# SERVICE MANUAL

## SILENT SYNCHROTOR SYSTEM
COMPUTERIZED FULLY AUTOMATIC TURNTABLE

# SANSUI XR-Q7

Sansui

SANSUI ELECTRIC CO., LTD.

## • SPECIFICATIONS

| | |
|---|---|
| Type | Two-speed direct-driven |
| Speeds | 33-1/3, 45 rpm |
| Platter | Aluminum alloy die-cast 330 mm (13") diameter, 1.7 kg (3.74 lbs) |
| Motor | DC brushless servo-type (Quartz-servo) |
| Wow and flutter | Less than 0.009 % (WRMS-read out direct at the FG output) |
| S/N | Better than 63 dB (IEC-B) |
| Rumble | Better than 80 dB (DIN-B) |
| Tonearm | Statically-balanced type |
| Tonearm length | 245 mm (9-11/16") |
| Overhang | 16 mm (5/8") |
| Optimum cartridge weight When the headshell supplied is employed | 4 ~ 9.5 g |
| Dimensions | 490 mm (19-5/16") W<br>180 mm (7-3/32") H<br>430 mm (16-15/16") D |
| Weight | 11 kg (24.26 lbs) net<br>12.9 kg (28.44 lbs) packed |
| Power consumption | 15 W |

- The power voltage is adjusted to the one of the area where you bought the unit.

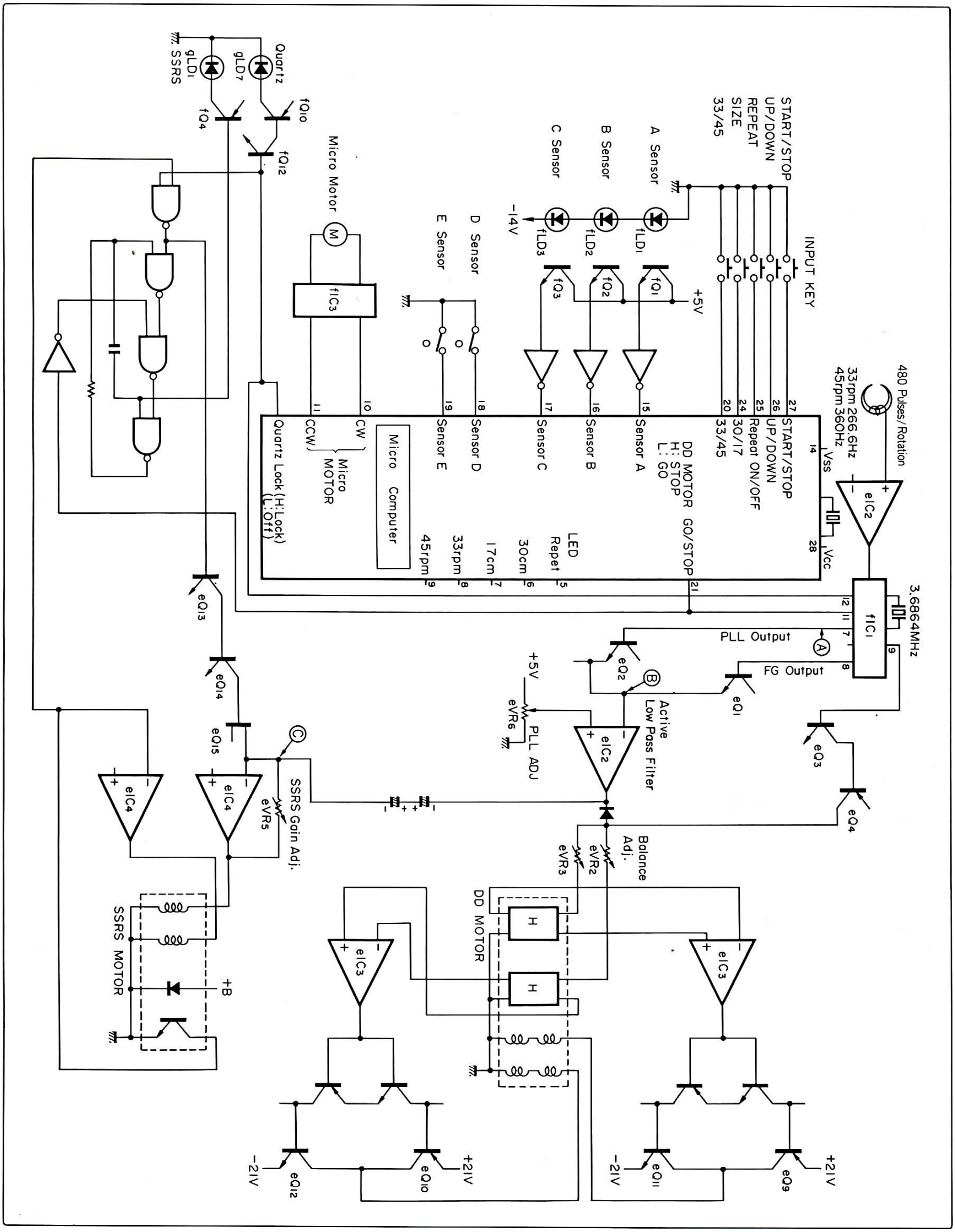
### Specifications of the cartridge

### Model SV-101

| | |
|---|---|
| Type | Dual magnet |
| Frequency response | 10 ~ 20,000 Hz |
| Output voltage | 2.5 mV per channel (1,000 Hz, 35.4 mm/sec) |
| Load impedance | 47 kΩ |
| Tracking force | 2 g |
| Stylus | 0.6 mil, diamond spherical (SN-101) |

* **Design and specifications subject to change without notice for improvements.**

# 1. BLOCK DIAGRAM



# 2. FEATURES & OPERATIONS OF XR-Q7

The XR-Q7 is a fully-automatic, manual type disc-selectable turntable having various functions of automatic start, automatic return, automatic repeat, etc. This turntable includes a newly-developed novel automatic mechanical assembly which has been improved on the basis of the one used for Model Nos. FR-D4 FR-D55. Since this mechanical assembly is also used for a new product FR-D40/40A, refer to FR-D40/40A Service Manual concerning the mechanical assembly operations.

## 2-1. Main Features of XR-Q7

1) Fully-automatic control by using a microcomputer.
2) A silent synchrotor system has been adopted to eliminate the useless vibration generated in the rotation system without simply damping the vibration.
3) A newly-developed coreless linear drive motor manufactured by our own factory has been adopted, the structure of which is superior in basic motor characteristics.

## 2-2. Description of Operations

### A. Basic circuit configuration for fully-automatic operations

(See Block Diagram)

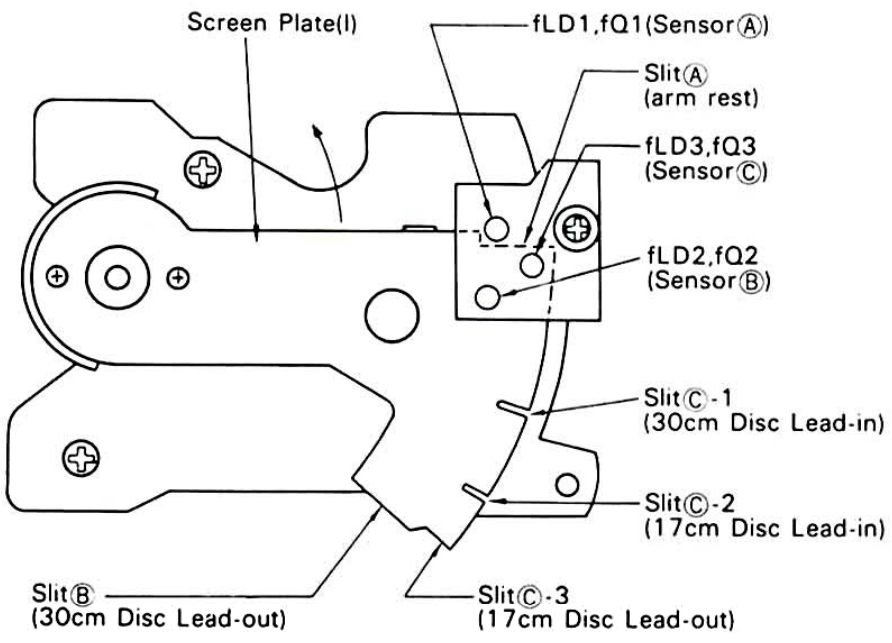
1. Microcomputer

According to the signals applied to the input ports, the microcomputer MB-8844-543M determines appropriate movements of the tone arm, arm lifter, and DD motor, and outputs various control signals through the output ports in accordance with the programs previously stored in the microcomputer.
The microcomputer MB-8844-543M becomes active when the input ports change to a L-voltage level, and the output ports change to a H-voltage level.

2. Sensors and detection circuits (See Fig. 2-1)

1) Sensor A

Fig. 2-1




The sensor A detects whether the tone arm stays on the arm rest (L-voltage level) or not (H-voltage level), these detections being necessary for automatic operation.
All the sensors A, B and C detect the corresponding detection signals by combining LEDs, phototransistors and a slit plate. The detected signals are inputted to the microcomputer through inverters.

- The table below shows the relationship between tonearm position and start/stop key.

| Conditions | | Operations | |
|---|---|---|---|
| Arm position | Lifter | DD Motor | Automatic |
| 1) Start | | | |
| Rest A = L | Down D = L<br>E = L | ON | IN |
| Rest A = L | Up D = H<br>E = H | ON | IN |
| 2) Stop | | | |
| On a disc<br>A = H | Down D = L<br>E = L | OFF at A = L<br>in returning | Return<br>(repeat clear) |
| 3) [S/S] stop in automatic operation | | | |
| Rest A = L | Lifter is going up, D = H<br>E = L | Immediately OFF | Lifter down<br>(repeat clear) |
| [S/S] key is disabled in other automatic operations | | | |
| 4) [S/S] key input in lifter operation by [UP/DOWN] key | | | |
| Rest A = L | Lifter is going up. | Immediately ON | IN |
| Reset A = L | Lifter is coming down. | Immediately ON | IN |
| [S/S] key is disabled in other lifter operations | | | |

Note) In the table above the symbol D denotes the sensor D, E denotes the sensor E. The expression D (E) = L indicates that the microswitch is off, and D (E) = H indicates that the microswitch is on.

- The following table shows the relationship between tonearm position and UP/DOWN key.

| Conditions | | Operations |
|---|---|---|
| Arm position | Lifter | Automatic |
| A = H<br>A = L | Down | Go up |
| | Up | Come down |
| | Going up | U-turns and comes down |
| | Coming down | U-turns and goes up |

[S/S] key is disabled in [UP/DOWN] key automatic operation.

2) Sensor B

The sensor B detects the 30cm-dia. disc lead-out groove position. When the sensor B detects the lead-out groove, since the pin 16 of the microcomputer changes from a H-voltage level to a L-voltage level, the pin 11 changes from L-voltage level to H-voltage level to rotate the micromotor in the CCW direction, so that the tonearm performs lead-out operation.

3) Sensor C

The sensor C detects the 30cm-dia. disc and 17cm-dia. disc lead-in positions and the 17cm-dia. disc lead-out position. The sensor C detects the respective detection signals in cooperation with the slit C-1 (for 30cm-dia. disc lead-in position), the slit C-2 (for 17cm-dia. disc lead-in position), and the cutout C-3 (for 17cm-dia. disc lead-out position), which are all formed in the slit plate. When a signal from the sensor C is detected, the pin 17 of the microcomputer changes to a L-voltage level, and the microcomputer controls the micromotor which drives the lifter and the tonearm.

The 17cm-dia. disc lead-in operation is performed by the combination of a pulse generated from the SIZE key set for 17cm-dia. disc and the second pulse detected through the slit C-2 following the first pulse detected through the slit C-1. (See Timing chart)

4) Sensors D and E

The sensors D and E are two microswitches turned on or off by the lifter cam. These microswitches control the micromotor by detecting the lifter positions. (See Timing Chart and Figs. 2-2 and 2-3)

3. Micromotor control circuit and micromotor functions

When the pin 10 of the microcomputer changes to a H-voltage level, the micromotor rotates in the CW direction; when the pin 7 changes to a H-voltage level, the micromotor rotates in the CCW direction. The lifter up-and-down operations and the tonearm lead-in and lead-out operations are performed by this micromotor.

CW direction . . . . . Lifter upward motion and tonearm lead-in motion in lead-in operation.
Lifter downward motion in lead-out operation and lifter upward motion due to the lifter switch.

CCW direction . . . . Lifter downward motion in lead-in operation. Lifter upward motion and tonearm lead-out motion in lead-out operation.
Lifter downward motion due to the lifter switch.

Fig. 2-2 Relationship between automatic operation and outputs of sensors D and E.

