



SERVICE MANUAL
TURNTABLE

MODEL DP-EC20



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SPECIFICATIONS

1. PHONO MOTOR SECTION

Type	Electronically controlled fully automatic operation
Drive mechanism	Direct drive
Motor	12-pole quartz locked PLL DC servo motor
Platter Diameter	33.3 cm (13-18")
Weight	1.8 kg
Material	Aluminum die-cast
Platter speed	33-1/3, 45 r.p.m.
Wow and Flutter	0.025% (Wrms) ±0.025% (Wp-p, DIN 45-507)
Signal to noise ratio	65 dB (IEC-B) 80 dB (DIN 45-539)

2. TONEARM

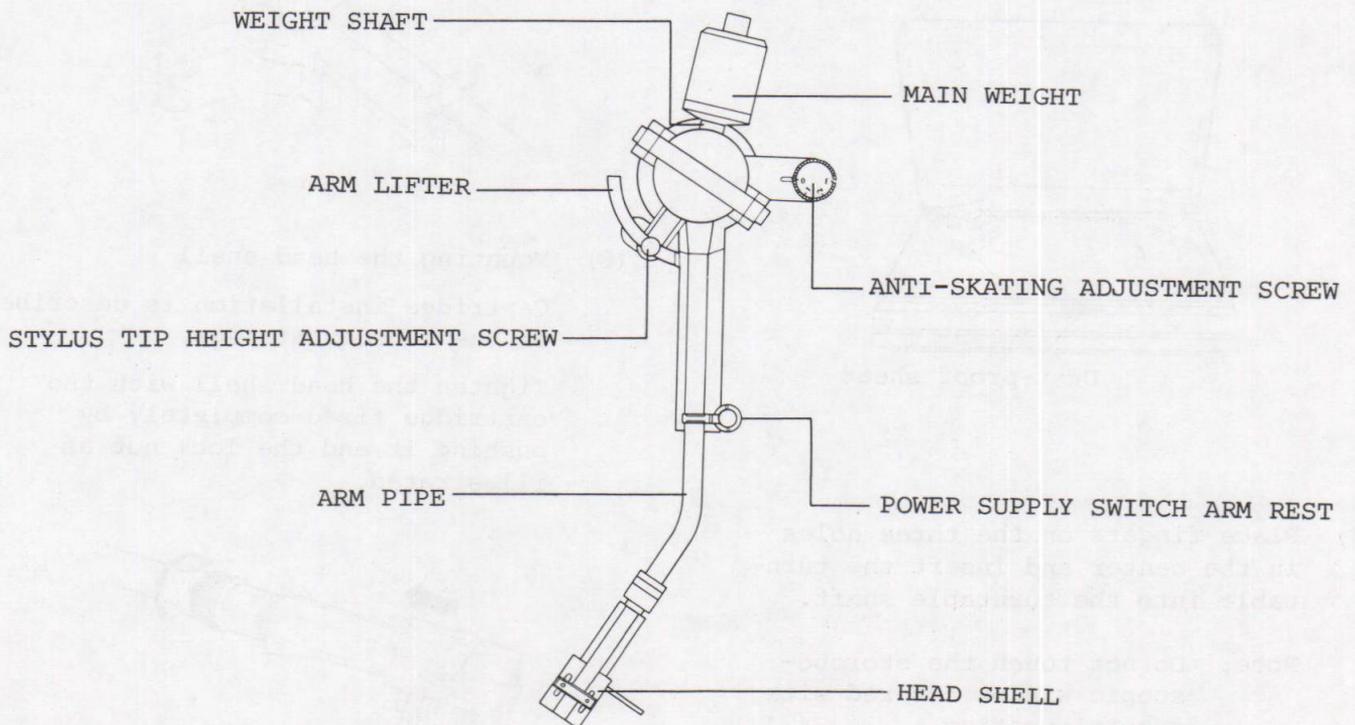
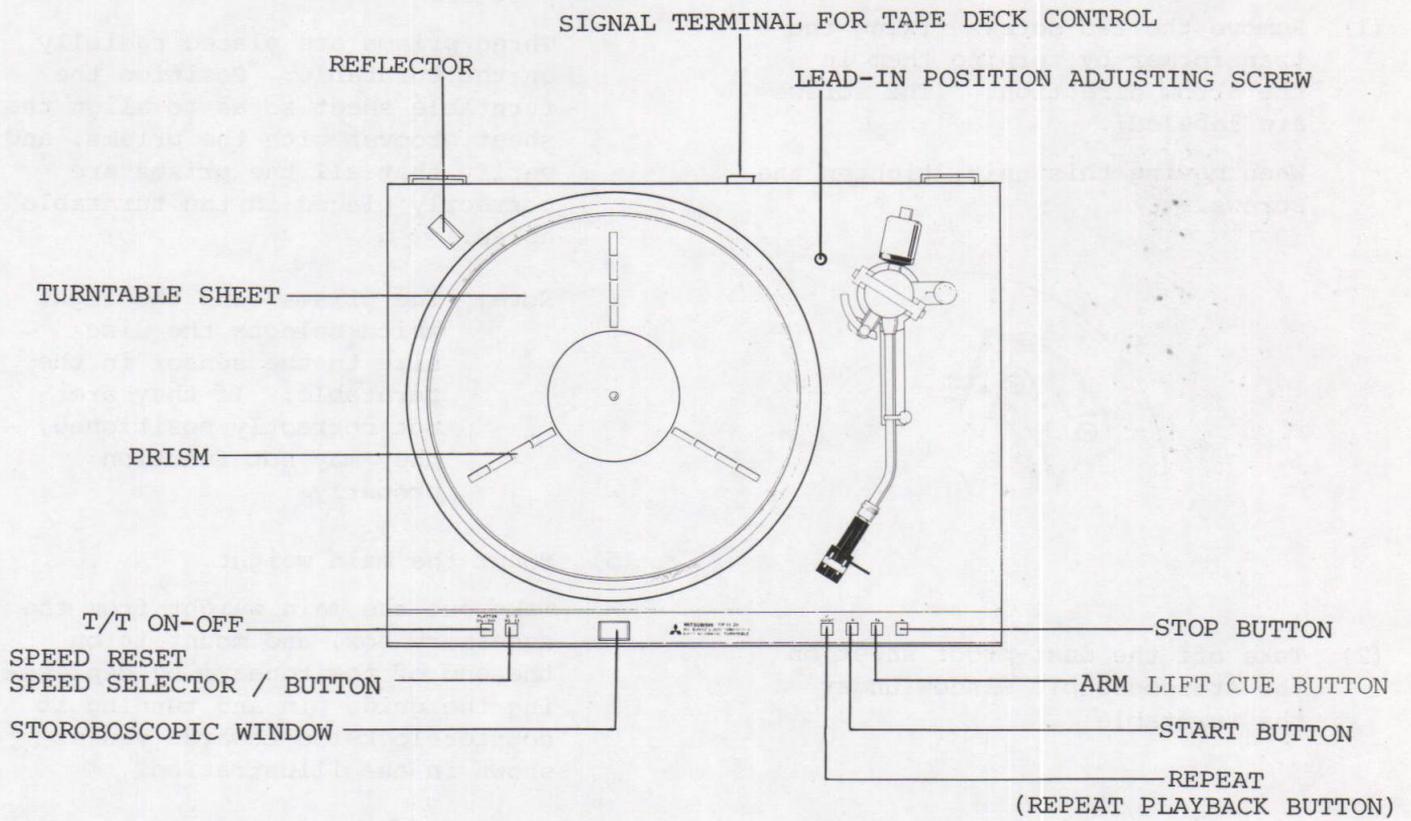
Type	S-type universal static balanced
Overall length	320 mm (12-5/8")
Effective length	227 mm (8-15/16")
Overhang	14 mm (9/16")
Tracking error (30 cm LP)	+2.9° - -1.5°
Offset angle	22°
Head shell Material	Magnesium alloy diecast
Weight	6.2 g
Possible cartridge weight	11 g to 16.5 g (with head shell) 16 g to 21.5 g (with head shell and sub-weight)

3. GENERAL

Power consumption	10 W
Dimensions (W × H × D)	470 × 135 × 395 mm (18-1/2 × 5-7/8 × 15-5/8")
Weight	13.5 kg (30 lbs)

Design and specifications are subject to change without notice for improvement.

