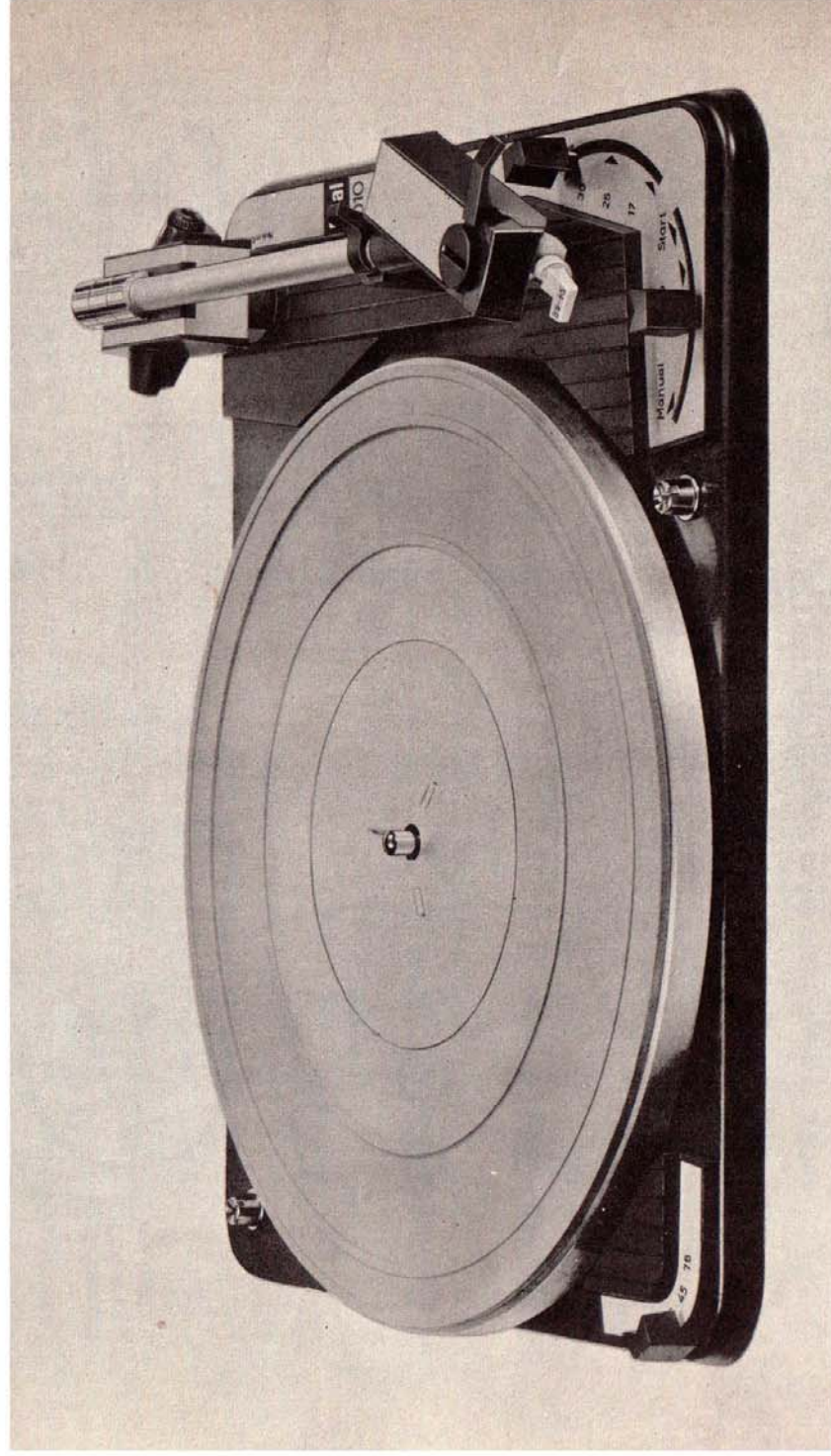


Dual

Service Manual Dual 1010



Technical Data:

- Line voltage:** selector for 110, 150, or 220 volts
- Line frequency:** 50 or 60 cycle with appropriate motor pulleys
- Drive:** two-pole, single-phase, induction motor
- Power consumption:** 6.5 watts approximately
- Wow and flutter:** with 8½" turntable, max. ± 0.25%; with 11" turntable, max. ± 0.17%
- Turntable speeds:** 78, 45, 33⅓ and 16⅔ r.p.m.
- Signal-to-noise ratio:** at 100 c.p.s. better than 42 db; at 250 c.p.s. better than 50 db
- Pickup cartridge:** tonearm will accept all crystal and ceramic cartridges with ½" mounting.
Standard is stereo crystal cartridge CDS 620/4/45
- Weight of unit:** with 8½" turntable, 8 lbs.
with 11" turntable, 9 lbs.
- Dimensions and mounting cutouts:** see fig. 18

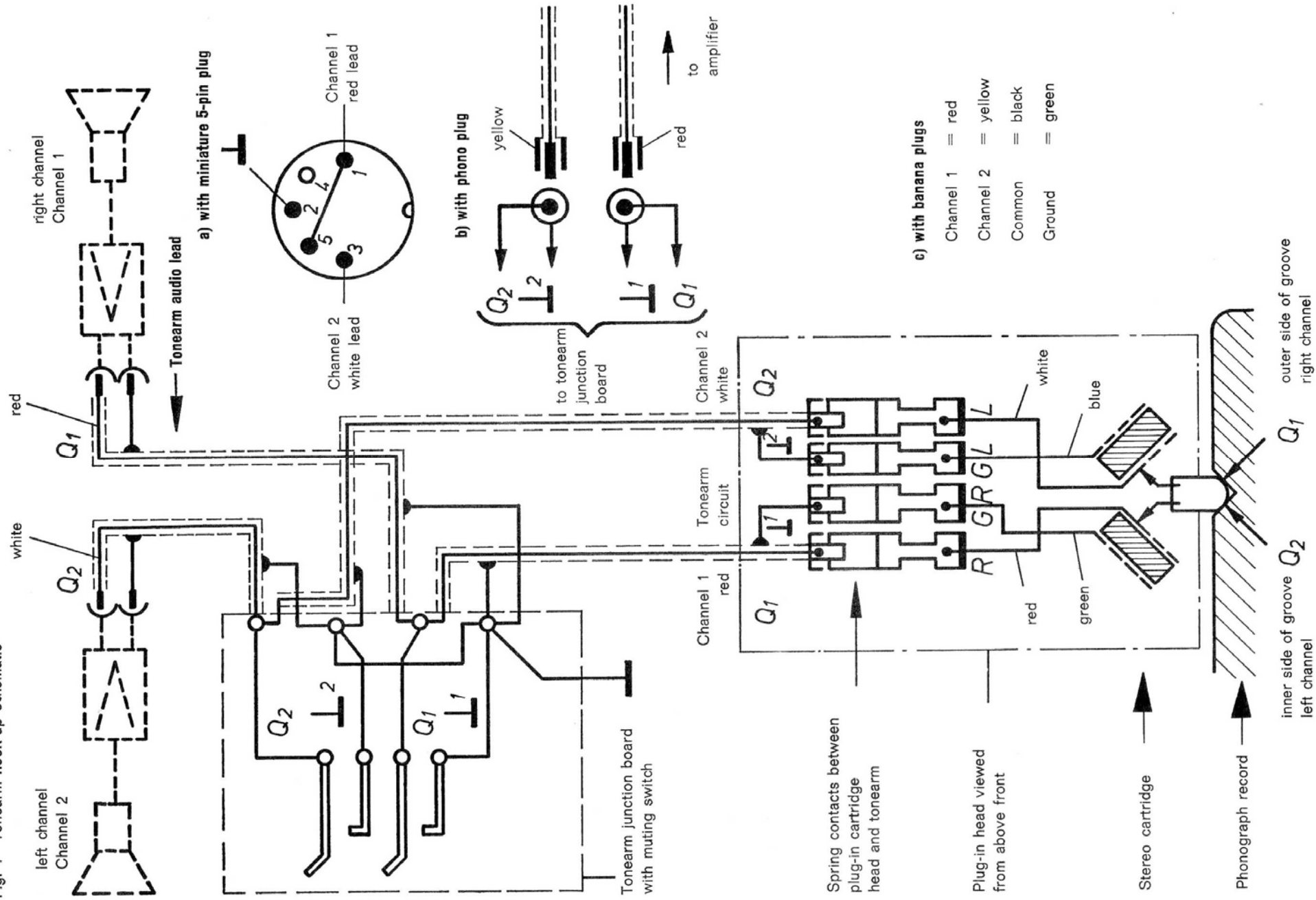
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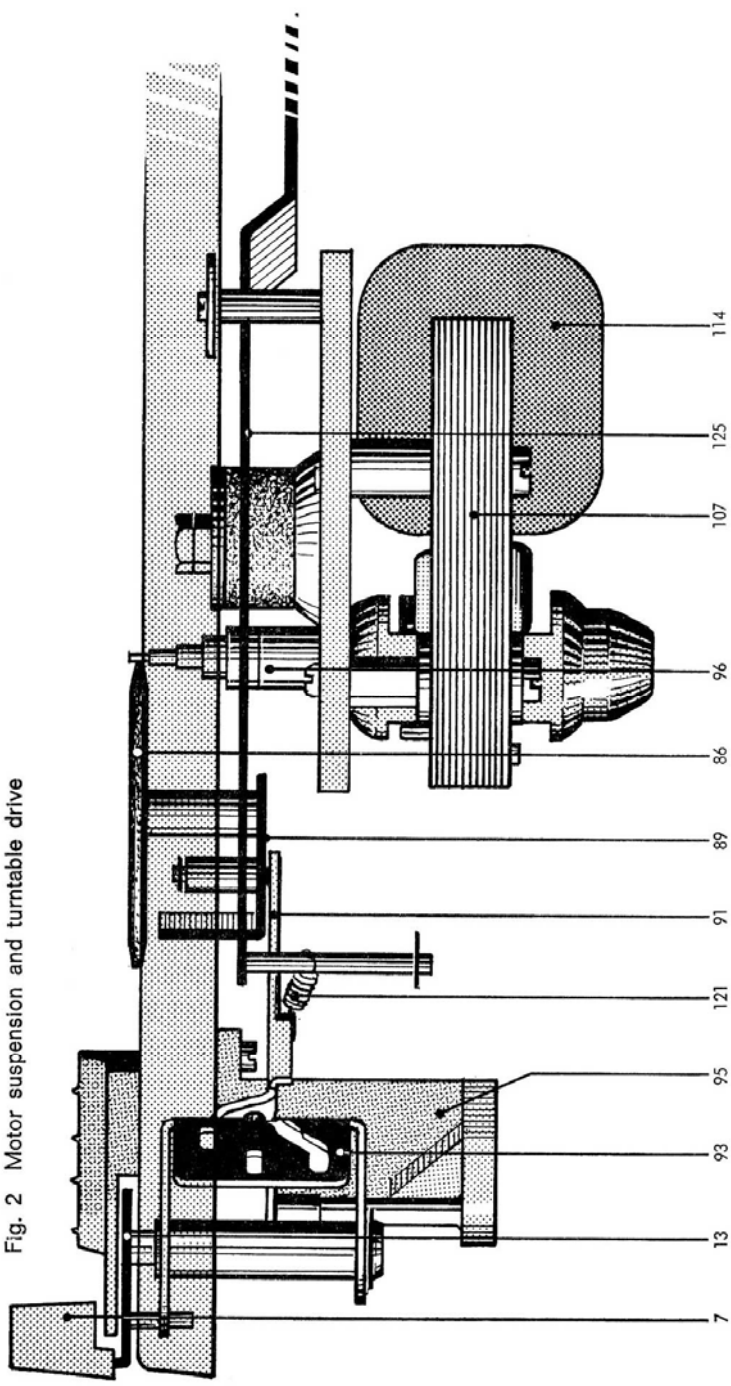
Fig. 1 Tonearm hook-up schematic



