ORDER NO. DAD83110040C1

Service Manual

Quartz Direct Drive Automatic Turntable System

SL-Q5

[M], [MC]

T4P is the standard mark for the "P-mount" plug-in-connector system. Products carrying this mark are inter-changeable and compatible with each other.

Areas

* [M] is available in U.S.A.
* [MC] is available in Canada.

***The cartridge shown here is an option.**

SL-Q5

Specifications

Specifications are subject to change without notice for further improvement.
Weight and dimensions shown are approximate.

■ General

Power supply:	120V AC, 60 Hz
Power consumption:	10 W
Dimensions: (W×H×D)	31.5 × 8.8 × 31.5 cm (12-1/2" × 3-1/2" × 12-1/2") 31.5 × 39 × 31.5 cm (12-1/2" × 15-23/64" × 12-1/2") (Maximum height when dust cover is open.)
Weight:	4.3 kg (9.5 lb.)

■ Turntable section

Type:	Fully Automatic turntable
Features:	Auto start/Auto lead-in Auto return Auto stop Repeat play Auto speed select Manual speed selection possible Auto size select Record presence detection
Drive method:	Direct drive
Motor:	Brushless DC motor
Drive control method:	Quartz-phase-locked control
Turntable platter:	Aluminum die-cast Diameter 30 cm (12")
Turntable speeds:	33-1/3 rpm and 45 rpm Auto speed select (Manual selection possible)
Wow and flutter:	0.012% WRMS* 0.025% WRMS (JIS C5521) ±0.035% peak (IEC 98A Weighted)

* Measured by obtaining signal from built-in frequency generator of motor assembly.

Rumble:	−56 dB (IEC 98A Unweighted) −78 dB (IEC 98A Weighted)

■ Tonearm section

Type:	Dynamic balanced type Linear tracking tonearm 4-pivot gimbal suspension
Effective length:	10.5 cm (4-1/8")
Tracking error angle:	Within ±0.1°
Effective mass:	9 g (including cartridge)
Resonance frequency:	12 Hz
Tonearm drive motor:	DC motor
Phono cable capacitance:	200 pF

Technics

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Secaucus. New Jersey 07094

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P.O. Box 774
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Victoria Industrial Park
Carolina, Puerto Rico 00630

■ CONTENTS

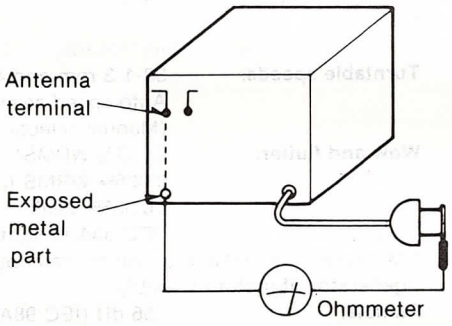
■ SAFETY PRECAUTION

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

• INSULATION RESISTANCE TEST

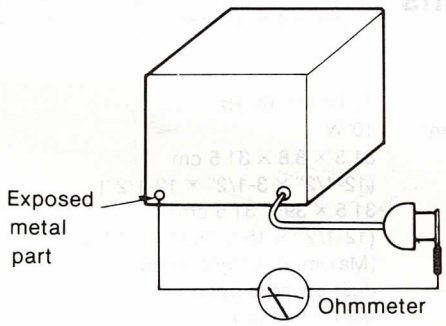
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3MΩ and 5.2MΩ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = 3MΩ—5.2MΩ

