ORDER NO. HAD85052536C0
A2

Service Manual

Turntable System

QUARTZ Direct Drive Automatic Turntable System

SL-MA1

Areas	
[M]	U.S.A.
[MC]	Canada.
[E]	Switzerland and Scandinavia.
[EK]	United Kingdom.
[XL]	Australia.
[EG]	F.R. Germany.
[EB]	Belgium.
[EH]	Holland.
[EF]	France.
[Ei]	Italy.
[EC]	Czechoslovakia.
[XA]	Southeast Asia, Oceania, Afirca, Middle Near East and Central South America.
[XM]	Central South America.
[XZ]	New Zealand.

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.

SPECIFICATIONS

■ Turntable section

Type: Quartz direct drive Automatic turntable

Features: Auto start/Auto lead-in
Optical auto size select
Optical auto speed select
Auto return/Auto stop
Repeat play
2-speed search play

Drive method: Direct drive

Motor: Brushless DC motor

Drive control method: Quartz-phase-locked control

Turntable platter: Aluminum die-cast
Diameter 32.5 cm (12-13/16")

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)
± 0.031% peak (IEC 98A Weighted)

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

Rumble: –70 dB (IEC 98A Unweighted)
–81 dB (IEC 98A Weighted)

■ Tonearm section

Type: Static balanced type
Straight pipe tonearm
4-pivot gimbal suspension
T4P type

Features: Electronically controlled
Auto lead-in/Auto return

Effective length: 23 cm

Tracking error angle: Within 2°32′ at the outer groove of 30 cm (12") record
Within 0°32′ at the inner groove of 30 cm (12") record

Effective mass: 9 g (including cartridge)

Resonance frequency: 10 Hz

Tonearm drive motor: Brushless DC motor

Phono cable capacitance: 100 pF

■ Cartridge section (Except for U.S.A. and Canada)

Model No.: EPC–P33

Type: Moving magnet stereo cartridge

Magnetic circuit: All laminated core

Frequency response: 10 Hz ~ 50 kHz
20 Hz ~ 10 kHz ± 1 dB

Output voltage: 2.5 mV at 1 kHz, 5 cm/s. Zero to peak lateral velocity
(7 mV at 1 kHz, 10 cm/s. Zero to peak 45° velocity [DIN 45 500])

Channel separation: 22 dB at 1 kHz

Channel balance: Within 1.8 dB at 1 kHz

Recommended load impedance: 47 kΩ ~ 100 kΩ

Compliance (dynamic): 12×10^{-6} cm/dyne at 100 Hz

Stylus pressure range: 1.25 ± 0.25 g (12.5 ± 2.5 mN)

Weight: 6 g (cartridge only)

Replacement stylus: EPS–33ES (elliptical)

Technics

Matsushita Engineering and Service Company
50 Meadowland Parkway,
Secaucus. New Jersey 07094

Panasonic Hawaii Inc.
91-238 Kauhi St. Ewa Beach
P.O. Box 774
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Ave, 65 De Infanteria, KM 9.7
Victoria Industrial Park
Carolina, Puerto Rico 00630

Matsushita Electric of Canada Limited
5770 Ambler Drive, Mississauga,
Ontario, L4W 2T3

SL-MA1

■ General

Power supply: For U.S.A. and Canaca
AC 120V, 60 Hz
For other countries
~110-127/220-240V, 50 or 60 Hz

Power consumption: For U.S.A. Canada 15W/2W
with the power switch OFF.
For other countries 18W/2W
with the power switch OFF.

Dimensions:
(W x H x D) 45.3 x 17 x 40.8 cm
(17-27/32" x 6-11/16" x 16-1/16")
Maximum height when dust cover is open
45.3 x 52 x 60 cm
(17-27/32" x 20-15/32" x 23-5/8")

Weight: 9 kg (19.8 lb.)

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

■ CONTENTS

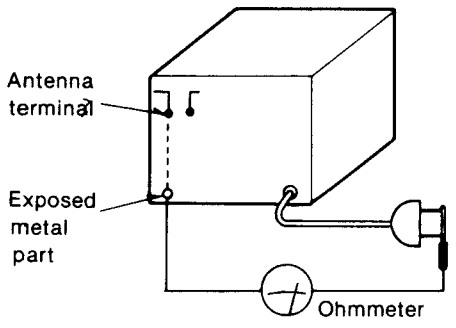
■ SAFETY PRECAUTION (This "safety precuation" is applied only in U.S.A.)

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

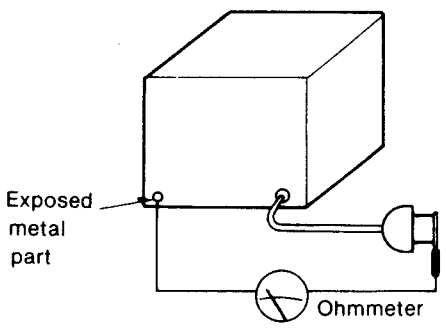
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with 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

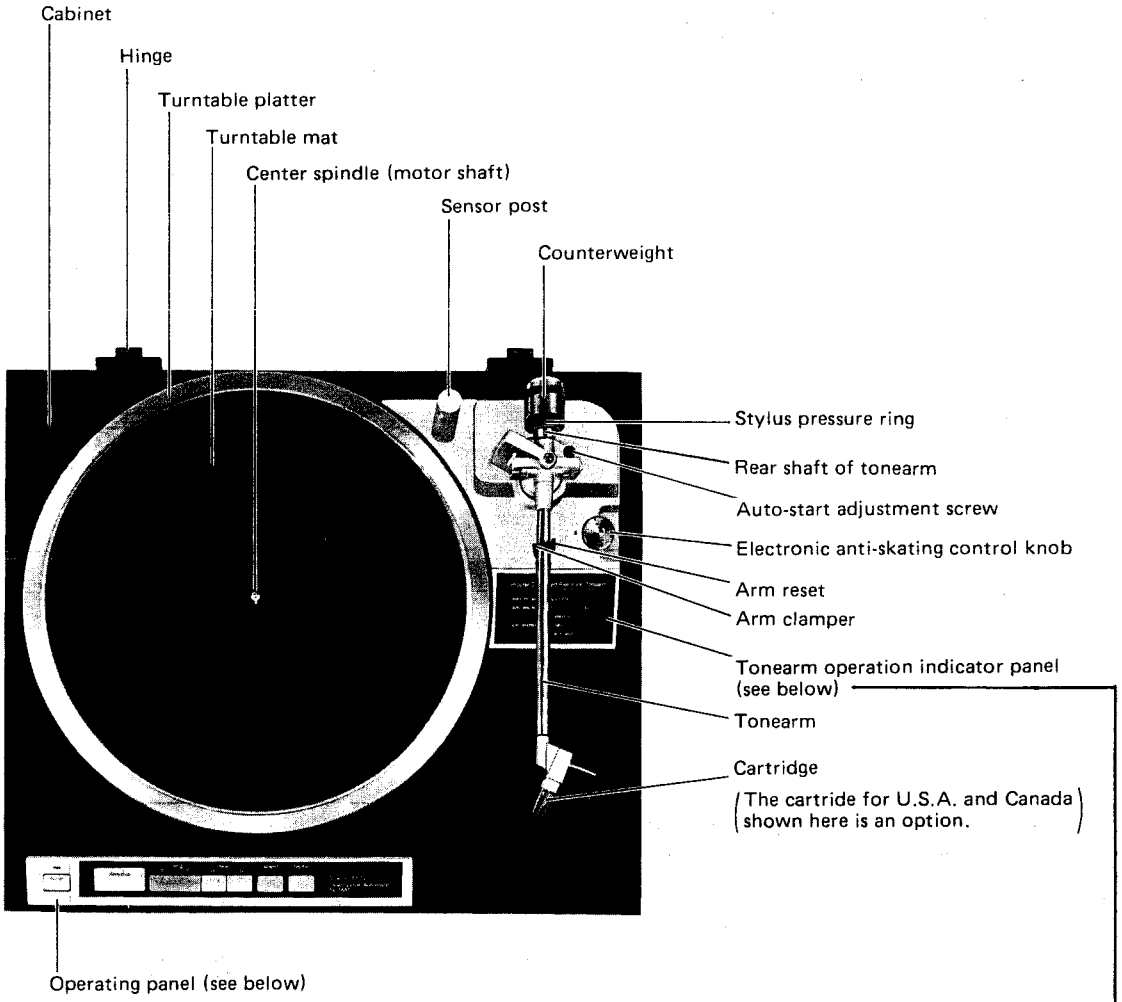


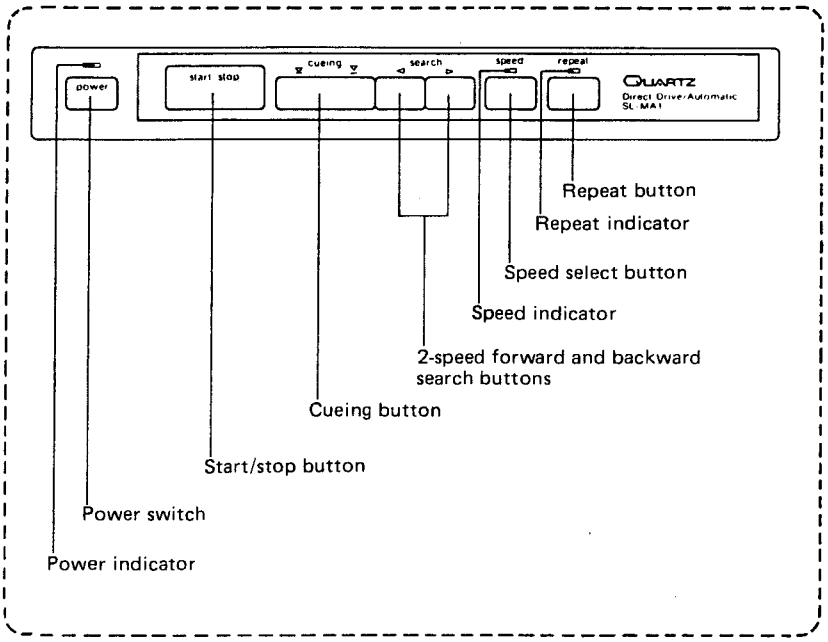
(Fig. B)

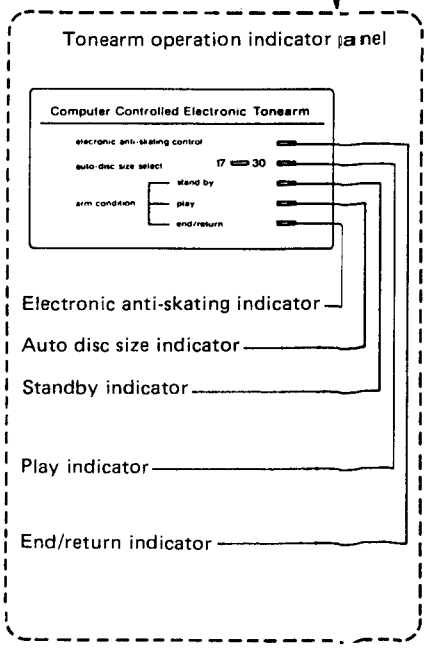
Resistance = Approx ∞

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



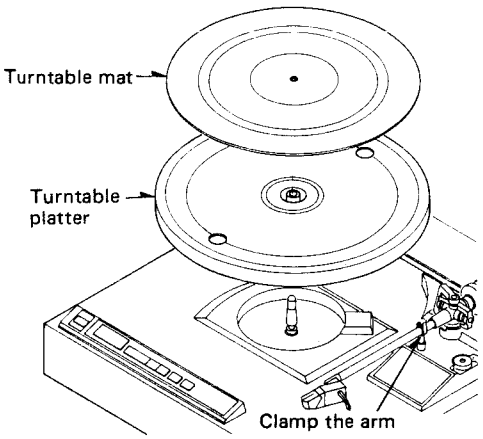




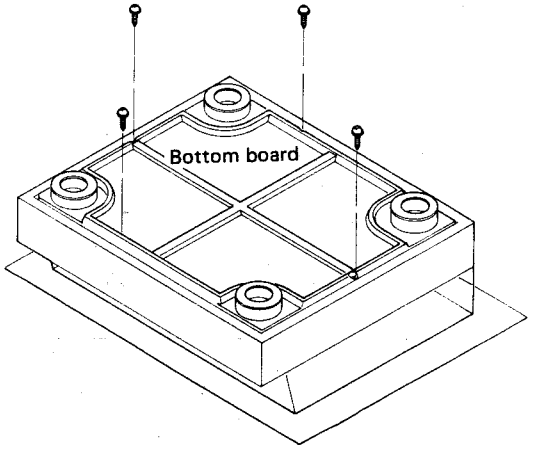
■ DISASSEMBLY INSTRUCTIONS

*** Be sure to remove the cartridge beforehand in order to prevent the stylus from geing damaged.**

Ref. No. 1	How to remote the turntable platter
Procedure 1	1. Secure tonearm with arm clamp. 2. Remove the turntable mat and lift the turntable platter.

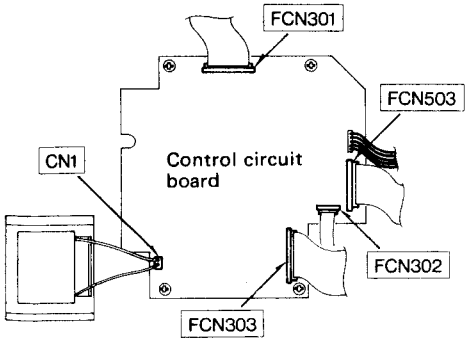


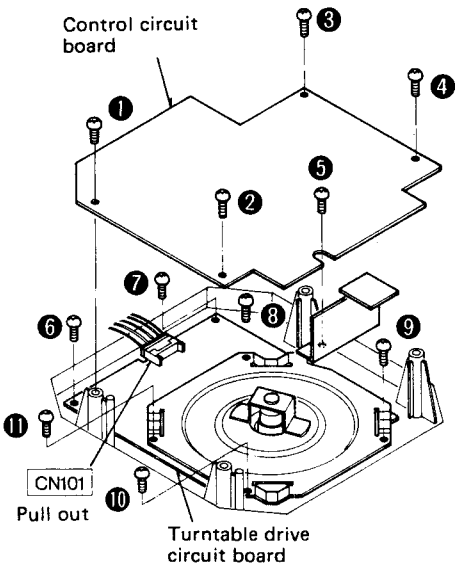
Ref. No. 2	How to remove the bottom board
Procedure 1 ➡ 2	1. Turn over the unit. 2. Remove the 4 setscrews.



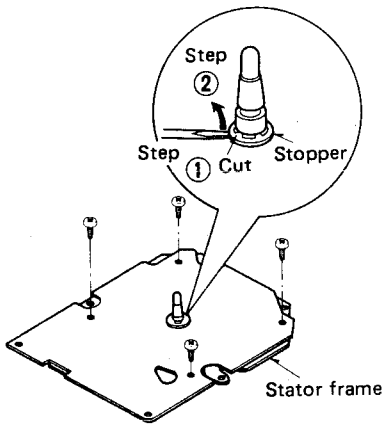
Ref. No. 3	How to remove the control circuit board and turntable drive circuit board
Procedure 1 ➡ 2 ➡ 3	1. Remove the 5 lead connectors. (CN1, FCN301 ~ FCN303, FCN503) 2. Remove the 5 setscrews (❶ ~ ❺) and pull out the connector CN101. 3. Remove the 6 setscrews (❻ ~ ⓫).

Note: Connector terminal ① is on the white line side of flat cable.

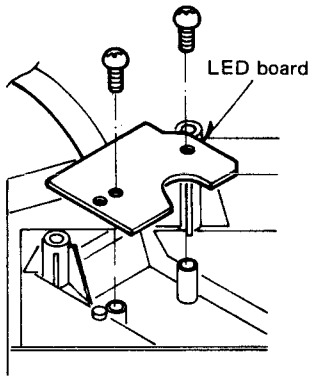




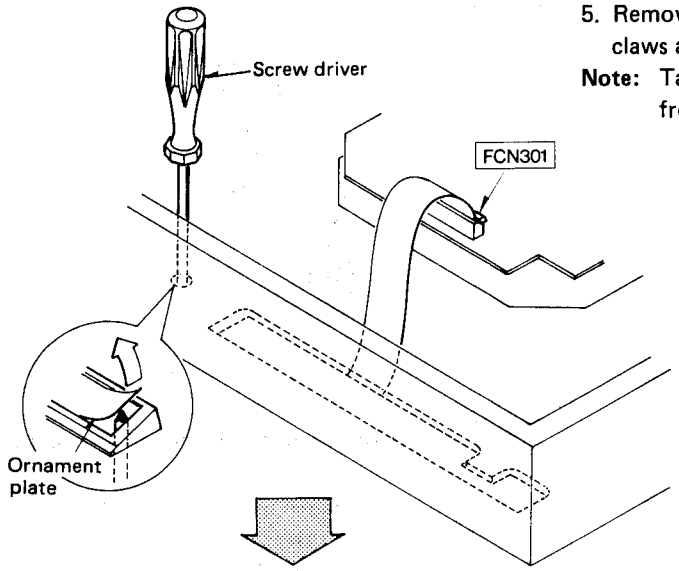
Ref. No. 4	How to remove the stator frame
Procedure 1➡2➡3➡4	1. Remove the 4 setscrews. 2. Cut off the stopper with nippers.

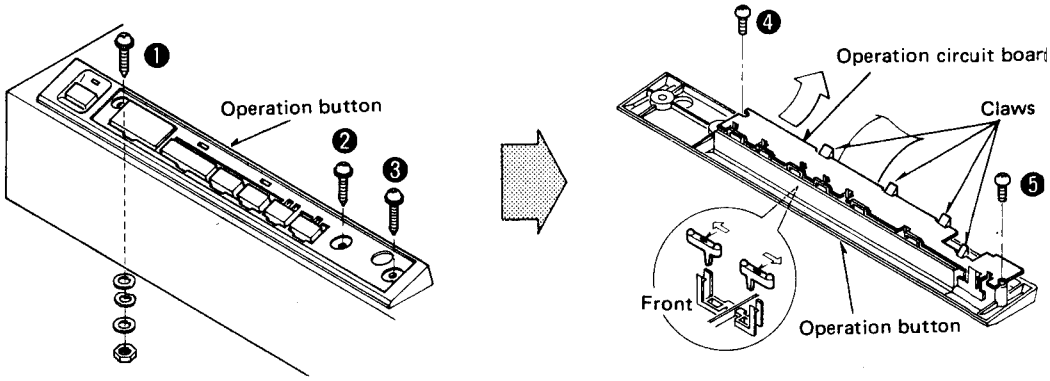


Ref. No. 5	How to remove the LED board
Procedure 1➡2➡3➡5	• Remove 2 setscrews.

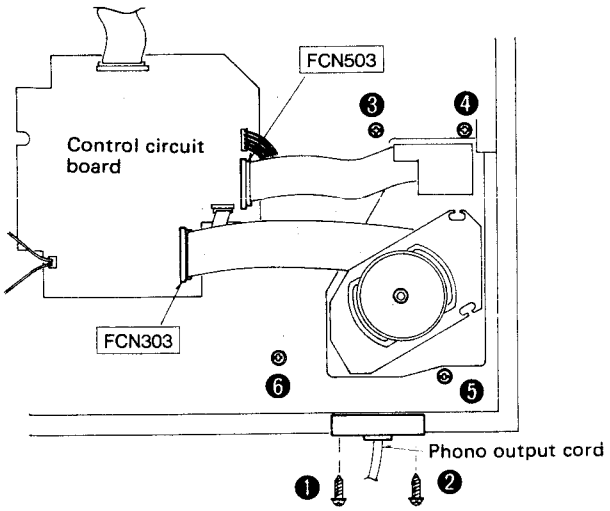


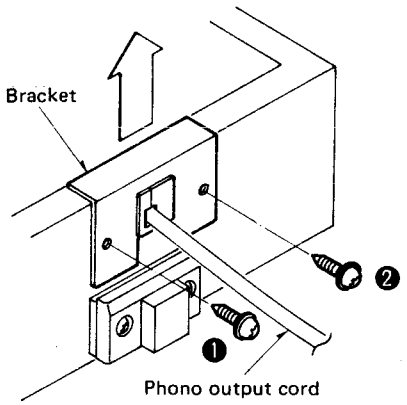
Ref. No. 6	How to remove the operation button and operation circuit board.
Procedure 1➡2➡6	1. Remove the lead connector FCN301. 2. Remove the ornament plate by pushing it with screw driver or the like through the hole in the cabinet. 3. Remove the 3 setscrews (❶~❸). 4. Remove the 2 setscrews (❹,❺). 5. Remove the operation circuit board, unfastening the claws at 4 portions. **Note:** Take care not to damage the claws projected from the operation button.