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Fig. 2 Motor suspension and turntable drive



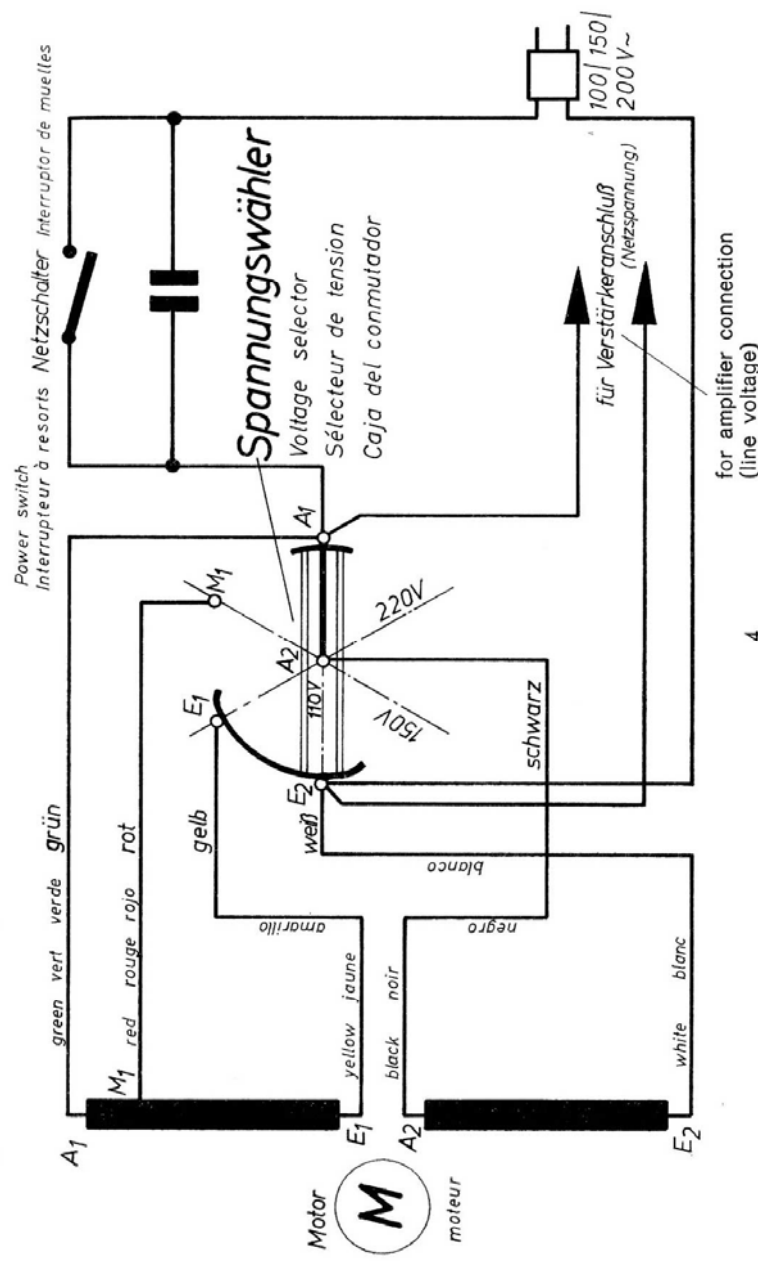
Motor and drive

The turntable and change cycle are driven by a two-pole induction motor (114) which employs an armature of two equal segments and superfinished bearings. Freedom from vibration is assured by elastic shock-mounting to the base plate.

Motor speed is constant, for line variations of $\pm 10\%$. Motor speed is dependent on and proportional to the line frequency.

Adapting for line frequencies of 50 or 60 cycle operation is accomplished by the use of replaceable motor pulleys (96).

Fig. 3 Motor field connections, voltage selector in 110 volt position



Motor pulley for two-pole motor

50 cycle: Part No. 12 G - U 45

60 cycle: Part No. 12 G - U 55

The motor pulley is secured to the motor by means of a set screw. When the pulley is changed, care must be taken that it is set to the correct height, i. e., with the drive wheel in the middle of the appropriate pulley stop.

The motor field is mounted before the stator is riveted. For this reason, the complete stator must be replaced when a winding becomes defective.

The turntable is driven by means of the drive wheel (86), which, to prevent damage to its friction surfaces, automatically disengages in the "off" position. Setting the turntable speed to 16 $\frac{2}{3}$, 33 $\frac{1}{3}$, 45 and 78 r.p.m. is accomplished by raising or lowering the drive wheel to the corresponding step of the motor pulley.

Similarly, moving the speed change knob (7) causes the switch segment (93) to rotate. The grooves in the switch segment guide the rocker assembly (91) on which the drive wheel is mounted. The drive wheel is thus lifted vertically from the motor pulley and placed in the desired position.

Trouble shooting:

Symptom	Cause	Remedy
Turntable does not run, when unit plugged in and "Start" button operated	a) Current path to motor interrupted	a) Check connections at switch plate and voltage selector
Turntable does not come up to speed	b) Drive wheel (86) not in contact with turntable c) Motor pulley (96) loose a) Motor pulley does not correspond to local line frequency b) Slippage between drive wheel (86) and motor pulley (96) c) Friction in motor or drive wheel bearings d) The vertical position of the motor pulley (96) does not correspond with the speed setting	b) Check rocker assembly (91) c) Tighten motor pulley (96) a) Change motor pulley b) Clean friction surface of drive wheel (86) and motor pulley. Change drive wheel, if necessary. c) Clean bearings and relubricate per lubrication chart d) Loosen set screw and correct motor pulley height so that drive wheel is in the center of the appropriate pulley step. Then tighten set screw.

