

Service Manual

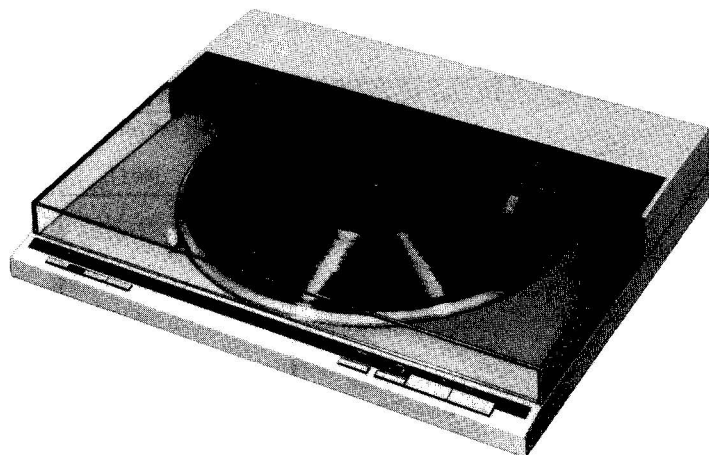
QUARTZ Direct Drive Automatic Turntable System

SL-QL1

[E], [EK], [XL], [EF],
[XA], [EB], [EG], [EI], [EH]

SL-QL1(K)

[XL], [EG],
[E], [EH], [XA]



* The colors of this model include silver and black. The black type model is provided with (K) in the Service Manual.

Areas

- * [E] is available in Switzerland and Scandinavia.
- * [EK] is available in United Kingdom.
- * [XL] is available in Australia.
- * [EF] is available in France.
- * [EB] is available in Belgium.
- * [EG] is available in F.R. Germany.
- * [EI] is available in Italy.
- * [EH] is available in Holland.
- * [XA] is available in East South Asia, Oceania, Africa, Middle Near East and Central South America.

English

Specifications

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

General

Power supply: ~ 110-120/220-240V, 50/60 Hz
Power consumption: 20 W
Dimensions: 43 x 8.8 x 35 cm
 (W x H x D) 43 x 39.7 x 35 cm
 (Maximum height when top
 (dust cover) is open.)
Weight: 7.4 kg (16.3 lb.)

Turntable section

Type: Quartz direct drive
 Automatic turntable
 Auto start/Auto lead-in
 Auto return
 Auto stop
 Repeat play
 Auto speed select
 Manual speed selection possible.
 Auto size select
 2-speed search functions
 Record presence detection
Drive method: Direct drive
Motor: Brushless DC motor
Drive control method: Quartz-phase-locked control
Turntable platter: Aluminum die-cast
 Diameter 31.2 cm

Turntable speeds: 33-1/3 rpm and 45 rpm
 Auto speed select
 (Manual selection possible)
Speed deviation: Within $\pm 0.002\%$
Wow and flutter: 0.012% WRMS*
 0.025% WRMS (JIS C5521)
 $\pm 0.035\%$ 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 $\pm 0.1^\circ$
Effective mass: 9 g (including cartridge)
Resonance frequency: 12 Hz
Tonearm drive motor: DC motor

Technica

Matsushita Electric Trading Co., Ltd.

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Cartridge section

Type:	Moving magnet stereo cartridge
	One point suspension system
Magnet:	Samarium cobalt (Sm-Co)
Cantilever:	Pure boron pipe
Magnetic circuit:	All laminated core
Frequency response:	10 Hz to 50 kHz
	20 Hz to 35 kHz ± 3 dB
	20 Hz to 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:	More than 22 dB at 1 kHz
Channel balance:	Within 1.8 dB at 1 kHz
Recommended load impedance:	47 k Ω ~ 100k Ω
Compliance (dynamic):	12×10^{-6} cm/dyne at 100 Hz
Vertical tracking angle:	20°
Stylus pressure range:	1.25 $\pm$ 0.25 g (12.5 $\pm$ 2.5 mN)
Stylus tip:	0.3 x 0.7 mil (7.5 x 18 μ m)
Weight:	6 g (cartridge only)
Replacement stylus:	EPS-22ES
	(Equivalent replacement stylus:
	EPS-22EB (EPS-202ED).)

TECHNISCHE DATEN

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

Allgemeine Daten

Stromversorgung:	~ 110-120/220-240 V, 50/60 Hz
	Wechselstrom
Leistungsaufnahme:	20 W
Abmessungen:	43 x 8,8 x 3,5 cm
(B x H x T)	43 x 39,7 x 35 cm
	(Maximale Höhe bei vollständig
	geöffnetem Gehäuseoberteil.)
Gewicht:	7,4 kg

Plattenspieler

Typ:	Quarz-Direktantrieb
	Automatischer Plattenspieler
	Auto-Start/Auto-Zuführung
	Rückführautomatik
	Stopp-Automatik
	Wiederhol-Betrieb
	Automatische Drehzahlwahl
	Manuelle Drehzahlwahl möglich
	2-Geschwindigkeiten-
	Suchfunktionen
	Plattenpräsenz-Registrierung
Antrieb:	Direktantrieb
Motor:	Kollektorloser Gleichstrommotor
Antriebsregel-Methode:	Quarz-Steuerung (QPL)
Plattenteller:	Aluminium-Druckguß
	Durchmesser 31,2 cm
Plattenteller-	
Drehzahlen:	33-1/3 und 45 U/min
	Automatische Drehzahlwahl
	(manuelle Wahl möglich)
Drehzahlabweichung:	Innerhalb $\pm 0,002\%$
Gleichlaufschwankungen:	0,012% WRMS*
	0,025% WRMS (JIS C5521)
	$\pm 0,035\%$ Spitze
	(IEC 98A bewertet)

*Gemessen anhand von Signalen vom eingebauten Frequenzgenerator des Motorbauteils.

Rumpel-Fremd-

spannungsabstand: -56 dB (IEC 98A unbewertet)

Rumpel-Geräusch-

spannungsabstand: -78 dB (IEC 98A bewertet)

■ Tonarm

Typ:	Dynamisch ausbalancierter
	Tangential-Tonarm mit Kardan-
	aufhängung mit 4-Punkt-Drehlager
Effektive Länge:	105 mm
Spurfehlwinkel:	Innerhalb $\pm 0,1^\circ$
Effektive Masse:	9 g (einschließlich Tonabnehmer)
Resonanzfrequenz:	12 Hz
Tonarm-Antriebsmotor:	Gleichstrommotor

■ Tonabnehmer

Typ:	Stereo-Magnet-Tonabnehmer mit
	Einpunkt-Aufhängungssystem
Magnet:	Samarium-Kobalt (SM-Co)
Nadelträger:	Röhre aus reinem Bor
Magnetkreis:	Ganzlamellenkern
Frequenzgang:	10 Hz bis 50 kHz
	20 Hz bis 35 kHz ± 3 dB
	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)]
	Mehr als 22 dB bei 1 kHz
Kanaltrennung:	
Empfohlene	
Endimpedanz:	47 k Ω ~ 100k Ω
Nachgiebigkeit	
(dynamisch):	12×10^{-6} cm/dyn bei 100 Hz
Vertikaler Spurwinkel:	20°
Auflagekraft-	
Einstellbereich:	1,25 $\pm$ 0,25 g (12,5 $\pm$ 2,5 mN)
Nadelspitze:	0,3 x 0,7 Mil (7,5 x 18 μ m)
Gewicht:	6 g (nur Tonabnehmer)
Ersatznadel:	EPS-22ES
	(Gleichwertige Ersatznadel:
	EPS-22ED (EPS-202ED))

SL-QL1

Français

CARACTERISTIQUES

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

■ Généralités

Alimentation: Alternatif 110-120/220-240V, 50/60 Hz
Consommation: 20 W
Dimensions: 43 x 8,8 x 35 cm
(L x H x P)
43 x 39,7 x 35 cm
(Hauteur maximum lorsque le dessus
(couvercle protégépousière) est ouvert.)
Poids: 7,4 kg

■ Platine de lecture

Type: Entraînement direct à quartz
Platine automatique
Départ automatique/Entrée automatique
Retour automatique
Arrêt automatique
Audition répétée
Sélection de vitesse automatique
Sélection de vitesses manuelle possible
Sélection automatique du diamètre
Fonctions exploratrices à 2 vitesses
Détection de la présence d'un disque
**Système d'entraîne-
ment:** Entraînement direct
Moteur: Moteur C.C. sans balai
Groupe de réglage: Réglage d'accrochage de phase par quartz
Plateau de lecture: Aluminium moulé sous pression
Diamètre 31,2 cm
Vitesses de rotation: 33-1/3 et 45 t/p.m
Sélecteur de vitesse automatique
(Sélection manuelle possible)
Déviati on de la vitesse: En deçà de ±0,002%
**Pleurage et
scintillement:** 0,012% de valeur efficace*
0,025% de valeur efficace
(JIS C5521)
±0,035% de crête
(IEC 98A Pondéré)

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

Ronflement: -56 dB (IEC 98A Non pondéré)
-78 dB (IEC 98A pondéré)

■ Bras de lecture

Type: Bras de lecture d'alignement linéaire
de type à équilibre dynamique
avec suspension à la cardan à 4 pivots
105 mm
Longueur effective: 105 mm
Angle d'erreur de piste: En deçà de ±0,1°
Masse réelle: 9 g (y compris la cellule pick-up)
**Fréquence de
résonance:** 12 Hz
**Moteur d'entraînement
du bras de lecture:** Moteur C.C. sans noyau