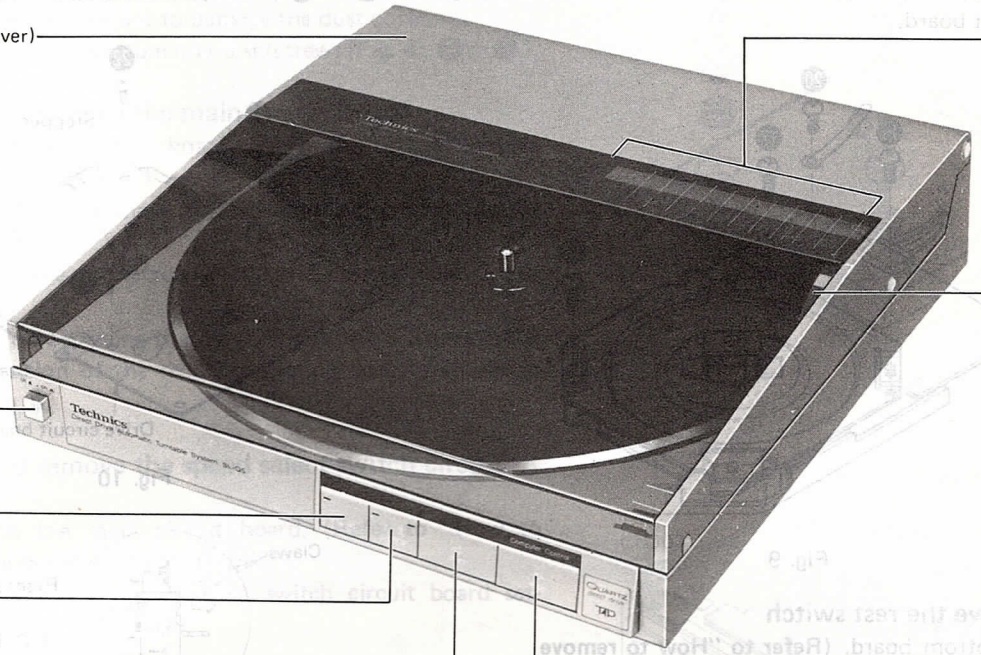


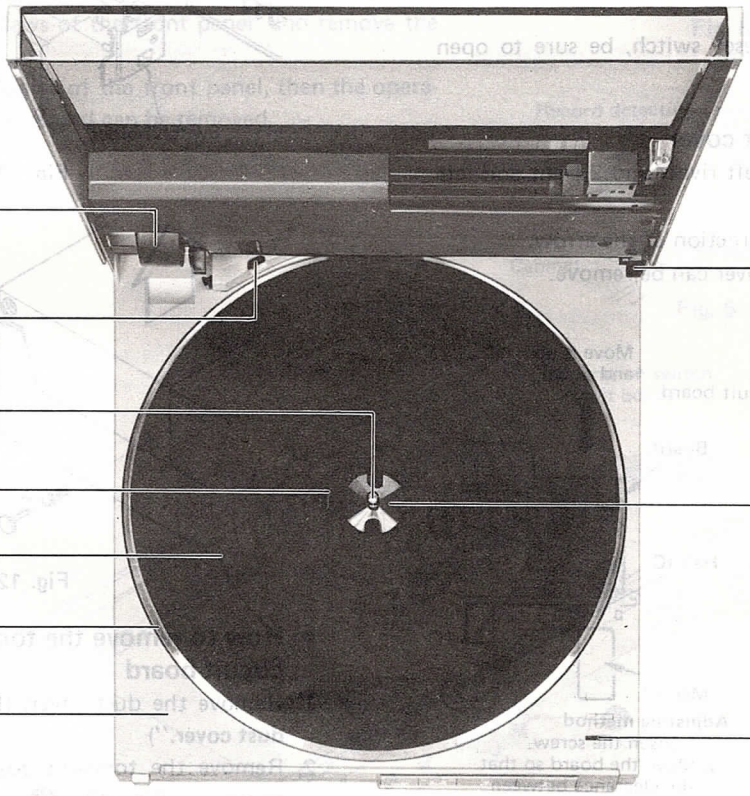
(Fig. B)

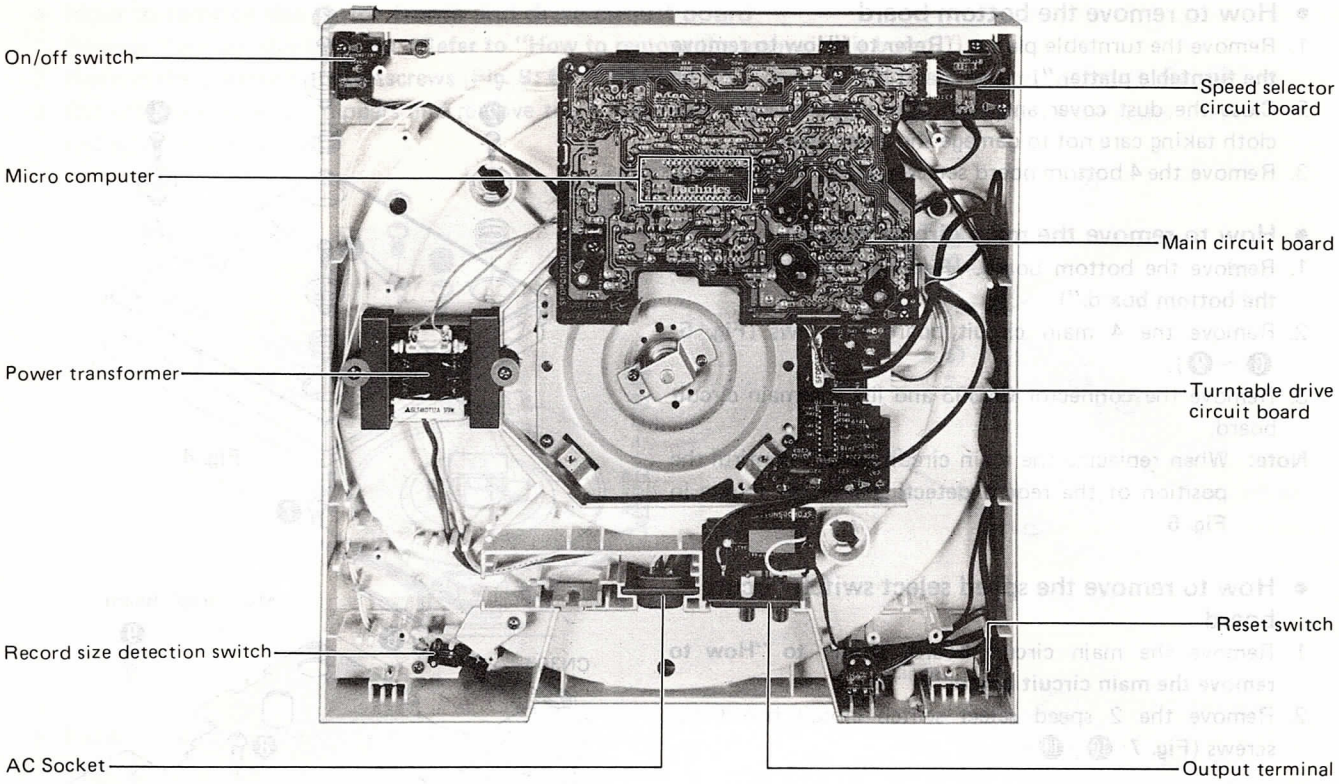
Resistance = Approx. ∞

4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

■ LOCATION OF CONTROLS







■ DISASSEMBLY INSTRUCTIONS

• How to remove the cartridge

1. Open the dust cover.
2. Remove the cartridge setscrew (**Fig. 1**: ❶), and pull out the cartridge in the direction of the arrow.

Note: When attaching the cartridge again, match the tonearm connector with the cartridge pins, then completely insert it and tighten the setscrew.

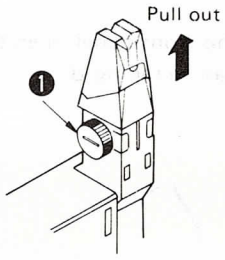


Fig. 1

• How to remove the turntable platter

1. Open the dust cover.
2. Remove the turntable mat and lift the turntable platter. (**Fig. 2**)

Note:

(1) When removing the turntable platter, it is not necessary to remove the 45 r.p.m. adaptor.

(2) The turntable platter is tight fitted on to the center spindle. When removing the turntable platter, take care not to give damage to the upper cabinet, arm motor cover and tonearm cover.

