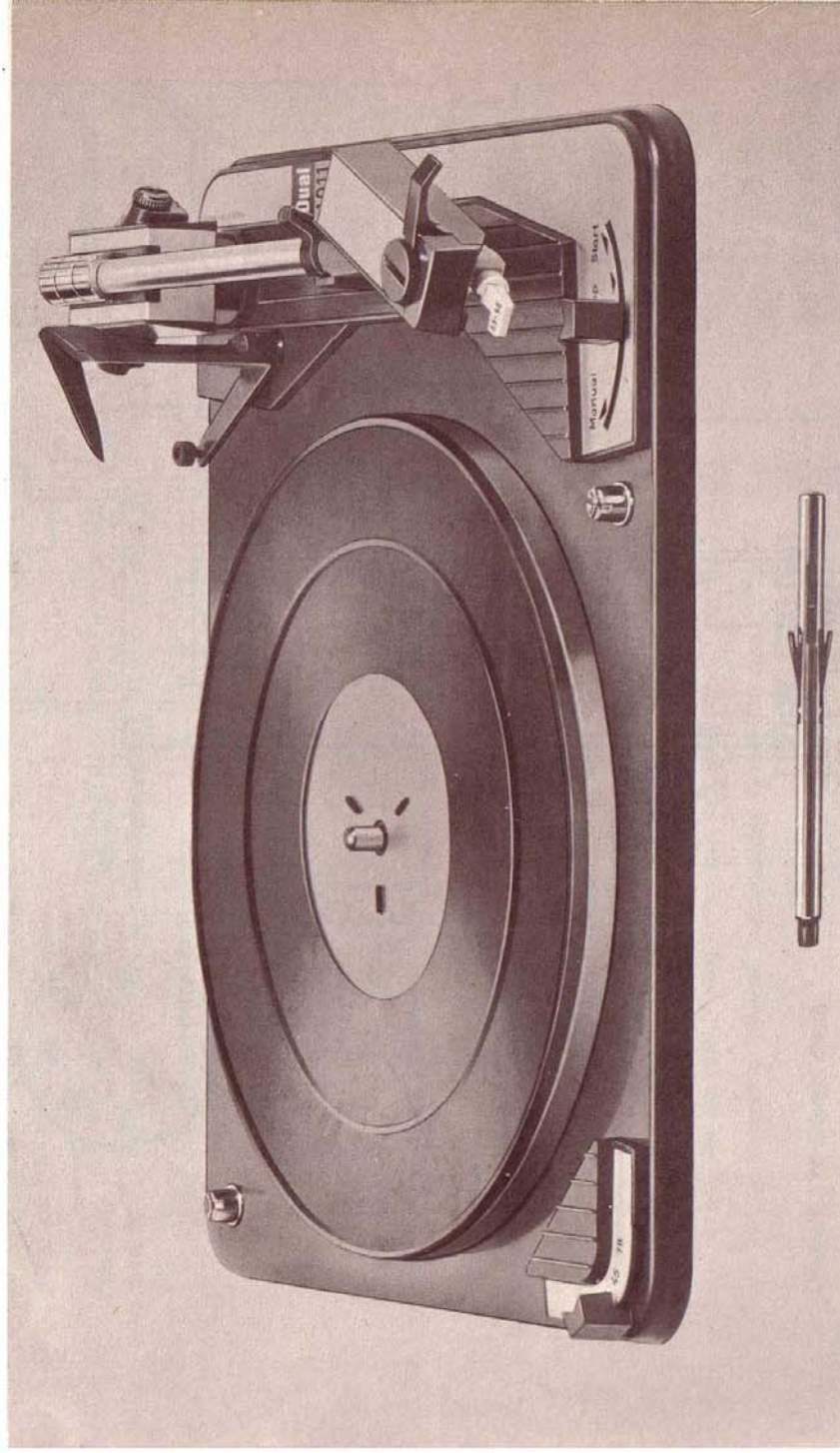


# Dual

## Service Manual Dual 1011



### Technical Data:

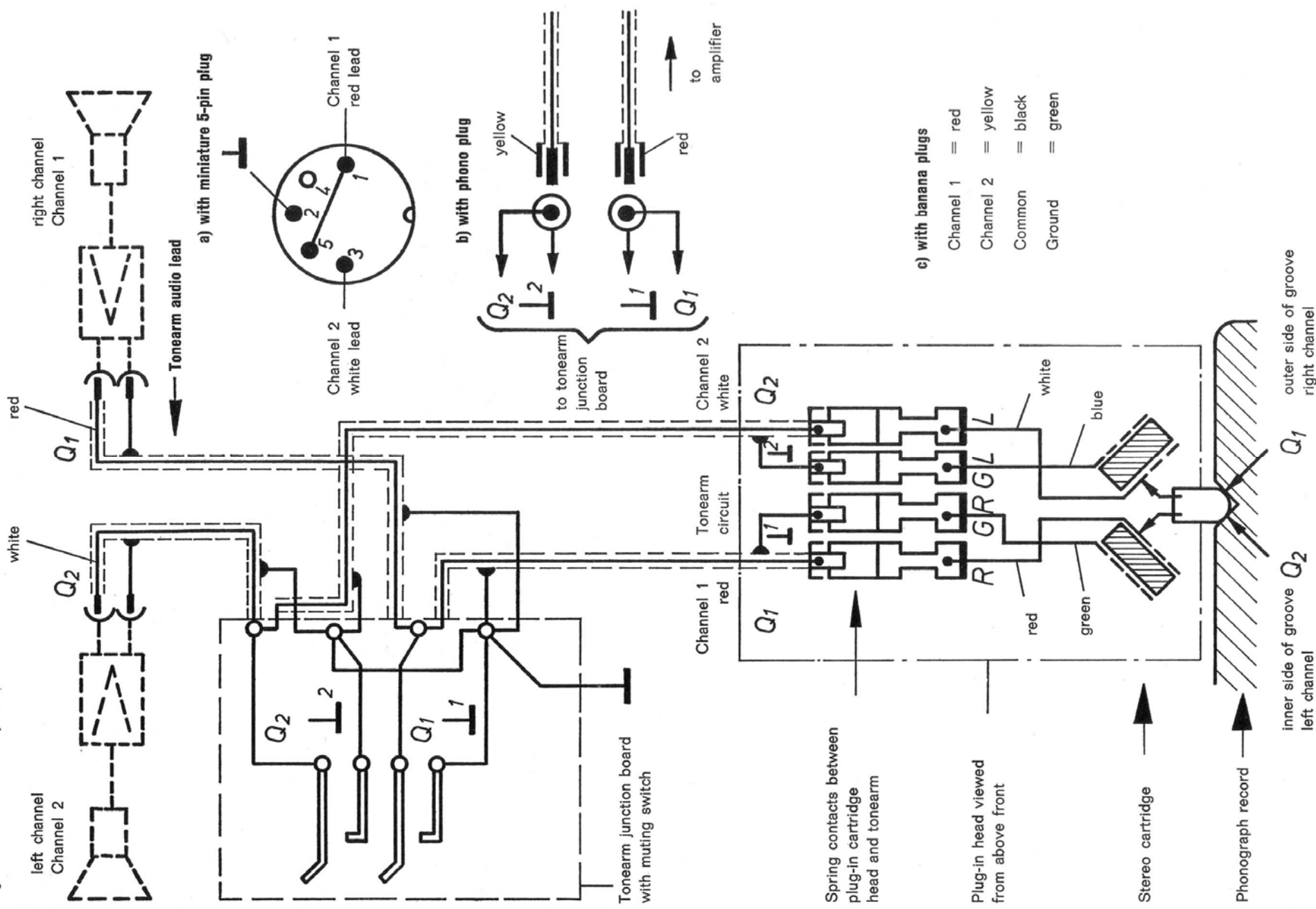
- Line voltage:** Selector for 110, 150 or 220 volts
- Current:** Alternating, 50 or 60 cycle, with appropriate motor pulleys
- Drive:** Two-pole, single-phase, induction motor
- Power consumption:** 6.5 watts approximately
- Wow and flutter:** With 8 $\frac{1}{4}$ " turntable, max.  $\pm$  0.25%; with 10" turntable, max.  $\pm$  0.20%
- Turntable speeds:** 78, 45, 33 $\frac{1}{3}$  and 16 $\frac{2}{3}$  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  $\frac{1}{2}$ " mounting.  
Standard is stereo crystal cartridge CDS 620/4/45
- Weight of unit:** With 8 $\frac{1}{2}$ " turntable, 8 lbs.  
With 10" turntable, 9 lbs.
- Dimensions and mounting cutouts:** See fig. 19

