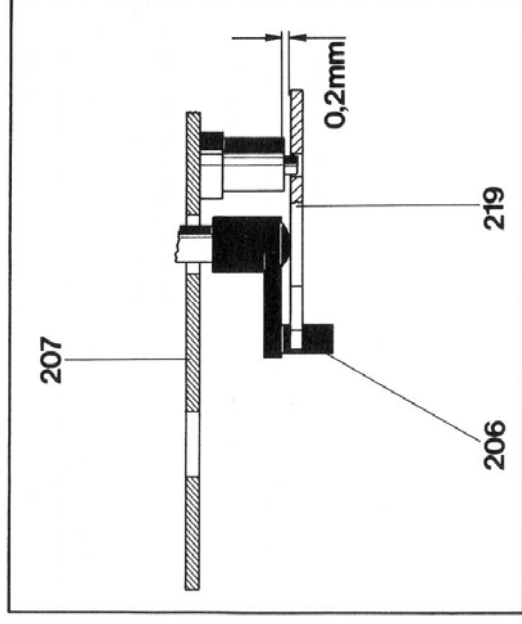


Fig. 14

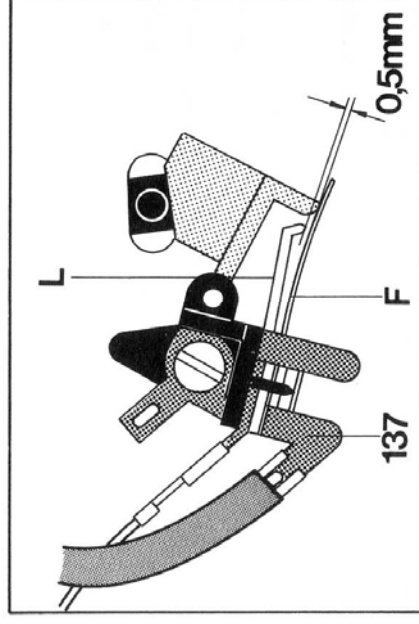
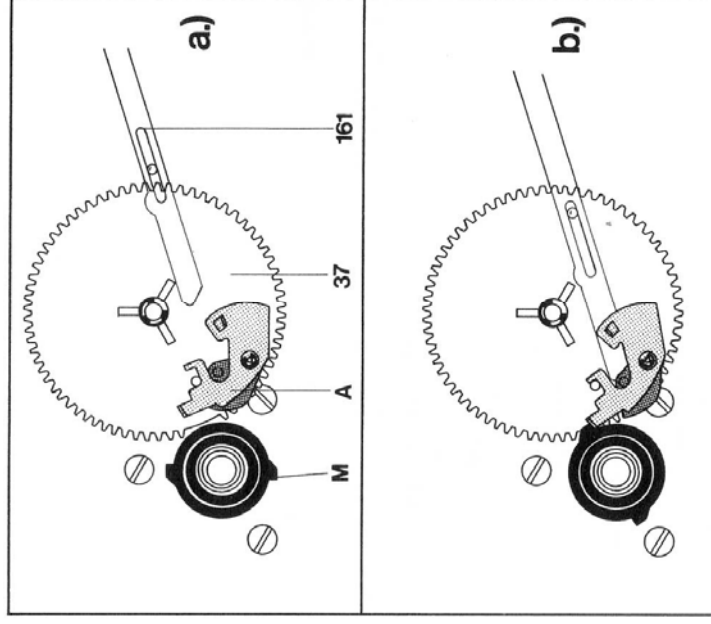


Fig. 15



## Adjustment Points

### 1. Segment

- a) When fixing the segment (207) move surt here is a play between the segment (207) and the switch lever (144) of 0.5 mm
- b) The shut-off point may be varied with the eccentric (E) mounted on the segment (Fig. 16).

### 2. Power Switch

- Swing in tonearm (48) slide (117) of power switch (116) should have a play of 0,2 – 0,5 mm. Make adjustments by bending the switch lever (144).

### Defect

Tonearm head not parallel to platter.

### Cause

Seat of tonearm head on the tonearm tube has changed during transit.

### Remedy

Remove platter. Insert screwdriver through the hole in the chassis mounting plate and loosen screw at tonearm head. Align tonearm head and retighten screw (Fig. 18).

