

# SERVICE MANUAL

COMPUTERIZED FULLY AUTOMATIC  
DIRECT DRIVE TURNTABLE

## SANSUI FR-D40



### ● SPECIFICATIONS

Type . . . . .	Two-speed direct-driven
Speeds . . . . .	33-1/3, 45 rpm
Platter . . . . .	Aluminum alloy die-cast 315 mm (12-13/32") diameter
Motor . . . . .	FG Servo DC Motor
Wow and flutter . . .	0.025% (W.R.M.S.)
S/N . . . . .	Better than 60 dB (IEC-B)
Rumble . . . . .	Better than 72 dB (DIN-B)
Tonearm	
Tonearm length . . .	220 mm (8-11/16")
Overhang . . . . .	17.5 mm (3/4")
Applicable cartridge weight	
. . . . .	4 to 9 g
Dimensions . . . . .	440 mm (17-5/16") W 127 mm (5") H 374 mm (14-11/16") D
Weight . . . . .	5.6 kg (12.3 lbs.) net 7.0 kg (15.4 lbs.) packed
Power consumption . .	18 W

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

### Specifications of the cartridge (applicable only to the units with cartridge)

#### Model SV-202

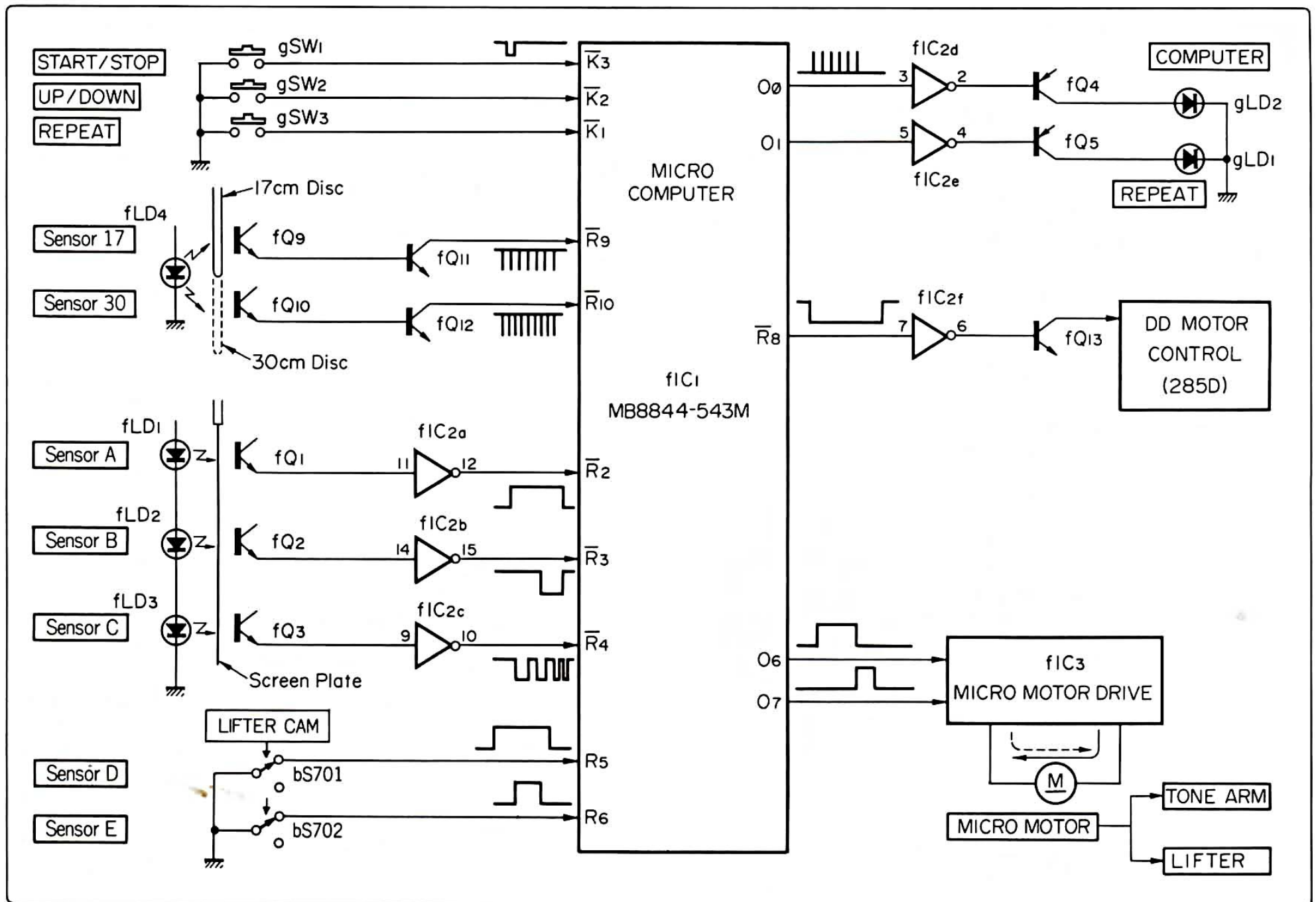
Type . . . . .	Dual magnet
Frequency response . .	10 ~ 20,000 Hz
Output voltage . . . . .	2.5 mV per channel (1,000 Hz, 35.4 mm/sec)
Load impedance . . . . .	47 k $\Omega$
Tracking force . . . . .	2 g
Stylus . . . . .	0.6 mil, diamond spherical (SN-202)

- \* Design and specifications subject to changes without notice for improvements.

*Sansui*

SANSUI ELECTRIC CO., LTD.

# 1. BLOCK DIAGRAM



## 2. OPERATIONS

### 2-1. Outline

The FR-D40 is a fully-automatic disc-selectable system turntable in which a newly-developed automatic mechanical assembly is controlled by a microcomputer.

The control circuit of this turntable includes an operation switch section, a tone-arm position detection circuit made up of a slit plate and three pairs of light emitting diodes (LEDs) and phototransistor, an arm lifter position detection circuit made up of a lifter cam and two microswitches, a micromotor drive circuit, and a microcomputer MB8844-543M.

Additionally, an automatic disc selection function is provided which is realized on the FR-D45.

### 2-2. Automatic Mechanical Assembly Operation

Tone arm lead-in and lead-out operations and arm-lifter up/down operations are performed when the micromotor rotates clockwise (CW) or counterclockwise (CCW).

The tone-arm position is detected by combination of the LEDs, the phototransistors and the slit plate; the arm lifter position is detected by the two microswitches and the lifter cam; the micromotor rotation direction is determined by the operation switches.

#### 1) Torque transmission route in lifter drive

When the micromotor rotates in the CW or CCW direction, the torque is transmitted from the motor, through a belt, a worm gear, a drive gear, two floating gears (I and II), a cam gear, a lifter cam, to a lifter guide, so that the arm lifter moves up or down. (See Fig. 2-1)

#### 2) Torque transmission route in tone-arm drive

When the micromotor rotates in the CW or CCW direction, the torque is transmitted from the motor, through a belt, worm gear, a drive gear, two floating gears (I and II), two drive pulleys (I and II), to a TA drum, so that the tone-arm moves in the lead-in or lead-out direction.

#### 3) Switching between lifter operation and tone-arm operation by cam gear

The lifter operation and the tone-arm operation are switched by using two cutout portions (I and II) formed in the cam gear. (See Fig. 2-4)

When the floating gears rotate and therefore the contact point of the floating gear with the cam gear reaches the cutout portion of the cam gear, the floating gear drops into the cutout, so that no torque of the floating gear is transmitted to the cam gear.

On the other hand, while the floating gear is in the cutout portion of the cam gear, the drive pulley concentrically fixed to the floating gear shaft is brought into pressure-contact with the TA drum.

As a result, the revolution force of the drive pulley rotates the TA drum, so that the tone-arm is moved.