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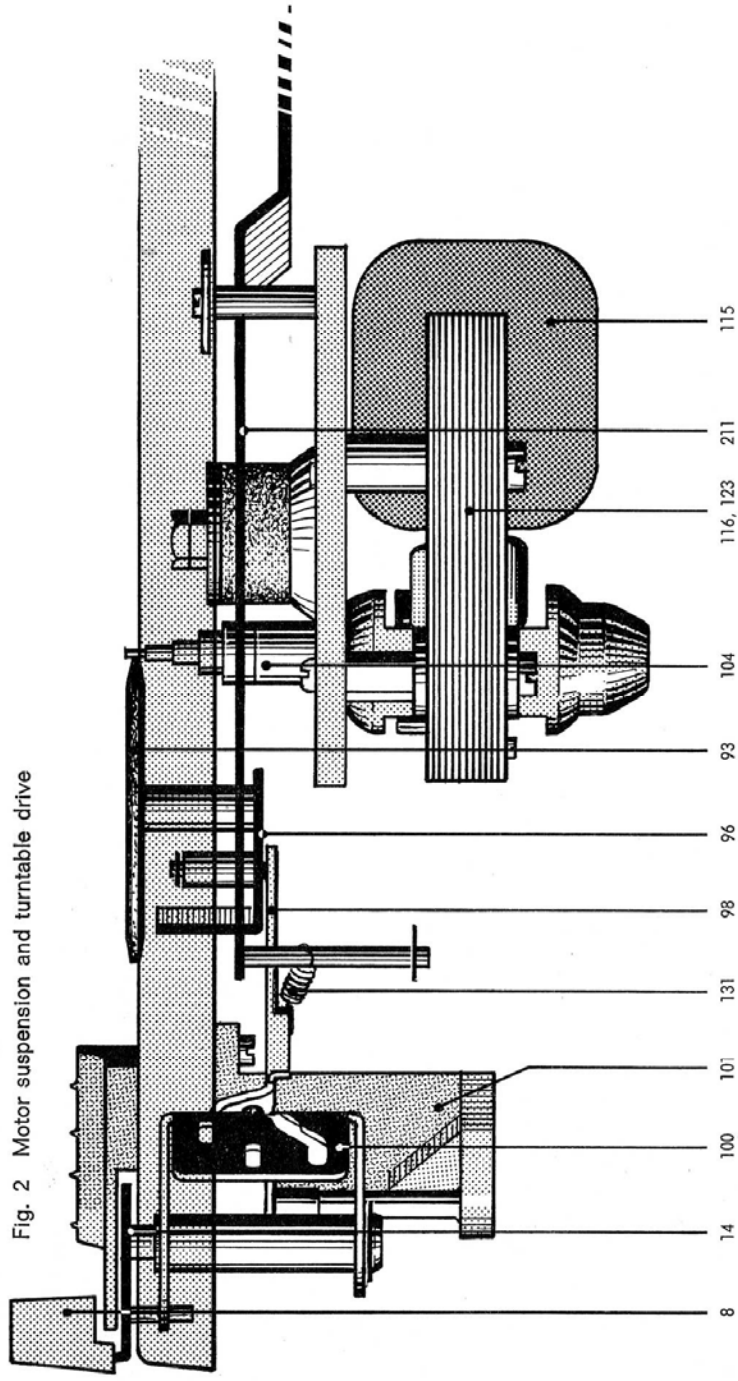
Fig. 1 Tonearm hook-up schematic



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Fig. 2 Motor suspension and turntable drive

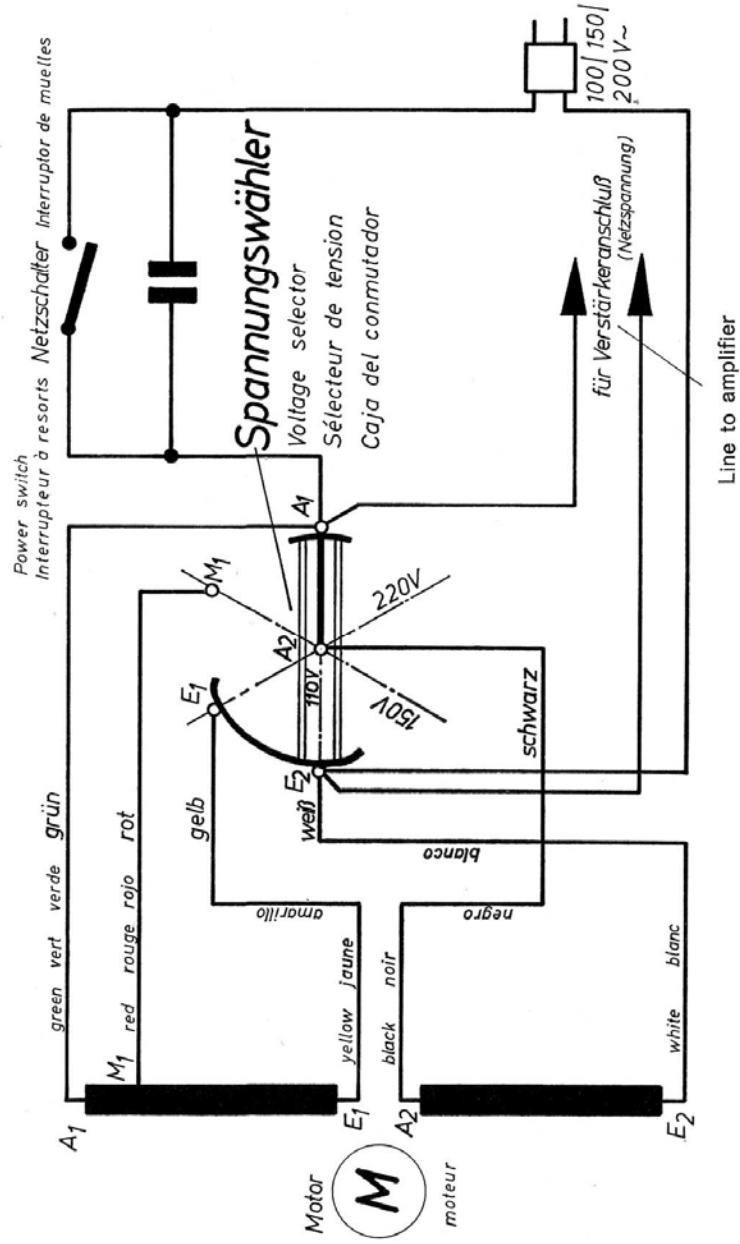


### Motor and drive

The turntable and change cycle are driven by a two-pole induction motor (123) 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 (104).

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 step.

The motor field is mounted before the stator is riveted. For this reason, the complete stator (116) must be replaced when a winding becomes defective.

The turntable is driven by means of the drive wheel (93), 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 (8) causes the switch segment (100) to rotate. The grooves in the switch segment guide the rocker assembly (98) 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
	b) Drive wheel (93) not in contact with turntable	b) Check rocker assembly (98)
	c) Motor pulley (104) loose	c) Tighten motor pulley (104)
Turntable does not come up to speed	a) Motor pulley does not correspond to local line frequency	a) Change motor pulley
	b) Slippage between drive wheel (93) and motor pulley (104)	b) Clean friction surface of drive wheel (93) and motor pulley. Change drive wheel, if necessary.
	c) Friction in motor or drive wheel bearings	c) Clean bearings and relubricate per lubrication chart
	d) The vertical position of the motor pulley (104) does not correspond with the speed setting	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

