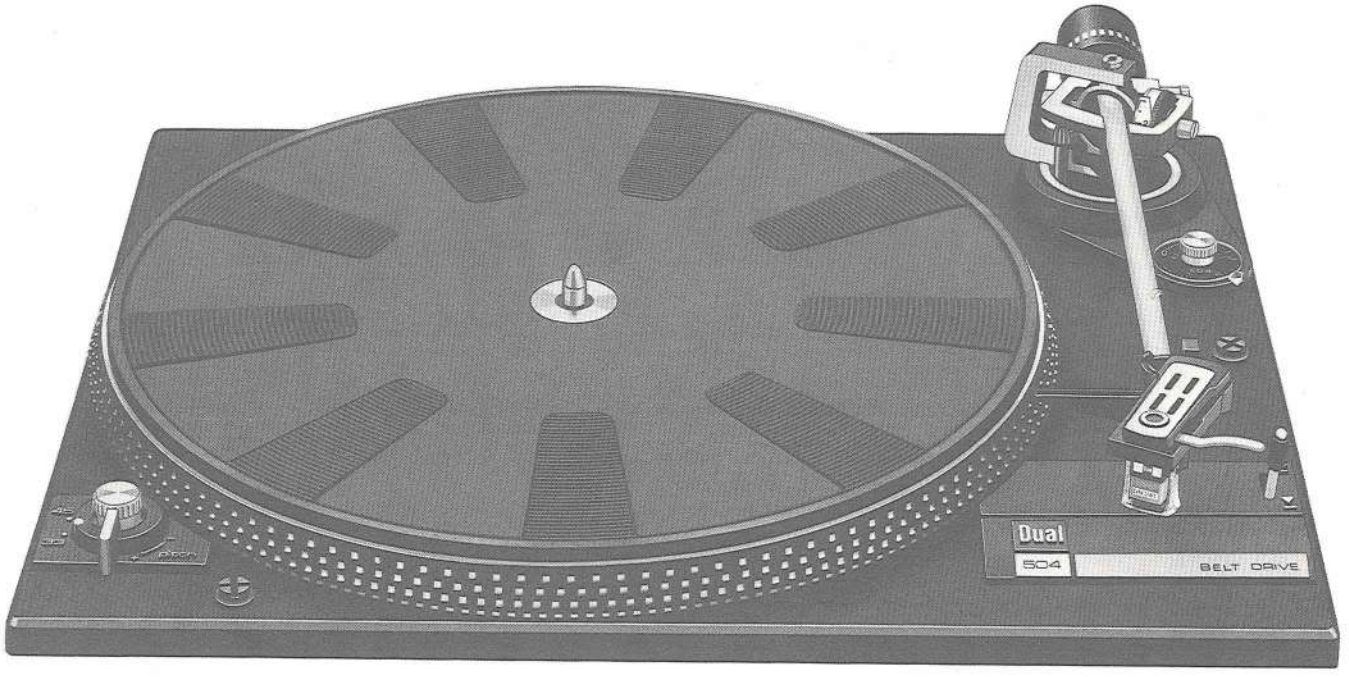
Dual

504

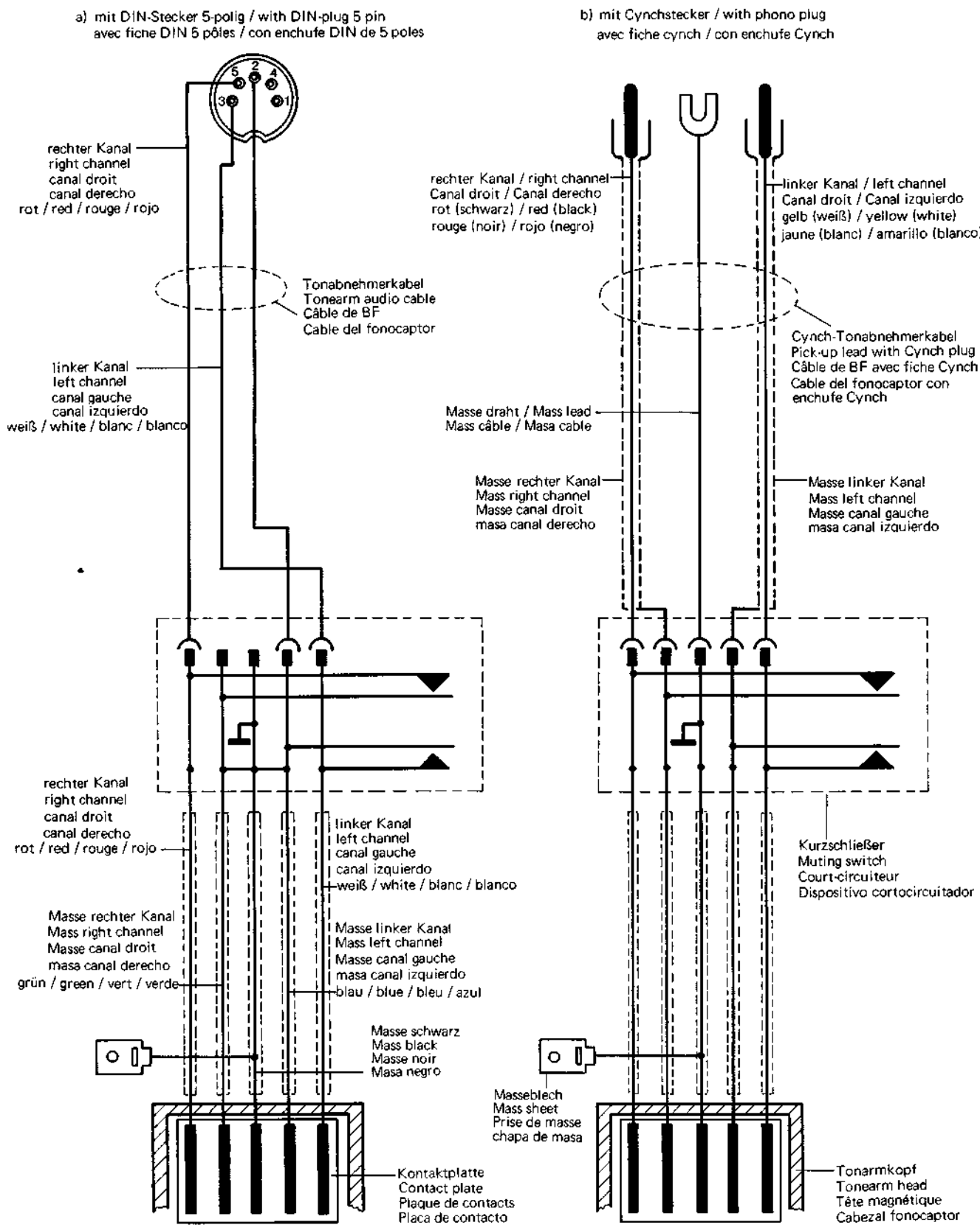
Edition August 1978



Service Manual

Dual Gebrüder Steidinger 7742 St.Georgen/Schwarzwald

Fig. 1 TA-Anschlußschema / Audio Connection Diagram / Schema de branchement / Esquema de conexion del fono captor



