

GA212 Turntable

Service
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Service Manual

PHILIPS AUDIO VIDEO SYSTEMS CORP.

AUDIO SERVICE DEPT.

• **31 McKEE DRIVE** •

MAHWAH, NEW JERSEY 07430

PHILIPS

OPERATION

a. Stabilisation of the supply voltage

The supply voltage has been adjusted to -9 V. Assume that this voltage drops, when, for instance, the load of the circuit is increased. Via D458 and R472 the base of TS441 becomes less negative in regard to the emitter. This emitter has been adjusted to a constant voltage owing to diode D457 being adjusted to its knee voltage.

As a result of the voltage drop, TS441 will conduct more. Consequently, the collector current of TS441 will also rise. Thus, TS402 will become more conductive.

The circuit is so dimensioned that owing to the fact that TS405 is more conductive, the emitter collector voltage decreases so much that the drop in supply voltage is just compensated.

b. Start circuits

1. Switching on the mains

The circuit is so designed that, when the mains voltage is switched on with SK1, the transistors TS426 and TS431 conduct and the transistors TS428 and TS429 do not conduct. Consequently, no voltage is applied. Transistor TS435 is conducting so that LA414 (stop) is burning.

Note:

The transistors TS426 and TS428 as well as TS431 and TS429 are bistable multivibrators.

2. Start 33 r.p.m. or 45 r.p.m.

If the touch control (33 r.p.m.) is touched by a finger, the base of TS432 is connected to earth through the finger resistance of some M Ω . As a result, TS432 starts conducting. The collector current flows via R550 to the base of TS428 so that TS428 becomes conductive and TS426 does not conduct any more.

(Bistable multivibrator). Lamp LA410 (33 r.p.m.) is burning. A positive voltage is applied to the collectors of TS438 and TS439 via D447. Consequently, the motor is then running.

TS435 then conducts no longer and LA414 ("stop") goes out. As TS428 becomes conductive, TS436 also starts conducting via R565. As a result, the speed control 33 r.p.m. is switched and the motor runs at a speed of 33 r.p.m.

The start 45 r.p.m. happens in the same way as the start 33 r.p.m. from the position "stop".

Switching over from 33 r.p.m. to 45 r.p.m. and vice versa always has to take place via "Stop".

Switching over directly from 33 r.p.m. to 45 r.p.m. is prevented as follows:

Example:

The apparatus is running at a speed of 33 r.p.m. The collector of TS428 is connected to earth. The emitter of TS433 is connected to the collector via R553. This implies that TS433 can never become conductive as long as TS428 is conducting. If touch control 45 r.p.m. is now switched on, nothing happens.

To prevent TS428 and TS429 from becoming conductive at the same time, they have been cut off as follows:

Example:

If TS428 conducts, TS426 does not conduct (bistable multivibrator). Via D446 a current flows to the base of TS431. Consequently, TS431 is being kept conductive so that TS429 cannot become conductive.

c. Stop circuits

1. "Stop" with touch control

Assume that the apparatus is running in position 33 r.p.m. So TS428 is conductive.

If the "stop" touch control is operated by a finger, the base of TS434 is connected to earth owing to the finger resistance, and TS434 starts conducting. The collector current of TS434 flows to the base of TS426 via R557 and R530. TS426 then starts conducting, whereas TS428 does not conduct (bistable multivibrator). No current flows to the motor, and therefore it will not run.

2. "Stop" with LDR, the stylus moving into lead-out groove of a record

Assume the apparatus is running at a speed of 33 r.p.m. When the stylus of the P.U. head is moving inwards and is about 65 mm from the middle of the turntable, the film on bracket 98 exposes R404 less strongly. Consequently, the resistance of the LDR is increased and the voltage also rises. After one revolution of the turntable the stylus has moved one groove inwards; the LDR is then exposed less strongly, which results in a voltage increase of ΔE volts per revolution of the turntable. This increase of ΔE volts is also available across the series circuit C726 - R532 - R466 (apparatus in position 33 r.p.m.). The RC time of these components has been so chosen that the increase in voltage per revolution of the turntable can just flow off. So nothing happens.

However, when the stylus of the P.U. head moves into the lead-in groove of the record, the increase in voltage across the LDR (R404) per revolution of the turntable is much larger than ΔE volts.