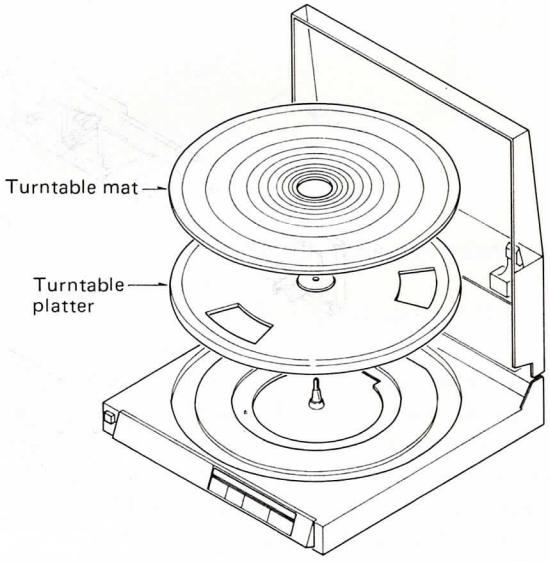


Fig. 2

• How to remove the 45 r.p.m. adaptor (Fig. 3)

1. Remove the turntable platter. (**Refer to "How to remove the turntable platter."**)
2. Turn the 45 r.p.m. adaptor counterclockwise to raise it from the turntable platter surface.
3. Push the claw by the blade screwdriver in the direction of the arrow, then remove the 45 r.p.m. adaptor.

Note: When removing the 45 r.p.m. adaptor, remove the turntable platter, otherwise the 45 r.p.m. adaptor claws will be broken.

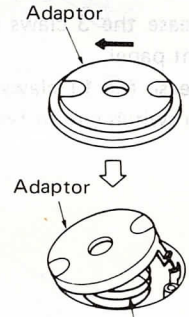


Fig. 3

■

- **How to remove the bottom board**

1. Remove the turntable platter. (**Refer to "How to remove the turntable platter."**)
2. Close the dust cover and turn over the unit on a soft cloth taking care not to damage the dust cover.
3. Remove the 4 bottom board setscrews (**Fig. 4:** ❷ ~ ❺).

- **How to remove the main circuit board**

1. Remove the bottom board. (**Refer to "How to remove the bottom board."**)
2. Remove the 4 main circuit board setscrews (**Fig. 5:** ❻ ~ ❾).
3. Remove the connector CN303 and lift the main circuit board.

Note: When replacing the main circuit board, confirm the position of the reocrd detecting lever as shown in **Fig. 6.**

- **How to remove the speed select switch circuit board**

1. Remove the main circuit board. (**Refer to "How to remove the main circuit board."**)
2. Remove the 2 speed select switch circuit board setscrews (**Fig. 7:** ❿ , ⓫).

- **How to remove the operation switch circuit board**

1. Remove the main circuit board. (**Refer to "How to remove the main circuit board."**)
2. Loosen the 4 front panel setscrews. (**Fig. 8:** ⓬ ~ ⓯)
3. Release the 3 claws of the front panel, and remove the front panel.
4. Release the 11 claws of the front panel, then the operation switch circuit board can be removed.