■ Cellule pick-up

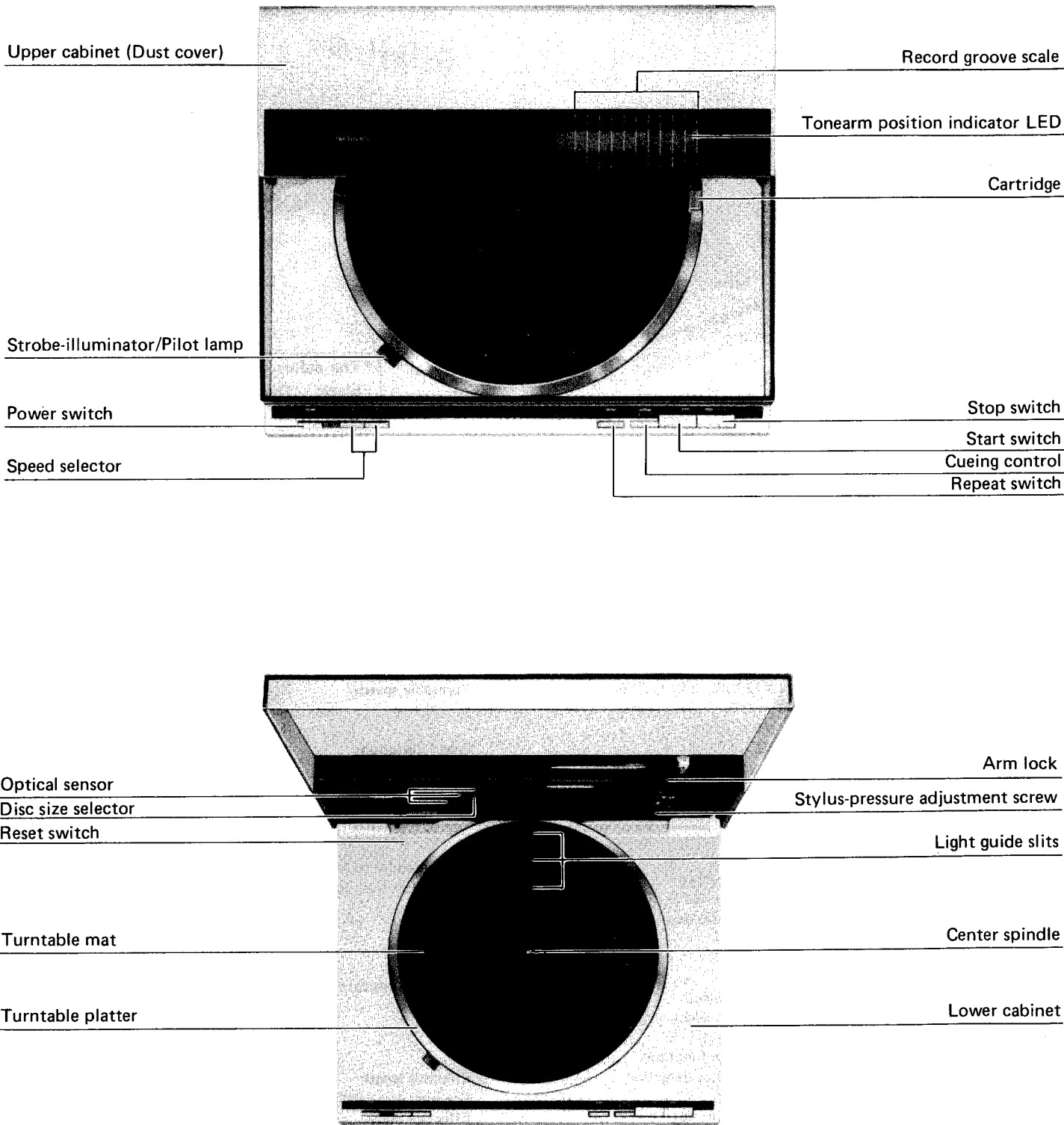
Type: Cellule pick-up stéréo à aimant mobile
Système de suspension ponctuelle
Samarium-Cobalt (Sm-Co)
Aimant: Tube à bore pur
Porte-à-faux: Noyau entièrement feuilleté
Circuit magnétique: 10 Hz à 50 kHz
20 Hz à 35 kHz ± 3 dB
20 Hz à 10 kHz ± 1 dB
Réponse en fréquence: 2,5 mV à 1 kHz; 5 cm/s., zéro
à vitesse latérale de crête
(7 mV à 1 kHz; 10 cm/s., zéro
à vitesse 45° de crête [DIN 45 500])
Tension de sortie: Plus de 22 dB à 1 kHz
Endeçà de 1,8 dB à 1 kHz
Séparation des canaux: 47 kΩ ~ 100 kΩ
Equilibrage des canaux: 12 x 10⁻⁶ cm/dyne à 100 Hz
**Impédance de charge
recommandée:** 12 x 10⁻⁶ cm/dyne à 100 Hz
Elasticité (dynamique): 20°
**Angle d'alignement
vertical:** 20°
**Plage de la force
verticale:** 1,25 ± 0,25 g (12,5 ± 2,5 mN)
**Extrémité de la pointe
de lecture:** 0,3 x 0,7 mil (7,5 x 18μm)
Poids: 6 g (cellule seule)
**Remplacement de la
pointe de lecture:** EPS-22ES
(Pointe de lecture de remplacement
équivalente: EPS-22ED (EPS-202ED))

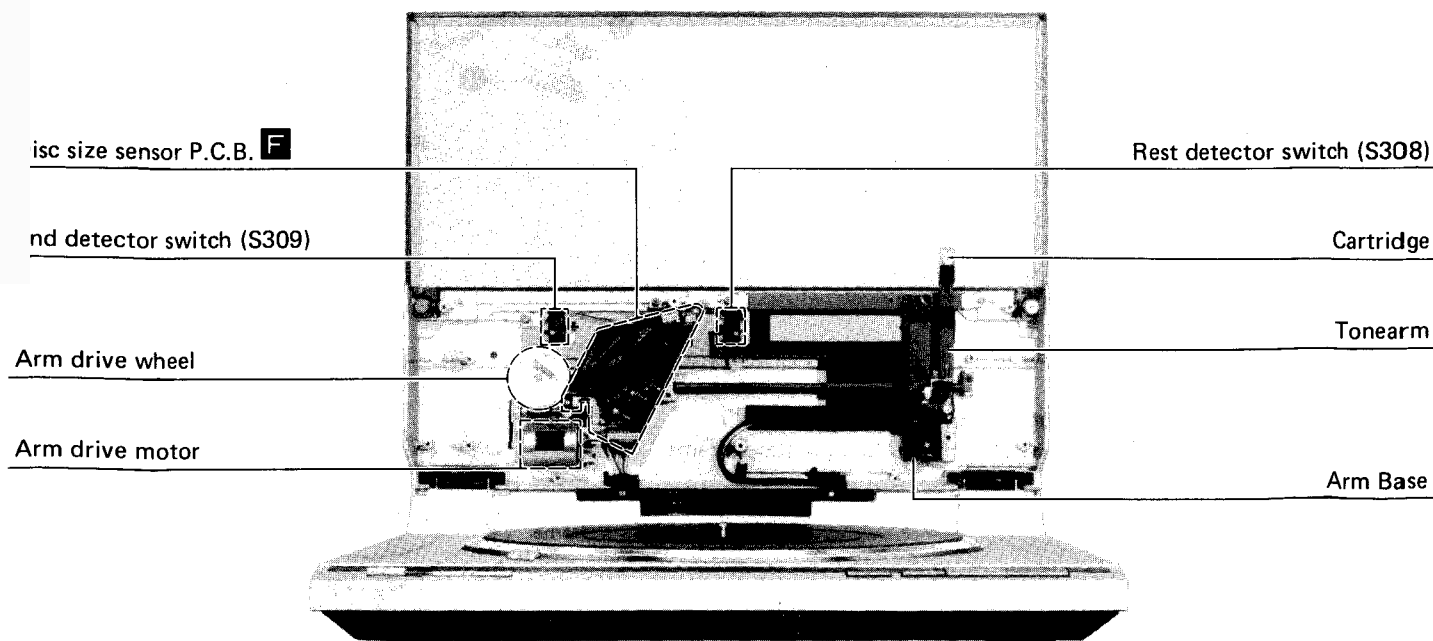
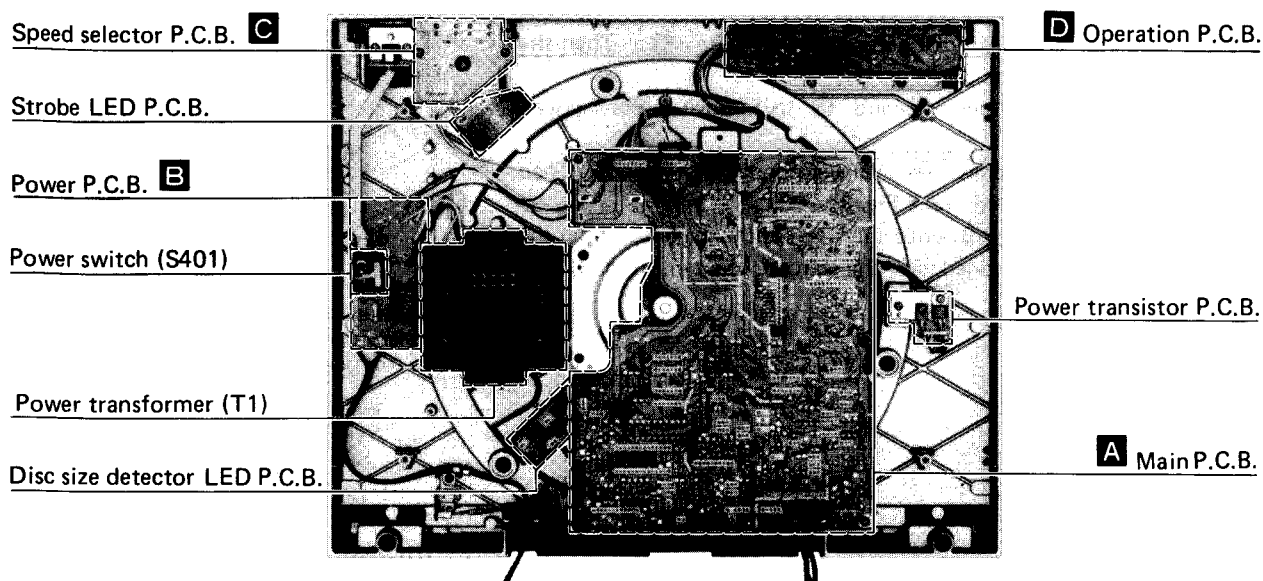
■ CONTENTS