(Note: The lead of the lead-out groove is much larger than that of the music groove.) This larger increase in voltage cannot flow off completely within the same time so that part of this voltage will become available between the base and the emitter of TS427. This transistor is driven into conduction, and, consequently, the base of TS426 becomes more negative through R530. TS426 starts conducting. TS428 does not conduct any more (bistable multivibrator). The motor then stops, because then no voltage is applied to it. TS435 now also starts conducting. LA414 ("Stop") is burning again.

d. Control of the speed

The apparatus are equipped with a tacho-controlled motor. Therefore, an AC voltage generator has been coupled to the shaft of the DC motor; this generator delivers a speed-dependent voltage.

Operation

When the speed of the motor decreases owing to an increasing load, the voltage delivered to the tacho generator also decreases. This voltage is rectified and causes the base voltage of TS438 to decrease also. As a result, the transistor becomes less conductive. The collector current also becomes less conductive, and the voltage across R579 has become less high. Owing to this voltage drop the base of TS439 becomes more positive, causing the collector current to increase.

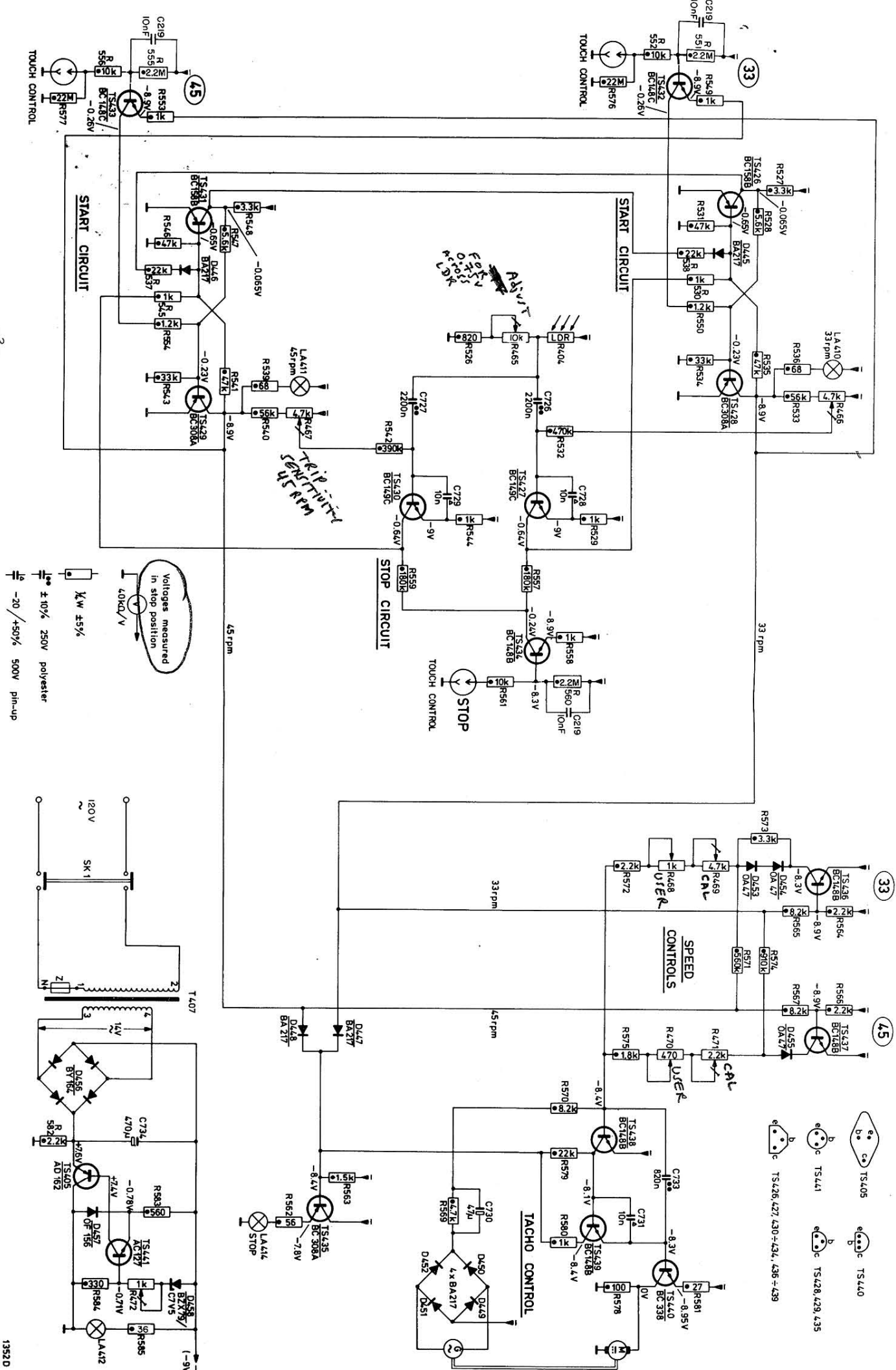
The emitter current of TS439 also increases; this current is also the base current of TS440. The collector current of TS440 also increases and is then also the current for the motor. The speed increases.