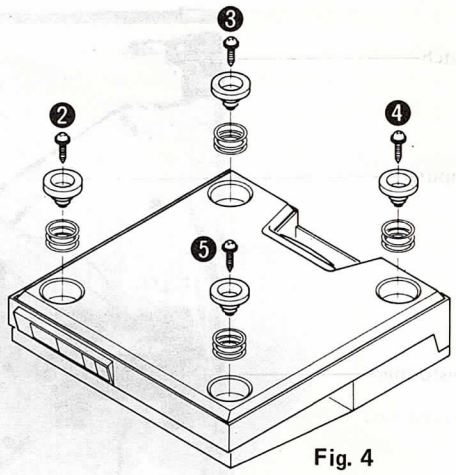


Fig. 4

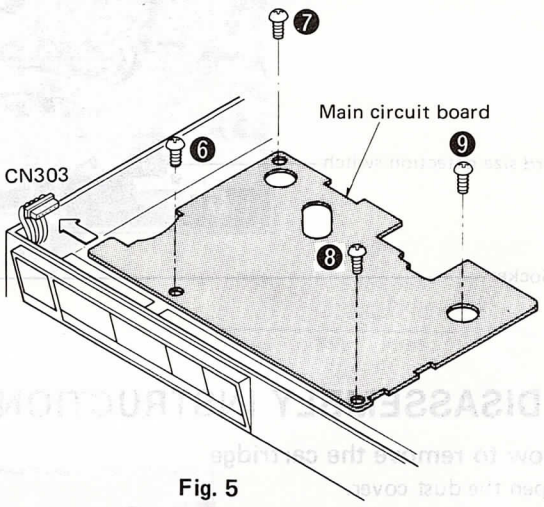


Fig. 5

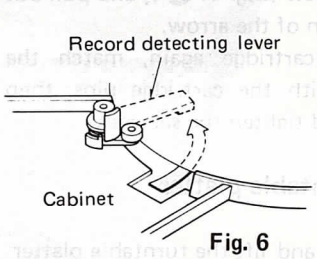


Fig. 6

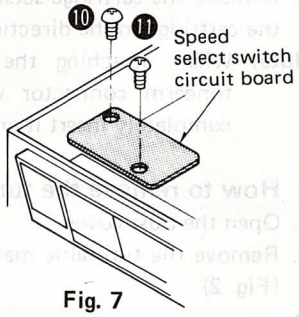


Fig. 7

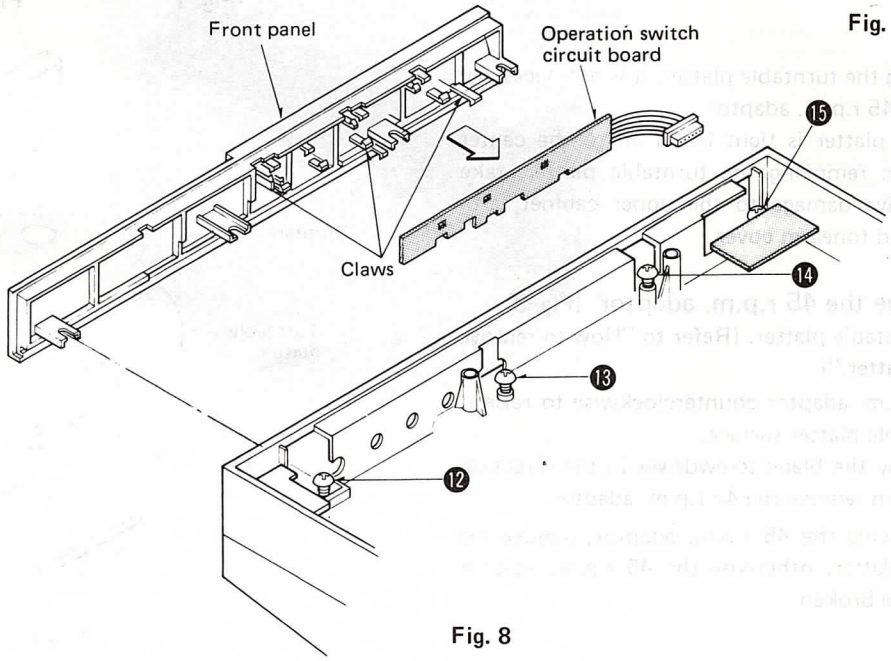


Fig. 8

• How to remove the stator frame and drive circuit board

1. Remove the main circuit board. (**Refer to "How to remove the main circuit board."**)
2. Remove the 3 stator frame setscrews (**Fig. 9:** ⑯ ~ ⑱) and the 2 drive circuit board setscrews (**Fig. 9:** ⑲, ⑳).
3. Cut off the stopper by nippers and remove the 4 setscrews (**Fig. 10 :** ㉑ ~ ㉔) to separate the stator frame and drive circuit board.

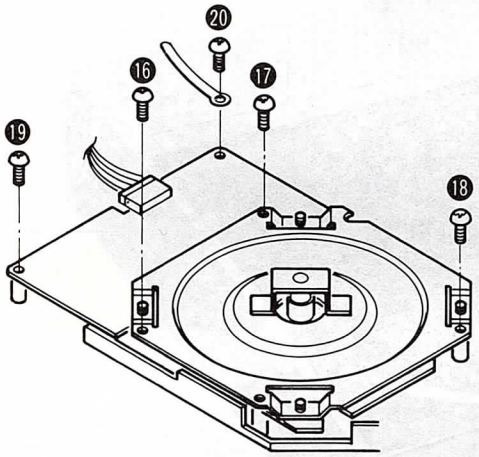


Fig. 9

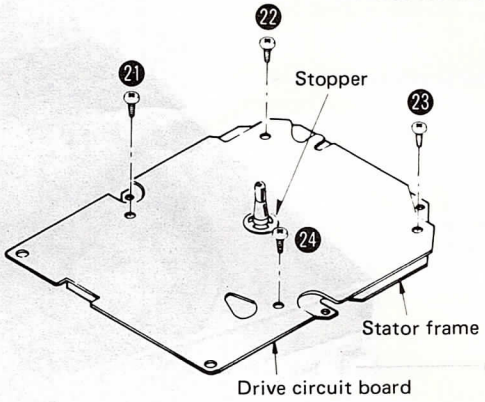


Fig. 10

• How to remove the rest switch

1. Remove the bottom board. (**Refer to "How to remove the bottom board".**)
2. Remove the swtich holder setscrew. (**Fig. 11:** ㉕)
3. Release the 2 claws of the switch holder and remove the reset switch circuit board.
4. Unsolder the 2 switch terminals, then the reset switch can be removed.

Note: When replacing the reset switch, be sure to open the dust cover.

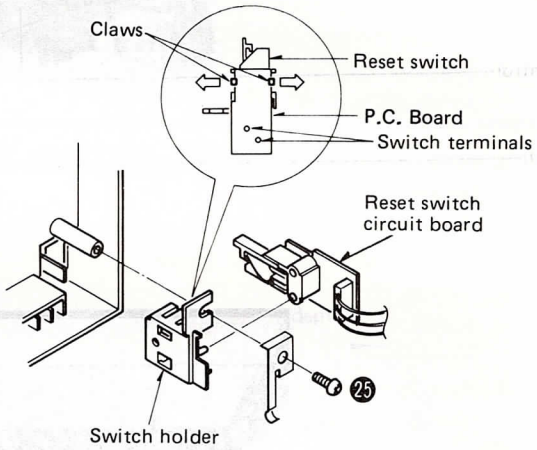


Fig. 11

• How to remove the dust cover

1. Pull out the 4 right and left rivets and 2 right and left rivet holders.
2. Lift the dust cover in the direction of the arrow. (**Fig. 12**) Then the dust cover can be remove.

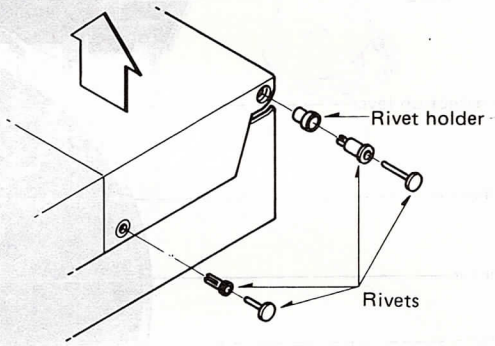


Fig. 12

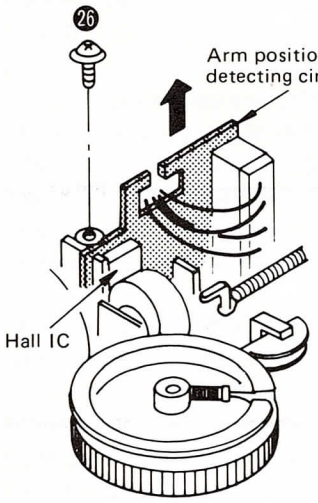
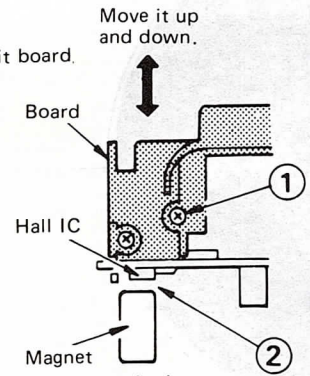


Fig. 13



Adjusting method
① Loosen the screw.
② Move the board so that the clearance between Hall IC and magnet is 0.8mm ±0.2mm, and then tighten the screw.