Contents

Specification

Mains frequency	50 or 60 Hz, use proper motor pulley
Mains voltage	110 – 130 V or 220 – 240 V, pluggable
Drive motor	Dual model 8-pole synchronous
Drive	by motor-to-turntable belt
Power consumption	less than 10 watts
Current drain	75 mA at 220 V/50 Hz, 140 mA at 110 V/60 Hz
Turntable	non-magnetic, dia. 304 mm, weight 1.3 kg
Record speeds	33 1/3 and 45 revolutions per minute (rpm)
Wow and flutter	less than $< \pm$ 0.09 % by test standard
Signal/noise ratio	intrinsic min. $>$ 62 dB external min. $>$ 41 dB
Tone arm	tubular anti-torsion type with universal four-point gimbal suspension
Tone arm bearing friction related to stylus point	vertical less than $<$ 0.1 mN (0.01 g) horizontal less than $<$ 0.4 mN (0.04 g)
Pick-up head	detachable, accepts all Dual snap-in cartridges and all other systems 1/2" weighing 5.5 to 10 g, mounting material included
Tracking force	continuously adjustable in the range 0 – 30 mN (0 - 3 g), calibration to 1 mN provided for lower half of this range. Reliable operation with 5 mN and higher
Weight	4.1 kg

For dimensions and bench cutout refer to Installation Instructions.

Fig. 2

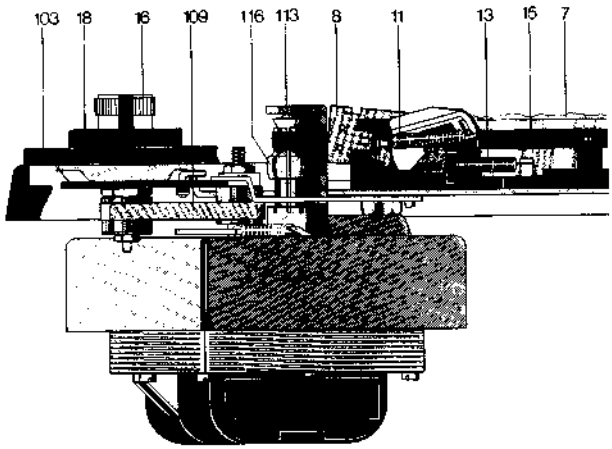


Fig. 3

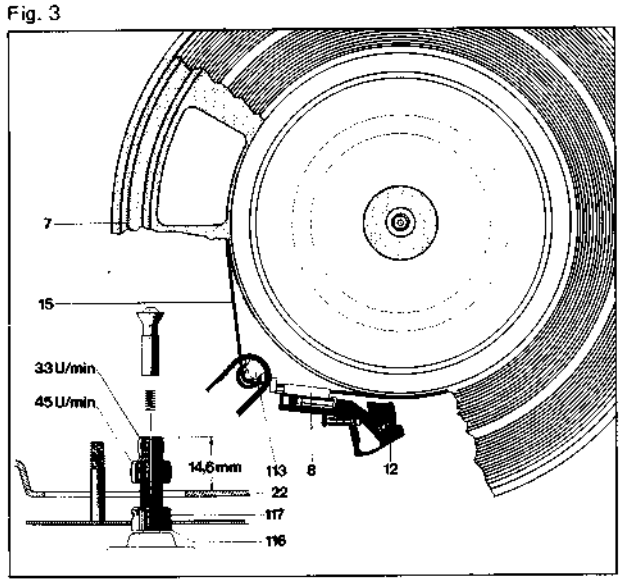
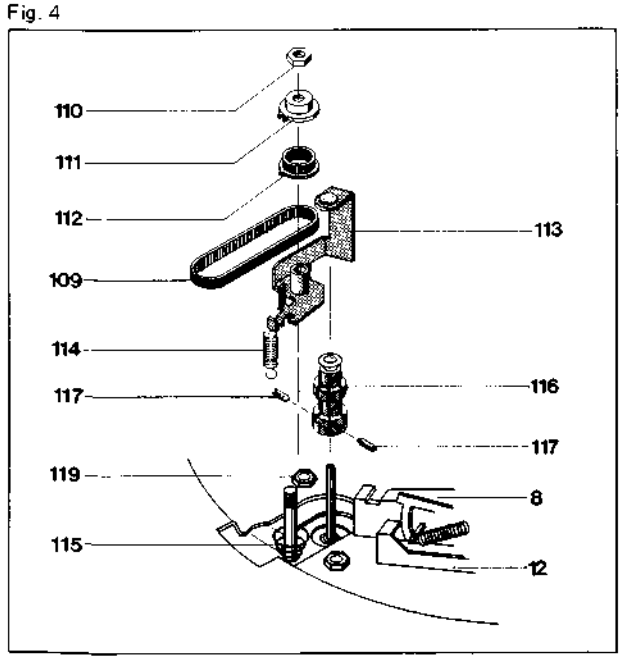


Fig. 4



Motor and Drive

Turntable and mechanism are driven by the motor (132) in (Fig. 16). The shaded-pole motor runs vibration-free in radially elastic mounts and has an extremely low magnetic leakage.
The motor speed is independent of voltage, temperature, and load variations. It can only fluctuate with the mains frequency. Two motor pulleys adapt to the mains frequency of 50 Hz or 60 Hz (see pulley (116) in Fig. 2).:

Part no. 234 453 pulley for 50 Hz
Part no. 234 454 pulley for 60 Hz.

The driving force is transmitted to the turntable by the belt (15) (Fig. 3).

Speed Selection

To adjust the turntable speed to 33 1/3 or 45 rpm, the belt is adjusted to the one or the other step of the motor pulley (116) (see Fig. 3). This is done by operating the knob (16) that will shift the change-over lever into the desired speed position through the lever (101) and the spring lever. As long as the platter is turned off, the change-over lever is blocked by the bar (12) and the speed is only pre-selected. As soon as the record player is turned on and the turntable (7) starts running, the blocking bar (12) will release the change-over lever. The latter will then shift the belt (15) to the one step of the motor pulley (116) that corresponds to the desired speed.

Turntable

The turntable (7) is fixed to the turntable bearing tube by lock tab (134). To remove the turntable, lift its top layer through one of the cutouts and rotate the turntable so that the recess is above the motor pulley. Pull the belt (15) from the pulley (116) and place it onto the turntable. Rotate the latter further until the cutout is above the lock tab (134). Slacken the screw (133). Press the holding bar (134) outwards and remove the turntable (7).

Belt

To replace the belt, first remove the turntable as above described, then remove the belt (15). Place the new belt on the pulley part of turntable (7).
NOTE: the ground (mat) side of the belt should face the pulley. Install the turntable. Place the belt onto the motor pulley (116).