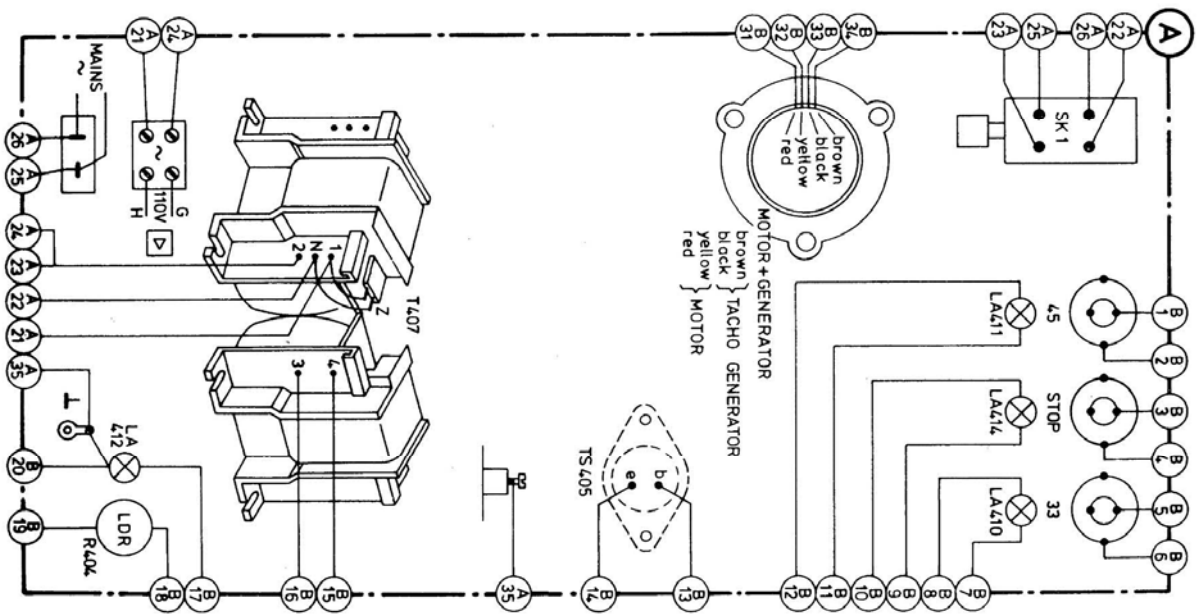
Note:

The transistors TS438 - TS439 - TS440 form a DC amplifier.