Fig. 4 Turntable speeds and drive wheel shift mechanism

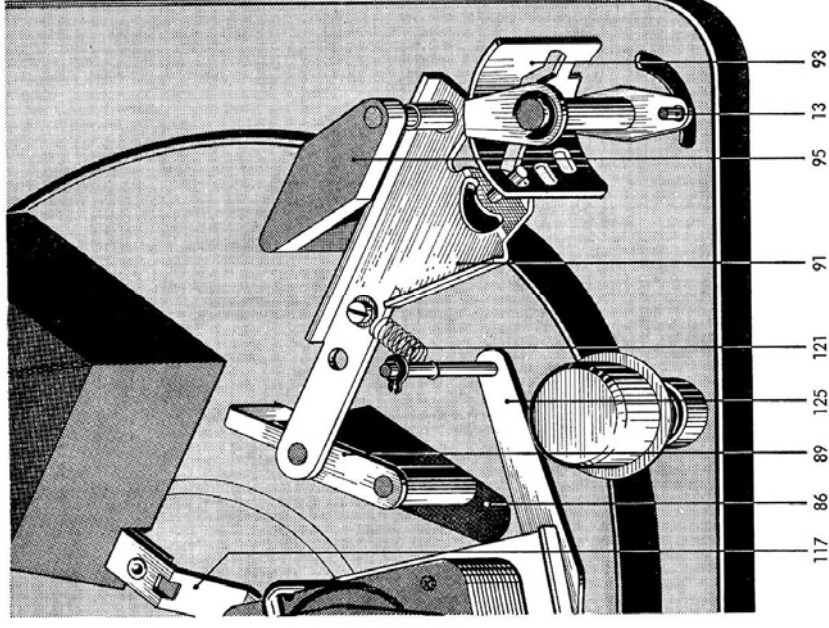
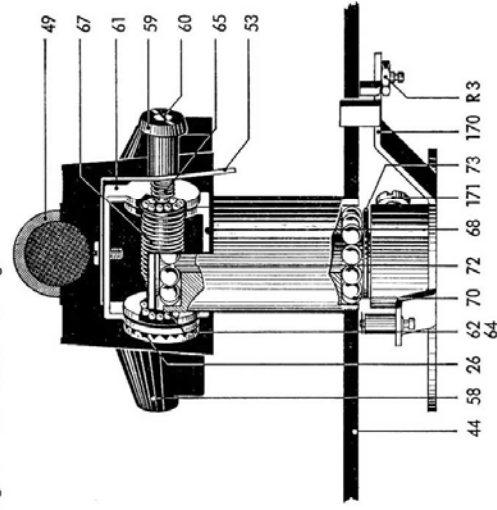


Fig. 5 Tonearm bearing



Tonearm — suspension and tracking pressure

The suspension of the tonearm for its vertical and horizontal motions is shown in the adjoining figure.

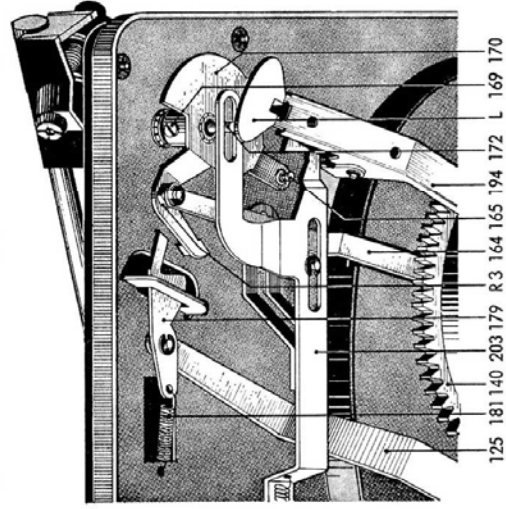
The tonearm is spring counterbalanced. The tracking pressure is adjustable from 2 to 7 grams in steps of $\frac{1}{2}$ gram.

The tracking pressure is set at the factory according to the pickup system used. When changing to another crystal or ceramic cartridge of other weight or tracking pressure, a coin or similar object can be used to turn the arm pivot knob (59) to suitably re-adjust the tracking pressure. Turning counter-clockwise reduces and clockwise increases the tracking pressure, each position changing the pressure by approximately $\frac{1}{2}$ gram.

Tonearm movements

A guide groove located on the underside of the tonearm (140) controls automatic lift off and set down of the tonearm as the main cam rotates 360° , by means of the main lever assembly (194) and the lift screw assembly (172). Horizontal movement of the tonearm is controlled by the main lever assembly (194) and the arm segment assembly (170).

Fig. 6 Tonearm bearing (view from below)

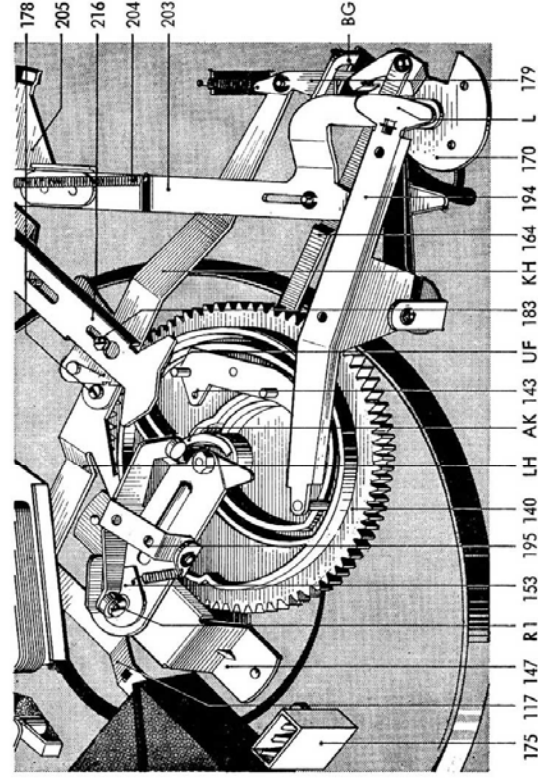


Automatic set-down of the tonearm in the lead-in grooves of the phonograph records of 7", 10" and 12" diameter is set by sliding the switch button (78 a, fig. 11). The point of set-down is determined by the eccentric of the arm positioning slide assembly (203) contacting the record size selector lever (205).

The horizontal movement of the tonearm is limited by the arm segment assembly (170) which strikes the arm positioning slide assembly (203). During the change cycle, the main lever assembly (194) raises the arm positioning slide assembly (203), bringing it within reach of the spring stud (165).

On completion of the change cycle (i. e. set-down of the tonearm on the record), the arm positioning slide assembly (203) is again released and returns to its normal position. It thus moves out of reach of the spring stud (165), permitting the tonearm to move horizontally without hindrance while playing a record.

Fig. 7 Tonearm movements and record drop



Record drop

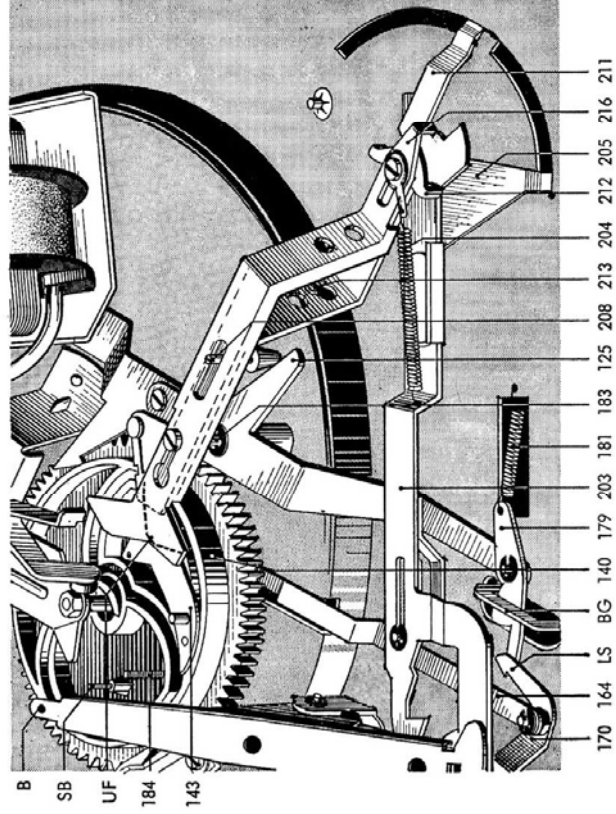
Records to be played are stacked on the appropriate record spindle — AW 2 for standard records, AS 9 for 45 r.p.m. records. Records are dropped by the rotation of the main cam assembly (140) whose cam (AK) guides the cam rocker (195), pushing the change actuator stud (158, fig. 12, 13), and releasing a record by means of the automatic spindle.

The design of the main cam assembly is such that a record can only drop when the tonearm is above the tonearm rest (75) — where it cannot interfere with the largest possible record (12" dia.).