Fig. 16

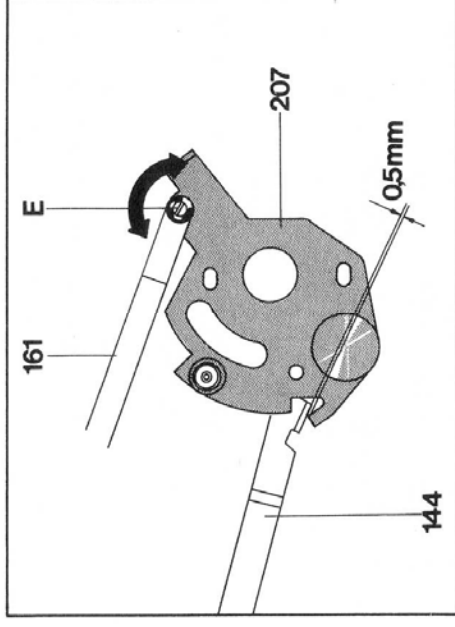


Fig. 17

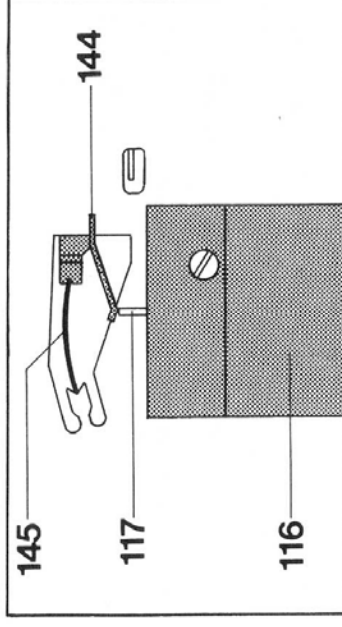
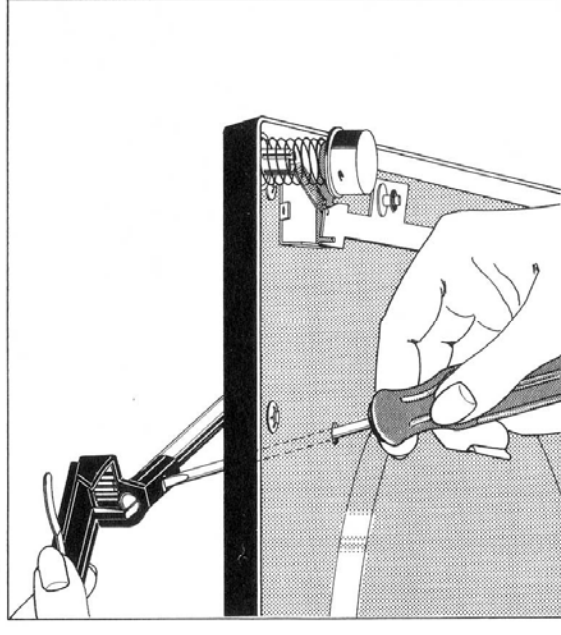


Fig. 18



### 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
- f) Steel ball (162) or shut-off bar (161) missing

### Remedy

- a) Balance tonearm
- b) Adjust tracking force to the value stated by the cartridge manufacturer
- c) Correct anti-skating setting
- d) Renew stylus
- e) Check tonearm bearings and readjust if necessary
- f) Renew steel ball (136)

**Defect**

Tonearm does not set down on record or lowers too quickly when operating the cue control lever (197).

With tracking force and anti-skating in 0 position tonearm moves outwards or inwards.

Motor does not switch off when tonearm sets down on rest.

Acoustic feedback

**Cause**

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

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

Capacitor type suppressor (110) in power switch is defective (short-circuit).

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

**Remedy**

Referring to page remove cue control plate (201). Remove adjustment bush sleeve (202). Remove lift pin (204) and compression spring (203). Clean lift tube and lift pin. Smear lift pin evenly with "Wacker Silicone Oil AK 300 000". Reassemble components.

- a) Readjust anti-skating device as described on pages 11/12
- b) Slacken leads

Replace capacitor type suppressor in power switch.