e. Explanation of some components

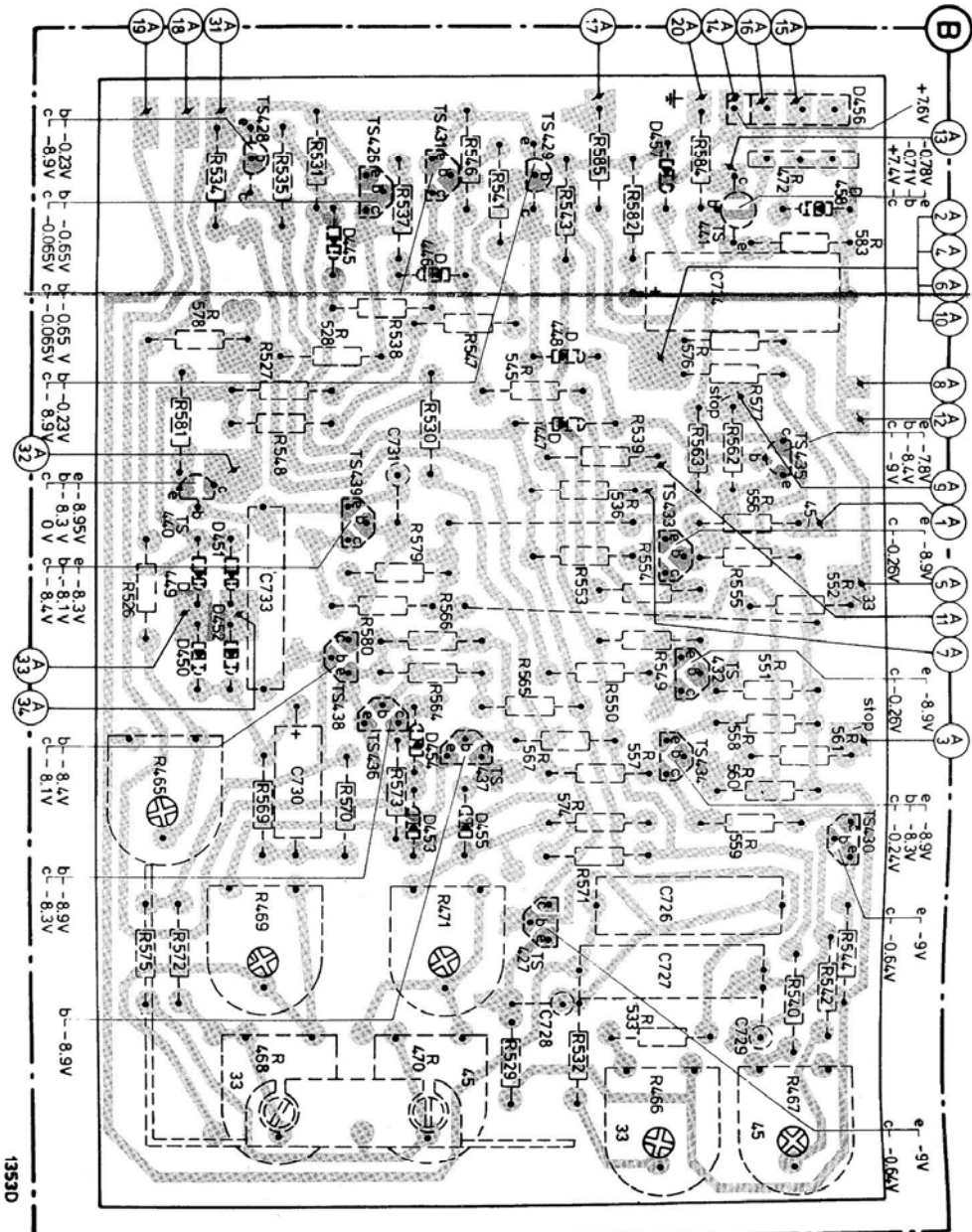
- C728 and C729 are anti-interference capacitors.
- D453, D454 and D455 are used for stabilising the temperature.
- C733 serves to smooth the ripple on the tacho voltage.
- C730 and R569 serve to start the motor quickly.
- C731 is used to prevent generating.
- D447 and D448 cut off TS435 in position 33 1/3 or 45 r.p.m.





Electrical Parts List

T407	4822 145 30097	TS405	4822 130 40213	LA411	6 V - 0.05 A	4822 134 40003
Z	4822 252 20007	TS431+TS426	4822 130 40477	LA412	6.3 V - 0.1 A	4822 134 40001
SK1	4822 276 10513	TS427+TS430	4822 130 40216	R404	4.7 kΩ	4822 116 10001
M-G	4822 272 10083	TS428+TS429+TS435	4822 130 40381	R468	1 kΩ	4822 101 10026
D465 + D462	4822 361 60187	TS432+TS433	4822 130 40361	R470	470 Ω	4822 101 10063
D463 + D455	4822 130 30703	TS434+TS436 + TS439	4822 130 40318	R471	2.2 kΩ	4822 101 10023
D456	4822 130 30234	TS440	4822 130 40392	R472	1 kΩ	4822 101 10005
D457	4822 130 30414	TS441	4822 130 40096	C730	47 μF - 40 V	4822 124 20374
D458	4822 130 30066	AC127		C734	470 μF - 25 V	4822 124 20406