To Replace the Motor Pulley

1. Remove belt 15 from pulley (116) and remove the turntable. Remove the toothed belt (109).
2. Disengage the tension spring (114) from the shield (122).
3. Unscrew the hex. nut (110). Remove the set cam (111), belt pulley (112), and counter bearing (113).
4. Slacken the grub screws (117) and slide off the motor pulley (116). Place the replacement pulley onto motor shaft. Remove the taper sleeve. Pay attention to the internal distance spring. Position the motor pulley at proper height above the mounting plane – see Fig. 3 – and uniformly tighten the grub screws (117). Place the taper sleeve into the motor pulley (116).
5. Mount the counter bearing (113), the belt pulley 2 (112), and the setting cam (111), tighten with hex. nut (110). Replace tension spring (114) and toothed belt (109). Mount the turntable (7). Place belt (15) onto motor pulley (116).
6. To adjust the rated speed: adjust the knob (11) to its mid position. Slacken or tighten the hex. nut (110) to achieve the rated speed.

Tuning to the Pitch of Tone Level

This tuning feature is independent of the power and controls both turntable speeds. For 33 1/3, the control range is max. 6 % or about 1 seminote.
Rotate the knob (16) to move the belt pulley (112). This rotary

motion is transmitted by the toothed belt (109) to the belt pulley 1 (105), see Fig. 2. As a result, the counter bearing (113) and the taper sleeve of the motor pulley (116) are shifted up or down. As an effect of the taper sleeve, the motor pulley diameter is reduced or increased, respectively, thus permitting to change the rated speed within the range of ± 3 %.

Tone arm with Bearings

The light-weight torsion-resistant metal-tube tone arm has a universal gimbal bearing characterized by four hardened and lapped steel points located in high-precision ball bearings. The tone arm bearing friction is thus reduced to a minimum, namely

less than 0.1 mN or 0.01 gr in vertical and
less than 0.4 mN or 0.04 gr in horizontal direction

referred to the stylus point.

This ensures particularly satisfactory tracking conditions. Before adjusting the tracking force in compliance with the pickup system used, the tone arm to its balanced position while the tracking-force scale is in the zero position. For coarse balancing, shift the weight with mandrel (51), for fine balancing, rotate the weight. This balancing weight will permit balancing of pickup systems that have a weight (including mounting parts) in the range from 5.5 to 10 g.
The tracking force is produced by tensioning the helical spring located in the spring case (64). The latter has a scale with marking points permitting exact adjustment of the tracking force within the range 0 — 30 mN (or 0 - 3 g).

To Remove the Tone arm from its Bearing Frame

1. Mount the record player in the servicing fixture. Remove the weight (51) and the tensioning screw (58). Adjust the tracking force scale to zero, see (64) in Fig. 6.
2. Turn the record player into head position. Remove the shield (158). Unsolder the tone arm leads from the terminal strip (156).
3. Record player in normal position. Screw the two mounting screws (60) counterclockwise until they abutt against the bearing frame (55).

NOTE: Bayonet union. Shift the tone arm (50) to the rear and lift it from the bearing frame (55).

To assemble, proceed in reverse sequence.

To Remove the Tone arm Complete with Bearings

1. Mount the record player in the servicing fixture. Adjust the tracking-force scale (64) to zero. Lock the tone arm (50) in place. Remove the weight (51).
2. Adjust record player in head position. Remove shield (158). Unsolder the tone arm leads from terminal strip (156).
3. Unhook the tension spring (226) from the bearing bracket (224). Rotate bearing part (195) through 90° degrees and remove it. Detach the setting bar (194).
4. Unhook the tension spring (214). Remove lock washer (210) and skating lever (207).
5. Remove lock washer (217) and disk (216). Detach the shut-off bar (215) from the segment (211).
6. Slacken the hex. nuts (213). Remove the segment (211).
7. Remove hex. nut (206) and then the tone arm complete with bearing.

To install the tone arm, proceed in reverse sequence; however, make sure the segment (211) is properly adjusted as described on page 7.

Fig. 5

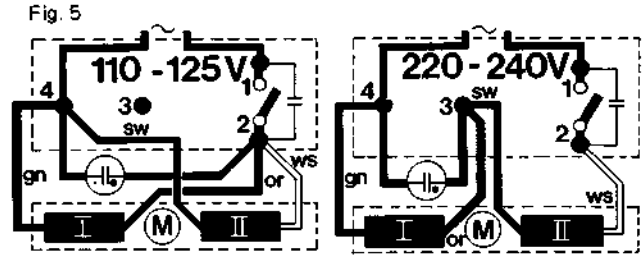


Fig. 6

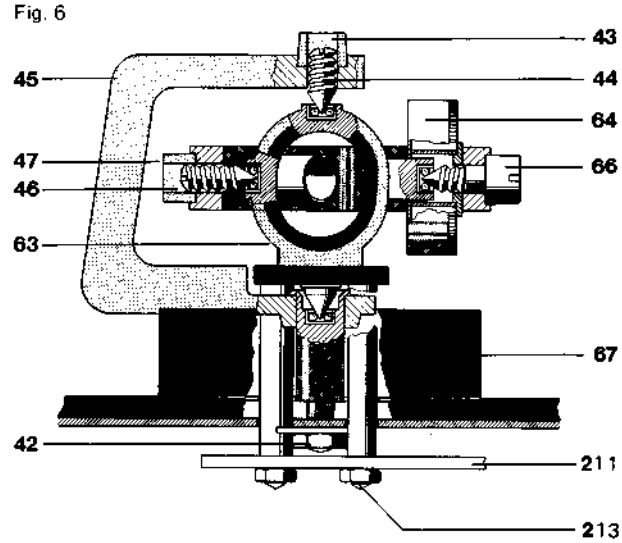
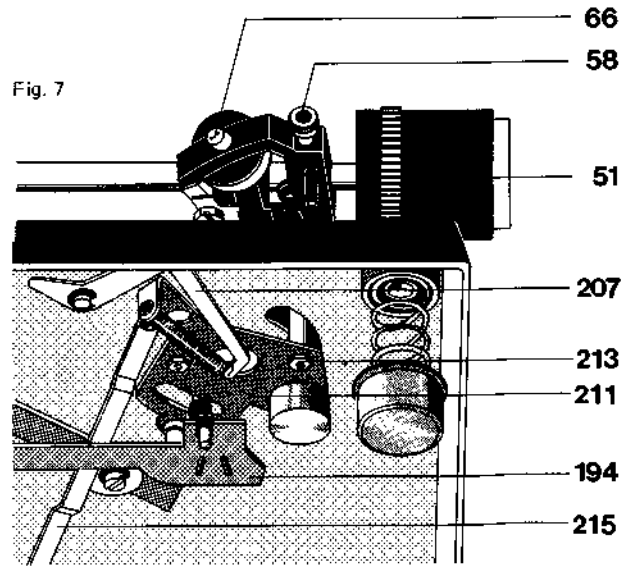


Fig. 7



NOTE: The item numbers referred to in the text are identical with those in the illustrations, the exploded views, and in the parts lists.