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

**Replacement part**

Pos.	Part.No.	Qty.	Description
1	220 213	1	Centering disc
2	214 054	1	Washer
3	244 460	1	Platter sandwich compl.
4	244 461	1	Platter compl. with mat
5	238 034	1	Rotary switch compl.
6	242 184	1	Rotary knob
7	242 189	1	Rotary knob
8	242 181	3	Threaded pin M 3 x 3
9	244 462	1	Pitch cover
10	200 444	3	Spring washer
11	239 414	3	Shipping screw compl.
17	232 975	3	Spring mount compl.
	237 228	1	(Transformer side/Tonearm side back)
			Spring mount compl.
			(Tonearm side front)
18	230 529	4	Threaded piece
19	230 523	3	Compression spring
			(Transformer/Tonearm side back)
			Compression spring (Tonearm side front)
20	236 712	1	Rubber damping
21	200 723	4	Steel cup
25	244 463	1	Tonearm head compl.
26	237 223	1	Contact plate compl.
27	234 611	1	Handle
28	210 182	1	Lock washer
29	210 630	1	Washer
30	210 197	1	"C" clip
31	236 242	1	Holder
32	234 635	2	Lock nut
33	230 063	1	Threaded pin
34	237 230	1	Frame compl.
35	242 192	1	Platter cone compl.
36	242 191	3	Threaded pin
37	244 464	1	Cam wheel cpl.
38	210 146	4	Lock washer
39	242 143	1	Tension spring
40	210 145	5	Lock washer
41	242 141	1	Contact lever
42	234 781	1	Adjustment screw
43	234 818	1	Pin screw
44	244 465	1	Mounting plate
48	244 466	1	Tonearm compl.
49	244 467	1	Weight compl.
50	239 741	1	Pointer
51	244 468	1	Bearing frame compl.
52	236 051	1	Clamp screw
53	244 244	2	Washer
54	244 103	2	Hexagon sheet screw
			3.5/6/1.5
			2.9 x 6.5

Pos.	Part.No.	Qty.	Description
55	234 635	2	Stop nut
56	234 634	1	Threaded pin
57	242 131	1	Adjustment screw
59	237 234	1	Bearing compl.
60	236 907	1	Spring housing compl.
61	234 637	1	Bearing screw
65	244 470	1	Cover back compl.
66	236 081	1	Ring
67	200 444	2	Spring washer
68	240 151	1	Rotary knob
69	244 471	1	Cover front compl.
70	200 444	3	Spring washer
71	244 472	1	Support compl.
72	210 362	1	Hex nut
101	210 517	2	Machine screw
102	210 648	2	Washer
103	242 283	2	Bushing
104	209 939	2	Sleeve
105	210 480	4	Machine screw
106	237 548	2	Sleeving with strain relief
107	228 209	1	Sleeve
108	242 284	1	Insulating plate
109	244 473	1	Power plate compl.
110	242 478	1	Fuse
C	51 225 322	1	Foil
C	52 224 886	1	Paper
C	53 222 760	2	Ceramic
C	54 222 760	2	Ceramic
C	55 226 686	1	Elyt
D	51 225 247	1	BY 183/300
D	52 227 344	4	1 N 4001
D	53 227 344	4	1 N 4001
D	54 227 344	4	1 N 4001
D	55 227 344	4	1 N 4001
R	51 232 402	1	Carbon
R	52 232 401	1	Carbon
			22 kΩ / 0.25 W / 5 %
			12 kΩ / 0.125 W / 5 %
111	244 474	1	Power transformer compl.
112	210 283	2	Fillister sheet screw
113	244 475	1	Power part compl.
116	242 581	1	Power switch compl.
117	236 335	1	Slide
118	200 444	1	Spring washer
119	233 012	1	Switch plate compl.
120	219 200	1	Snab spring
121	239 732	1	Tension spring
122	230 148	1	Switch angle