ELECTRICAL ADJUSTMENTS

1. In position "Stop" the supply voltage must be -9 V in regard to the chassis.
Adjust this voltage by turning **R472**.
2. At 33 1/3 and 45 r.p.m. the apparatus must have the correct speed.
SEE ADJUST
Adjust this speed by setting **R468** and **R470** to mid-position and then adjust the correct speed by means of **R469** and **R471**.
Check with the stroboscopic disc on the turntable mat or test record 4822 397 30019.
3. The clearance between the film on the scanner and **R404** (LDR) must be between 0.5 mm and 2 mm.
Adjust this clearance as follows:
Loosen screw 24 on bracket 512 and move scanner 98. Then retighten bracket 512.
4. When the arm lies on the P.U.-arm support and the apparatus is in position "Stop", the voltage across **R404** (LDR) must be 0.75 V. The supply voltage must then be -9 V (see *point 1*).
Adjust by turning **R465**. *SEE*
5. When the stylus of the P.U. head and the middle of the turntable are 65 mm apart, the voltage across **R404** (LDR) must be $1.35 \text{ V} \pm 0.15 \text{ V}$.
The supply voltage must then be -9 V (see *point 1*).
Adjust as follows:
Loosen securing screw 11 on bracket 512.
Adjust with screw 22 and then retighten securing screw 11.
6. When a record with a lead of 1.2 mm or less is played, the apparatus must not switch off before the stylus and the middle of the turntable are 44 mm apart.
Besides, when a record with a lead of 1.8 mm or more is played, the apparatus must switch off when the stylus and the middle of turntable are 60 mm or less apart.
Check with test record 4822 397 30015 at the two speeds.
Adjust by turning **R466** (33 r.p.m.) or **R467** (45 r.p.m.)

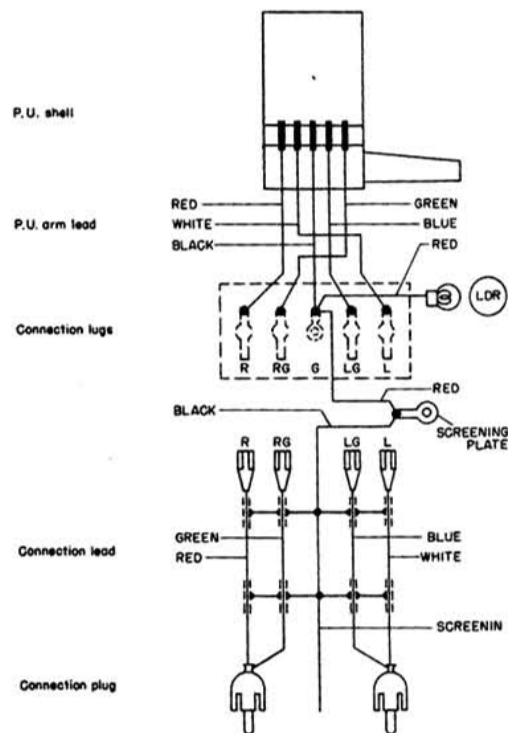
Voltages

The voltages stated in the wiring diagram and circuit diagram have been measured in the rest position (position "Stop"). In the list below these voltages and the voltages measured in the playing position (33 1/3 r.p.m.) are stated once more.

All voltages have been measured in regard to the collector of **TS405** (= chassis).

		Stop	33 1/3
T407	6-7 (~)	14 V	13.7 V
D458	Va	-9 V	-8.9 V
TS405	Vb	+7.4 V	+6.6 V
TS405	Ve	+7.6 V	+6.8 V
TS426	Vb	-0.65 V	-0.16 V
TS426	Vc	-0.065 V	-5.55 V
TS427	Vc	-0.64 V	-0.17 V
TS427	Ve	-9 V	-9 V
TS428	Vb	-0.23 V	-0.81 V
TS428	Vc	-8.9 V	-0.3 V
TS429	Vb	-0.23 V	-
TS429	Vc	-8.9 V	-
TS430	Vc	-0.64 V	-
TS430	Ve	-9 V	-
TS431	Vb	-0.65 V	-
TS431	Vc	-0.065 V	-
TS432	Vb	-	-4.8 V
TS432	Vc	-0.26 V	-0.83 V
TS432	Ve	-8.9 V	-8.9 V

		Stop	33 1/3
TS433	Vc	-0.26 V	-
TS433	Ve	-8.9 V	-
TS434	Vb	-8.3 V	-
TS434	Vc	-0.24 V	-0.14 V
TS434	Ve	-8.9 V	-8.9 V
TS435	Vb	-8.4 V	-1.05 V
TS435	Ve	-7.8 V	-0.45 V
TS436	Vb	-8.9 V	-8.3 V
TS436	Vc	-8.3 V	-8.9 V
TS437	Vb	-8.9 V	-
TS438	Vb	-8.4 V	-8.4 V
TS438	Vc	-8.1 V	-6.4 V
TS439	Vc	-8.4 V	-1.25 V
TS439	Ve	-8.3 V	-6.9 V
TS440	Vc	0 V	-1.95 V
TS440	Ve	-8.95 V	-7.7 V
TS441	Vb	-0.71 V	-0.69 V
TS441	Ve	-0.78 V	-0.78 V



Output Circuit

List of mechanical parts (player)