Fig. 2-1

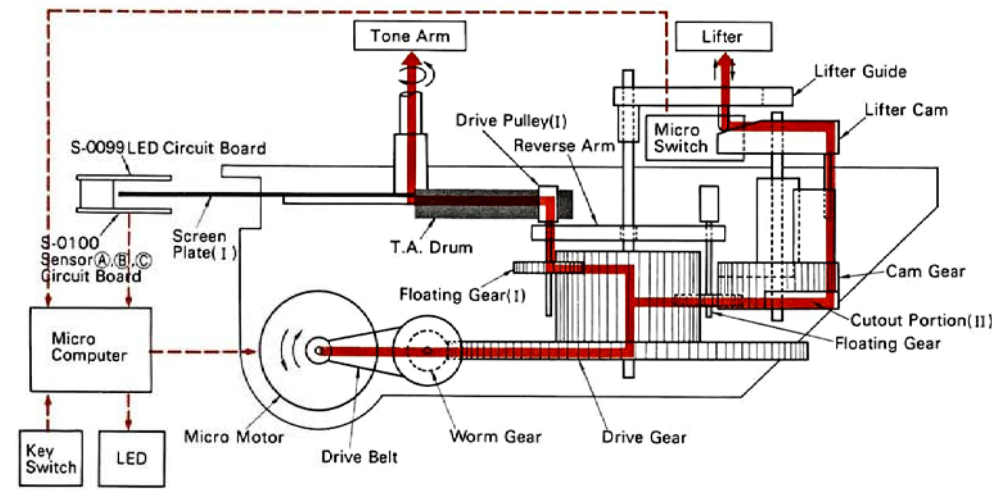


Fig. 2-2

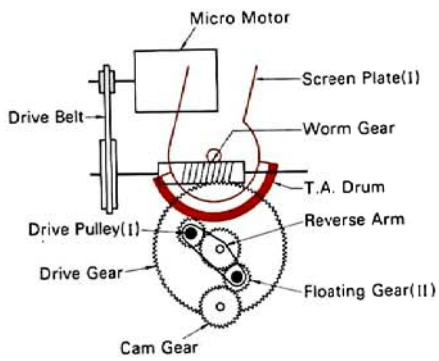


Fig. 2-3

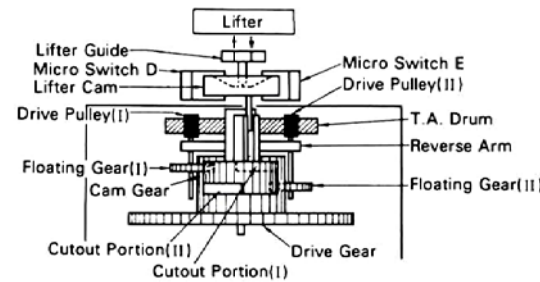


Fig. 2-4

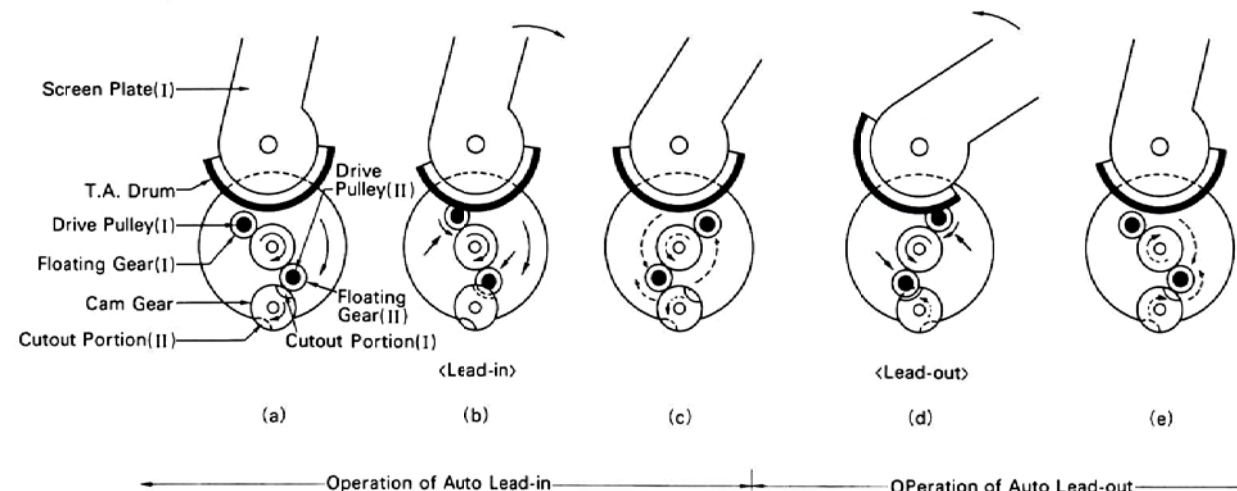
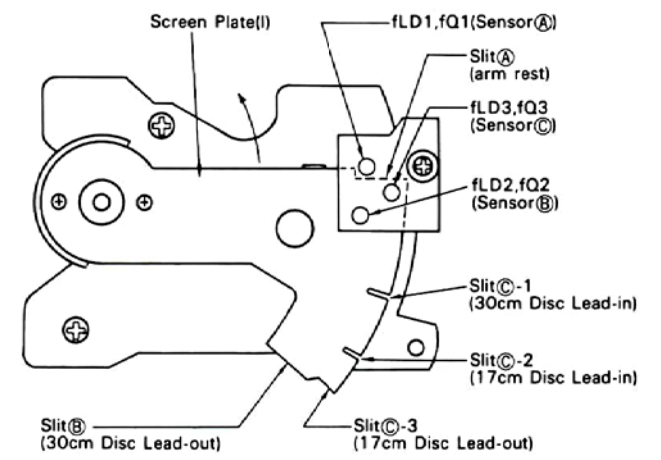


Fig. 2-5



### 2-3. Actual Fully-Automatic Operation (See Fig. 2-4, Tables 2-1 and 2-2)

#### 1. Start → Read-in → Stop (in 30cm-dia. disc)

- When the start key is depressed, the micromotor rotates in the CW direction. At the same time, the DD motor begins to rotate, and therefore the turn table platter also rotates. When the micromotor rotates, the torque is transmitted from the motor, through the belt, the worm gear, the drive gear, the floating gear (II), the cam gear, the lifter cam, to the lifter guide, so that the arm lifter goes upward (See Fig. 2-4 a to b).
- When the floating gear (II) drops into the cutout portion (II) of the cam gear, the lifter arm stops rotating. (See Fig. 2-4 b) On the other hand, since the drive pulley (I) is brought into pressure-contact with the TA drum by a reversal arm, the TA drum moves in the lead-in direction, so that the tone-arm performs lead-in operation. (See Fig. 2-4 b)
- The slit plate moves in conjunction with the tone-arm movement. When the phototransistor fQ<sub>3</sub> (sensor C) detects the light emitted from the LED fLD<sub>3</sub> passing through the slit portion C-1 formed in the slit plate (See Fig. 2-5), the micromotor rotates in the CCW direction. When the drive gear rotates in the CCW direction, the drive pulley is separated away from the TA drum, and moved toward the cam gear. Accordingly, the TA drum stops moving, so that tone-arm lead-in operation stops. Next, the floating gear (I) engages with the cam gear, so that the cam gear and lifter cam both begin to rotate, as a result, the lifter comes downward. (See Fig. 2-4 b-c)
- When the lifter downward motion has been completed, the lifter cam turns on the microswitch D, so that the micromotor stops rotating. (See Fig. 2-4 a)

#### 2. Lead-out → Stop (in 30cm-dia. disc)

- When a stylus on a record disc reaches the innermost lead-out groove, the phototransistor fQ<sub>2</sub> (sensor B) detects the light emitted from the LED fLD<sub>2</sub> passing through the end portion B of the slit plate, so that the micromotor rotates in the CCW direction. Since the floating gear (I) rotates, the cam gear also rotates, so that the lifter goes upward. (See Fig. 2-4 c-d)
  - When the floating gear (I) drops into the cutout portion (I) of the cam gear, the cam gear stops rotating. (See Fig. 2-4 d) On the other hand, since the drive pulley (II) is brought into pressure-contact with the TA drum by a reversal arm, the TA drum moves in the lead-out direction, so that the tone-arm performs lead-out operation (See Fig. 2-4 d)
  - When the tone-arm returns onto the arm rest, the phototransistor fQ<sub>1</sub> (sensor A) detects the light emitted from the LED fLD<sub>1</sub> passing through the cutout portion A formed in the slit plate, so that the DD motor stops rotating. One second after the DD motor stops, the micromotor begins to rotate in the CW direction. Then the drive gear rotates reversely, since the drive pulley (II) is separated away from the TA drum, the tone-arm stops moving.
  - Next, the floating gear (II) engages with the cam gear, the cam gear and the lifter cam both begin to rotate. As a result, the lifter comes downward.
  - When the lifter downward motion has been completed, the lifter cam turns on the microswitch E, so that the micromotor stops rotating (See Fig. 2-4 e)
- 3. Start without any record disc (See Table 2-1)**
- When the start key is depressed, the micromotor begins to rotate in the CW direction, the lifter cam rotates, and the arm lifter goes up.

- The moment the start key is depressed, the DD motor begins to rotate, the phototransistors fQ<sub>9</sub> and fQ<sub>10</sub> detect the light emitted from the LED fLD<sub>4</sub> and a minus-voltage pulse is inputted to the microcomputer, so that the lead-in mode is canceled.
- When the arm lifter upward motion has been completed, the lifter cam turns off the microswitch E, so that the micromotor rotates in the CCW direction reversely. At the same time, the DD motor stops rotating.
- Since the micromotor rotates in the CCW direction, the lifter cam returns, so that the lifter comes down.
- After the lifter downward motion has been completed, the lifter cam turns on the microswitch D, so that the micromotor stops rotating.

#### 2-4. Various Sensor Signals (See Fig. 2-5 Block Diagram)

##### 1. Sensor A

- A signal from the sensor A informs the microcomputer of whether or not the tone-arm stays on the arm rest.
- The phototransistor fQ<sub>1</sub> detects the light emitted from the LED fLD<sub>1</sub> passing through the cutout portion A of the slit plate.
- After having been phase-inverted through the inverter fIC<sub>2a</sub>, this signal is inputted to the input port  $\bar{R}_2$  of the microcomputer fIC<sub>1</sub>.

##### 2. Sensor B

- A signal from the sensor B informs the microcomputer of the lead-out groove position of a 30cm-dia. disc.
- The phototransistor fQ<sub>2</sub> detects the light emitted from the LED fLD<sub>2</sub> passing through the end portion B of the slit plate.
- After having been phase-inverted through the inverter fIC<sub>2b</sub>, this signal is inputted to the input port  $\bar{R}_3$  of the microcomputer fIC<sub>1</sub>.

##### 3. Sensor C

- A signal from the sensor C informs the microcomputer of the lead-in groove positions of a 30cm-dia. disc and a 17cm-dia. disc, and the lead-out groove position of a 17cm-dia. disc.
- The phototransistor fQ<sub>3</sub> detects the light emitted from the LED fLD<sub>3</sub> passing through the slits C-1, 2 and 3.
- After having been phase-inverted through the inverter fIC<sub>2c</sub>, this signal is inputted to the input port  $\bar{R}_4$  of the microcomputer fIC<sub>1</sub>.

##### 4. Sensor D

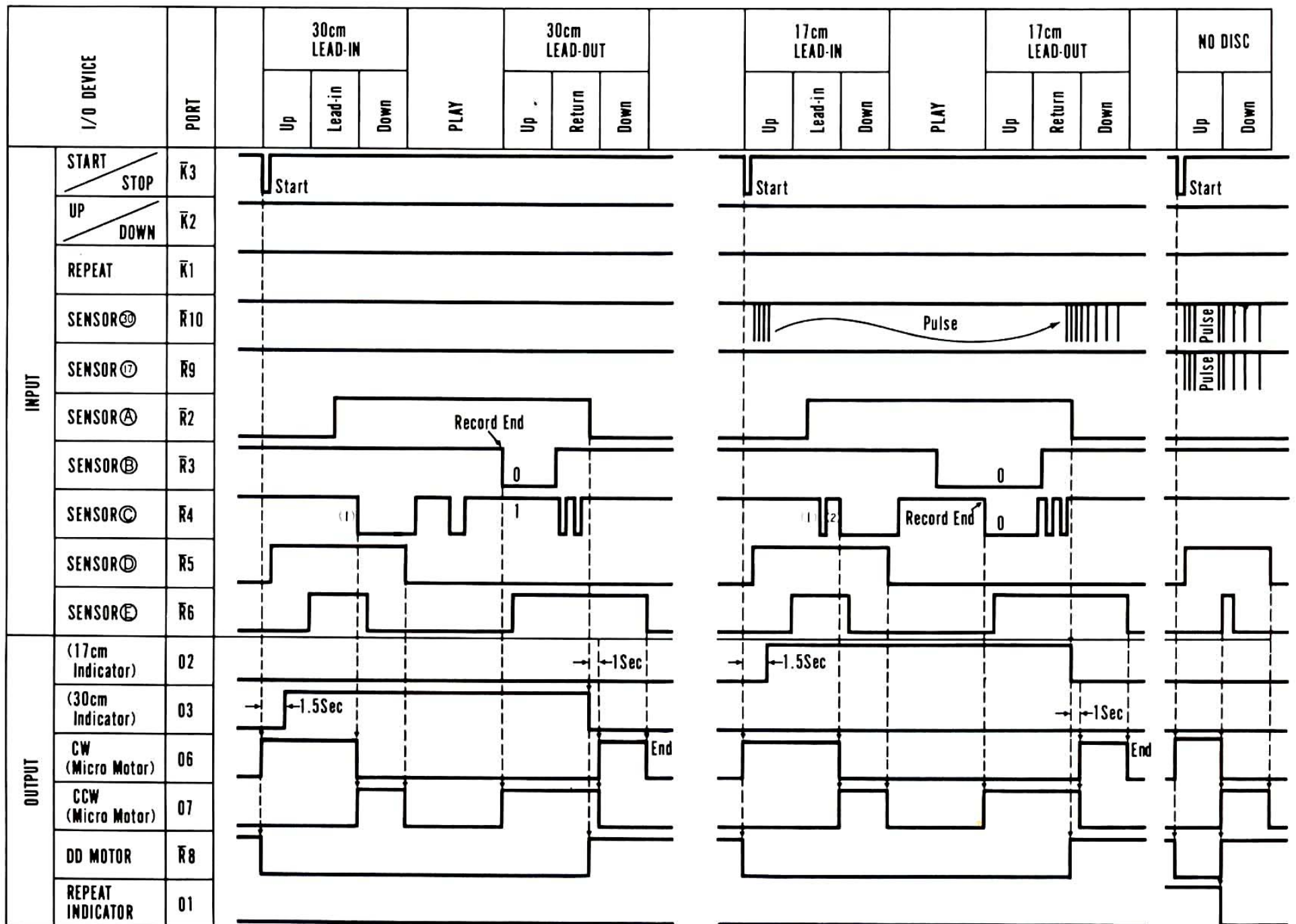
- A signal from the sensor D informs the microcomputer that the tone-arm is in lead-in operation.
- The microswitch D detects the lifter cam position.
- The signal detected by the microswitch D is inputted to the input port  $\bar{R}_5$  of the microcomputer fIC<sub>1</sub>. When the tone-arm stays on the arm rest, the microswitch D is on; however, once the lead-in operation begins, the lifter cam rotates in the CW direction, the microswitch is turned off, so that the input port  $\bar{R}_5$  of the microcomputer fIC<sub>1</sub> changes to a H-voltage level.