Trouble shooting:

Symptom	Cause	Remedy
Records do not drop	a) Travel of cam rocker (195) too short	a) Re-adjust eccentric R 1. Adjustment is correct when the three supports of the automatic spindle are completely retracted and further rotation of the main cam assembly causes overtravel of about $\frac{1}{8}$ " between the cam and the roller of the cam rocker.
Tonearm strikes during cycling record	b) Automatic spindle not locked in position c) Spindle is defective Tonearm height incorrectly set	b) After inserting spindle, rotate to its stop. c) Replace spindle. Correct by bending the tab (L) of the main lever assembly (194) with the main cam assembly in its null position. Adjust so that the tonearm moves about $\frac{1}{8}$ " above the tonearm rest and the tabs (L) are parallel to the arm segment surface.
Turntable slows down as record drops	Travel of cam rocker (195) too long	Re-adjust eccentric R 1. Adjustment is correct when the three supports of the automatic spindle are completely retracted and further rotation of the main cam assembly causes overtravel of about $\frac{1}{8}$ " between the cam and the roller of the cam rocker.
Tonearm lands beside the tonearm rest (75)	Arm segment assembly (170) out of position	Loosen the machine screws (171, 169) and rotate the arm segment assembly. (Then tighten screw (171) and re-check adjustment.) Adjustment is correct when the tonearm is lowered onto the tonearm rest (75) without binding. Finally tighten screw (169).
Tonearm misses the edge of record	a) Record size selector incorrectly set b) Set-down point incorrectly adjusted	a) Set correctly with the record size button. b) Correct the set-down point by turning the eccentric screw R 5, fig. 11 (visible when record size selector is at 7"). Adjustment is correct when the tonearm sets down about $\frac{1}{16}$ " from the edge of the record.
Turntable stops after the tonearm lowers automatically onto the record	c) Friction surface of the arm segment assembly contaminated with grease d) Record not of standard size Switch arm (125) falls to lock with latch (179)	c) Clean friction surfaces. d) Use standard records. Loosen screw (178). Turn the short arm (KH) on the long switch arm piece (LH) to correct the switch arm position. Turn the main cam to its null position and adjust for about $\frac{1}{64}$ " play between the latch (179) and the support (BG).
Tonearm slowly lowers then suddenly drops onto the record	Main lever (194) out of adjustment	Bend tabs (L) of the main lever (194) down . Take care that the tabs are parallel to the arm segment surface.
Tonearm drops quickly then lowers unsteadily	Main lever (194) out of adjustment	Bend tabs (L) of the main lever (194) up . Take care that the tabs are parallel to the arm segment surface.

Fig. 8 Start cycle



Start Cycle

Operating the start button (78 b, fig. 11) moves the switch lever assembly (212) towards the main cam initiating the following sequence:

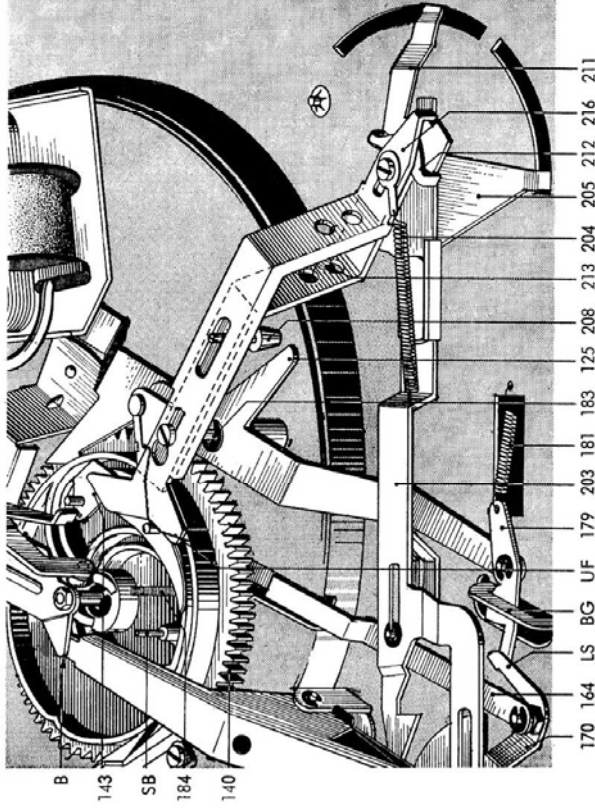
- a) The set screw (208) of the switch lever assembly (212) turns the switch arm (183) mounted on the grooved shaft (183). The rocker assembly (91, fig. 2) moves the drive wheel (86, fig. 2) into contact with the motor pulley and turntable by means of a tension spring. At the same time the switch slide assembly (117, fig. 7) actuates the line switch through the switch arm and the turntable begins to turn.
- b) The switch spring (UF) mounted on the switch lever assembly (212) is brought within range of the cam follower lever (143) so that it is pushed into the change position after the rotation of the main cam.

Operating the start button also releases the start lever (216) pulling it towards the main cam by means of the tension spring (213). This causes the coiled spring (184) to bring the shut-off lever (136, fig. 14) within range of the main cam dog. Thus the shut-off lever drives the main cam.

To prevent mis-operation, the start button is locked during the start cycle (i. e. when the main cam is turning). Just before the main cam reaches its null position (at the end of the change cycle), the start lever is pushed clear of the main cam by means of the start pin (SB) of the main cam. This, in turn, restores the switch lever and start button to their original positions.

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

Fig. 9 "Stop" function

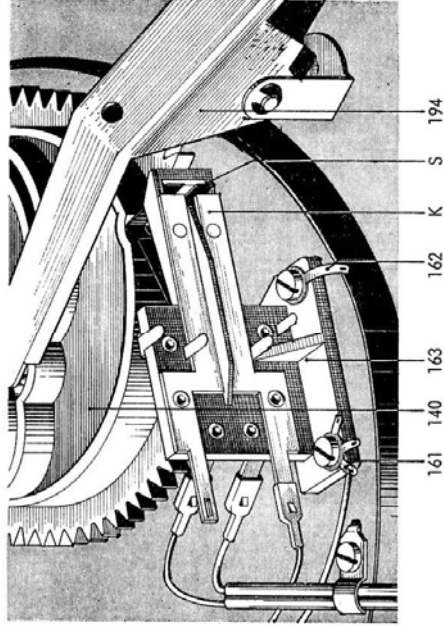


Manual operation

Placing the switch button in "Manual" position initiates the start cycle. The switch lever assembly (212) is pushed towards the main cam and the following sequence is set up:

- a) Set screw (208) mounted on the switch lever (212) rotates the switch arm (125) which is mounted on the grooved shaft (183).
- b) The rocker assembly (91, fig. 4) then moves the drive wheel (86, fig. 2) into contact with the motor pulley and turntable by means of a tension spring.
- c) At the same time, the switch slide (117, fig. 7) actuates the line switch and the turntable begins to rotate.
- d) The switch arm latch (179) rests in the support (BG) in the base plate, locking the switch arm in position to keep the drive wheel in contact with the turntable.

Fig. 10 Muting switch



On reaching the shut-off groove, the tonearm automatically returns to its rest position and the unit shuts off (see shut-off mechanism). However, should the tonearm be lifted off manually and returned to the tonearm rest, the tabs (LS) of the arm segment (170) release the latch (179). The tension spring (181) then returns the switch arm (125) to its initial position, opening the line switch and disengaging the drive wheel.

Stop switching

Placing the switch button in "Stop" position moves the switch lever (212) and switch spring (UF) towards the main cam, as in the start cycle, but only half as far. This causes the main cam to push the cam follower lever (143) to the side, into its stop position.

Muting switch

A muting switch (163) is provided to prevent change cycle noises from being picked up by the tonearm cartridge. The switch springs (S) for both channels are actuated by the main cam (140). In rest position, the muting switch opens.

Trouble shooting:

Symptom	Cause	Remedy
Operating the switch button (78 b) to "Start" actuates the "Stop" cycle	Tension on switch spring (UF) too low, so that cam follower lever (143) is not guided into its change position	Bend switch spring (UF). Check spring position by placing the switch button in "Stop" and rotation main cam back. The rear stud of the cam follower lever (143) should only just touch the switch spring.
Operating the switch button (78 b) to "Stop" actuates the "Start" cycle	Tension on switch spring (UF) too high, so that cam follower lever (143) is guided back to the start position after the stop switching	Bend switch spring (UF). Check spring position by placing the switch button in "Stop" and rotating the main cam back. The rear stud of the cam follower lever (143) should only just touch the switch spring.
Placing the switch button in "Manual" causes turntable to stop	Switch lever assembly out of adjustment	Re-adjust set screw (208) so that the latch (179) overtravels the support (BG) by about $\frac{1}{64}$ " in "Manual" position. Lock the set screw (208) in position with lock nut.
Noises picked up by phono cartridge during the change cycle	Muting switch out of adjustment. The space between the switch springs (S) and muting contacts is too large	Bend the switch springs (S) so that in the null position of the main cam (140) the distance between the switch spring (S) and the contact (K) is about $\frac{1}{64}$ ".
No playback. Muting switch fails to open	Muting switch contacts touching	Bend switch springs (S) so that in the null position of the main cam (140) the distance between the spring (S) and contact (K) is about $\frac{1}{64}$ ".