1	4822 505 10464
2	4822 502 11055
3	4822 505 10325
4	4822 530 80082
5	4822 532 10582
6	4822 530 70124
7	4822 532 10335
8	4822 532 20311
9	4822 502 10691
10	4822 502 11053
11	4822 502 10558
12	4822 502 30103
13	4822 530 80083
14	4822 502 10051
15	4822 530 70125
16	4822 530 70121
17	4822 530 70043
18	4822 502 11112
19	4822 502 11051
20	4822 530 70123
21	4822 502 11053
22	4822 502 11004
23	4822 530 80075
24	4822 502 10689
25	4822 532 10333
26	4822 502 10696
27	4822 530 80076
51	4822 532 60579
52+501+502 (60 Hz)	4822 466 50068
53	4822 492 61215
54	4822 528 10184
55+1+2+503	4822 444 30169 - C- 7.80
56	4822 290 80221
57	4822 454 30178
58	4822 459 80101*
59	4822 276 10513*
60	3822 361 60187*
61	4822 325 60139
62	4822 145 30097
63	4822 462 70813
64	4822 492 30996
65	4822 691 30043
66	4822 520 10224
67	4822 276 10512
68	4822 528 10276
69	4822 358 30182
70	4822 402 60323
71	4822 402 60384
72	4822 462 40199
73	4822 325 60137
74	4822 492 31057
75	4822 522 31151
76	4822 460 20093
77	4822 411 60225
78	4822 520 10223
79	4822 321 30144
80	4822 462 70566
81	4822 535 90505
82	4822 411 50254
83	4822 535 90504
84	4822 492 40303
85	4822 402 60389
86	4822 402 60391
87	4822 255 10007

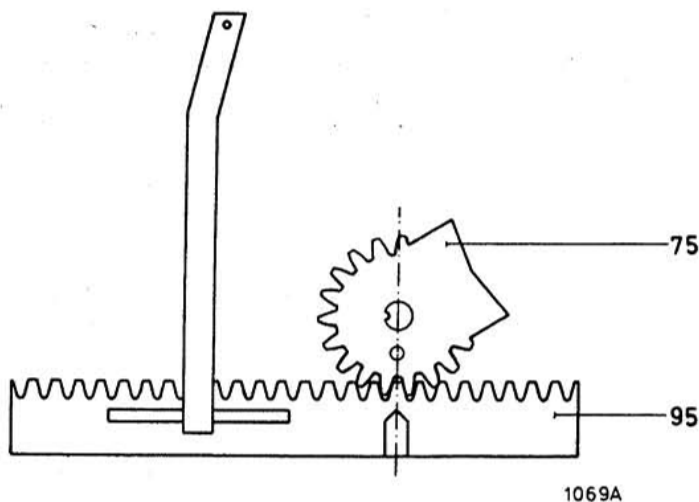
88	4822 691 30031
89	4822 251 70123
90	4822 520 40012
91	4822 413 10093
92	4822 413 10094
93	4822 402 60404
94	4822 492 30938
95	4822 522 31149
96+77+508+509+510+ 511+12+21+100+c	4822 402 60383
97	4822 492 90004
98	4822 403 10098
99	4822 492 50658
100	4822 492 50164