Fig. 19 Exploded view 1

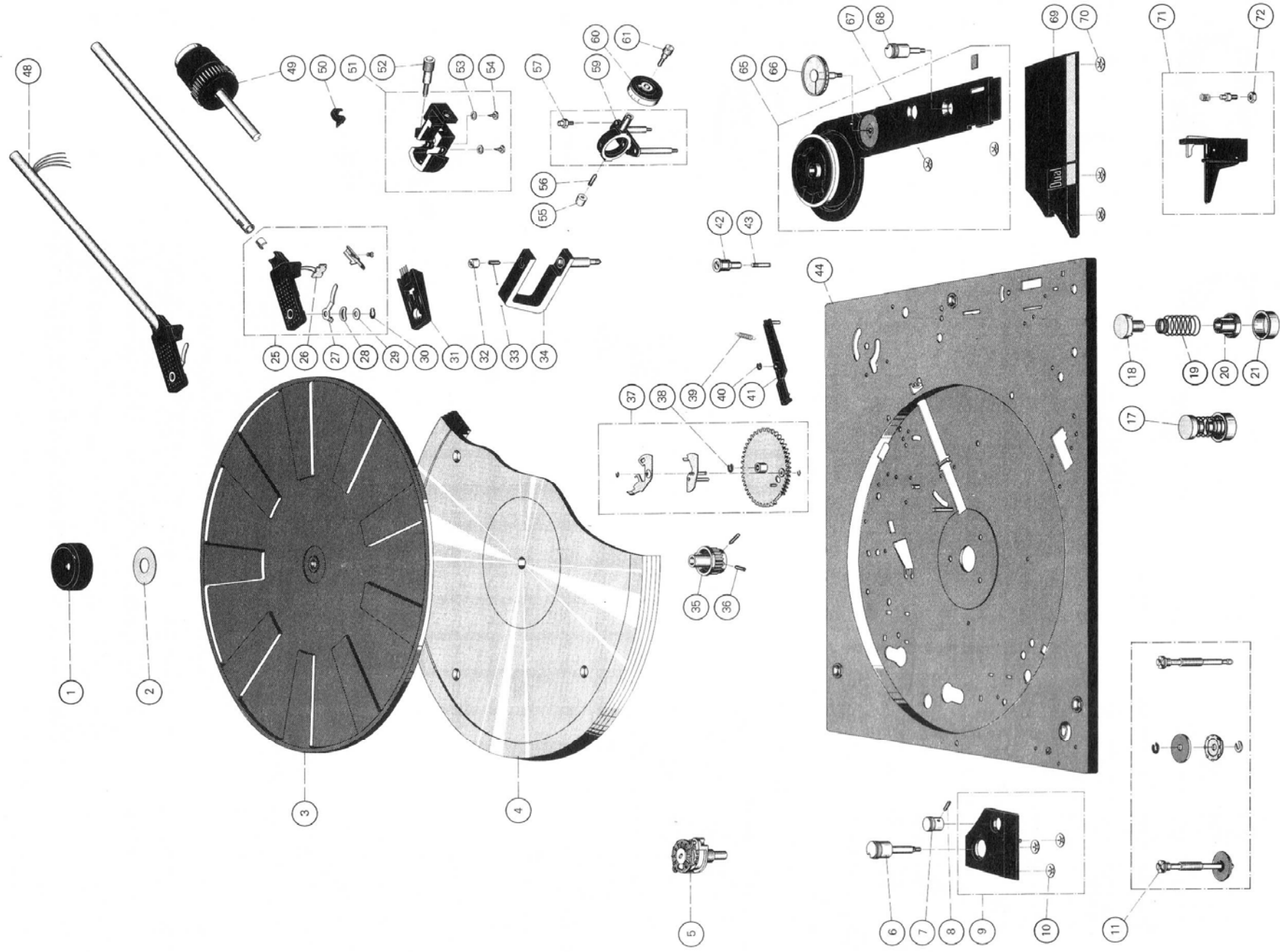