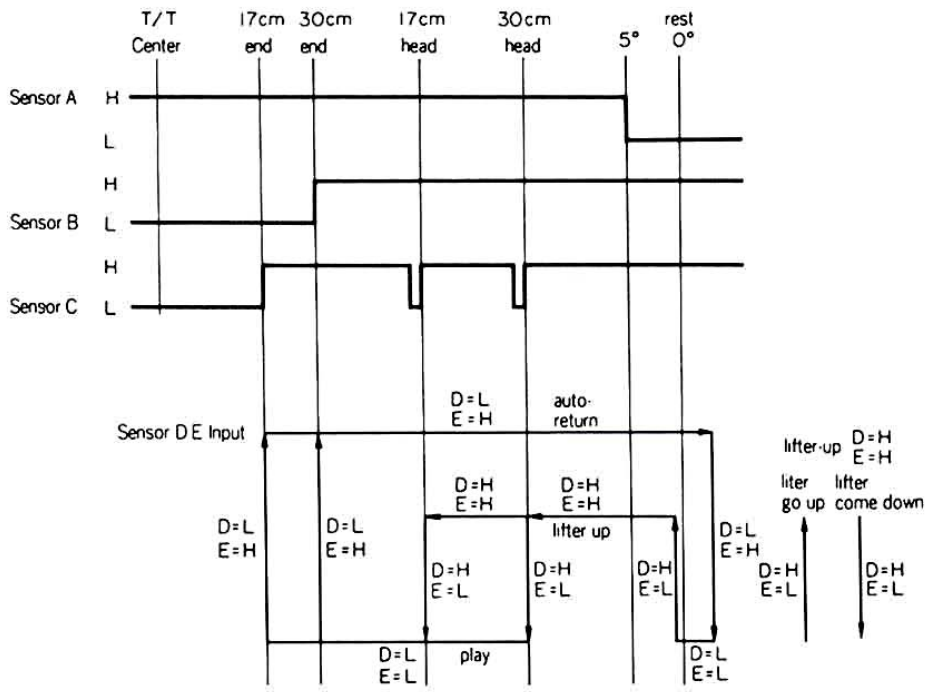
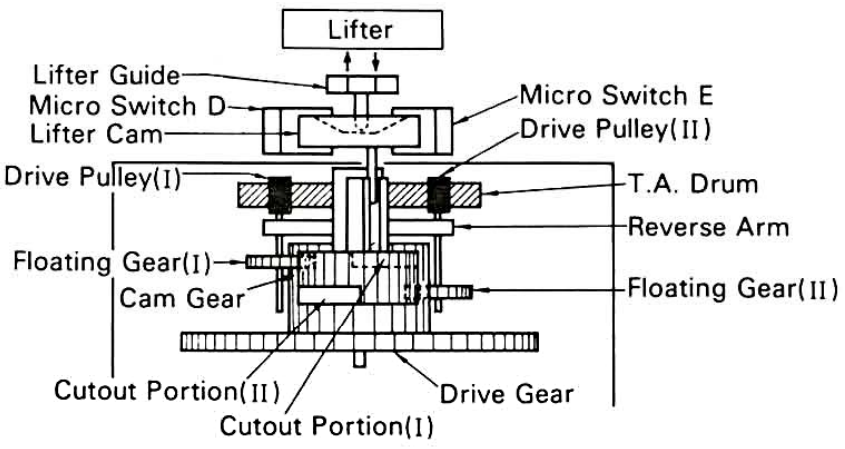



Fig. 2-3



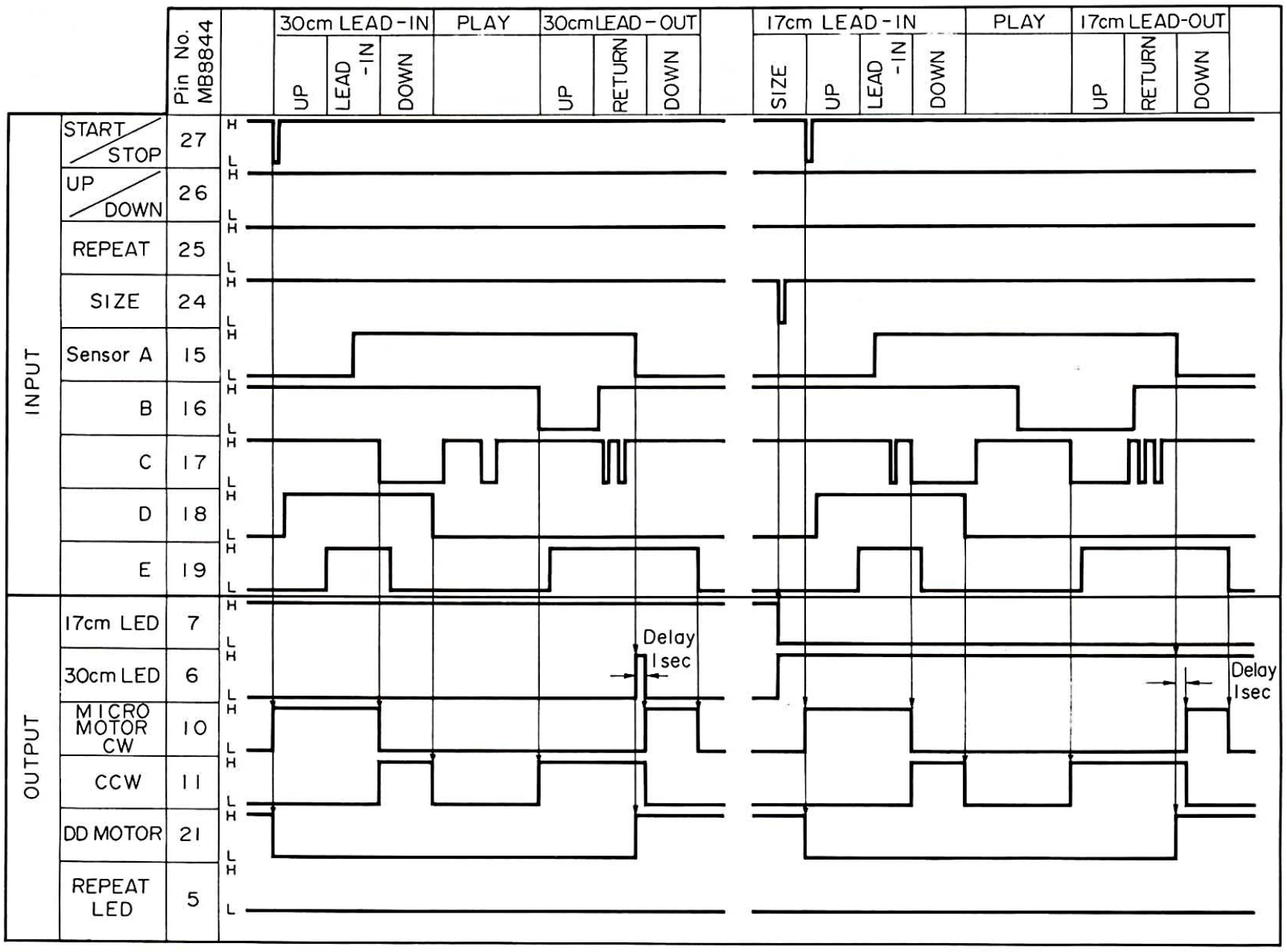

4. Protection functions

1) When the start key is depressed in the state where the tonearm is locked to the arm rest by the hook, the turn table platter rotates and the lifter begins to up.
In this case, however, the DD motor and turn table platter stop rotating 20 sec. after the start key is depressed, and the lifter comes down, so that the micromotor stops rotating.
2) When the tone-arm or the automatic mechanism is locked during automatic operation, the DD motor and the micromotor both stop rotating 20 sec. after the mechanism is locked, so that the turn table platter stops rotating and the automatic operation also stops.

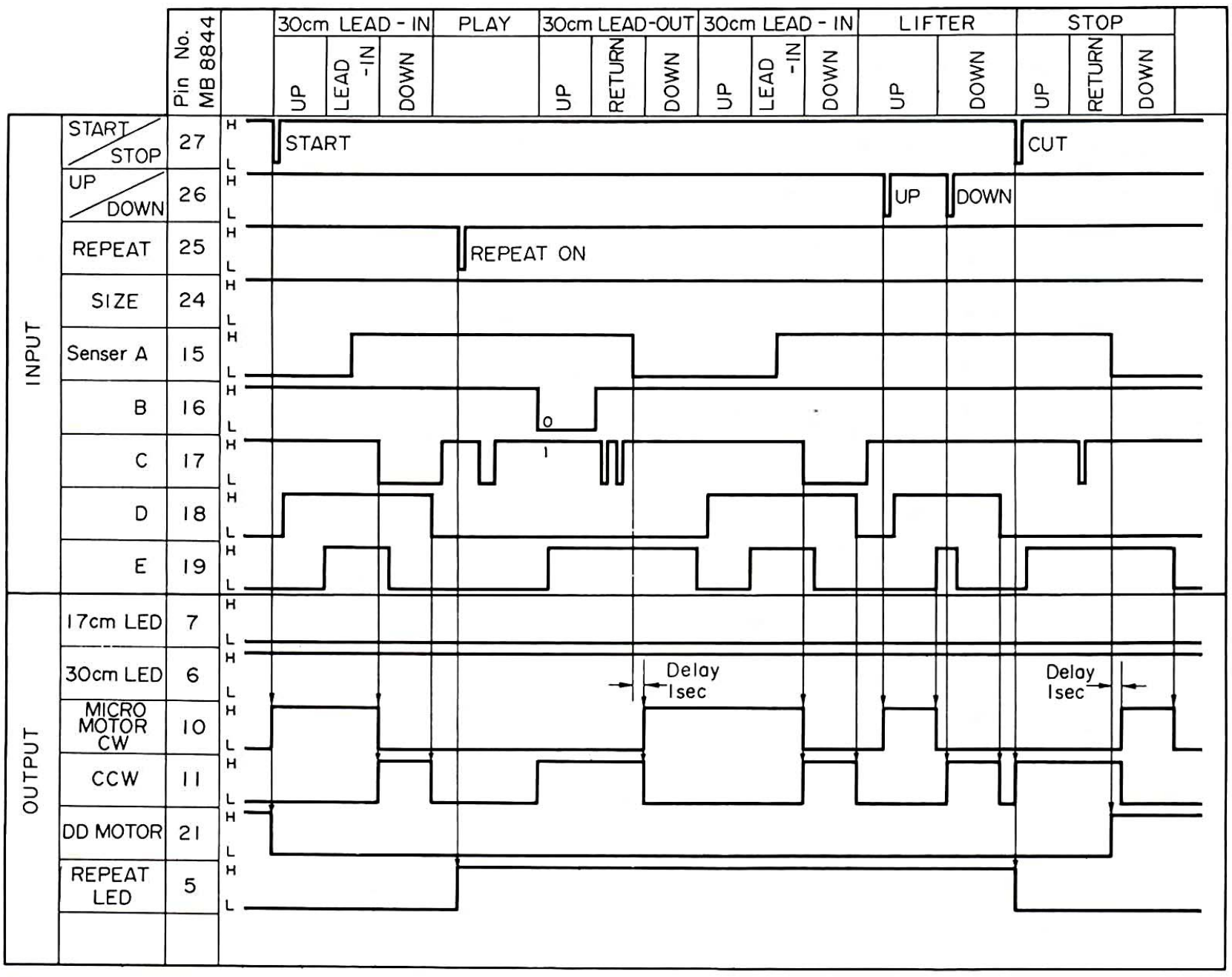
| Condition | | | | | | | | Sensor condition in normal operation. (At input port of micro-computer |
|---|---|---|---|---|---|---|---|---|
| Trouble operation | Sensors (At input port of microcomputer) | | | | | | | |
| | A | B | C | D | E | CW | CCW | |
| | 15 | 16 | 17 | 18 | 19 | 06 | 07 | |
| Keeps arm lifter down | L | | | L | L | H | L | D = H |
| Tonearm is locked during lead-in operation | H | | H | H | H | H | L | C = L |
| Arm lifter will not come down at lead-in position | H | | L | H | H | L | H | E = L |
| Same as above | H | | | H | L | L | H | D = L |
| Tonearm will not return at end of 30cm dia. disc | H | L | H | L | L | L | H | E = H |
| Tonearm will not return at end of 17cm dia. sic | H | L | L | L | L | L | H | E = H |
| Tonearm will not return to arm rest | H | | H | L | H | L | H | C = L 17 position |
| Same as above | H | | H | L | H | L | H | C = L 30 position |
| Same as above | H | | | L | H | L | H | A = L |
| Arm lifter will not come down in return operation | L | | | L | H | H | L | E = L |

3) When the platter is held with hand during the DD motor is powered, the microcomputer stops to turn the DD motor automatically after 20 seconds.

- **Microcomputer Timing Chart**
  **(30cm LEAD-IN →PLAY →LEAD-OUT. 17cm LEAD-IN →PLAY →LEAD-OUT)**




- **Microcomputer Timing Chart**
  **(30cm LEAD-IN →PLAY →REPEAT ON →LEAD-OUT →LEAD-IN →LIFTER UP·DOWN →STOP)**



## B. DD motor control circuit operations

The DD motor control circuit comprises a comparison pulse signal detection circuit including a magnetic head, a motor control PLL IC, a speed-inversely-proportional-voltage generating circuit, a motor brake circuit, and a motor drive circuit of hall element position detection type, as shown in Block Diagram.

### 1. Pulse detection circuit using a magnetic head

This circuit detects a pulse signal produced by 480 magnetic poles magnetized in a magnetic paint material applied on the inner side of the platter. The detected pulse signal is amplified through $eIC_2$ and is applied to the terminal No. 6 of the PLL IC. Therefore, it is possible to detect a comparison-pulse signal proportional to the revolution speed of the platter. The comparison frequency is 360 Hz in 45rpm and 266.6 Hz in 33-1/3rpm.

### 2. Motor control PLL IC (See Fig. 2-4 Block Diagram)

The TC9142P includes a PLL circuit which can convert a phase difference between DD motor revolution speed signal and reference frequency signal into a voltage signal inversely proportional to the revolution speed in order to control the DD motor.