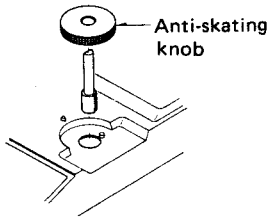


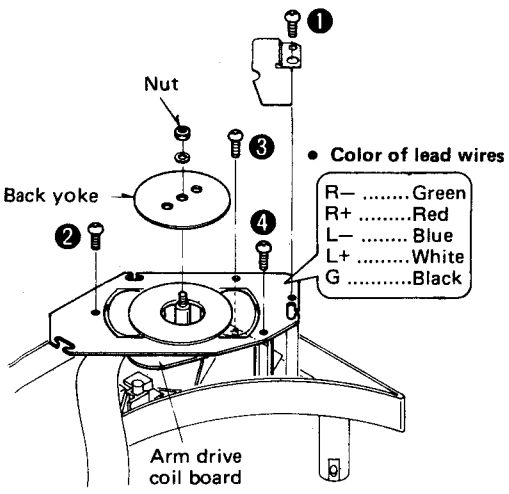
Ref. No. 7	How to remove the arm base
Procedure 1 ➡ 2 ➡ 7	1. Remove the 2 lead connectors (FCN303, 503). 2. Remove the 2 setscrews (❶, ❷) and remove phono output cord from bracket. 3. Remove the 4 setscrews (❸ ~ ❻).



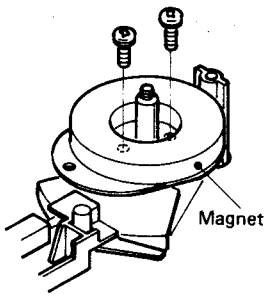


Ref. No. 8	How to remove the ard drive coil board
Procedure 7 ➡ 8	1. Remove the anti-skating knob. 2. Remove the setscrew (❶). 3. Unsolder the 5 lead wires. 4. Remove the nut. 5. Remove the 3 setscrews (❷ ~ ❹). **Note:** Take care not to break the coil.

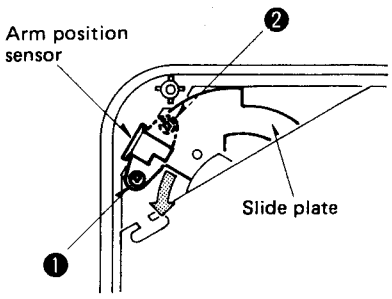




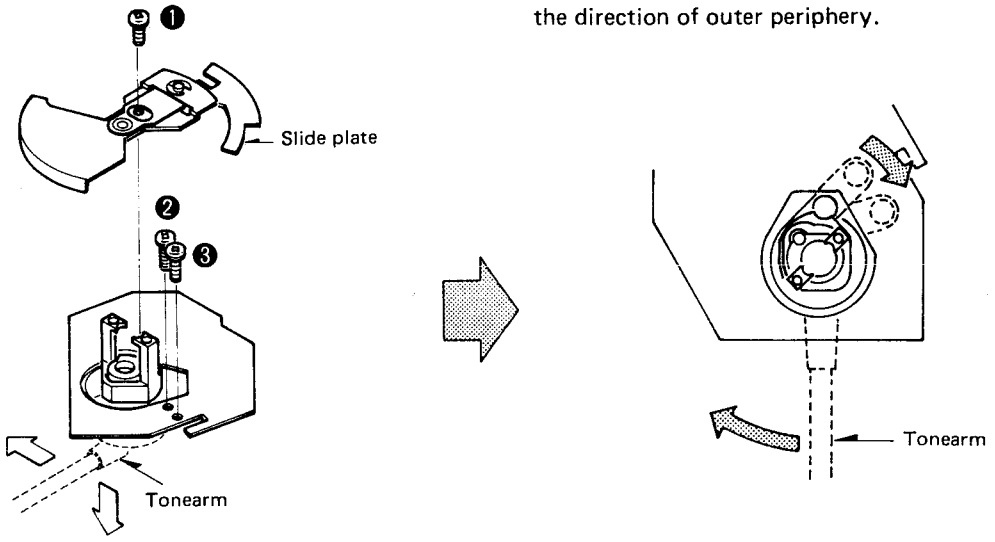
Ref. No. 9	How to remove the magnet
Procedure 7 ➡ 8 ➡ 9	• Remove the 2 setscrews.



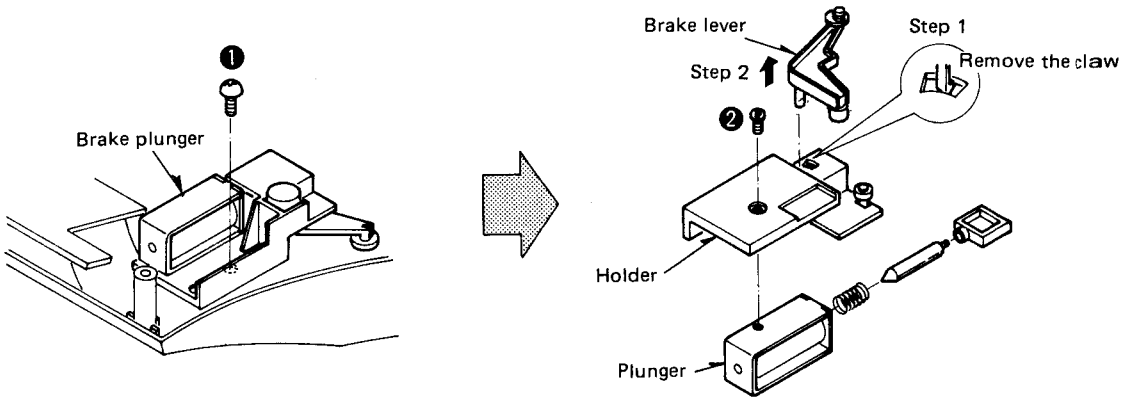
Ref. No. 10	How to remove the arm position sensor
Procedure 7 ➡ 10	1. Remove the setscrew (❶). 2. Shift the tonearm inside and remove the screw ❷.



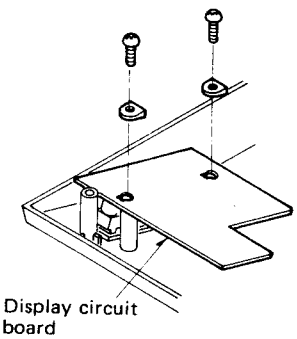
Ref. No. 11	How to remove the tonearm
Procedure 7➡8➡9 ➡10➡11	1. Remove the setscrew (❶). 2. Remove the 2 setscrews (❷, ❸). 3. Shifting the tonearm down, remove it by turning in the direction of outer periphery.



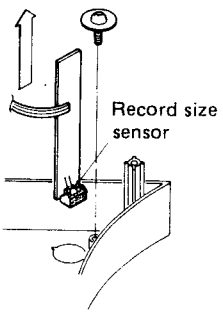
Ref. No. 12	How to remove the brake plunger
Procedure 7➡12	1. Remove the setscrew (❶). 2. Remove the setscrew (❷).



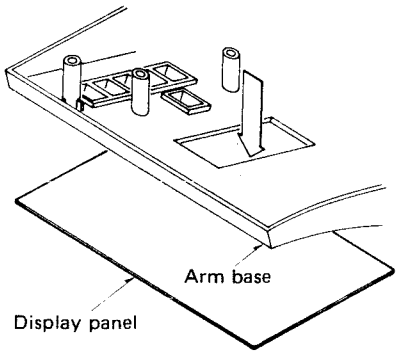
Ref. No. 13	How to remove the display circuit board
Procedure 7➡13	• Remove the 2 setscrews.

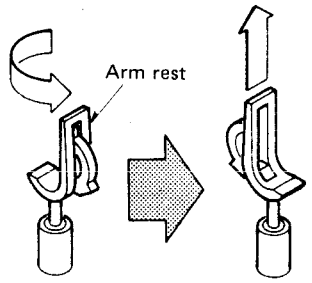


Ref. No. 14	How to remove the record size detection sensor
Procedure 7➡14	• Remove the setscrew.



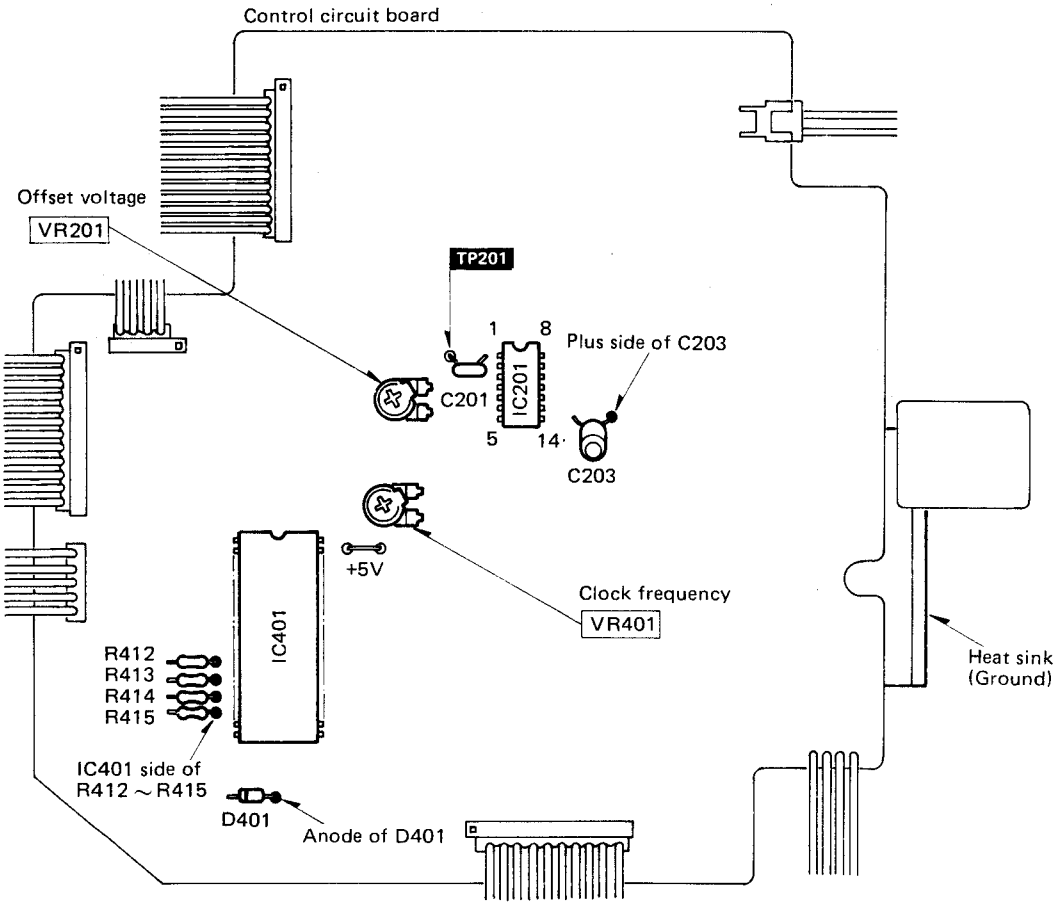
Ref. No. 15	How to remove the display panel	Ref. No. 16	How to remove the arm rest
Procedure 7➡13➡15	• Remove the panel by pushing the arrow-marked part.	Procedure 16	• Turn the arm rest 180° counterclockwise and pull it out.





■ MEASUREMENTS AND ADJUSTMENT

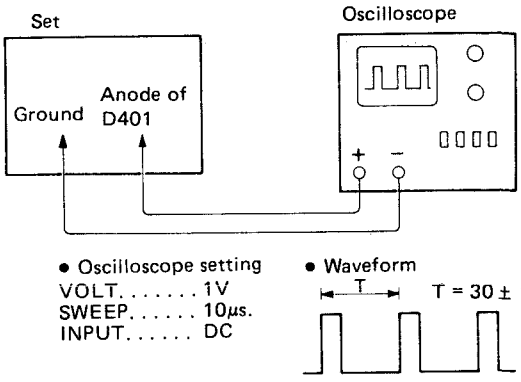
Adjustment Points



Adjustment Procedure

Adjustment of clock frequency

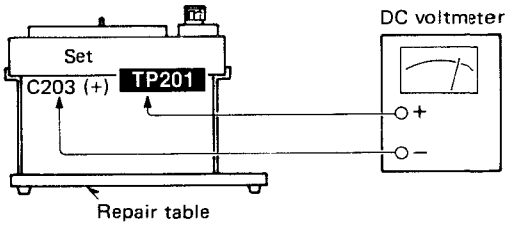
1. Short-circuit the IC401 side of R412 ~ R415 and connect it to the jumper (+5V) near IC401 pin 40 (or short circuit IC401 pins 14 ~ 17, and connect it to pin 39).
2. Connect the oscilloscope to the anode side of D401 (or IC401 pin 4).
3. Turn the power switch on.
4. Adjust VR401 so that the period of waveform is 30 ± 1μsec.



Adjustment of offset voltage

1. Connect the DC voltmeter or oscilloscope to TP201 and the plus (+) side of C203 (or connect it to IC301 pins 1 and 8).
2. Turn the power switch on.
3. Adjust VR201 so that DC voltage is 0 ± 20 mV.
   If the voltage fluctuates, adjust it to minimize the fluctuation.

Note: Put the set on a horizontal table and clamp the arm when making the adjustment.



Adjustment of arm lift height

The arm-lift height (distance between the stylus tip and the record surface when the tonearm is at the " ▼ " position) has been adjusted at the factory to approximately 5 to 7 mm (3/16" ~ 9/32").

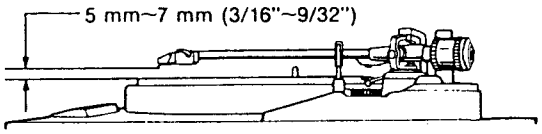
If the clearance is too narrow or too wide, turn the adjustment screw clockwise or counterclockwise.

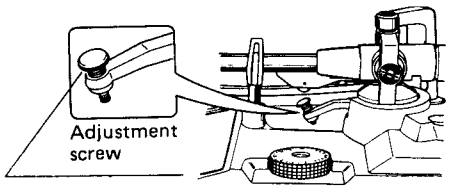
Clockwise rotation

—distance between the record and stylus tip is decreased.

Counterclockwise rotation

—distance between the record and stylus tip is increased.





Adjustment of auto start position

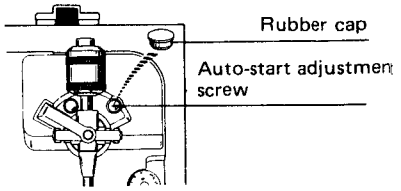
If the stylus does not land in the lead-in groove, adjust as follows.

1. Clamp the tonearm to the arm rest.
2. Remove the rubber cap.
3. Turn the auto-start adjustment screw with a screwdriver, clockwise or counterclockwise as necessary.

If the stylus tip sets down too far in the recorded groove,
—turn counterclockwise.

If the stylus tip sets down outside of the record,
—turn clockwise.

Adjust so the stylus tip lands 1 ~ 2 mm in from the edge of the record.



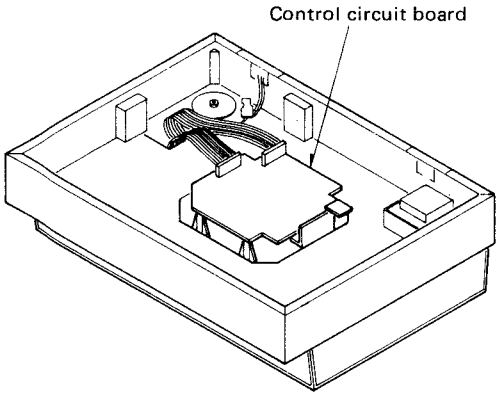
■ HOW TO CHECK EACH CIRCUIT

• Control circuit

Ref. No. 1	Check of stop mode

Procedure 1

1. Clamp the tonearm and remove the turntable platter.
2. Remove the bottom plate.
3. Turn the power switch on.



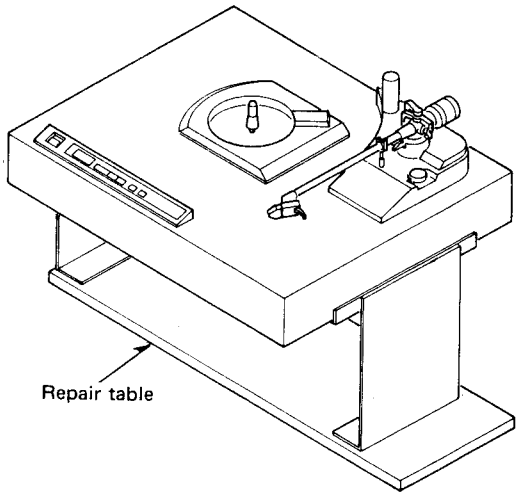
Ref. No. 2	Check of arm drive

Procedure 1 ➡ 2

1. Put the set on the repair table.
2. Fit the stylus cover to the cartridge.
3. Unclamp the tonearm.
4. Turn the power switch on, then press the search key and cueing key.

Note: In this condition, the start stop key does not work.

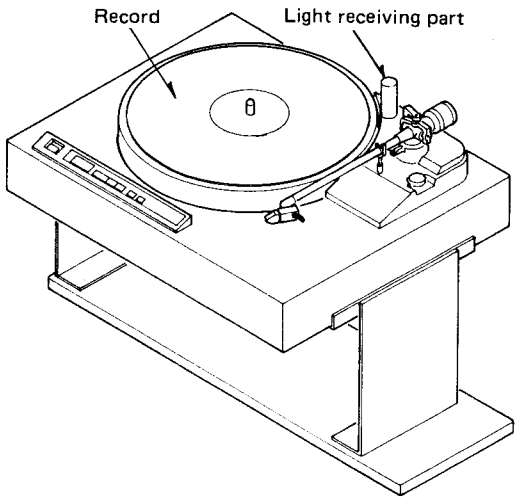
5. Connect the tester from underneath the set, and check.



Ref. No. 3	Check of auto start/return

Procedure 1 ➡ 2 ➡ 3

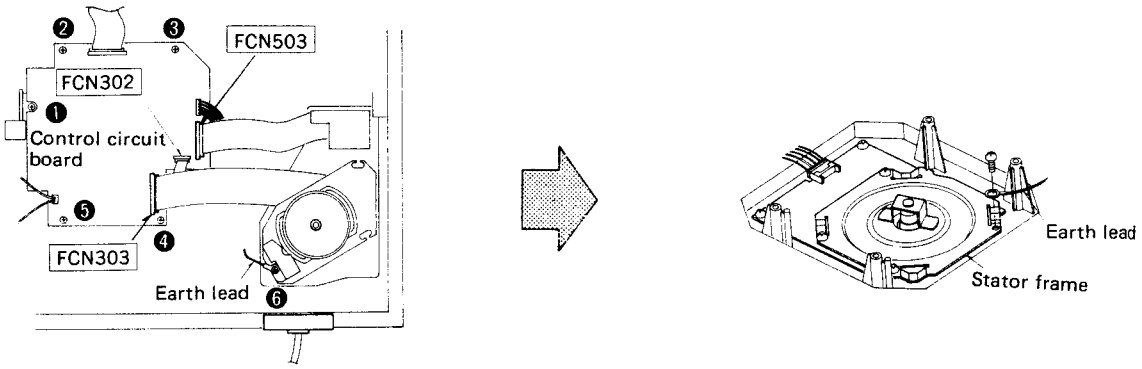
1. Fit the turntable platter in place.
2. Put a 30 cm or 17 cm record on the turntable platter.
3. Remove the stylus cover.
4. Turn the power switch on and press the start key.
5. Connect the tester from underneath the set, and check.
   * If no record is available, shift the turntable platter sheet from the hole provided for the sensor to cover it or cover the light receiving port of the sensor located beside the tonearm with a black tape. This procedure will substitute for a 30 cm record.