To Replace the Spring Case

Remove tone arm (50) from bearing frame (55) as above described. Slacken the lock nut (47) and the grub screw (46). Unscrew the bearing screw (66).
Lift the bearing frame (55). Remove washer (65) and spring case (64). When reassembling, make sure the helical spring snaps into the recess of bearing (63). Slide-in the washer (65). Tighten the screw (66). Mount the tone arm. Adjust the bearing backlash with grub screw (46) and lock nut (47) as below described.

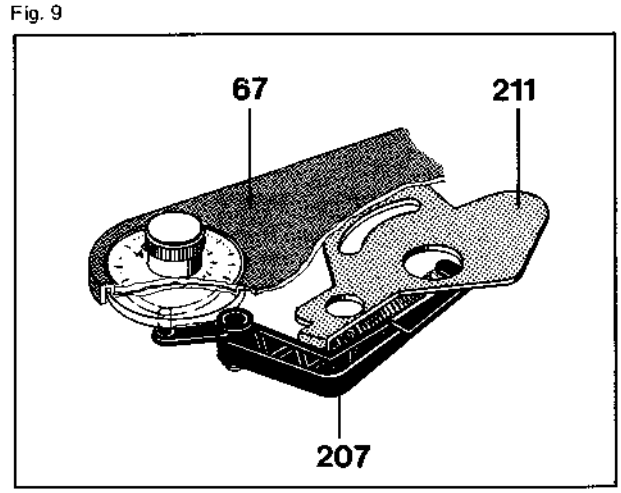
To Adjust the Tone arm Bearings

Exactly balance the tone arm. Both bearings should have a small, just perceptible backlash. Proper adjustment of the horizontal bearing is achieved if the tone arm can freely slide from the record inside to outside while the anti-skating adjustment is 0.5. Proper adjustment of the vertical bearing is achieved when the the carefully kicked tone arm swings into balanced position.
Adjust the backlash by grub screws (44), (46) for the horizontal and vertical bearing, respectively.

Anti-Skating Device

To adjust the anti-skating force, operate the pointer scale provided on the cover (67). Depending on this adjustment, the non-symmetric cam disk will guide the skating lever (207) out of the tone arm pivot point. The anti-skating force is transferred by the tension spring (214) to the segment (211) and, hence, to the tone arm (50).
The factory adjustment is optimal for any stylus having a spherical tip radius of 15 µm or an elliptical tip radius 5/6 by 18/22 µm as well as for CD 4 pickup systems.
These factory-adjusted vylues may be varied only in an authorized Dual service workshop using a Dual Skate-O-Meter and a test record.

Fig. 9



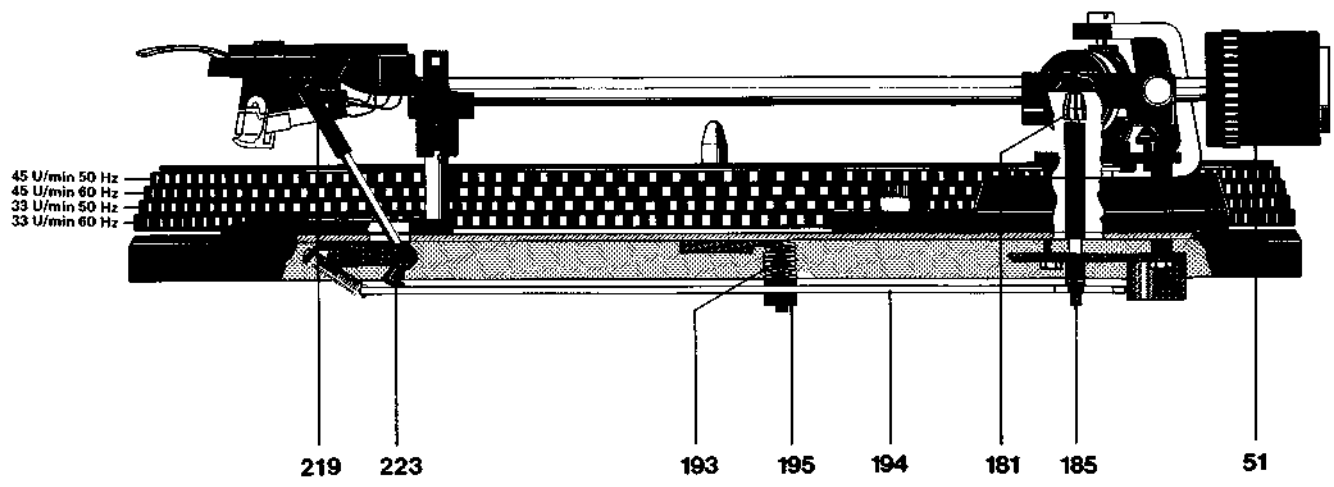
Tone Arm Lift

Move the lift control bar (219) to the front (▼) or LIFT position; this will rotate the lift cam (223) and operate the setting bar (194) and the lifting bolt that will lift the tone arm. In this way the tone arm can be lifted from or lowered on any point of the record except in the shut-off range.
Move the bar (219) to the rear (▼) or LOWER position; this will release the setting bar (176). The pressure spring (184) will return the lifting bolt (185) to its operating position and the tone arm (50) will be loweredsoftly, braked by the silicone oil in the lifter tube.

To Adjust the Lift Height

Slightly rotate the adjusting sleeve (181). The stylus should be lifted from the record by 5 to 7 mm.

Fig. 8



To Replace the Lift Plate

1. Fasten the record player in the service jig and lock it in place.
2. Adjust record player to head position.
3. Detach the tension spring (226) from the bearing bracket (224). Rotate bearing part (195) through 90° degrees and remove it. Remove the setting bar (194).
4. Detach the tension spring (214), slacken the lock washer (217) and remove the skating lever (207).
5. Remove lock washer (217) and disk (216). Detach shut-off bar (215) from segment (211).
6. Slacken hex. nuts (213) and remove segment (211).
7. Remove lock washer (188) and disk (187), disengage pawl (186).
8. Remove screw (183). Hold the tone arm bearings. Unscrew the hex. nut (206) and remove lift plate assy. (182).
9. Lock tone arm against dropping out with the aid of nut (206).

To replace the lift plate (182), proceed in reversed sequence, but look for proper Adjustments (described below) when you fix the segment (211).

Starting and Shutting Off

Swinging-in of the tone arm (50) causes rotation of segment (211).
As a result, pawl (164) and shift arm (172) will operate the power switch (143) causing the motor (123) and turntable (7) to rotate.
After the record has been played, the dog (M) of the turntable (Fig. 11 b) will operate the shut-off lever (34). During play-back, the shut-off bar (215) is dragged in proportion to the motion of segment (211). For records 116 to 122 mm in diameter, the shut-off lever (34) is gradually pushed to dog (M) by the shut-off bar (215) in the shut-off range, see Fig. 11 a. When the dog (M) contacts the shut-off lever (A), the carrier (37) will move the shift arm (172) to its zero position and the power switch will interrupt the supply.
At the same time the lift bar (218) coupled to the shift arm (172) will operate the tone arm lift and the tone arm (50) will be lifted.