MECHANICAL ADJUSTMENTS

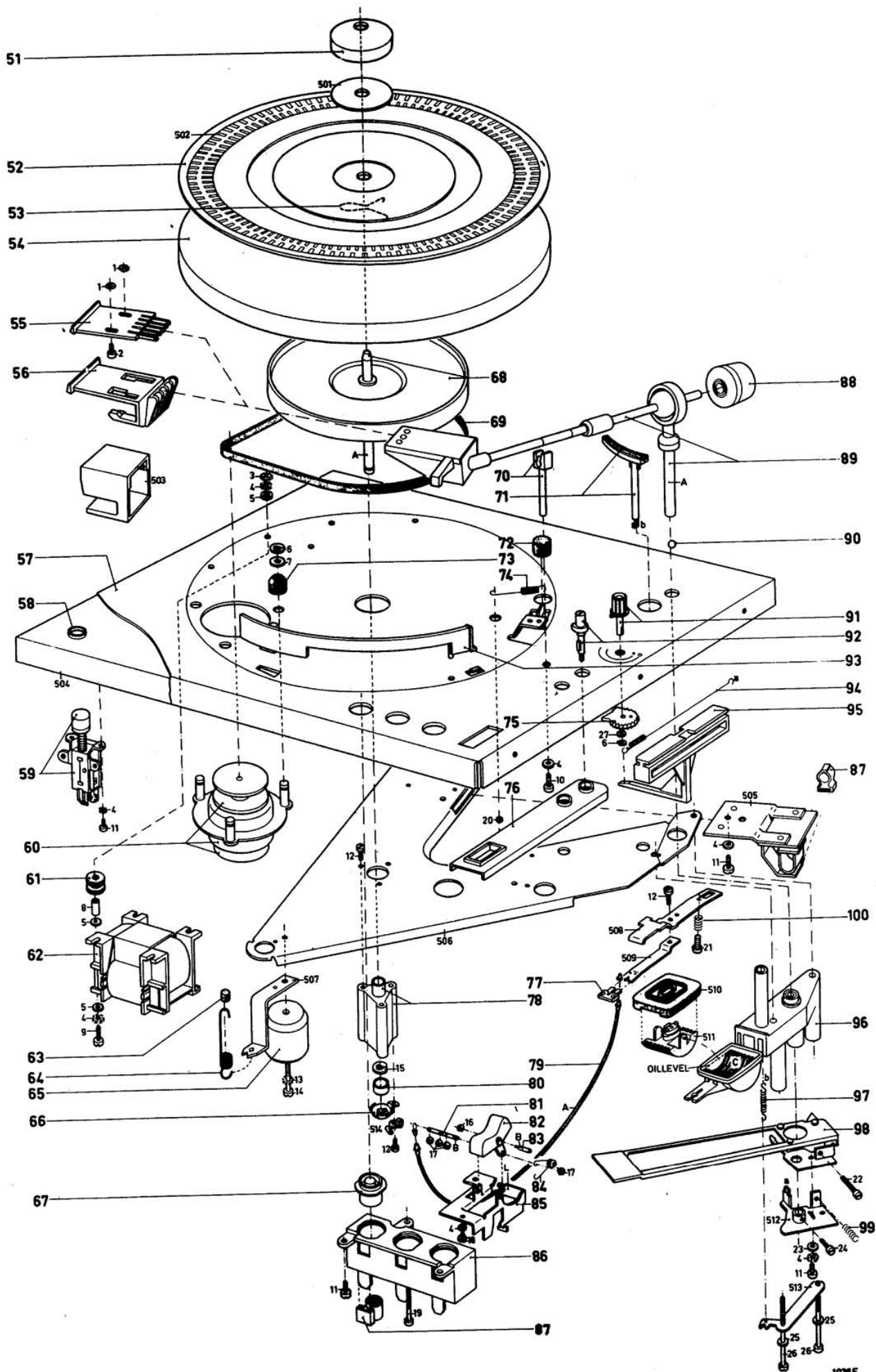
1. Mount gearwheel 75 and guide bracket 95.
2. In the playing position with the P.U. stylus on the record, the clearance between the upperside of lift 71 and the lower side of P.U. arm 89 must be about 0.5 mm.
Adjust this clearance by bending tag L of bracket 85.
3. When P.U. arm 89 has been raised by lift 71, the clearance between the stylus tip of the P.U. head and the turntable mat must be 8 mm.
Adjust this clearance by turning set screw 21.