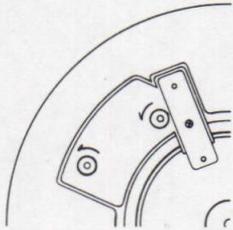
DESCRIPTION AND FUNCTION OF EACH PART



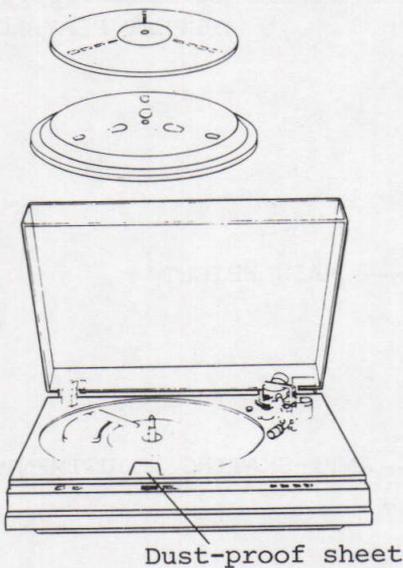
ASSEMBLY

- (1) Remove the two screws fixing the transformer by turning them in the arrow direction. (The screws are labeled).

When moving this unit, tighten the screws.



- (2) Take off the dust-proof sheet on the stroboscopic window under the turntable.



- (3) Place fingers on the three holes in the center and insert the turntable into the turntable shaft.

Note: Do not touch the stroboscopic window covered with special coating.

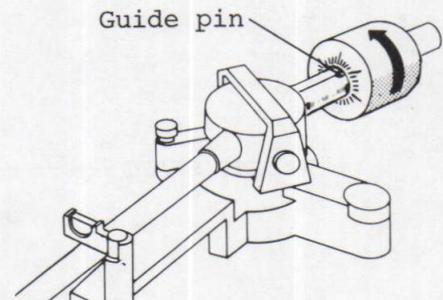
- (4) Mount the turntable sheet on the platter.

Three prisms are placed radially on the turntable. Position the turntable sheet so as to align the sheet grooves with the prisms, and verify that all the prisms are correctly placed in the turntable holes.

Note: The prisms send the light which selects the disc size to the sensor in the turntable. If they are not correctly positioned, they may not function properly.

- (5) Mount the main weight.

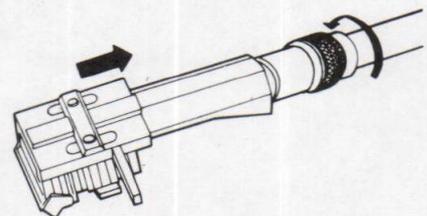
Take out the main weight from the accessory box, and mount it on the end of the tonearm by depressing the guide pin and turning it counterclockwise towards you as shown in the illustration.



- (6) Mounting the head shell

Cartridge installation is described in the subsequent page.

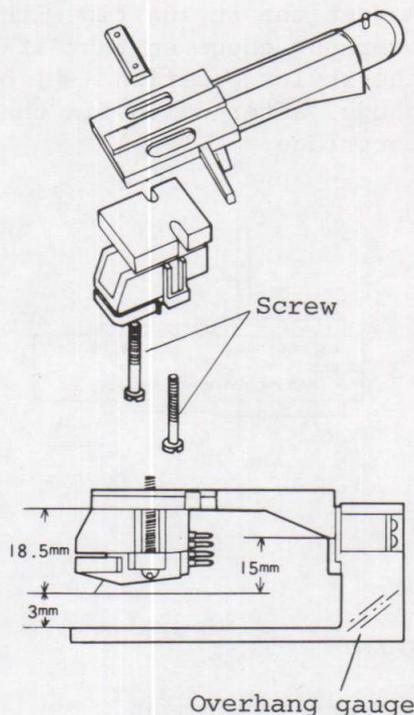
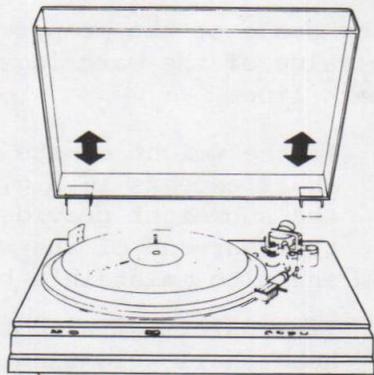
Tighten the head shell with the cartridge fixed completely by pushing it and the lock nut as illustrated.



Removing the Dust Cover

Insert the dust cover right on the hinge part into the holder itself on the die cast base.

To remove it, hold the cover with hands and push it up while it is open.



CARTRIDGE INSTALLATION

This unit is not provided with any cartridge. Mount the cartridge on the market in accordance with the following steps.

(1) Verifying the stylus height

Verify the stylus height of the cartridge to be mounted.

The standard stylus height from the cartridge mount of the shell provided for the unit is 18.5 mm.

Check the specification of the cartridge to be mounted, and select a proper spacer from among those provided to make the stylus height 18.5 mm.

The thick spacer provided is 4 mm and the thin one 2 mm. When using a shell on the market or when the cartridge specification is not known, verify the stylus height by using the overhang gauge provided.

The proper stylus height from the center of the head shell connector is 15 mm. The gauge inserted into the shell has a height of 18.5 mm from the surface below. A clearance of 3 mm is, therefore, a correct height.

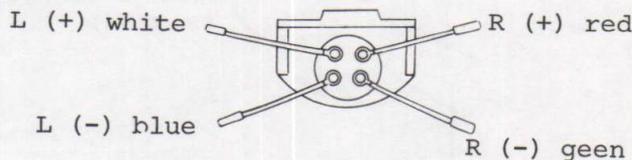
Note: When a shell other than the one provided is used, the correct stylus height from the center of the head shell connector is 15 mm. Verify it with the gauge provided.

(2) Lead wire connections

Connect the lead wires according to the cartridge marks and the color codes as follows:

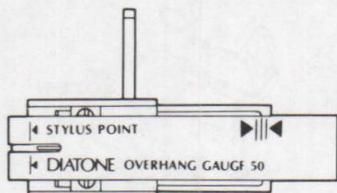
Cartridge marks	Lead wire color codes
L(+)	white
L(-) (G) (E)	blue
R(+)	red
R(-) (G) (E)	green

o Mount the cartridge on the head shell with screws of appropriate length.



(3) Adjusting the stylus tip position

Adjust the stylus tip with the overhang gauge so that it reaches the stylus position (◀) of the gauge, after which fix the cartridge.