	Page
LOCATION OF CONTROLS	4, 5
DISASSEMBLY INSTRUCTIONS	6 ~ 9
HOW TO SET THE TONEARM DRIVE ROPE	10
REPLACEMENT OF HALL ELEMENT	10
DESCRIPTION OF CONNECTOR	11
MEASUREMENTS AND ADJUSTMENTS (English)	11 ~ 13
MESSUNGEN UND JUSTIERUNGEN (Deutsch)	14, 15
MESURAGES ET MISES AU POINT (Français)	16, 17

	Page
REPLACEMENT PARTS LIST (Cabinet and Chassis Parts)	18, 19
EXPLODED VIEW	19 ~ 21
REPLACEMENT PARTS LIST (Electrical Parts)	22, 29
CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM	23, 24
SCHEMATIC DIAGRAM	25, 26
BLOCK DIAGRAM	27, 28
PACKING	30

■ LOCATION OF CONTROLS





* S309 (end detection switch) will be replaced by MN1400PE of which the end detection unit is built into MN1400PA (IC301) in the course of manufacture. At the time of servicing, it is possible to replace MN1400PA with MN1400PE, but not MN1400PE with MN1400PA. Incidentally, MN1400PE will be supplied as repair parts.

DISASSEMBLY INSTRUCTIONS

How to remove the bottom board and main P.C.B.

Remove the turntable and turntable seat.

Turn the main body upside down, using a soft sheet of cloth or the like as a cushion to protect the upper cabinet and dust cover.

Remove the insulator and bottom board setscrews ① ~ ④. Then the bottom board can be removed. (See Fig. 1)

Remove the rear cover setscrews ⑤ and ⑥ to remove the rear cover. (Fig. 2)

Remove the main P.C.B. setscrews ⑦ ~ ⑩ and connectors ⑪ ~ ⑮. Then the main P.C.B. can be removed. (See Fig. 3)

*When installing the main P.C.B. onto the main body, make sure that the connector ⑮ (CN102) is engaged with the stator frame pin. (Fig. 3)

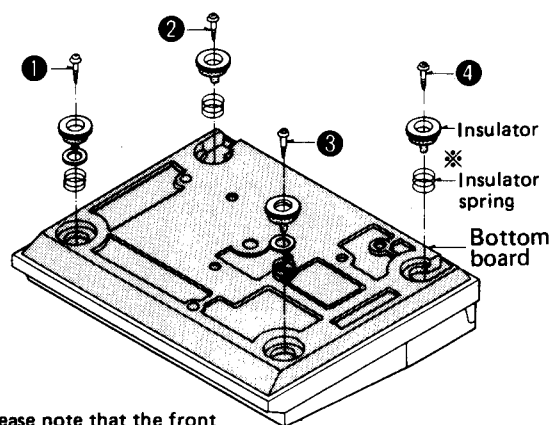


Fig. 1

* Please note that the front and rear insulator springs are different from each other.
Front White
Rear Yellow

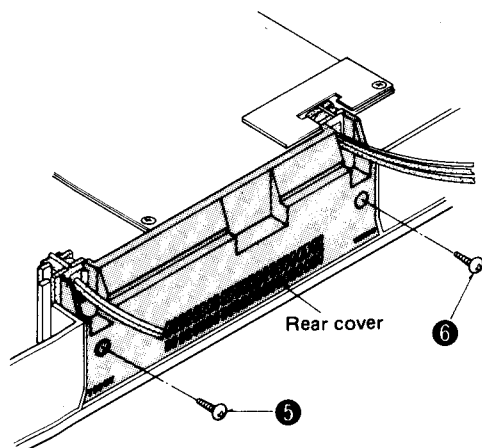


Fig. 2

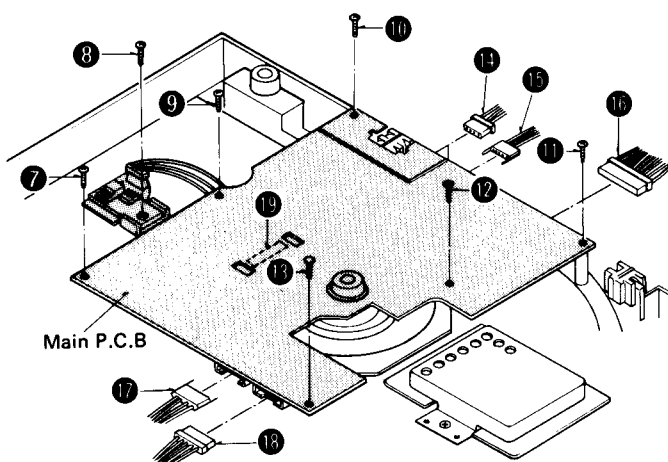


Fig. 3

• How to remove the stator frame

1. Remove the main P.C.B.

(Refer to "How to remove the bottom board and main P.C.B.")

2. Remove the stator frame setscrews ⑲ ~ ⑳. Then the stator frame can be removed. (Fig. 4)

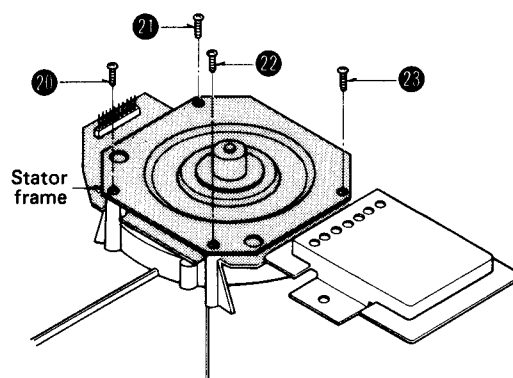


Fig. 4

• How to remove the cartridge

1. Open the upper cabinet and turn the arm lock in the direction of the arrow to lock the tonearm.
2. Loosen the cartridge setscrew with the attached screwdriver. (Turn the setscrew until it is freed as shown in Fig. 5.)
3. Pull out the cartridge, taking care not to touch the stylus. (Fig. 6)
4. When mounting the cartridge, match the tonearm connector with the cartridge pin and completely insert the cartridge and tighten the setscrew. (Fig. 6)

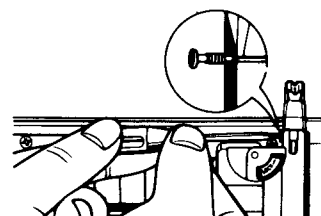


Fig. 5

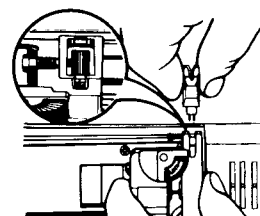


Fig. 6

• How to remove the surface plate and dust cover

1. Remove the cartridge. (Refer to "How to remove the cartridge".)
2. Open the upper cabinet and push the scale part of the surface plate from inside. (Fig. 7)
* Carefully remove the surface plate since it is secured with double-sided tape.
3. Remove the dust cover setscrews 24 ~ 26. (Fig. 8)
4. Completely open the dust cover; remove the upper cabinet cover setscrews 27 ~ 35; and remove the upper cabinet cover while pulling the tonearm in the direction of the arrow. (Fig. 9)
5. Remove the dust cover setscrews 36 and 37.
Then the dust cover can be removed by pulling it in the direction of the arrow. (Fig. 10)