The functions of input/output terminals of this IC are as follows:

Pin 6 . . . . . Terminal for inputting a comparison pulse signal representative of motor revolution speed

Pin 7 . . . . . Terminal for outputting a motor phase control signal (8-bit D/A converter output terminal)

Pin 8 . . . . . Terminal for outputting a motor speed control signal (8-bit D/A converter output terminal)

Pin 9 . . . . . Terminal for outputting a motor reversal signal

Pin 10 . . . . . Terminal for inputting a motor speed switching signal (L = 33-1/3 rpm, H = 45 rpm)

Pin 11 . . . . . Terminal for inputting a motor start/stop signal (L = start, H = stop)

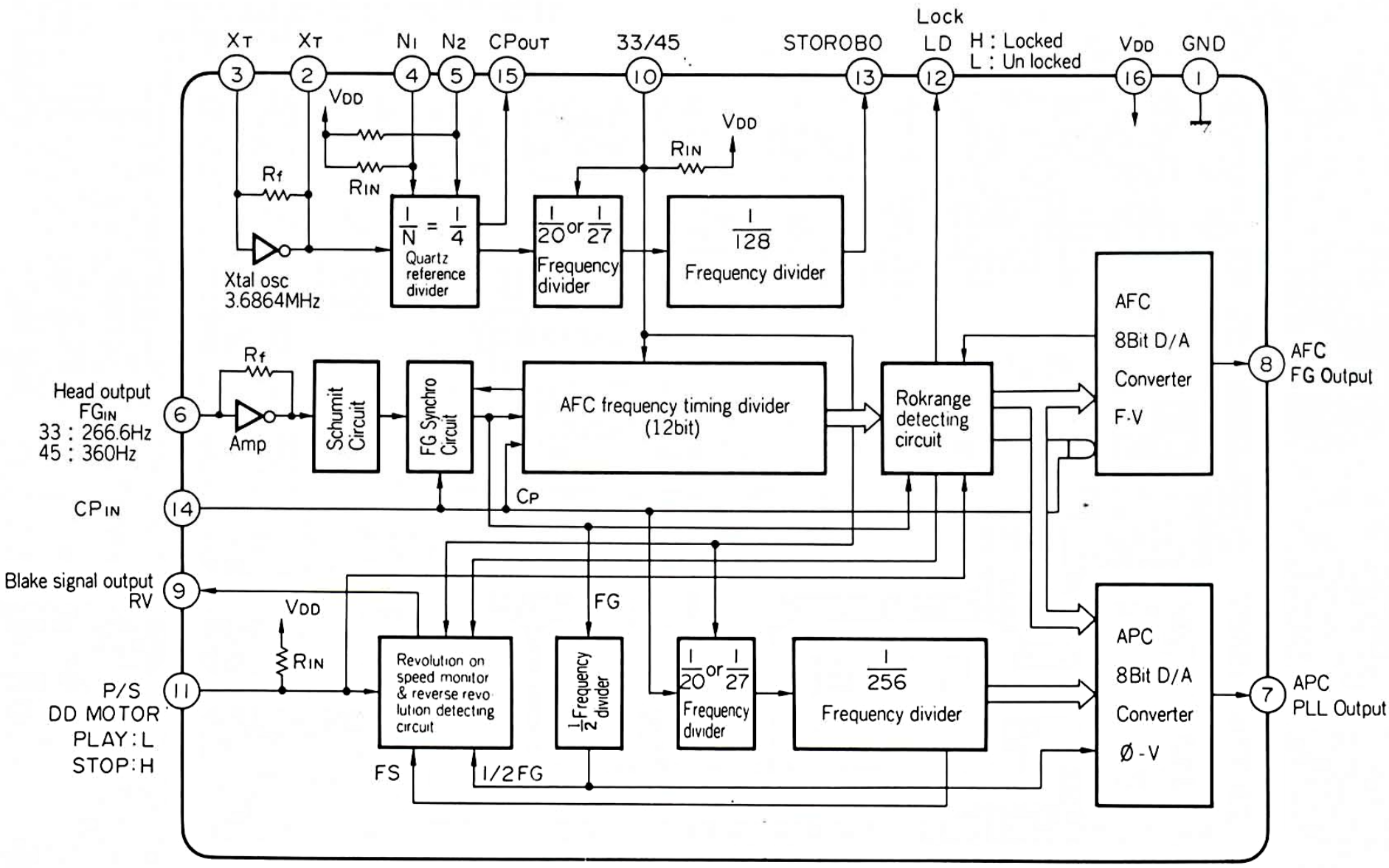
Pin 12 . . . . . Terminal for outputting a lock-range detection signal (H = within the range, L = out of the range)

Pin 14, 15 . . . . . Division output from a quartz reference frequency divider is applied from pin 15 to pin 14.

### 3. Circuit for obtaining a voltage inversely proportional to motor revolution speed (See Block Diagram)

The motor speed control signal is outputted from the pin 8 of the TC9142P and the motor phase control signal is outputted from the pin 7. After being passed through active low-pass filters, respectively, these two signals are mixed at point B with the ratio of FG: PLL = 10 : 1 in order to obtain a voltage inversely proportional to motor revolution speed. This speed-inversely-proportional voltage is compared with a divided reference voltage through the $eIC_2$, and is next applied to a hall element. Since the $eIC_2$ is an inversion amplifier, a minus voltage is being applied to the hall device when the motor starts or is rotating in the normal direction.

Fig. 2-4



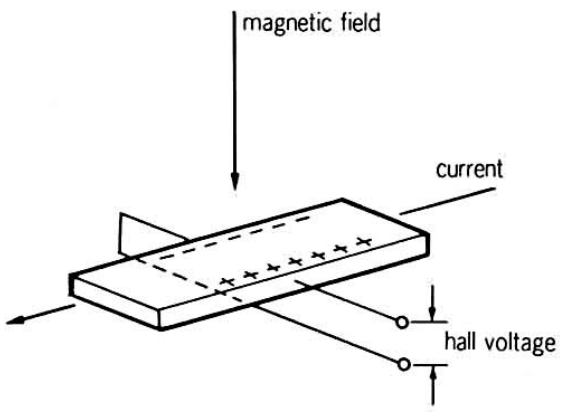
**4. Motor brake circuit**

When a command signal to switch the motor speed from 45 rpm to 33-1/3 rpm is applied to the pin 10 of the TC9142P, that is, when the pin 10 is changed from a H-voltage level to a L-voltage level, and when a command signal to switch the motor from start to stop is applied to the pin 11, that is, when the pin 11 is changed from a L-voltage level to a H-voltage level, the terminal pin 9 for outputting a motor reversal signal generates a brake signal of a H-voltage level until the motor speed drops to one-eighth of 45 rpm or 33-1/3 rpm. This brake signal is amplified by two transistors and is next applied to the hall element as a plus voltage in order to stop the motor forcedly.

**5. Position detection by hall element and motor drive circuit**

The hall element is a semiconductor material such that a hall voltage (E) is generated, as shown in Fig. 2-5, when a current is kept passed in a direction and when a magnetic field is applied in another direction perpendicular to the current-flowing direction.

**Fig. 2-5**




In the position detection circuit of the XR-Q7, when the motor is rotating in the normal direction, since a minus voltage is applied to the hall element, the current flows as shown in Fig. 2-6. In motor brake operation, however, since a plus voltage is applied to the hall element as stated in 4. above, the polarity of the Hall voltage is reversed, that is, the current flows in the opposite direction in Fig. 2-6, so that a brake force is applied to the motor.

Fig. 2-7 shows the arrangement of the DD motor drive coils, hall element sensors, and rotor magnets.

**Fig. 2-6**

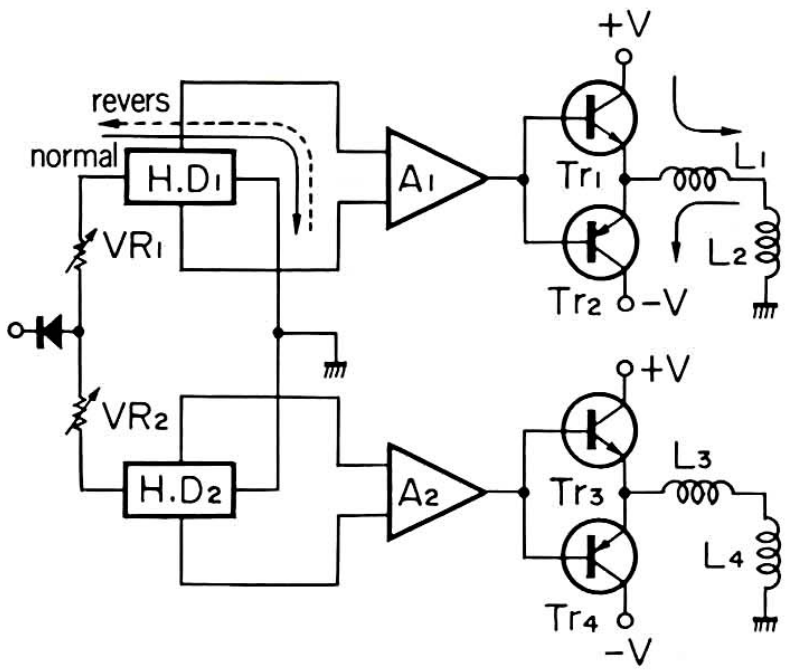
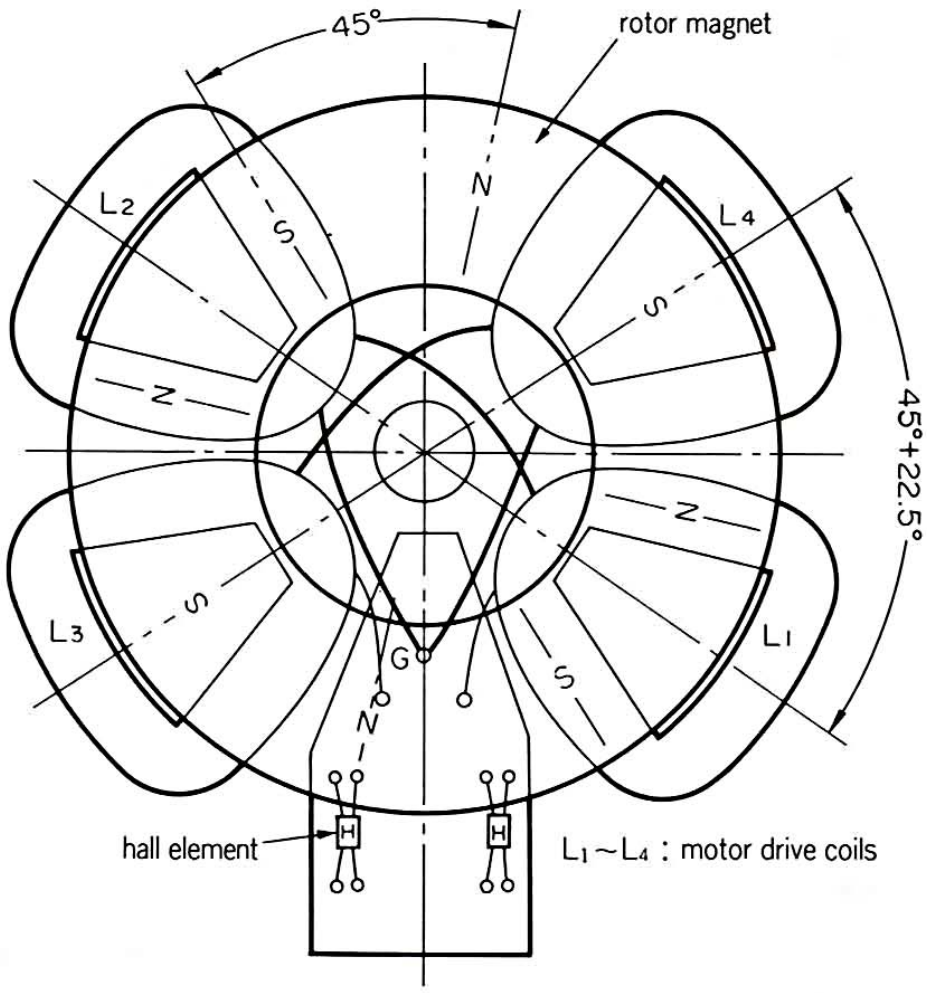



**Fig. 2-7**



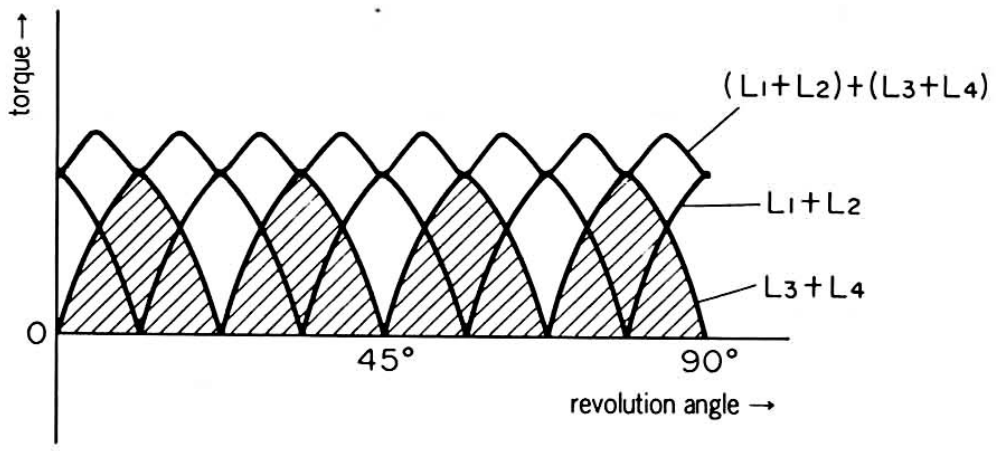

As shown in Fig. 2-7, since the rotor magnet has eight poles including four N and S each, whenever the rotor rotates 45 degrees, the phase of the voltage generated from the hall element also changes by 180° degrees.

Therefore, the transistors $TR_1$ and $TR_2$ (or $TR_3$ and $TR_4$) in the drive circuit are alternately turned on as shown in Fig. 2-6, and thus the direction of the current flowing through the coils $L_1$ and $L_2$ (or $L_3$ and $L_4$) also changes alternately. In this case, however, since the magnetic poles of S and N also change, the direction of a force to rotate the motor is kept constant.

Next, the reason why two pairs of drive coils $L_1$ and $L_2$, and $L_3$ and $L_4$ are arranged is as follows: since the variation in torque is great as is well understood in Fig. 2-8 when only one pair of coils $L_1$ and $L_2$ are provided on one side, a torque generated by the coils $L_1$ and $L_2$ is combined with a torque generated by the coils $L_3$ and $L_4$ by shifting the respective coil torque phases of $L_1$, $L_2$ and $L_3$, $L_4$ by 22.5 degrees from each other, in order to reduce the torque variation.

Further, a pair of coils $L_1$ and $L_2$ (or $L_3$ and $L_4$) are placed facing each other with 180-degree angle intervals.