##### 5. Sensor E

- A signal from the sensor E informs the microcomputer that the tone-arm is in lead-out operation.
- The microswitch E detects the lifter cam position. The signal detected by the microswitch E is inputted to the input port  $\bar{R}_6$  of the microcomputer fIC<sub>1</sub>.
- While a stylus is on a record disc in playing a record, the microswitch E is on.
- When the lead-out operation begins, the lifter cam rotates in the CCW direction, the microswitch is turned off, so that the input port  $\bar{R}_6$  of the microcomputer fIC<sub>1</sub> changes to a H-voltage level.

Table 2-1 Microcomputer Timing

(30cm LEAD-IN → PLAY → LEAD-OUT, 17cm LEAD-IN → PLAY → LEAD-OUT, NO DISC)



6. Sensor 30

- A signal from the sensor 30 informs the microcomputer of whether or not a 30cm-dia. disc is on the turn table platter.
- The phototransistor fQ<sub>10</sub> detects the light emitted from the LED fLD<sub>4</sub> through the prism on the turn table platter. This signal is inputted to the input port R<sub>10</sub> of the microcomputer.

7. Sensor 17

- A signal from the sensor 17 informs the microcomputer of whether or not a 30cm-dia. or 17cm-dia. disc is on the turn table platter.
- The phototransistor fQ<sub>9</sub> detects the light emitted from the LED fLD<sub>4</sub> through the prism on the turn table platter. This signal is inputted to the input port R<sub>9</sub> of the microcomputer.

2-5. Various Detection Functions and Microcomputer Inputs/Outputs

(See Fig. 2-5 Block Diagram and Tables 2-1, 2-2)

1. 30cm-dia. disc lead-in position detection

- When the tone-arm moves to the 30cm-dia. disc lead-in position, a signal from the sensor C is detected through the slit C-1 formed in the slit plate.
- As a result, the input port R<sub>4</sub> of the microcomputer changes from a H-voltage level to a L-voltage level.
- At this time, since a 30cm-dia. disc is on the turn table platter, without generating a signal from the sensor 30 and a signal from the sensor 17, the input ports R<sub>10</sub> and R<sub>9</sub> are both at a H-voltage level.

- Therefore, the output port O<sub>6</sub> of the microcomputer changes from a H-voltage level to a L-voltage level, and the output port O<sub>7</sub> changes from a L-voltage level to a H-voltage level, so that the micromotor rotates in the CCW direction.
- The lifter cam rotates, and the lifter comes down.

2. 17cm-dia. disc lead-in position detection

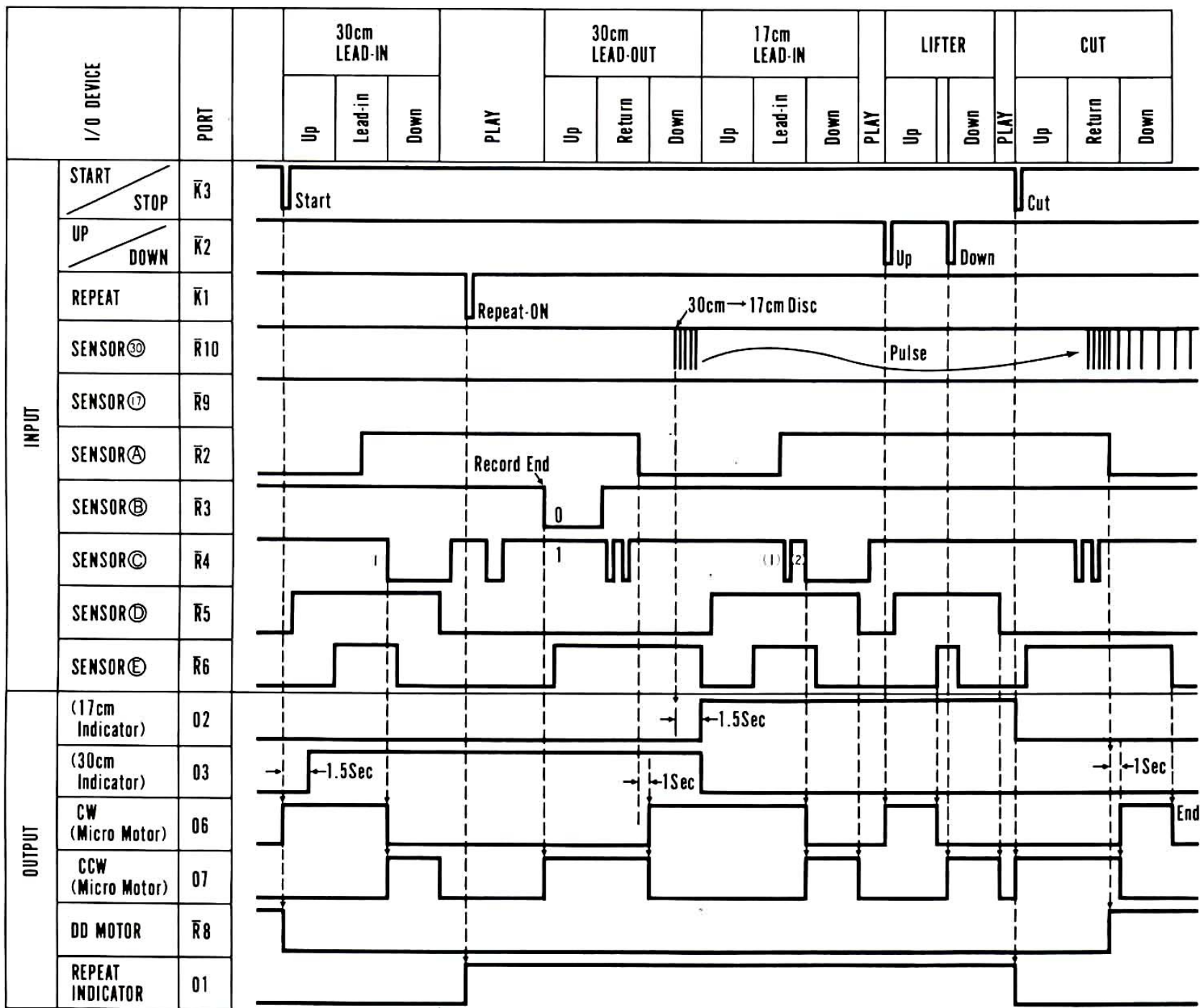
- When the tone-arm moves to the 17cm-dia. disc lead-in position, the second signal from the sensor C is detected through the slit C-2 formed in the slit plate. (Before this second detection, the signal from the sensor C has already been detected through the slit C-1 in the slit plate.)
- The input port R<sub>4</sub> of the microcomputer changes from a H-voltage level to a L-voltage level.
- At this time, since a 17cm-dia. disc is on the turn table platter, a signal from the sensor 30 is detected, and a minus pulse is applied to the input port R<sub>10</sub> of the microcomputer.
- As a result, 17cm-dia. disc lead-in operation is performed.

3. 30cm-dia. disc lead-out position detection

- When a stylus is carried to the 30cm-dia. disc lead-out position, a signal from the sensor B is detected through the plate end position B of the slit plate.
- The input port R<sub>3</sub> of the microcomputer changes from a H-voltage level to a L-voltage level.
- At this time, since a 30cm-dia. disc is on the turn table platter, without generating a signal from the sensor 30 and a signal from the sensor 17, the input ports R<sub>10</sub> and R<sub>9</sub> of the microcomputer stays at a H-voltage level.
- Therefore, it is possible to detect the 30cm-dia. disc lead-out position.

Table 2-2 Microcomputer Timing

(30cm LEAD-IN → PLAY → LEAD-OUT → 17cm LEAD-IN → PLAY → LIFTER → PLAY → CUT)



- As a result, the output port  $O_7$  of the microcomputer changes from a L-voltage level to a H-voltage level, and the micromotor rotates in the CCW direction, so that the tone-arm performs the lead-out operation.

#### 4. 17cm-dia. disc lead-out position detection

- When a stylus is carried to the 17cm-dia. disc lead-out position, a signal from the sensor C is detected through the cutout portion C-3 in the slit plate.
- The input port  $\bar{R}_4$  of the microcomputer changes from a H-voltage level to a L-voltage level.
- At this time, since a 17cm-dia. disc is on the turn table platter, a signal from the sensor 30 is generated and a minus pulse is inputted to the input port  $\bar{R}_{10}$  of the microcomputer.
- As a result, the 17cm-dia. disc lead-out operation is performed.

#### 5. Lead-in operation completion detection

- The lifter cam and the microswitch D detect the lead-in operation completion.
- When the lifter completely comes down after the tone-arm lead-in operation, the microswitch D is turned from off to on, and the input port  $\bar{R}_5$  of the microcomputer changes from a H-voltage level to a L-voltage level.
- As a result, the micromotor stops rotating.

#### 6. Lead-out operation completion detection

- The lifter cam and the microswitch E detect the lead-out operation completion.
- When the lifter completely comes down after the tone-arm lead-out operation, the microswitch E is turned from off to on, and the input port  $\bar{R}_6$  of the microcomputer changes from a H-voltage level to a L-voltage level.

- As a result, the micromotor stops rotating.

#### 7. 30cm-dia. disc detection

- When a 30cm-dia. disc is on the turn table platter, without generating a signal from the sensor 17 and a signal from the sensor 30, the input ports  $\bar{R}_9$  and  $\bar{R}_{10}$  of the microcomputer change to a H-voltage level.
- As a result, a function command of 30cm-dia. disc fully-automatic operation is inputted to the microcomputer, and therefore it is possible to perform 30cm-dia. disc lead-in and lead-out operations.