• Turntable drive circuit

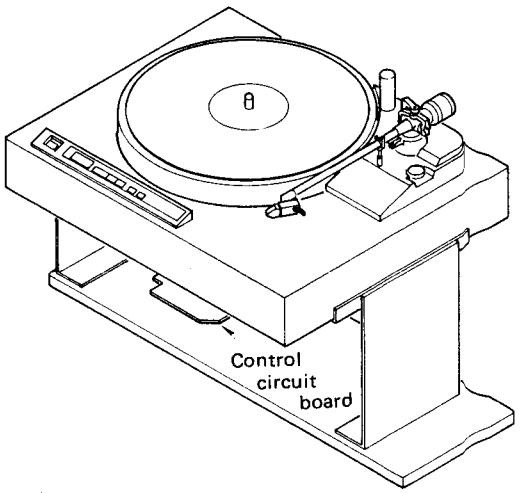
Ref. No. 4	Check of stop mode
Procedure 1 ➡ 4	

1. Remove the connectors FCN302, FCN303 and FCN503 of control circuit.
2. Remove the control circuit board setscrews ❶ ~ ❺ and earth lead setscrews ❻.
3. Connect the earth lead to the stator frame.
4. Turn the power switch on with care not to short-circuit the control circuit board.



Ref. No. 5	Check of rotation mode
Procedure 1 ➡ 4 ➡ 5	

1. Put the set on the repair table.
2. Fit the turntable platter in place.
3. Turn the power switch on with care not to short-circuit the control circuit board.
4. Press the start key.
5. Connect the tester from underneath the set, and check.
   * The indication is incorrect because the detection input connector of microcomputer is disconnected. Also, the power indicator keeps lighting when power switch is pressed again, and then the start key does not work. In that case, pull out the power cord plug and turn the power switch on again.



• Arm drive coil circuit

Ref. No. 6	Check of drive coil conduction
Procedure 1 ➡ 6	

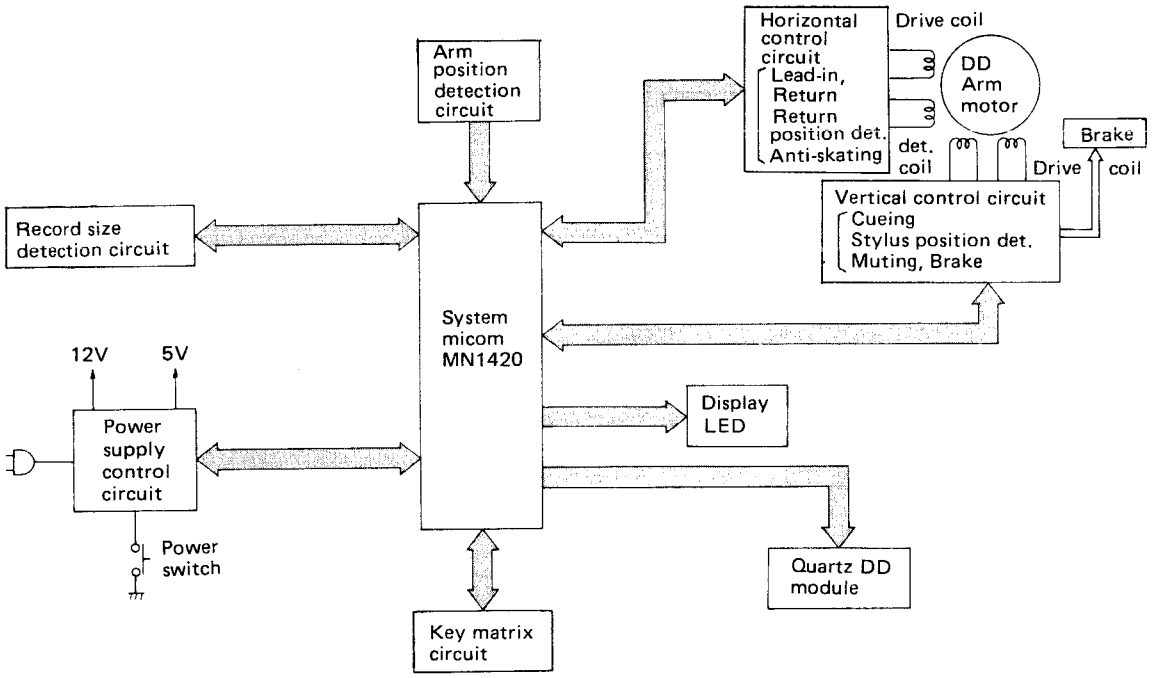
1. Turn the power switch off.
2. Remove the lead connector of FCN303.
3. Check the terminal resistance of drive coil P.C.B. FC303.

• **FC303 (Arm drive circuit board)**

Terminals	Resistance
④ – ⑤	163 ± 5Ω
⑥ – ⑦	113 ± 5Ω
⑧ – ⑨	163 ± 5Ω
⑩ – ⑪	327 ± 7Ω

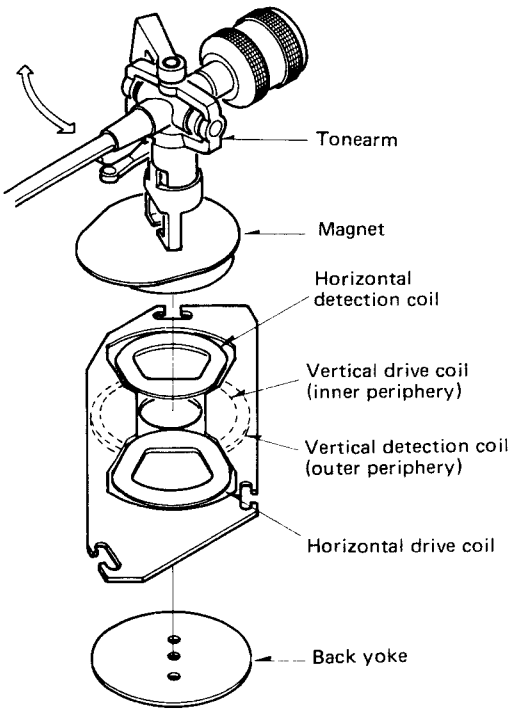
■ TECHNICAL GUIDE

This unit is equipped with an electronic drive arm employing unique DD arm drive motor mechanism in which the newly developed vertical and horizontal drive motors are unistructurally included. It ensures smoother operation without applying load to the arm and cartridge during auto lead-in or auto return as compared with a mechanism type.
Also, infrared detection system is employed for the detection of record and size, and while non-contact type auto mechanism utilizing magnetic characteristics, for the detection of record ends.

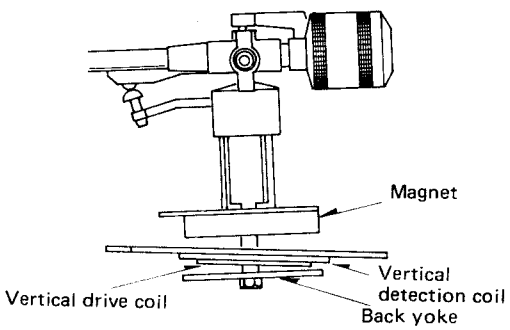


System Block Diagram

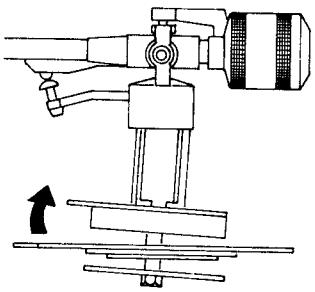
- **Schematic diagram of electronic drive arm**



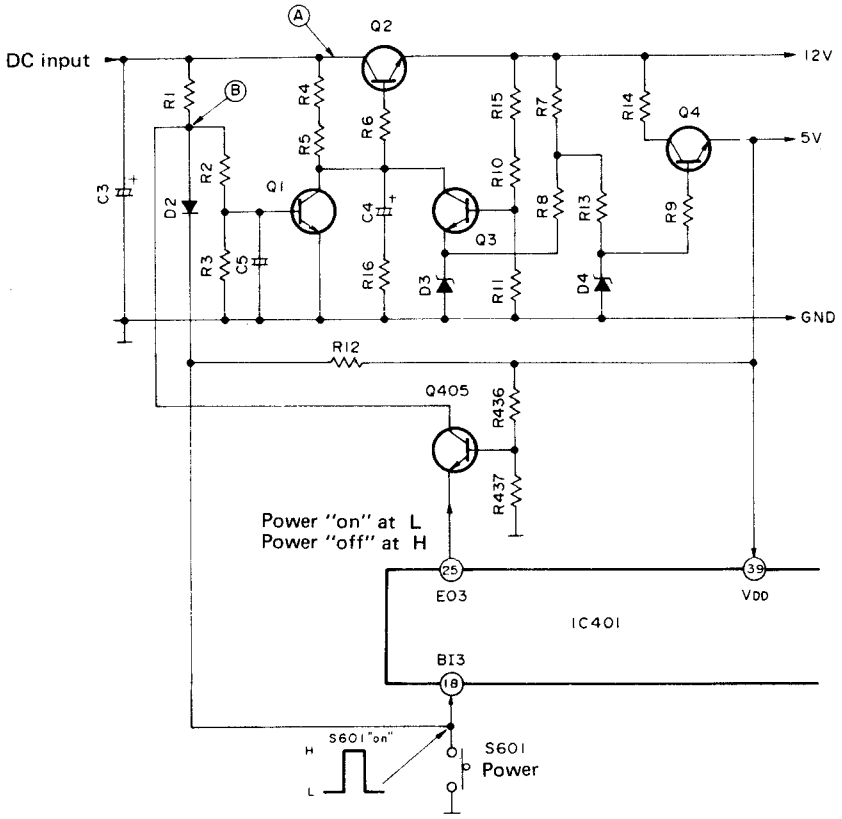
*** Cueing down**



*** Cueing up**



1. Power supply control circuit



With the AC cord connected to a power outlet socket, a voltage is generated at point Ⓐ, and then over 0.6V is applied to the base of Q1 to turn it on. As Q1 is turned on, the base of Q1 is nearly at ground potential causing Q2 to turn off and then no output voltage is generated. (Initial condition)

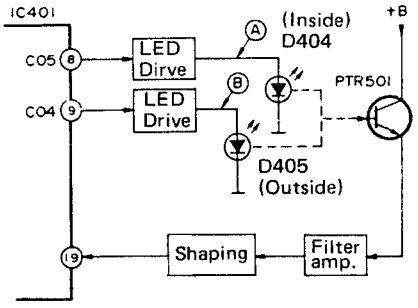
When S601 (power switch) is turned on, the voltage at point Ⓑ is clamped at about 0.6V, and the base voltage of Q1 becomes lower than 0.6V, then Q1 turns off. As Q1 is off, the base voltage is applied to Q2 to turn it on. Thus, Q3 and Q4 are operated to supply power of 12V and 5V.
The 5V power supply causes the microcomputer to operate, then the level of terminal ㉕ becomes becomes "L" and the voltage at point Ⓑ is lowered to the ground potential through Q405, thereby holding Q1 in an "off" state.

With S601 (power switch) again turned on, the pulse rising at the moment when the switch is released is input to terminal ⑱ of the microcomputer, then the level of terminal ㉕ becomes "H", Q405 turns off, the potential at point Ⓑ becomes higher, Q1 turns on, and delivery of output voltage is discontinued.

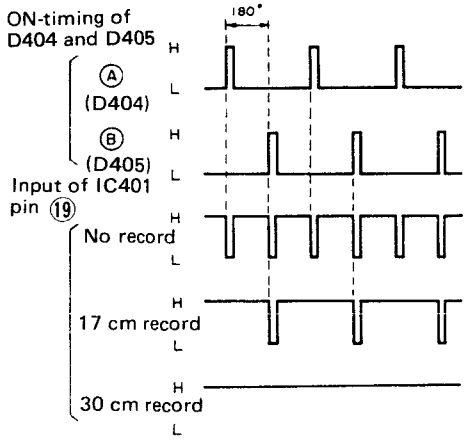
Note: Terminal ㉕ of microcomputer is provided with a safety function to shift the arm back to the rest and to make the level "H" after cueing down for the protection of stylus tip when the arm is not on the rest.

2. Auto size detection circuit

The 2 LED's light up with 180° phase shifted pulses of pin ⑧ and pin ⑨ of microcomputer (IC401) and are fitted on the inner and outer periphery sides of turntable platter. On the inner periphery side, the light is received through prism, and on the outer periphery side, directly by photo transistor (PTR501).
The light received is input to pin ⑲ through the filter amplifier and wave shaping circuit.



The LED ON-timing and input pulse of pin ⑲ are shown below.



No record is present. . . . . .The light of 2 LED's is input.

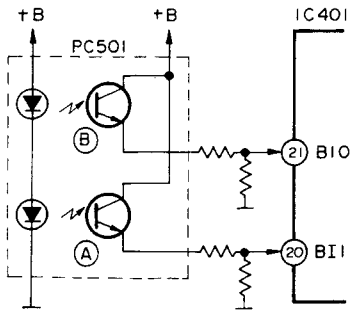
17 cm record is present. . . . . .The light of only outer periphery LED (D405) is input.

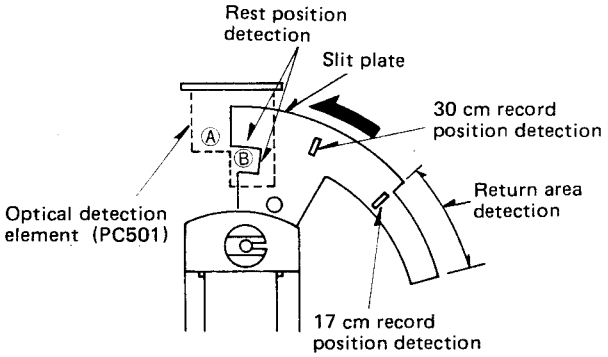
30 cm record is present. . . . . .No light of LED is input.

The microcomputer detects the sizes of record by the operations mentioned above.

3. Arm position detection circuit

The rest position, 30 cm record, 17 cm record lead-in position and return area are detected by the slit plate and optical detection element located under the tonearm, and the input is entered into the microcomputer.



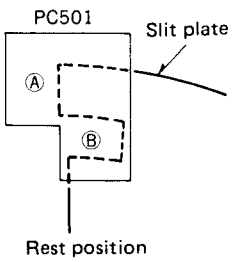


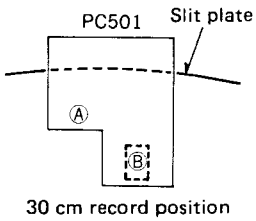
The optical detection element (PC501) is equipped with 2 detection elements Ⓐ and Ⓑ.

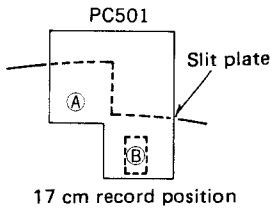
When the tonearm is on the rest, the slit plate is in the position as shown on the right, then both detection elements Ⓐ and Ⓑ are "on", and microcomputer pins ⑳ and ㉑ are at "H".

At the outer periphery (lead-in position) of 30 cm record, the slit plate is in the position as shown on the right, the detection element Ⓐ is "off" and Ⓑ is "on", then microcomputer pin ⑳ goes "L" and pin ㉑, "H".

Also, for the outer periphery position of 17 cm record, the states are the same as above.

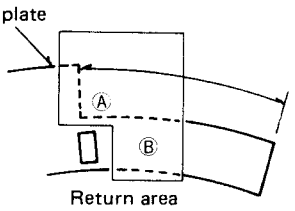






In the range of tonearm return, the slit plate is in the position shown on the right, the detection element Ⓐ is "on" and Ⓑ is "off", then microcomputer pin ⑳ goes "H" and pin ㉑, "L".

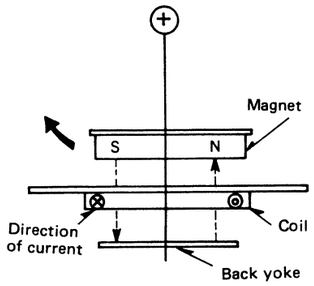
In the other modes (lead-in, return operation, play modes), both deteciton elements Ⓐ and Ⓑ are "off", then microcomputer pins ⑳ and ㉑ are at "L".

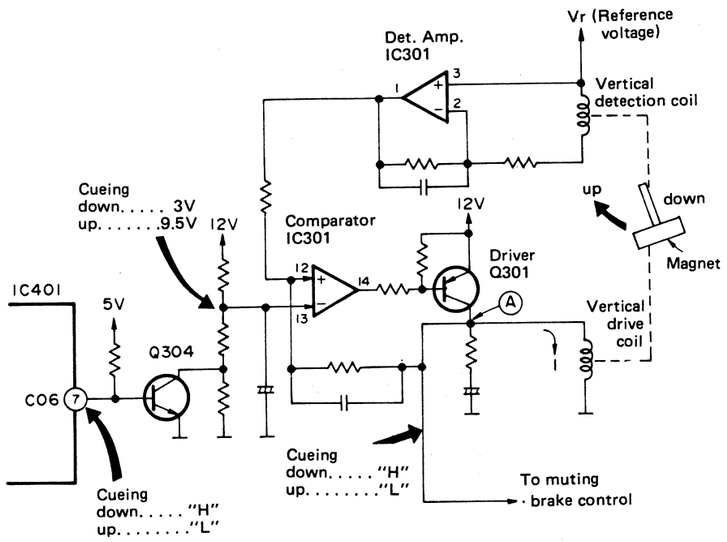


4. Vertical control circuit

< Operating principle >

When a magnetic field is created by a disk magnet of arm drive DD motor, thereby letting a current flow in the coil wound in a circular from, then vertical forces are generated in either direction (Fleming's left-hand rule). Since the coil is secured on the main body, the magnet rotates on the fulcrum in the direction of the arrow due to the reaction. The rotation is utilized for cueing operation.





< Vertical drive circuit >

During cueing-up, microcomputer (IC401) pin ⑦ goes "L" and Q304 turns "off", then the potential of comparator (IC301) pin ⑬ rises to become ⊖ > ⊕ and the output of pin ⑭ becomes "–". As pin ⑭ is "–", Q301 turns "on" to apply voltage to the drive coil.

When voltage is applied to the drive coil, the magnet begins rotating (vertically) causing voltage to be generated in the detection coil. The voltage is input to comparator pin ⑫ through the amplifier thereby applying vertical drive servo.

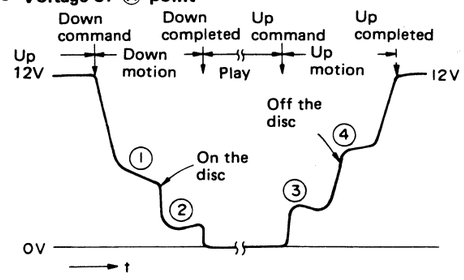
During cueing-down, microcomputer (IC401) pin ⑦ goes "H" and Q304 turns "on", then the potential of comparator (IC301) pin ⑬ lowers to becomes ⊕ > ⊖ and the output of pin ⑭ becomes "+". As pin ⑭ is "+", Q301 turns "off" for a moment, causing the voltage of drive coil to drop abruptly.

When the voltage of drive coil is decreased, the magnet begings to rotate downward, but is slolwy returns with servo applied due to the voltage generated in the detection coil.