**Fig. 2-8**



## C. Silent synchrotor system (SSRS) operations

The PLL servo circuit controls the DD drive motor at an accurate revolution speed while reducing the revolution speed fluctuations. Additionally, the DD motor is so designed as to reduce the torque variation as small as possible as explained in B above. However, since magnetic field intensity changes due to the presence of magnetic poles, the torque also inevitably changes, and therefore it is impossible to completely eliminate the revolution speed variation or fluctuations of the DD motor, that is, wow and flutter component. If the revolution speed varies or fluctuates, this causes the board to vibrate, thus deteriorating sound quality. This silent synchrotor system (SSRS) is one to eliminate the revolution speed variation or fluctuation of the DD motor, the structure of which is shown in Fig. 2-10.

**Fig. 2-9**

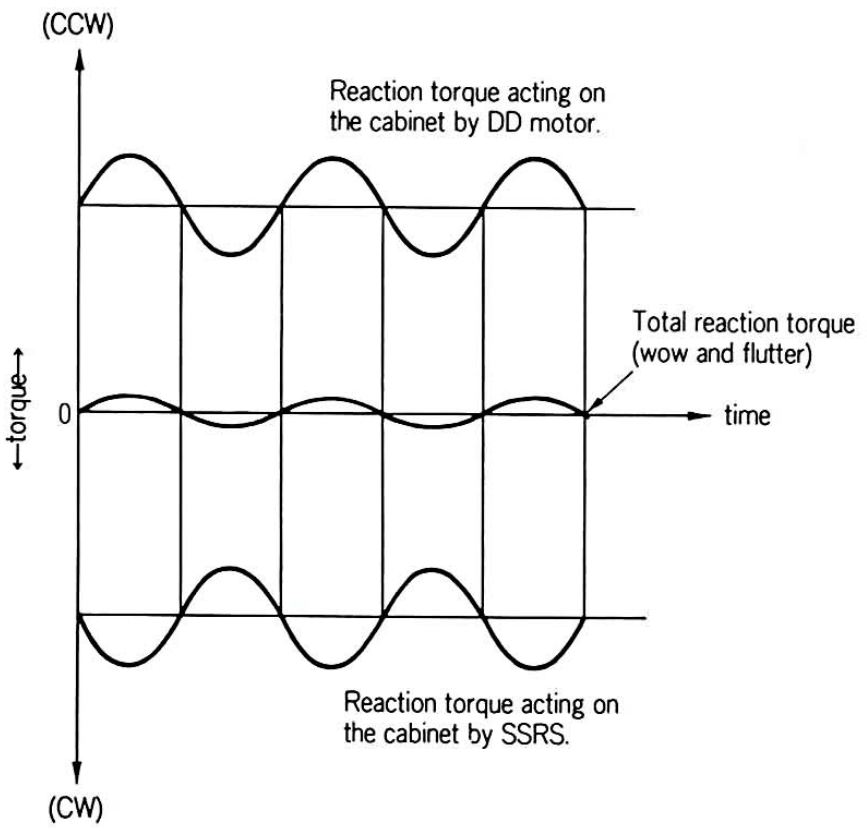
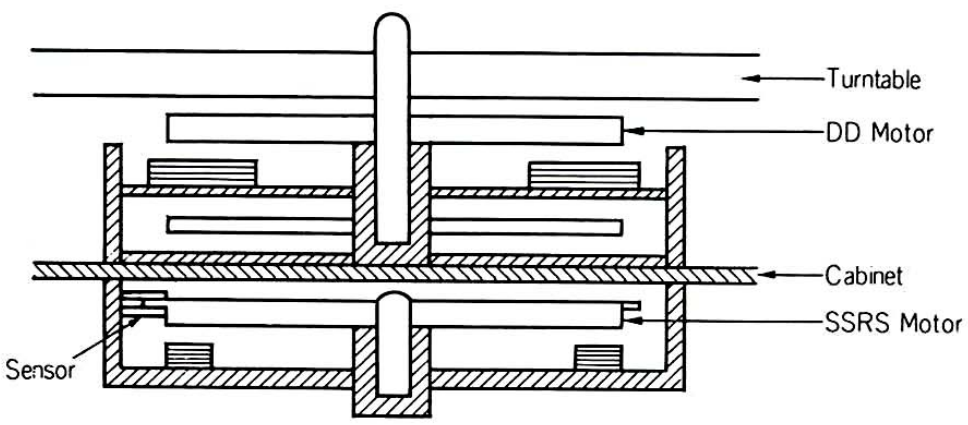



**Fig. 2-10**




In the figure, since the DD motor rotates in the CW direction, a reverse torque generated in the CCW direction is applied to the board because of reaction.

This reverse torque due to reaction also varies according to the revolution speed variation of the DD motor. Accordingly, it is possible to cancel the board vibration generated by the DD motor by rotating a SSRS motor by flowing a current the phase of which is opposite to the wow and flutter component.

Now follows a description of the SSRS motor operation. As stated in B 3. above, an AFC output signal (speed control output signal) from the pin 8 of TC9142P and a PLL output signal (phase control output signal) from the Pin 7 are first passed through two active lowpass filters, respectively, mixed with each other, and applied to the $eIC_2$ as an inversely-proportional voltage.

Since the $eIC_2$ output signal has a waveform in which the wow and flutter component is superposed on the DC component, this $eIC_2$ output signal is passed through coupling capacitors $eC_{19, 20}$ and is applied to the inversion amplifier $eIC_4$. Since drive coils of the SSRS motor is driven by the output signal inverted by this $eIC_4$, the vibration generated by the SSRS motor can cancel the vibration generated by the DD motor, that is, the wow and flutter component. (See Fig. 2-9)

The coil other than the drive coils serves to prevent the SSRS motor from being driven excessively by a large roughly-DC input current, because the SSRS motor is a kind of small-sized coreless DD motor.

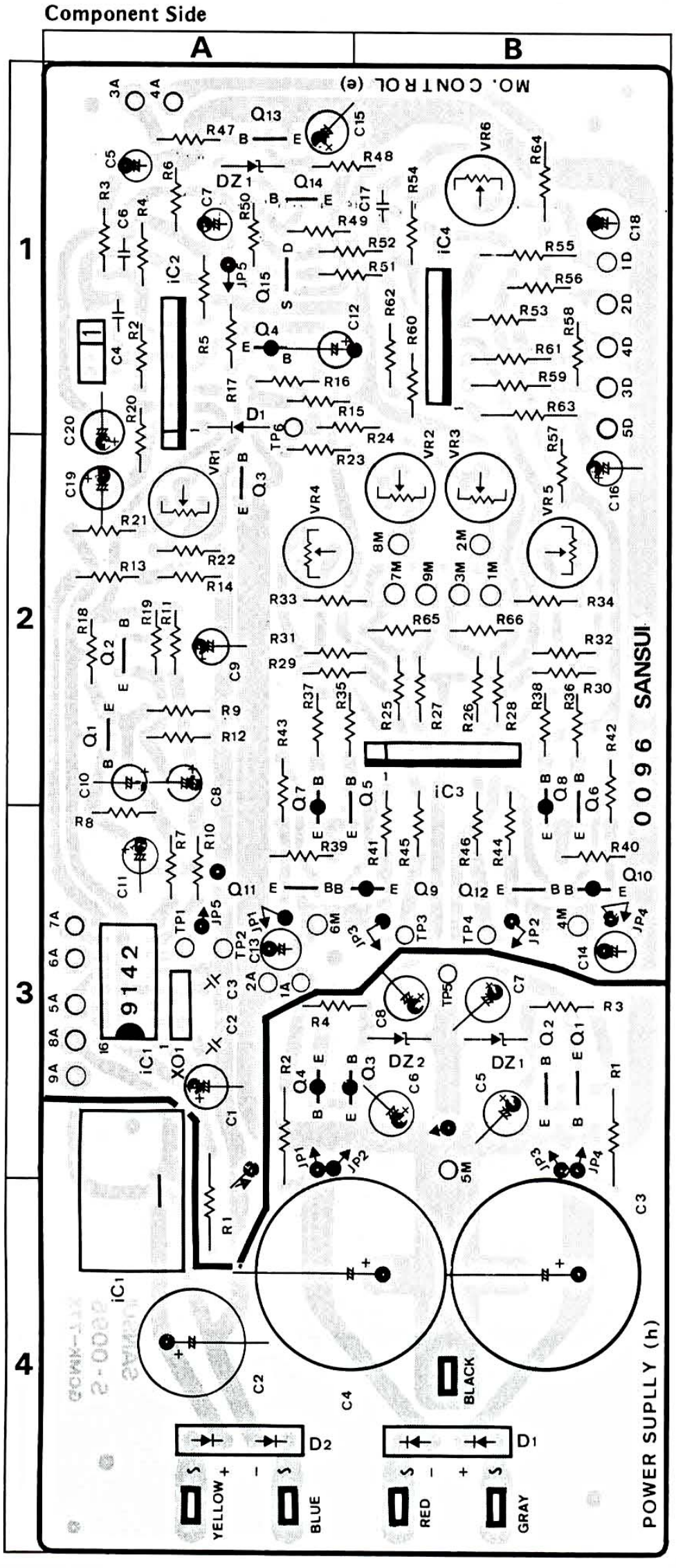
In this SSRS motor, a slit plate projected from one end of the SSRS magnet is provided between a LED and a phototransistor. Therefore, when the SSRS magnet is advanced or delayed from a predetermined position, the slit plate is away from the LED and the phototransistor, and thus a control signal is generated from the phototransistor. By using this control output signal, a current is passed through a holding coil so as to pull the magnet in a reverse direction, so that the SSRS magnet can be corrected at the original position.

# 3. PARTS LOCATION & PARTS LIST

## 3-1. S-0096 Motor Control Circuit Board (Stock No. 13085301)

•Since some of capacitors and resistors are omitted from parts lists in this Service Manual, refer to the Common Parts List for capacitors & resistors, which was appended previously to Sansui Manual.

Component Side




Parts List

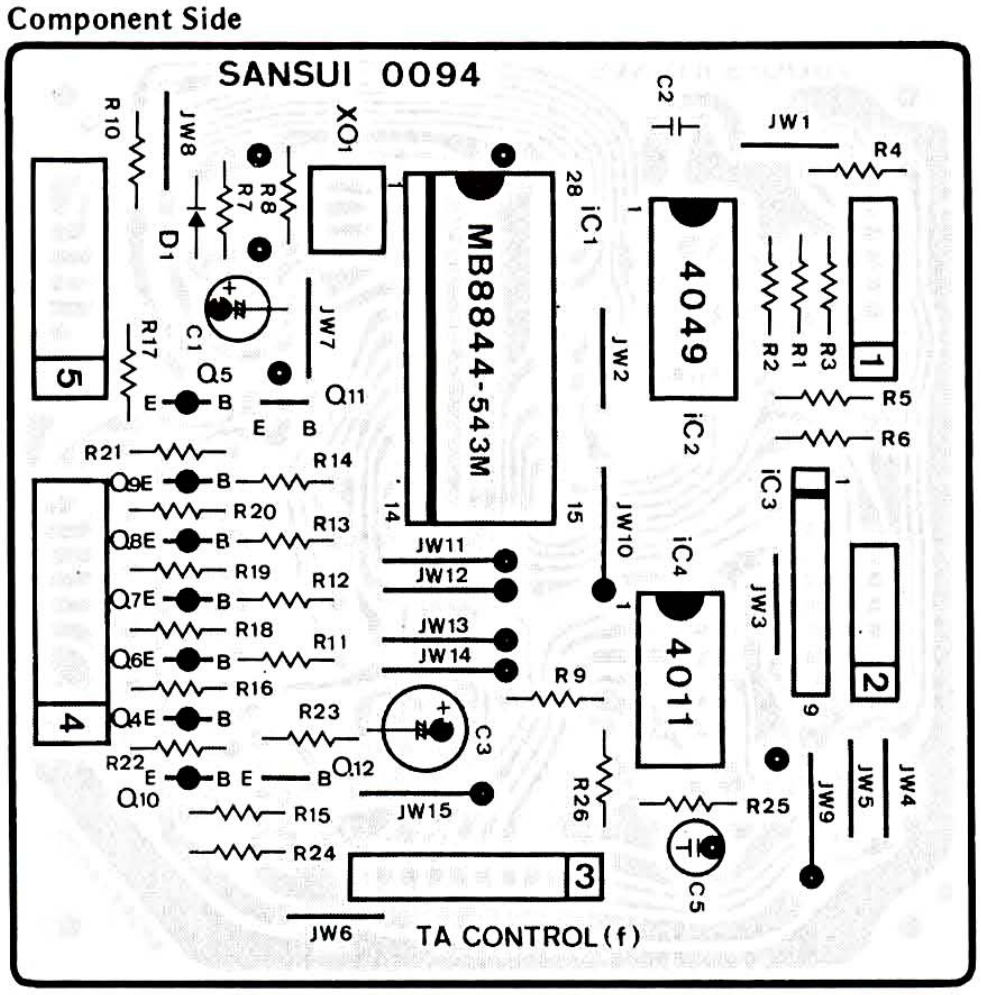
| Parts No. | Stock No. | Description |
|---|---|---|
| •Transistor | | |
| eQ1 | 07194800 | 2SC1815 |
| | 03059501 | 2SC945 |
| | 07299701 | 2SC2603 |
| eQ2 | 07194800 | 2SC1815 |
| | 03059501 | 2SC945 |
| | 07299701 | 2SC2603 |
| eQ3 | 07194800 | 2SC1815 |
| | 03059501 | 2SC945 |
| | 07299701 | 2SC2603 |
| eQ4 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| eQ5 | 07194800 | 2SC1815 |
| | 03059501 | 2SC945 |
| | 07299701 | 2SC2603 |
| eQ6 | 07194800 | 2SC1815 |
| | 03059501 | 2SC945 |
| | 07299701 | 2SC2603 |
| eQ7 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| eQ8 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| eQ9 | 46149300 | 2SB744 |
| eQ10 | 46149300 | 2SB744 |
| eQ11 | 46149400 | 2SD794 |
| eQ12 | 46149400 | 2SD794 |
| eQ13 | 07194800 | 2SC1815 |
| | 03059501 | 2SC945 |
| | 03059503 | 2SC945 |
| | 07299701 | 2SC2603 |
| eQ14 | 07194800 | 2SC1815 |
| | 03059501 | 2SC945 |
| | 03059503 | 2SC945 |
| | 07299701 | 2SC2603 |
| eQ15 | 03703402 | 2SK163 |
| •IC | | |
| eIC1 | 46146400 | TC9142P |
| eIC2 | 46147700 | M5218L |
| | 46087100 | NJM4558S |
| | 46146500 | BA715 |
| eIC3 | 46147700 | M5218L |
| | 46087100 | NJM4558S |
| | 46146500 | BA715 |
| eIC4 | 46147700 | M5218L |
| •XTAL | | |
| eXO1 | 09300600 | NC-186 |
| •Diode | | |
| eD1 | 03111600 | 1S2473D |
| •Zener Diode | | |
| eDZ1 | 03185800 | RD5.1E-B |
| eR21 | 00207900 | 39kΩ 1/4W M.R. |
| eR22 | 00202500 | 150kΩ 1/4W M.R. |
| eC5 | 00305800 | 2.2μF 25V E.B. |
| eC7 | 00305800 | 2.2μF 25V E.B. |
| eC8 | 46030700 | 0.47μF 50V E.BL |
| eC9 | 46030600 | 0.22μF 50V E.BL |
| eC10 | 46030600 | 0.22μF 50V E.BL |
| eC11 | 46030500 | 0.1μF 50V E.BL |
| eC13 | 00307000 | 2.2μF 50V E.B. |
| eC14 | 00307000 | 2.2μF 50V E.B. |
| eC18 | 00305800 | 2.2μF 25V E.B. |
| eVR1 | 10342700 | 10kΩ B PLL Adjust Volume |
| eVR2 | 10350900 | 2.2kΩ Balance Adjust Volume |
| eVR3 | 10350900 | 2.2kΩ Balance Adjust Volume |
| eVR4 | 10351100 | 4.7kΩ B Off Set Adjust Volume |
| eVR5 | 10351100 | 4.7kΩ B Off Set Adjust Volume |
| eVR6 | 10352100 | 220kΩ D.R.S. Gain Adjust Volume |