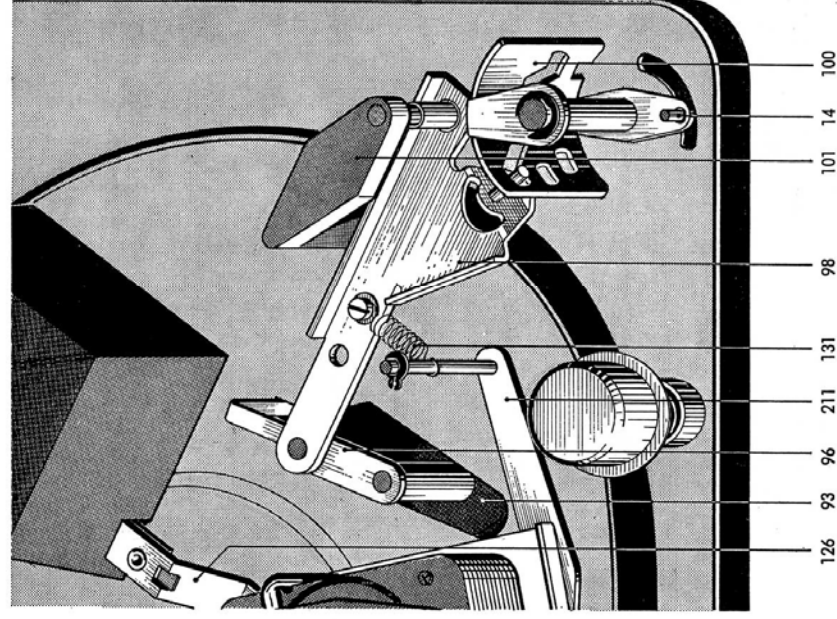
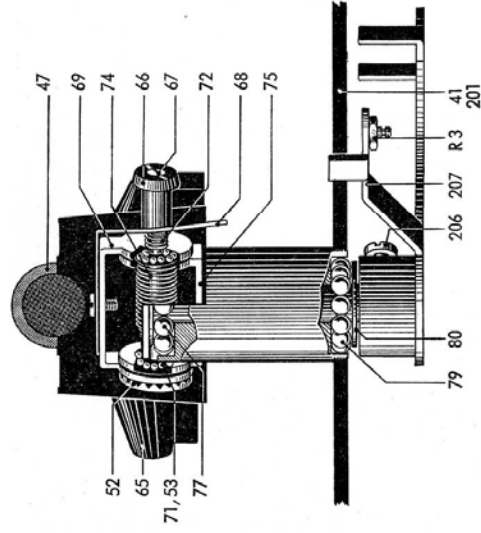


Fig. 5 Tonearm bearing

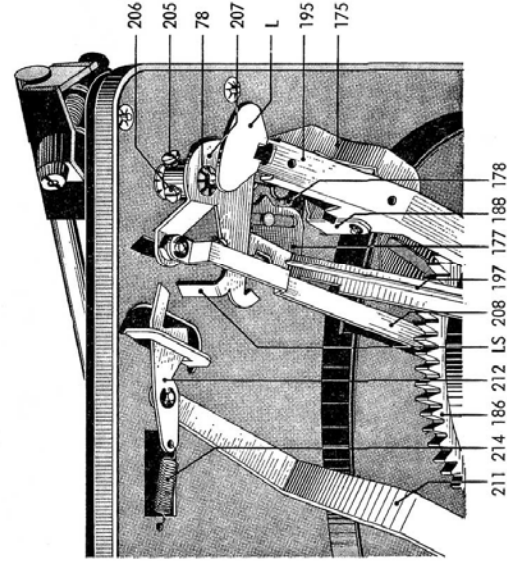


## Tonearm — suspension and tracking pressure

The suspension of the tonearm with 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 1/2 gram.

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 (66) to suitably re-adjust the tracking pressure. Turning counter-clockwise reduces and clockwise increases the tracking pressure, each position changing the pressure by approximately 1/2 gram.

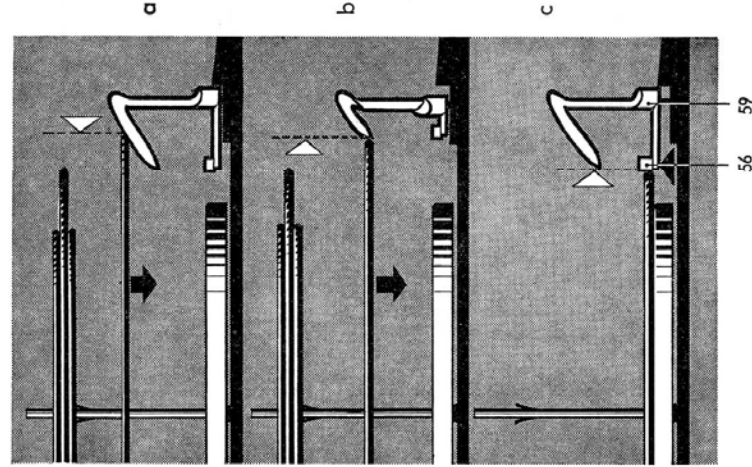
Fig. 6 Tonearm bearing (view from below)



## Tonearm movements

A guide groove located on the underside of the main cam (186) controls automatic lift off and set down of the tonearm as the main cam rotates 360°, by means of the main lever assembly (195) and the lift screw assembly (78). Horizontal movement of the tonearm is controlled by the main lever assembly (195) and the arm segment assembly (207).

Fig. 7 Feeler arm



The set-down point of the tonearm onto the record is determined by the three steps of the striker (177) which correspond to record sizes of 7", 10" and 12". The horizontal movement of the tonearm is limited by the tab (LS) of the arm segment (207) running up against the above-mentioned steps of the striker.

The movement of the feeler arm (59) for the automatic sensing of record sizes of 7", 10" and 12" diameter is controlled by the main cam.

Before the record drops, the main cam frees the positioning lever (175) and moves it to the center of the main cam by means of a tension spring. The carrier (178) secured to the underside of the main plate is coupled to the positioning lever (175) and transfers the inward movement of the positioning lever to the striker (177) which is in contact with the feeler arm (59) and guides it towards the turntable.

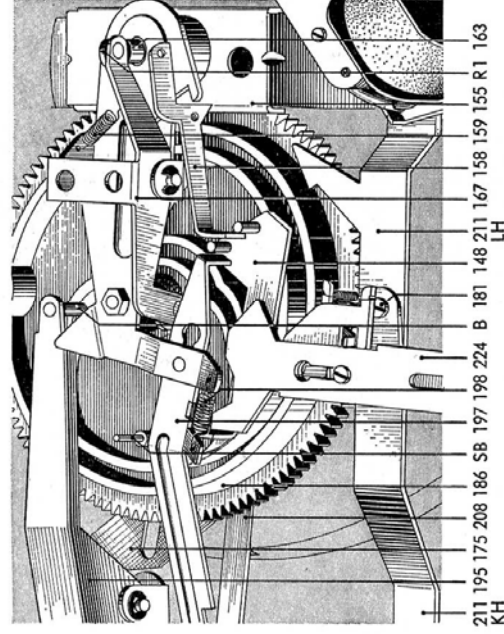
Record drop follows immediately upon the completion of the inward movement of the feeler arm (59). The dropping of 10" and 12" records pushes the feeler arm towards the outside depending on the record

diameter (see Fig. 7 a, 7 b). This in turn brings the striker (177) within range of the tab (LS) of the arm segment and engages the step corresponding to the record diameter.

When using the unit as an automatic record player, the record size sensing results from the feeler roller (56) of the feeler arm which, as it moves inwards, is struck by the outer edge of the 10" or 12" record (see fig. 7 c).

When single records are played, the cam follower lever (148) raises the feeler arm by means of the pusher slide (197).

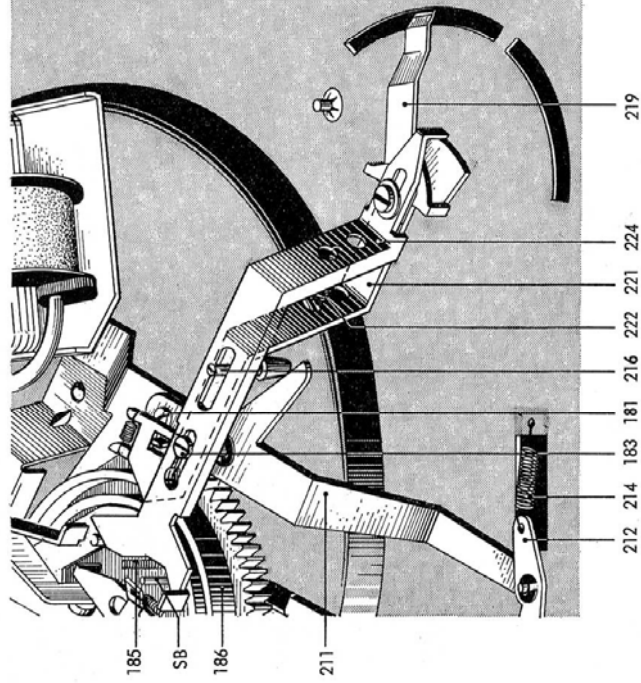
Fig. 8 Cam follower lever and pusher slide



## Trouble shooting

Symptom	Cause	Remedy
Turntable stops after the tonearm lowers automatically onto the record	Switch arm (211) fails to lock with latch (212)	Loosen screw (181). 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 (212) and the support (BG), fig. 10.
Tonearm slowly lowers then suddenly drops onto the record	Main lever (195) out of adjustment	Bend tabs (L) of the main lever (195) down. Take care that the tabs are parallel to the arm segment surface.
Tonearm misses the edge of record	a) Set-down point incorrectly adjusted b) Friction surface of the arm segment assembly (207) contaminated with grease c) Record not of standard size	a) Bend angles (LS) on arm segment assembly (207). Adjustment is correct when the tonearm sets down about $\frac{1}{16}$ " from the edge of the record. b) Clean friction surfaces. c) Use standard records.
Tonearm lands beside the tonearm rest	Arm segment assembly (207) out of position	Loosen the machine screws (205, 206) and rotate the arm segment assembly (207). (Then tighten screw (205) and re-check adjustment.) Adjustment is correct when the tonearm is lowered onto the tonearm rest (82) without binding. Finally tighten screw (206).
Tonearm strikes record during cycling	Tonearm height incorrectly set	Correct by bending the tab (L) of the main lever assembly (195) 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.
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.