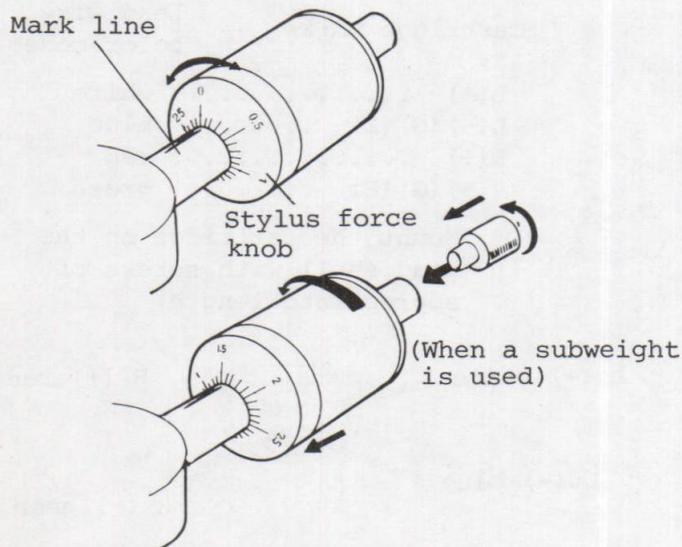


ADJUSTMENT

Stylus Force Adjustment

Adjust the stylus force by the following steps:

- (1) Adjust the anti-skating adjustment knob by setting it to "0".
- (2) Remove the tonearm off the arm rest.
- (3) Maintain the horizontal balance by shifting and turning the main weight while lightly holding the finger of the head shell with one hand.



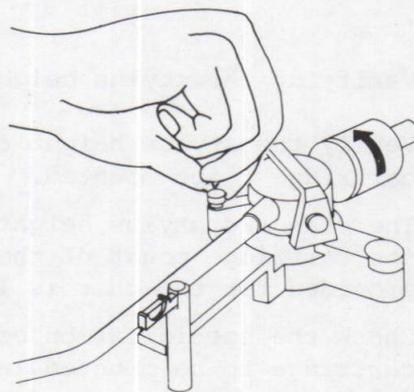
(4) Hold the main weight to prevent it from rotating and set the "0" scale of the stylus force knob to the mark line of the weight shaft.

(5) Return the tonearm to the arm rest and increase the stylus force while turning the main weight counterclockwise towards you.

Set the scale of the proper stylus force value of the cartridge to the mark line.

Note: If the weight of the head shell exceeds 16.5 g, screw the subweight provided into the rear end of the weight shaft to maintain a balance.

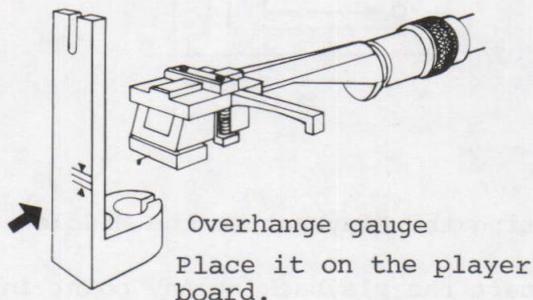
If a cartridge with the head shell weighting more than 21.5 g is used, the stylus force cannot be adjusted with the subweight provided. In this case, buy an appropriate subweight at the dealer from whom you bought your unit.



Stylus Tip Height Adjustment

- (1) Turn on the power by turning the power supply switch knob and set the arm to "UP" position by depressing the button.
- (2) Put the overhang gauge on the player board as illustrated.
- (3) Adjust the stylus tip height to reach the center of the three mark lines printed on the gauge

as STYLUS HEIGHT by turning the stylus tip height adjustment screw while watching the tip in the arrow direction.



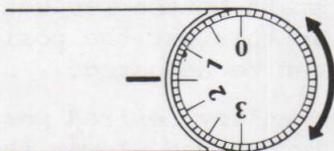
Note: If the stylus tip height is not correctly adjusted, the following inconveniences will arise.

- o When the stylus tip height is too low
 - (1) While the arm is moving horizontally, the tip is liable to touch the record and turntable sheet.
- o When the height is too high
 - (1) The stylus tip floats at a low position of a warped record, which will damage a proper record play.

Anti-Skating Adjustment

This adjustment is required to assure smooth lowering of the stylus tip onto the record groove. Set its anti-skating dial to the same value as that of the cartridge to be used.

Note: Do not set the anti-skating dial in excess of the stylus force of the cartridge. Otherwise, it may damage normal auto play.



OPERATING THE TURNTABLE

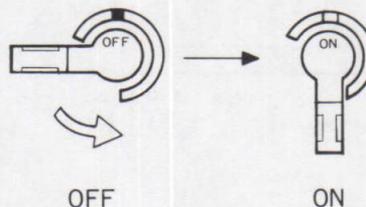
Auto Play

Prepare the following before the playback.

- (1) Place a record on the turntable.
- (2) Turn the power supply switch knob towards you as illustrated.

This turns on the power supply.

The arm pipe becomes free, which gets the playback ready.



Starting the Playback

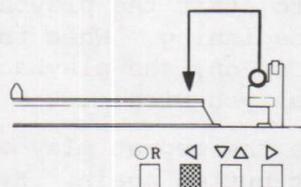
Depress the start button.

This turns on the operating circuit. The turntable starts rotating according to revolutions of the record to be played.

The arm lifter is actuated to lift the tonearm gently and the tonearm moves horizontally towards the inside. The tonearm stops above the outside lead-in groove of the record and descends quietly onto the record to begin the playback.

Note: No noise will be heard before the playback is started because muting takes place in the cartridge output circuit.

START

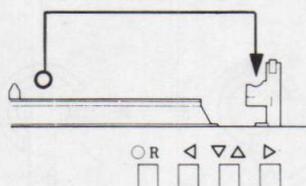


Ending the Playback

When the playback is completed, the tonearm will be lifted gently to return to the arm rest and the turntable will be stopped. Note that the power supply is on in preparation for the next playback.

When the entire program is finished, check to see that the tonearm has descended and turn off the power supply.

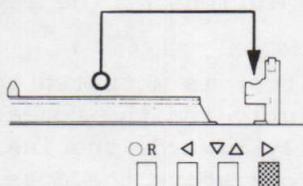
RETURN



Stop

To stop the playback of a record in the middle, depress the stop button. The tonearm will return to the arm rest wherever it is and the turntable will be brought to a stop.

STOP



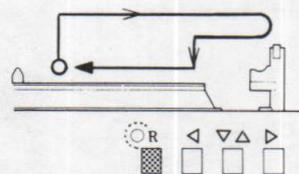
Repeating the Playback

To listen to the same record repeatedly, depress the repeat button.

The repeat indicator is lighted and the tonearm ascends when the playback is completed. The tonearm is then shifted to the position above the outermost groove and returned to the rest position to start the playback again from the beginning. When the repeat indicator is on, the playback can be repeated as you wish.

To release the repeat playback, depress the repeat button again. Even when the stop button is depressed, the repeat playback can be released.

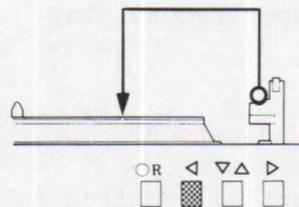
REPEAT



Starting the Playback at the Middle

To start the playback at any point in the middle of the record, proceed as follows:

- (1) Depress the start button and keep it depressed. The tonearm will be lifted and be shifted inwards. The tonearm will move at the normal speed till the position above the outermost groove and slow down automatically as it is shifted further inside the record. When the stylus reaches above the position in which you wish to start the playback, release the start button. The arm is stopped.
- (2) When the arm lift cue button is depressed, the arm is lowered gently.