Fig. 11 Operating controls

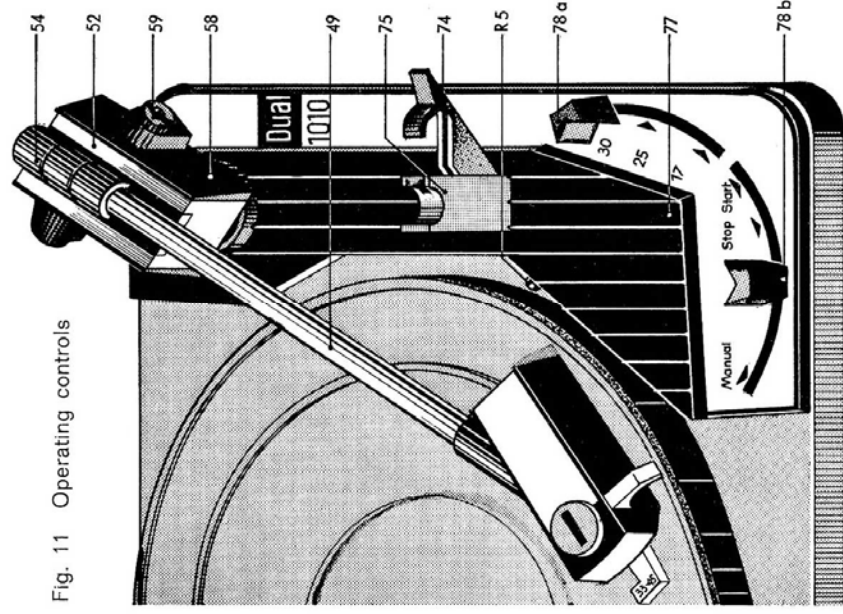
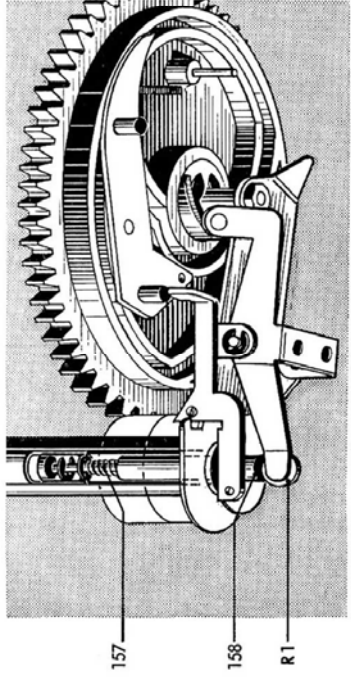


Fig. 12 Change cycle



Shut-off

Shut-off and change functions are determined by the position of the cam follower (143). After the last record of the stack drops, the change lever (153) guides the cam follower lever.

To initiate shut-off, the cam follower lever is brought into position (longer end towards the center of the main cam) by the change lever. After the tonearm has swung over the tonearm rest, the guide post (B, fig. 8, 9) of the main lever (194) contacts the outside of the main cam (140), whose vertical profile causes the tonearm to lower onto its support. The traversing of the tonearm releases the latch (179) from its support (BG, fig. 8, 9). However, the main cam keeps the switch arm (125, fig. 8, 9) in its play position until the end of the change cycle. When the main cam returns to its null position, the switch arm drops into the cut-out in the main cam, the line switch is operated and the drive wheel disengaged.

Fig. 13 Shut-off

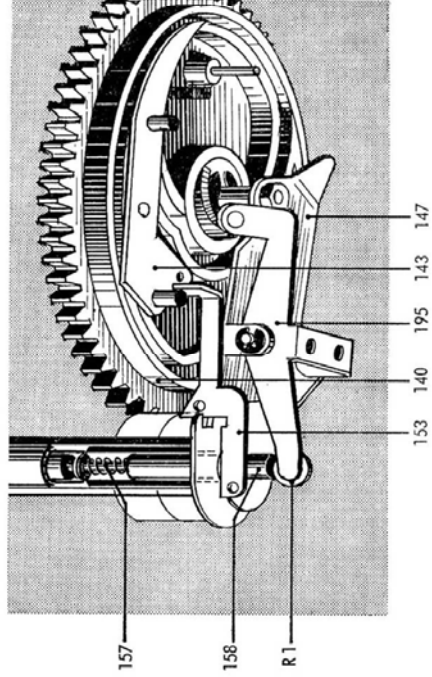
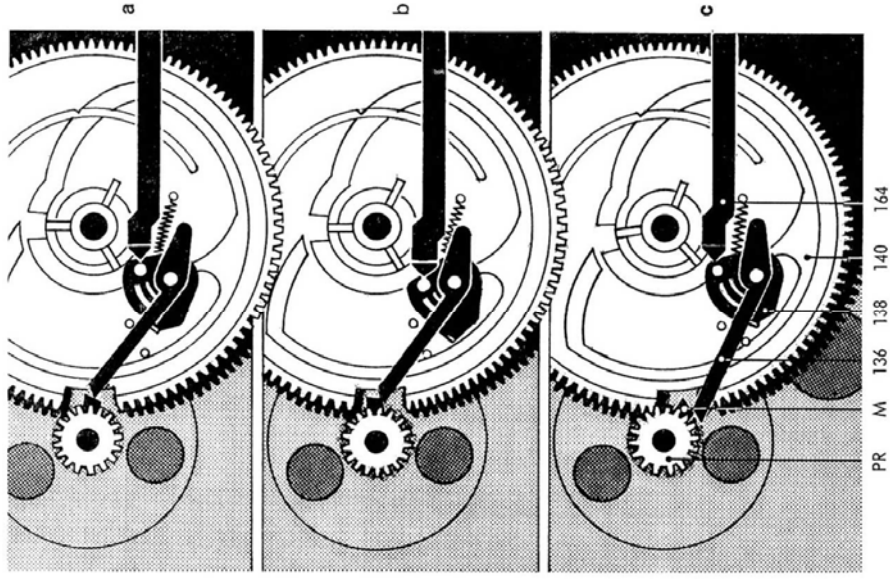


Fig. 14 Change cycle and shut-off operation



Shut-off and change cycle

The dog (M) on the turntable gear (PR) and the shut-off lever (136) actuate both the change cycle at the end of a record as well as the shut-off after the last record of a stack.

As a record is played, the tonearm moves towards the center of the record dependent on the pitch of the record groove. This motion carries the shut-off lever (136) towards the dog (M) by means of the shut-off slide (164). The eccentric dog pushes the shut-off lever back at each revolution, as long as the tonearm advance is only one record groove (fig. 14 a). The shut-off groove with its greater pitch brings the shut-off lever against the dog with greater force (fig. 146). The shut-off lever (136) then engages and causes the main cam (140) to be driven by the turntable gear out of its null position (fig. 14 c).

PR M 136 138 140 164

Trouble shooting

Symptom	Cause	Remedy
Tonearm returns to its rest position after playing each record	Engagement between change lever (153) and cam follower (143) is too great	Re-adjust change lever (153) so that with record on and spindle locked there is about $\frac{1}{64}$ " clearance between change lever and the guide post of the cam follower lever (143). With no record loaded, engagement should be about $\frac{1}{32}$ " to obtain shut-off.
Tonearm continues to run in shut-off grooves after playing record	a) Shut-off groove missing or defective b) Shut-off mechanism triggered too late	a) Use another record. b) Correct the shut-off point by means of eccentric screw (R 3, fig. 6) so that actuation occurs at a record diameter of $4\frac{1}{2}$ " to 5". Check with special record such as Deutsche Grammophon Gesellschaft No. 329013.
Record is not played to the end	Shut-off mechanism triggered too soon	Correct the shut-off point by means of eccentric screw (R 3, fig. 6) so that actuation occurs at a record diameter of $4\frac{1}{2}$ " to 5". Check with special record such as Deutsche Grammophon Gesellschaft No. 329013.
Change cycle keeps repeating	Start lever (216) does not have sufficient overtravel	Bend angle tabs on Manual automatic selector lever (211). Check by operating "Start" button and turning main cam back until the short pin raises the start lever (216). In this position, adjust to obtain clearance of about $\frac{1}{64}$ " between the tabs of the start lever and the manual/automatic selector lever.
Last record keeps repeating	Engagement between change lever (153) and cam follower (143) is too little	Re-adjust change lever (153) so that with record on and spindle locked there is about $\frac{1}{64}$ " clearance between change lever and the guide post of the cam follower lever (143). With no record loaded, engagement should be about $\frac{1}{32}$ " to obtain shut-off.
Acoustic feedback	a) Parts of the chassis (for example, junction board) touching the mounting board b) Connecting leads pulled too tight	a) Correct cut-out according to installation instructions. Re-locate leads. b) Loosen or lengthen cables.