Fig. 9 Start and stop operation



## Start cycle

Operating the start button (85, fig. 12) moves the switch lever (221) towards the main cam initiating the following sequence:

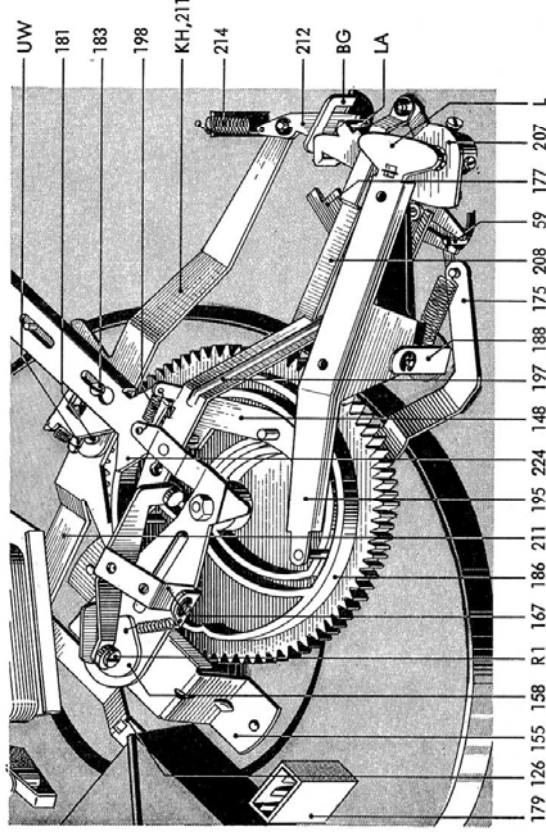
- a) The set screw (216) of the switch lever assembly turns the switch arm (211) mounted on the grooved shaft (183). The rocker assembly (98, fig. 2) moves the drive wheel (93, fig. 2) into contact with the motor pulley and turntable by means of a tension spring. At the same time the switch slide assembly (126) actuates the line switch through the switch arm and the turntable begins to turn.
- b) The switch angle (UW) mounted on the switch lever assembly (221) is brought within range of the cam follower lever (148) 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 (224) pulling it towards the main cam by means of the tension spring (222). This causes the coiled spring (185) to bring the shut-off lever (143, fig. 13) 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. 10 Main cam and guide groove



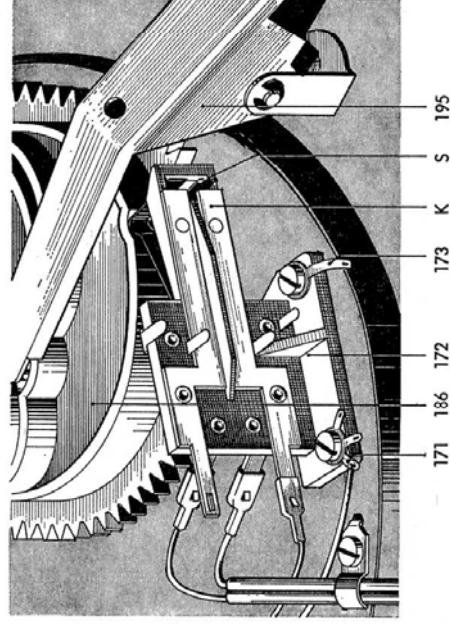
## Stop switching

Placing the switch button in "Stop" position moves the switch lever (221) and switch angle (UW) 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 (148) to the side, into its stop position.

## Muting switch

A muting switch (172) is provided to prevent change cycle noises from being picked up by the tonearm cartridge. The switch spring (s) for both channels are actuated by the main cam. In rest position, the muting switch opens.

Fig. 11 Muting switch





## Manual operation

Placing the switch button in "Manual" position initiates the start cycle. The switch lever assembly (221) is pushed towards the main cam and the following sequence is initiated:

- Set screw (216) mounted on the switch lever (221) rotates the switch arm (211) which is mounted on the grooved shaft (183).
- The Rocker Assembly (98, fig. 2) then moves the drive wheel (93, fig. 2) into contact with the motor pulley and turntable by means of a tension spring.
- At the same time, the switch slide (126, fig. 10) actuates the line switch and the turntable begins rotate.
- The switch arm latch (212) 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.

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 (LA) of the arm segment (207) release the latch (212). The tension spring (214) then returns the switch arm (211) to its initial position, opening the line switch and disengaging the drive wheel.

## Trouble shooting

Symptom	Cause	Remedy
Operating the switch button (85) to "Start" actuates the "Stop" cycle	Tension on switch spring (units with serial numbers below 45,500) too low, so that cam follower lever (148) is not guided into its change position	Bend switch spring on the switch lever (221). Check spring position by placing the switch button in "Stop" and rotating main cam back. The rear studs of the cam follower lever (148) should only just touch the switch spring.
Operating the switch button (85) to "Stop" actuates the "Start" cycle	Tension on switch spring (units with serial numbers below 45,500) too high, so that cam follower lever (148) is guided back to the "Start" position after the "Stop" switching	Bend switch spring on the switch lever (221). Check spring position by placing the switch button in "Stop" and rotating the main cam back. The rear stud of the cam follower lever (148) should only just touch the switch spring.
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 (186) the distance between the switch spring (S) and the contact (K) is about $\frac{1}{64}$ ".
No playback. Muting switch fails to open	Space between switch springs (S) and muting contacts (K) too little or lacking	Bend switch springs (S) so that in the null position of the main cam (186) the distance between the spring (S) and contact (K) is about $\frac{1}{64}$ ".
Placing the switch button in "Manual" causes turntable to stop	Switch lever assembly out of adjustment	Re-adjust set screw (216) so that the latch (212) overtravels the support (BG) by about $\frac{1}{64}$ " in "Manual" position. Lock the set screw (11) in position with lock nut.