| Parts No. | Stock No. | Description |
|---|---|---|
| ●Transistor | | |
| hQ1 | 46149400 | 2SD794 |
| hQ2 | 07194800 | 2SC1815 |
| | 03059501 | 2SC945 |
| | 07299701 | 2SC2603 |
| hQ3 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| hQ4 | 46149300 | 2SB744 |
| ●IC | | |
| hIC1 | 07183500 | μPC78M05H |

| Parts No. | Stock No. | Description |
|---|---|---|
| ●Diode | | |
| hD1 | 07193300 | UB-152LFF |
| hD2 | 03117000 | RB-152 |
| ●Zener Diode | | |
| hDZ1 | 03159900 | EQA01-15R |
| hDZ2 | 03159900 | EQA01-15R |
| hC3 | 46168700 | 3300μF 35V E.C. |
| hC4 | 46168700 | 3300μF 35V E.C. |

## 3-2. S-0094 Tonearm Control Circuit Board (Stock No. 13085101)

**Component Side**




**Parts List**

| Parts No. | Stock No. | Description |
|---|---|---|
| ●XTAL | | |
| fXO1 | 46149200 | KMFC1001S (3.58MHz) |
| ●Transistor | | |
| fQ4 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| fQ5 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| fQ6 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| fQ7 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| fQ8 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| fQ9 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| fQ10 | 07194700 | 2SA1015 |
| | 07197001 | 2SA733A |
| | 07299601 | 2SA1115 |
| fQ11 | 07194800 | 2SC1815 |
| | 03059501 | 2SC945 |
| | 07299701 | 2SC2603 |

**Parts List <S-0094>**

| Parts No. | Stock No. | Description |
|---|---|---|
| fQ12 | 07194800 | 2SC1815 |
| | 03059501 | 2SC945 |
| | 07299701 | 2SC2603 |
| ●IC | | |
| fIC1 | 46149500 | MB8844-543M |
| fIC2 | 03611800 | MSM4049RS |
| | 46160400 | MB84049B |
| | 46160500 | TC4940BP |
| fIC3 | 46149600 | BA6208 |
| fIC4 | 03604000 | MSM4011 |
| | 03604100 | TC4011P |
| | 07207200 | MB84011BM |
| ●Diode | | |
| fD1 | 03111600 | 1S2473D |
| fC5 | 00306800 | 1μF 50V E.B. |

● Note: The circuit boards, S-0099 & S-0100 are not supplied as the assembled. However, the individual parts on the circuit board are provided by orders.

## 3-3. S-0099 A, B, C Sensor Circuit Board

**Parts List**

| Parts No. | Stock No. | Description |
|---|---|---|
| ●LED | | |
| fLD1 | 46150400 | TLR121 |
| fLD2 | 46150400 | TLR121 |
| fLD3 | 46150400 | TLR121 |

## 3-4. S-0100 A, B, C Sensor Circuit Board

**Parts List**

| Parts No. | Stock No. | Description |
|---|---|---|
| ●Photo Transistor | | |
| fQ1 | 46160000 | TPS605 |
| fQ2 | 46160000 | TPS605 |
| fQ3 | 46160000 | TPS605 |

● Abbreviations

| | | | |
|---|---|---|---|
| C.R. | Carbon Resistor | E.L. | Low Leak Electrolytic Capacitor |
| S.R. | Solid Resistor | E.B. | Bi-Polar Electrolytic Capacitor |
| Ce.R. | Cement Resistor | E.BL. | Low Leak Bi-Polar Electrolytic Capacitor |
| M.R. | Metal Film Resistor | | |
| F.R. | Fusing Resistor | Ta.C. | Tantalum Capacitor |
| N.I.R. | Non-Inflammable Resistor | F.C. | Film Capacitor |
| C.C. | Ceramic Capacitor | M.P. | Metalized Paper Capacitor |
| C.T. | Ceramic Capacitor, Temperature Compensation | P.C. | Polystyrene Capacitor |
| | | G.C. | Gimmic Capacitor |
| E.C. | Electrolytic Capacitor | | |

# 4. ADJUSTMENTS

## 4-1. Adjustment of Screen Plate Installation Position

Adjust the position whenever the tonearm is replaced. With the tonearm placed on the arm rest, install the screen plate to the tonearm shaft, as shown in Fig. 4-1 and 4-2.

Fig. 4-1 Installation of Screen Plate

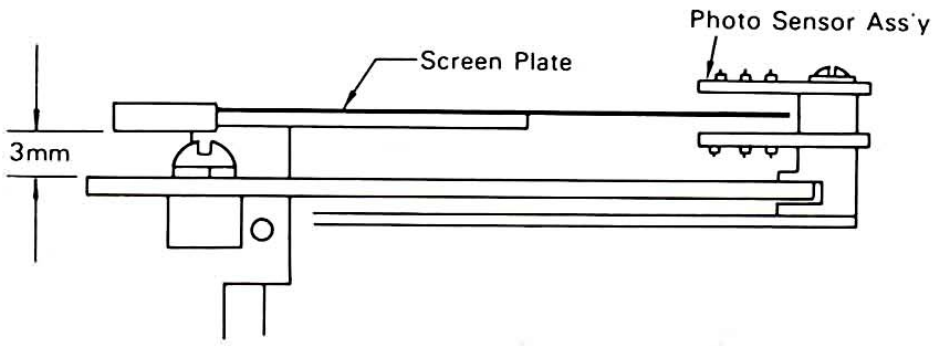
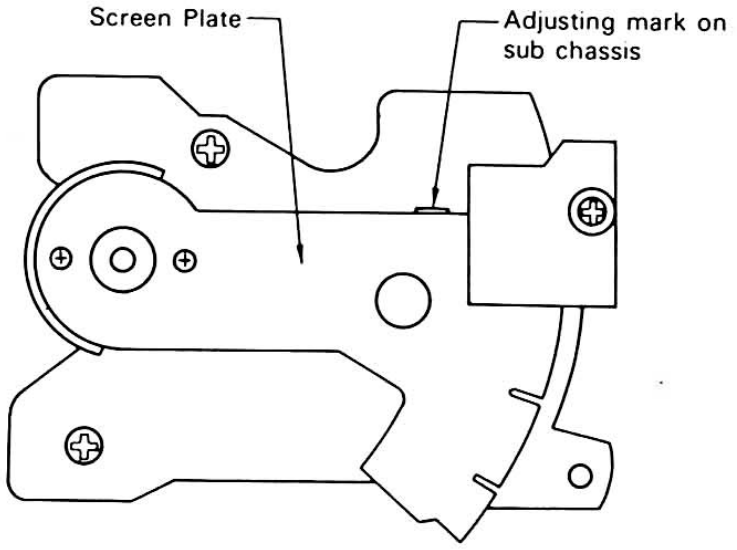


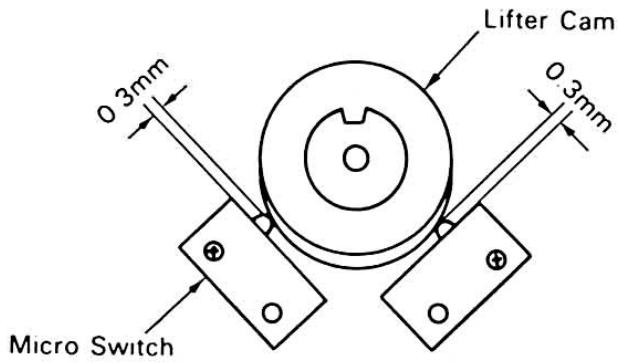

Fig. 4-2 Bottom View of Screen Plate




## 4-2. Adjustment of Micro Switch Position

When the micro switch is replaced, adjust its position as shown in Fig. 4-3.

Fig. 4-3




## 4-3. Lead-in Position Adjustment

1) Confirm that the screen plate is installed as shown in Fig. 4-1.
2) Turn the adjusting cam (See 5-2. Top View on Page 8) so as to lower the stylus to the middle of lead-in groove.

## 4-4. Adjustment of Motor Control Section

1) Adjust the gap between puls detecting head and platter approximately 0.2mm (See top view on page 8). Perform this adjustment without turntable sheet.
2) Adjustment of motor drive circuit (See bottom view on page 7).
   presetting
   1. Turn power switch on.
   2. No plater revolution.

| EQUIPMENT | MEASURE OUTPUT | ADJUST FOR | ADJUST |
|---|---|---|---|
| DC volt meter | $TP_3$ (S-0096) | 0V | $eVR_4$ (S-0096) |
| | $TP_4$ (S-0096) | 0V | $eVR_5$ (S-0096) |

3) Gain adjustment of motor drive circuit (See bottom view on page 7).
   Presetting
   1. Turn the platter with 33-1/3 or 45 rpm speed.

| EQUIPMENT | MEASURE OUTPUT | ADJUST FOR | ADJUST | REMARKS |
|---|---|---|---|---|
| DC volt meter | $TP_3$ (S-0096) | +18V | $eVR_2$ (S-0096) | Brake the platter with hand to make it almost stop but a little revolution. |
| | $TP_4$ (S-0096) | +18V | $eVR_3$ (S-0096) | |

* Connect a 1S2473D diode to positive lead.

4) PLL output adjustment (See bottom view on page 7)
   Presetting
   1. Play 30cm-dia. disc with 33-1/3 rpm speed.

| EQUIPMENT | MEASURE OUTPUT | ADJUST FOR | ADJUST |
|---|---|---|---|
| DC volt meter | Pin No. 7 of $eIC_1$ (S-0096) Refer to bottom view on page 7 with shows as point A | 1.8V | $eVR_1$ (S-0096) |

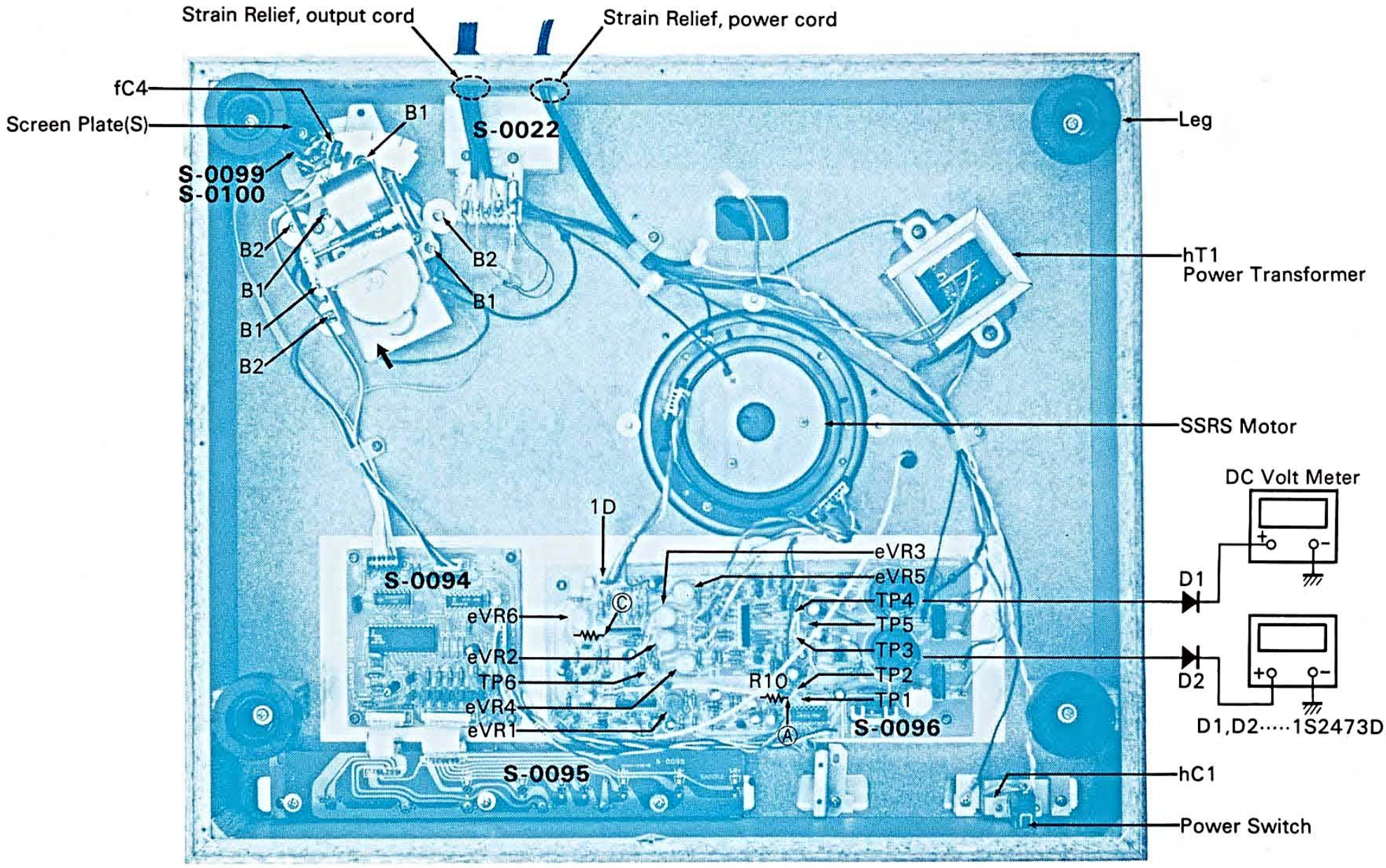
5) Silent synchrotor system adjustment (NF resistance adjustment on $eIC_{4b}$)
   Presetting
   1. Turn power switch off.
   2. Remove the connector for SSRS motor from S-0096.