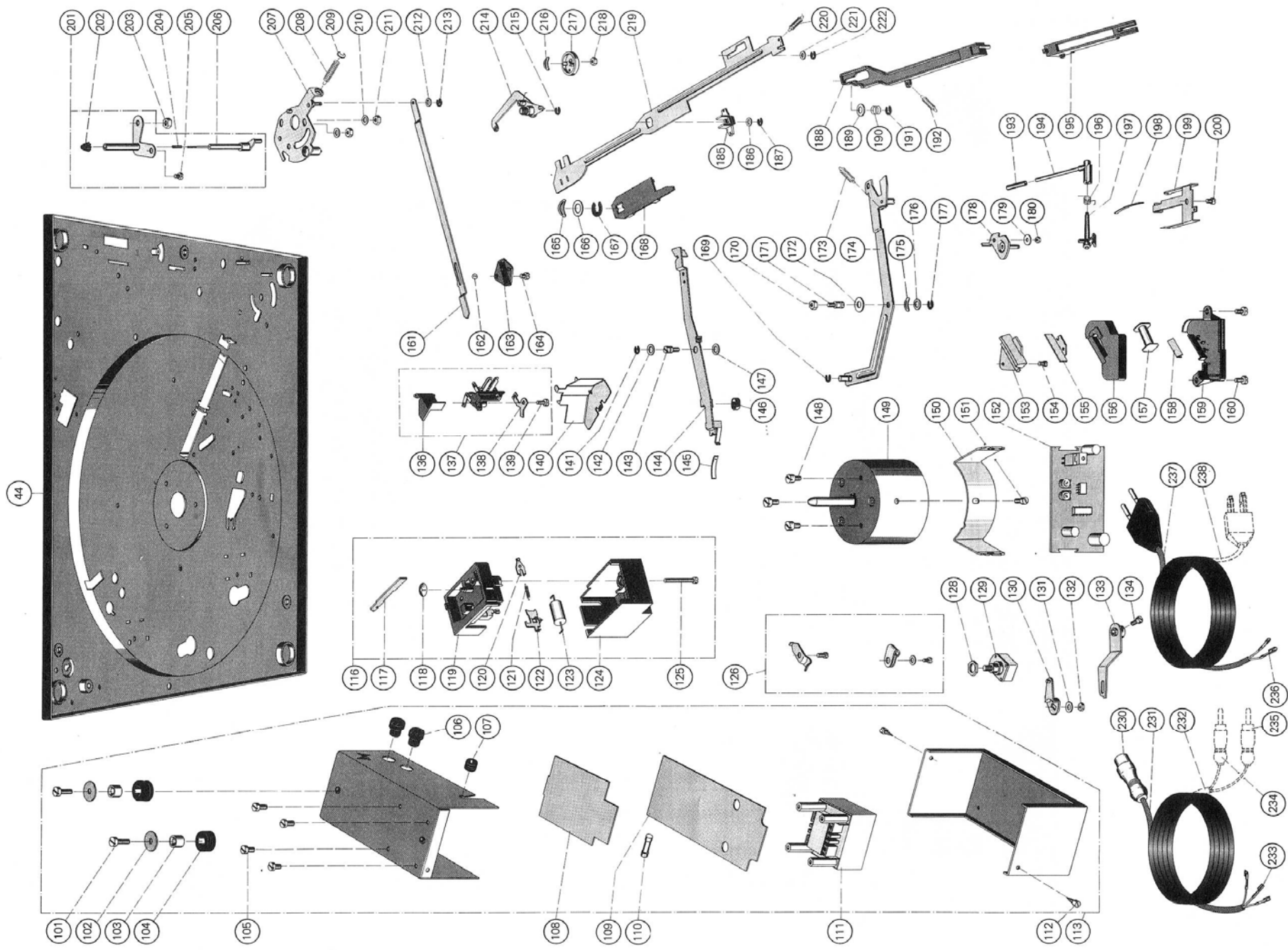