Fig. 12 Operating controls

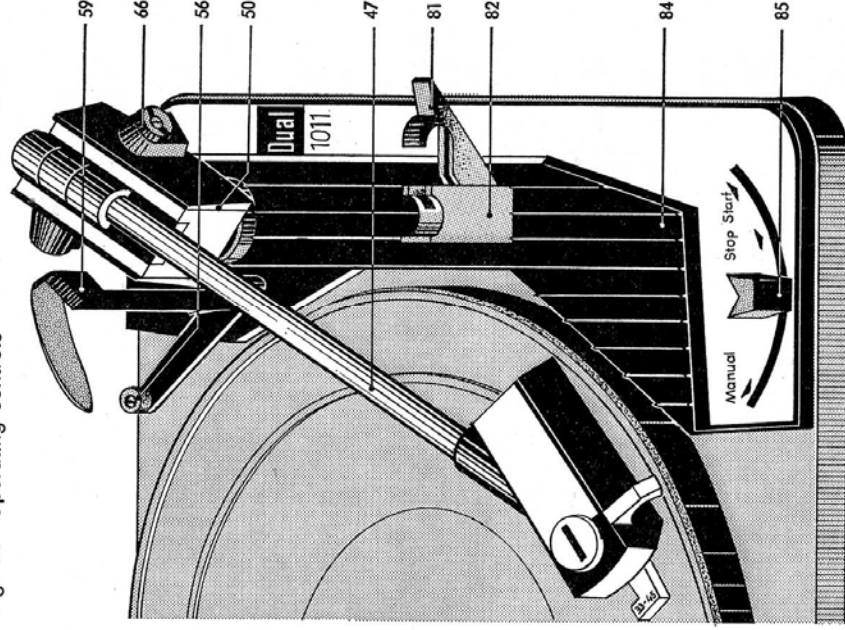
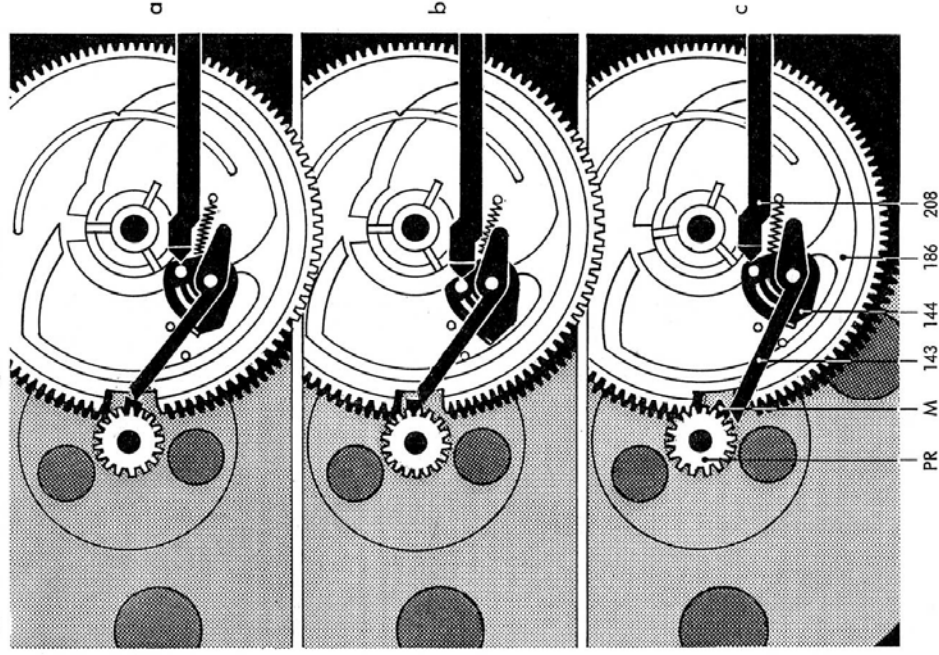


Fig. 13 Initiation of change and shut-off



## Shut-off and change cycle

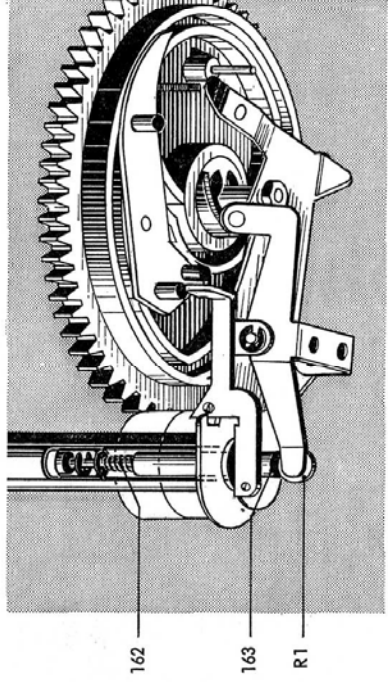
The dog (M) on the turntable gear (PR) and the shut-off lever (143) actuate both the change cycle at the end of a record as well as the shut-off after the last record of a stack.

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 (143) towards the dog (M) by means of the shut-off slide (208). The eccentric dog pushes the shut-off lever back at each revolution, as long as the tonearm advance is only one record groove (fig. 13 a). The shut-off groove with its greater pitch brings the shut-off lever against the dog with greater force (fig. 13 b). The shut-off lever (143) then engages and causes the main cam (186) to be driven by the turntable gear out of its null position (fig. 13 c).

## 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 (186) whose cam guides the cam rocker (167), pushing the change actuator stud (163), and releasing a record by means of the automatic spindle.

Fig. 14 Change cycle

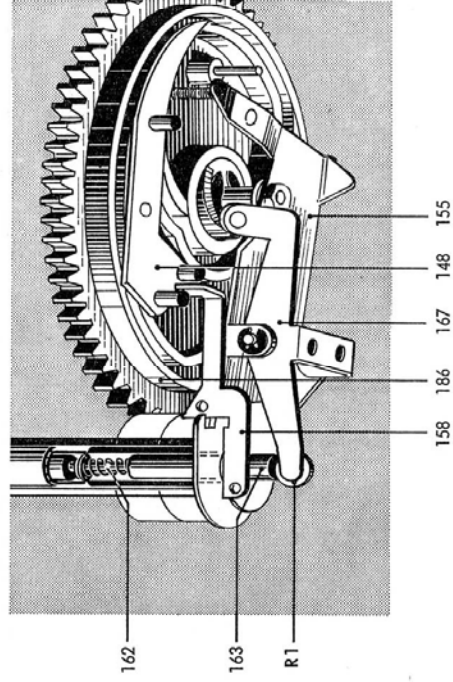


The design of the main cam assembly is such that a record can only drop when the tonearm is above the tonearm rest — where it cannot interfere with the largest possible record (12" dia.).

## Shut-off

Shut-off and change functions are determined by the position of the cam follower (148). After the last record of the stack drops, the change lever (158) guides the cam follower lever.

Fig. 15 Shut-off



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) of the main lever (195, fig. 8) contacts the outside of the main cam (186), whose vertical profile causes the tonearm to lower onto its support. The traversing of the tonearm releases the latch (212) from its support (BG, fig. 10). However, the main cam keeps the switch arm (211, fig. 10) 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.

## Trouble shooting

Symptom	Cause	Remedy
Turntable slows down as record drops	Travel of cam rocker (167) 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 $1/64$ " between the cam and the roller of the cam rocker.
Records do not drop	a) Travel of cam rocker (167) too short. b) Automatic spindle not locked in position c) Spindle is defective	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 $1/64$ " between the cam and roller of the cam rocker. b) After inserting spindle, rotate to its stop. c) Replace spindle.
Tonearm returns to its rest position after playing each record	Engagement between change lever (158) and cam follower (148) is too great.	Re-adjust change lever (158) so that with record on and spindle locked there is about $1/64$ " clearance between change lever (158) and guide post of the cam follower lever (148). With no record loaded, engagement should be about $1/32$ " 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 triggers too late	a) Use another record. b) Correct the shut-off point by means of the eccentric screw (R 3, fig. 5) 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 triggers too soon	Correct the shut-off point by means of the eccentric screw (R 3, fig. 5) 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 (224) does not have sufficient overtravel	Bend angled tabs on manual / automatic selector lever (219). Check by operating "Start" button and turning main cam back until the short pin raises the start lever (224). In this position, adjust to obtain clearance of about $1/64$ " between the tabs of the start lever and the manual / automatic selector lever.
Last record keeps repeating	Too little engagement between change lever (158) and cam follower (148)	Re-adjust change lever (158) so that with record on and spindle locked there is about $1/64$ " clearance between change lever (158) and the guide post of the cam follower lever (148). With no record loaded, engagement should be about $1/32$ " to obtain shut-off.