| EQUIPMENT | MEASURE OUTPUT | ADJUST FOR | ADJUST | REMARKS |
|---|---|---|---|---|
| Resistance meter (Multi meter) | Between 1D terminal of connector for SSRS motor and $eR_{54}$ (Point C of bottom view on page 6) | 100kΩ (S-0096) | $eVR_6$ (S-0096) | Higher voltage lead must be connected to 1D. |

- Return the SSRS connector to S-0096 P.C.B., and turn the platter with 33-1/3 rpm speed. Measure both ripple voltages apply to $TP_6$ and 1D terminal with scope, and confirm that the 1D terminal voltage is about 21 dB more than $TP_6$ voltage.
- After silent synchrotor lock indicator are not blinking during the platter is turning with normal speed.

# 5. OTHER PARTS

## 5-1. Bottom View



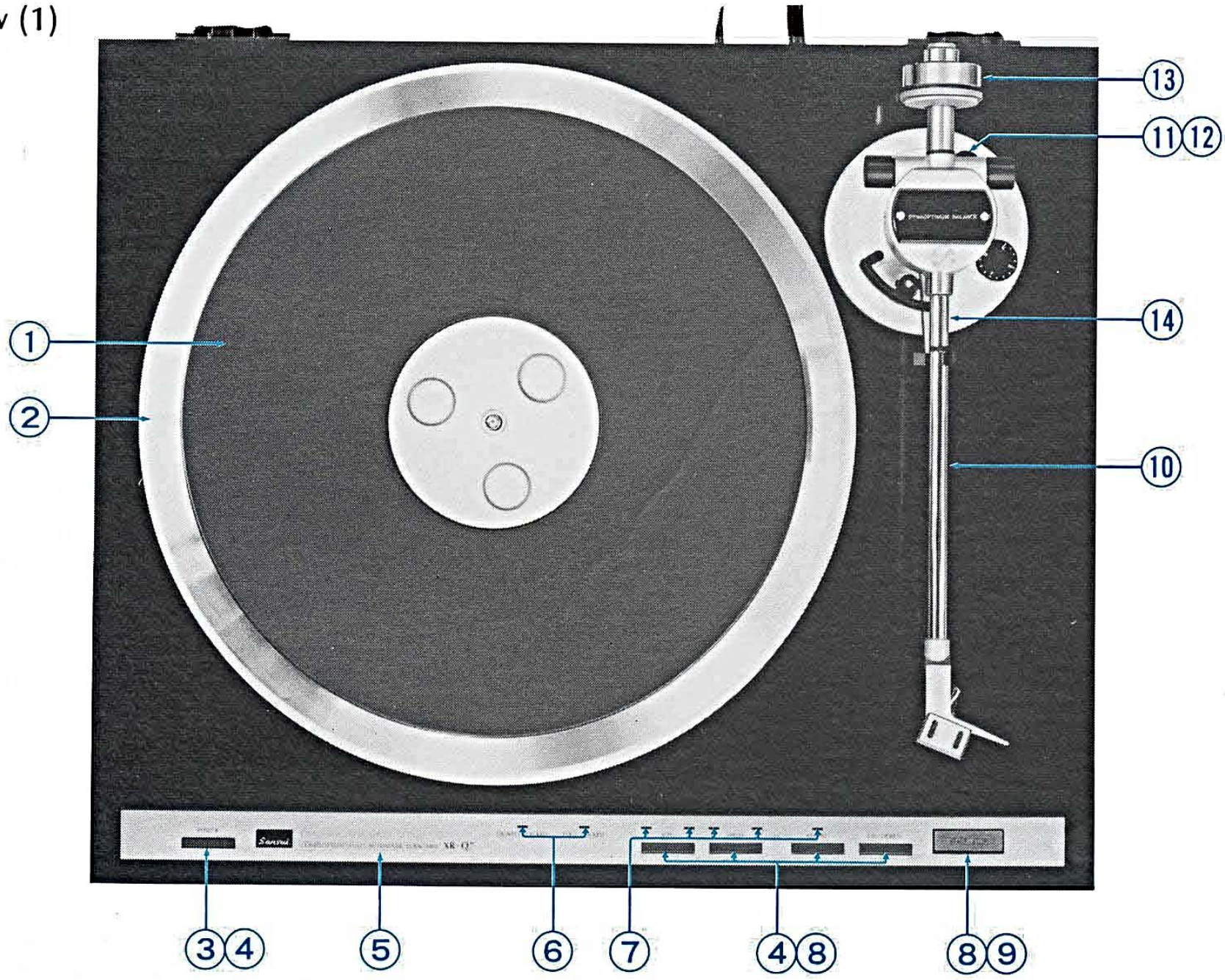

Parts List <Bottom View>

| Parts No. | Stock No. | Description |
|---|---|---|
| hT1 | 15005401 | Power Transformer |
| hC1 | 08302600 | 10000pF 125V C.C. |
| fC4 | 00302500 | 10μF 6.3V E.B. |
| | 13112300 | SSRS Motor |
| | 13086600 | Leg |
| | 39106000 | Strain Relief, power cord |
| | 39105700 | Strain Relief, output cord |
| | 13083400 | Screen Plate (S) |

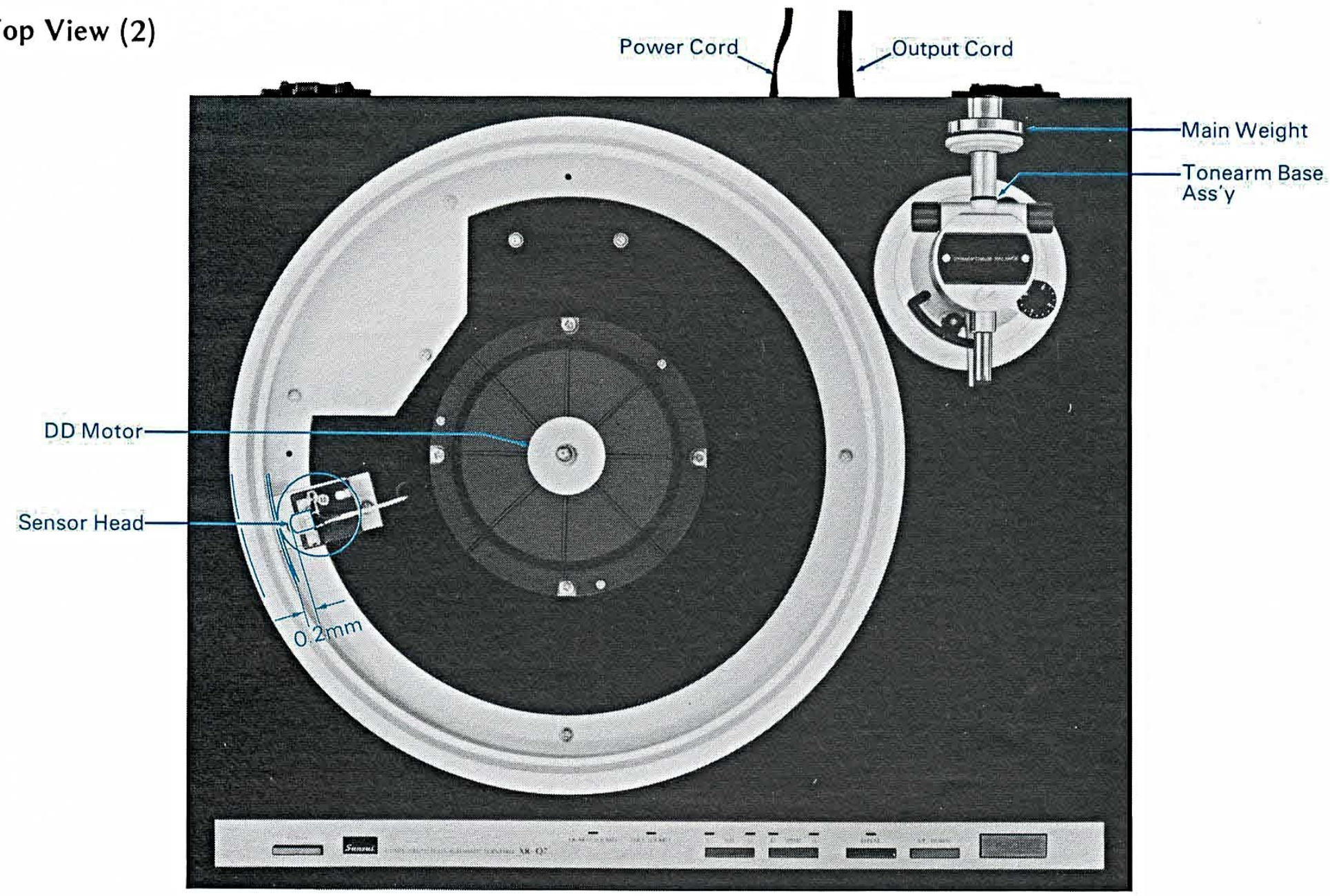
Parts List <Top View (1), (2)>

| Parts No. | Stock No. | Description |
|---|---|---|
| 1 | 13089000 | Turntable Sheet |
| 2 | 13088900 | Turntable |
| 3 | 46087300 | Power Switch |
| 4 | 07838300 | Push Switch Knob |
| 5 | 13086800 | Front Panel |
| 6 | 07246200 | LED, green |
| 7 | 46162500 | LED, red |
| 8 | 11320900 | Control Switch |
| 9 | 13086900 | START/STOP Switch Knob |
| 10 | 13107100 | Tonearm Pipe |
| 11 | 13089100 | Lead-in Adjusting Knob |
| 12 | 13083310 | Lead-in Adjusting Cam |
| 13 | 13087800 | Main Weight Ass'y |
| 14 | 13106900 | Tonearm Base Ass'y |
| | 46172700 | DD Motor |
| | 45030400 | Sensor Head |
| | 38004700 | Power Cord |
| | 13118700 | Output Cord |
| | 13085900 | Dust Cover Ass'y |
| | 13086300 | Auto Hinge |