#### 8. 17cm-dia. disc detection

- When a 17cm-dia. disc is on the turn table platter, a signal from the sensor 30 is detected, a minus pulse is inputted to the input port  $\bar{R}_{10}$  of the microcomputer.
- As a result, a function command of 17cm-dia. disc fully-automatic operation is inputted to the microcomputer, and therefore it is possible to perform 17cm-dia. disc lead-in and lead-out operation.

#### 9. No record disc detection

- When no record disc is on the turn table platter, a signal from the sensor 30 and a signal from the sensor 17 are generated, and minus pulses are inputted to the input ports  $\bar{R}_{10}$  and  $\bar{R}_9$  of the microcomputer.
- As a result, no function command of fully-automatic operation is inputted to the microcomputer.
- Therefore, even when the start key is depressed with no record disc on the turn table platter, the lifter first goes up and next comes down, without any lead-in operation.

## 10. Arm rest position detection

- When the tone-arm returns onto the arm rest after lead-out operation, a signal from the sensor A is detected through the cutout portion A in the slit plate.
- The input port  $\overline{R}_2$  of the microcomputer changes from a H-voltage level to a L-voltage level, and the output port  $O_6$  changes from a L-voltage level to a H-voltage level after one second, so that the microcomputer rotates in the CW direction.
- As a result, after the tone-arm has returned onto the arm rest in the lead-out operation, the tone-arm stops moving and the lifter comes down.

## 2-6. Micromotor Drive Circuit and Micromotor Functions

When the output port  $O_6$  of the microcomputer changes to a H-voltage level, the micromotor rotates in the CW direction; when the output port  $O_7$  of the microcomputer changes to a H-voltage level, the micromotor rotates in the CCW direction. The lifter up-and-down movement and the tone-arm lead-in and lead-out operation are performed by this micromotor.

### 1. Automatic lead-in operation and lifter up/down operation

The lifter-up movement and tone-arm lead-in operation are performed, when the micromotor rotates in the CW direction. Also, the lifter-down movement is performed, when the micromotor rotates in the CCW direction.

### 2. Automatic lead-out operation

The lifter-up movement and tone-arm lead-out operations are performed, when the micromotor rotates in the CCW direction. Also, the lifter-down movement is performed when the micromotor rotates in the CW direction.

## 2-7. Microcomputer Functions

### 1. Microcomputer control functions

#### 1) Automatic start

When the start key is depressed with the tone-arm on the arm rest, the tone-arm moves into the lead-in groove of a 30cm- or 17cm-dia. disc.

#### 2) Automatic return

When the slit plate and the photosensor provided in the tone-arm drive mechanism detect the lead-out groove of a disc, the tone-arm returns onto the arm rest.

#### 3) Automatic repeat

When the repeat function is on, after the tone-arm once returns onto the arm rest and the lifter comes down, the lifter goes up and the tone-arm returns back into the lead-in groove, repeatedly.

#### 4) Automatic cut

When the stop key is depressed in playing a record, the tone-arm returns onto the arm rest. At this time, the repeat function is released.

#### 5) Lifter

When the up/down key is depressed, the lifter goes up or comes down.

#### 6) Protection functions

- When the tone-arm is stopped intentionally or by mistake during automatic operation, or when something is wrong with the mechanical assembly, all the operations stop 20 sec. after the present automatic operation has been started.
- If the power supply is once turned off and next turned on when the tone-arm is on a disc, the tone-arm once returns onto the arm rest.

#### 7) Manual operation

When the tone-arm is moved from the arm rest manually, the turn table platter begins to rotate.

By depressing the up/down key, it is possible to perform the manual operation.

#### 8) Automatic disc size detection

When a record disc is placed onto the turn table platter, since the photosensor installed under the turn table platter is shaded, it is possible to detect two sizes of 30cm-dia. and 17cm-dia. discs.

## 2. Key operations (See Table 2-1.)

### 1) Start/stop key

Key operations	Conditions		Turn table platter rotation and automatic operation	
	Tone-arm position: Microcomputer input port	Lifter position: Microcomputer input port	Turn table platter	Automatic
Start	Rest: $R_2$ (sensor A) is L	Down: $R_5$ (sensor D) is L $R_6$ (sensor E) is L	ON	Lead-in
	Rest: $R_2$ (sensor A) is L	Up: $R_5$ (sensor D) is H $R_6$ (sensor E) is H	ON	Lead-in
Stop	On a disc: $R_2$ (sensor A) is H	Down: $R_5$ (sensor D) is L $R_6$ (sensor E) is L	OFF, since $R_2$ (sensor A) is L in return	Return (Repeat release)
Stop in automatic operation	Rest: $R_2$ (sensor A) is L	Lifter is going up: $R_5$ (sensor D) is H $R_6$ (sensor E) is L	Immediately OFF	Lifter down (Repeat release)
		In other automatic operations, start/stop key is disabled.		
Start in lifter operation by up/down key	Rest: $R_2$ (sensor A) is L	Lifter is going up, coming down	Immediately ON	Lead-in
		In other lifter operations, start/stop key is disabled.		

### 2) Up/down key

Conditions		Lifter operation
Tone-arm position: Microcomputer input port	Lifter position	
On a disc: $R_2$ (sensor A) is H	Down Up	Go up Come down
Rest: $R_2$ (sensor A) is L	Going up Coming down	Come down after U-turn Go up after U-turn
In automatic operation by start/stop key, up/down key is disabled.		

### 3) Repeat key

#### a) Input and clear

- The repeat key can be turned on or off at all times, and the on- or off-state is displayed by the repeat LEDs.
- The repeat operation is cleared, by depressing the start/stop key.

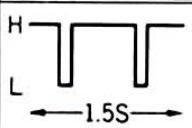
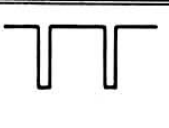

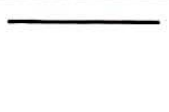

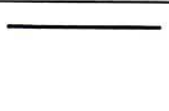
#### b) Repeat operation

- In the repeat lead-in operation, after the tone-arm once returns onto the arm rest and the lifter also comes down, the lifter goes up and the tone-arm returns back into the lead-in groove, repeatedly.
- When the repeat key is turned on again only before the lifter begins to come down in the automatic-cut operation, the repeat function is enabled.

- When the stop key is turned on in the repeat operation, the repeat-cut operation is enabled only while the tone-arm stays on the arm rest and the lifter is going up. In this case, the repeat operation is cleared, and the lifter U-turns and comes down.
- It is also possible to turn off the repeat key while the tone-arm is in repeat lead-in operation; however in this case, the tone-arm moves in the lead-in groove.

### 3. Disc. size detection

- The size of a disc is detected every 1.5 sec. by two signals: a signal from the sensor 30 ( $\overline{R_9}$ ) and a signal from the sensor 17 ( $\overline{R_{10}}$ ).

Disc size	Input signal during 1.5 sec.		Output signal every 1.5 sec.	
	Sensor 30 ( $\overline{R_9}$ )	Sensor 17 ( $\overline{R_{10}}$ )	30cm ( $O_2$ )	17cm ( $O_3$ )
No disc			L	L
30cm disc			H	L
17cm disc			L	H

#### • Automatic operations

- 1) When the start key is depressed for start operation without any disc on the turn table platter in the state where the tone-arm stays on the arm rest and the lifter stays down, no disc is detected 1.5 sec. after the start key is depressed and the lifter U-turns and comes down.
- 2) When the start key is depressed for start operation with a disc on the turn table platter in the state where the tone-arm stays on the arm rest and the lifter stays up, the turn table platter immediately begins to rotate, the disc size is selected 1.5 sec. after the start key is depressed, and the tone-arm moves into the lead-in groove.  
In the case of no disc, the turn table platter stops rotating, and the lifter comes down.
- 3) It is possible to change the disc size in repeat operation from when the lifter stays down with the tone-arm on the arm rest to when the lifter goes up in lead-in operation.  
(when sensor D is H and sensor E is L).

### 4. Protection functions

- 1) When the start key is depressed in the state where the tone-arm is locked to the arm rest by the hook, the turn table platter rotates and the lifter begins to go 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.

### 5. Others

- 1) When the lifter is going up for lead-in operation, if the tone-arm is moved by hand to a position other than the arm rest (sensor A changes to a H-voltage level), the automatic operation stops since the input port  $\overline{R_6}$  (sensor E) changes to a H-voltage level. In this case, however, the turn table is left rotating.
- 2) When the lifter is going up for automatic cut operation, if the tone-arm is moved by hand to a position the arm rest (sensor A changes to a L-voltage level), the lifter comes down after one second.
- 3) A lead-out groove is detected when the following conditions are satisfied:
  1. Input port  $\overline{R_2}$  (sensor A) is a H-voltage level.
  2. Input port  $\overline{R_5}$  (sensor D) is a L-voltage level.
  3. Input port  $\overline{R_6}$  (sensor E) is a L-voltage level.
- 4) DD motor control
  - a) When the start key is depressed for start operation, the DD motor immediately begins to rotate.  
In return operation, the DD motor stops rotating when the input port  $\overline{R_2}$  (sensor A) changes to a H-voltage level.
  - b) In case the tone-arm is moved by hand, the DD motor begins to rotate when the input port  $\overline{R_2}$  (sensor A) changes to a H-voltage level and stops rotating when the input port  $\overline{R_2}$  changes to a L-voltage level.
  - c) In case the tone-arm is moved by hand while the lifter is coming down in automatic operation, this tone-arm movement is detected when the input ports  $\overline{R_5}$  and  $\overline{R_6}$  change to a L-voltage level. In this case, the DD motor begins to rotate when the input port  $\overline{R_2}$  changes to a H-voltage level and stops rotating when the input port  $\overline{R_2}$  changes to a L-voltage level.