Lubrication

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

Use the following lubricants:

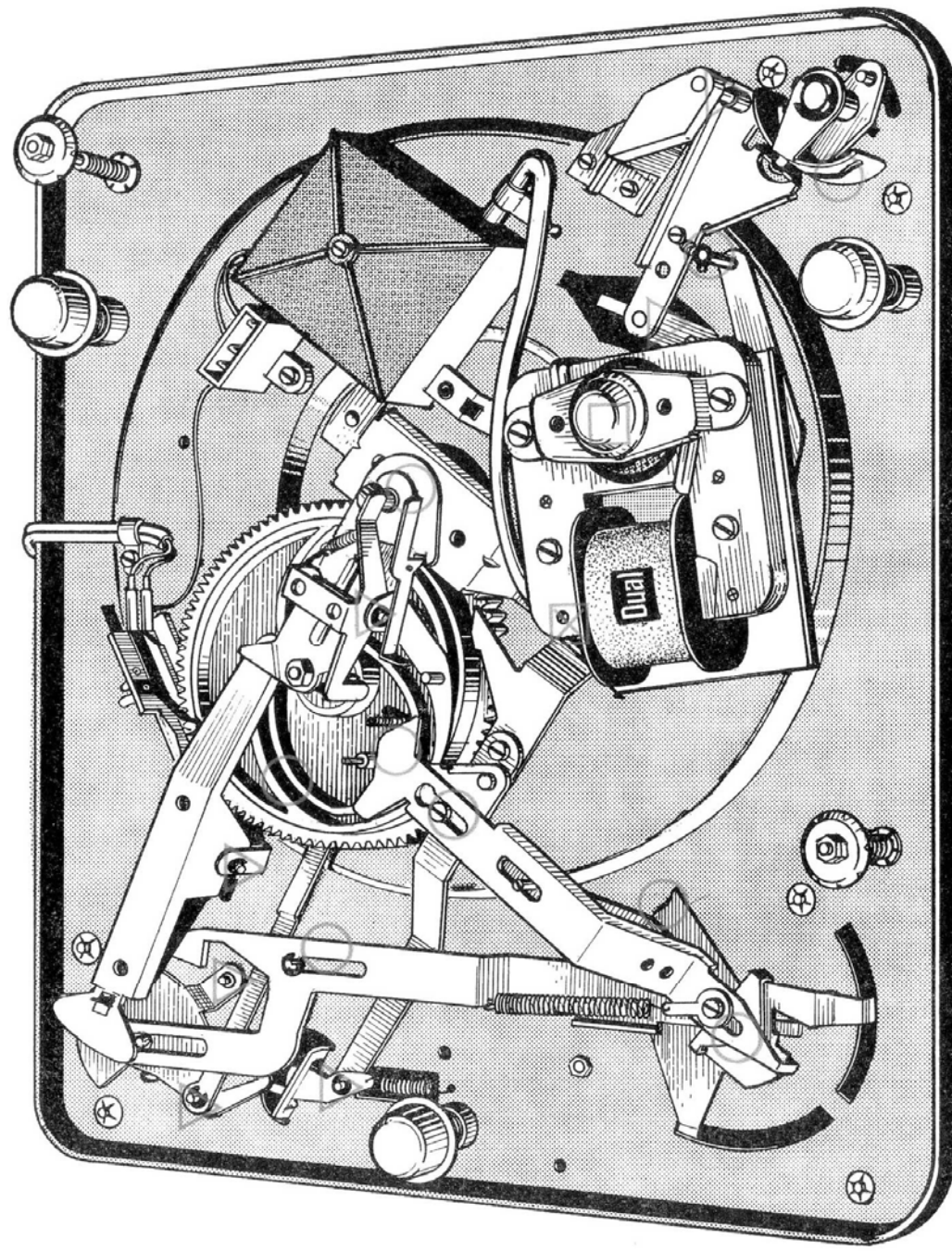
- Fine bearing oil (such as Shell AB 11) for motor bearings and sintered bearings.
- △ Thicker, non-gumming oil (such as Calypsol WIK 700) for sliding and bearing points.
- × Adhesive oil (such as Renotac) for the turntable and drive wheel (not visible on fig. 15).
- Molykote paste G (or equal) for points where greater pressure and friction occur.
- ⊠ Silicone grease.

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 or slippage may result. For the same reasons avoid touching these parts.

When mixing lubricants, chemical reactions frequently occur. To avoid breakdown of lubricants, we recom-

mend the above original lubricants.

Fig. 15 Bottom view showing lubrication points



Exploded view Fig. 16 showing parts above the baseplate

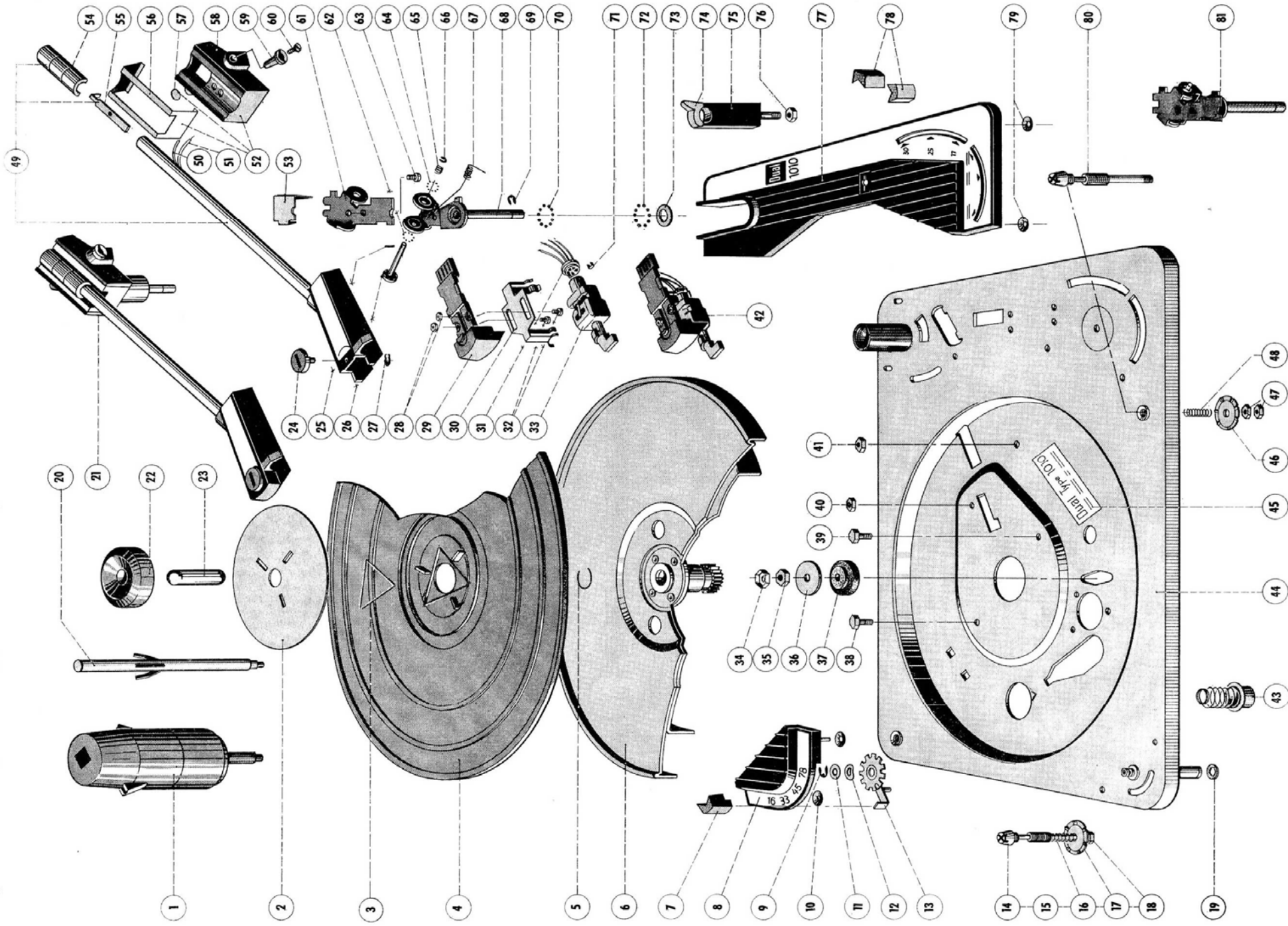
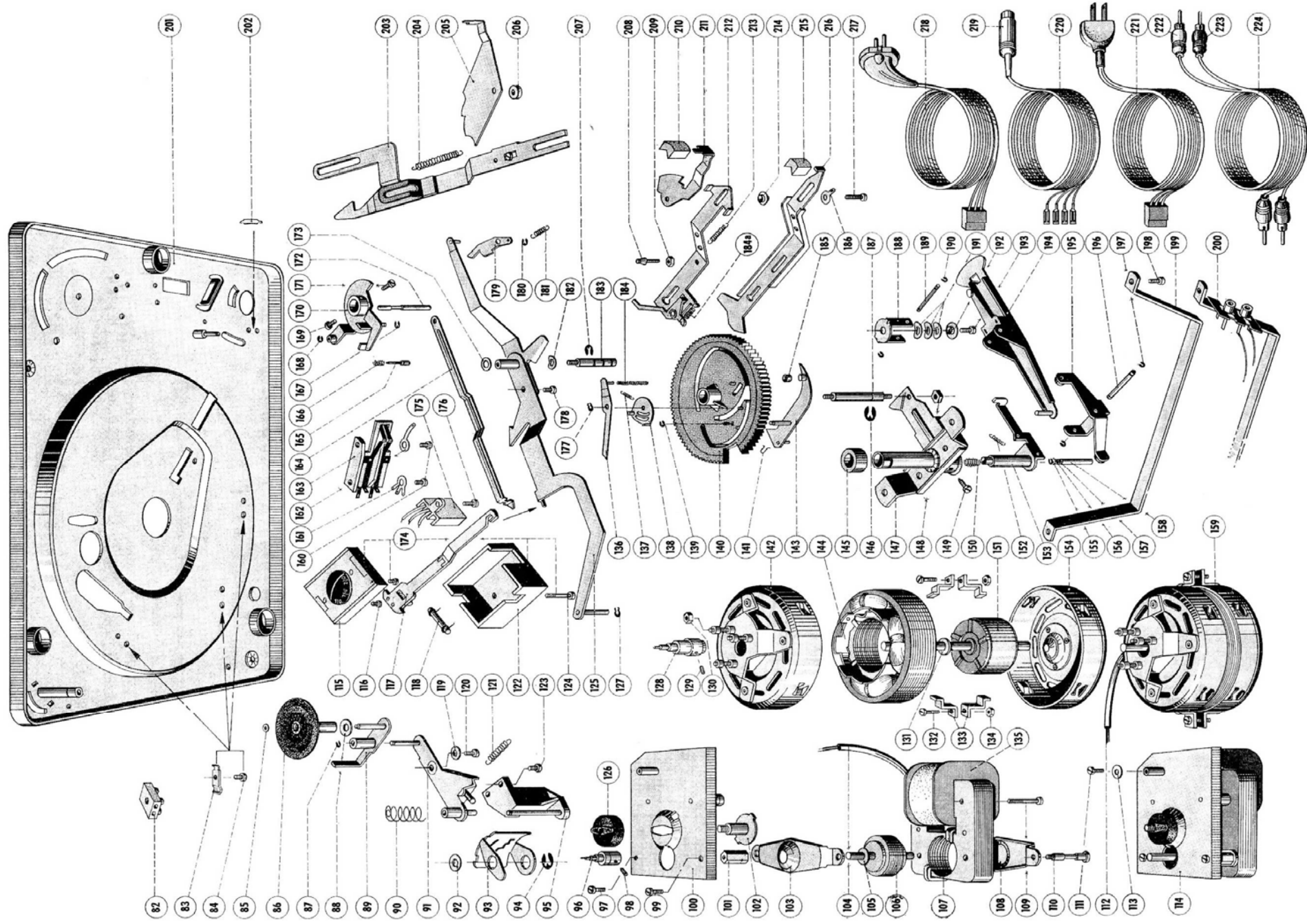