Fig. 14

• How to remove the tonearm positon detecting circuit board

1. Remove the dust cover. (**Refer to "How to remove the dust cover."**)
2. Remove the tonearm position detecting circuit board setscrew (**Fig. 13:** ㉖), then the tonearm position detecting circuit board can be removed.

Note: When fitting the tonearm position detecting circuit board, adjust the clearance between Hall IC and magnet should be **0.8 mm ± 0.2 mm.** Adjustment procedure as shown in **Fig. 14.**

• How to remove the tonearm

1. Remove the bottom board. (**Refer to "How to remove the bottom board."**)
2. Remove the connectors CN701 and CN301.
3. Remove the lead wires cover. (**Fig. 15**)
4. Remove the dust cover. (**Refer to "How to remove the dust cover."**)
5. Remove the cartridge. (**Refer to "How to remove the cartridge."**)
6. Remove the lead wires holder. (**Fig. 16**)
7. Turn the worm gear by finger to move the tonearm inward.
8. Remove the pulley cap and pulley.
9. Remove the rest switch rod.
10. Remove the rope connecting piece from the tonearm unit.
11. Remove the guide rail clamper and guide rail.
12. Remove the tonearm setscrew (**Fig. 16:** ㉗), then the tonearm can be removed.

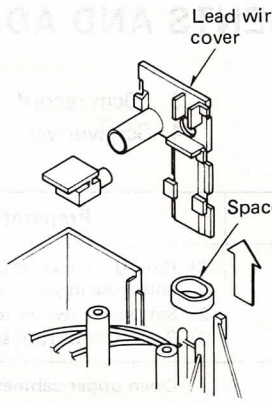


Fig. 15

• How to remove the offset angle detection circuit board

1. Remove the dust cover. (**Refer to "How to remove the dust cover."**)
2. Remove the indicator cover setscrew (**Fig. 16:** ㉘) and the indicator cover in the direction of the arrow.
3. Remove the offset angle detection circuit board setscrew (**Fig. 16:** ㉙), then the offset angle detection circuit board can be removed.

Note: When fitting the offset angle detection circuit board again, be sure to adjust the servo gain and offset voltage. (**Refer to the adjustment procedure**)

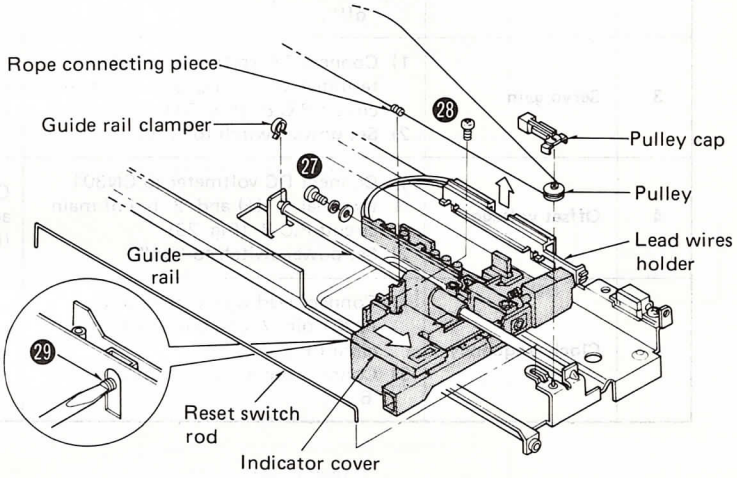


Fig. 16

• How to remove the cueing plunger

1. Remove the tonarm. (**Refer to "How to remove the tonearm."**)
2. Remove the offset angle detection circuit board. (**Refer to "How to remove the offset angle detection circuit board."**)
3. Unsolder the 2 lead wires of cueing plunger on the offset angle detection circuit board.
4. Remove the cueing plunger setscrew (**Fig. 17 :** ㉚), then the cueing plunger can be removed.

Note: The cueing plunger must be fitted in the position of **Fig. 18.**

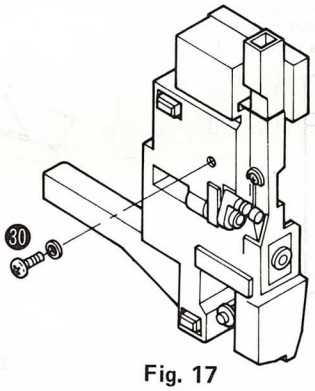


Fig. 17

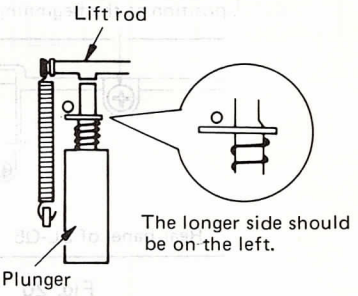


Fig. 18

■ HOW TO SET THE TONEARM DRIVE ROPE

When setting the rope, follow the procedure given below.

1. Remove the dust cover and tonearm cover. (**Refer to "How to remove the dust cover."**)
2. Remove the roller cover. (**Fig. 19**)
3. Set the rope in the order of 1 ~ 5 (**Fig. 19**)
4. Fit the rope connector to the tonearm.
5. Set the roller cover and turn the worm gear by finger to see that the tonearm moves.

Note: The arm drive wheel is not fixed. So, take care not to let is come loose during servicing. (Stop it with C-ring to prevent its removal.)