## 5-2. Top View (1)




## 5-3. Top View (2)



# 6. EXPLODED VIEW OF MECHANICAL Ass'y & PARTS LIST

Fig. 6-1

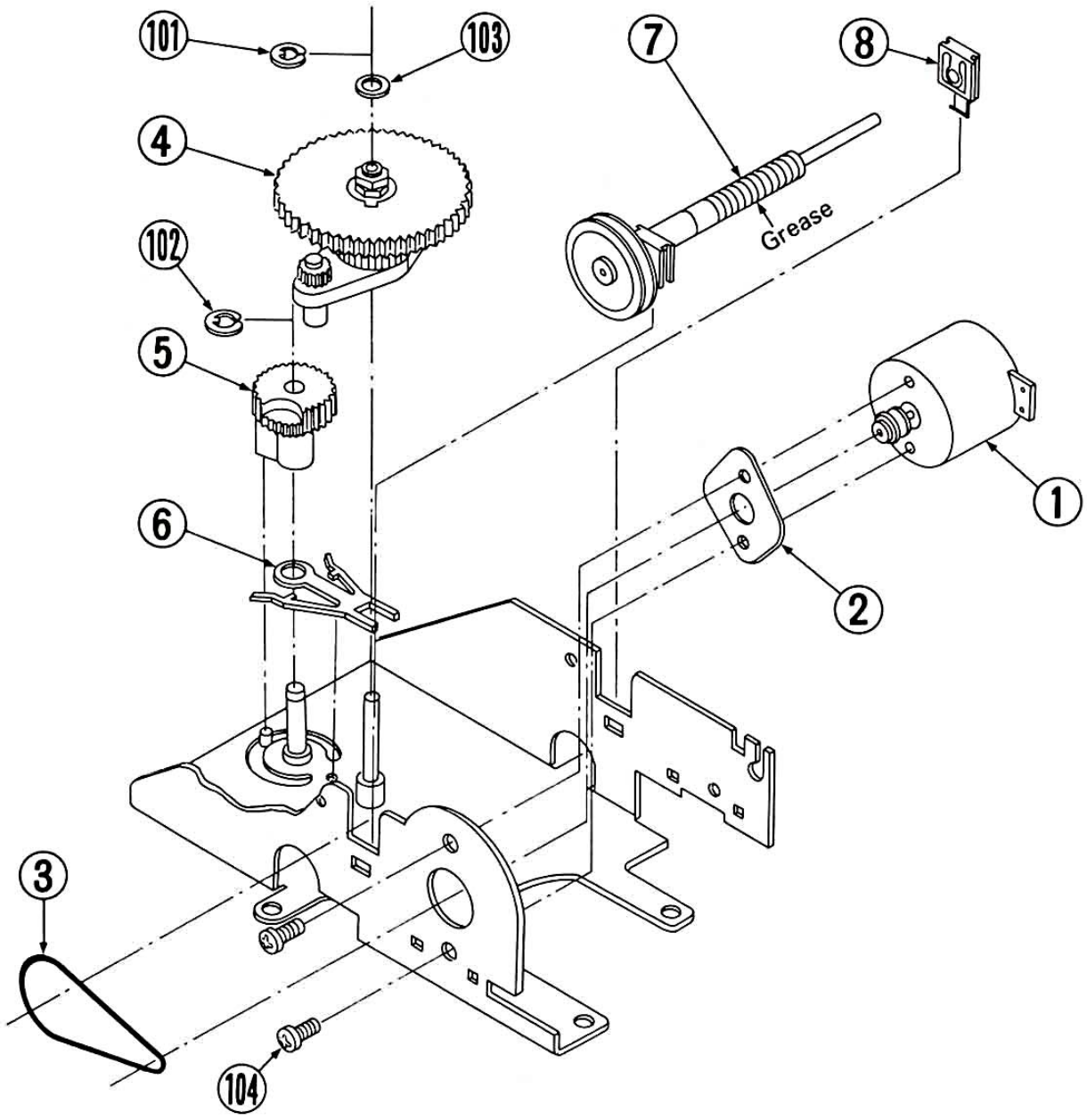



Fig. 6-2

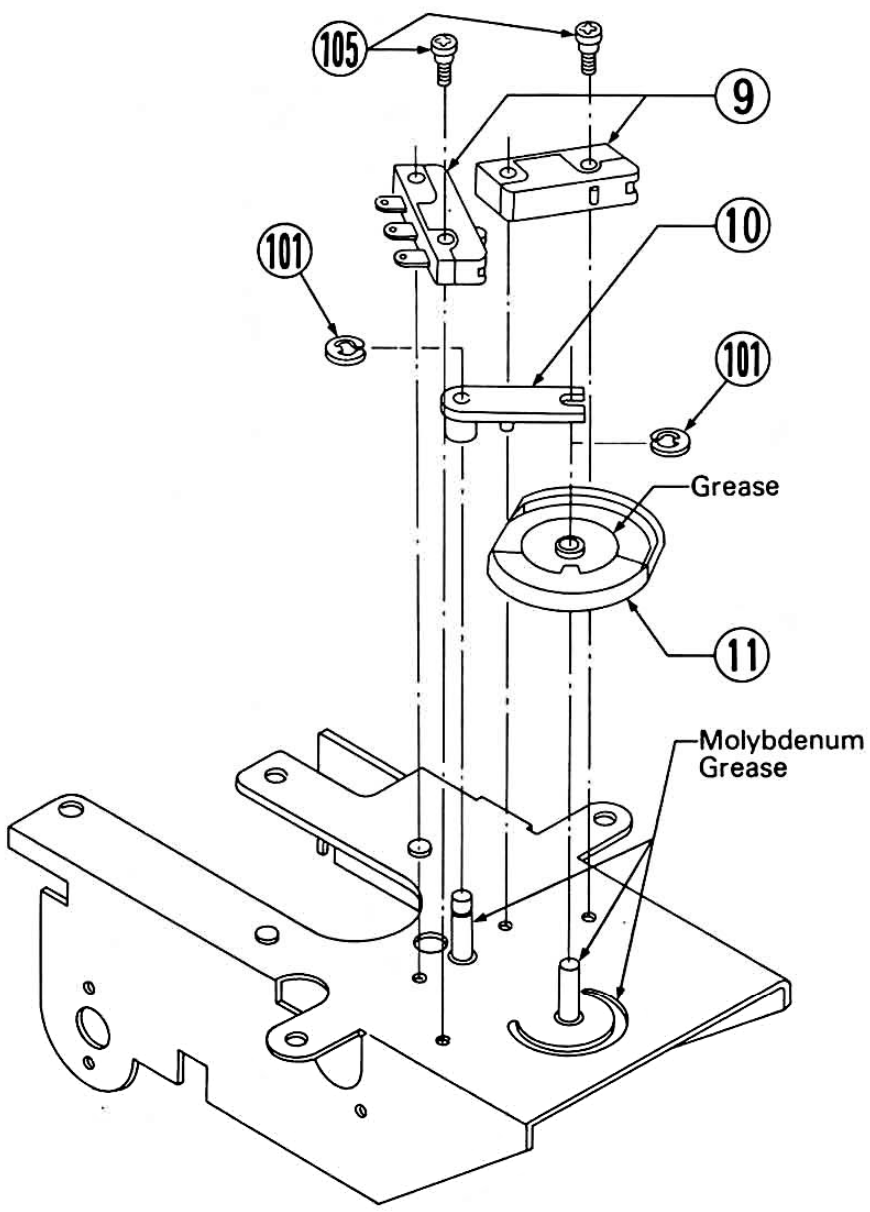
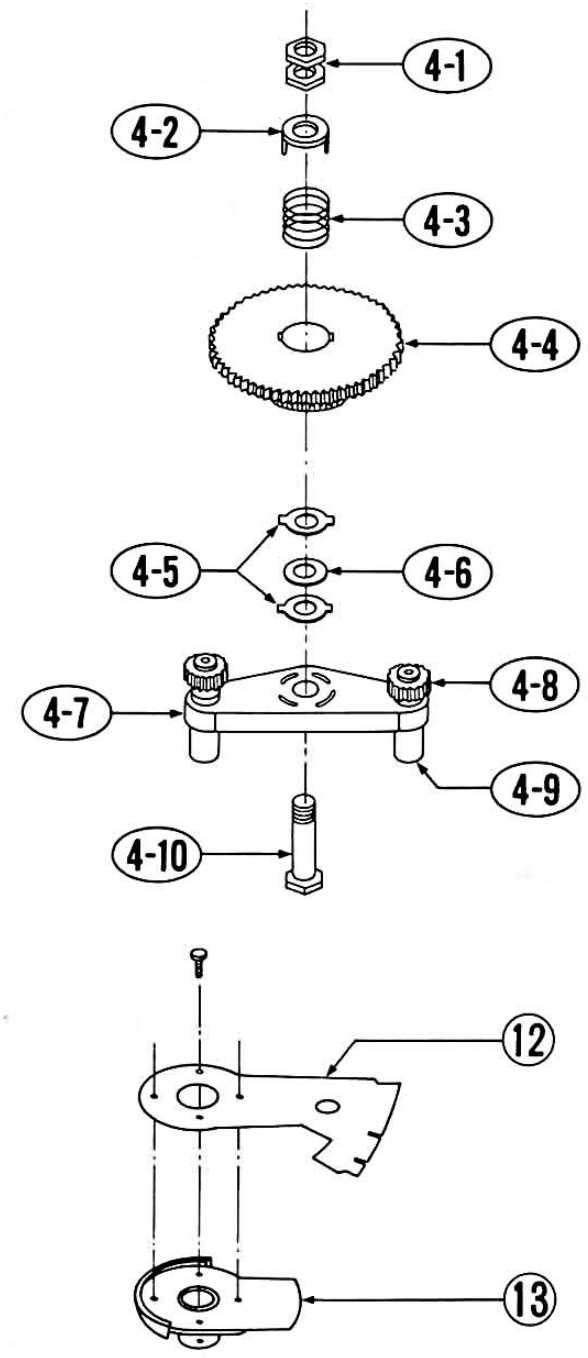



Fig. 6-3

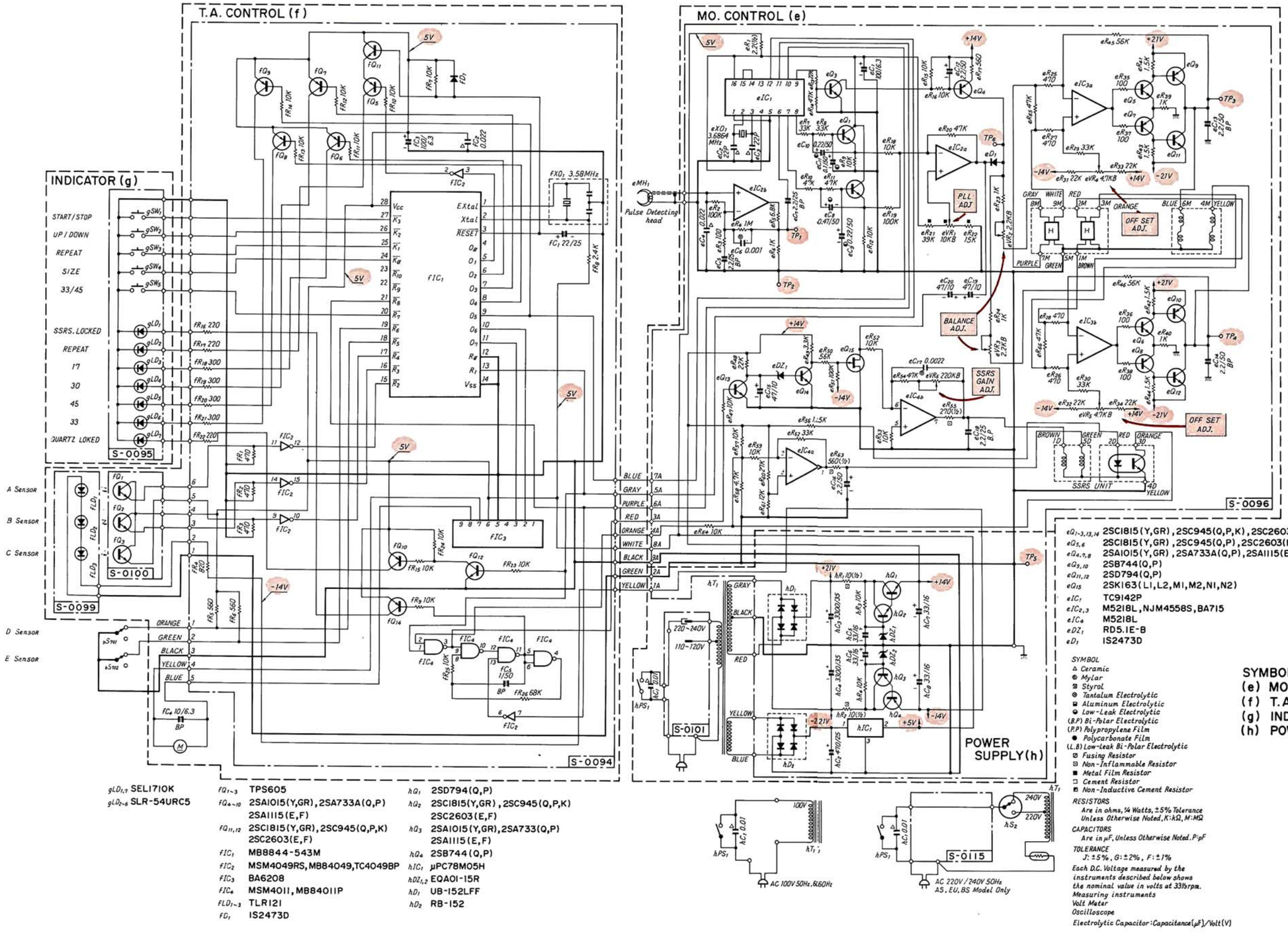



Parts List

| Parts No. | Stock No. | Description |
|---|---|---|
| 1 | 46161600 | Micro Motor |
| 2 | 55029810 | Rubber Cushion |
| 3 | 60322310 | Drive Belt |
| 4 | 13110700 | Drive Gear Ass'y |
| 4-1 | | Hexagon Nuts |
| 4-2 | | Holding Plate |
| 4-3 | | Compression Spring |
| 4-4 | | Drive Gear |
| 4-5 | | Friction Plate |
| 4-6 | | Friction Disc |
| 4-7 | | Reverse Arm |
| 4-8 | | Floating Gear |
| 4-9 | | Drive Pulley |
| 4-10 | | Boss |
| 5 | 13082710 | Cam Gear |
| 6 | 13081920 | Cam Spring |
| 7 | 13128300 | Worm Gear Ass'y |
| 8 | 13083700 | Bearing Holder |
| 9 | 11602700 | Micro Switch |
| 10 | 13083900 | Lifter Guide |
| 11 | 13083110 | Lifter Cam |
| 12 | 13083600 | Screen Plate (1) |
| 13 | 13083800 | TA Drum |
| •Washer & Screw | | |
| 101 | 08322600 | 2.5$\phi$ E-Type Washer |
| 102 | 00489200 | 3$\phi$ E-Type Washer |
| 103 | 51821600 | 3$\phi$ Thrust Washer |
| 104 | 00436500 | M2 x 4 Pan Head Screw |
| 105 | 13113200 | M2 x 10 Pan Head SEMS A |

# 7. SCHEMATIC DIAGRAM

* Design and specifications subject to change without notice for improvement.
* La présention et les spécifications sont susceptibles d'être modifiées sans préavis par suites d'améliorations éventuelles.
* Änderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.