Fig. 20 Exploded view 2





Pos.	Part.No.	Qty.	Description
123	241 883	1	Capacitor
124	242 102	1	Cap
125	210 498	1	Machine screw
126	231 079	1	Cable holder compl.
128	237 782	1	Nut for potentiometer
129	238 073	1	Fine speed control (R)
130	242 195	1	Switch unit
131	210 587	1	Washer
132	210 362	1	Hex nut
133	242 187	1	Switch member
134	210 469	1	Machine screw
136	242 182	1	Contact arm
137	242 612	1	Short circuiter compl.
138	239 806	1	Base sheet
139	210 486	1	Machine screw
140	239 808	1	Screening sheet
141	210 146	1	Lock washer
142	210 630	1	Washer
143	234 759	1	Screw pin
144	242 142	1	Switch lever
145	242 144	1	Spring
146	242 145	1	Silicone tubing
147	210 630	1	Washer
148	210 511	3	Machine screw
149	244 476	1	Motor mechanics compl.
150	242 233	1	Stop angle
151	210 511	1	Machine screw
152	244 477	1	Motor electronics compl.
153	242 160	1	Stroboscope trimplate
154	210 469	1	Machine screw
155	242 158	1	Angle reflector
156	237 677	1	Bottom part of housing
157	225 321	1	Lamp
158	242 201	1	Angle reflector
159	237 679	1	Stroboscope cover
160	210 472	2	Machine screw
161	242 179	1	Stop lever
162	209 357	1	Ball
163	232 104	1	Ball bed
164	210 472	1	Machine screw
165	234 782	1	Lock washer
166	210 713	1	Washer
167	210 151	1	Lock washer
168	242 180	1	Plate
169	210 145	1	Lock washer
170	210 366	1	Hex nut
171	242 175	1	Screw pin
172	210 607	1	Washer
173	233 710	1	Tension spring
174	242 171	1	Lever
175	210 182	1	Lock washer
176	210 630	1	Washer
177	210 146	4	Lock washer
178	242 164	1	Rotary lever
179	203 477	1	Washer
180	210 353	1	Hex nut
185	234 784	1	Bearing
186	210 586	1	Washer
187	210 145	5	Lock washer
188	242 165	1	Rail
189	242 166	1	Washer
190	243 001	1	Compression spring
191	210 145	5	Lock washer
192	242 167	1	Tension spring
193	237 543	1	Rubber sleeve
194	239 547	1	Handle
195	242 161	1	Lift rail
196	234 778	1	Spring
197	234 777	1	Shift curve
198	232 545	1	Spring
199	234 776	1	Bearing lever
200	210 469	1	Machine screw
201	244 482	1	Lift plate compl.
202	243 125	1	Adjustment bush
203	210 366	1	Hex nut

Pos.	Part.No.	Qty.	Description
204	234 798	1	Compression spring
205	210 469	1	Machine screw
206	234 795	1	Lift pin
207	244 481	1	Segment compl.
208	218 591	1	Tension spring
209	201 184	1	Adjustment washer
210	210 587	2	Washer
211	210 362	2	Hex nut
212	201 187	1	Washer
213	210 145	5	Lock washer
214	238 192	1	Skating lever compl.
215	210 146	4	Lock washer
216	216 867	1	Lock washer
217	225 176	1	Curve washer
218	210 362	1	Hex nut
219	242 181	1	Adjustment lever
220	235 152	1	Tension spring
221	210 607	1	Washer
222	210 145	5	Lock washer
230	209 424	1	Spoile plug
231	207 303	1	Pick-up-cable compl.
232	207 301	1	Pick-up-cable compl.
233	209 436	3	Falt connector sleeve
234	209 425	1	Cynch plug white
235	209 426	1	Cynch plug black
236	214 602	2	AMP connector sleeve
237	232 996	1	Power cable europe compl.
238	232 995	1	Power cable america compl.
214 120		1	Distance roll and screws for pick-up mounting
244 347		1	Mounting instructions
242 713		1	Operating instructions
242 694		1	Operating instructions UAP
242 718		1	Shipping carton
<b>Motor electronic</b>			
1	220 766	4	Elyt 47 $\mu$ F/ 25 V
2	224 597	1	Elyt 220 $\mu$ F/ 6 V
3	216 410	3	Elyt 470 nF/ 35 V/10 %
4	216 410	3	Elyt 470 nF/ 35 V/10 %
5	227 963	2	Ceramic 10 nF/ 30 V/20 %
6	227 390	2	Ceramic 1 nF/ 63 V/20 %
7	227 390	2	Ceramic 1 nF/ 63 V/20 %
8	222 499	1	Foil 0,22 $\mu$ F/100 V/ 5 %
9	222 760	1	Ceramic 20 nF/ 50 V
10	216 410	3	Elyt 470 nF/ 35 V/10 %
11	235 573	1	Elyt 10 $\mu$ F/ 16 V
12	242 314	1	Elyt 0,68 $\mu$ F/ 35 V
13	220 766	4	Elyt 47 $\mu$ F/ 25 V
14	226 459	1	Foil 0,1 $\mu$ F/100 V/ 5 %
1	227 360	1	ZPD 7,5
2	223 906	1	1 N 4148
1	224 603	3	1 M $\Omega$ /0,25 W/5 %
2	211 202	4	10 k $\Omega$ /0,25 W/5 %
3	224 735	1	68 k $\Omega$ /0,25 W/5 %
4	239 387	1	22 k $\Omega$ /0,25 W/5 %
5	224 603	3	1 M $\Omega$ /0,25 W/5 %
6	241 342	1	82 k $\Omega$ /0,25 W/5 %
7	242 307	1	47 k $\Omega$
8	243 616	1	10 k $\Omega$ / lin.
9	243 617	1	22 k $\Omega$ / lin.
10	245 531	1	24 k $\Omega$
11	227 384	1	110 k $\Omega$ /0,125 W/5 %
12	228 265	1	270 k $\Omega$ /0,25 W/5 %
13	239 395	1	15 k $\Omega$ /0,25 W/5 %
14	224 590	1	220 k $\Omega$ /0,25 W/5 %
15	211 202	4	10 k $\Omega$ /0,25 W/5 %
16	217 868	1	560 $\Omega$ /0,3 W/5 %
17	239 367	1	47 k $\Omega$ /0,25 W/5 %
18	242 311	1	2 $\Omega$ /25 W/5 %
1	229 511	2	BC 172 B
2	229 511	2	BC 172 B
3	244 715	1	BC 238 C
4	242 306	1	BD 415
1	242 303	1	NS 4069
2	242 304	1	NS 555