< Stylus position detection >

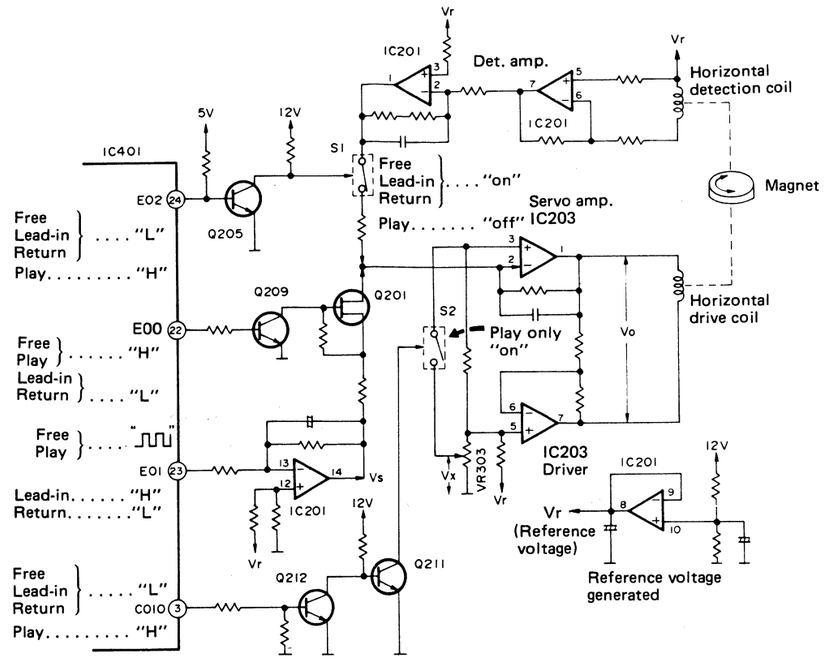
Since the cueing speed is controlled as mentioned above, the voltage applied to the drive coil changes as illustrated on the right according to the load in cueing mode. The position of the stylus on or off the disc is detected by the voltage for the operation of brake (to prevent the stylus from dropping aslant) and muting.

- **Voltage of Ⓐ point**



① and ④ ..... stylus pressure and magnet loads.
② and ③ ..... only magnet load.

5. Horizontal control circuit



< Horizontal drive circuit >

In free mode (with arm on rest), microcomputer (IC401) pin ㉒ is "H", pin ㉓ "pulse output", pin ㉔ "L", then Q209 turns "on", Q201 "off", Q205 "off", and analog switch (S1) is "on". (IC401 pin ③ goes "H" only in play mode, and analog switch S2 is "off".) In this case, the voltage Vo across the horizontal drive coil is "0".

During lead-in mode, microcomputer (IC401) pin ㉒ goes "L", pin ㉓ "H", pin ㉔ "L", then Q209 turns "off", Q201 "on", Q205 "off", and analog switch (S1) is "on". Also, speed (rotational direction) command voltage Vs is output to IC201 pin ⑭. (Vs is about 4V when IC401 pin ㉓ is at "H", and about 8V at "L".)

Due to the voltage of Vs, the voltage across the drive coil instantaneously changes from "0" to plus (+) voltage causing the magnet to start rotating. Then a voltage is generated in the deteciton coil, and the voltage is amplified to apply servo to the horizontal drive circuit. Vo is almost zero while servo is applied to the circuit.

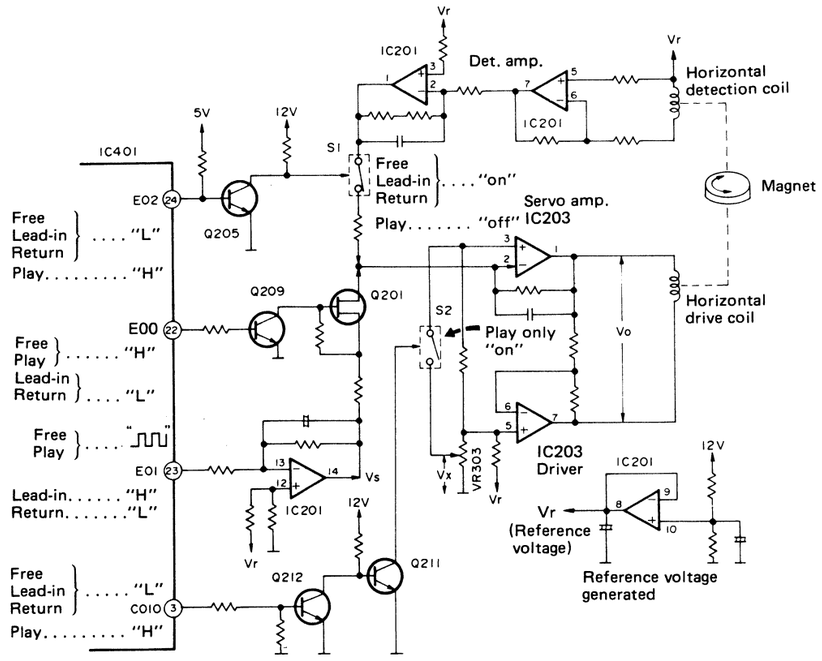
In return mode, microcomputer (IC401) pin ㉓ goes "L" and the speed command voltage Vs becomes higher than in lead-in mode (about 8V), and the voltage across the drive coil instantaneously changes from "0" to minus (–) voltage. The magnet starts rotating in the reverse direction causing a voltage to be generated in the detection coil. The voltage is amplified to apply servo to the horizontal drive circuit.

< Anti-skating >

In play mode, microcomputer (IC401) pin ㉒ goes "H", pin ㉓ "pulse output", pin ㉔ "H", then Q209 turns "on", Q201 "off", Q205 "on", and analog switch (S1) is "off", then IC401 pin ③ goes "H", Q212 "on", Q211 "off", and analog switch S2 is "on".

That is, the servo circuit by the detection coil becomes open, then only the horizontal drive circuit consisting of IC203 and VR303 is in operation. The voltage Vx of VR303 and voltage Vo across the drive coil change linearly to Vx therefore voltage Vo is applied to the drive coil according to the variation of VR303 for the purpose of anti-skating.

5. Horizontal control circuit



< Horizontal drive circuit >

In free mode (with arm on rest), microcomputer (IC401) pin ㉒ is "H", pin ㉓ "pulse output", pin ㉔ "L", then Q209 turns "on", Q201 "off", Q205 "off", and analog switch (S1) is "on". (IC401 pin ③ goes "H" only in play mode, and analog switch S2 is "off".) In this case, the voltage Vo across the horizontal drive coil is "0".

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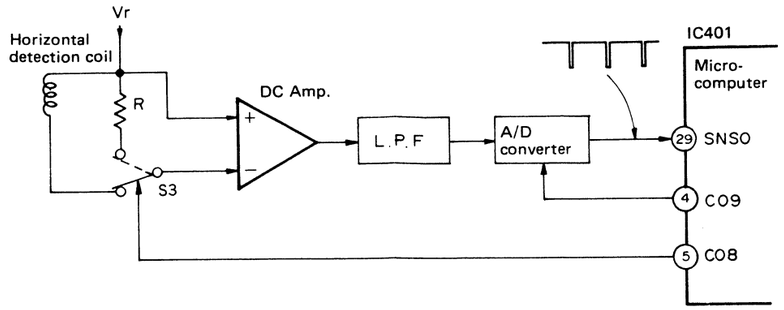
In return mode, microcomputer (IC401) pin ㉓ goes "L" and the speed command voltage Vs becomes higher than in lead-in mode (about 8V), and the voltage across the drive coil instantaneously changes from "0" to minus (−) voltage. The magnet starts rotating in the reverse direction causing a voltage to be generated in the detection coil. The voltage is amplified to apply servo to the horizontal drive circuit.

< Anti-skating >

In play mode, microcomputer (IC401) pin ㉒ goes "H", pin ㉓ "pulse output", pin ㉔ "H", then Q209 turns "on", Q201 "off", Q205 "on", and analog switch (S1) is "off", then IC401 pin ③ goes "H", Q212 "on", Q211 "off", and analog switch S2 is "on".
That is, the servo circuit by the detection coil becomes open, then only the horizontal drive circuit consisting of IC203 and VR303 is in operation. The voltage Vx of VR303 and voltage Vo across the drive coil change linearly to Vx, therefore voltage Vo is applied to the drive coil according to the variation of VR303 for the purpose of anti-skating.

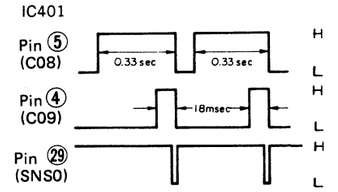
< End detection circuit >



Immediately after power "on", the microcomputer pins ④ and ⑤ delivers the outputs at the timing as shown on the right.
The output causes S3 to be shifted to R side, and the voltage is read into microcomputer pin ㉙. The value is the initial value. (Reading is finished in about 1 sec.)

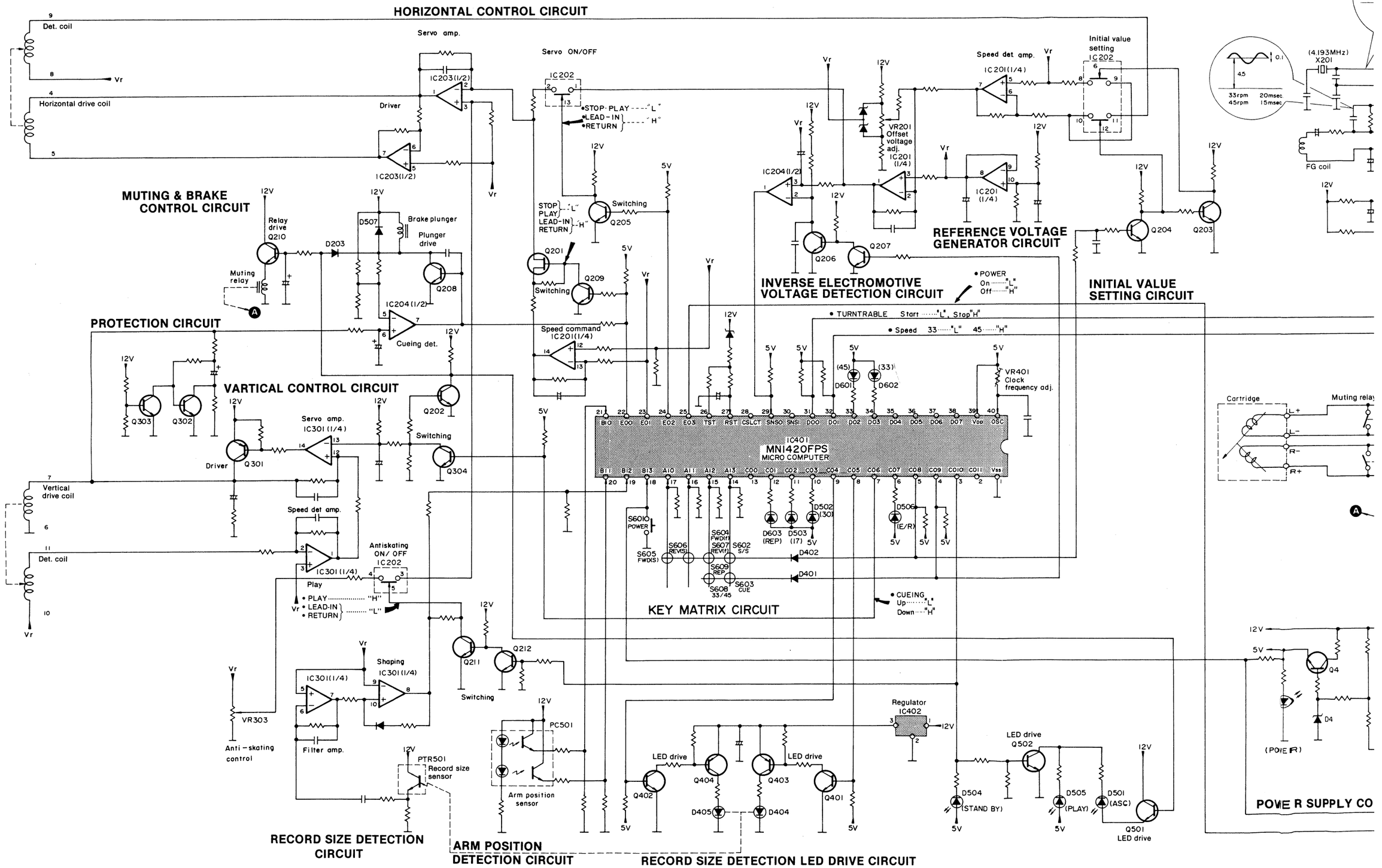
* Shifting it to R in the initial read mode is intended to avoid the influence of external vibration of the detection coil, then the resistance values of the coil and R are equal to each other.

After completion of read, S3 is shifted to the detection coil side. In play mode, the change in voltage of the detection coil (inverse electromotive voltage) caused by the movement of the magnet is detected at 150° interval during a turn of the turntable platter, and the input is entered into microcomputer pin ㉙.
When the slit plate under the tonearm comes to the return area, the microcomputer detects the end through comparison between the initial value and the inverse electromotive voltage of detection coil.



SL-MA1 SL-MA1

■ BLOCK DIAGRM



ITROL CIRCUIT

Servo ON/SW

IC202

•STOP·PLAY ---"L"
•LEAD-IN } ---"H"
•RETURN }

12V 5V

STOP } ---"L"
PLAY }
LEAD-IN } ---"H"
RETURN }

Switching Q205

Q201 Switching Q209

Speed command IC201(1/4)

5V Vr 12V

IC204(1/2) IC201(1/4) VR201 Offset voltage adj. IC201(1/4)

Speed det amp. IC201(1/4)

Initial value setting IC202

REFERENCE VOLTAGE GENERATOR CIRCUIT

Q206 Q207

INVERSE ELECTROMOTIVE VOLTAGE DETECTION CIRCUIT

Q204 Q203

INITIAL VALUE SETTING CIRCUIT

• POWER
On ·····"L"
Off·····"H"

• TURNTRABLE Start ·····"L", Stop"H"

• Speed 33·····"L" 45·····"H"

(45) D601 (33) D602

VR401 Clock frequency adj.

IC401
MN1420FPS
MICRO COMPUTER

S601 POWER
S604 FWD(f)
S605 FWD(S)
S606 REV(S)
S607 REV(f)
S602 S/S
S609 REP
S608 33/45
S603 CUE

D603 (REP) D503 (17) D502 (30) D506 (E/R) D402 D401

• CUEING
Up·····"L"
Down···"H"

KEY MATRIX CIRCUIT

Q212

PC501

Arm position sensor

SITION
ION CIRCUIT

Regulator IC402

LED drive Q402 Q404 Q403 Q401

D405 D404

LED drive Q502

D504 (STAND BY) D505 (PLAY) D501 (ASC) Q501 LED drive

RECORD SIZE DETECTION LED DRIVE CIRCUIT

2.2 24 0.24 μsec.

1.9 μsec. 2

0.1 4.5 33rpm 45rpm 20msec. 15msec

(4.193MHz) X201

TURNTABLE CONTROL CIRCUIT

IC201

Quartz oscillator
Divider (1/2) 524kHz
Divider (1/4) 131kHz
Speed comparator
Phase comparator
Schmitt
Waveform shaping
F.G amplifier
FG coil
Synchronous in-rush circuit
Strobe drivider
Stabilizer
Brake timer
Start/stop selector
Speed selector

X1 X2 FGO FGI FGR Vcc INJ GND B1 SSN SS 33 45 VO PO

TURNTABLE DRIVE CIRCUIT

IC101

Loop filter amplifier
Current feed back amplifier
Inverse prevention circuit
Hall element power supply
Hall element signal processing circuit
Output drive circuit

LF0 CS Vcc LF1 GND PC PT VHO HI HIB H2 H2B A1 A2 A3 A4

Between A1 and A2
Between A3 and A4
2.5 33rpm 303msec

HI01 HI02 Position det.

Cartridge Muting relay PHONO OUT L R L+ L- R- R+ A

Q2 Q4 Q3 Q1 D4 D3 D2 Q405 D1 T1 Power transformer AC Line

12V 5V

•POWER
off---0.7V
on ---0V

(POWER)

POWER SUPPLY CONTROL CIRCUIT

■ FUNCTION OF TERMINAL (MN1420FPS)

No.	Symbol	Description
1	Vss	Ground terminal.
2	CO11	Not used in this unit.
3	CO10	Standby indicator output terminal. (Indicator ON at "L")
4	CO9	Key scan output and inverse electromotive power read-in strobe output terminal.
5	CO8	
6	CO7	End/Return indicator output terminal. (Indicator ON at "L")
7	CO6	Cueing control terminal. ("H" cueing down, "L" cueing up)
8	CO5	Auto size LED strobe output terminal.
9	CO4	
10	CO3	30 cm record indicator output terminal. (Indicator ON at "L")
11	CO2	17 cm record indicator output terminal. (Indicator ON at "L")
12	CO1	Repeat indicator output terminal. (indicator ON at "L")
13	CO0	Not used in this unit.
14	AI3	Key scan input terminal. (Each key is read-in through key scan with CO8 and CO9.)
15	AI2	
16	AI1	
17	AI0	
18	BI3	Power switch input terminal. (Power switch ON at "L")
19	BI2	Record size detection input terminal.
20	BI1	Arm position detection sensor input terminal.
21	BI0	

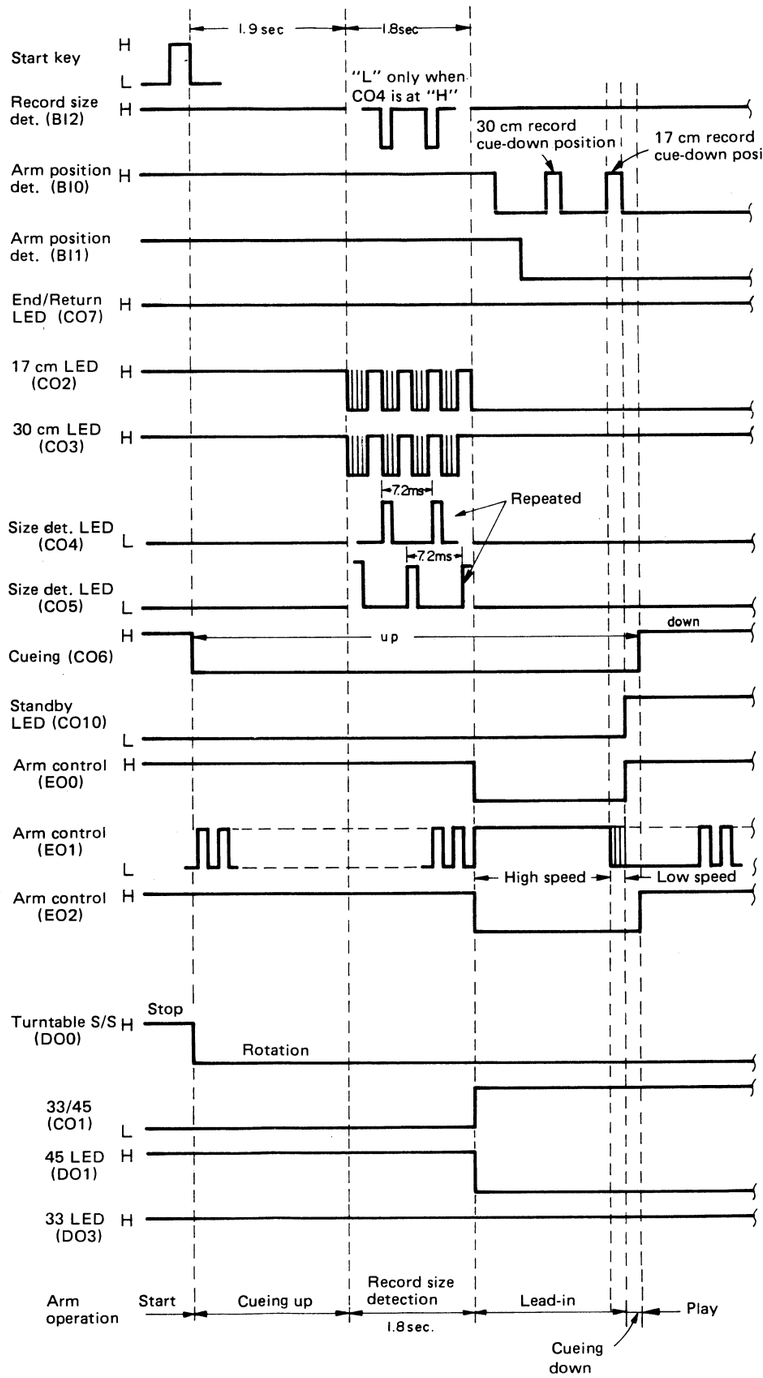
Arm position	BI0	BI1
Rest	H	H
Lead-in	H	L
Return	L	H
Other	L	L

No.	Symbol	Description
22	EO0	Arm motor drive control output terminal. ※
23	EO1	
24	EO2	