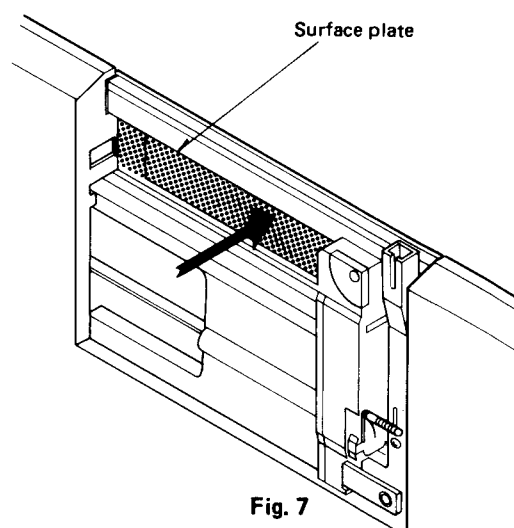


Fig. 7

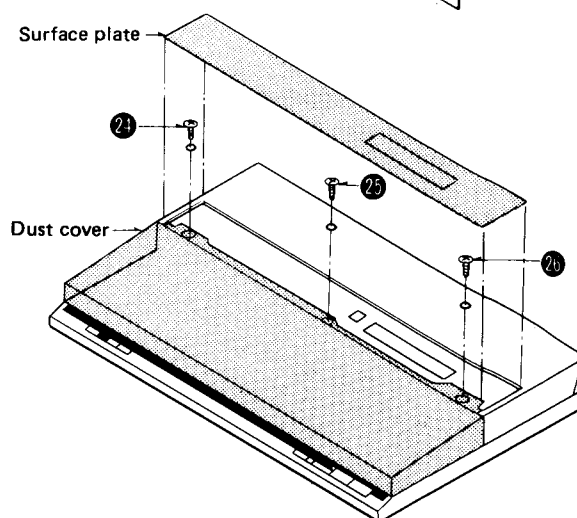


Fig. 8

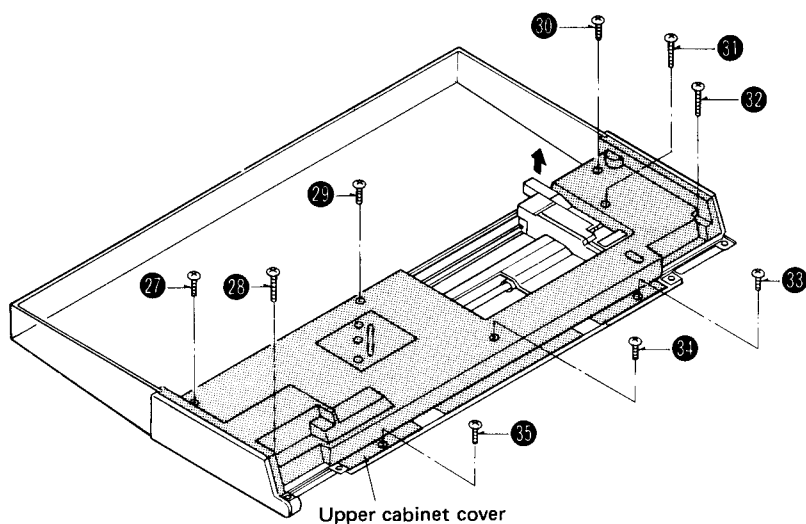


Fig. 9

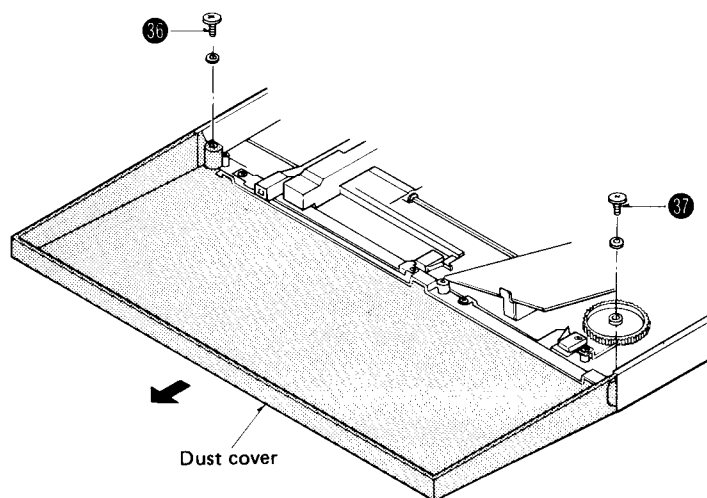


Fig. 10

● How to remove the upper cabinet

1. Remove the rear cover. (Refer to "How to remove the bottom board and main P.C.B.")
2. Remove the connectors 38 ~ 40. (Fig. 11)
3. Remove the hinge setscrews 41 ~ 44; open the upper cabinet and remove it by lifting. (Fig. 11)

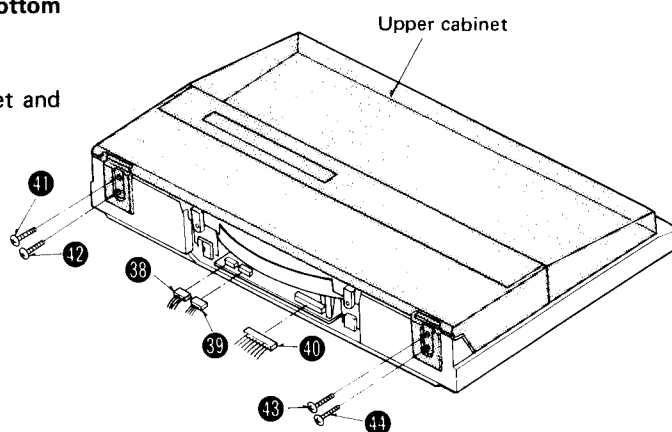


Fig. 11

• How to remove the arm drive plate and disc size sensor P.C.B.

1. Remove the upper cabinet cover. (Refer to "How to remove the surface plate and dust cover.")
2. Remove the disc size sensor P.C.B. setscrew ④⑤ and connectors ④⑥, ④⑦. (Fig. 12)
3. To remove the disc size sensor P.C.B. completely, remove the upper cabinet and the lead wire clasper setscrew ④⑧ in Fig. 12. (Refer to "How to remove the upper cabinet.")
4. Remove the arm drive rope from the tonearm, and remove the arm drive plate setscrews ④⑨ ~ ④⑫. Then the arm drive board can be detached. (Fig. 12)

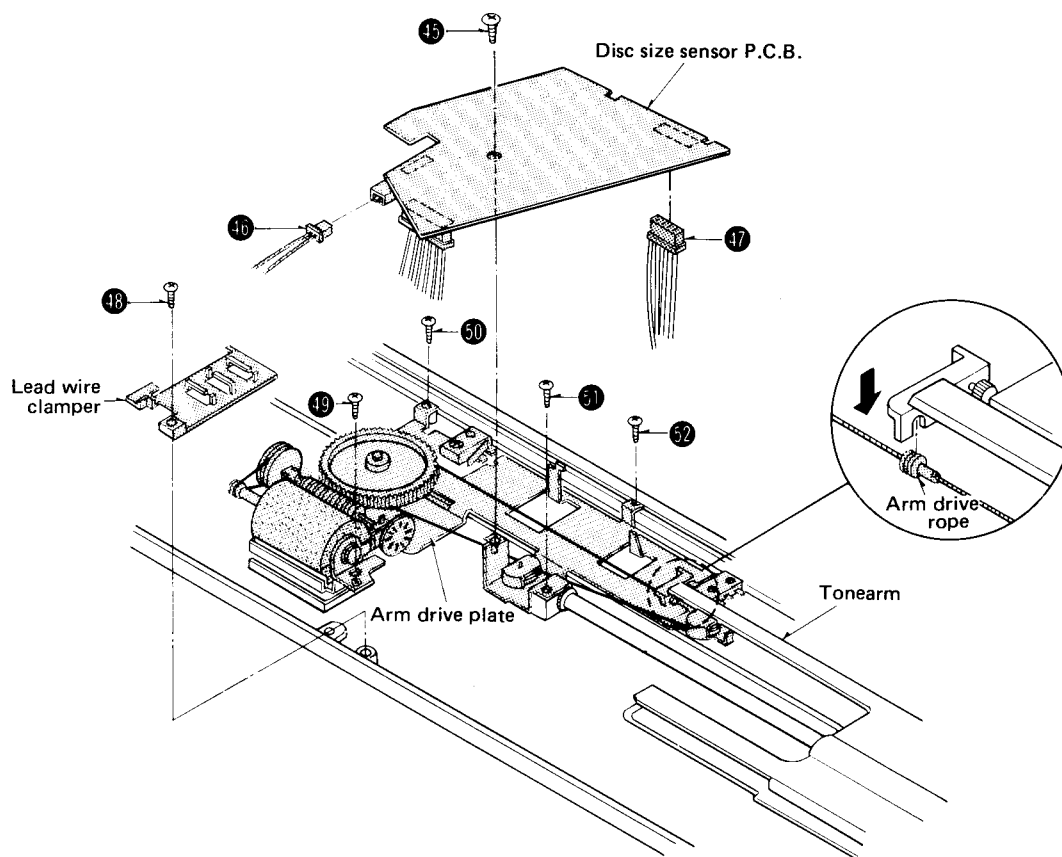


Fig. 12

• How to remove the tonearm

1. Remove the upper cabinet. (Refer to "How to remove the upper cabinet.")
2. Remove the arm drive plate. (Refer to "How to remove the arm drive plate and disc size sensor P.C.B.")
3. Remove the tonearm guide rail setscrew ⑤③ and lead wire clasper setscrews ⑤④, ⑤⑤. Then the tonearm can be removed. (Fig. 13)

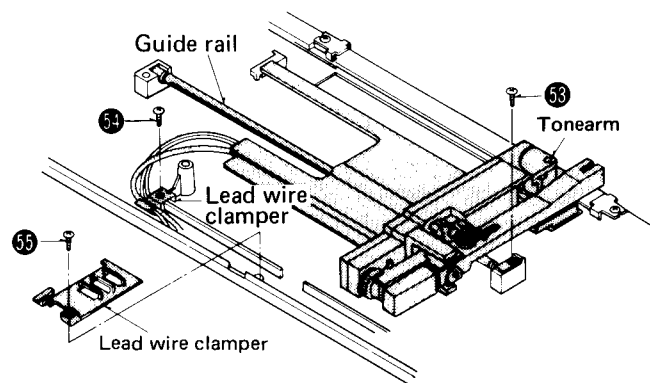


Fig. 13

■ HOW TO SET THE TONEARM DRIVE ROPE

If the rope is disengaged or when setting a new rope, follow the procedure below.

- Remove the upper cabinet cover.
(Refer to "Disassembly instructions.")
- Remove the E-ring (56) and washer (57) to remove the arm drive wheel. (Fig. 14)
- Turn over the arm drive wheel, and set the rope according to the steps 1 ~ 3 in Fig. 15.
- Holding the rope set over the arm drive wheel, set the drive wheel and rope according to the steps 4 ~ 5 in Fig. 16.
- After setting the rope, rotate the worm gear by hand to adjust the tonearm and rope connector positions, and secure them.
- Rotate the worm gear by hand to check that the tonearm moves smoothly.
- Mount the E-ring (56) and washer (57).