## 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.

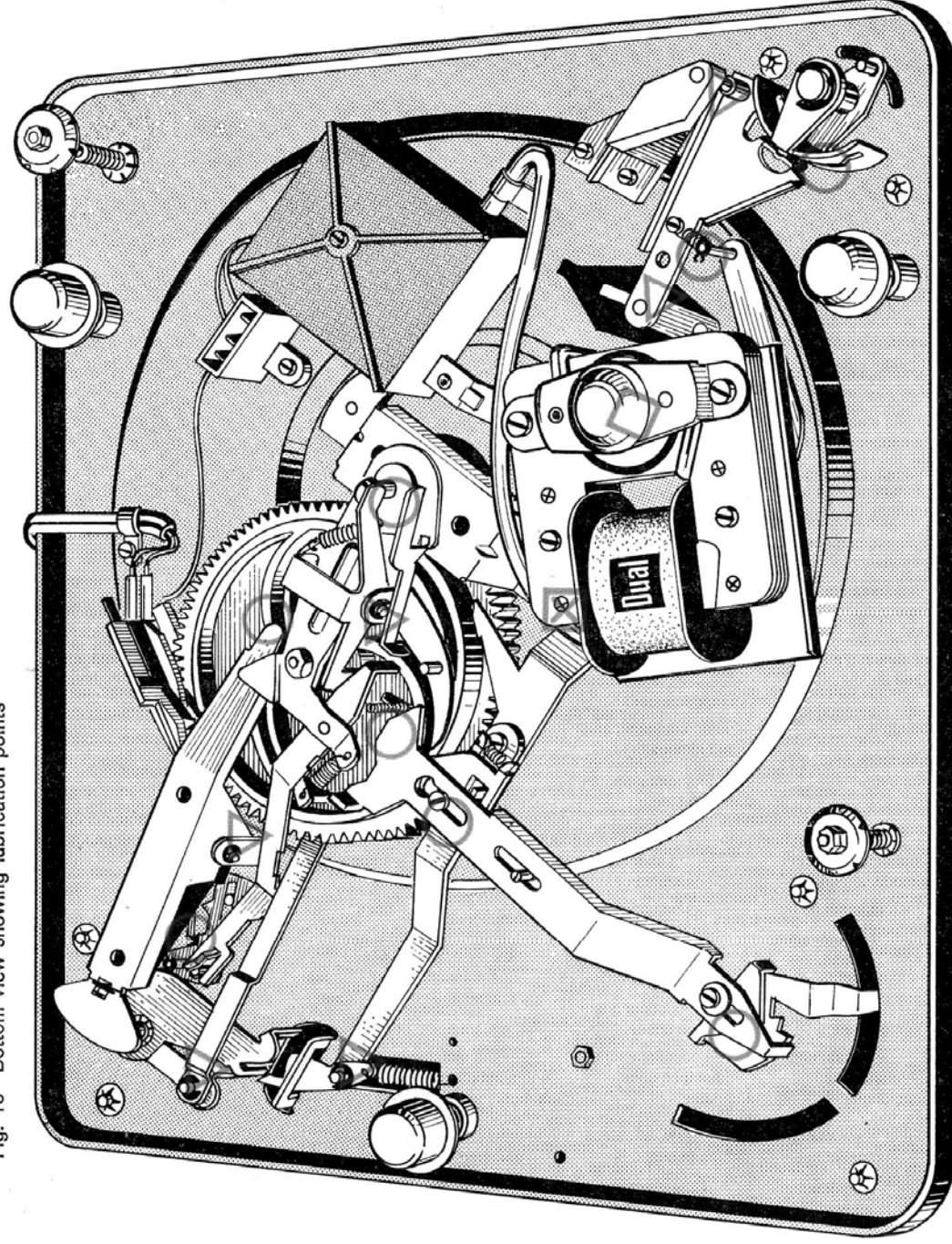
Use the following lubricants:

- 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. 16).
- Molykote paste G (or equal) for points where greater pressure and friction occur.
- ⊠ Silicone grease.

When mixing lubricants, chemical reactions frequently occur. To avoid breakdown of lubricants, we recommend the above original lubricants.

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.

Fig. 16 Bottom view showing lubrication points



**Exploded view** Fig. 17 showing parts above the baseplate

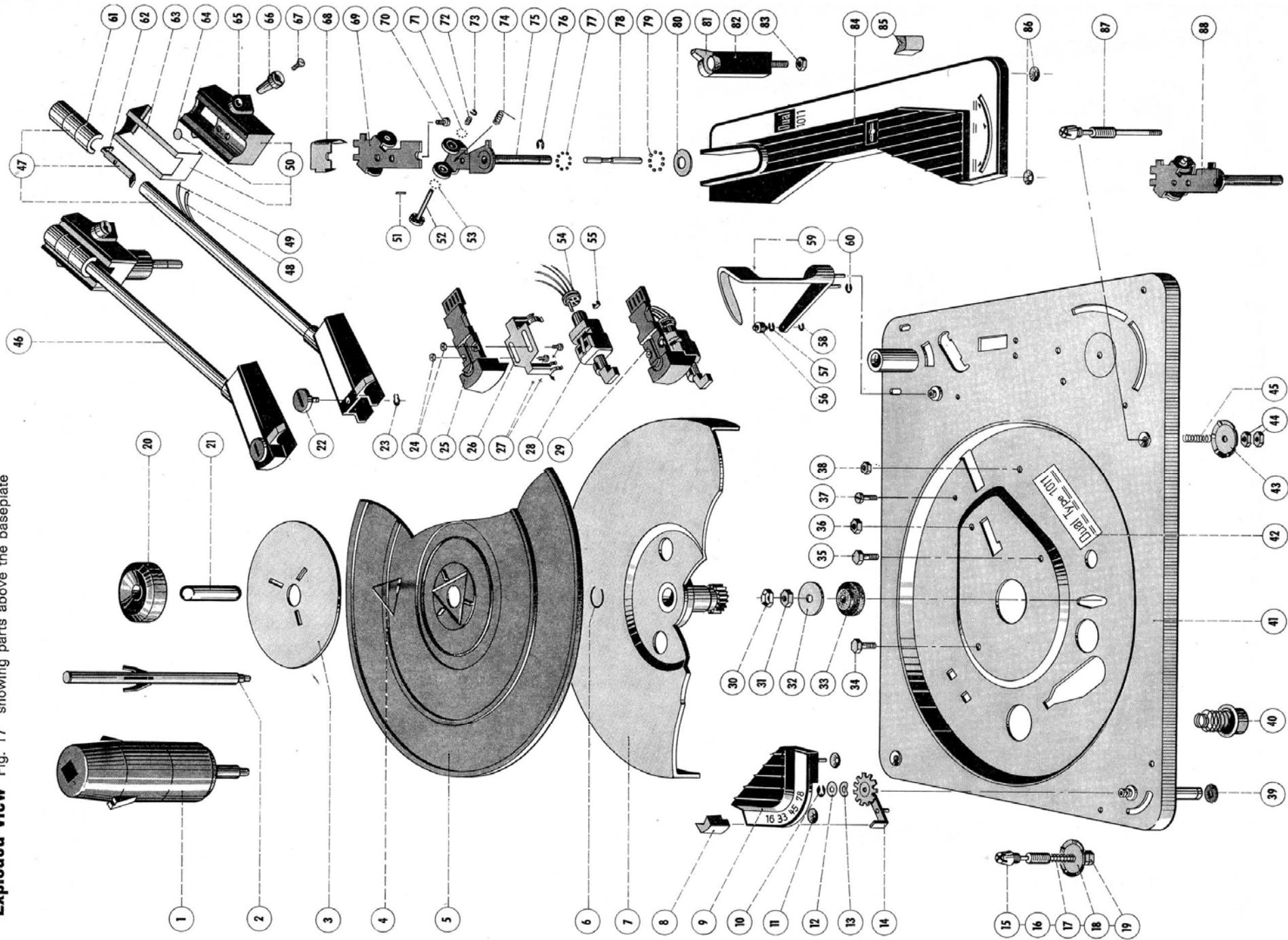
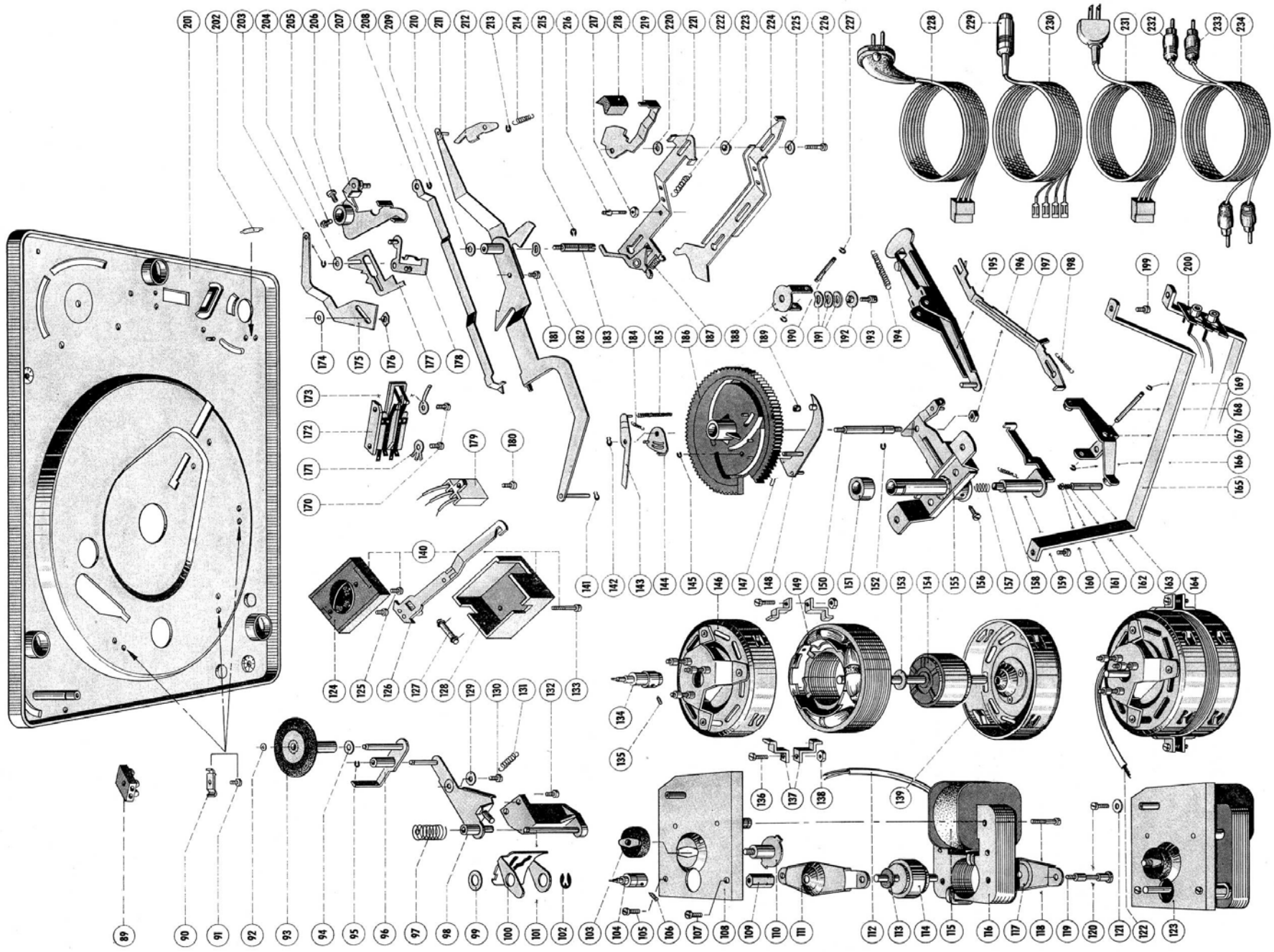