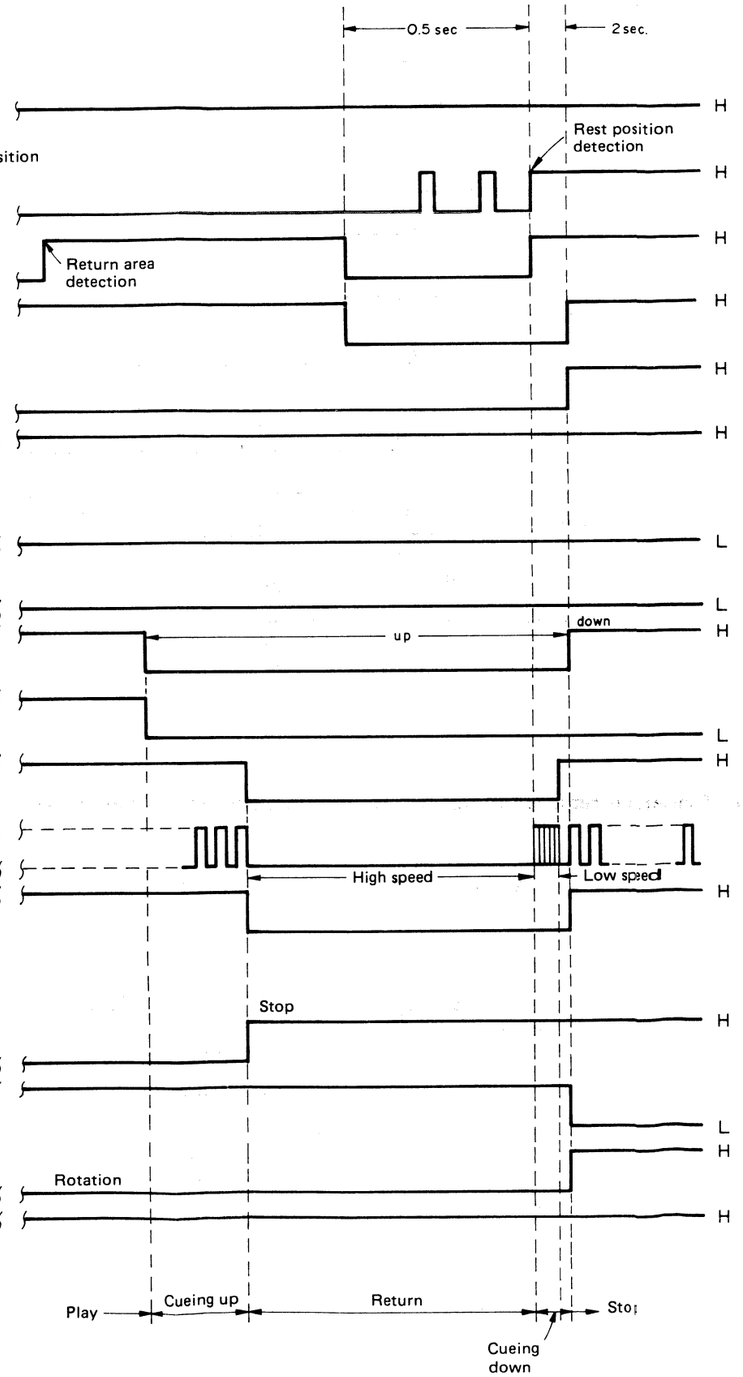
Arm condition	E00	E01	C02
Stop	H	※	L
Free	H	※	H
F-Search (High speed)	L	H	L
B-Search (High speed)	L	L	L

No.	Symbol	Description
25	EO3	Power OFF output terminal. (Power ON at "L", Power OFF at "H")
26	TST	Test terminal.
27	RST	Reset terminal. (Micom is reset at "L")
28	CSLCT	Not used in this unit.
29	SNS0	Inverse electromotive power read input terminal.
30	SNS1	Not used in this unit.
31	DO0	Turntable start/stop output terminal. (Start at "L", Stop at "H")
32	DO1	Turntable speed select output terminal. (45 r.p.m. at "L", 33-1/3 r.p.m. at "H")
33	DO2	Speed (45) indicator output terminal. (Indicator ON at "L")
34	DO3	Speed (33) indicator output terminal. (Indicator ON at "L")
35	DO4	Not used in this unit.
36	DO5	
37	DO6	
38	DO7	
39	VDD	Power supply terminal (+5V)
40	OSC	Clock oscillation terminal.

• Auto start timing chart (17 cm record)

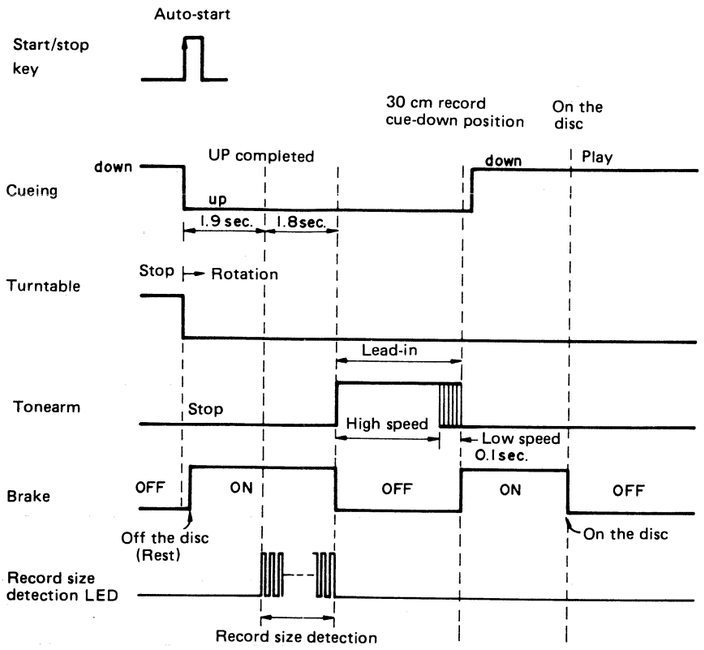


• Auto return timing chart

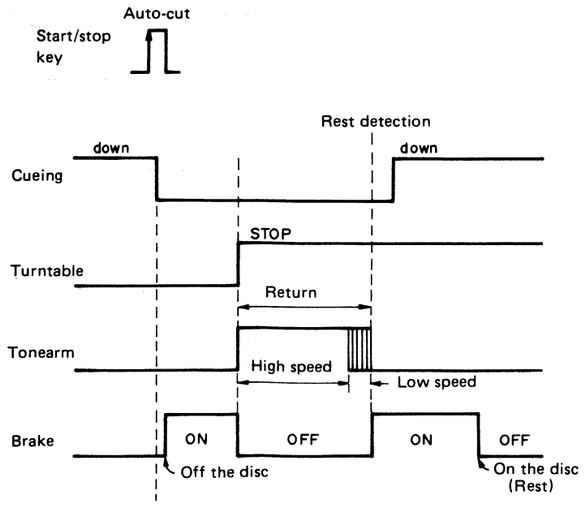


■ OPERATION TIMING CHART

- **Lead-in to 30 cm record from rest position with start key pressed**



- **Tonearm is returned to rest by pressing start/stop key in play mode**



■ REPLACEMANT PARTS LIST

Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specifity the area. Parts without these indications can be used for all areas.
4. The "Ⓢ" mark is service standard parts and may differ from production parts.
5. The paranthesized numbers in the columns of description stand for the quantity per set.

Areas
[M] ..... U.S.A.
[MC]..... Canada.
[E] ..... Switzerland and Scandinavia.
[EK]..... United Kingdom.
[XL]..... Australia.
[EG] ..... F.R. Germany.
[EB]..... Belgium.
[EH] ..... Holland.
[EF]..... France.
[Ei] ..... Italy.
[EC] ..... Czechoslovakia.
[XA]..... Southeast Asia, Oceania, Afirca, Middle Near East and Central South America.
[XM]..... Central South America.
[XZ]..... New Zeaiand.

Ref. No.	Part No.	Description
INTEGRATED CIRCUITS (Drive Circuit)		
IC101	AN6638	Turntable Drive
IC201	AN6683	Turntable Control
INTEGRATED CIRCUITS (Main Circuit)		
IC201	AN6554	Operational Amplifier
IC202	MN4066B	Analog Switch
IC203	SVIM5216P	Operational Amplifier
IC204	AN6914	Comparator
IC301	AN6554	Operational Amplifier
IC401	MN1420FPS	Micro Computer
IC402	AN78L09	Regulator
TRANSISTORS		
Q1	2SD636	Switching
Q2	2SD1275−Q	Regulator
Q3	2SD636	Regulator
Q4	2SC1383	Regulator
Q201	2SK301	Switching
Q202~207	2SD636	Switching
Q208	2SD892	Solenoid Drive
Q209~212	2SD636	Switching
Q301	2SB643	Drive
Q302~304	2SD636	Switching
Q401, 402	2SD636	L.E.D Drive
Q403, 404	2SB643	L.E.D Drive
Q405	2SD636	Switching
Q501, 502	2SD636	Switching
PTR501	PN150	Photo Transistor
DIODES		
D1 ⚠	SVDS1WB40	Rectifier
D2	MA165	Switching
D3, 4	MA4056	Zener, 5.6V
D201, 202	MA4047	Zener, 4.7V
D203	MA165	Switching
D301	MA165	Switching
D401, 402	MA165	Switching
D403	MA4068	Zener, 6.8V
D404, 405	LN66−S	Disc Size Detector
D501~504	LN216RP	L.E.D
D505	LN316GP	L.E.D
D506	LN216RP	L.E.D
D507	SVD1SR35200V	Rectifier
D601~603	SVDGL−9PR4	L.E.D
604	SVDGL9PR24	L.E.D
PHOTO INTERRUPTOR		
PC501	0N1357	End Detection
SWITCHES		
S601~609	EVQQS405K	Operation Control
S901 ⚠ Except [M, MC]	SFDSHXW01317	Voltage Selector

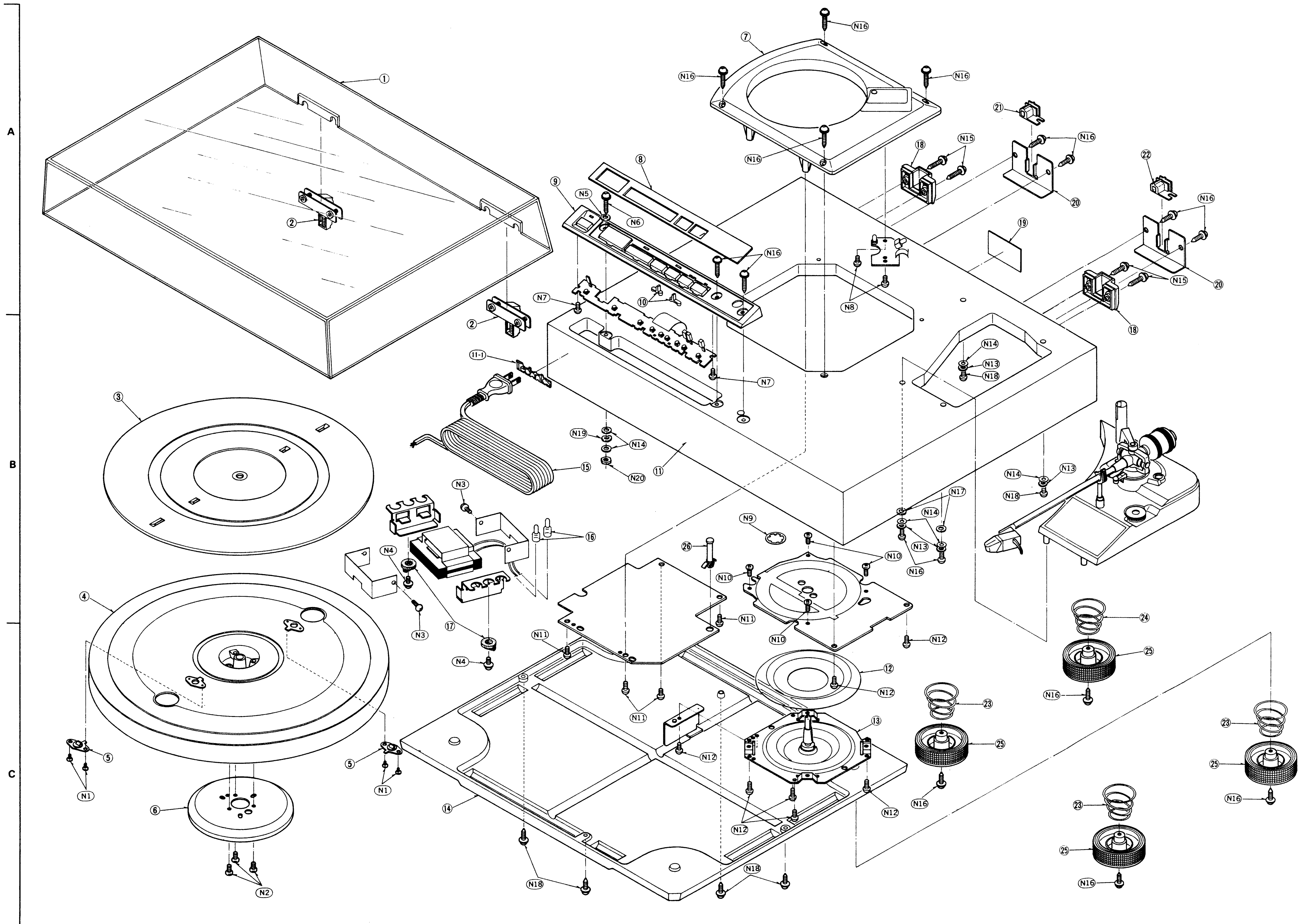
Ref. No.	Part No.	Description
VARIABLE RESISTORS		
VR201	EVN61AA00B24	Offset Adjuster, 20kΩ (B)
VR303	EVJFDAF20B53	Anti-Stating Adjuster, 5kΩ (B)
VR401	EVN61AA00B24	Clock Frequency Adjuster, 20kΩ (B)
CRYSTAL		
X201	SVQNR41TR	4.193MHz
HALL ELEMENTS		
H101, 102	0H−002	Turntable Position Detecting
RELAY		
RLY1	SFDYG5A237P	Muting
COIL		
L401	ELEV101KA	
POWER TRANSFORMER		
T1 [M]	⚠ SLT66DTL4A	Power Source
T1 [MC]	⚠ SLT66DTS15C	Power Source
T1 [Other areas]	⚠ SLT66DTE14E	Power Source
FUSES		
F901 ⚠ Except [M, MC]	XBA2C02TR0	250V, T200mA
F902 ⚠ [MC] only	XBA1M12NU100	125V, 1.2A
F902 ⚠ Except [M]	XBA2C08TR0	250V, T800mA

Ref. No.	Part No.	Description
CABINET and CHASSIS PARTS		
1	SFADM01N01E	Dust Cover (1)
2	SFATM02N01A	Hinge (2)
3	SFTGMA1N01	Turntable Mat (1)
4	SFTEMA1N01	Turntable Platter (1)
5	SFUMMA1N03	Sensor Block (2)
6	SFTMC07−01E	Magnet (1)
7 [M] only	SFUMMA1M02	Motor Base (1)
7 [Other areas]	SFUMMA1N02	Motor Base (1)
8	SFUZMA1N01	Ornament (1)

Ref. No.	Part No.	Description
CABINET and CHASSIS PARTS		
9 [M, MC, XA, XM]	SFUMMA1N01R	Button Ass'y, Operation (1)
9 [Other areas]	SFUMMA1S01R	Button Ass'y, Operation (1)
10	SFUMC10−23	Sub Plate, Button Ass'y (2)
11 [M] only	SFACMA1N01R	Cabinet (1)
11 [Other areas]	SFACMA1S01R	Cabinet (1)
11-1	SFKBM03N02	Badge (1)
12	SFMGQ34N01	Cover, Coil (1)
13	SFMZMA1N01A	Stater Flame Ass'y (1)
14	SFAUM02N01	Bottom Cover (1)
15 ⚠ [M, MC]	RJA9YA−K	AC Cord (1)
15 [EK] ⚠	SJA139	AC Cord (1)
15 ⚠ [XL, XZ]	SJAG23	AC Cord (1)
15 ⚠ [Other areas]	SJA137	AC Cord (1)
16 [M] only	SJE41	Terminal (2)
17	SFGCMA1N01	Cushion Rubber, Power Transformer (3)
18	SFUMMA1N06	Hinge Case (2)
19 [M]	SFNNMA1M01	Name Plate (1)
19 [MC]	SFNNMA1C01	Name Plate (1)
19 [E, EC]	SFNNMA1S01	Name Plate (1)
19 [EK, XL, XZ]	SFNNMA1G01	Name Plate (1)
19 [XA, XM]	SFNNMA1X01	Name Plate (1)
19 [Other areas]	SFNNMA1R01	Name Plate (1)
20	SFUPM01N08	PU Output Cord (2)
21 [M, MC] only	SFUMQ34N09	Cord Bushing (1)
21 [Other areas]	SFUMQ34N10	Cord Bushing (1)
22	SFUMQ34N10	Cord Bushing (A) (1)
23	SFQAMA1N01	Spring, Insulator (A) (3)
24	SFQAMA1N02	Spring, Insulator (B) (1)
25	SFGAM01N01E	Insulator (4)
26	SFUMMA1N05	Spacer (1)