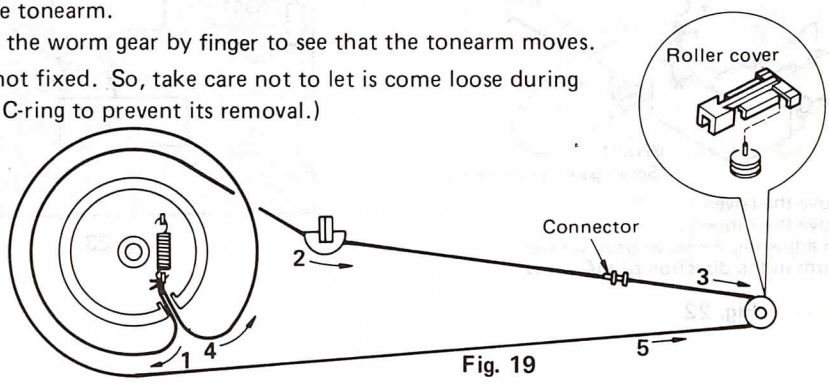


Fig. 19

■ MEASUREMENTS AND ADJUSTMENTS

• Instruments used

1. Oscilloscope
2. DC voltmeter
3. 30cm record
4. Screwdriver

Step	Item	Preparations	Parts adjusted	Procedure
1	**Start position**	1) Put 30 cm record on turntable mat and close upper cabinet. 2) Set power switch to "on". 3) Push start button switch.	Start position adjust screw. (Fig. 20)	1) If stylus drops between tunes, turn adjust screw counterclockwise.
2	**Tonearm offset angle**	1) Open upper cabinet. 2) Set power switch to "on". 3) Push start button to move tonearm inside, then set power switch to "off".	Offset angle adjust screw. (Fig. 21)	1) Turn offset angle adjust screw so that tonearm center is aligned to V-groove of lift rod.
3	**Servo gain**	1) Connect DC voltmeter to CN301 terminal 3 (+) and 2 (−) of main circuit P.C.B. (Fig. 23) 2) Set power switch to "on".	VR501 (Fig. 22)	1) Completely shift tonearm to the right. 2) Adjust VR501 so that output voltage is 3.6V.
4	**Offset voltage**	1) Connect DC voltmeter to CN301 terminal 3 (+) and 2 (−) of main circuit P.C.B. (Fig. 23) 2) Set power switch to "on".	Offset voltage adjust screw. (Fig. 22)	1) Set tonearm to center. 2) Turn adjust screw so that output voltage is 1.8V.
5	**Clock frequency**	1) Connect lead wire with clip to IC301 pin 7 and pin 27 of main circuit P.C.B. 2) Connect oscilloscope to IC301 pin 6.	VR301 (Fig. 23)	1) Set power switch to "on". 2) Adjust VR301 so that the cycle output waveform is 30μF ± 1μs.

• Adjustment points

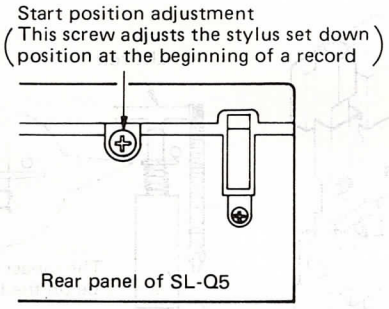


Fig. 20

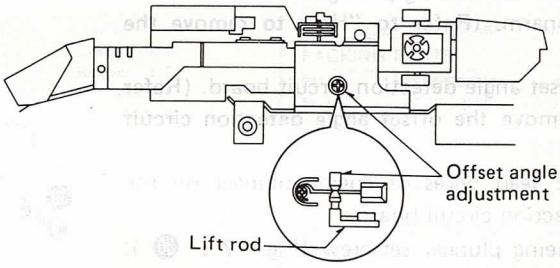
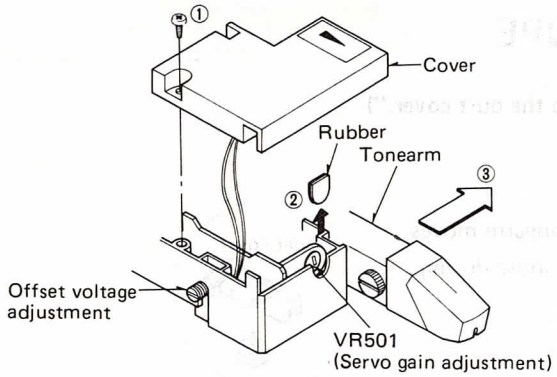


Fig. 21



① Remove the cover.
② Remove the rubber.
③ When adjusting the servo gain, set the tonearm in the direction of the arrow.

Fig. 22

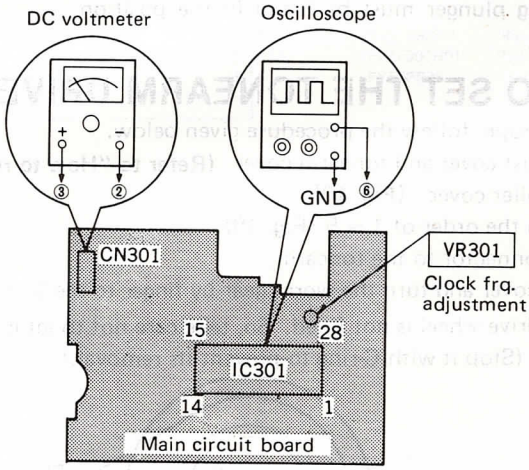


Fig. 23

■ HOW TO REPLACE CHIPS

(Resistor, capacitor and jumper)

- **Removing procedure**

1. Completely remove the solder from both ends of the chip by use of solder suker.
2. Touch the soldering iron to the end of the chip as shown in Fig. 24, then turn the tweezers in the direction of the arrow.

Chip resistor

Do not re-use chip resistor or capacitor without color cord.