Adjustments

1. **Segment**

a) Lock the tone arm (50) in place. Record player in head position. The central hole (L) of segment (211) should be centered over the frame axis (45). Moreover, a play of 0.3 zo 0.5 mm should be provided between the pawl (186) and the stop (A) of segment (211), adjustable by slackening the hex. nuts (213) and shifting the segment (211).

b) The excenter (S) on segment (211) can be used to vary the shut-off point for records 116 to 122 mm in diameter (see (Fig. 12).

2. **Pawl**

Swing-in the tone arm (50). Make sure there is a play of 0.2 to 0.5 mm between stop pin (B) of the shift arm (172) and the deck plate (22). If necessary, adjust by rotation of excenter (E).

Fig. 10

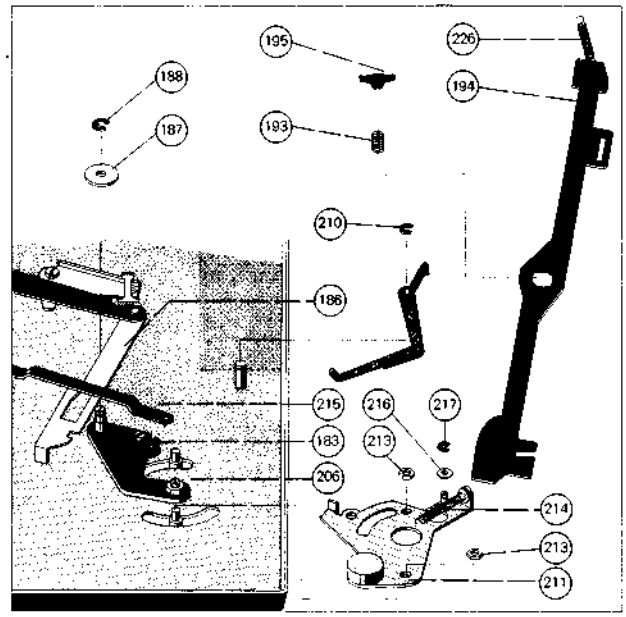


Fig. 11

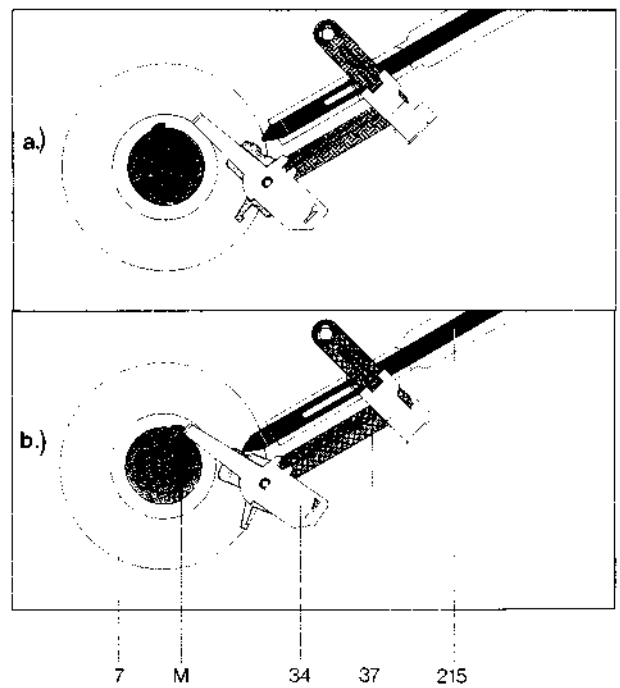


Fig. 12

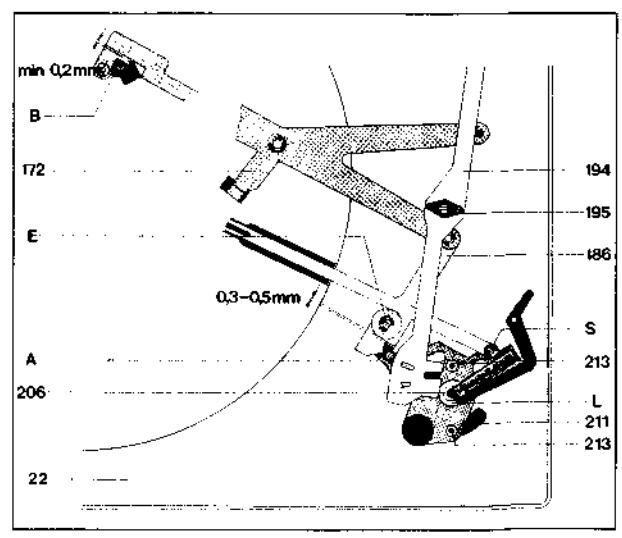
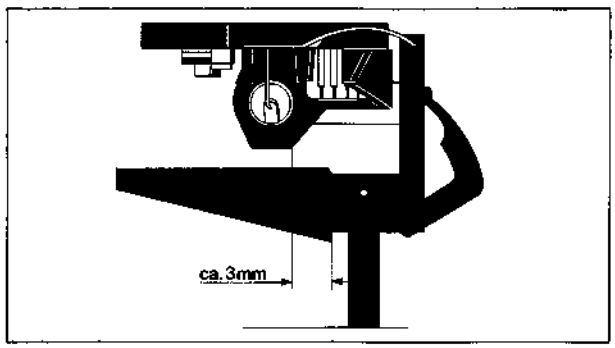


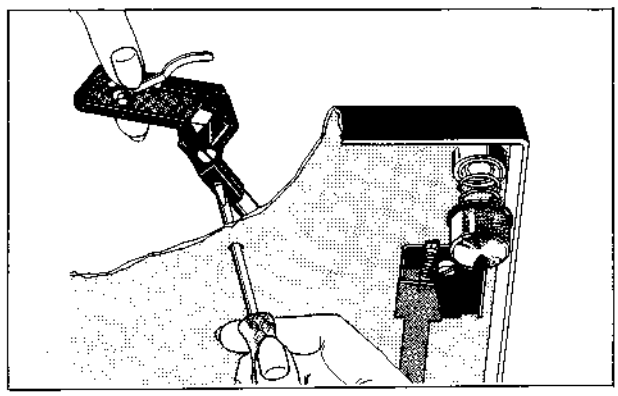
Fig. 13



3. **Power Switch**

Disconnect mains plug. Swing the tone arm (50) back to its support. Power switch (143) must not turn off before the tone arm has reached a position about 3 mm in front of the support (Fig. 13). If necessary, adjust by bending the shift arm (172).

Fig. 14



Defect

Tone arm head not parallel to turntable.