Fig. 18 parts below the baseplate



# Replacement parts

Ref. No.	Part No.	Description	Number p. unit
EX 1	13E - Ausf. A	45 Automatic spindle (accessory)	1
EX 2	12C - U 208	Automatic spindle AW 2	1
EX 3	12G - 87	Turntable washer	1
EX 4	12G - 85	Retainer spring	1
EX 5	12G - 84	Turntable mat, 8 1/2"	1
	12H - 52	Turntable mat, 10"	1
EX 6	12E - 214	Retaining ring	1
EX 7	12G - U 79	Turntable (8 1/2" diameter)	1
	12H - U 56	Turntable (10" diameter)	1
EX 8	12G - 17	Speed change knob	1
EX 9	12G - U 72	Switch plate ass'y	1
EX 10	4650/4	"C" ring 4,0	3
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 - U 4	Speed change lever ass'y	1
EX 15	12F - 252	Shoulder screw	2
EX 16	12F - U 186	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	12G - U 82	45 Centering disc	1
EX 21	12F - 246	Manual spindle	1
EX 22	15P - 6	Adjustment knob	1
EX 23	4693/4	Grip ring	1
EX 24	M 2,6/4b	Hex nut BM 2,6	2
EX 25	15L - U 28	Pickup head O 11 ass'y (for CDS 620/4/45)	1
	15L - U 29	Pickup head O 12 ass'y (with plug connections)	1
EX 26	14J - 8	Pickup cartridge retainer spring	1
EX 27	Z 2,6/5a	Machine screw AM 2,6 x 5	2
EX 28	14J - U 32	Crystal pickup, stereo, CDS 620/4/45 ass'y (with needles DN 4 and DN 45)	1
EX 29	14J - U 147	Pickup head O 1 ass'y (grey) (with CDS 620/4/45)	1
EX 30	P 5/1	Locknut	1
EX 31	M 5/2	Hex nut BM 5	1
EX 32	31 Q - 14	Washer	1
EX 33	31 Q - 12	Rubber washer	1
EX 34,35	6 k 4/4	Hex-head screw M 4 x 4	2
EX 36	M 4/2	Hex nut BM 4	6
EX 37	Z 3/3,5a	Machine screw AM 3 x 3,5	1
EX 38	M 3/7a	Hex nut BM 3	2
EX 39	8,1/15/0,5 St	Washer	1
EX 40	12F - U 137	Suspension spring (3 pieces to a set)	3
EX 41	12H - U 2	Base plate ass'y	1
EX 42	12H - 54	Nameplate, 50 cycle	1
	12H - 55	Nameplate, 60 cycle	1
	12H - 66	Nameplate, 60 cycle, Canada	1
	12F - 255	Washer	2
EX 43	M 4/2	Hex nut BM 4	6
EX 44	12F - 291	Compression spring	2
EX 45	15P - U 1	Tonearm ass'y, with bearings (available disassembled only)	1
EX 46	15P - U 3	Tonearm ass'y (with leads)	1
EX 47	15N - 22	Tonearm lead (right channel)	1
EX 48	15N - 26	Tonearm lead (left channel)	1
EX 49	15P - U 5	Arm socket ass'y	1
EX 50	1h 11/5	Threaded shaft	1
EX 51	15P - U 12	Bearing shaft	1
EX 52	4000/150	Steel ball, 1/16" diameter	18
EX 53	14J - U 84	Mounting clip ass'y (for pickup)	1
EX 54	14J - 13	Jumper for pickup cartridge	1
EX 55	12E - U 38	Feeler arm roller ass'y	1
EX 56	4650/1,5	"C" ring 1,5	3
EX 57	4650/1,2	"C" ring 1,2	1
EX 58	12H - U 54	Feeler arm ass'y	1
EX 59	4650/1,5	"C" ring 1,5	3
EX 60	15P - 8	Shell	1
EX 61	15P - 4	Fastener	1
EX 62	15P - 11	Arm socket cover	1
EX 63	15P - 13	Washer	1
EX 64	15P - 20	Arm socket	1
EX 65	15P - 22	Arm pivot knob	1
EX 66	LS 2/6a	Oval head screw M 2 x 6	1
EX 67	15P - 26	Leaf spring	1
EX 68	15P - 18	Bearing plate	1
EX 69	Z 3/8a	Machine screw AM 3 x 8	1
EX 70	4000/150	Steel ball, 1/16" diameter	3
EX 71	15G - 76	Compression spring	18
EX 72	4650/2,3	"C" ring 2,3	1
EX 73	15P - 28	Torsion spring	8
EX 74	15P - U 10	Bearing post	1
EX 75	4650/6	"C" ring 6,0	1
EX 76	4000/200	Steel ball, 5/64" diameter	3
EX 77	12G - U 18	Lift screw ass'y	1
EX 78			28