Alterations reserved!

## Lubrication

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

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

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

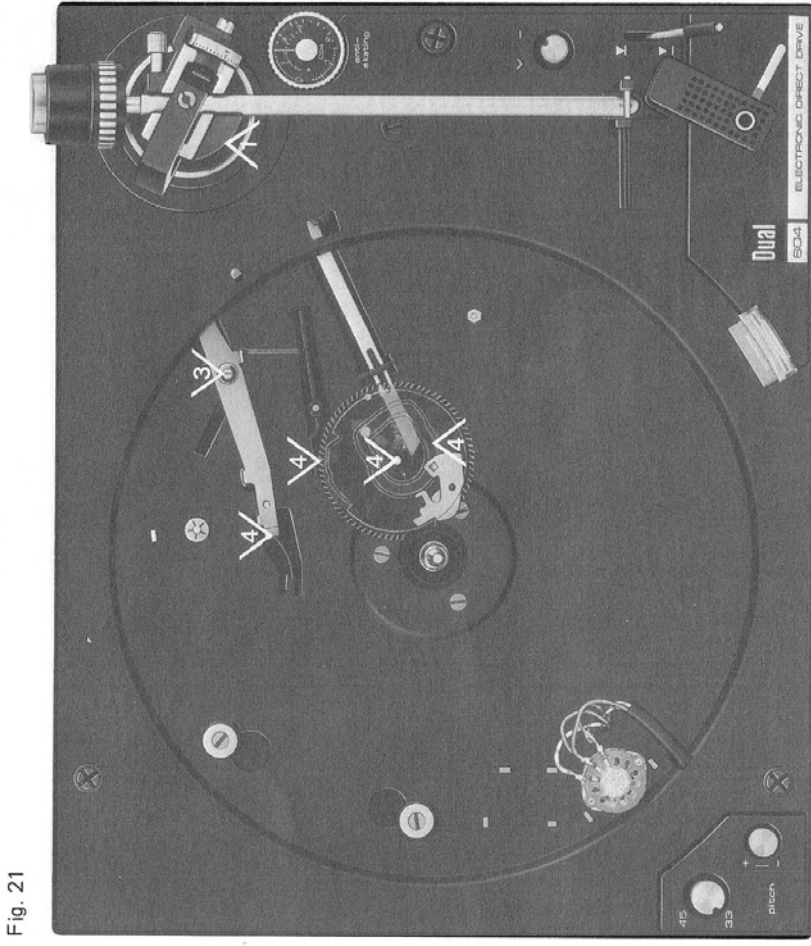


Fig. 21

1

Wacker Silicone oil  
AK 500 000.

3

BP Super Viskostatik  
10 W/30

4

Shell Alvania No. 2

Fig. 22