Cause

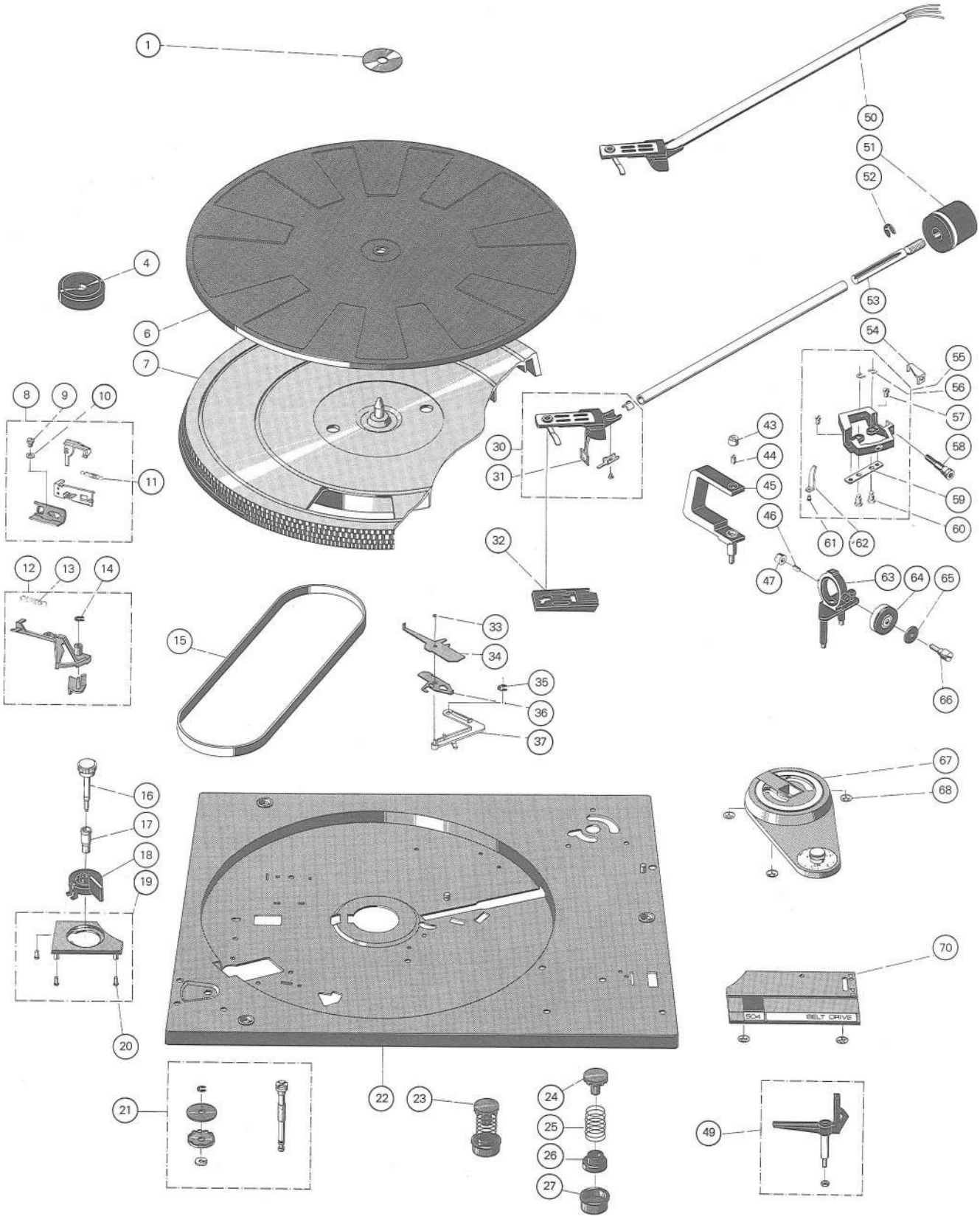
The seat of the tone-arm head in the tube has been displaced by the effect of shipping.

Repair

Remove turntable, push screw driver through hole (Fig. 14) and slacken screw of tone-arm head, align the head and tighten the screw.

Defect	**Cause**	**Repair**
Turntable does not start	a) Belt (15) is not in place: mount the belt.	a) Belt 15 is not in place: mount the belt.
	b) Motor (132) is not powered: check switch base (142) and mains plug.	b) Motor 132 is not powered: check switch base 142 and mains plug.
	c) Motor pulley (116) has come loose: tighten it.	c) Motor pulley 116 has come loose: tighten it.
Turntable speed unsatisfactory	a) Motor pulley (116) not in compliance with mains frequency: exchange.	a) Motor pulley 116 not in compliance with mains frequency: exchange.
	b) Belt (15) slipping on pulley (116) or turntable (7): clean all surfaces in contact, if necessary replace belt (15).	b) Belt 15 slipping on pulley 116 or turntable 7: clean all surfaces in contact, if necessary replace belt 15.
	c) Rated speed maladjusted: readjust.	c) Rated speed maladjusted: readjust.
Stylus slides out of playing groove	Steel ball (166) of shut-off bar (166) missing	Renew steel ball
Tonearm does not set down on record or lowers too quickly when operating the cue control lever (190)	Excessive or insuffidient damping as a result of contamination of the silicone oil in the lift tube	Referring to page remove cue control plate (182). Remove adjustment bush sleeve (181). Remove lift pin (185) and compression spring (184). Clean lift tube and lift pin. Smear lift pin evenly with "Wacker Silicone Oil AK 300 000". Reassemble components.
Acoustic feedback	a) Chassis components (e.g. connecting leads) rubbing on board cut out	a) Line up mounting board cut-out according to installation instructions
	b) Connecting leads too tight.	b) Slacken or lengthen leads.