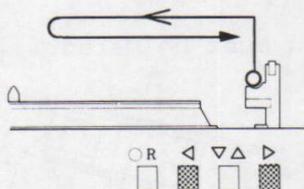


Note: If the arm cannot be stopped at desired position in accordance with Step 1), the arm is moved at a low speed in its respective direction by depressing the stop button or the start button respectively. In this way the position can be adjusted.

When any desired position is decided, lower the arm downwards by depressing the arm lift cue button.

When the Record cannot be Placed on the Turntable

Even if the start button is depressed, the stylus does not touch the turntable. At this time the tonearm moves horizontally on the turntable to return to the arm rest.

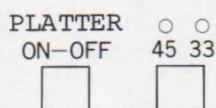


Switching Rotation Speed

The unit can be automatically switched to any revolutions mentioned below depending upon record size. The speed indicator is lighted to indicate its revolution.

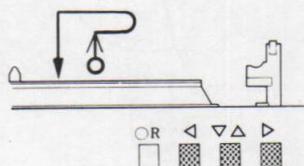
30 cm record 33 rpm
 17 cm record 45 rpm

If revolutions are different from these revolutions, depress the speed button matching with the record after the turntable starts to rotate.



Lift-Up Cueing

When the arm lift cue button is depressed, the arm lifts up or cues. To listen to a different record, lift up the arm by depressing the arm lift cue button, move the arm till any desired position by depressing the stop button or the start button and lower the arm by the arm lift cue button.

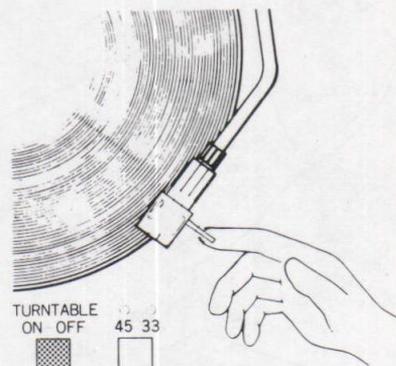


Manual Operation

This turntable can be manually operated as the conventional manual player.

Lift the tonearm from the arm rest manually and lower it on the record. As the turntable does not rotate at this time, depress the TURNTABLE ON-OFF button.

When the playback is finished, the tonearm will be returned automatically to the arm rest as in the auto play.



Tape Deck Control Signal

Tape deck control signals can be obtained from this unit. REC PLAY AND PAUSE of the tape deck can be controlled through the operation of the player if the Diatone cassette deck DT-9600 is connected to this unit by the cord provided.

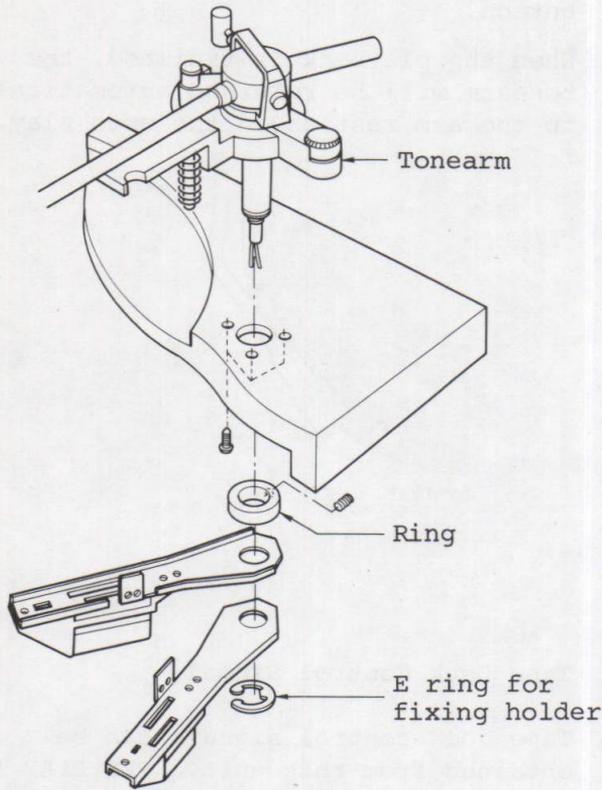
o REC PLAY

Recording can be automatically started after muting is off (noise is eliminated when the stylus is on the record) when the stylus is lowered on the record by depressing the start button or the arm lift cue button.

o PAUSE or STOP

The recording state of the tape deck is released and is automatically set to PAUSE when the arm is lifted by depressing the stop button or the arm lift cue button. If the stylus is cued again, the

- 8) Remove the three tonearm mounting screws and take out the tonearm from the rest while holding the mechanical base as if it was afloat. Thereafter remove the tonearm end by pushing it inward.

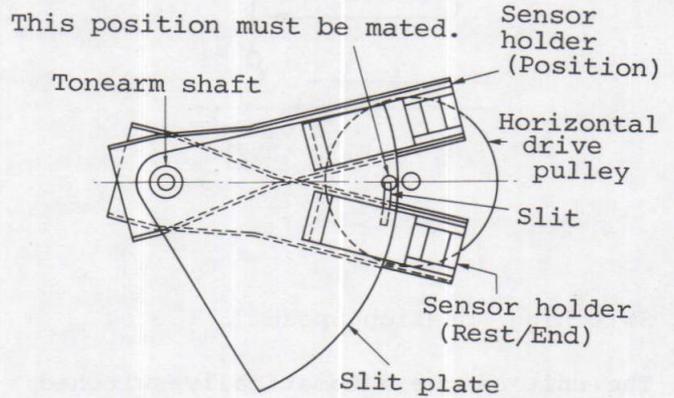
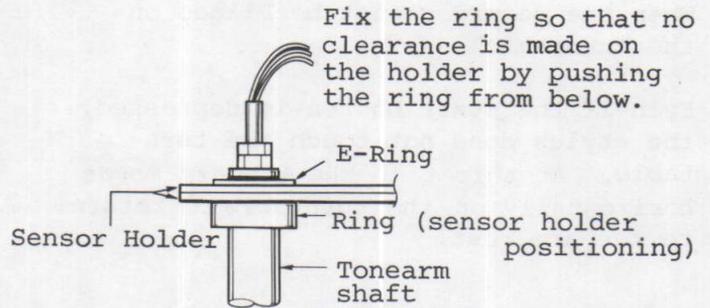


Disassembled view of the tonearm

2. Mounting the tonearm

Mounting of the tonearm is made in the reverse procedure of its removal by making the following adjustment.

- 1) The ring must be attached to the shaft as illustrated after fixing the tonearm.
- 2) When mounting the slit plate, the slit end (outmost slit) of the slit plate is matched with the position where the center of the tonearm shaft meets that of the horizontal drive pulley.



Adjustment after fixing the tonearm

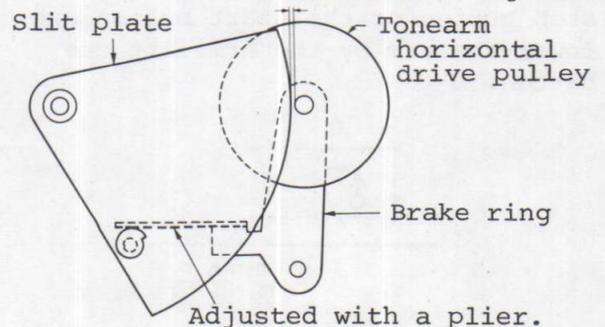
- 3) The lead-in and lead-out position is adjusted with adjusting screws in Step 2 mounting. If its position is not correct, adjustment will be impossible.
- 4) Adjust the rest/end and lead-out position after having mounted the tonearm.