# 3. ADJUSTMENTS

## 3-1. 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. 3-1 and 3-2.

Fig. 3-1 Side View of Screen Plate

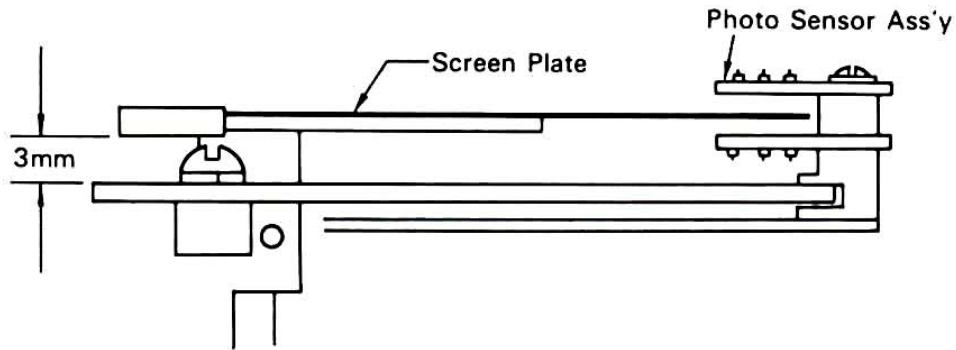
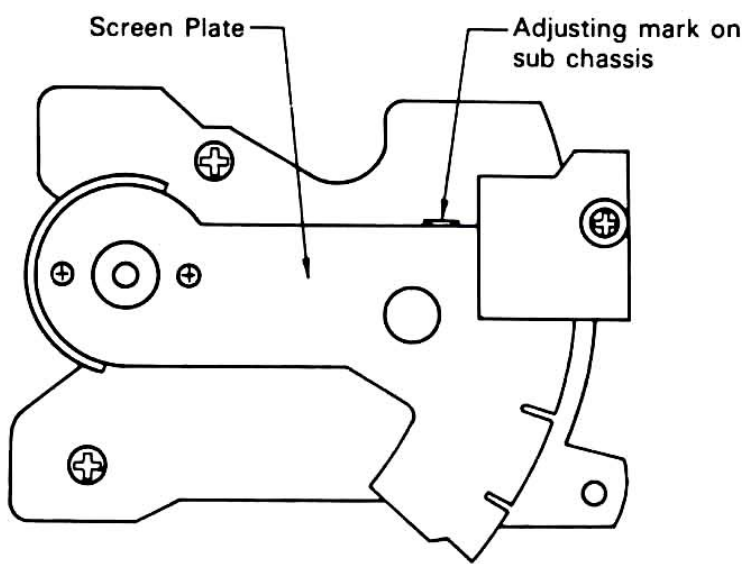


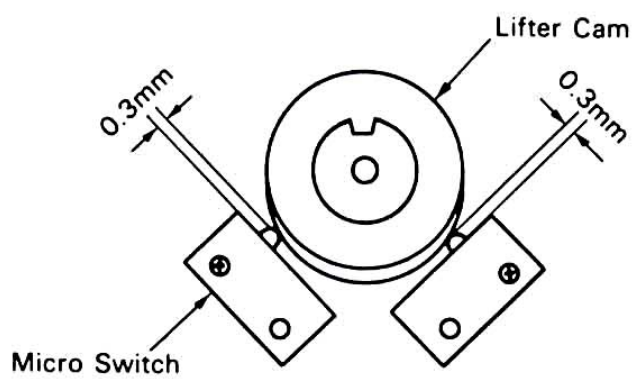
Fig. 3-2 Bottom View of Screen Plate



## 3-2. Adjustment of Micro Switch Position

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

Fig. 3-3



## 3-3. Lead-in Position Adjustment

- 1) Confirm that the screen plate is installed as shown in Fig. 3-1.
- 2) Turn the adjusting cam (See 5-1. Top View on Page 7) so as to lower the stylus to the middle of lead-in groove.

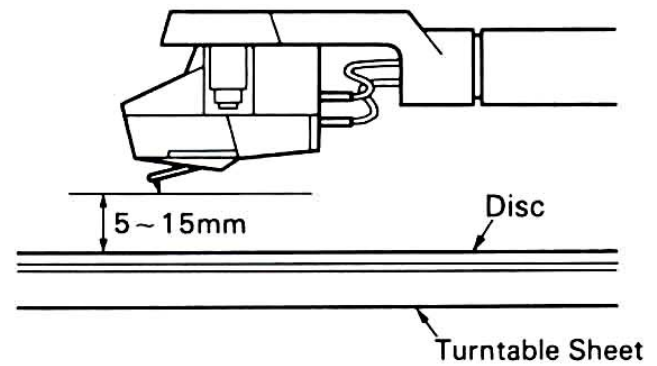
## 3-4. Speed Adjustment

- 1-a) Set the Pitch Control (hVR<sub>1</sub>) on control panel to center position.
- 2-a) Set the Speed Selector to 33 (r.p.m.)
- 2-b) Adjust eVR<sub>33</sub> on the D.D. Motor Control Circuit Board (See 5-2. Bottom View on Page 8) so as to standstill the strobo marking pattern.
- 3-a) Set the Speed Selector to 45 (r.p.m.)
- 3-b) Adjust eVR<sub>45</sub> on the D.D. Motor Control Circuit Board (See 5-2. Bottom View on Page 8) so as to standstill the strobo marking pattern.

## 3-5. Lifter Height Adjustment

Adjust the screw B (See 5-1. Top View on Page 7) so the distance between the stylus tip and the disc is as Fig. 3-4.

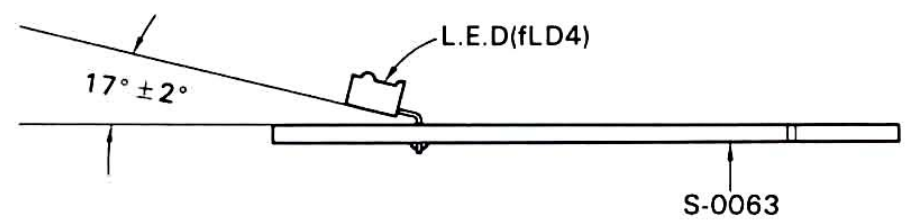
Fig. 3-4



## 3-6. Adjustment of Disc Size Detector LED Position

When the disc size detector LED is replaced, adjust its position as shown in Fig. 3-5.

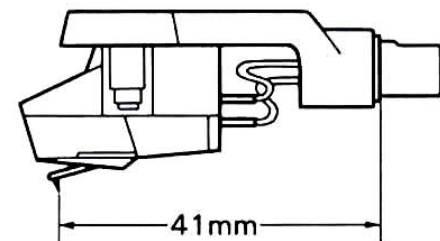
Fig. 3-5



## 3-7. Mounting Cartridge

Mount a suitable cartridge on the headshell supplied with screws and nuts as shown in Fig. 3-6.

Fig. 3-6



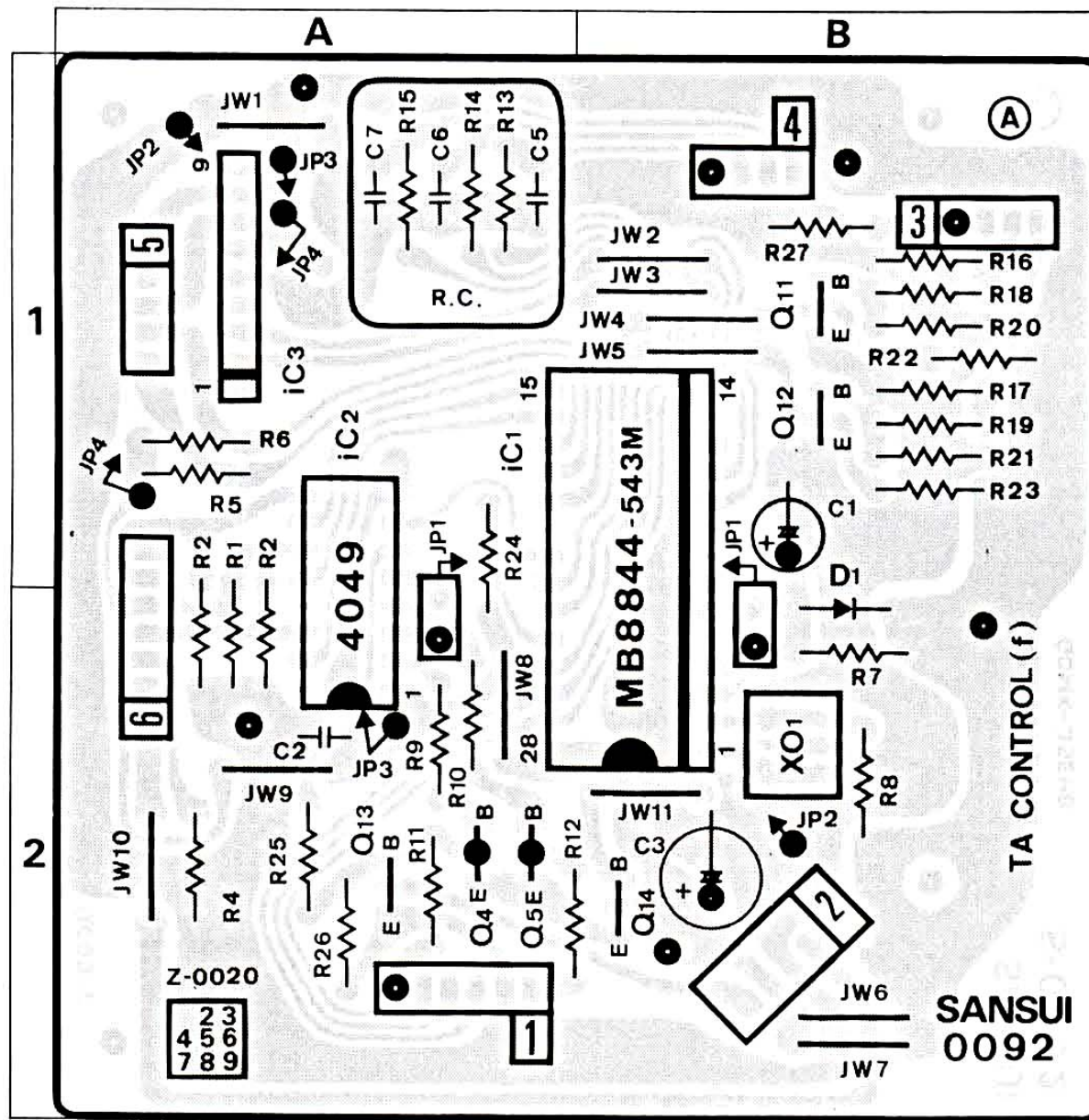


# 4. PARTS LOCATION & PARTS LIST

● 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.