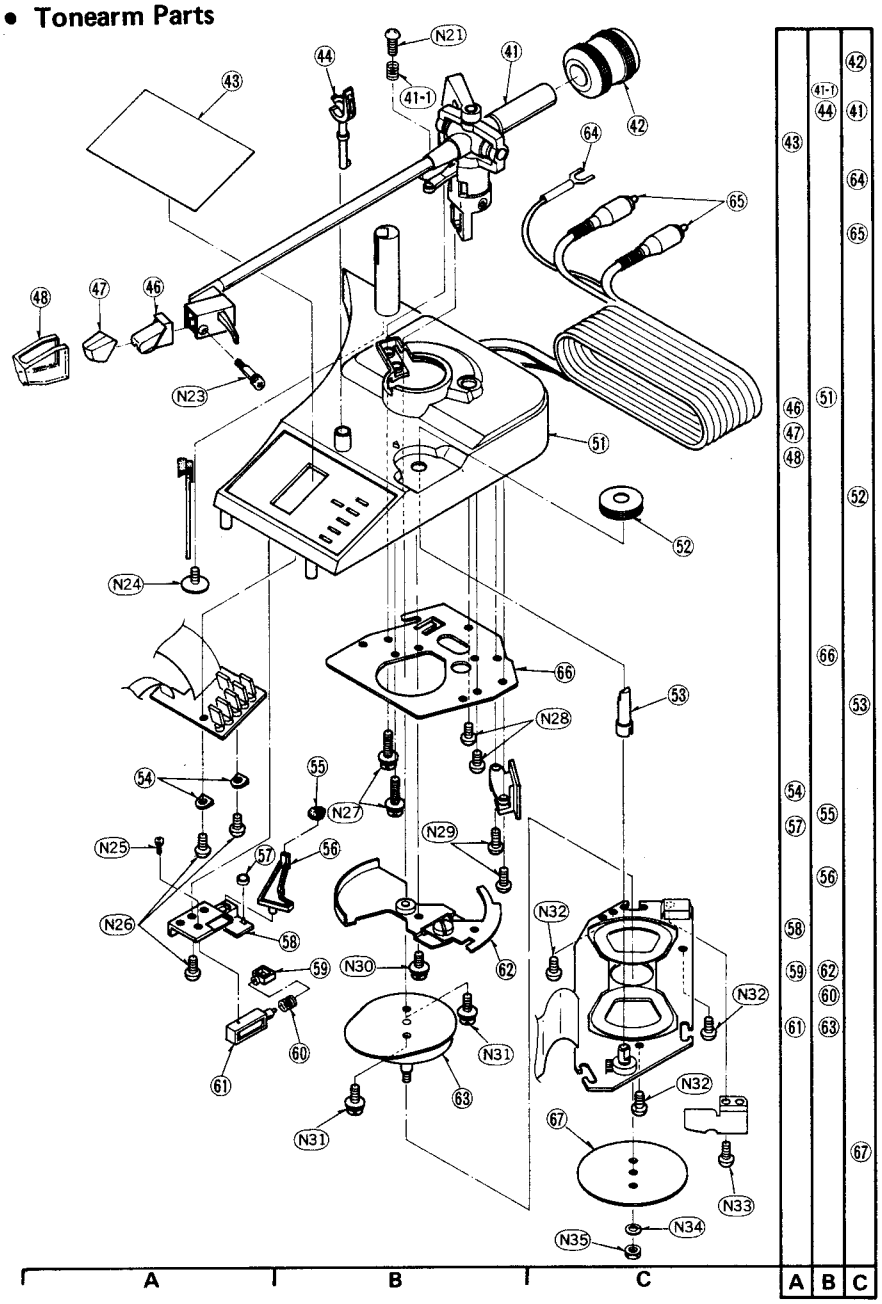
■ EXPLODED VIEW

• **Cabinet and Chassis Parts**



A	② ① ②	⑧⑨⑩	⑦	⑱	⑲㉑⑳	⑱	㉒⑳			
B	③	⑰	(11-1)⑮	⑯	㉖	⑪	㉔㉕			
C	⑤	④⑥	⑤	⑰	⑭	⑫⑬	㉓㉕	㉕㉓	㉓㉕	

• Tonearm Parts

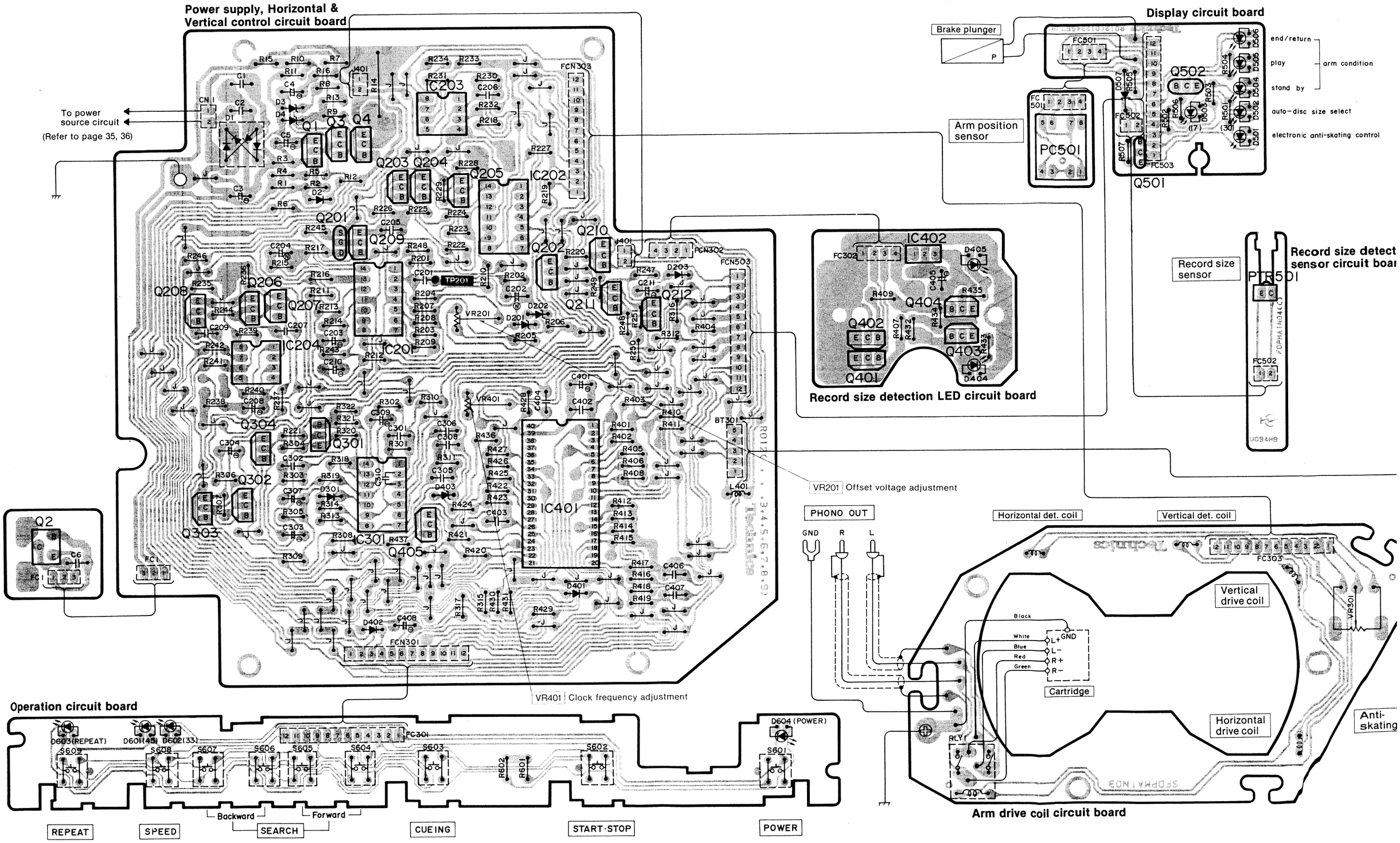


Ref. No.	Part No.	Description	
TONEARM PARTS			
41	SFPAMMA102A	Tonearm	(1)
41-1	SFPSPMA102	Spring	(1)
42	SFPWGMA101E	Balance Weight	(1)
43	SFPAKMA101	Ornament Plate	(1)
44	SFKUMA1N01E	Arm Rest	(1)
46 Except [M, MC]	EPC−P33	★ Cartridge	(1)
47 Except [M, MC]	EPS−33ES	Stylus	(1)
48 Except [M, MC]	SFCNC03301	Stylus Cover	(1)
51	SFPKDMA101E	Arm Base	(1)
52	SFPJKMA104	Knob, Canceller	(1)
53	SFPJKMA105	Guide, Canceller	(1)
54	SFPZBMA108	Spacer	(1)
55	SFPGMMA104	Brake Rubber	(1)
56	SFPZBMA104	Brake Lever	(1)
57	SFPZBMA109	Felt	(1)
58	SFPABMA103	Holder	(1)
59	SFPZBMA105	Cam, Solenoid	(1)
60	SFQAQX3M51	Spring, Solenoid	(1)
61	SFDZMA101	Solenoid Ass'y	(1)
62	SFPABMA101E	Guide	(1)
63	SFPZBMA101E	Magnet	(1)
64	SFEL028−01E	Ground Wire	(1)
65	SFDHMA1M01	PU Output Cord	(1)
66	SFPKBMA101	Plate, Arm Base	(1)
67	SFPZBMA103	Plate	(1)

Ref. No.		Part No.	Description	
SCREWS and WASHERS				
N1		SFPEV13006	Screw	(4)
N2	Ⓢ	XTN3+6B	Screw, ⊕3×6	(3)
N3	Ⓢ	XTV3+6BFN	Screw, ⊕3×6	(2)
N4		SFXGM02N02	Screw	(2)
N5	Ⓢ	XWG3	Washer	(1)
N6		XTV3+25F	Screw, ⊕3×25	(1)
N7		XTV3+8G	Screw, ⊕3×8	(2)
N8		XTV3+8G	Screw, ⊕3×8	(2)
N9		SFXWC06N02	Washer	(1)
N10		XTV3+6JFZ	Screw, ⊕3×6	(4)
N11		XTV3+8G	Screw, ⊕3×8	(4)
N12		XTV3+8G	Screw, ⊕3×8	(7)
N13		MB−4302	Washer	(4)
N14		XWE3F12SZ	Washer, φ3	(6)
N15		XYE3+EG10	Screw, ⊕3×10	(4)
N16		XTWS3+20QFZ	Screw, ⊕3×20	(16)
N17		XWE6F13	Washer, φ6	(2)
N18		XTWS3+25QFZ	Screw, ⊕3×25	(6)
N19		SFXWMA1N01	Washer	(1)
N20	Ⓢ	XNG3E	Washer, φ3	(1)
N21		SFPEVMA101	Screw	(1)
N23		SFPEV0Q601	Screw	(1)
N24		SFXG122−02	Screw	(1)
N25		XYN2+C4	Screw, ⊕2×4	(1)
N26		XTV3+8G	Screw, ⊕3×8	(3)
N27		XYN3+C16S	Screw, ⊕3×16	(2)
N28		XTV3+6GFZ	Screw, ⊕3×6	(2)
N29	Ⓢ	XTV3+6BFN	Screw, ⊕3×6	(2)
N30		SFXGQ34N02	Screw	(1)
N31		SFXGMA1N02	Screw	(2)
N32		XTV3+8G	Screw, ⊕3×8	(3)
N33	Ⓢ	XTN3+8B	Screw, ⊕3×8	(1)
N34		XWA4BFR	Washer, φ4	(1)
N35	Ⓢ	XNG4ES	Nut	(1)
ACCESSORIES				
A1 [M]		SFNUMA1M01	Instruction Book	(1)
A1 [MC]		SFNUMA1C01E	Instruction Book	(1)
A1 [EK]		SFNUMA1G01	Instruction Book	(1)
A1 [E, EB, EH, EC]		SFNUMA1S01	Instruction Book	(1)
A1 [Ei]		SFNUMA1i01	Instruction Book	(1)
A1 [Other areas		SFNUMA1X01	Instruction Book	(1)
A2		SFWE212−01	45r.p.m Adaptor	(1)
A3 [XA, ⚠ XM] only		SFDKI19118	2 Pin Plug	(1)
PACKING PARTS				
P1 [EF, MC]		SFHPMA1C01	Carton Box	(1)
P1 [Other areas]		SFHPMA1M01	Carton Box	(1)
P2		SFHHMA1N01	Pad, Front	(1)
P3		SFHHMA1N02	Pad, Rear	(1)
P4		XWA4BFR	Washer	(1)
P5		SFHZMA1N03	Pad	(1)
P6		SFYP18A180	Polyethylene Bag	(1)
P7		SFHDM01N01	Pad, Turntable Platter	(1)
P8		XSN4D25FYBS	Screw	(1)
P9		SFX0MA1N01	Washer	(1)
P10		SFHZMA1N01	Clamp Spacer	(1)
P11		SFHZMA1N02	Pad, Turntable	(1)
P12		SFYP75A45	Polyethylene Bag	(1)
P13		SFYF60A80	Polyethylene Bag, Unit	(1)
P14		SFYH60X60	Polyethylene Bag, Dust Cover	(1)
P15		SFYH40X45	Polyethylene Bag, Turntable Platter	(1)
P16		SFYF09A10	Polyethylene Bag, Weight, 45 Adaptor	(2)
P17 Except [M, MC]		SFYF09A10	Polyethylene Bag, Cap	(1)

SL-MA1 SL-MA1

■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM



Display circuit board

Brake plunger

Arm position sensor

end/return
play
stand by
arm condition
auto-disc size select
electronic anti-skating control

Record size sensor

Record size detection sensor circuit board

Record size detection LED circuit board

VR201 Offset voltage adjustment

PHONO OUT
GND R L

Horizontal det. coil

Vertical det. coil

Vertical drive coil

Horizontal drive coil

Anti-skating

Black
White
Blue
Red
Green
L+ GND
L−
R+
R−
Cartridge

Clock frequency adjustment

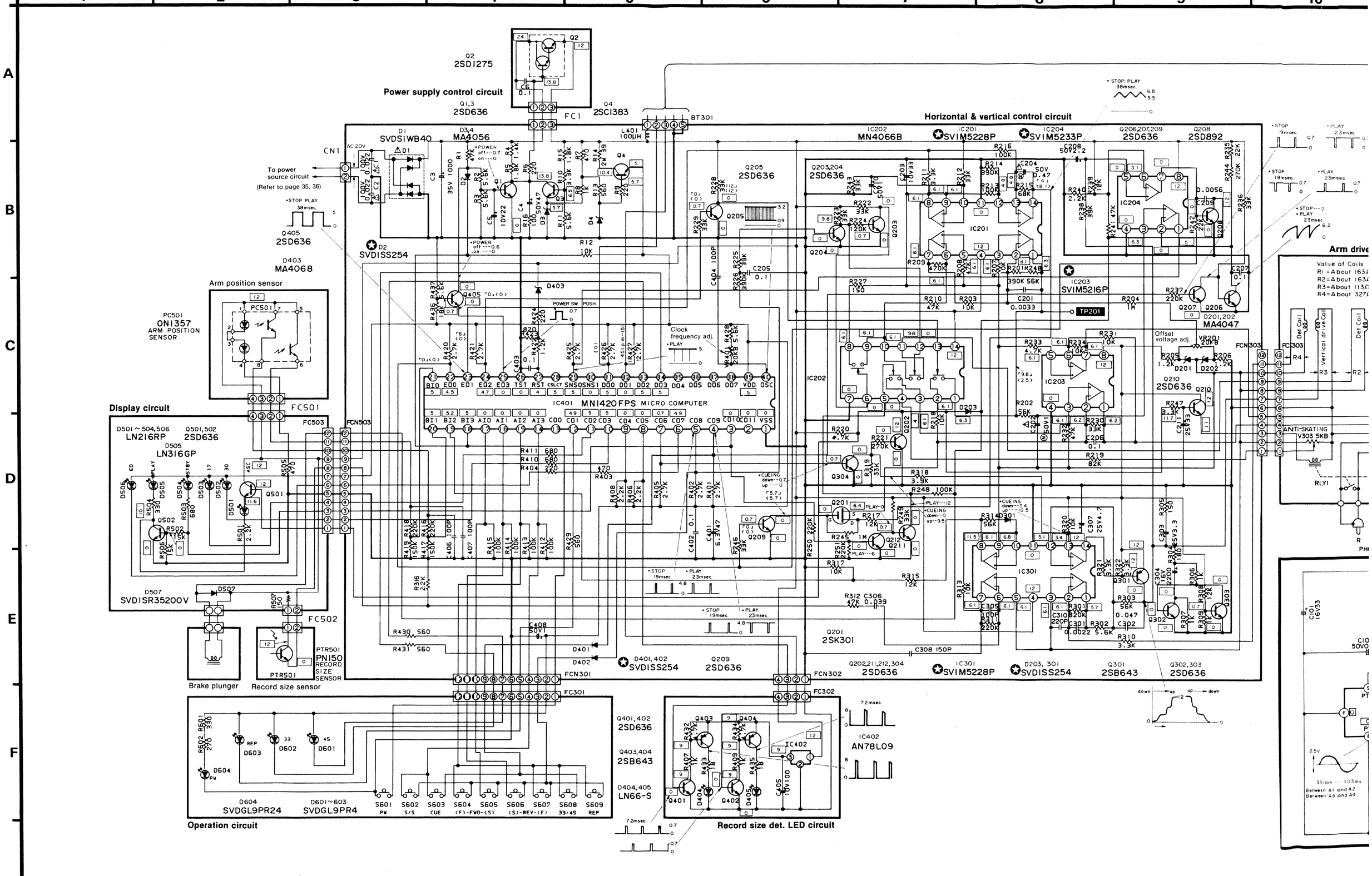
D604 (POWER)

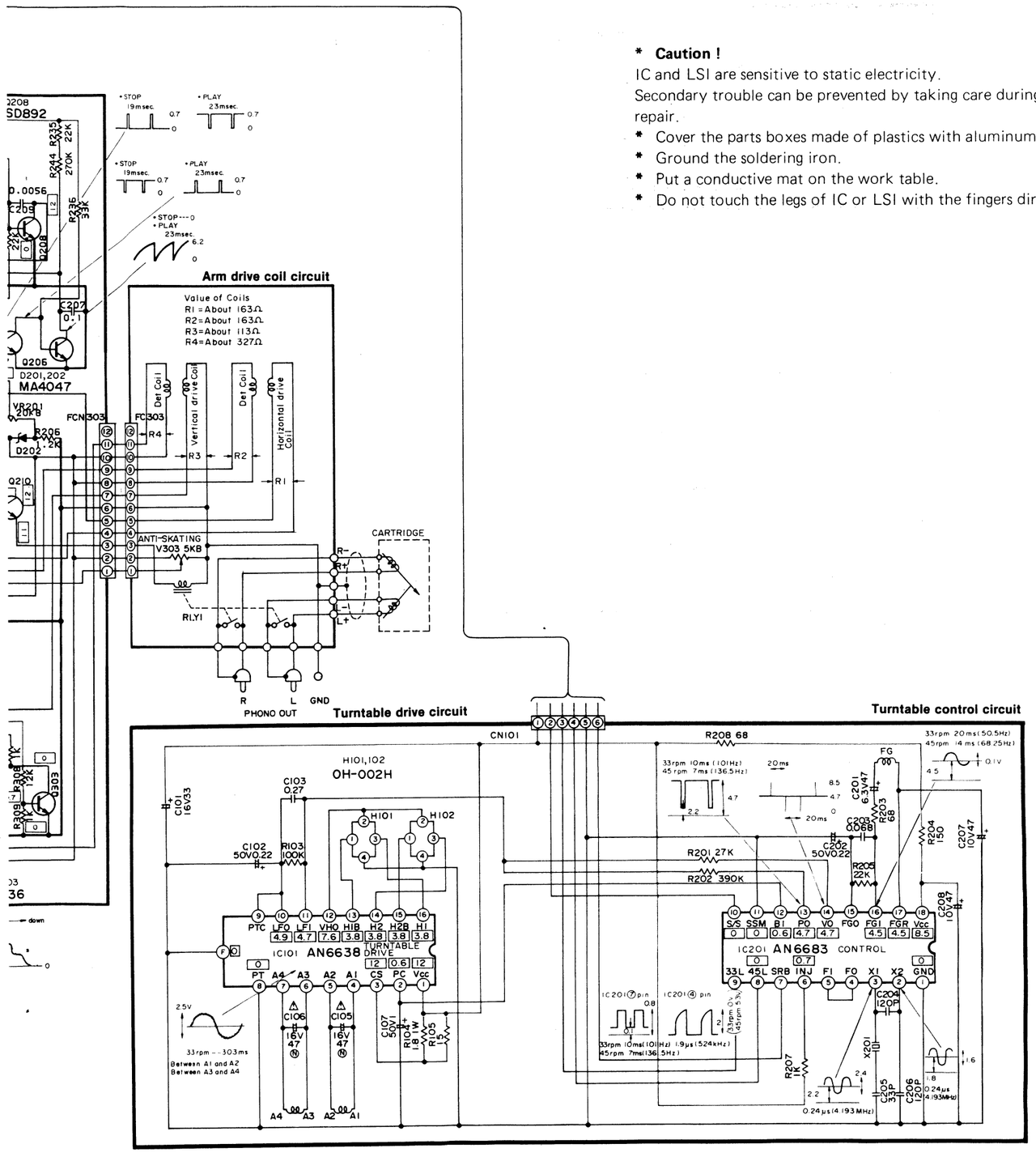
START·STOP

POWER

Arm drive coil circuit board

Turntable drive & control circuit board


Power supply control circuit
Horizontal & vertical control circuit
Arm drive
Display circuit
Arm position sensor
Operation circuit
Record size det. LED circuit
Brake plunger
Record size sensor
Clock frequency adj.
Offset voltage adj.
ANTI-SKATING
IC MN1420FPS MICRO COMPUTER
IC MN4066B
IC SVIM5228P
IC SVIM5233P
IC SVIM5216P
IC SVIM5228P
IC AN78L09
Q2 2SD1275
Q1,3 2SD636
Q4 2SC1383
D1 SVDS1WB40
D2 SVDISS254
D3,4 MA4056
D403 MA4068
PC501 ON1357 ARM POSITION SENSOR
D501~504,506 LN216RP
D505 LN316GP
Q501,502 2SD636
D507 SVDISR35200V
PTR501 PN150 RECORD SIZE SENSOR
D401,402 SVDISS254
Q209 2SD636
Q205 2SD636
Q203,204 2SD636
Q206,207,209 2SD636
Q208 2SD892
Q210 2SD636
Q201 2SK301
Q202,211,212,304 2SD636
IC301 SVIM5228P
D203, 301 SVDISS254
Q301 2SB643
Q302,303 2SD636
Q401,402 2SD636
Q403,404 2SB643
D404,405 LN66-S
D604 SVDGL9PR24
D601~603 SVDGL9PR4
IC402 AN78L09
TP201
To power source circuit
(Refer to page 35, 36)
AC 20V
L401 100μH
BT301
FC1
FC501
FC502
FC503
FCN301
FCN302
FCN303
FC301
FC302
FCN503
Value of Coils
R1 = About 163Ω
R2 = About 163Ω
R3 = About 113Ω
R4 = About 327Ω
Det. Coil
Vertical drive Coil
RLY1
PH
S601 PW
S602 5/5
S603 CUE
S604 (F)-FWD-(S)
S605 (S)-REV-(F)
S606 33/45
S607 REP
S608
S609



* **Caution !**

IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.