Brake Adjustment

The brake is adjusted by adjusting the brake lever with a plier so that a clearance between the slit plate and the horizontal drive pulley shaft can be 0.5 to 1.0 mm with the state of the tonearm being down.

Brake Adjustment

To be adjusted to be a clearance of 0.5 to 1 mm with the tonearm being down.



tape deck enters a recording state, which permits continuous playback.

- Note:
1. Connection cord is provided together with the tape deck.
 2. Read Instruction Manual for the cassette tape deck.

Non-Auto Play Record

Such special records as those mentioned below are not allowed Auto Play. Therefore run them manually.

- Trnsparent records (red, blue, yellow records, etc.)
- Extremely warped records
- Records not conformity with JIS specifications

If a 25 cm record is used, the stylus is lowered on the position of the 17 cm record. Then operate the record manually.

ON-OFF Operation Power Supply Source

If the power supply source is turned on and off promptly, the tonearm driving motor may rotate.

Power Failure

If any power failure happens during playback and then power is supplied again, follow the steps as follows:

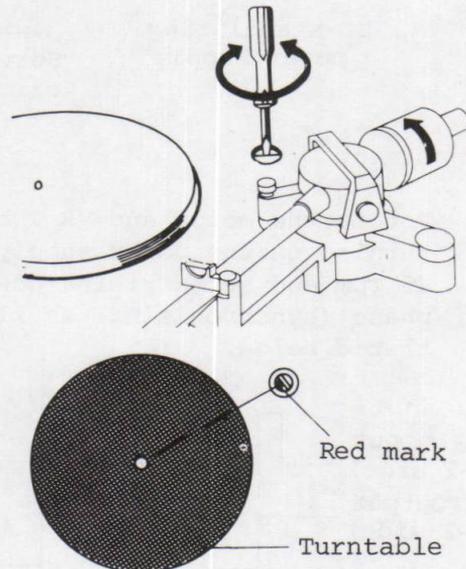
- Keep on playback when power failuer arises while the record is being played.
- If any power failure arises while the record is in Auto Play, depress the stop button after the power is again supplied and return the tonearm to the arm rest to start playback.

ADJUSTMENT OF EACH PART

Lead-In Positioning

When the lead-in position of the stylus is not correct during Auto Play (when the stylus is down outside the record), adjust it by turning the lead-in position adjusting screw with a screw-driver.

1. Remove the rubber cap.
2. The tonearm comes at the innermost position when the red mark of the adjusting screw reaches the nearest position to the platter. So adjust the adjusting screw to cause the stylus to be placed in the optimum position.



Rest Position Adjustment

Remove the platter and you will find the adjusting hole at the right hand in the rear. Turn the adjusting screw with the screw-driver.

When the red mark of the screw is at the position of 45° on the upper left, the tonearm returns to the outermost position, while when the red mark is at the position of 45° on the lower right, the tonearm returns and stops at the innermost position of the turntable.

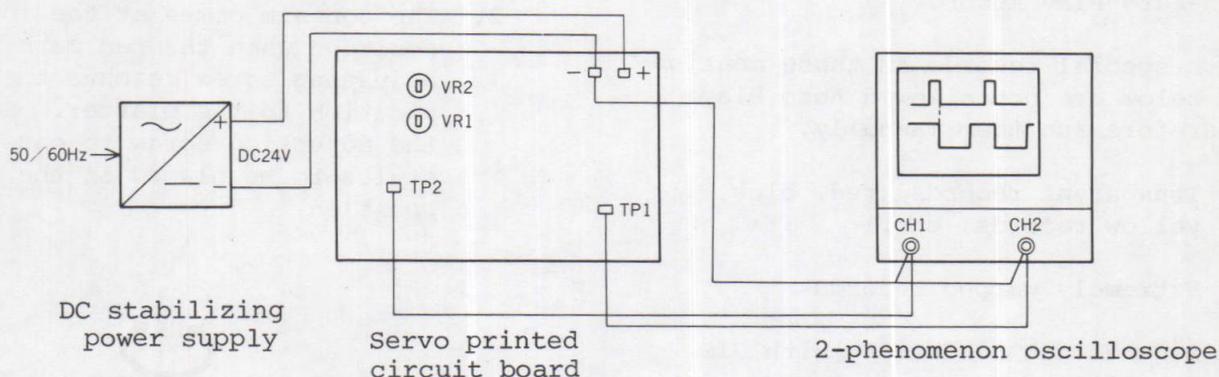
Servo Circuit Phase Adjustment

When the servo circuit is repaired or revolution is not correct, adjust it as follows:

1. Measuring instrument and power supply to be used

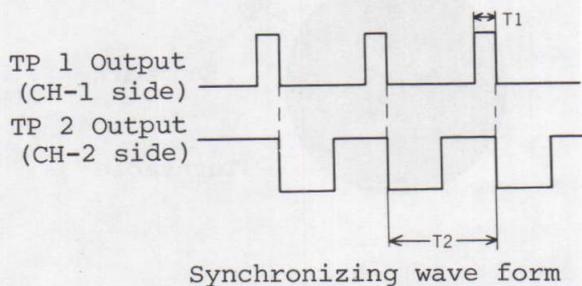
1) 2-phenomenon oscilloscope

2. Connection



3. Adjustment

1) Rotate the motor and VR 1 by turning on the power supply at 45 rpm and set a rising-down phase (synchronizing) as illustrated below.



T_1	0.8 to 1.2 ms
T_2	20 ms at 33-1/3 rpm 14.814 ms at 45 rpm

2) Adjust VR 2 as above at 33-1/3.

Note: 1) The 45 rpm must be first adjusted.