## 4-1. S-0092 T.A. Control Circuit Board (Stock No. 13094001)

Component Side



### Parts List

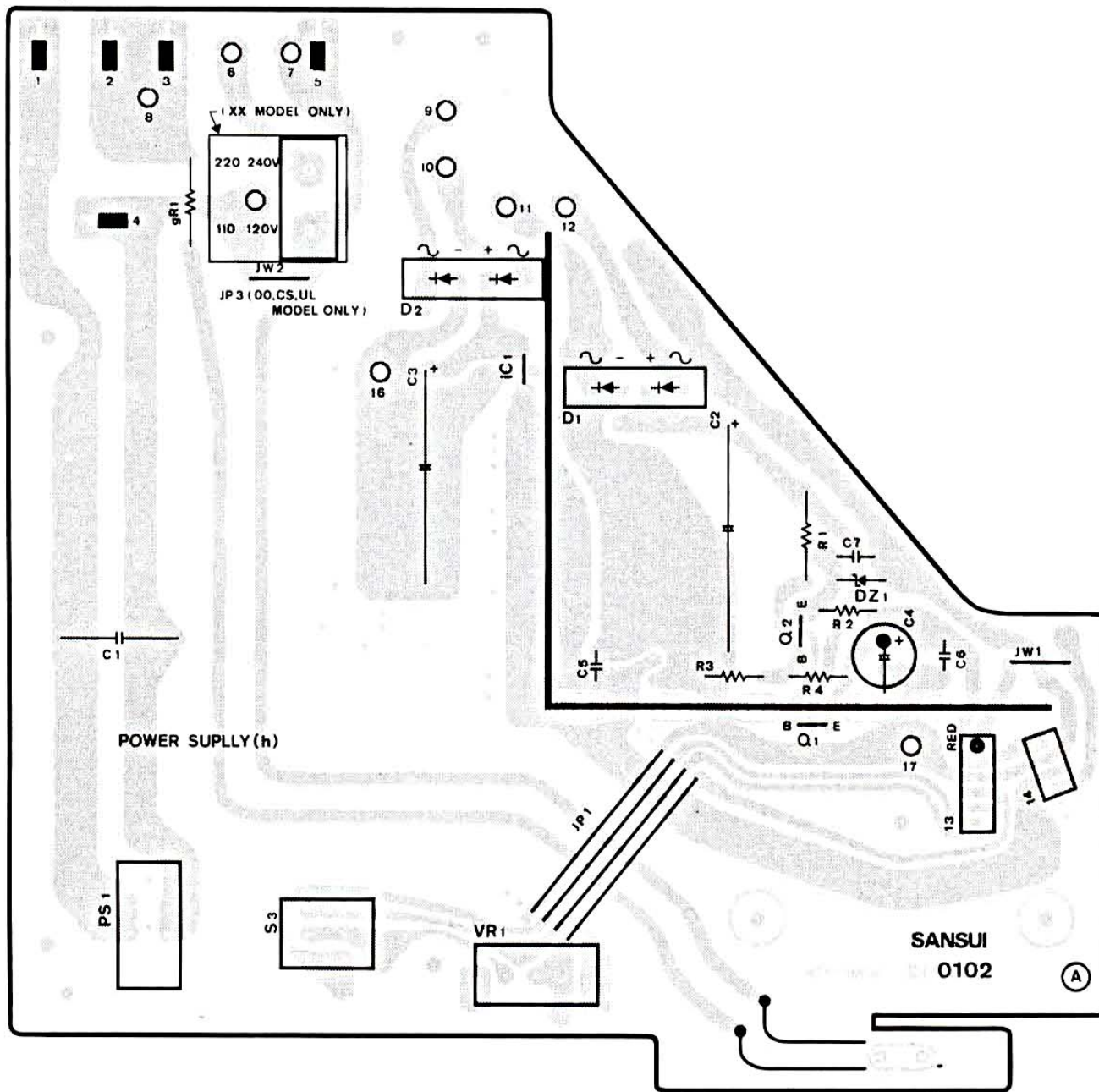
Parts No.	Stock No.	Description	Parts No.	Stock No.	Description
fXO1	46149200	Ceramic Osc Element 3.58MHz	fQ13	03069101	2SC2060
● Transistor				or 07270601	2SC2673-Q
fQ4	07194701	2SA1015		or 03085901	2SD471-L
	or 07197001	2SA733A	fQ14	07194801	2SC1815
	or 07299601	2SA1115		or 03059501	2SC945
	or 46086601	2SA937		or 07299701	2SC2603
fQ5	07194701	2SA1015		or 03069401	2SC2021
	or 07197001	2SA733A	● IC		
	or 07299601	2SA1115	fIC1	46149500	MB8844-543M
	or 46086601	2SA937	fIC2	03611800	MSM4049RS
fQ11	07194801	2SC1815		or 46160400	MB84049B
	or 03059501	2SC945		or 46160500	TC4049BP
	or 07299701	2SC2603	fIC3	46149600	BA6208
	or 03069401	2SC2021	● Diode		
fQ12	07194801	2SC1815	fD1	03111600	1S2473D
	or 03059501	2SC945			
	or 07299701	2SC2603			
	or 03069401	2SC2021			

### ● 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	Ta.C.	Tantalum Capacitor
F.R.	Fusing Resistor	F.C.	Film Capacitor
N.I.R.	Non-Inflammable Resistor	M.P.	Metalized Paper Capacitor
C.C.	Ceramic Capacitor	P.C.	Polystyrene Capacitor
C.T.	Ceramic Capacitor, Temperature Compensation	G.C.	Gimmic Capacitor
E.C.	Electrolytic Capacitor		

## 4-2. S-0102 Power Supply Circuit Board (Stock No. 13094801)

Component Side



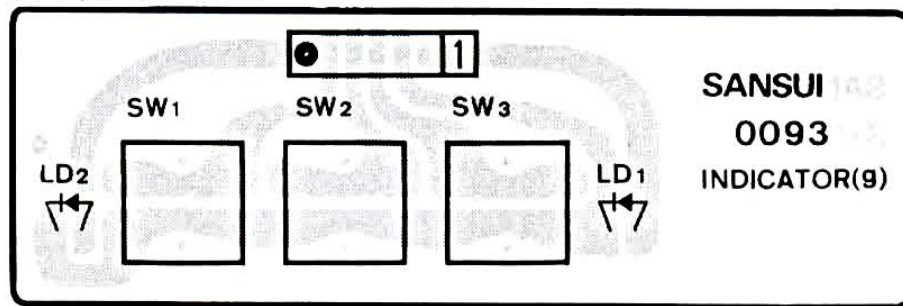
### Parts List

Parts No.	Stock No.	Description
gR1	00179900	12kΩ 1W N.I.R.
nNL1	07253900	Neon Lamp NE-2HUSA-1
●Transistor		
hQ1	03070400	2SC1983
hQ2	03062801	2SC1735
	or 03059301	2SC1211
●IC		
hIC1	07183500	μPC78M05H
●Diode		
hD1	03117000	RB-152
hD2	03117000	RB-152
●Zener Diode		
hDZ1	03166300	RD5.1E
hR1	00184400	680Ω 1W N.I.R.
hC1	00386000	0.01μF 150V C.C.
hC2	00283400	470μF 50V E.L.
hC3	00281800	470μF 25V E.L.
hVR1	46087500	100kΩ (B) Volume, speed control
hS1	07260300	Push Switch

● Note: The circuit board, S-0093, S-0063, S-0091, S-0099 & S-0100 are not supplied as the assembled. However, the individual parts on the circuit board are provided by orders.

## 4-3. S-0093 Indicator Circuit Board

Component Side



### Parts List

Parts No.	Stock No.	Description
gLD1	46162500	Light Emitting Diode SLR-54URC
gLD2	07246200	Light Emitting Diode SEL1710K
gS1	11907000	Push Switch
gS2	11907000	Push Switch
gS3	11907000	Push Switch

## 4-4. S-0063 LED (Sensor ⑰, ⑳) Circuit Board

### Parts List

Parts No.	Stock No.	Description
fLD4	07260900	Light Emitting Diode GL-430

## 4-5. S-0091 Sensor ⑰, ⑳ Circuit Board

### Parts List

Parts No.	Stock No.	Description
●Transistor		
fQ9	03900100	Photo Transistor PH101
fQ10	03900100	Photo Transistor PH101

## 4-6. S-0099 LED (Sensor ⑰, ⑱, ㉑) Circuit Board

### Parts List

Parts No.	Stock No.	Description
fLD1	46150400	Light Emitting Diode TLR121
fLD2	46150400	Light Emitting Diode TLR121
fLD3	46150400	Light Emitting Diode TLR121

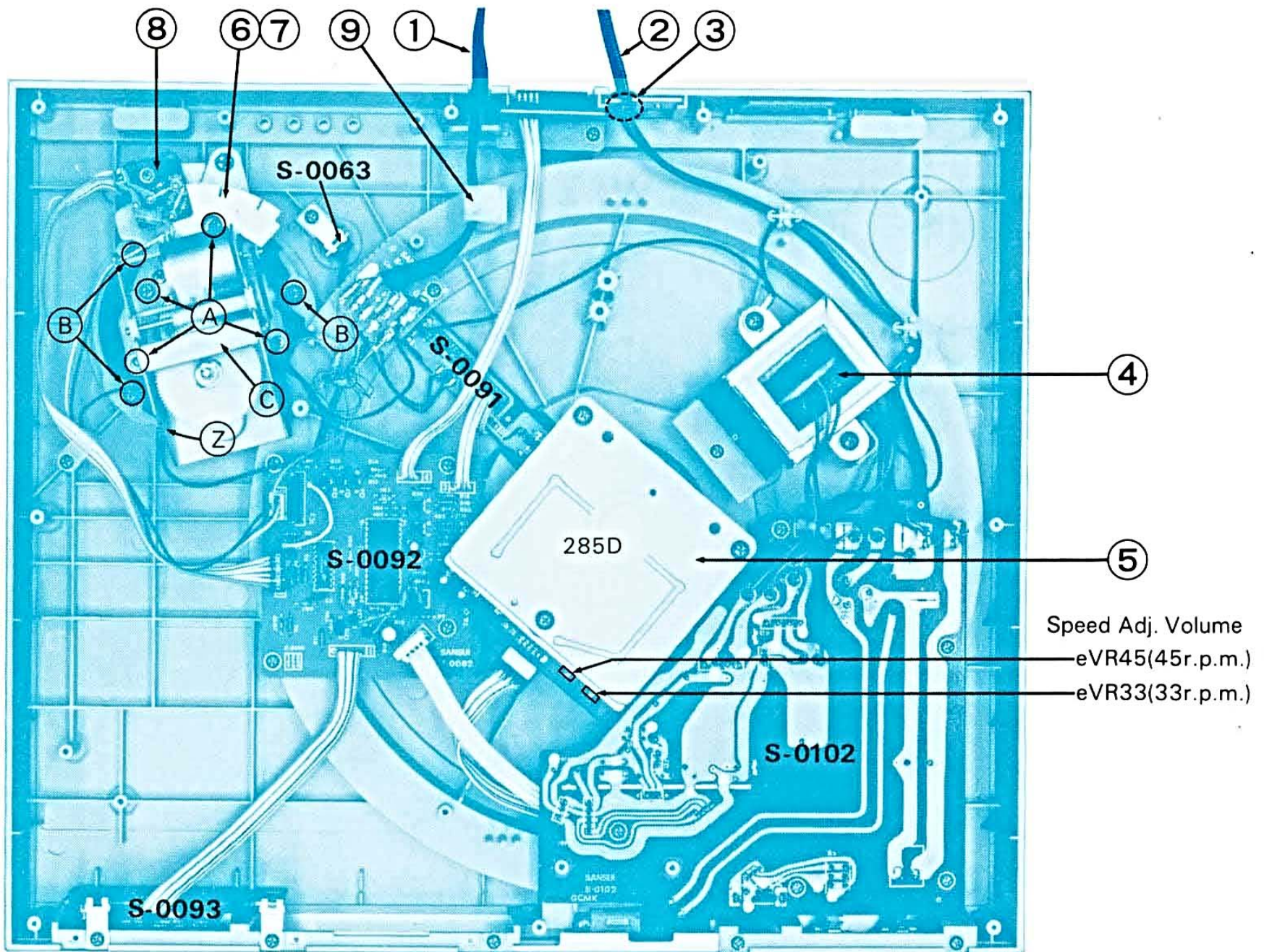
## 4-7. S-0100 Sensor ⑰, ⑱, ㉑ Circuit Board