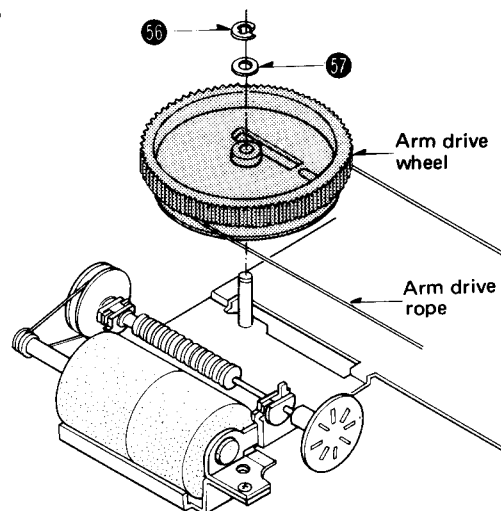


Fig. 14

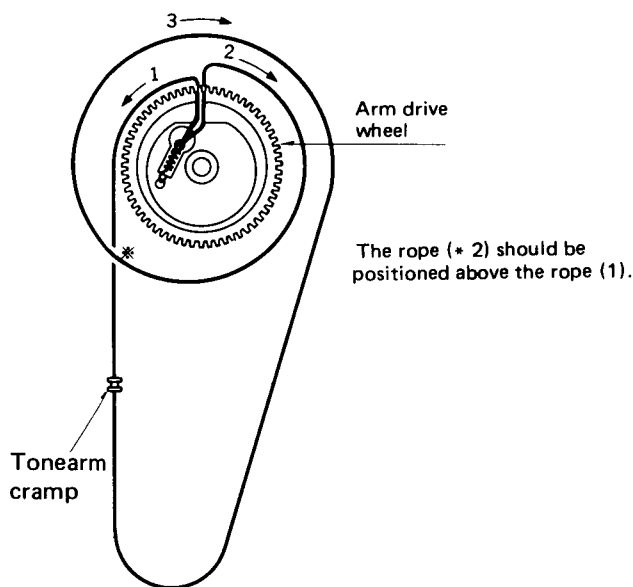


Fig. 15

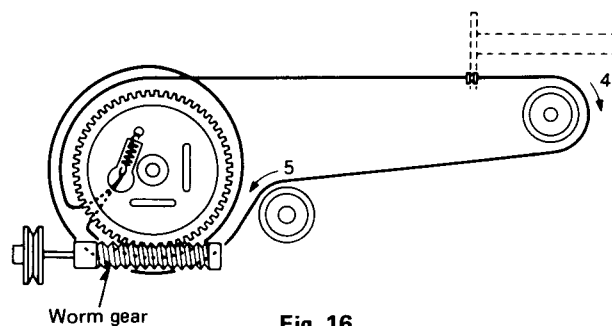


Fig. 16

■ REPLACEMENT OF HALL ELEMENT

When replacing the Hall element of the stator frame, be sure to place it with the marking side up as shown Fig. 17.

- * The leg position is not specified provided that the marking side is up.

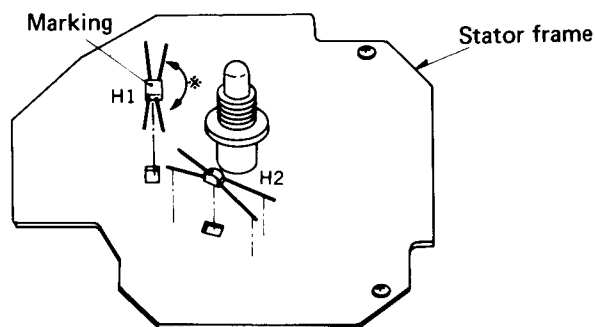


Fig. 17

DESCRIPTION OF CONNECTOR

Two types of connectors are used for this unit: one is directly soldered to the printed circuit board, and the other is insertion type. The insertion type is represented by "CN", while the direct soldering type is by "BT". (See Fig. 18)

Note: Soldered connectors (indicated by BT) cannot be pulled out.

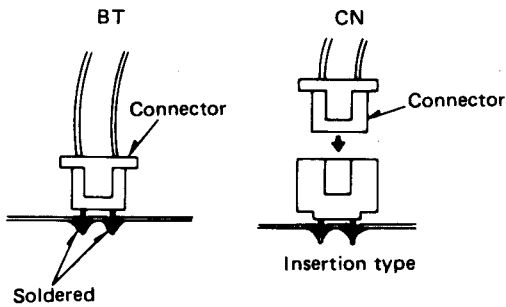


Fig. 18

MEASUREMENTS AND ADJUSTMENTS English

Adjustment of auto start

- (Use a 30cm disc for this adjustment.)
1. Remove the surface plate. (Refer to "Disassembly instructions.")
 2. Make sure that the tonearm is at the start position (the outermost periphery of turntable).
 3. Insert the screwdriver into the adjusting hole. (Fig. 19)
 - * The start position is too much inside:
Turn the screwdriver counterclockwise.
 - * The start position is too much outside:
Turn the screwdriver clockwise.
 4. If the start position is still deflected, turn the auto start position adjusting screw. (Fig. 19)
 - * The start position is too much inside:
Turn it clockwise.
 - * The start position is too much outside:
Turn it counterclockwise.
 5. After the adjustment, be sure to lock the adjusting screw with bond.

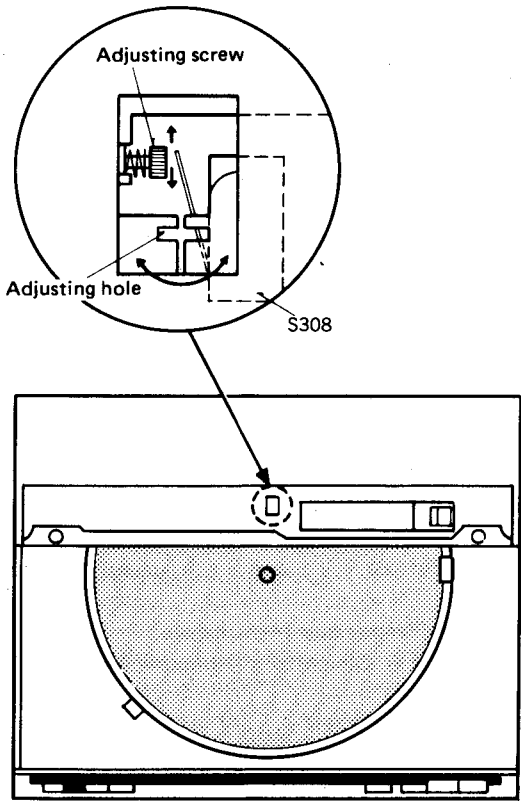


Fig. 19

Adjustment for the stylus pressure

Stylus pressure is normally set to 1.25 grams but may be raised or lowered by ± 0.25 grams. It may be necessary to increase stylus pressure when playing records cut at high levels, or when room temperature is low, or when the unit easily picks up external vibrations. This will help prevent distortion and groove-skipping. To adjust stylus pressure, turn either way, as shown in the diagram. The screw is coupled to the graduated ring.

Note: Do not turn the stylus pressure adjustment screw further than the set limits (1.5 g ~ 1.0 g)

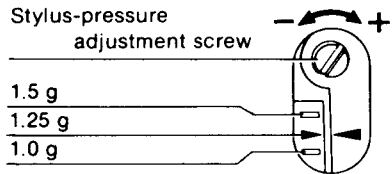


Fig. 20

Offset adjustment of tonearm and servo gain

After repair of the tonearm and arm drive circuit, make the adjustment according to the following procedure.

- Tools and equipment used**
1. DC electronic voltmeters (VTVM).
 2. 1mm pitch record.
 3. Flat head screwdriver (small).
 4. Phillips head screwdriver (small).
 5. Hexagon wrench (M1.5).

Condition of the set

1. Remove the dust cover and surface plate. (Refer to "Disassembly instructions.")
2. Turn the reset switch (S307) "on" by pressing it with tape. (Fig. 21)
3. Remove the rear cover. (Refer to "Disassembly instructions.")
4. Completely open the upper cabinet and make sure that the tonearm operates when the start button is pressed.

Note: The tonearm does not operate with the turntable removed.

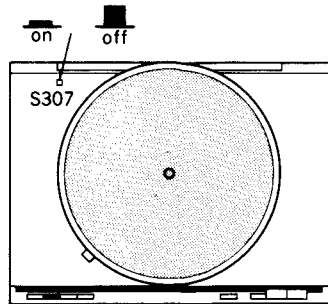
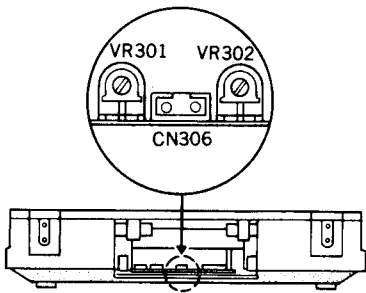
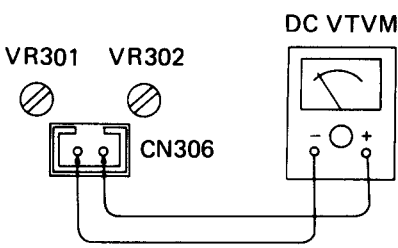
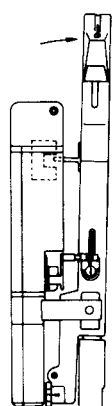
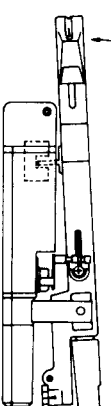
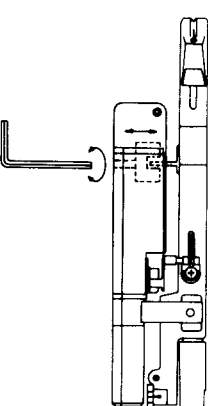
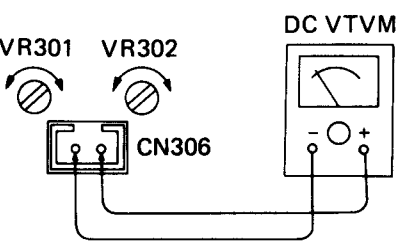


Fig. 21

Step	Item	Adjustment method
1	Adjustment of arm lift height (See Fig. A)	① Turn the power switch "on" and move the tonearm towards the center of disc by pressing the start button. ② Press the cueing button to check that the clearance between the cartridge stylus and the guide rail is about 26mm. ③ If the clearance is incorrect, adjust the lift height by turning the adjusting screw with a flat head screwdriver. - Turn clockwise when excessive ($> 26\text{mm}$). - Turn anticlockwise when insufficient ($< 26\text{mm}$). Note: The lift height adjusting screws of the replacement tonearm is completely tightened up. So, loosen the adjusting screw before making the above adjustment.
2	Offset angle adjustment of tonearm (See Fig. B)	① Turn the power switch "on" and move the tonearm towards the center of disc by pressing the start button. ② Make sure that the arm center is aligned with the V groove of the lift lever. ③ Make sure that the arm base is in parallel with the arm. (Check the clearance between (A) and (B) in Fig. B.) ④ If the arm base is not in parallel with the arm, adjust it by turning the offset angle adjusting screw.