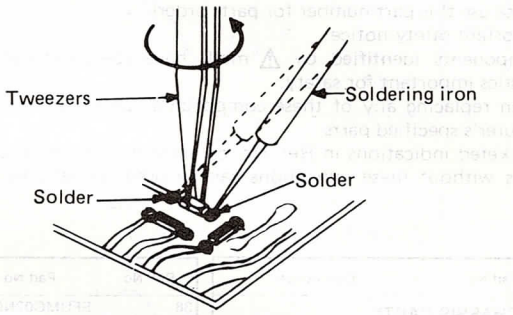


Fig. 24

- **Replacing procedure**

1. Place solder on the foil where the chip is fitted.
   Then solder the chip by holding the soldering iron as shown in Fig. 25.

Note:

1. If the chip jumper is removed, connect a coated lead wire to the part. (See Fig. 26).
   Chip jumper is marked with "J" on the printed circuit board.

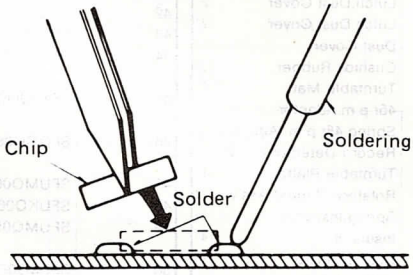


Fig. 25

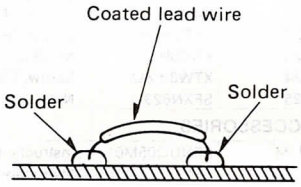


Fig. 26

- **Note for replacing chips**

1. Do not heat the chip more than 3 seconds.
2. Do not rub the electrode against the chip.
3. Use the tweezers with care not to damage the surface of the chip.
4. It is desirable to use a pencil type soldering iron. And use soldering iron less than 60W.

■ TROUBLE SHOOTING

1. How to use the repair table (Fig. 27)

① Remove the bottom board.
② Remove the main circuit board and connect the P.C.B. ground terminal to the chassis. (stator frame)
③ Put the unit on the repair table.
④ Fit the turntable platter and put on the turntable mat.
⑤ Put on the record and check the circuits from under the unit.

2. How to raise the unit (Fig. 28)

Note: Turntable platter is not fixed on the center spindle. Take care so that the turntable platter will not come loose. Also, take care allow the unit to fall down.

① Remove the bottom board.
② Completely open the upper cabinet.
③ Hold the cabinet (reset) switch with tape.
④ Fit the turntable platter.
⑤ Raise the unit and check the circuits.

3. How to turn over the unit (Fig. 29)

Note: This purpose is to check the voltage of each circuit during stop of the turntable.

① Remove the turntable platter and turn over the unit.
② Remove the bottom board.
③ Turn the power switch "on" and check the voltage.

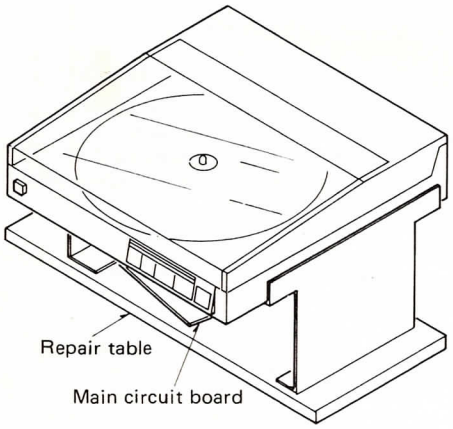


Fig. 27

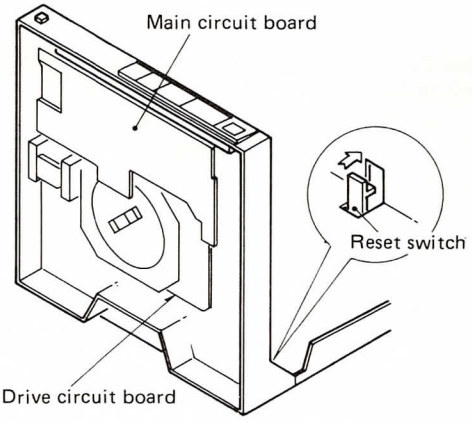


Fig. 28

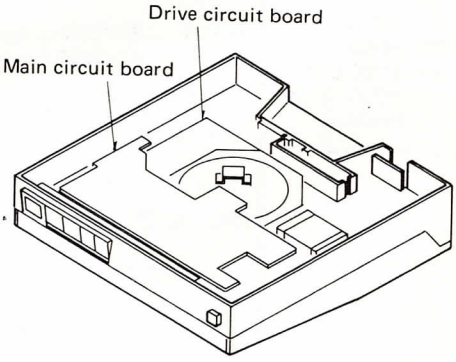


Fig. 29

Turntable does not rotate

Power source circuit

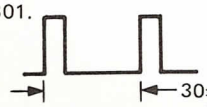
1. AC18V between CN1 terminals ① and ②.
2. DC voltage of regulator IC (IC1). ①21V, ②0V, ③11.8V.
3. DC voltage of regulator transistor (Q1). Ⓒ 9.2V, Ⓑ 5.7V, Ⓔ 5V
4. DC voltage at terminal ① of IC101. (11.8V)
5. DC voltage at terminal ⑱ of IC201. (8.5V)

NO → 1.Power transformer, AC cord 2.IC1, S1, D1, C1~C5 3.Q1, D2 R1~R3 4.IC101 5.IC201

YES ↓

Clock frequency

1. IC301 terminal ⑦ ~ ㉗ connected. Waveform of terminal ④ of IC301.



NO → IC301 VR301 C301 R310

YES ↓

Push start switch, (S301). →

Start/stop circuit

1. DC voltage at terminal ⑧ of IC301. (5V)
2. DC voltage at terminal ㉖ of IC301. (0V)
3. DC voltage at terminal ⑩ of IC201. (0V)
4. DC voltage at terminal ② of IC101. (0.6V)

NO → 1. S301, Q309, D309 2. IC301 3. IC201 4. IC101

YES ↓

Drive coil and Hall element

1. Conduction check of drive coils. (About 33Ω)
2. DC voltage of Hall elements.

	①	②	③	④
Voltage	3.8	7.6	3.8	0

NO → 1. Drive coil 2. H101, H02, IC101

YES ↓

Drive circuit (Stop)