### Parts List

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



## 5-2. Bottom View



### Parts List <Top View>

Parts No.	Stock No.	Description
1	13036420	Turntable Sheet
2	13040010	Turntable Platter
3	13037900	Prism, disk size detector
4	13076200	Disk Size Detector Post Ass'y
5	50624800	Lid
6	13083210	Adjusting Cam
7	13074100	Main Weight Ass'y
8	13132200	Arm Base Ass'y
9	13074200	I.F.C. Ass'y
10	13074400	Armrest Hook Ass'y
11	13132100	Armlifter Ass'y
12	13107800	Tonearm Ass'y
13	13107900	Head Shell
14	13012300	EP Adaptor
15	13103100	Front Panel Ass'y
16	13037000	Push Knob, power, speed selector
17	13037100	Knob, pitch control
18	13037700	Strobo Cover
19	46162500	Light Emitting Diode SLR-54URC, repeat indicator
20	13037300	Push Knob Ass'y, repeat, up/down, start/stop
21	07246200	Light Emitting Diode SEL1710K, computer indicator
	13034100	Insulator

### Parts List <Bottom View>

Parts No.	Stock No.	Description
1	38103610	P.U. Output Cord
2	38004700	Power Supply Cord
3	39106000	Strain Relief
4	15005501	Power Transformer
5	13065710	285D DD Motor (with control circuit board)
6	13083500	Screen Plate (1)
7	13083810	TA Drum
8	13083400	Screen Plate (S), S-0100 circuit board
9	07254700	Strain Relief

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

Fig. 6-1

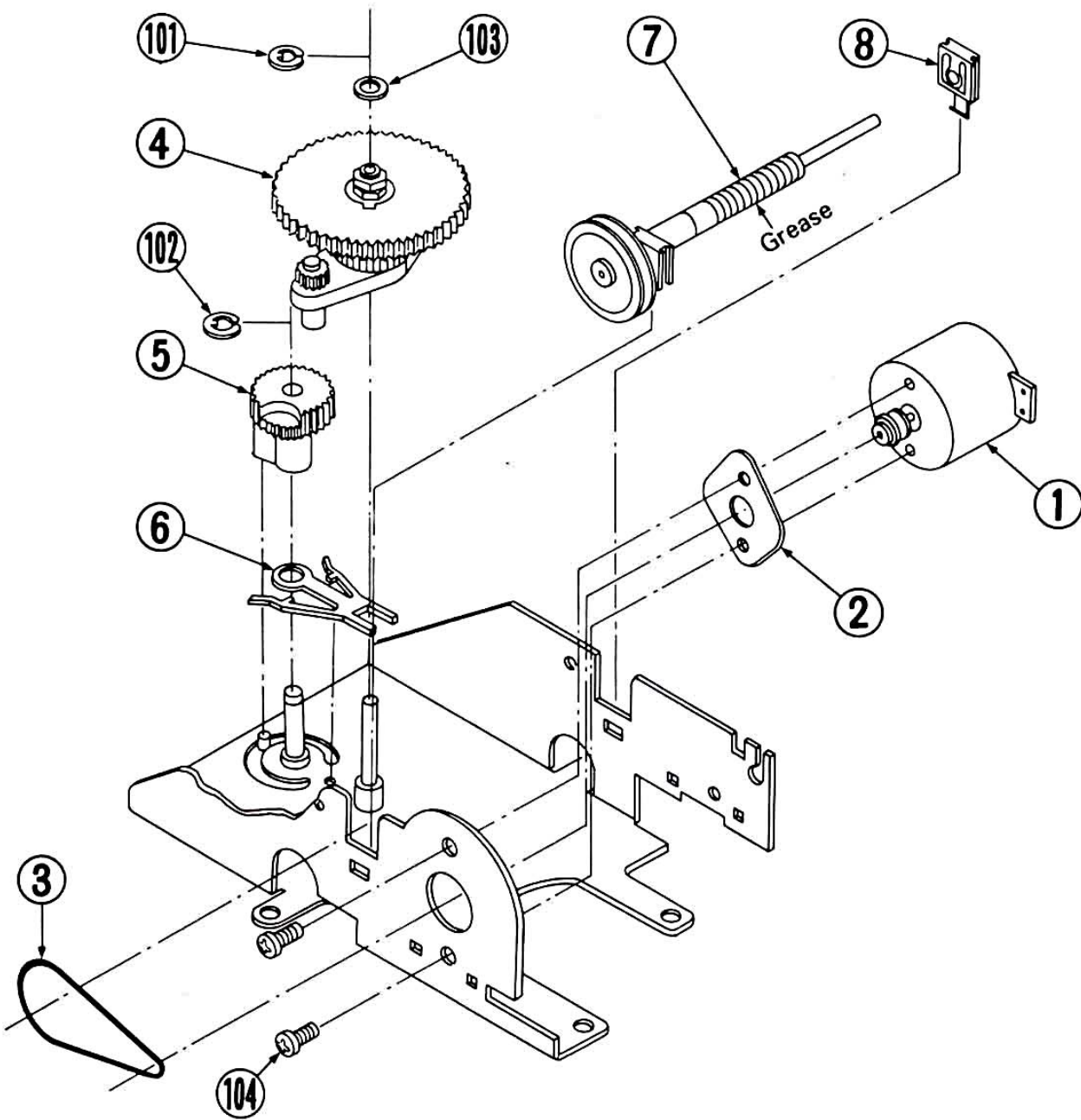


Fig. 6-3

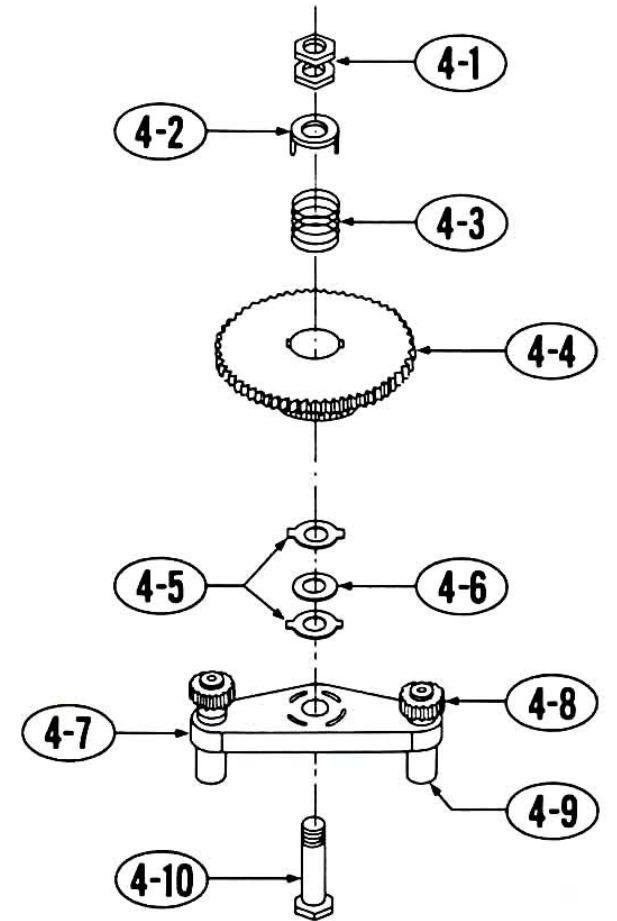
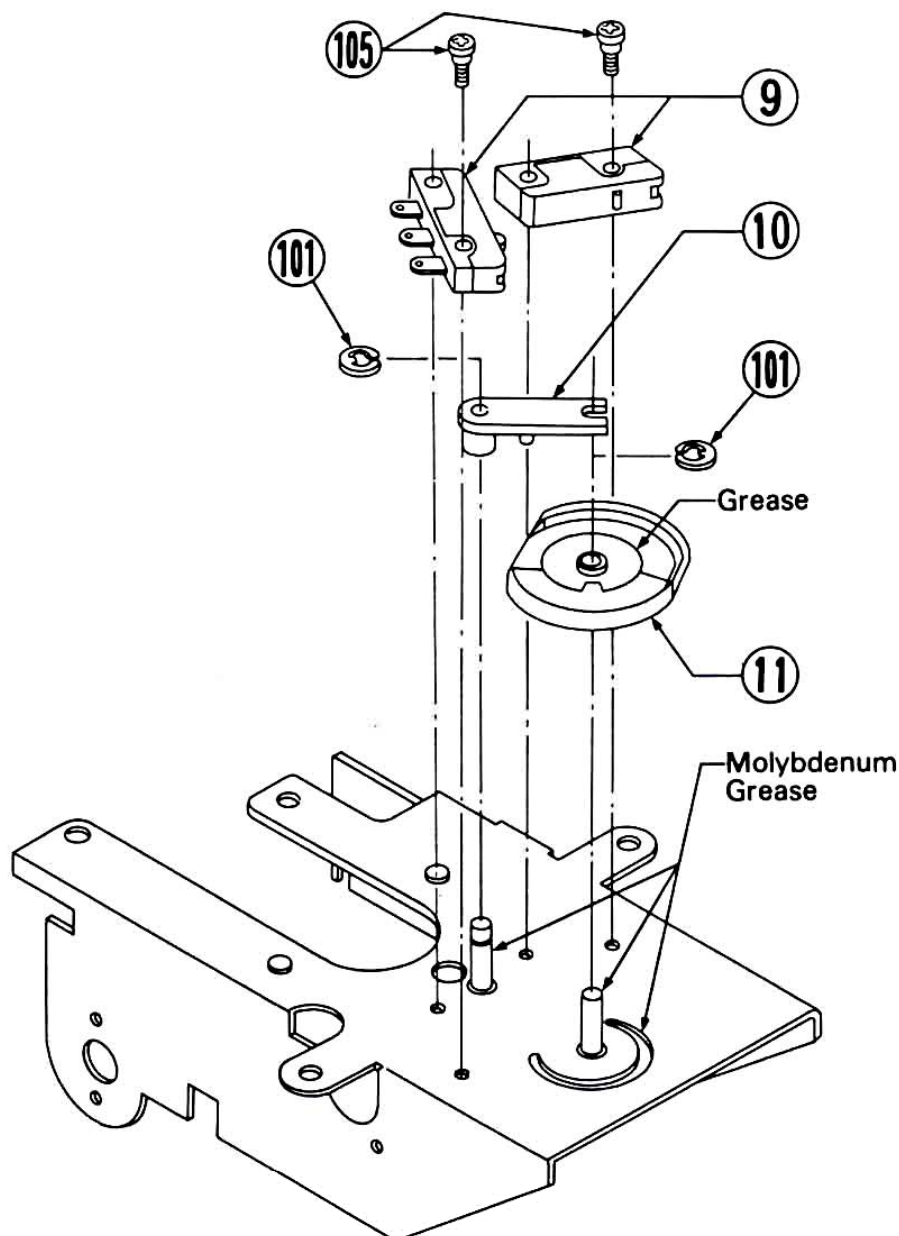