Step	Item	Adjustment method
3	Adjustment of tonearm sensitivity	① Turn the power switch "on" and move the tonearm towards the center of disc by pressing the start button. ② Press the cueing button and make sure that the arm is lowered. ③ Connect the DC VTVM to the connector pin. (See Fig. C, D) ④ Read the voltage values with the tonearm fully shifted to the right and left respectively. (See Fig. E, F) ⑤ Calculate the center voltage from the difference between the two voltage values. For example, when the voltage is 1.5V in Fig. E and 0.02V in Fig. F then $\frac{(1.5V - 0.02V)}{2} + 0.02V = 0.76V$ (middle point voltage) ⑥ Set the tonearm to the center position, and turn the adjusting screw of the arm base by a hexagon wrench until the center voltage is achieved. (See Fig. G)  Fig. C  Fig. D  Fig. E  Fig. F  Fig. G
4	Servo gain and offset adjustment	① Put a recrod on the turntable. ② Open the dustcover 1 or 2 cm, turn the power switch "on" and lower the tonearm. (In this case, do not allow the stylus to touch the disc.) ③ Connect the DC VTVM to the connector pin. (See Fig. H) ④ Make sure that VR301 has been completely turned clockwise. ⑤ Turn VR302 until the DC VTVM indicates 0.72V. (Servo gain adjustment) ⑥ Put a 1 mm-pitch record on the turntable, close the dust cover, and play the record. ⑦ Turn VR301 until the DC VTVM indicates 0.6V. (Offset adjustment)  Fig. H

■ MESSUNGEN UND JUSTIERUNGEN ■ Deutsch

- **Justierung der Auto-Start-Position**
(Für diese Justierung ist eine 30cm-Platte zu verwenden.)
 1. Die Deckplatte abnehmen. (Siehe "Entfernen der Deckplatte".)
 2. Überprüfen, daß der Tonarm in der Start-Position ist (am Außenrand des Plattentellers).
 3. Den Schraubenzieher in das Justierloch einführen. (Abb. 19)
 - * Die Start-Position ist zu weit innen: Den Schraubenzieher entgegen dem Uhrzeigersinn drehen.
 - * Die Start-Position ist zu weit außen: Den Schraubenzieher im Uhrzeigersinn drehen.

- **Justieren Sie die Auflagekraft in dem folgenden Fällen** (Siehe Abb. 20)

Die normale Auflagekraft beträgt 1,25g, doch kann sie um $\pm 0,25$ g gesenkt oder erhöht werden.

Es könnte notwendig sein, die Auflagekraft zu erhöhen, wenn Platten abgespielt werden, die bei hohem Pegel geschnitten wurden, wenn die Raumtemperatur tief ist, oder wenn der Plattenspieler externer Vibration ausgesetzt ist. Dies hilft dabei, Verzerrung und Überspringen der Rillen zu vermeiden.

- **Reibungswinkel-Justierung des Tonarms und der Servo-Verstärkung**

Nach der Reparatur des Tonarms und der Tonarm-Antriebschaltung, sind die folgenden Justierungen durchzuführen.

- Benötigte Werkzeuge und Instrumente**
1. Elektronisches Gleichstrom-Röhrenvoltmeter oder Prüfgerät.
 2. Platte mit 1mm-Rillenabstand.
 3. Flachkopf-Schraubenzieher (klein).
 4. Kreuzkopf-Schraubenzieher (Philips) (klein).
 5. Sechskant-Schlüssel (M1,5).

4. Wenn die Start-Position noch immer von der korrekten Position abweicht, die Auto-Start-Position-Justierschraube drehen. (Abb. 19)
 - * Die Start-Position ist zu weit innen: Im Uhrzeigersinn drehen.
 - * Die Start-Position ist zu weit außen: Entgegen dem Uhrzeigersinn drehen.
5. Nach erfolgter Justierung muß die Justierschraube mit Lack gesichert werden.

Zum Justieren der Auflagekraft kann die Schraube nach links oder rechts gedreht werden, wie in der Skizze gezeigt. Die Schraube ist mit dem gradierten Ring gekoppelt.

Anmerkung:
Drehen Sie die Auflagekraft-Justierschraube nie weiter, als bis zu den Begrenzungen (1,5 g ~ 1,0 g).

- Zustand des Gerätes**
1. Die Staubabdeckung und die Plattentellerauflage entfernen. (Siehe "Anleitung für die Zerlegung".)
 2. Den Deckelschalter (S307) durch Drücken mit Band einschalten. (Abb. 21)
 3. Die Gehäuserückseite entfernen. (Siehe "Anleitung für die Zerlegung".)
 4. Das obere Gehäuse vollständig öffnen und überprüfen, daß der Tonarm funktioniert, wenn die Start-Taste gedrückt wird.
- Anmerkung:** Der Tonarm funktioniert bei ausgebautem Plattenteller nicht.

Schritt	Einstell-Gegenstand	Justiermethode
1	Justierung der Tonarm-Lifthöhe (Siehe Abb. A)	① Den Netzschalter einschalten und den Tonarm durch Drücken der Start-Taste gegen die Plattenmitte bewegen. ② Die Lifttaste drücken und überprüfen, daß der Abstand zwischen der Tonabnehmer-Nadelspitze und der Führungsschiene ca. 26mm beträgt. ③ Falls der Abstand nicht korrekt ist, die Lifthöhe durch Drehen der Justierschraube mit einem Flachkopf-Schraubenzieher justieren. – Bei zu großem Abstand: im Uhrzeigersinn drehen (> 26mm). – Bei zu kleinem Abstand: entgegen dem Uhrzeigersinn drehen (< 26mm). Anmerkung: Die Lifthöhe-Justierschraube des Ersatztonarms ist vollständig angezogen. Die Justierschraube ist daher vor dem Durchführen obiger Justierung zu lösen.
2	Reibungswinkel-Justierung des Tonarms (Siehe Abb. B)	① Den Netzschalter einschalten und den Tonarm durch Drücken der Start-Taste gegen die Plattenmitte bewegen. ② Überprüfen, daß die Tonarmmitte mit der V-Kerbe der Liftachse übereinstimmt. ③ Überprüfen, daß der Tonarm parallel zum Tonarmträger ist. (Den Abstand zwischen ① und ② in Abb. B überprüfen.) ④ Falls der Tonarmträger nicht parallel zum Tonarm ist, durch Drehen der Reibungswinkel-Justierschraube justieren.
3	Justierung der Tonarm-Empfindlichkeit	① Den Netzschalter einschalten und den Tonarm durch Drücken der Start-Taste gegen die Plattenmitte bewegen. ② Die Lifttaste drücken und überprüfen, daß der Tonarm abgesenkt wird. ③ Das Gleichstrom-Röhrenvoltmeter an die Anschlußstifte anschließen. (Siehe Abb. C und D) ④ Die Spannungswerte bei ganz nach rechts und dann nach links gestelltem Tonarm ablesen. (Siehe Abb. E und F) ⑤ Vom Unterschied zwischen den beiden Spannungswerten die Mittelspannung berechnen. Zum Beispiel, wenn die Spannung in Abb. E 1.5V, und in Abb. F 0,02V beträgt: (1,5V – 0,02V) 2 + 0,02V = 0,76V (Mittelpunkt-Spannung) ⑥ Den Tonarm in die Mittelposition stellen, und die Justierschraube der Armbasis mit dem Sechskantschlüssel drehen, bis die Mittelspannung erreicht wird. (Siehe Abb. G)
4	Servo-Verstärkungs- und Reibungswinkel-Justierung	① Eine Platte auf den Plattenteller legen. ② Die Staubabdeckung 1 oder 2 cm öffnen, den Netzschalter einschalten und den Tonarm absenken. (In diesem Fall darauf achten, daß die Abtastnadel die Platte nicht berührt.) ③ Das Gleichstrom-Röhrenvoltmeter an die Steckerstifte anschließen. ④ Überprüfen, daß VR301 bis zum Anschlag im Uhrzeigersinn gedreht worden ist. ⑤ VR302 drehen, bis das Gleichstrom-Röhrenvoltmeter, 0,72V anzeigt. (Servo-Verstärkungs-Justierung) ⑥ Die Platte mit 1mm-Rillenabstand auf den Plattenteller auflegen, die Staubabdeckung schließen, und die Platte abspielen. ⑦ VR301 drehen, bis das Gleichstrom-Röhrenvoltmeter 0,6V anzeigt. (Reibungswinkel-Justierung)

MESURAGES ET MISES AU POINTFrançais

Mise au point du démarrage automatique

(Utiliser un disque de 30 cm pour cette mise au point.)

1. Enlever la plaque ornementale. (Se référer aux "Instructions pour le Démontage".)
2. S'assurer que le bras de lecture est sur la position de démarrage (la périphérie la plus à l'extérieure de la platine).
3. Insérer le tournevis dans le trou de réglage. (Fig. 19)

* La position de démarrage est trop à l'intérieur: Tourner le tournevis dans le sens inverse des aiguilles d'une montre.

* La position de démarrage est trop à l'extérieur: Tourner le tournevis dans le sens des aiguilles d'une montre.