1. DC voltage at each terminal of IC101

	②	③	④~⑩	⑪
Voltage	0	12	0	6

NO → IC101

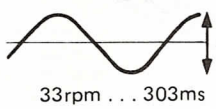
YES ↓

Drive circuit (Rotation)

1. DC voltage at each terminal of IC101.

	②	⑨	⑩	⑪
Voltage	0.8	4.9	4.9	4.7

2. Waveform between terminal ④ and ⑤ (⑥and⑦) of IC101.



NO → IC101

Arm motor does not rotate

1. Measurement of tonearm drive rope.
2. Measurement of tonearm drive belt.

YES ↓

Arm motor control circuit

1. DC voltage at each terminal of IC301.

	⑮	⑯	⑰	⑱
Stop	5	5	0.7	0.7
Lead-in	0	5	0	0.7
Return	5	0	0.7	0

2. DC voltage at each terminal of IC401.

	①	②	③
Stop · Lead-in	1.2	3.7	3.6
Return	11	2	3.6

3. DC voltage at each terminal of IC401.

	⑤	⑥	⑦
Stop · Return	3.6	3.7	1.2
Lead-in	3.6	2	11

4. DC voltage of Q401 ~ Q404.

	Q401		Q403	
	Ⓑ	Ⓔ	Ⓑ	Ⓒ
Stop	0.4	0	0.7	0
Return	8.5	8.2	0	8.2

	Q402		Q404	
	Ⓑ	Ⓔ	Ⓑ	Ⓒ
Stop	0.4	0	0.7	0
Return	8.5	8.2	0	8.2

Lead-in return defective with 17cm record

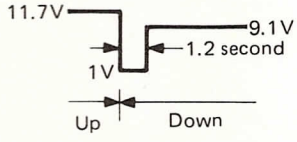
Arm position detection circuit

1. DC voltage of Hall IC (IC2) ①12V, ②0V, ③4.5V
2. Clearance between Hall IC and magnet.
3. Waveform of IC2 terminal ③ during arm motor rotation.

Cueing down/up does not work

Cueing control circuit

1. DC voltage of IC301 terminal ②. (During cueing and down 0.8V.)
2. DC voltage of IC301 terminal ③. (Only during cueing down 1.6V.)
3. DC voltage of Q304 Ⓒ



f tonearm drive rope.
f tonearm drive belt.
NO → Rope and belt dislocation

(I

● R

1. C trol circuit
c each terminal of

2. T
in

⑯	⑰	⑱
5	0.7	0.7
5	0	0.7
0	0.7	0

th

each terminal of

D

①	②	③
1.2	3.7	3.6
11	2	3.6

c

● R

1. Pl

each terminal of

T

⑤	⑥	⑦
3.6	3.7	1.2
3.6	2	11

sh

NO →
1. IC301
2. IC401
3. IC401
4. Q401~404
RF1

Note

1. If
wi
Ch
bo

Q401 ~ Q404.

01	Q403	
Ⓔ	Ⓑ	Ⓒ
0	0.7	0
8.2	0	8.2

02	Q404	
Ⓔ	Ⓑ	Ⓒ
0	0.7	0
8.2	0	8.2

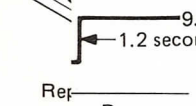
■

1. H detection circuit
(F f Hall IC (IC2)
① R 0V, ③ 4.5V
② R tween Hall IC and
co f IC2 terminal ③
to notor rotation.
③ Pu
④ Fi
on
⑤ Pu
cir

NO →
1. IC2
2. Adjustment
(See Fig. 14)
3. IC2, 301

circuit

IC301 terminal ②.
g and down 0.8V.)
IC301 terminal ③.
cueing down 1.6V.)
Q304 Ⓒ

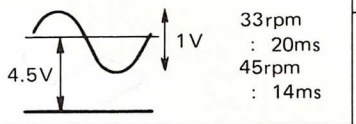


Re
Down

NO →
1. IC301
2. Q303, 304
Plunger

Unstable rotation

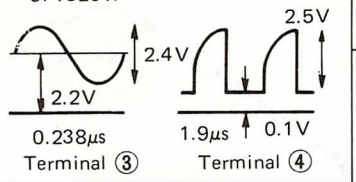
FG amplifier circuit
1. Conduction check of FG coil.
2. Waveform of terminal ⑮ of IC201.



NO →
FG coil
IC201
R203, 205
C201~203

YES

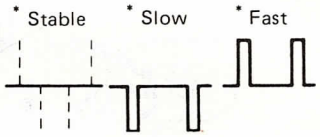
Quartz oscillator circuit
1. Waveform of terminals ③ and ④ of IC201.



NO →
X201
IC201
C204~205

YES

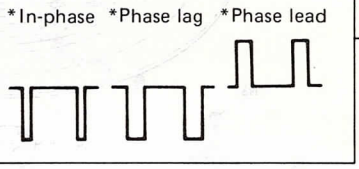
Speed control circuit
1. Waveform of terminal ⑭ of IC201.



NO →
IC201
IC101

YES

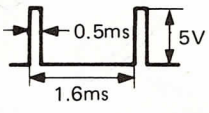
Phase control circuit
1. Waveform of terminal ⑬ of IC201.



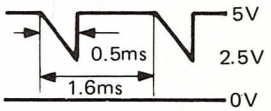
IC201
IC101

Offset angle does not detection

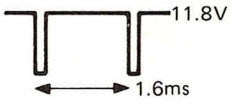
Offset error angle detection circuit
1. Waveform of terminal ⑥ of IC301. (During cueing down)



2. DC voltage of Q305 Ⓑ . . . (1.8V)
3. Waveform of Q305 Ⓒ.



4. Waveform of terminal ⑧ of IC401.



NO →
1.IC301
2.Q305, PC501
3.Q305, 306
C302
4.IC401

■ EXPLODED VIEW