Fig: 15 Exploded view 1

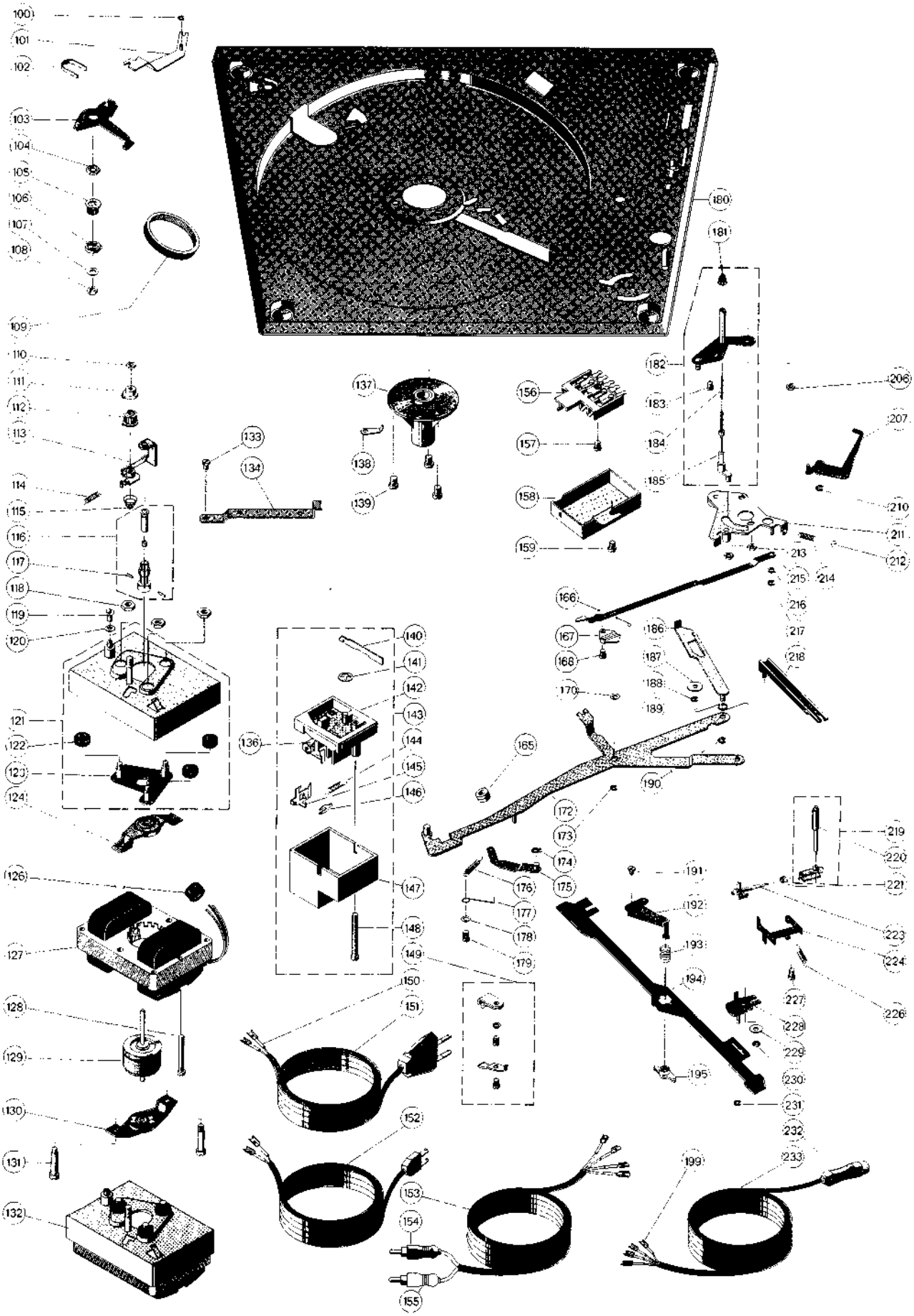


Replacement parts

Pos.	Part.-No.	Qty.	Description	
1	214 054	1	Washer	
4	220 213	1	Centering piece	
6	244 460	1	Turntable lining	
7	246 734	1	Turntable cpl.	
8	234 428	1	Carrier cpl.	
9	210 472	1	Fillister head screw	M 3 x 4
10	210 586	1	Washer	3.2
11	232 086	1	Tension spring	
12	237 220	1	Locking rail cpl.	
13	240 000	1	Tension spring	
14	210 194	1	Grip ring	
15	246 084	1	Flat belt	
16	234 912	1	Control knob	
17	239 270	1	Bearing bush	
18	234 910	1	Speed lever	
19	237 222	1	Speed cover	
20	213 260	3	Grooved drive stud	
21	237 414	3	Transport lock	
22	246 735	1	Built-in plate cpl.	
23	237 226	1	Spring suspension cpl. (motor side rear)	
	237 227	1	Spring suspension cpl. (motor right front)	
	237 228	1	Spring suspension cpl. (pick-up arm side rear)	
	237 229	1	Spring suspension cpl. (pick-up arm side front)	
24	230 529	4	Threaded coupling	
25	236 710	1	Pressure spring (motor side rear)	
	236 711	1	Pressure spring (motor side front)	
	236 712	1	Pressure spring (pick-up arm side rear)	
	236 713	1	Pressure spring (pick-up arm side front)	
26	200 725	4	Rubber absorber	
27	200 722	4	Pot	
30	246 741	1	Pick-up arm head cpl.	
31	237 223	1	Contact plate cpl.	
32	236 242	1	Fixture	TK 24
33	210 142	1	Locking washer	1.2
34	234 766	1	Throw-off lever	
35	210 145	4	Locking washer	2.3
36	234 764	1	Friction plate	
37	234 762	1	Carrier	
43	234 635	2	Counter nut	
44	230 063	1	Grub screw	
45	246 736	1	Frame cpl.	
46	234 634	1	Grub screw	
47	234 635	2	Counter nut	
49	246 744	1	Support cpl.	
50	246 743	1	Pick-up arm cpl.	
51	240 964	1	Weight	
52	210 147	1	Locking washer	4
53	238 666	1	Mandril	
54	233 744	1	Stay	
55	240 966	1	Bearing frame	
56	236 160	2	Support plate	
57	239 565	2	Fillister head screw	M 2.5 x 3
58	241 447	1	Clamping screw	
59	238 201	1	Threaded plate	
60	238 202	2	Locking screw	
61	237 672	1	Groove drive stud	1.4 x 6
62	238 623	1	Pointer	
63	240 967	1	Bearing cpl.	
64	236 907	1	Spring casing cpl.	
65	237 563	1	Washer	
66	237 564	1	Bearing screw	
67	246 745	1	Rear cover	
68	200 444	5	Spring washer	
70	246 737	1	Front cover	
100	210 145	4	Locking screw	2.3
101	234 824	1	Switch lever	
102	236 374	1	Clip spring	
103	232 094	1	Connection part	
104	232 079	1	Shouldered nut	
105	232 097	1	Belt wheel II	
106	240 035	1	Washer	
107	210 607	1	Washer	3.2/10/0.5