Repair hint

1. The motor pulley, the belt and the drive disc must be completely free of grease.
Clean with alcohol or spirit.

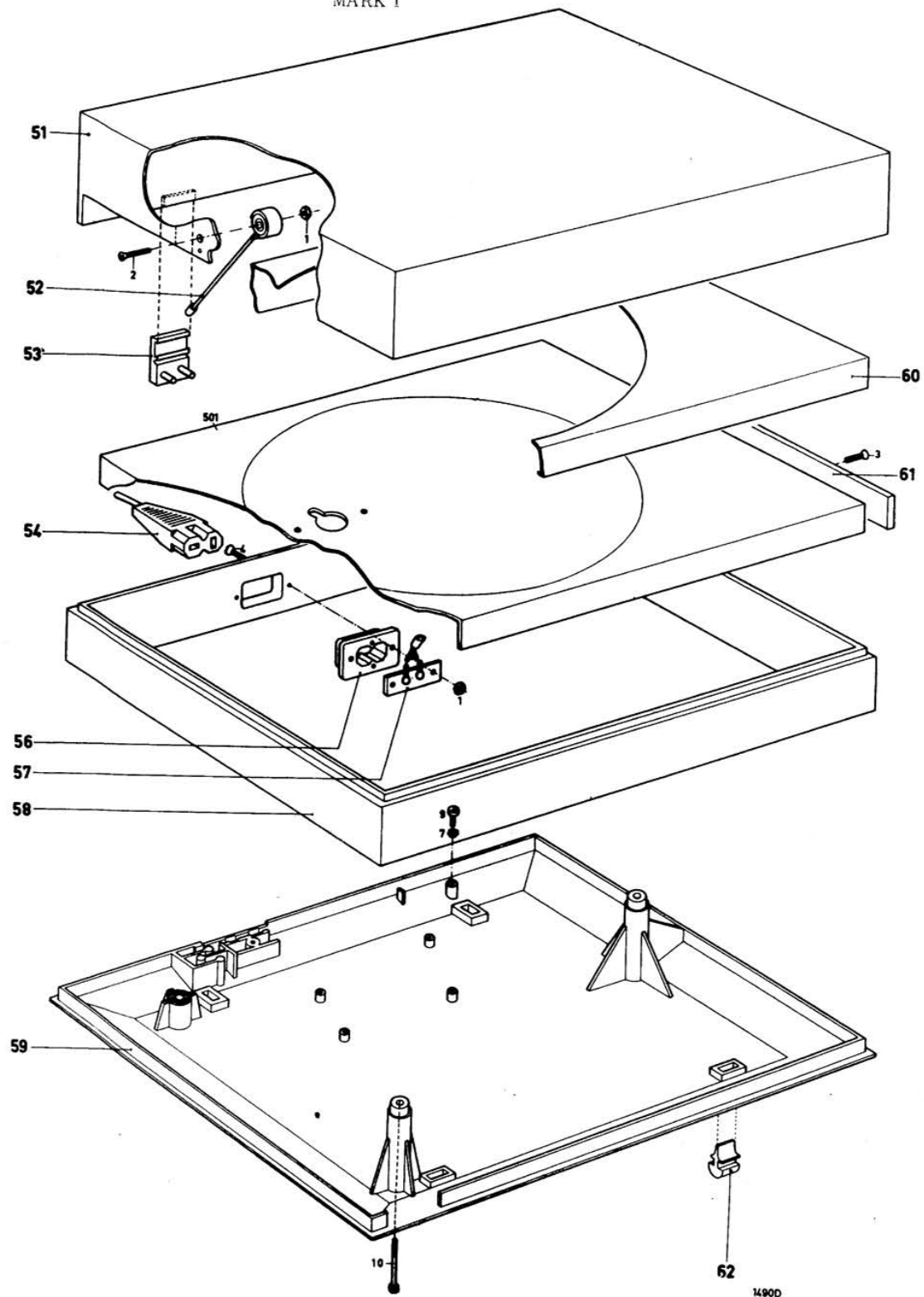


* See Addendum for Mark II



1036F

MARK I



List of mechanical parts (cabinet) Mark I

1	4822 505 10325	53	4822 417 10515 *
2	4822 502 11168	54	4822 321 10074 *
3	4822 502 11093	55	4822 272 10003
4	4822 502 10591	56	4822 268 40067
5	4822 532 20311	57	4822 265 20089
6	4822 532 10332	58	4822 444 40059 *
7	4822 530 80082	59	4822 444 50189
8	4822 502 10974	60	4822 454 30179
9	4822 502 30084	61	4822 444 40058
10	4822 502 10695	62	4822 462 40245
51	4822 444 60212 *	-	4822 264 40026 (plug)
52	4822 417 10251		

* See Addendum for Mark II

MARK II ADDENDUM

1. Part Number Changes to Mechanical Parts List – Cabinet

Cabinet On model 22GA212/66Z starting with production week AHO3-435 the following changes are effected (production label is located under the turnplatter):

- | | | |
|----------------|----------------|-----------------|
| a. Item No. 58 | 4822 459 40345 | AC switch mount |
| b. Item No. 59 | 4822 276 10519 | AC switch |
| c. Item No. 60 | 4822 361 60261 | Motor w/flange |

2. Hinges, Cabinet, Mains Lead

Transparent cover (51) has been replaced by a transparent cover part number 4822 444 20159. New Friction hinges are used and consist of the following:

- | | |
|--------------------------|----------------|
| a. Pin (63) – | 4822 417 10543 |
| b. Clamping block (64) – | 4822 417 10545 |
| c. Clamping plate (65) | 4822 417 10544 |
| d. Screws (11) M4 x 25 – | 4822 502 10695 |

The separate mains lead (54) has been replaced by a fixed lead. The connecting block for the lead and the preamplifier has been replaced by connecting block 4822 290 60198.

Cabinet (58) has been modified because of the friction hinges and mains lead. The new code number is 4822 444 40068.