Fig. 6-2

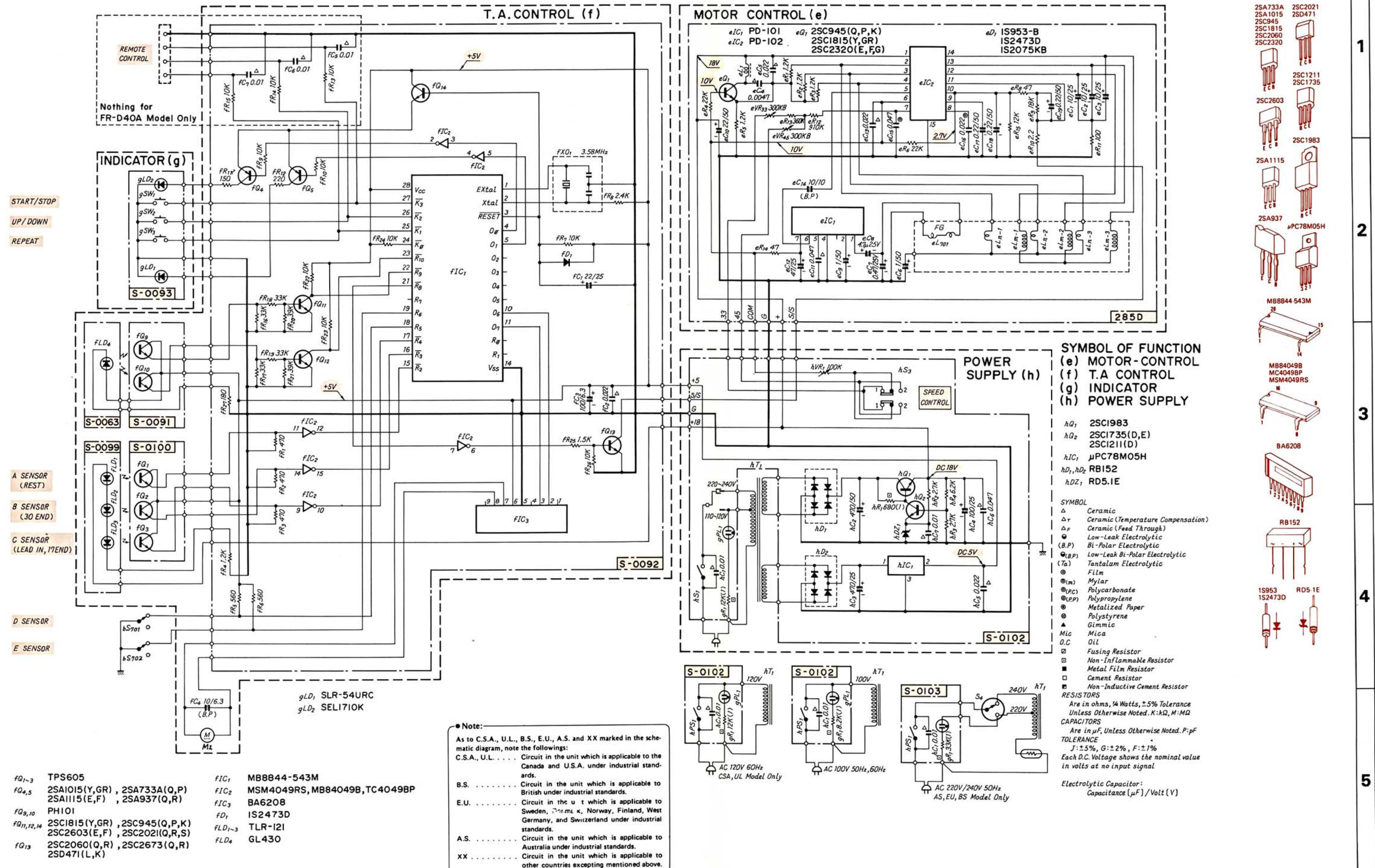


## Parts List

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
●Washer & Screw		
101	08322600	2.5φ E-Type Washer
102	00489200	3φ E-Type Washer
103	51821600	3φ Thrust Washer
104	00436500	M2 x 4 Pan Head Screw
105	13113200	M2 x 10 Pan Head SEMS A

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

# 7. SCHEMATIC DIAGRAM



START/STOP  
 UP/DOWN  
 REPEAT

A SENSOR (REST)  
 B SENSOR (30 END)  
 C SENSOR (LEAD IN, 17 END)  
 D SENSOR  
 E SENSOR

fQ1-3 TPS605  
 fQ4,5 2SA1015(Y,GR), 2SA733A(Q,P), 2SA1115(E,F), 2SA937(Q,R)  
 fQ9,10 PH101  
 fQ11,12,14 2SC1815(Y,GR), 2SC945(Q,P,K), 2SC2603(E,F), 2SC2021(Q,R,S)  
 fQ13 2SC2060(Q,R), 2SC2673(Q,R), 2SD471(L,K)

fIC1 MB8844-543M  
 fIC2 MSM4049RS, MB84049B, TC4049BP  
 fIC3 BA6208  
 fD1 IS2473D  
 fLD1-3 TLR-121  
 fLD4 GL430

**Note:**  
 As to C.S.A., U.L., B.S., E.U., A.S. and XX marked in the schematic diagram, note the followings:  
 C.S.A., U.L. . . . . Circuit in the unit which is applicable to the Canada and U.S.A. under industrial standards.  
 B.S. . . . . . Circuit in the unit which is applicable to British under industrial standards.  
 E.U. . . . . . Circuit in the unit which is applicable to Sweden, Denmark, Norway, Finland, West Germany, and Switzerland under industrial standards.  
 A.S. . . . . . Circuit in the unit which is applicable to Australia under industrial standards.  
 XX . . . . . . Circuit in the unit which is applicable to other countries excepting mentioned above.

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

hQ1 2SC1983  
 hQ2 2SC1735(D,E), 2SC1211(D)  
 hIC1 μPC78M05H  
 hD1, hD2 RB152  
 hDZ1 RD5.1E

**SYMBOL**  
 Δ Ceramic  
 ΔT Ceramic (Temperature Compensation)  
 ΔF Ceramic (Feed Through)  
 ● Low-Leak Electrolytic  
 (B,P) Bi-Polar Electrolytic  
 ●(B,P) Low-Leak Bi-Polar Electrolytic  
 (Ta) Tantalum Electrolytic  
 ⊙ Film  
 ⊙(m) Mylar  
 ⊙(PC) Polycarbonate  
 ⊙(PP) Polypropylene  
 ⊙ Metalized Paper  
 ⊙ Polystyrene  
 ▲ Gimmic  
 ▲ Mica  
 O.C Oil  
 □ 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 shows the nominal value in volts at no input signal  
 Electrolytic Capacitor:  
 Capacitance (μF)/Volt (V)

- 2SA733A
- 2SA1015
- 2SC945
- 2SC1815
- 2SC2060
- 2SC2320
- 2SC2021
- 2SD471
- 2SC1211
- 2SC1735
- 2SC2603
- 2SC1983
- 2SA1115
- 2SA937
- μPC78M05H
- MB8844-543M
- MB884049B
- MC4049BP
- MSM4049RS
- BA6208
- RB152
- 1S953
- 1S2473D
- RD5.1E

1  
 2  
 3  
 4  
 5

## 8. MAIN PARTS REPLACEMENT

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

(See bottom view on Page 8)

- 1) Set the arm lifter at the down position.
- 2) Remove the bottom plate.
- 3) Unscrew four (A) 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 8)

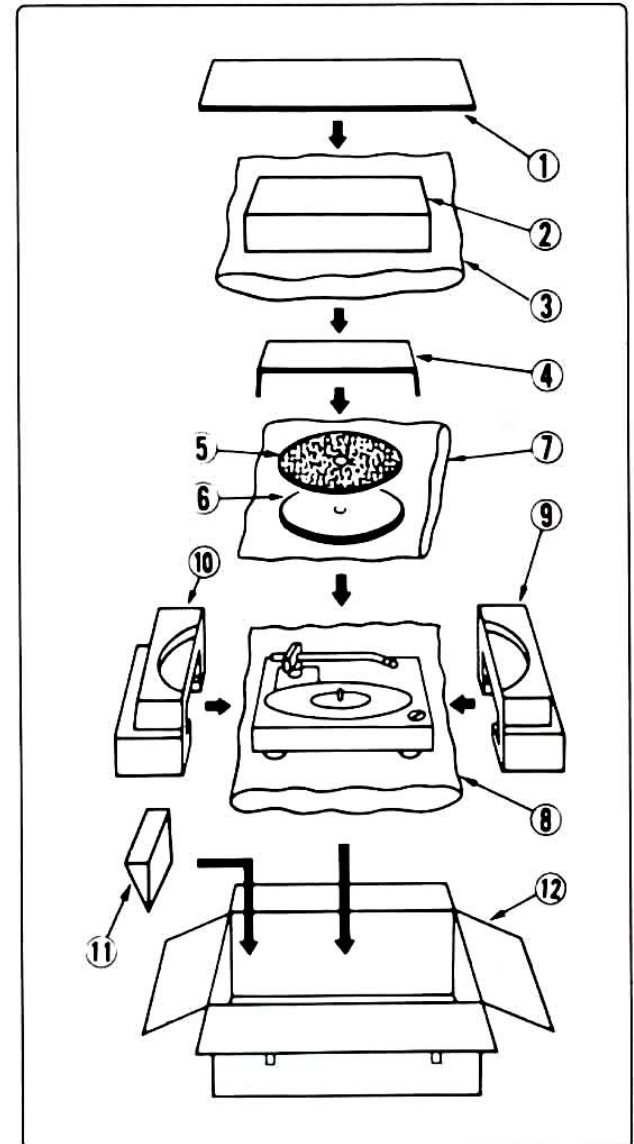
- 1) Remove the mechanical assembly in accordance with the procedures as stated under 8-1 above.
- 2) Remove the parallel cords connected to the sensor assembly board.
- 3) Fix the tone-arm by using the arm rest hook.
- 4) Unscrew three (B) screws fastening the tone-arm assembly.
- 5) Shift the tone-arm base 1cm in the arrow direction Z 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	13040300	Protector Board, upper
2	13073000	Dust Cover Ass'y
3	91122500	Polyethylene Bag, dust cover
4	13035800	Protector Board, platter
5	13036420	Turntable Sheet
6	13040010	Turntable Platter
7	91166000	Polyethylene Bag, turntable platter
8	91122710	Polyethylene Bag, turntable unit
9	13057500	Styrofoam Packing, front
10	13057610	Styrofoam Packing, rear
11	13040220	Accessory Box
12	13092300	Carton Case



## 10. ACCESSORY LIST

Stock No.	Description
13074600	Sub Weight Ass'y
13012300	EP Adaptor
13107900	Head Shell
46145400	Operating Instruction
13073600	Cartridge Ass'y, SV-202 (XX, AS)
13073800	Stylus, SN-202
13070200	Auto Hinge, dust cover

•Note: There are two types of units in FR-D40

1) The unit with a cartridge, SV-202

2) The unit without a cartridge

The mark (E) is stamped on the side of carton case.



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