Pos.	Part.-No.	Qty.	Description	
108	210 362	1	Hex nut	M 3
109	232 076	1	Toothed belt	
110	244 104	1	Hex nut	M 3.5
111	241 641	1	Control curve	
112	241 642	1	Belt wheel I	
113	241 644	1	Abutment	
114	233 777	1	Tension spring	
115	232 615	1	Pressure spring	
116	234 453	1	Drive roller cpl.	50 Hz
	234 454	1	Drive roller cpl.	60 Hz
117	233 137	1	Grub screw	M 2.5 x 3
118	210 366	3	Hex nut	
119	210 480	1	Fillister head screw	M 3 x 6
120	210 609	1	Washer	3.2/10/1
121	241 328	1	Screen plate	
122	232 841	3	Buffer	
123	232 840	1	Insert plate	
124	241 570	1	Upper bearing stay	
126	209 939	1	Sleeve	
127	241 569	1	Stator	110/220 V cpl.
128	233 815	1	Fillister head screw	M 2.5 x 18
129	241 571	1	Anchor cpl.	
130	241 572	1	Lower bearing stay	
131	210 525	2	Fillister head screw	M 4 x 25
132	242 076	1	Motor SM 860/1	110/220 V cpl.
133	210 472	1	Fillister head screw	M 4 x 6
134	237 970	1	Holding rail	
136	241 885	1	Capacitor	10 nF/250 V
	230 355	1	Capacitor	68 nF/250 V
137	237 236	1	Bearing casing cpl.	
138	236 759	1	Earthing spring	
139	210 515	3	Fillister head screw	M 4 x 6
140	236 335	1	Slide	
141	200 444	1	Spring washer	
142	233 012	1	Switch panel cpl. (10 nF)	
	236 605	1	Switch panel cpl. (68 nF)	
143	242 581	1	Mains switch cpl.	
	242 582	1	Mains switch	
144	239 732	1	Tension spring	
145	230 148	1	Switch angle	
146	219 200	1	Catch spring	
147	242 095	1	Cover	
148	210 498	1	Fillister head screw	M 3 x 28
149	231 079	1	Cable clamps cpl.	
150	214 602	1	Socket AMP	
151	232 996	1	Mains lead Europe	
152	232 995	1	Mains lead USA	
153	207 301	1	Phono pick-up cable Cynch	
154	209 426	1	Cynch plug black	
155	209 425	1	Cynch plug white	
156	237 238	1	Pick-up connection plate	
157	210 480	2	Fillister head screw	M 3 x 5
158	236 080	1	Screen plate	
159	210 480	2	Fillister head screw	M 3 x 5
165	236 950	1	Stop bush	
166	209 357	1	Ball	3.2
167	232 104	1	Ball bed	
168	210 469	2	Fillister head screw	AM 3 x 3
170	210 626	1	Washer	4.2/7/0.5
172	234 756	1	Switch arm	
173	210 146	3	Locking washer	3.2
174	210 196	1	Grip ring	
175	234 760	1	Engaging lever	
176	234 799	1	Tension spring	
177	237 785	1	Wire spring	
178	210 586	1	Washer	
179	234 759	1	Screw bolt	
181	234 800	1	Adjustable adaptor	
182	234 790	1	Lift plate cpl.	
183	210 472	1	Fillister head screw	AM 3 x 4
184	234 798	1	Pressure spring	
185	234 795	1	Lift bolt	
186	234 786	1	Catch	
187	210 643	1	Washer	4.2/12/1
188	210 145	4	Locking washer	2.3

Fig. 16 Exploded view 2



Pos.	Part.-No.	Qty.	Description	
189	234 789	1	Leg spring	
190	210 146	3	Locking washer	3.2
191	210 469	2	Fillister head screw	M 3 x 3
192	237 969	1	Bearing angle	
193	237 974	1	Pressure spring	
194	234 783	1	Adjusting rail	
195	237 975	1	Bearing segment	
199	209 436	4	Flat plug	
206	210 366	1	Hex nut	
207	244 331	1	Skating lever	
210	210 146	3	Locking washer	3.2
211	240 970	1	Segment	
212	201 184	1	Adjusting washer	
213	210 362	2	Hex nut	M 3
214	218 591	1	Tension spring	
215	234 807	1	Switch-off rail	

Pos.	Part.-No.	Qty.	Description	
216	201 187	1	Sliding washer	
217	210 145	1	Locking washer	
218	234 780	1	Lifting rail	
219	240 893	1	Grip hub cpl.	
220	237 543	1	Rubber bush	
221	234 778	1	Torsion spring	
223	234 777	1	Stroke curve	
224	237 972	1	Bearing stay	
226	233 710	1	Tension spring	
227	210 469	2	Fillister head screw	M 3 x 3
232	209 424	1	5-pole plug DIN	
233	207 303	1	Phono pick-up cable cpl.	
***	214 120	1	TA fixing material	
***	244 749	1	Operating instructions	
***	245 517	1	Operating instructions UAP	
***	241 278	1	Shipping carton CS	

*** Parts not illustrated

Subject to change

Lubrication

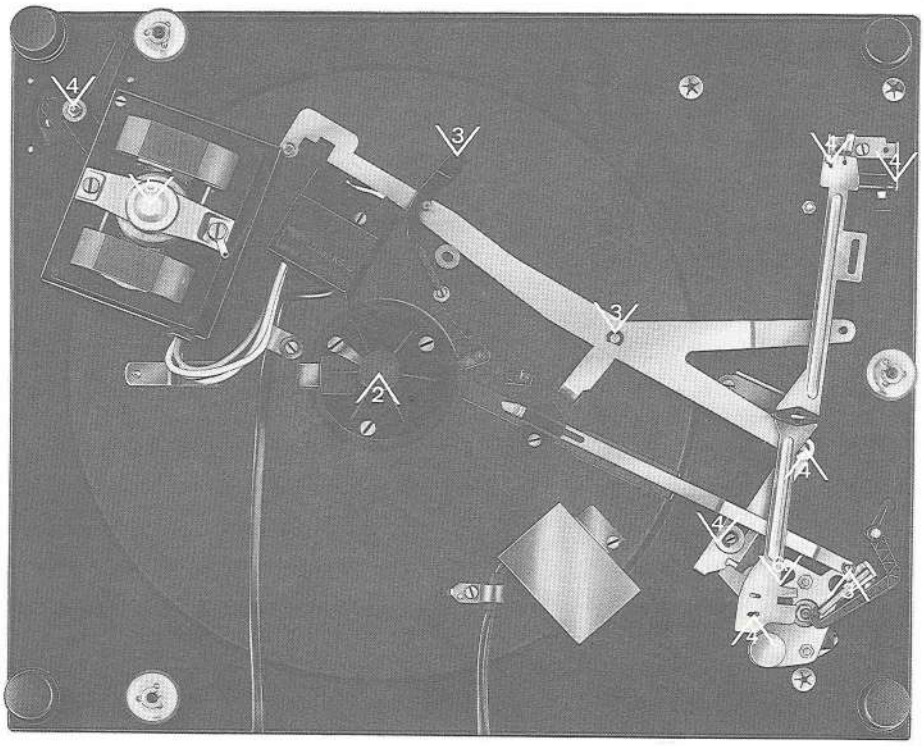
All bearing and friction points of the unit are adequately lubricated at the works. Replenishment of oil and grease is only necessary after approximately 2 years of normal use of the record player as the most important bearing points (motor bearings) have sintered metal bushes.

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

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

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

Fig. 17



2 Renotac No. 342 adhesive oil

3 BP Super Viscostatic 10 W/30

4 Shell Alvania No. 2

5 Isoflex PDP 40

6. Silicone oil AK 500 000

Safety regulations

Servicing of electronic equipment should be performed only by authorized service personnel.

During service the unit has to be operated with an isolated transformer.

Safety requirements (e. g. VDE 0860 H) have to be strictly observed during repair.

In order to not reduce safety, the original design of the unit should not be changed, e. g. cover plates, mechanically secured wiring, tracking and creepage distance in air etc.

Use only factory replacement parts which must be reinstalled per original design.

Upon completion of repair make shure that all accessible and conductive parts do not carry line voltage.

920546-2 5.2/0878

Printed in Germany by Dual