| | |
|---|---|
| $gLD_{1,7}$ | SEL1710K |
| $gLD_{2\sim6}$ | SLR-54URC5 |

| | |
|---|---|
| $fQ_{1\sim3}$ | TPS605 |
| $fQ_{4\sim10}$ | 2SA1015(Y,GR), 2SA733A(Q,P) 2SA1115(E,F) |
| $fQ_{11,12}$ | 2SC1815(Y,GR), 2SC945(Q,P,K) 2SC2603(E,F) |
| $fIC_1$ | MB8844-543M |
| $fIC_2$ | MSM4049RS, MB84049, TC4049BP |
| $fIC_3$ | BA6208 |
| $fIC_4$ | MSM4011, MB84011P |
| $fLD_{1\sim3}$ | TLR121 |
| $fD_1$ | IS2473D |

| | |
|---|---|
| $hQ_1$ | 2SD794(Q,P) |
| $hQ_2$ | 2SC1815(Y,GR), 2SC945(P,K) 2SC2603(E,F) |
| $hQ_3$ | 2SA1015(Y,GR), 2SA733(Q,P) 2SA1115(E,F) |
| $hQ_4$ | 2SB744(Q,P) |
| $hIC_1$ | µPC78M05H |
| $hDZ_{1,2}$ | EQA01-15R |
| $hD_1$ | UB-152LFF |
| $hD_2$ | RB-152 |

| | |
|---|---|
| $eQ_{1\sim3,13,14}$ | 2SC1815(Y,GR), 2SC945(Q,P,K), 2SC2603(E,F) |
| $eQ_{5,6}$ | 2SC1815(Y,GR), 2SC945(Q,P), 2SC2603(E,F) |
| $eQ_{4,7,8}$ | 2SA1015(Y,GR), 2SA733A(Q,P), 2SA1115(E,F) |
| $eQ_{9,10}$ | 2SB744(Q,P) |
| $eQ_{11,12}$ | 2SD794(Q,P) |
| $eQ_{15}$ | 2SK163(L1,L2,M1,M2,N1,N2) |
| $eIC_1$ | TC9142P |
| $eIC_{2,3}$ | M5218L, NJM4558S, BA715 |
| $eIC_4$ | M5218L |
| $eDZ_1$ | RD5.1E-B |
| $eD_1$ | IS2473D |

*SYMBOL*
- Δ Ceramic
- Ⓜ Mylar
- Ⓢ Styrol
- Ⓣ Tantalum Electrolytic
- Ⓐ Aluminum Electrolytic
- Ⓛ Low-Leak Electrolytic

(B.P) Bi-Polar Electrolytic
(P.P) Polypropylene Film
- ● Polycarbonate Film

(L.B) Low-Leak Bi-Polar Electrolytic
- ⊠ Fusing Resistor
- ⊟ Non-Inflammable Resistor
- ■ Metal Film Resistor
- □ Cement Resistor
- ◩ Non-Inductive Cement Resistor

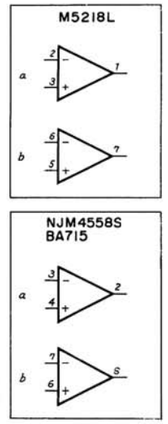
*RESISTORS*
Are in ohms, 1/4 Watts, ±5% Tolerance
Unless Otherwise Noted, K:kΩ, M:MΩ

*CAPACITORS*
Are in µF, Unless Otherwise Noted. P:pF

*TOLERANCE*
J: ±5%, G: ±2%, F: ±1%

Each D.C. Voltage measured by the instruments described below shows the nominal value in volts at 33⅓rpm.
Measuring instruments
Volt Meter
Oscilloscope
Electrolytic Capacitor: Capacitance(µF)/Volt(V)

SYMBOL OF FUNCTION
(e) MO. CONTROL
(f) T.A. CONTROL
(g) INDICATOR
(h) POWER SUPPLY




# 8. MAIN PARTS REPLACEMENT

## 8-1. How to remove the mechanical assembly

(See bottom view on Page 7)

1) Set the arm lifter at the down position.
2) Remove the bottom plate.
3) Unscrew four Ⓐ screws fastening the mechanical assembly, and pull the mechanical assembly toward the front panel.

- When installing the mechanical assembly, pull the arm lifter upward.

## 8-2. How to replace the tone-arm

(See bottom view on Page 7)

1) Remove the mechanical assembly in accordance with the procedures as stated under 8-1 above.
2) Remove the parallel cords connected to the sensor assembly board.
3) Fix the tone-arm by using the arm rest hook.
4) Unscrew three Ⓑ screws fastening the tone-arm assembly.
5) Shift the tone-arm base 1 cm in the arrow direction and then remove the tone-arm assembly with the slit plate attached thereto.
6) Loosen a screw fastening the slit plate by using a 1.5 mm-hexagon wrench to remove the slit plate.

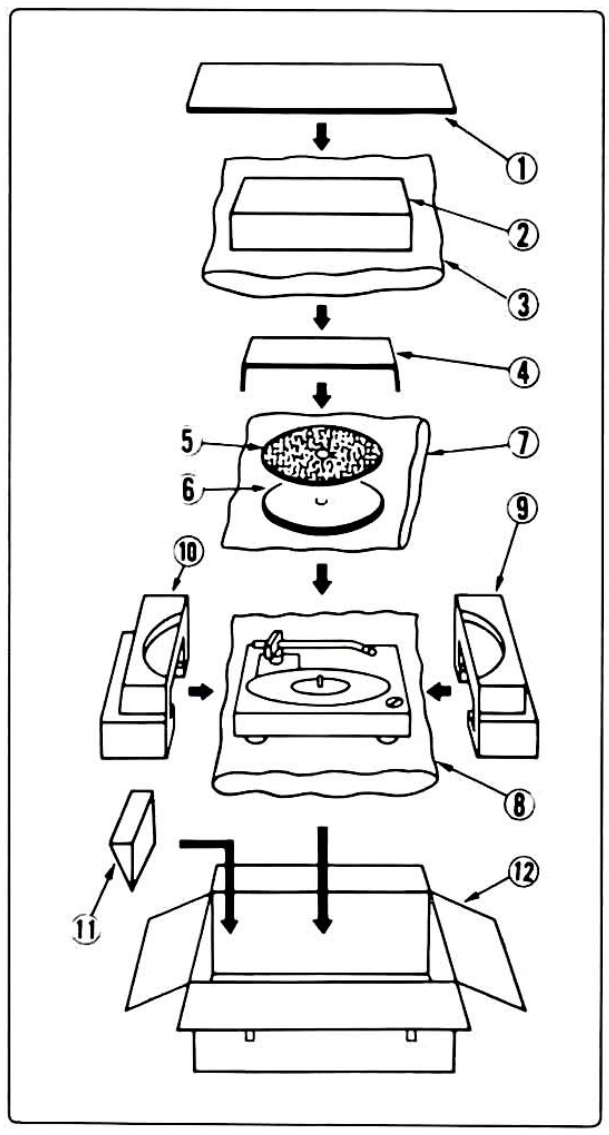
## 8-3. How to replace drive gear assembly ④ and the precautions

1) Remove the mechanical assembly in accordance with the procedures as stated under 8-1 above.
2) Remove the E-ring 101 to remove the drive gear assembly ④.

- When installing the drive gear assembly ④, use care to geared positions of the floating gears I and II. (See Figs. 2-2 and 2-3, on Page 2)

# 9. PACKING LIST

| Parts No. | Stock No. | Description |
|---|---|---|
| 1 | 13109800 | Protector Board, upper |
| 2 | 13085900 | Dust Cover Ass'y |
| 3 | | Polyethylene Bag, dust cover |
| 4 | 13109900 | Protector Board, platter |
| 5 | 13089000 | Turntable Sheet |
| 6 | 13088900 | Turntable |
| 7 | 91166000 | Polyethylene Bag, turntable |
| 8 | 13126300 | Polyethylene Bag, turntable unit |
| 9 | 13110010 | Styrofoam Packing, front |
| 10 | 13110100 | Styrofoam Packing, rea |
| 11 | 13121300 | Accessory Box |
| 12 | 13101200 | Carton Case |




# 10. ACCESSORY LIST

| Stock No. | Description |
|---|---|
| 13012300 | 45 rpm Adaptor |
| 13121400 | Over Hang Gage |
| 13107100 | Tonearm Pipe |
| 46145200 | Operating Instruction |
| 13086300 | Auto Hinge |
| 13010800 | Cartridge, SV-101 E type only |
| 13010900 | Stylus, SN-101 |

- Note: There are two types of units in XR-Q7.
  1) The unit with a cartridge, SV-101.
  2) The unit without a cartridge, the mark Ⓔ is stamped on the side of carton case.

# Sansui SERVICE BULLETIN

SANSUI ELECTRIC COMPANY LIMITED · 9-15 SHINCHENJAKU ROKUNE MITAKA-CITY TOKYO 181 JAPAN PHONE 0422 (48) 721
Quality Assurance Dept

**MODEL:** XR-Q7
Automatic Turntable

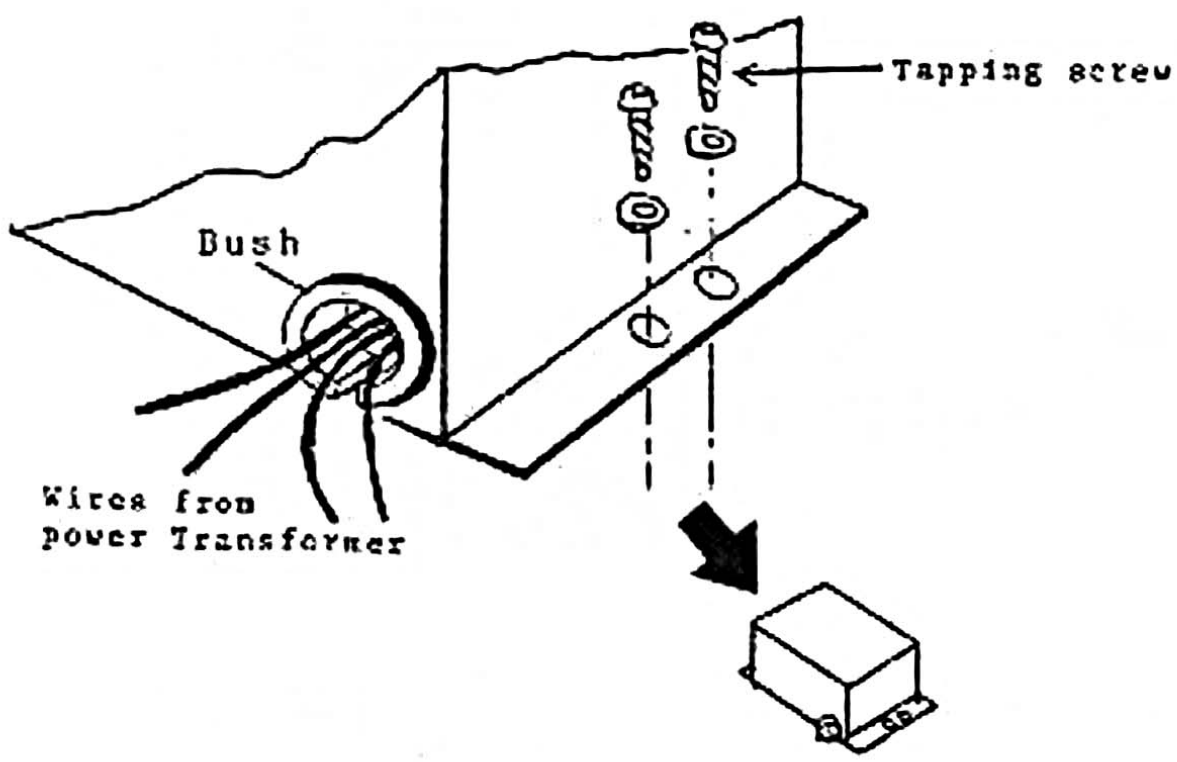
Ref. AN-147
Date: January '82

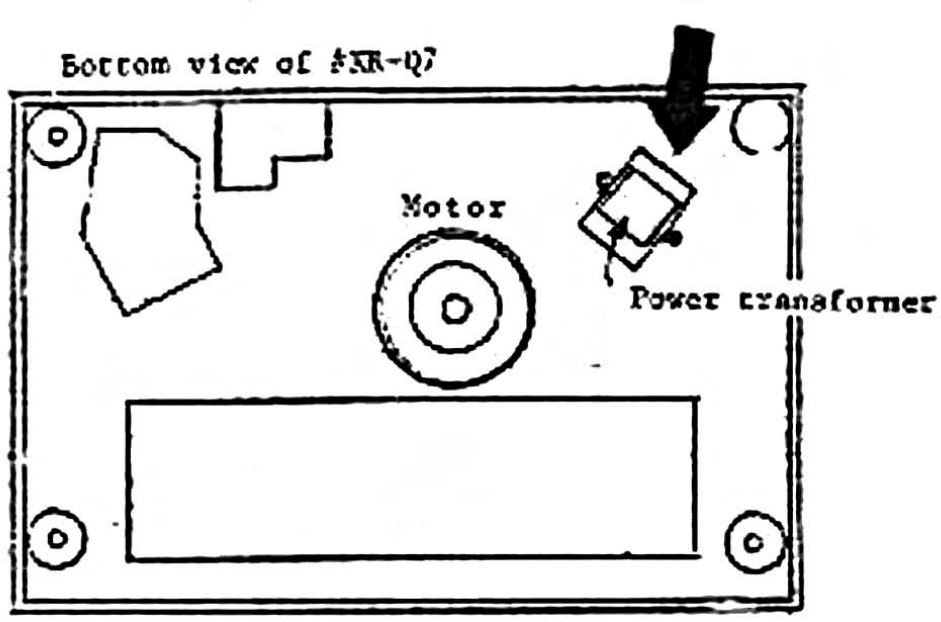
**SUBJECT:** HUM NOISE AT MC POSITION(MC Cartridge)

Symptom:
When playing this turntable, #XR-Q7 together with an integrated amplifier(or receiver), it could make hum noise in speakers at MC position by the influence of slightly leaked magnetic flux from power transformer of this set.

Remedy:
To eliminate the hum noise, cover the power transformer with metal case for grounding shield.

| | Stock No. | Q'ty |
|---|---|---|
| The Metal case ---------- | 13133400 | 1ea |
| & Bush ------ | 13133600 | 1 " |




Note:
The above improvement was taken on all #XR-Q7 with Serial No. 51112040 or more.

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(SM1-34) Printed in Japan (N10530M) 〈Stock No. 36462300〉