Fig. 17 parts below the baseplate



Replacement parts

Ref. No.	Part No.	Description	Quantity
EX 1	13 E- Ausf. A	45 automatic spindle (accessory)	1
EX 2	12G-87	Turntable washer	1
EX 3	12G-85	Retainer spring	1
EX 4	12G-88	Turntable mat, 11"	1
	12G-84	Turntable mat, 8 1/2"	1
EX 5	12E-214	Retaining ring	1
EX 6	12G-U80	Turntable, 1 1/2" diameter	1
EX 7	12G-U78	Turntable, 8 1/2" diameter	1
EX 8	12G-17	Speed change knob	1
EX 9	12G-U72	Switch plate ass'y	1
EX 10	4650/4	"C" ring 4.0	2
EX 11	12A-92	Spring washer	6
EX 12	5,1/10/1 St	Washer	1
EX 13	4680/5,2/10a	Bowed lockwasher	4
EX 14	12F-U4	Speed change lever ass'y	1
EX 15	12F-252	Shoulder screw	2
EX 16	12F-U186	Shipping screw ass'y	1
EX 17	12F-291	Compression spring	2
EX 18	12F-255	Washer	2
EX 19	M 4/2	Hex. nut BM 4	6
EX 20	8,1/15/0,5 St	Washer	1
EX 21	12C-U208	Automatic spindle AW 2	1
EX 22	15P-U1	Tonearm ass'y (with bearing)	1
EX 23	12G-U82	45 centering disc	1
EX 24	12F-246	Manual spindle	1
EX 25	15P-6	Adjustment knob	1
EX 26	1h,11/5	Threaded shaft 1 h 11 x 5	1
EX 27	15P-U12	Bearing shaft	1
EX 28	4693/4	Grip ring G 4 x 0,8	1
EX 29	M2,6/4b	Hex. nut BM 2,6	2
	15L-U28	Pickup head O 11 ass'y	1
	15L-U29	(with retaining spring for CDS 620/4/45)	1
		Pickup head O 12 ass'y	1
		(plug-in head with plug connections)	1
EX 30	14J-8	Pickup cartridge retainer spring	1
EX 31	14J-U84	Mounting clip ass'y (for pickup)	1
EX 32	Z,2,6/5 a	Machine screw AM 2,6 x 5	2
EX 33	14J-U32	Crystal pickup, stereo, CDS 620/4/45 ass'y	2
		(with needles DN 4 and DN 45)	
EX 34	P,5/1	Safety nut	1
EX 35	M,5/2	Hex. nut M 5	1
EX 36	31 Q-14	Washer	1
EX 37	31 Q-12	Rubber washer	1
EX 38	6k4/4	Hex. screw M 4 x 4	1
EX 39	6k4/4	Hex. screw M 4 x 4	2
EX 40	M,4/2	Hex. nut BM 4	2
EX 41	M,3/7 a	Hex. nut BM 3	6
EX 42	14J-U147	Pickup head O 1 ass'y (grey complete with crystal pickup, stereo, CDS 620/4/45)	2
EX 43	12F-U135	Suspension spring (3 pieces to a set)	1
EX 44	12G-U2	Base plate ass'y	3
EX 45	12G-53	Nameplate, 50 cycle	1
	12G-54	Nameplate, 60 cycle	1
	12G-66	Nameplate, 60 cycle, Canada	1
EX 46	12F-255	Washer	1
EX 47	M,4/2	Hex. nut BM 4	2
EX 48	12F-291	Compression spring	6
EX 49	15P-U3	Tonearm ass'y (with leads)	2
EX 50	15N-22	Tonearm lead (right channel)	1
EX 51	15N-26	Tonearm lead (left channel)	1
EX 52	15P-U5	Arm socket ass'y	1
EX 53	15P-26	Leaf spring	1
EX 54	15P-8	Shell	1
EX 55	15P-4	Fastener	1
EX 56	15P-11	Arm socket cover	1
EX 57	15P-13	Washer	1
EX 58	15P-20	Arm socket	1
EX 59	15P-22	Arm pivot knob	1
EX 60	LS2/6 a	Oval-head screw M 2 x 6	1
EX 61	15P-18	Bearing plate	1
EX 62	4000/150	Steel ball, 1/16" diameter	1
EX 63	Z,3/8 a	Machine screw AM 3 x 8	18
EX 64	4000/150	Steel ball, 1/16" diameter	3
EX 65	15G-76	Compression spring	18
EX 66	4650/2,3	"C" ring 2.3	1
EX 67	15P-28	Torsion spring	9
EX 68	15P-U10	Bearing bracket ass'y	1
EX 69	4650/6	"C" ring 6.0	1
EX 70	4000/200	Steel ball, 5/64" diameter	3
EX 71	14J-13	Jumpers for pickup cartridge	28
EX 72	4000/200	Steel ball, 5/64" diameter	1
EX 73	7,2/12/1 St	Flat washer	28
EX 74	12G-50	Arm latch	1
EX 75	12G-U20	Tonearm rest	1