Ref. No.	Part No.	Description	Number p. unit
EX 79	4000/200	Steel ball, 5/64" diameter	28
EX 80	7,2/12/1 St	Washer	1
EX 81	12G-50	Arm latch	1
EX 82	12G-U20	Tonearm rest	1
EX 83	M3/7a	Hex nut BM 3	2
EX 84	12H-U53	Dress-up cover ass'y	1
EX 85	12G-52	Switch buttons	1
EX 86	12A-92	Spring washer	6
EX 87	12F-252	Shoulder screw	2
EX 88	15P-U4	Tonearm bearing ass'y	1
EX 89	4010/2	Clamp (for power cord)	1
EX 90	12A-325	Cable clamp	3
EX 91	Z3/4d	Machine screw AM 3 x 4	5
EX 92	12B-86	Lockwasher	1
EX 93	12G-U71	Drive wheel ass'y	1
EX 94	11C-138	Washer	1
EX 95	4650/3,2	"C" ring 3,2	1
EX 96	12G-U4	Lever and stud ass'y	1
EX 97	12F-24	Compression spring	1
EX 98	12F-U7	Rocker ass'y	1
EX 99	8,1/15/0,5 St	Washer	1
EX 100	12G-6	Switch segment	1
EX 101	12F-U8	Support ass'y	1
EX 102	4650/6	"C" ring 6,0	3
EX 103	31Q-11	Buffer	1
EX 104	12G-U45	Motor pulley, 50 cycle	1
EX 105	12G-U55	Motor pulley, 60 cycle	1
EX 106	Z3,5/7d	Machine screw AM 3,5 x 7	2
EX 107	G2,6/3,5	Set screw M 2,6 x 3,5	1
EX 108	Z3,5/7 d	Machine screw AM 3,5 x 7	2
EX 109	31Q-U24	Shield ass'y	1
EX 110	31G-45	Motor post	2
EX 111	31Q-U26	Motor mount ass'y	1
EX 112	31F-U37	Bearing housing ass'y, upper	1
EX 113	J60/sw/190	Insulating sleeve	1
EX 114	31F-78	Washer	2
EX 115	31Q-U52	Armature ass'y	1
EX 116	31Q-U11	Field coil, 110/150/220 V	1
EX 117	31Q-U41	Stator ass'y, 110/150/220 V	1
EX 118	31F-U33	Bearing housing ass'y, lower	1
EX 119	Z4/18a	Machine screw AM 4 x 18	2
EX 120	31F-59	Mounting screw	2
EX 121	Z3/4d	Machine screw AM 3 x 4	5
EX 122	3,2/20/1 St	Washer	1
EX 123	J07 mt/150	Sleeve	1
EX 124	31Q-U31	Motor 110/150/220 V ass'y (less motor pulley)	1
EX 125	12G-U27	Switch plate (with voltage selector)	1
EX 126	12F-U54	Switch plate (less voltage selector)	1
EX 127	Z3/8a	Machine screw AM 3 x 8	3
EX 128	12F-U57	Switch slide ass'y	1
EX 129	4020/89	Capacitor, 10,000 pF, 700 V	1
EX 130	12F-152	Power switch cover	1
EX 131	3,2/6/0,5 St	Washer	1
EX 132	Z3/3c	Machine screw AM 3 x 3	2
EX 133	12F-112	Drive wheel tension spring	1
EX 134	Z3/5a	Machine screw AM 3 x 5	3
EX 135	31N-U45	Machine screw AM 3 x 30	1
EX 136	31N-U44	Motor pulley, 50 cycle	1
EX 137	G2,6/3,5	Motor pulley, 60 cycle	1
EX 138	Z4/12a	Set screw M 2,6 x 3,5	2
EX 139	31N-40	Machine screw AM 4 x 12	4
EX 140	M4/7	Retaining brackets	2
EX 141	31N-U5	Hex nut BM 4	1
EX 142	12G-U77	Lower end bell ass'y	2
EX 143	12F-U52	Power switch ass'y (with voltage selector)	1
EX 144	4693/3	Power switch ass'y (with slide and cover)	1
EX 145	4693/2	Grip ring	1
EX 146	12G-U21	Grip ring	1
EX 147	12G-U19	Shut-off lever ass'y	1
EX 148	4650/2,3	Friction plate ass'y	1
EX 149	31N-U6	"C" ring 2,3	8
EX 150	12D-57	Upper end bell ass'y	1
EX 151	12H-U10	Snap spring	1
EX 152	31N-U1	Cam follower lever ass'y	1
EX 153	12D-36	Stator ass'y	1
EX 154	12F-U28	Main cam bearing post	1
EX 155	4650/6	Ball bearing	1
EX 156	5,3/10/2 F	"C" ring 6,0	3
EX 157	31N-U15	Washer	1
EX 158	12H-U4	Rctor ass'y	1
EX 159	12F-63	Turntable bearing support ass'y	1
EX 160	12G-U12	Machine screw	1
EX 161	12D-64	Compression spring	1
EX 162	12G-U12	Change lever ass'y	1
EX 163	12D-96	Change lever tension spring	1



Ref. No.	Part No.	Description	Number p. unit
EX 160	4650/1,5	"C" ring 1,5	3
EX 161	2,1/5/0,5 St	Washer	1
EX 162	12 F - 68	Compression spring (for change actuator stud)	1
EX 163	12 G - U 14	Change actuator stud	1
EX 164	31 N - Ausf. A	Motor ass'y (less motor pulley)	1
EX 165	12 G - 35	Stand	1
EX 166	4650/2,3	"C" ring 2,3	8
EX 167	12 D - U 60	Cam rocker	1
EX 168	12 D - 102	Cam rocker shaft	1
EX 169	4650/2,3	"C" ring 2,3	1
EX 170	Z 3/4,5a	Machine screw AM 3 x 4,5	8
EX 171	4103/29	Solder lug	2
EX 172	12 F - U 75	Muting switch ass'y	1
EX 173	4103/27	Solder lug	1
EX 174	3,2/10/0,3 St	Washer	1
EX 175	12 H - 28	Positioning lever	1
EX 176	12 H - 30	Threaded bushing	1
EX 177	12 E - 222	Striker	1
EX 178	12 E - U 212	Carrier ass'y	1
EX 179	12 F - U 164	Four-pin connector ass'y (for plug-in power cord)	1
EX 180	Z 3/6c	Machine screw AM 3 x 6	2
EX 181	Z 3/3c	Machine screw AM 3 x 3	2
EX 182	4680/5,2/8	Bowed lockwasher	1
EX 183	12 F - 100	Grooved shaft	1
EX 184	12 G - 31	Tension spring	1
EX 185	12 F - 98	Coiled spring	1
EX 186	12 H - U 57	Main cam ass'y	1
EX 187	12 F - 137	Tension spring	1
EX 188	12 F - 196	Main lever bearing support	1
EX 189	12 F - 84	Rubber grommet	1
EX 190	12 D - 212	Main lever shaft	1
EX 191	4680/5,2/10a	Bowed lockwasher	1
EX 192	12 B - 50	Spacer	4
EX 193	12 H - 34	Socket screw	1
EX 194	12 E - 223	Tension spring (for arm positioning slide)	1
EX 195	12 F - U 71	Main lever ass'y	1
EX 196	M 4/2	Hex nut BM 4	1
EX 197	12 H - 32	Pusher slide	6
EX 198	12 H - 36	Tension spring	1
EX 199	Z 3/4d	Machine screw AM 3 x 4	1
EX 200	12 G - U 81	Bracket ass'y (with phono jacks)	5
EX 201	12 F - U 160	Bracket ass'y (with phono jacks, for 4-pole motor)	1
EX 202	12 H - U 2	Base plate ass'y	1
EX 203	4650/4	Audio cable spring retainer	1
EX 204	5,2/9,5/0,5 St	"C" ring 4,0	3
EX 205	Z 3/6c	Washer	1
EX 206	Z 3/5a	Machine screw AM 3 x 6	1
EX 207	12 H - U 18	Machine screw AM 3 x 5	2
EX 208	12 H - 26	Arm segment ass'y	3
EX 209	4650/2,3	Shut-off slide	1
EX 210	3,2/8/0,5 St	"C" ring 2,3	1
EX 211	12 F - U 43	Washer	8
EX 212	12 F - 114	Switch arm ass'y	1
EX 213	4650/2,3	Latch	1
EX 214	11 A - 10	"C" ring 2,3	1
EX 215	4650/4	Tension spring	8
EX 216	12 F - U 51	Set screw	3
EX 217	M 3/4	Hex nut BM 3	1
EX 218	12 G - 52	Switch buttons	1
EX 219	12 F - 123	Manual / Automatic selector lever	1
EX 220	12 H - 17	Spacer ring	1
EX 221	12 F - U 41	Switch lever ass'y (serial nos. from 45,500)	1
EX 222	12 H - U 52	Switch lever ass'y (serial nos. to 45,500)	1
EX 223	12 H - 22	Start lever tension spring	1
EX 224	12 F - 132	Long spacer	1
EX 225	12 H - 20	Start lever	1
EX 226	3,2/10/0,5 St	Washer	1
EX 227	Z 3/12a	Machine screw AM 3 x 12	1
EX 228	4650/2,3	"C" ring 2,3	8
EX 229	4012/21	Power cord, european	1
EX 230	12 F - U 133	Miniature 5-pin plug	1
EX 231	12 G - U 175	Audio output cable (with miniature plug)	1
EX 232	4012/22	Power cord, american	1
EX 233	4012/23	Phono plug (yellow)	1
EX 234	12 F - U 127	Phono plug (red)	1
EX 235 *	31 Q - 13	Audio output cable (with phono plugs)	1
EX 236 *	12 F - U 211	Washer	1
EX 237 *	12 F - U 212	Assorted screws and nuts	1
EX 238 *	12 F - U 213	Assorted springs	1
EX 239 *	12 H - D 2	Assorted washers and "C" rings	1
EX 240 *	4090/140	Operating instructions	1
EX 241 *	4090/141	Touch-up paint (black for base plate, 2 oz. container)	1
EX 242 *	12 G - U 90	Touch-up paint (silver for turntable, 2 oz. container)	1
		Shipping carton (with fillers)	1