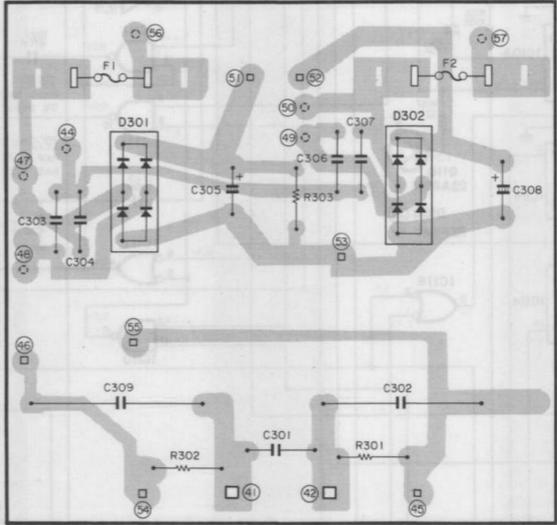
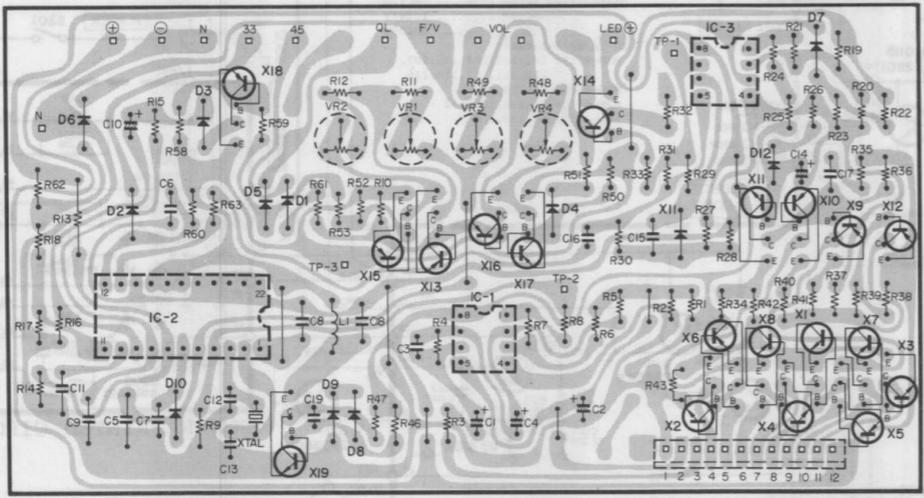
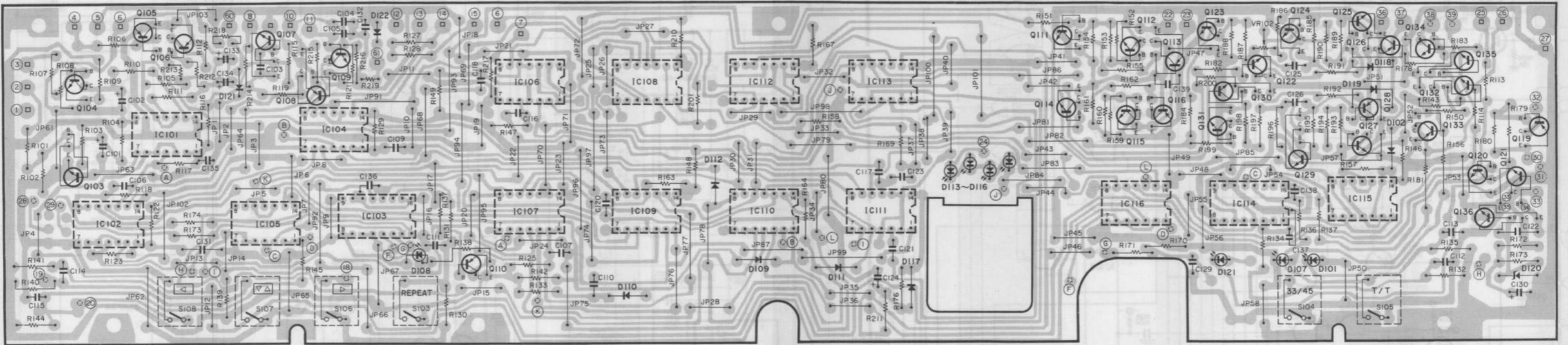
2) Adjustment shall be preferably within ± 0.2 ms to the center.

2) DC 24 V ... When adjustment is made with a servo printed circuit board alone, direct current stabilizing power supply is required.