* Cover the parts boxes made of plastics with aluminum foil.
* Ground the soldering iron.
* Put a conductive mat on the work table.
* Do not touch the legs of IC or LSI with the fingers directly.

■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

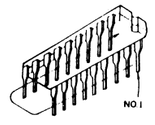
Notes:

1. **S601** : Power switch.
2. **S602** : Start · Stop switch.
3. **S603** : Cueing switch.
4. **S604, S605** : Forward search switch.
5. **S606, S607** : Backward search switch.
6. **S608** : Speed selector switch.
7. **S609** : Repeat switch.
8. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the bais of chassis. Therefore, the voltage value and waveform may included some error due to the internal impedance of the tester or the measuring unit.
   * [ ] is the voltage when turntable is stop.
   * ( ) is the voltage when turntable is in rotation.
   * ⌐ ⌙ is the voltage when tonearm is in lead-in mode.
   * < > is the voltage when tonearm is in return mode.
9. ——— Positive voltage lines.
10. Important safety notice:
    Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacurer's specified parts.

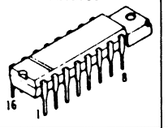
* The part No. of transistor, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with ✪ mark the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part, please use the part No. in the replacement parts list.

■ TERMINAL GUIDE OF IC'S, TRANSISTORS and DIODES

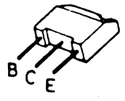
SVIM5216P ····· 8 Pin
SVIM5233P ····· 8 Pin
SVIM5228P ····· 14 Pin
MN4066B ····· 14 Pin
AN6683 ····· 18 Pin
MN1420FPS ····· 40 Pin



AN6638



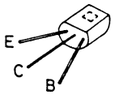
2SB641, 2SD636,
2SD638, 2SB643



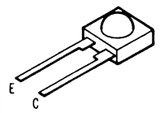
AN78L09

1. Vin
2. GND
3. Vout

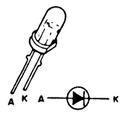
2SC1383
2SD892



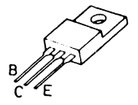
PN150



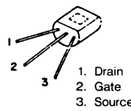
LN66



2SD1275

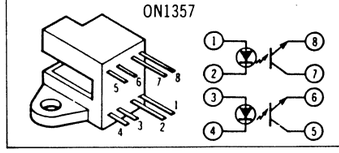


2SK301

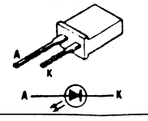


1. Drain
2. Gate
3. Source

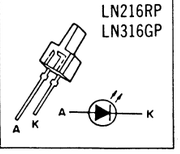
ON1357



SVDGL-9PR4
SVDGL9PR24



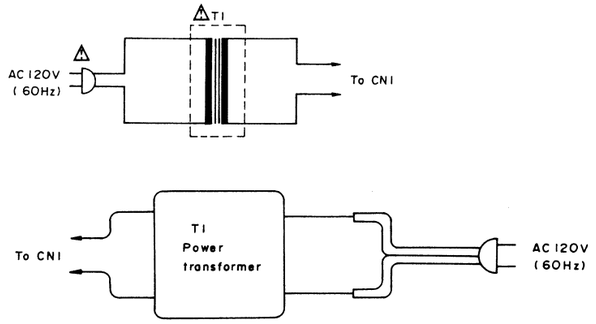
LN216RP
LN316GP



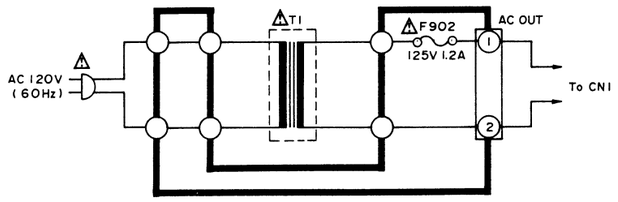
■ POWER SOURCE CIRCUIT

Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

• Product for U.S.A.



• Product for Canada



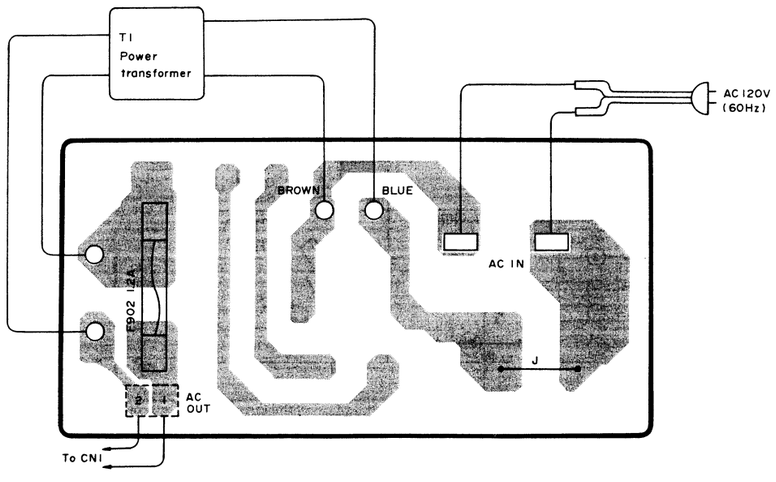
• Product for MC only

FUSE REPLACEMENT

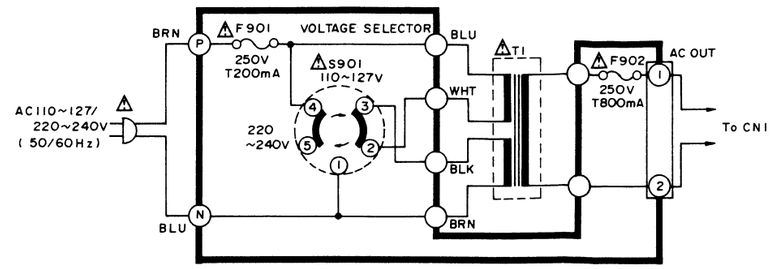
Symbol located near the fuse indicates fast operating type. For continued protection against fire hazard, replace with same type fuse. Refer to the symbol for fuse rating.

FUSIBLE REMPLACEMENT

Le symbole qui se trouve près du fusible singifie un fusible à action rapide. Pour une protection contiue contre les risques d'incendie, n'utiliser que des fusibles du même type. Se rapporter au symbole pour la valeur des fusibles.

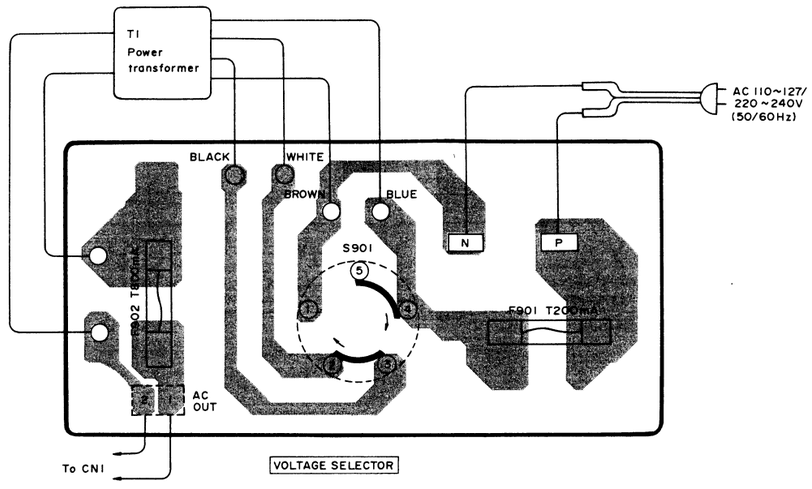


• Product for Others



Note:

S901 : Voltage selector.
in "**220 ~ 240V**" position.
110 ~ 127V ⟷ 220 ~ 240V



■ RESISTORS and CAPACITORS

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The " S " mark is service standard parts and may differ from production parts.
4. Unless otherwise specified. All resistors are in OHMS (Ω), K = 1000Ω, M = 1000kΩ All capacitors are in MICROFARADS (μF), P = 10^{-6}μF.

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage (1/4W)	Shape	Tolerance	Value (100Ω)

ERD	1	AN	J	2R2
Type	Wattage (1W)	Shape	Tolerance	Value (2.2Ω)

Numbering System of Capacitor

Example

ECKD	1H	102	Z	F
Type	Voltage (50V)	Value (0.001μF)	Tolerance	Peculiarity

ECEA	50	M	R47	R
Type	Voltage (50V)	Peculiarity use	Value (0.47μF)	Special use

Resistor Type	Wattage	Tolerance
ERD : Carbon ERO : Metal Film ERG : Metal Oxide ERX : Metal Film	S2 : 1/4W 1 : 1W 2 : 2W	J : ± 5% G : ± 2%

Capacitor Type	Voltage		Tolerance
	ECEA Type	Others	
ECEA : Electrolytic ECEA....N : Non Polar Electrolytic ECFR : Ceramic ECQM : Polyester ECCD : Ceramic ECQV : TF	0J : 6.3V 1A : 10V 1C : 16V 1E : 25V 1V : 35V 1H : 50V 50 : 50V	1H : 50V DC 05 : 50V 1 : 100V	J : ± 5% K : ± 10% Z : +80%, −20%

● RESISTORS (Control Circuit)

Ref. No.	Part No.	Value
R1	ERDS2TJ473	47K
R2, 3	ERDS2TJ562	5.6K
R4	ERDS2TJ152	1.5K
R5	ERDS2TJ182	1.8K
R6	ERDS2TJ221	220
R7	ERDS2TJ471	470
R8	ERDS2TJ102	1K
R9	ERDS2TJ221	220
R10	ERDS2TJ332	3.3K
R11	ERDS2TJ562	5.6K
R12	ERDS2TJ103	10K
R13	ERDS2TJ561	560
R14	ERG2SJ390H	39
R15	ERDS2TJ182	1.8K
R16	ERDS2TJ101	100
R201	ER0S2TKG3903	390K
R202	ERDS2TJ563	56K
R203	ERDS2TJ103	10K
R204	ERDS2TJ105	1M
R205, 206	ERDS2TJ331	330
R207	ER0S2TKG1002	10K
R208	ERDS2TJ473	47K
R209	ER0S2TKG4703	470K
R210	ER0S2TKG4702	47K
R211	ERDS2TJ332	3.3K
R212	ERDS2TJ333	33K
R213	ER0S2TKG1003	100K
R214	ER0S2TKG3903	390K
R215	ER0S2TKG6802	68K
R216	ER0S2TKG1003	100K
R217	ERDS2TJ562	5.6K
R218	ERDS2TJ103	10K
R219	ERDS2TJ823	82K
R220	ERDS2TJ472	4.7K
R221	ERDS2TJ274	270K
R222, 223	ERDS2TJ333	33K
R224	ERDS2TJ124	120K
R225	ERDS2TJ393	39K
R226	ERDS2TJ394	390K
R227	ERDS2TJ151	150
R228, 229	ERDS2TJ333	33K
R230	ERDS2TJ333	33K
R231	ERDS2TJ103	10K
R232	ERDS2TJ473	47K
R233	ERDS2TJ472	4.7K
R234	ERDS2TJ103	10K
R235	ERDS2TJ223	22K
R236	ERDS2TJ333	33K
R237	ERDS2TJ224	220K
R238	ERDS2TJ393	39K
R239	ERDS2TJ333	33K
R240	ERDS2TJ123	12K
R241	ERDS2TJ224	220K
R242	ERDS2TJ223	22K
R243	ERDS2TJ333	33K
R244	ER0S2TKG2703	270K
R245	ERDS2TJ105	1M
R246	ERDS2TJ333	33K
R247	ERDS2TJ332	3.3K
R248	ERDS2TJ563	56K
R249	ERDS2TJ333	33K
R250, 251	ERDS2TJ224	220K
R252	ERDS2TJ104	100K
R301	ERDS2TJ824	820K
R302	ERDS2TJ562	5.6K
R303	ERDS2TJ563	56K
R304	ERDS2TJ181	180
R305	ERDS2TJ151	150
R306, 307	ERDS2TJ102	1K
R308	ERDS2TJ123	12K
R309	ERDS2TJ102	1K
R310	ERDS2TJ332	3.3K
R311	ERDS2TJ224	220K
R312	ERDS2TJ473	47K
R313	ERDS2TJ103	10K
R314	ERDS2TJ563	56K
R315	ERDS2TJ123	12K
R316	ERDS2TJ102	1K
R317	ERDS2TJ103	10K
R318	ERDS2TJ392	3.9K
R319	ERDS2TJ683	68K
R320	ERDS2TJ103	10K
R321, 322	ERDS2TJ332	3.3K
R401, 402	ERDS2TJ272	2.7K
R403	ERDS2TJ471	470
R404	ERDS2TJ221	220
R405	ERDS2TJ272	2.7K
R406	ERDS2TJ222	2.2K
R407	ERDS2TJ102	1K
R408	ERDS2TJ222	2.2K
R409	ERDS2TJ102	1K
R410, 411	ERDS2TJ681	680
R412, 413	ERDS2TJ104	100K
R414, 415	ERDS2TJ104	100K
R416	ERDS2TJ224	220K
R417	ERDS2TJ154	150K
R418	ERDS2TJ224	220K
R419	ERDS2TJ154	150K
R420, 421	ERDS2TJ272	2.7K
R422	ERDS2TJ122	1.2K
R423	ERDS2TJ821	820
R424	ERDS2TJ221	220
R425, 426	ERDS2TJ272	2.7K
R427	ERDS2TJ272	2.7K
R428	ERDS2TJ562	5.6K
R429, 430	ERDS2TJ561	560
R431	ERDS2TJ561	560
R432	ERDS2TJ472	4.7K
R433	ERDS2TJ180	18
R434	ERDS2TJ472	4.7K
R435	ERDS2TJ180	18
R436	ERDS2TJ183	18K
R437	ERDS2TJ562	5.6K
R501	ERDS2TJ222	2.2K
R502	ERDS2TJ153	15K
R503	ERDS2TJ681	680
R504	ERDS2TJ331	330
R505	ERDS2TJ471	470
R506	ERDS2TJ153	15K
R507	ERDS2TJ151	150
R601	ERDS2TJ331	330
R602	ERDS2TJ271	270

● CAPACITORS (Control Circuit)

Ref. No.	Part No.	Value
C1, 2 ⚠	ECQM1223KZ	0.022
C3	ECEA1VU102	1000
C4	ECEA1HU470	47
C5	ECEA1AU220	22
C6	ECFR1H104ZF	0.1
C201	ECQM1H332KV	0.0033
C202 ⚠	ECEA1HN010	1
C203	ECEA1AU330	33
C204 ⚠	ECEA1HN4R7	4.7
C205	ECFR1H104ZF	0.1
C206, 207	ECQM1H104JV	0.1
C208	ECEA1HU2R2	2.2
C209	ECQM1H563KV	0.056
C210	ECEA1HU010	1
C211	ECEA1CU330	33
C301	ECQM1H222KV	0.0022
C302	ECQM1H473KV	0.047
C303	ECEA1EU3R3	3.3
C304	ECEA1CU222	2200
C305	ECCD1H101K	100P
C306	ECQM1H393KV	0.039
C307	ECEA1EU4R7	4.7
C308	ECCD1H151K	150P
C309	ECEA1HU010	1
C401	ECEA0JU470	47
C402, 403	ECFR1H104ZF	0.1
C404	ECCD1H1101K	100P
C405	ECEA1AU101	100
C406, 407	ECCD1H101K	100P
C408	ECEA1HU010	1

● RESISTORS (Drive Circuit)

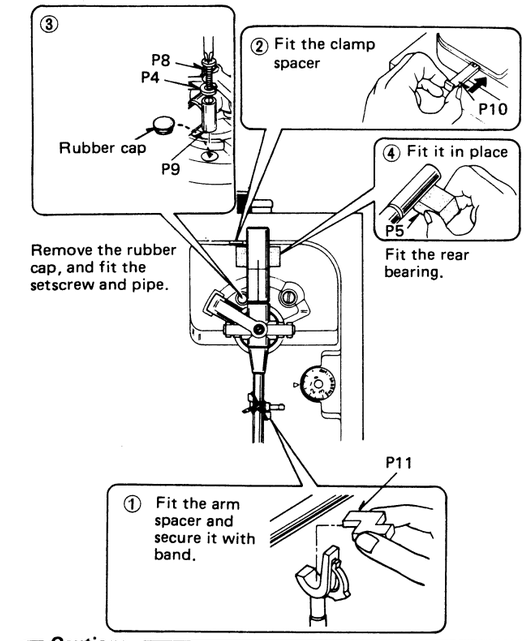
Ref. No.	Part No.	Value
R103	ERDS2TJ104	100K
R104	ERX1ANJ2R7	2.7
R105	ERDS2TJ270	27
R201	ERDS2TJ273	27K
R202	ERDS2TJ394	390K
R203	ERDS2TJ680	68
R204	ERDS2TJ151	150
R205	ERDS2TJ223	22K
R207	ERDS2TJ102	1K
R208	ERDS2TJ680	68

● CAPACITORS (Drive Circuit)

Ref. No.	Part No.	Value
C101	ECEA1CU330	33
C102	ECEA50ZR22	0.22
C103	ECQV05274KZ	0.27
C105, 106 ⚠	ECEA1AN470S	47
C107	ECEA1HU010	1
C201	ECEA0JU470	47
C202	ECEA50ZR22	0.22
C203	ECQM1H683KV	0.068
C204	ECCD1H121KC	120P
C205	ECCD1H330JC	33P
C206	ECCD1H121KC	120P
C207	ECEA0JU470	47
C208	ECEA1AU221	220

■ PACKING

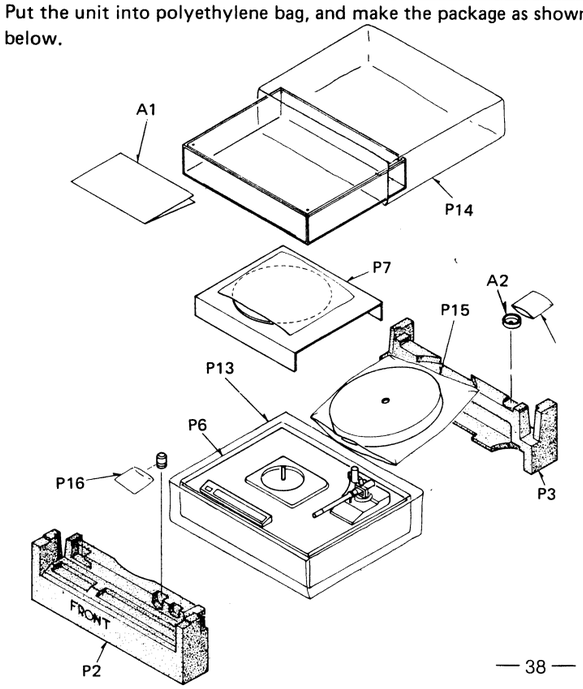
1. Fit the packing materials in the order of ① ~ ④.



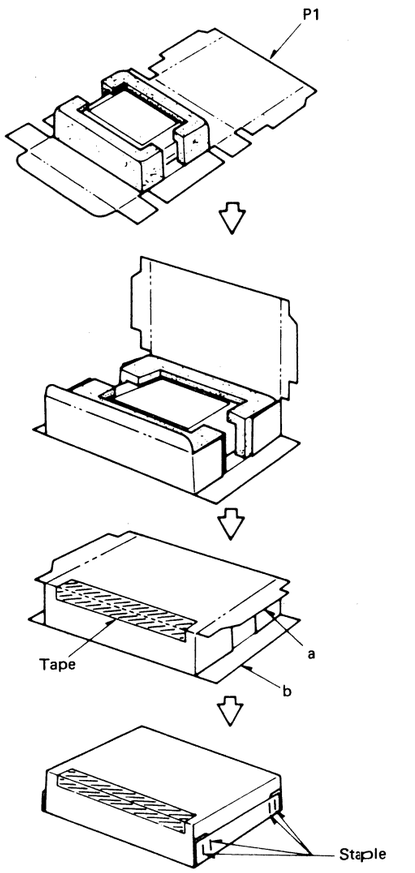
Cautions

Be sure to keep the following points when packing or re-transporting the unit.
1. Completely insert the clamp spacer.
2. Set the pipe in place.
3. Fit the washer to the setscrew and fasten the pipe with the screw. (Do not fasten it with the screw before inserting the clamp spacer. Otherwise the tonearm may be damaged.)