Ref. No.	Part No.	Description	Quantity
EX 76	M 3/7 a	Hex. nut BM 3	2
EX 77	12G-U 75	Dress-up cover ass'y (metric markings)	1
	12G-U 76	Dress-up cover ass'y (inch markings)	1
EX 78	12G-52	Switch buttons	2
EX 79	12A-92	Spring washer	2
EX 80	12F-252	Shoulder screw	2
EX 81	15P-U 4	Tonearm bearing ass'y	1
EX 82	4010/2	Clamp board for line cord	1
EX 83	12A-325	Cable clamp	3
EX 84	Z 3/4 d	Machine screw AM 3 x 4	5
EX 85	12B-86	Lock-washer	1
EX 86	12G-U 71	Drive wheel ass'y	1
EX 87	4650/3,2	"C" ring 3,2	1
EX 88	11C-138	Washer	1
EX 89	12G-U 4	Lever and stud ass'y	1
EX 90	12F-24	Compression spring	1
EX 91	12F-U 7	Rocker ass'y	1
EX 92	8,1/15/0,5 St	Washer	1
EX 93	12G-6	Switch segment	1
EX 94	4650/6	"C" ring 6,0	3
EX 95	12F-U 8	Support ass'y	1
EX 96	12G-U 45	Motor pulley, 50 cycle	1
	12G-U 55	Motor pulley, 60 cycle	1
EX 97	Z 3,5/7 d	Machine screw AM 3,5 x 7	2
EX 98	G 2,6/3,5	Set screw M 2,6 x 3,5	1
EX 99	Z 3,5/7 d	Machine screw AM 3,5 x 7	2
EX 100	31 Q-U 24	Shield ass'y	1
EX 101	31 G-45	Motor post	2
EX 102	31 Q-U 26	Motor mount ass'y	1
EX 103	31 F-U 37	Bearing housing ass'y, upper	1
EX 104	31 Q-14	Insulating sleeve	1
EX 105	31 F-78	Washer	2
EX 106	31 Q-U 52	Armature ass'y	1
EX 107	31 Q-U 41	Stator 110/150/220 V ass'y	1
	31 Q-U 42	Stator 150 V ass'y	1
	31 Q-U 44	Stator 110/125 V ass'y	1
EX 108	31 F-U 33	Bearing housing, ass'y, lower	1
EX 109	Z 4/18 a	Machine screw AM 4 x 18	2
EX 110	31 F-59	Mounting screw	2
EX 111	Z 3/4 d	Machine screw AM 3 x 4	5
EX 112	J 07 nff/150	Sleeve	1
EX 113	3,2/20/1 St	Washer	1
EX 114	31 Q-U 31	Motor ass'y, 110/150/220 V (less motor pulley)	1
	31 Q-U 32	Motor ass'y 150 V (less motor pulley)	1
	31 Q-U 34	Motor ass'y 110/125 V (less motor pulley)	1
EX 115	12G-U 27	Switch plate (with voltage selector)	1
	12F-U 54	Switch plate (less voltage selector)	1
EX 116	Z 3/8 a	Machine screw AM 3 x 8	3
EX 117	12F-U 57	Switch slide ass'y	1
EX 118	4020/89	Capacitor, 10,000 pF, 700 V	1
EX 119	3,2/6/0,5 St	Washer	1
EX 120	Z 3/3 c	Machine screw AM 3 x 3	2
EX 121	12F-112	Drive wheel tension spring	1
EX 122	12F-152	Power switch cover	1
EX 123	Z 3/5 a	Machine screw AM 3 x 5	2
EX 124	Z 3/30 a	Machine screw AM 3 x 30	1
EX 125	12F-U 43	Switch arm ass'y	1
EX 126	31 Q-U 11	Rubber bumper	1
EX 127	4693/3	Grip ring	1
EX 128	31 N-U 45	Motor pulley, 50 cycle	1
	31 N-U 55	Motor pulley, 60 cycle	1
EX 129	G 2,6/3,5	Set screw M 2,6 x 3,5	1
EX 130	M 4/2	Hex. nut BM 4	6
EX 131	5,3/10/2 F	Washer	1
EX 132	Z 4/12 a	Machine screw AM 4 x 12	2
EX 133	31 N-40	Retaining brackets	4
EX 134	M 4/7	Hex. nut M 4	2
EX 135	31 Q-U 11	Field coil 110/150/220 V	1
	31 Q-U 12	Field coil 150 V	1
	31 Q-U 14	Field coil, 110/125 V	1
EX 136	12G-U 21	Shut-off lever ass'y	1
EX 137	12G-31	Tension spring	1
EX 138	12G-U 19	Friction plate ass'y	1
EX 139	4650/2,3	"C" ring 2,3	1
EX 140	12G-U 73	Main cam ass'y	9
EX 141	12D-57	Snap spring	1
EX 142	31 N-U 6	Upper end bell ass'y	1
EX 143	12F-U 36	Cam follower lever ass'y	1
EX 144	31 N-U 1	Stator ass'y	1
EX 145	12F-U 28	Ball bearing ass'y	1
EX 146	4650/6	"C" ring 6,0	3
EX 147	12G-U 10	Turntable bearing support ass'y	1
EX 148	M 4/2	Hex. nut M 4	6
EX 149	12F-63	Machine screw	1
EX 150	12F-64	Compression spring	1

Ref. No.	Part No.	Description	Quantity
EX 151	31 N - U 15	Rotor ass'y	1
EX 152	12 D - 96	Change lever	1
EX 153	12 G - U 12	Change lever ass'y	1
EX 154	31 N - U 5	Lower end bell ass'y	1
EX 155	4650/1,5	"C" ring 1,5	2
EX 156	2,1/5/0,5 St	Washer	1
EX 157	12 F - 68	Compression spring (for change actuator stud)	1
EX 158	12 G - U 14	Change actuator stud	1
EX 159	31 N - Ausf. A	Motor ass'y (less motor pulley)	1
EX 160	Z 3/4,5 a	Machine screw AM 3 x 4,5	2
EX 161	4103/29	Solder lug	1
EX 162	4103/27	Solder lug	1
EX 163	12 F - U 75	Muting switch ass'y	1
EX 164	12 G - 32	Shut-off slide	1
EX 165	12 F - 168	Spring stud	1
EX 166	12 F - 170	Compression spring	1
EX 167	4650/2,3	"C" ring 2,3	1
EX 168	4650/1,5	"C" ring 1,5	9
EX 169	Z 3/6 c	Machine screw AM 3 x 6	2
EX 170	12 G - U 74	Arm segment ass'y	1
EX 171	Z 3/6	Machine screw AM 3 x 6	1
EX 172	12 G - U 18	Lift screw ass'y	2
EX 173	3,2/8/0,5 St	Washer	1
EX 174	12 G - U 77	Power switch ass'y (with voltage selector)	1
	12 F - U 52	Power switch ass'y (with slide and cover)	1
EX 175	12 F - U 164	Four-pin connector ass'y (for plug-in power cord)	1
EX 176	Z 3/6	Machine screw AM 3 x 6	2
EX 177	4693/2	Grip ring G 2 x 0,6	1
EX 178	Z 3/3 c	Machine screw AM 3 x 3	2
EX 179	12 F - 114	Latch	1
EX 180	4650/2,3	"C" ring 2,3	1
EX 181	11 A - 10	Tension spring	9
EX 182	4680/5,2/8	Bowed lockwasher	2
EX 183	12 F - 100	Grooved shaft	1
EX 184	12 F - 98	Coiled spring	1
EX 184 a	12 F - 137	Tension spring	1
EX 185	12 F - 84	Rubber grommet	1
EX 186	4103/32	Solder lug	1
EX 187	12 D - 36	Main cam bearing post	1
EX 188	12 F - 196	Main lever bearing support	1
EX 189	12 D - 212	Main lever shaft	1
EX 190	4650/2,3	"C" ring 2,3	1
EX 191	4680/5,2/10 a	Bowed lockwasher	9
EX 192	12 B - 50	Spacer	4
EX 193	Z 3/6 b	Machine screw M 3 x 6	1
EX 194	12 F - U 71	Main lever ass'y	1
EX 195	12 D - U 60	Cam rocker	1
EX 196	12 D - 102	Cam rocker shaft	1
EX 197	4650/2,3	"C" ring 2,3	1
EX 198	Z 3/4 d	Machine screw AM 3 x 4	9
EX 199	12 G - 35	Stand	5
EX 200	12 G - U 81	Bracket ass'y with phono jacks	1
	12 F - U 160	Bracket ass'y (with phono jacks for 4-pole motor)	1
EX 201	12 G - U 2	Base plate ass'y	1
EX 202	12 F - 172	Audio cable spring retainer	1
EX 203	12 F - U 64	Arm positioning slide ass'y	1
EX 204	12 A - 452	Tension spring (for arm positioning slide)	1
EX 205	12 F - 118	Record size selector lever	1
EX 206	12 F - 120	Short spacer	1
EX 207	4650/4	"C" ring 4,0	1
EX 208	12 F - U 51	Set screw	2
EX 209	M 3/4	Hex. nut M 3	1
EX 210	12 G - 52	Switch buttons	1
EX 211	12 F - 123	Manual and automatic lever	1
EX 212	12 F - U 53	Switch lever ass'y	2
EX 213	11 A - 10	Tension spring	1
EX 214	12 F - 132	Long spacer	1
EX 215	12 G - 52	Switch buttons	2
EX 216	12 F - 135	Start lever	1
EX 217	Z 3/12 a	Machine screw AM 3 x 12	1
EX 218	12 F - U 184	Power cord, european	1
EX 219	12 G - U 100	Power cord, european, 6 ft.	1
EX 220	4012/21	Output plug, 5 pin (miniature)	1
EX 221	12 F - U 133	Audio output cable (with miniature plug)	1
EX 222	12 F - U 175	Power cord, american	1
EX 223	4012/22	Cinch plug, yellow	1
EX 224	4012/23	Cinch plug, red	1
EX 225 *	12 F - U 127	Audio cable, cinch plug (plug-in)	1
EX 226 *	31 O - 13	Washer	1
EX 227 *	12 F - U 211	Assorted screws and nuts	1
EX 228 *	12 F - U 212	Assorted springs	1
EX 229 *	12 F - U 213	Assorted washers and "C" - rings	1
EX 230 *	12 G - D 2	Operating instructions	1
EX 231 *	4090/140	Touch-up paint charcoal for top plate (2 oz. container)	1
EX 232 *	4090/141	Touch-up paint silver for turntable (2 oz. container)	1
	12 C - U 90	Shipping carton (with fillers)	1

Fig. 18 Dimensions and mounting cutouts