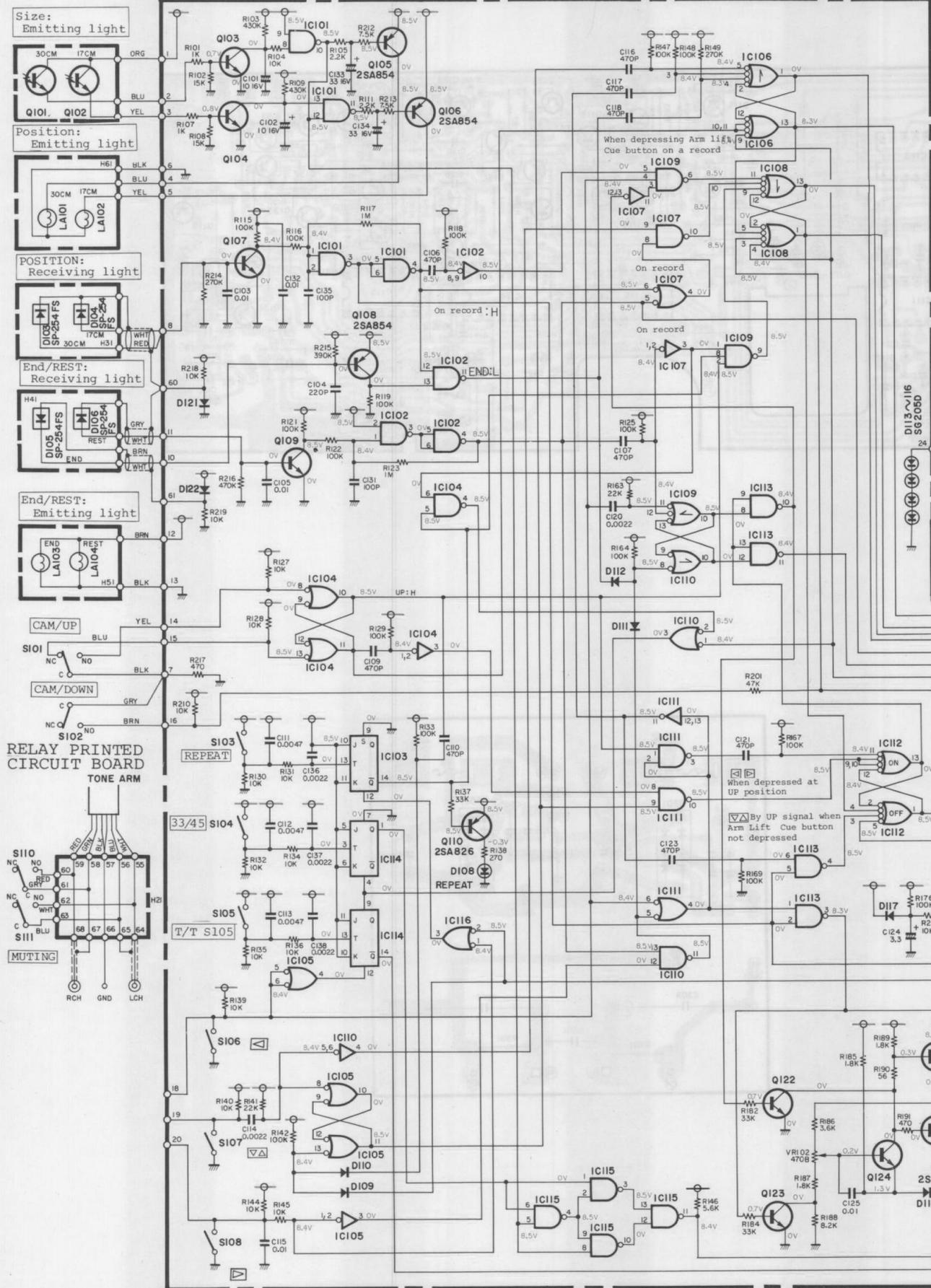
Replacing the Tonearm

1. Removing the tonearm

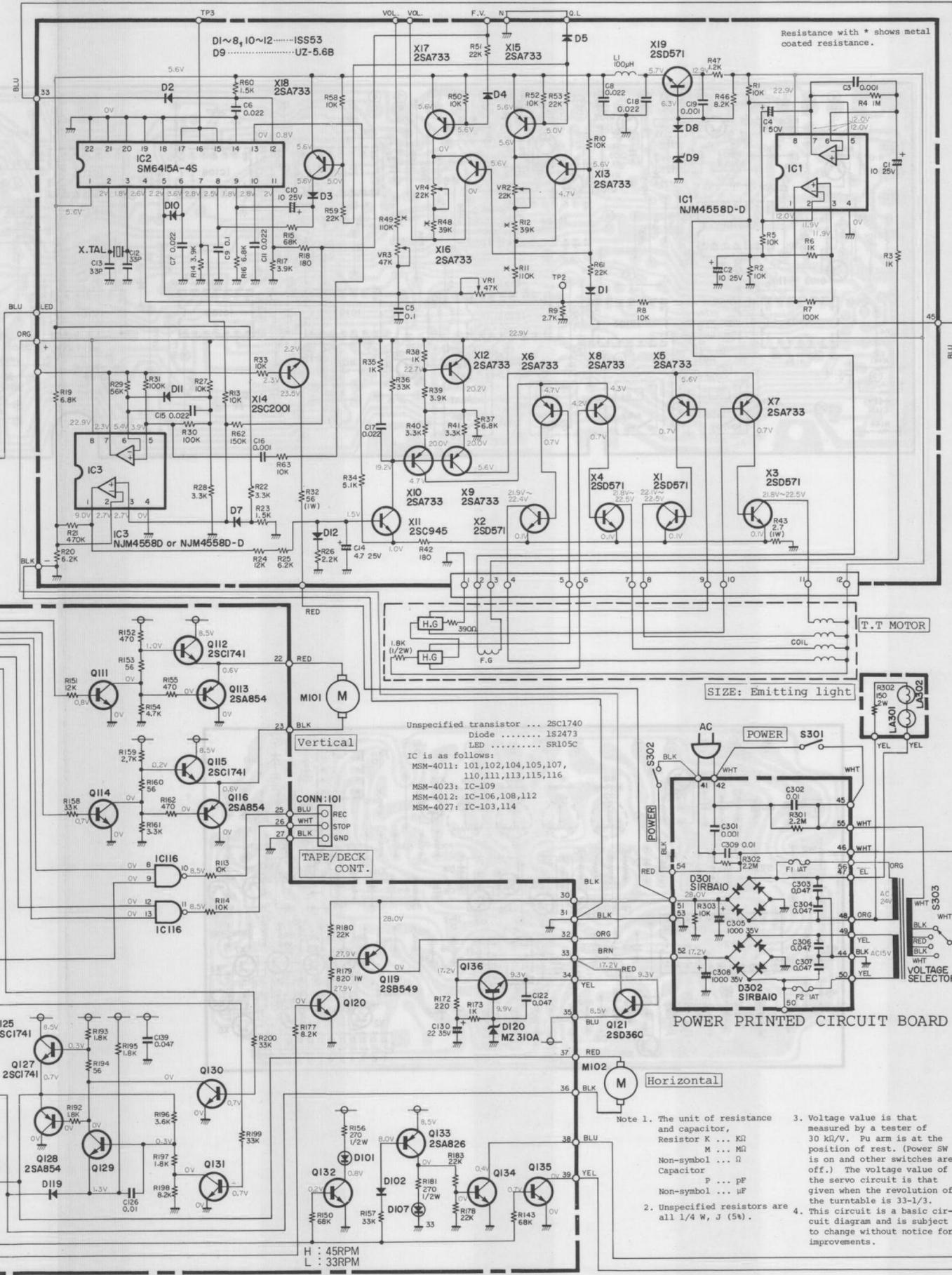
- 1) Fix the tonearm on the rest.
- 2) Remove the bottom cover by placing the turntable face downward.
- 3) Remove the tonearm output lead-in wire with a soldering iron.
- 4) Loosen the two slit plate fixing screws and remove the slit place. (Removal is made by turning the slit plate.)
- 5) Remove the E ring fixing the center holder and the sensor holder (Position Rest/End).
- 6) Remove the ring determining the position of the sensor holder (fixed to the tonearm shaft) with a 1.5 mm hexagon wrench.
- 7) Remove the four mechanical base fixing screws.