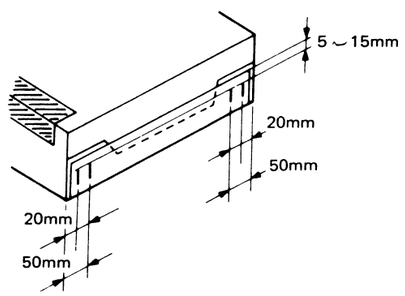
2. Put the unit into polyethylene bag, and make the package as shown below.



3. Plase the unit (with cushions attached) as illustrated.
4. Fold the flaps according to the line marks.
5. Seal the top with adhesive tape.
   * Use gum tape or adhesive cloth tape of 50mm wide at least.
6. For the edges, first fold the flap "a" and then flap "b", and staple. Remember to staple only flap "b". (Use 15 or 16mm staple)



* Stapling positions are shown below.



Printed in Japan
850406500 Ⓗ TK/HY

ORDER NO. HAD85052536C0–A

QUARTZ Direct Drive Automatic Turntable System

SL-MA1

- This booklet contains specifications and adjustment of Model SL–MA1 (Order No. HAD85052536C0) written in German, French and Spanish.
- File this booklet together with the service manual of Model SL–MA1.

- Dieses broschüre die technischen Daten und Justierungsanleitungen von Modell SL–MA1 (Bestell-Nr. HAD85052536C0) in den Sprachen Deutsch, Französisch und Spanisch.
- Bewahren Sie dieses Büchlein zusammen mit dem Service-Handbuch von Modell SL–MA1 auf.

- Cette brochure contient les spécifications et la mise au point du Modèle SL–MA1 (N° d'Ordre HAD85052536C0) écrites en allemand, en français et en espagnol.
- Classer cette brochure en même temps qu'avec le manuel de service du N° du Modèle SL–MA1.

- Este librito contiene las especificaciones de y ajuste Modelo SL–MA1 (Pedido N° HAD85052536C0) escritas en alemán, francés y español.
- Guardar este librito juntamente con el manual de servicio de Modelo SL–MA1.

DEUTSCH

■ TECHNISCHE DATEN

(DIN 45 500)

■ Plattenteller

Typ:	Vollautomatischer Plattenspieler mit Quarz-Direktantrieb
Eigenschaften:	Auto-Start/Auto-Zuführung Rückführautomatik Stopautomatik Wiederholtes Abspielen Suchabspiel mit 2 Geschwindigkeiten
Antrieb:	Direktantrieb
Motor:	Kollektorloser Gleichstrommotor
Antriebsregelmethode:	Phasenverriegelte Quarzsteuerung
Plattenteller:	Aluminium-Druckguß Durchmesser 32,5 cm
Plattenteller-Drehzahlen:	33-1/3 und 45 U./min. Automatische Drehzahlwahl (manuelle Wahl möglich)
Gleichlaufschwankungen:	0,012% WRMS* 0,025% WRMS (JIS C5521) ±0,031% Spitze (IEC 98A bewertet)

*Gemessen anhand von Signalen vom eingebauten Frequenzgenerator des Motorteils.

Rumpeln:	–70 dB (IEC 98A unbewertet) –81 dB (IEC 98A bewertet)

■ Tonarm

Typ:	Linearabtastungs-Tonarm mit 4-Punkt-Kardanaufhängung, statisch balanciert
Effektive Länge:	23 cm
Spurfehlwinkel:	Innerhalb 2°32' an der Einlaufrille einer 30 cm-Schallplatte Innerhalb 0°32' an der inneren Rille einer 30 cm-Schallplatte
Effektive Masse:	9 g (einschließlich Tonabnehmer)
Resonanzfrequenz:	10 Hz
Tonarm-Antriebsmotor:	Gleichstrommotor
Phonokabel-Kapazität:	100 pF

■ Tonabnehmer

Typ:	Beweglicher Magnet-Stereo-Tonabnehmer 14P
Magnetkreis:	Ganzlamellenkern
Frequenzgang:	10 Hz bis 50 kHz 20 Hz bis 10 kHz ±1 dB
Ausgangsspannung:	2,5 mV bei 1 kHz 5 cm/s. Null-zu-Spitze, lateral [7 mV bei 1 kHz 10 cm/s. Null-zu-Spitze, 45° (DIN 45 500)]
Kanaltrennung:	22 dB bei 1 kHz
Kanalabweichung:	Innerhalb 1,8 dB bei 1 kHz
Empfohlene Endimpedanz:	47 kΩ~100 kΩ
Nachgiebigkeit (dynamisch):	12×10^{-6}cm/dyn bei 100 Hz
Nadeldruckbereich:	1,25±0,25 g (12,5±2,5 mN)
Gewicht:	6 g (nur Tonabnehmer)
Ersatznadel:	EPS-33ES (elliptisch)

■ Allgemeine Daten

Stromversorgung: ~110-127/220-240V, 50 order 60 Hz

Leistungsaufnahme: 18 W/2 W (Wenn nur der Strom ausgeschaltet wird, verbraucht das Gerät 2 W.)

Abmessungen: (B×H×T) 45,3 × 17 × 40,8 cm (Maximale Höhe bei vollständig geöffnetem Gehäuseoberteil) 45,3 × 52 × 60 cm

Gewicht: 9 kg

Änderungen der technischen Daten vorbehalten.
Die angegebenen Gewichts- und Abmessungsdaten sind ungefähre Werte.

■ MESSUNGEN UND JUSTIERUNGEN

Justierung der Taktfrequenz

1. Die IC401-Seite von R412 ~ R415 kurzschließen und an den Schalterdraht (+5V) in der Nähe von IC401, Stift 40 verbinden (oder IC401, Stifte 14 ~ 17 kurzschließen und mit Stift 39 verbinden).
2. Das Oszilloskop an die Anodenseite von D401 (order IC401, Stift 4) anschließen.
3. Den Ein-/Aus-Schalter einschalten.
4. VR401 so justieren, daß die Periode der Wellenform 30 ± 1 μsec beträgt.

Justierung der Offset-Spannung

1. Das Gleichstrom-Voltmeter oder Oszilloskop an TP201 anschließen und die Plus-Seite (+) von C203 (oder diese an IC201, Stift 1 und 8) anschließen.
2. Den Ein-/Aus-Schalter einschalten.
3. VR201 so justieren, daß die Gleichspannung 0 ± 20 mV beträgt. Wenn die Spannung schwankt, so ist diese Schwankung durch Justieren so gering wie möglich zu machen.

Anmerkung: Das Gerät auf eine horizontale Oberfläche stellen und den Arm auf der Tonarmablage festklemmen, um die Justierung durchzuführen.

Justierung der Tonarmlifthöhe

Die Tonarmlifthöhe, d.h. der Abstand zwischen Nadelspitze und Schallplattenoberfläche bei Liftsteuerungs-Position "▼", wurde werkseitig auf ca. 5 ~ 7 mm eingestellt.
Falls der Abstand zu klein oder zu groß ist (z.B. wegen der unterschiedlichen Tonabnehmer-Abmessungen, drehen Sie die Justierschraube im Uhrzeigersinn oder entgegen dem Uhrzeigersinn.

Drehung im Uhrzeigersinn
— Der Abstand zwischen der Platte und der Nadelspitze wird kleiner.

Drehung entgegen dem Uhrzeigersinn
— Der Abstand zwischen der Platte und der Nadelspitze wird gräßer.

Justierung des Aufsetzpunktes der Automatik

Wenn der Tonarm in der Nähe der Plattenmitte ist, so ist die Auto-Rückkehr-Justierschraube sichtbar.
Wenn die Abtastnadel nicht in der Einlaufrille aufsetzt, justieren Sie wie folgt.

1. Befestigen Sie den Tonarm mit der Arretierklammer auf der Tonarmablage.
2. Nehmen Sie die Gummikappe von der Auto-Start-Positions-Justierschraube ab.
3. Drehen Sie die Justierschraube im Uhrzeigersinn oder entgegen dem Uhrzeigersinn, wie erforderlich.

Falls der Aufsetzpunkt im Wiedergabeteil der Schallplatte liegt.
— Entgegen dem Uhrzeigersinn drehen.
Falls der Aufsetzpunkt außerhalb der Platte liegt.
— Im Uhrzeigersinn drehen.
Justieren Sie so, daß die Nadelspitze 1 ~ 2 mm vom Rand entfent auf der Platte aufsetzt.

FRANÇAIS

■ CARACTERISTIQUES

■ Platine de lecture

Type: Entraînement direct par quartz
Platine automatique

Caractéristiques: Démarrage automatique/Entrée automatique,
Sélection optique automatique du diamètre,
Sélection optique automatique de la vitesse,
Retour automatique/Arrêt automatique,
Audition répétée,
Lecture de recherche à 2 vitesses.

Système d'entraînement: Entraînement direct

Moteur: Moteur C.C. sans balai

Système de commande d'entraînement: Réglage d'accrochage de phase par quartz

Plateau de lecture: Aluminium moulé sous pression
Diamètre 32,5 cm

Vitesses de la platine: 33-1/3 et 45 t/p.m.
Sélecteur de vitesse automatique (Sélection manuelle possible)

Pleurage et scintillement: 0,012% de valeur efficace*
0,025% de valeur efficace (JIS C5521)
±0,031% de crête (IEC 98A pondéré)

*Mesuré par l'obtention d'un signal provenant du générateur de fréquences incorporé de l'ensemble du moteur.

Ronflement: −70 dB (IEC 98A non pondéré)
−81 dB (IEC 98A pondéré)

■ Bras de lecture

Type: Bras de lecture tubulaire rectiligne de type statiquement équilibré avec suspension à la cardan sur 4 pivots

Caractéristiques: Electroniquement contrôlé
Entrée automatique/Retour automatique

Longueur effective: 23 cm

Erreur d'angle d'alignement: En deçà de 2°32' au sillon extérieur d'un disque de 30 cm (12 pouces)
En deçà de 0°32' au sillon intérieur d'un disque de 30 cm (12 pouces)

Masse réelle: 9 g (y compris la cellule pick-up)

Fréquence de résonance: 10 Hz

Moteur d'entraînement du bras de lecture: Moteur C.C. sans balai

Capacitance du câble phono: 100 pF

Plage de la force verticale d'appui 1,25 ±0,25 g (12,5 ±2,5 mN)

■ Cellule pick-up

No du modèle: EPC-P33

Type: Cellule pick-up stéréo à aimant mobile [14P]

Circuit magnétique: Noyau entièrement feuilleté

Réponse en fréquence: 10 Hz à 50 kHz
20 Hz à 10 kHz ±1 dB

Tension de sortie: 2,5 mV à 1 kHz; 5 cm/s. Zéro à vitesse latérale de crête
(7 mV à 1 kHz; 10 cm/s. Zéro à vitesse 45° de crête [DIN 45 500])

Séparation des canaux: 22 dB à 1 kHz

Equilibrage des canaux: En deçà de 1,8 dB à 1 kHz

Impédance de charge recommandée: 47 kΩ~100 kΩ

Elasticité (dynamique): 12×10^{-6}cm/dyne à 100 Hz

Plage de la force verticale d'appui: 1,25±0,25 g (12,5±2,5 mN)

Poids: 6 g (cellule seule)

Remplacement de la pointe de lecture: EPS-33ES (ellipsoïdale)

■ Généralités

Alimentation: ~110-127/220-240V, 50 ou 60 Hz

Consommation: 18 W/2 W avec l'interrupteur d'alimentation mis hors circuit

Dimensions: (L × H × P) 45,3 × 17 × 40,8 cm
Hauteur maximum lorsque le couvercle protège-poussière est ouvert: 45,3 × 52 × 60 cm.

Poids: 9 kg

Les spécifications sont susceptibles d'être modifiées sans avertissement préalable.
Le poids et les dimensions donnés sont approximatifs.

■ MESURAGES ET RÉGLAGES

Réglage de la fréquence d'horloge

1. Court-circuiter le côté IC401 de R412 ~ R415 et le raccorder à la bretelle (+5V) de la broche 40 de IC401 (ou court-circuiter les broches 14 ~ 17 de IC401, et le raccorde à la broche 39).
2. Brancher l'oscilloscope au côté de l'anode de D401 (ou de la broche 4 de IC401).
3. Mettre en circuit l'interrupteur d'alimentation.
4. Régler VR401 de telle sorte que la durée de la forme d'onde soit de 30 ± 1 μsec.

Réglage de la tension de décalage

1. Raccorder le voltmètre à C.C. ou l'oscilloscope à TP201 et au côté positif (+) de C203 (ou le raccorder aux broches 1 et 8 de IC201).
2. Mettre en circuit l'interrupteur d'alimentation.
3. Régler VR201 de telle sorte que la tension C.C. soit de 0 ± 20 mV.
   Si la tension varie, la régler pour miniser la variation.

Nota: Placer l'appareil sur une table horizontale et bloquer le bras lorsque l'on effectue la mise au point.

Mise au point de la hauteur de l'élévateur du bras

La hauteur de l'élévateur du bras (distance entre l'extrémité de la pointe de lecture et la surface du disque, lorsque la commande de pose et de relevage est à la position " ▼ ") a été réglée en usine sur approximativement 5 à 7 mm.
Si l'écartement est trop étroit ou trop large, tourner la vis de réglage dans le sens des aiguilles d'une montre ou dans le sens contraire.

Rotation dans le sens des aiguilles d'une montre.
– La distance entre la surface du disque et l'extrémité de la pointe de lecture diminue.

Rotation dans le sens contraire des aiguilles d'une montre.
– La distance entre la surface du disque et l'extrémité de la pointe de lecture augmente.

Mise au point de la position de d'emarrage automatique

Si la pointe de lecture ne repose pas dans le sillon d'entrée, ajuster de la manière suivante.

1. Bloquer le bras de lecture sur le support du bras.
2. Retirer le capuchon en caoutchouc.
3. Avec un tournevis, tourner la vis de réglage dans le sens des aiguilles d'une montre ou dans le sens inverse selon la nécessité.

Si la tête de la pointe de lecture se dépose trop loin du sillon enregistré,
—tourner dans le sens contraire des aiguilles d'ue montre.
Si la tête de la pointe de lecture se dépose en dehors du disque,
– tourner dans le sens des aiguilles d'une montre.
Ajuster de façon à ce que l'extrémité de la pointe de lecture atterrisse à 1 ~ 2 mm à partir du bord du disque.

ESPAÑOL

■ ESPECIFICACIONES

■ Sección del plato giratorio

Tipo: Plato giratorio automático con accionamiento directo por cuarzo

Ventajas: Arranque/descenso automáticos
Selección óptica automática del tamaño
Selección óptica automática de la velocidad
Retorno/parada automáticos
Ejecución repetida
Ejecución con búsqueda con 2 velocidades

Método de accionamiento: Accionamiento directo

Motor: Motor de corriente continua sin escobillas

Método de control de accionamiento: Control enclavado de fase de cuarzo

Platillo del plato giratorio: Aluminio fundido
32,5 cm de diámetro

Velocidades del plato giratorio: 33-1/3 y 45 rpm
Selección automática de la velocidad
(También posibilidad de seleccionar a mano)

Ululaciones y trémolo: 0,012% WRMS*
0,025% WRMS (JIS C5521)
±0,031% cresta
(IEC 98A Ponderado)

*Medido obteniendo una señal proveniente del generador de frecuencias incorporado del conjunto del motor.

Ruido de rodadura: −70 dB (IEC 98A No ponderado)
−81 dB (IEC 98A Ponderado)

■ Sección del brazo sonoro

Tipo: Brazo sonoro con tubo recto estáticamente equilibrado, suspensión cardánica de 4 pivotes

Ventajas: Descenso/retorno automáticos electrónicamente controlados

Longitud efectiva: 23 cm

Angulo de error de seguimiento: Inferior a 2°32' en el surco exterior de un disco de 30 cm (12")
Inferior a 0°32' en el surco interior de un disco de 30 cm (12")

Masa efectiva: 9 g (incluyendo el cartucho)

Frecuencia de resonancia: 10 Hz

Motor de accionamiento del brazo sonoro: Motor de corriente continua sin escobillas

Capitancia del cable del fonógrafo: 100 pF

Radio de presión de la aguja: 1,25 ±0,25 g

■ Sección del cartucho

Núm. del model: EPC-P33

Tipo: Cartucho estereofónico de imán móvil [14P]

Circuito magnético: Núcleo totalmente laminado

Respuesta de frecuencia: 10 Hz a 50 kHz
20 Hz a 10 kHz ±1 dB

Voltaje de salida: 2,5 mV a 1 kHz
Velocidad lateral de cero a cresta de 5 cm/s
(7 mV a 1 kHz, Velocidad de 45° de cero a cresta de 10 cm/s [DIN 45 500])

Separación de canales: 22 dB a 1 kHz

Equilibrio de canales: Inferior a 1,8 dB a 1 kHz

Impedancia de carga recomendada: 47 kΩ a 100 kΩ

Elasticidad (dinámica): 12×10^{-6}cm/dina a 100 Hz

Radio de presión de la aguja: 1,25±0,25 g (12,5±2,5 mN)

Peso: 6 g (cartucho solamente)

Aguja de recambio: EPS-33ES
(Aguja elíptica)

■ En general

Alimentación de corriente: ~110-127/220-240V, 50 ó 60 Hz

Consumo de corriente: 18 W/2 W con el interruptor de corriente apagado

Dimensiones: (Ancho×Alto×Prof.) 45,3 × 17 × 40,8 cm
(Altura máxima cuando la tapa contra el polvo está abierta: 45,3 × 52 × 60 cm)

Peso: 9 kg

Las especificaciones quedan sujetas a cambios sin aviso previo.
Los pesos y las dimensiones son aproximativos.

■ MEDICIONES Y AJUSTE

Ajuste de frecuencia de reloj

1. Cortacircuite el lado de IC401 R412 ~ R415 y conéctelo al puente (+5V) cerca del pernos 40 de IC401 (o cortacircuite los pernos 14 ~ 17 de IC401, y conéctelo al perno 39).
2. Conecte el osciloscopio al lado del ánodo de D401 (o perno 4 de IC401).
3. Prenda el interruptor de alimentación.
4. Ajuste VR401 de manera que el periodo de forma de onda sea 30 ± 1 μseg.

Ajuste de voltaje de desnivel

1. Conecte el voltímetro de CC u osciloscopio a TP201 y el lado más (+) de C203 (o conéctelo a los pernos 1 y 8 de IC201).
2. Prenda el interruptor de alimentación.
3. Ajuste VR201 de manera que el voltaje de CC sea 0 ± 20 mV.
   Si el voltaje fluctúa, ajústelo para minimizar la fluctuación.

Nota: Ponga el aparato sobre una mesa horizontal y fije el brazo al hacer el ajuste.

Ajuste de la altura de elevación del brazo

La altura de elevación del brazo (o sea, la distancia entre la punta de la aguja y la superficie del disco cuando el control de colocación está en la posición " ▼ ") ha sido regulada en la fábrica aproximadamente entre 5 y 7 mm.
En caso que la distancia fuese demasiado abundante o demasiado escasa, girar el tornillo de ajuste hacia la derecha o hacia la izquierda.

Rotación hacia la derecha
— raduce la distancia entre el disco y la punta de la aguja.

Rotación hacia la izquierda
— aumenta la distancia entre el disco y la punta de la aguja.

Ajuste de la posición para el arranque automático

En caso que la aguja no se depositara en el surco de comienzo, regular de la manera que sigue.

1. Sujetar el brazo sonoro al apoyo del mismo con la grapa.
2. Quitar la tapita de goma.
3. Girar el tornillito de ajuste hacia la derecha o hacia la izquierda usando un destornillador, según sea necesario.

En caso que la punta de la aguja se deposita muy dentro del surco grabado:
— Girar hacia la izquierda.
En caso que la punta de la aguja se deposita fuera del disco:
— Girar hacia la derecha.
Regular de manera tal que la punta de la aguja se deposite a uno o dos milímertros del borde del disco.

Printed in Japan
850502700 Ⓑ TK