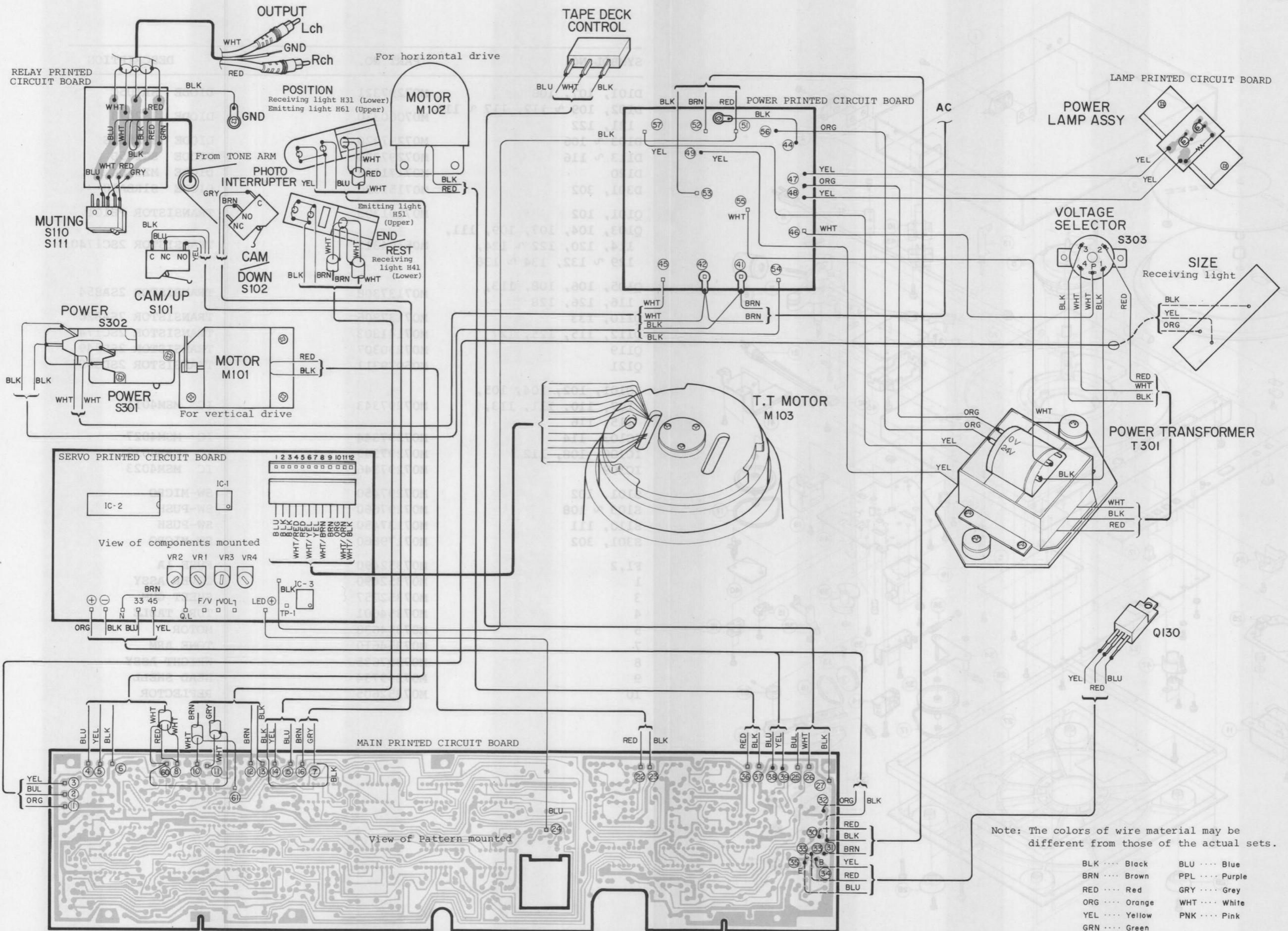


MAIN PRINTED CIRCUIT BOARD



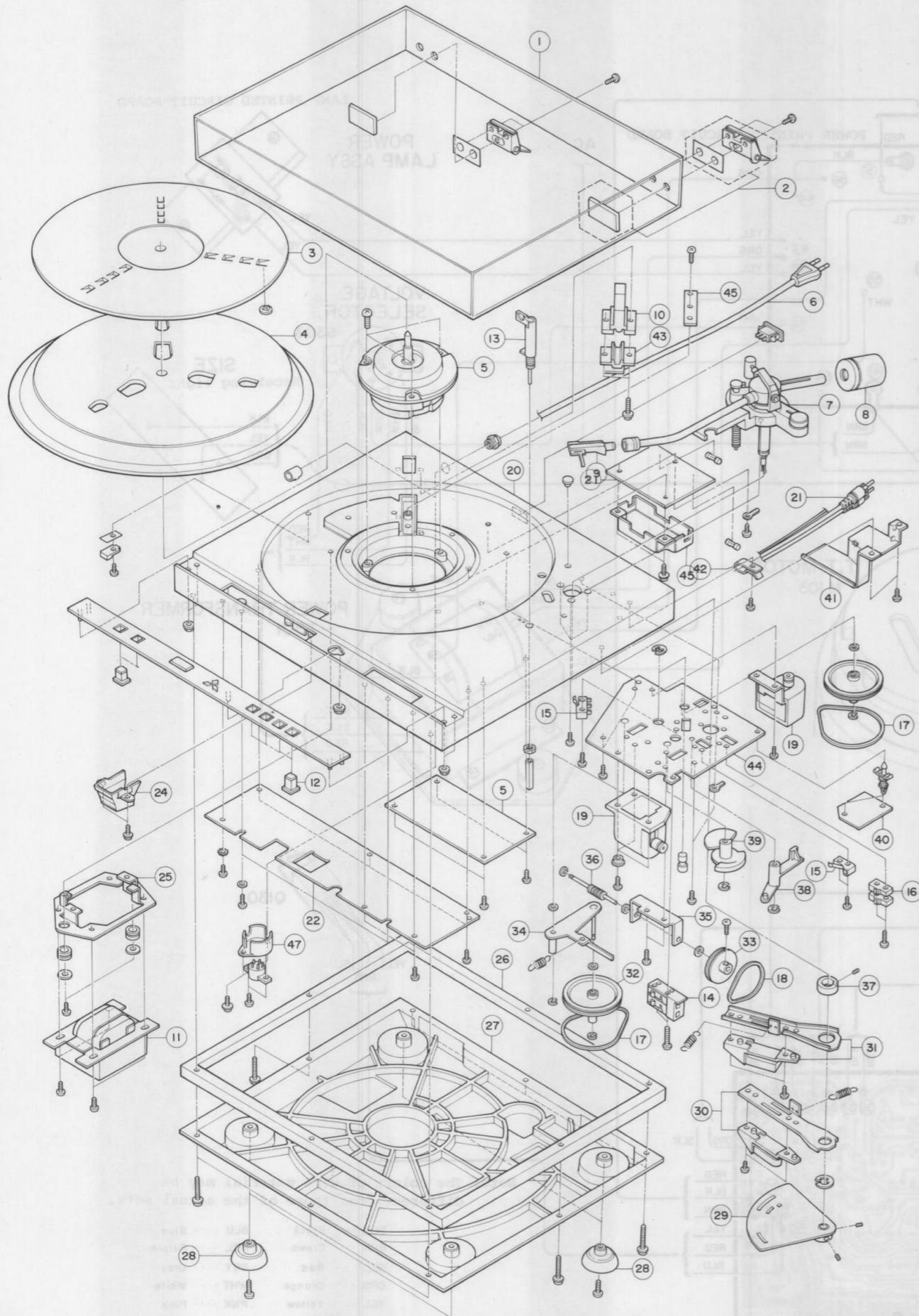
SERVO PRINTED CIRCUIT BOARD





Note: The colors of wire material may be different from those of the actual sets.

- | | |
|----------------|----------------|
| BLK ... Black | BLU ... Blue |
| BRN ... Brown | PPL ... Purple |
| RED ... Red | GRY ... Grey |
| ORG ... Orange | WHT ... White |
| YEL ... Yellow | PNK ... Pink |
| GRN ... Green | |



PARTS LIST

SYMBOL NO.	PART NO.	DESCRIPTION
D101, 107, 108	M07297321	DIODE SRI05C
D102, 109 ~ 112, 117 ~ 119 121, 122	M07060320	DIODE 1S2473
D103 ~ 106	M07297320	DIODE SP254FS
D113 ~ 116	M07297322	DIODE SG205D
D120	M07171322	DIODE MZ310A
D301, 302	M07151320	DIODE SIRBA10
Q101, 102	M07191303	TRANSISTOR PH101
Q103, 104, 107, 109, 111, 114, 120, 122 ~ 124, 129 ~ 132, 134 ~ 136	M05104313	TRANSISTOR 2SC1740
Q105, 106, 108, 113, 116, 126, 128	M07137308	TRANSISTOR 2SA854
Q110, 133	M07137306	TRANSISTOR 2SA826
Q112, 115, 125, 127	M07141303	TRANSISTOR 2SC1741
Q119	M07230307	TRANSISTOR 2SB549
Q121	M05079311	TRANSISTOR 2SD360
IC101, 102, 104, 105, 107, 110, 111, 113, 115, 116	M07297343	IC MSM4011
IC103, 114	M07297344	IC MSM4027
IC106, 108, 112	M07297345	IC MSM4012
IC109	M07297346	IC MSM4023
S101, 102	M07297450	SW-MICRO
S103 ~ 108	M07297660	SW-PUSH
S110, 111	M07137450	SW-PUSH
S301, 302	M07179660	SW-MICRO
F1,2	M07352490	FUSE 1A
1	M07352690	COVER ASSY
3	M07352757	SHEET GUM
4	M07354601	TURN TABLE
5	M07354638	MOTOR
7	M07354610	TONE ARM
8	M07297635	WEIGHT ASSY
9	M07299734	HEAD SHELL
10	M07352605	REFLECTOR

SYMBOL NO.	PART NO.	DESCRIPTION
11	M07355500	TRANS POWER US.
	M07354500	TRANS POWER WG. NL. SS.
12	M07354650	KNOB ASSY
13	M07297210	KNOB ASSY
17	M07352629	BELT
18	M07297629	BELT
19	M07297639	MOTOR
28	M07297695	LEG
47	M07295450	SW-ROTARY
	M07191603	ADAPTOR
	M07352012	GAUGE
	M07297636	SUB WEIGHT
	M07297251	LAMP 12 V 0.05 A
	M07297250	LAMP 5 V 0.06 A

DESCRIPTION	PART NO.	SYMBOL NO.
TRANS POWER US	M0735250	11
TRANS POWER WG, NL, SS	M0735450	12
KNOB ASSY	M0735450	13
KNOB ASSY	M0735710	14
BELT	M0735729	15
BELT	M0735729	16
MOTOR	M0735729	17
LEG	M0735729	18
SW-ROTARY	M0735729	19
ADAPTOR	M0735729	20
GAUGE	M0735729	21
SUB WEIGHT	M0735729	22
LAMP 12 V 0.05 A	M0735729	23
LAMP 5 V 0.08 A	M0735729	24