4. Si la position de démarrage est encore déviée, tourner la vis de mise au point du démarrage automatique. (Fig. 19)

* La position de démarrage est trop à l'intérieur: La tourner dans le sens des aiguilles d'une montre.

* La position de démarrage est trop à l'extérieur: La tourner dans le sens inverse des aiguilles d'une montre.
5. Après la mise au point, s'assurer de bloquer la vis de mise au point avec un adhésif.

Mettre au point la force verticale d'appui de la pointe de lecture dans les cas suivants. (Voir Fig. 20.)

La force verticale d'appui de la pointe de lecture est normalement réglée sur 1,25 g, mais elle peut être augmentée ou diminuée de ± 0,25 g.
Il pourra être nécessaire d'augmenter la force verticale d'appui de la pointe lorsqu'on joue des disques enregistrés à des niveaux élevés, ou lorsque le tempèrature de la pièce est basse, ou encore lorsque l'appareil capte facilement des vibrations extérieures.

Cela aidera à empêcher une distorsion et un sautillement des sillons. Pour régler cette force verticale d'appui de la pointe de lecture, tourner la vis de réglage d'un côté ou de l'autre, comme il est montré sur le schéma. La vis est couplée avec la bague graduée.

Nota:
Ne pas tourner la vis de réglage de la force verticale d'appui de la pointe de lecture plus que les limites de réglage admissibles (1,5 ~ 1,0 g).

Mise au point du décalage du bras de lecture et de l'amplification servo-mécanique

Après la révision du bras de lecture et du circuit d'entraînement du bras, effectuer la mise au point suivante selon la procédure ci-dessous.

Outils et équipement à utiliser:

1. Vérificateur ou voltmètre électronique (VTVM) à C.C.
2. Disque à écarts de 1 mm.
3. Tournevis à tête plate (petit).
4. Tournevis à tête Philips (petit).
5. Clef hexagonale (M1,5).

Conditions du réglage:

1. Retirer le couvercle protège-poussière et la plaque de surface. (Se référer aux "Instructions pour le Démontage".)
2. Mettre "en marche" le commutateur (S307) du couvercle en appuyant dessus avec un ruban. (Fig. 21)
3. Retirer le capot arrière. (Se référer aux "Instructions pour le Démontage".)
4. Ouvrir complètement le boîtier supérieur et s'assurer que le bras de lecture fonctionne lorsqu'on appuie sur la touche de démarrage.

Nota: Le bras de lecture ne fonctionne pas lorsque la platine est retirée.

SL-QL1

Etape	Article	Méthode de réglage
1	Mise au point de la hauteur d'élévation du bras (Voir Fig. A)	① Mettre "en marche" l'interrupteur d'alimentation et déplacer le bras de lecture vers le centre du disque en appuyant sur la touche de démarrage. ② Appuyer sur la touche de pose/relevage pour vérifier si l'intervalle entre la pointe de lecture de la cellule pick-up et le rail de guidage est d'à peu près 26 mm. ③ Si l'intervalle n'est pas suffisant, ajuster la hauteur d'élévation en tournant la vis de réglage avec un tournevis à tête plate. – Tourner dans le sens des aiguilles d'une montre si l'intervalle est excessif (> 26 mm). – Tourner dans le sens inverse des aiguilles d'une montre si l'intervalle est insuffisant (< 26 mm). Nota: La vis de réglage de la hauteur d'élévation du bras de lecture de rechange est serrée à fond. Aussi, la desserrer avant d'effectuer la mise au point ci-dessus.
2	Mise au point de l'angle de décalage du bras de lecture (Voir Fig. B)	① Mettre "en marche" l'interrupteur d'alimentation et déplacer le bras de lecture vers le centre du disque en appuyant sur la touche de démarrage. ② S'assurer que le centre du bras soit aligné avec l'encoche en V du levier d'élévation. ③ S'assurer que le socle du bras soit parallèle au bras. (Vérifier l'intervalle entre A et B dans la Fig. B) ④ Si le socle du bras n'est pas parallèle au bras, l'ajuster en tournant la vis de réglage de l'angle de décalage.
3	Mise au point de la sensibilité du bras du lecture	① Mettre "en marche" l'interrupteur d'alimentation et déplacer le bras de lecture vers le centre du disque en appuyant sur la touche de démarrage. ② Appuyer sur la touche de pose/relevage et s'assurer que le bras soit abaissé. ③ Brancher le voltmètre électronique à C.C. à la broche du connecteur. (Voir les Figs. C et D) ④ Observer les valeurs de tension avec le bras de lecture complètement orienté respectivement vers la droite et la gauche. (Voir les Figs. E et F) ⑤ Calculer la tension moyenne à partir de la différence entre les deux valeurs de tension. Par exemple, lorsque la tension est de 1,5V dans la Fig. E et de 0,02V dans la Fig. F, alors: $\frac{(1,5V - 0,02V)}{2} + 0,02V = 0,76V$ (tension du point intermédiaire) ⑥ Placer le bras de lecture sur la position du centre, et tourner la vis de réglage du socle du bras avec une clef kexagonale jusqu'à ce que la tension médiane soit obtenue. (Voir Fig. G)
4	Mise au point du décalage et de l'amplification servomécanique	① Placer un disque sur la platine. ② Ouvrir le couvercle protège-poussière de 1 à 2 cm, mettre "en marche" l'interrupteur d'alimentation et abaisser le bras de lecture. (Dans ce cas, ne pas laisser la pointe de lecture toucher le disque.) ③ Brancher le voltmètre électronique à C.C. à la broche du connecteur. ④ S'assurer que VR301 à été entièrement tourné dans le sens des aiguilles d'une montre. ⑤ Tourner VR302 jusqu'à ce que le voltmètre électronique à C.C. indique 0,72V. (Mise au point de l'amplification servo-mécanique.) ⑥ Placer un disque à écarts de 1 mm sur la platine, refermer le couvercle protège-poussière et faire jouer le disque. ⑦ Tourner VR301 jusqu'à ce que le voltmètre électronique à C.C. indique 0,6V. (Mise au point du décalage.)

REPLACEMENT PARTS LIST...Cabinet & Chassis Parts

- Notes:**
- Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 - Important safety notice: Components indentified by Δ make have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
 - $\square$ -marked parts are used for black type only, while $\bigcirc$ -marked parts are for silver type only.
 - Parts other than $\square$ and $\bigcirc$ -marked are used for both black and silver types.
 - Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Black type model No. : SL-QL1 (K)

Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
MAIN CABINET PARTS					
1	SFTGQ11N01	Turntable Mat	61	SFADQ11N01E	Dust Cover
2	SFTEQ11N01A	Turntable	62	SFUMC07-19	Guide, Lead Wire
3	$\square$ SFACQ11N01	Cabinet (Silver)	63	SFKKQ11N02	Surface Plate
3	SFACQ11N03	Cabinet (Black)	64	$\bigcirc$ SFATQ11N01A	Hing (Silver)
4	SFUMQ11N11	Rear Cover	64	$\square$ SFATQ11N02A	Hing (Black)
5 [E] only	SFNNQ11S01	Name Plate	65	SFUPC07-01E	Arm Drive Plate
5 [EK],[XL]	SFNNQ11G01	Name Plate	66	SFUPC07-07	Clamper, Lead Wire
5 [EG],[EB],[EF]	SFNNQ11R01	Name Plate	67	SFUMC07-23	Pulley
5 [EH],[EI]			68	SFUMC07-22	Stopper, Pulley
5 [XA] only	SFNNQ11X01	Name Plate	69	SFUMC10-05	Arm Drive Wheel
6	SFDJQ11N05E	Connector, 3 Pin (With Wire)	70	SFDJC10-02E	Connector, 4 Pin (With Wire)
7	SFKKQ11N01	Surface Plate	71	SFXZC07-01R	Worm Ass'y
8	SFUMQ11N09	Spacer Strobe	72	SFGBC10-01	Belt, Arm Drive
9	SFUMQ11N15	Spacer, Strobe L.E.D.	73	SFUZC07-05E	Arm Drive Rope
10	SFDJQ11N06E	Connector, 2 Pin (With Wire)	74	SFMHC07-01E	Arm Drive Motor
11	SFUMQ11N01E	Guide (A), Operation Knob	75	SFGCQ11N03	Cushion, Arm Drive Motor
12	SFUMQ11N03	Guide (B), Speed Selector Knob	76	SFUPQ11N15	Supporter, Arm Drive Motor
13	SFKTQ11N03	Knob, Speed Selector	77	SFDJQ11N03E	Connector, 12 Pin (With Wire)
14	SFKTQ11N04	Knob, Power	78	SFUZQ11N02	Lable, Surface Plate
15	SFUMQ11N06	Shaft, Power Switch Knob	TONEARM PARTS		
16	SFUPQ11N04	Bracket, Power Switch Knob	101	SFPAM00701A	Tonearm
17	SFUMQ11N05	Joint Rod, Power Switch	102	EPCP22SK	Cartridge
18	SFDJQ11N02E	Connector, 6 Pin (With Wire)		EPS22ES	Stylus
19	SFGCC07-06	Cushion, Power Transformer	103	SFPCS00701A	Tonearm Position Indicator
20	SFUPQ11N09	Cover, Power Transformer	104	SFPKD00701E	Arm Base
21	SFUMC07-08	Spacer, Disc Size Detect L.E.D.	105	SFDZC07-01E	Cueing Plunger (RL501)
22	SFDJC07-05E	Connector, 2 Pin (With Wire)	106	SFPJL00701A	Lift Ass'y
23	SFAUQ11N01E	Bottom Board	107	SFSP01505	Spring, Lift Ass'y
24	SFQCC07-01	Spring (Front), Audio Insulator	108	SFPKD00702	Arm Base Cover
25	SFQCC07-01	Spring (Rear), Audio Insulator	109	SFSP00706	Spring, Rest Position Adjustment
26	Δ SFGAC07-01E	Audio Insulator	110	SFDJC07-03E	Connector, Phono (With Wire)
27	Δ		111	SFDJC07-02E	Connector, 5 Pin (With Wire)
27 [EK] only	Δ SJA88	AC Cord	113	SFPGM00702	Cushion, Lead Wire
27 [XL] only	QFC1205M	AC Cord	114	SFPZB00709	Bracket, Arm Base
	QFC1208M	AC Cord	115	SFGZ172-01	Spacer, Arm Base Cover
28	SFUM190-11	Clamper, AC Cord	SCREWS, WASHERS and CIRCUITS		
28 [XL] only	SFUM190-12	Clamper, AC Cord	N1	XTV3+8BFN	Screw, Tapping, $\oplus$ 3 x 8
29	SFDHC07-01A	Phono Cord	N2	XTV3+8BFZ	Screw, Tapping, $\oplus$ 3 x 8
30	SFMZQ11N01Z	Stator Fram	N3	SFXGQ20-01	Screw, Insulator
31	SFDJQ11N01E	Connector, 8 Pin (With Wire)	N4	XYE3+EJ8	Screw, Tapping, $\oplus$ 3 x 8
32	SFUZQ11N03	Shield Plate	N5	XYN3+C8	Screw, $\oplus$ 3 x 8
33	SFDJQ11N04E	Connector, 5 Pin (With Wire)	N6	SFXWQ11N02	Washer, Insulator
34	SFDFQ11N01	Plate, Power Transistor	N7	XTV3+8BFN	Screw, Tapping, $\oplus$ 3 x 6
35	SFDCC07-01	Sheet, Power Transistor	N8	XTS26+6B	Screw, Tapping, $\oplus$ 2.6 x 6
36	SFD8C07-01	Bushing	N9	SFXGQ11N01	Screw, Dust Cover
37	SFDSTWM9901A	Switch, Power Switch	N10	SFXWQ11N01	Washer, Dust Cover
38	SFUM190-11	Clamper, Phono Cord	N11	XTV3+16BFZ	Screw, Tapping, $\oplus$ 3 x 16
39	SFGZQ11N01	Spacer, L.E.D. (D325, 328, 329)	N12	SFXW551D2	Washer, Arm Drive Wheel
40	SFGZQ11N02	Spacer, L.E.D. (D321 ~ 324)	N13	XUC3FT	Circlip, Arm Drive Wheel
UPPER CABINET PARTS			N14	XYN23+C10BN	Screw, $\oplus$ 2.3 x 10
50	SFUMQ11N12	Upper Cabinet Cover	N15	XYC4+CJ20FZ	Screw, Tapping, $\oplus$ 4 x 20
51	SFNCZ07M01	Lable, Disc Size Selector	N16	XTN3+8BFZ	Screw, Tapping, $\oplus$ 3 x 8
52	SFUPQ11N08	Guide, Upper Cabinet Cover	N17	SFPEV00701	Screw, Cartridge
53	SFUMC07-16	Shutter	N18	XTN3+4B	Screw, Tapping, $\oplus$ 3 x 4
54	SFGCQ11N01	Cushion (A), Guide Rail (A)	N19	XTN23+6BFZ	Screw, Tapping, $\oplus$ 2.3 x 6
55	SFXJQ11N01	Guide Rail (A), Tonearm	N20	XSN2+4BV	Screw, $\oplus$ 2 x 4
56	SFUPC07-04	Supporter (A), Guide Rail (A)	N21	XWA2BFZ	Washer, Spring, ϕ 2
57	SFUPQ11N03	Guide Rail (B), Upper Cabinet	N22	XXE3D2FZS	Screw, Lift Ass'y
58	SFUPQ11N05	Supporter (B), Guide Rail (B)	N23	XWC3B	Washer, External Toothed Lock ϕ 3
59	SFGCQ11N02	Cushion (B), Guide Rail (B)	N24	XSN3+8S	Screw, $\oplus$ 3 x 8
60	$\bigcirc$ SFACQ11N02	Upper Cabinet (Silver)	N25	XXE3D6FZS	Screw, Offset Angle Adjustment
60	$\square$ SFACQ11N04	Upper Cabinet (Black)	N26	SFXGQ10-06	Screw, Rest Position, Adjustment
			N27	SFXWQ11N04	Washer, Dust Cover
			N28	SFXWQ11N05	Washer, Upper Cabinet Cover

Ref. No.	Part No.	Part Name & Description
ACCESSORIES		
A1 [E] only	SFNUQ11S01	Instructions Book, Printed Matter
A1 [EK] only	SFNUQ11G01	Instructions Book, Printed Matter
A1	SFNUQ11X01	Instructions Book, Printed Matter
A2	SFWE212-01	45 Adaptor
A3	SFCB30001	Brush
A4	SFWTC07-01	Screw Driver
A5 [XA] only	SFDK119118	2 Pin Plug
PACKING PARTS		
P1	○ SFHPQ11M01	Carton Box, (Silver)
P1 [EF] only	○ SFHPQ11C01	Carton Box, (Silver)
P1	⊗ SFHPQ11M21	Carton Box, (Black)

Ref. No.	Part No.	Part Name & Description
P2	SFHHQ11N01	Pad, Front
P3	SFHHQ11N02	Pad, Rear
P4	SFHDQ11N01	Pad, Top
P5	SFHSQ11N01E	Spacer, Tonearm
P6	SFHSQ11N02	Spacer, Dust Cover
P7	SFYH60X60	Polyethylene Bag, Unit
P8	SFYH40X45	Polyethylene Bag, Turntable
P9	SFYF09A15	Polyethylene Bag, Accessories
P10 [XA] only	SFHSC07-02	Spacer (A), Corner
P11 [XA] only	SFHSC07-03	Spacer (B), Corner

Areas

- * [E] is available in Switzerland and Scandinavia.

* [EK] is available in United Kingdom.

* [XL] is available in Australia.

* [EF] is available in France.

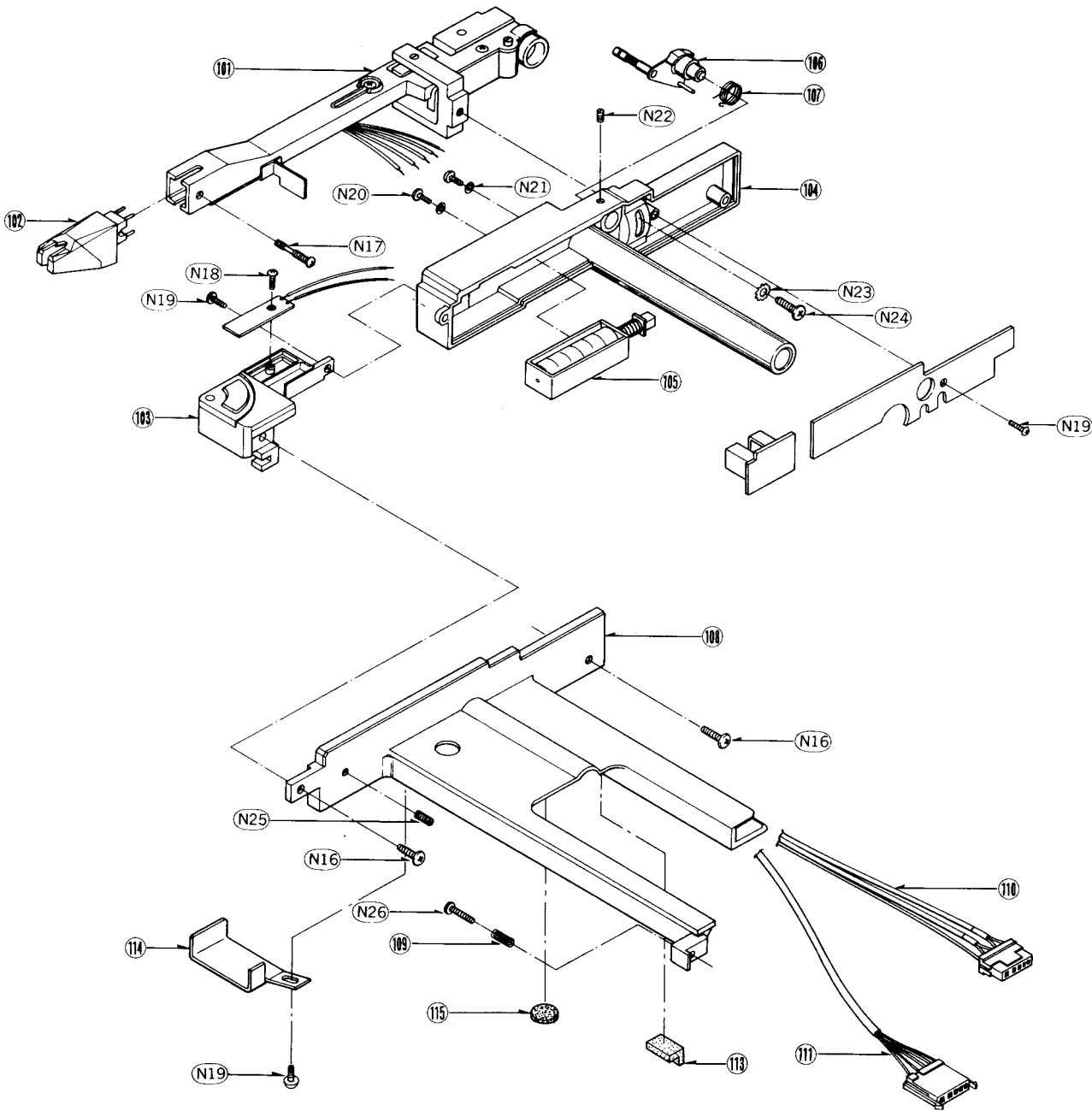
* [EB] is available in Belgium.
- * [EG] is available in F.R. Germany.

* [EI] is available in Italy.

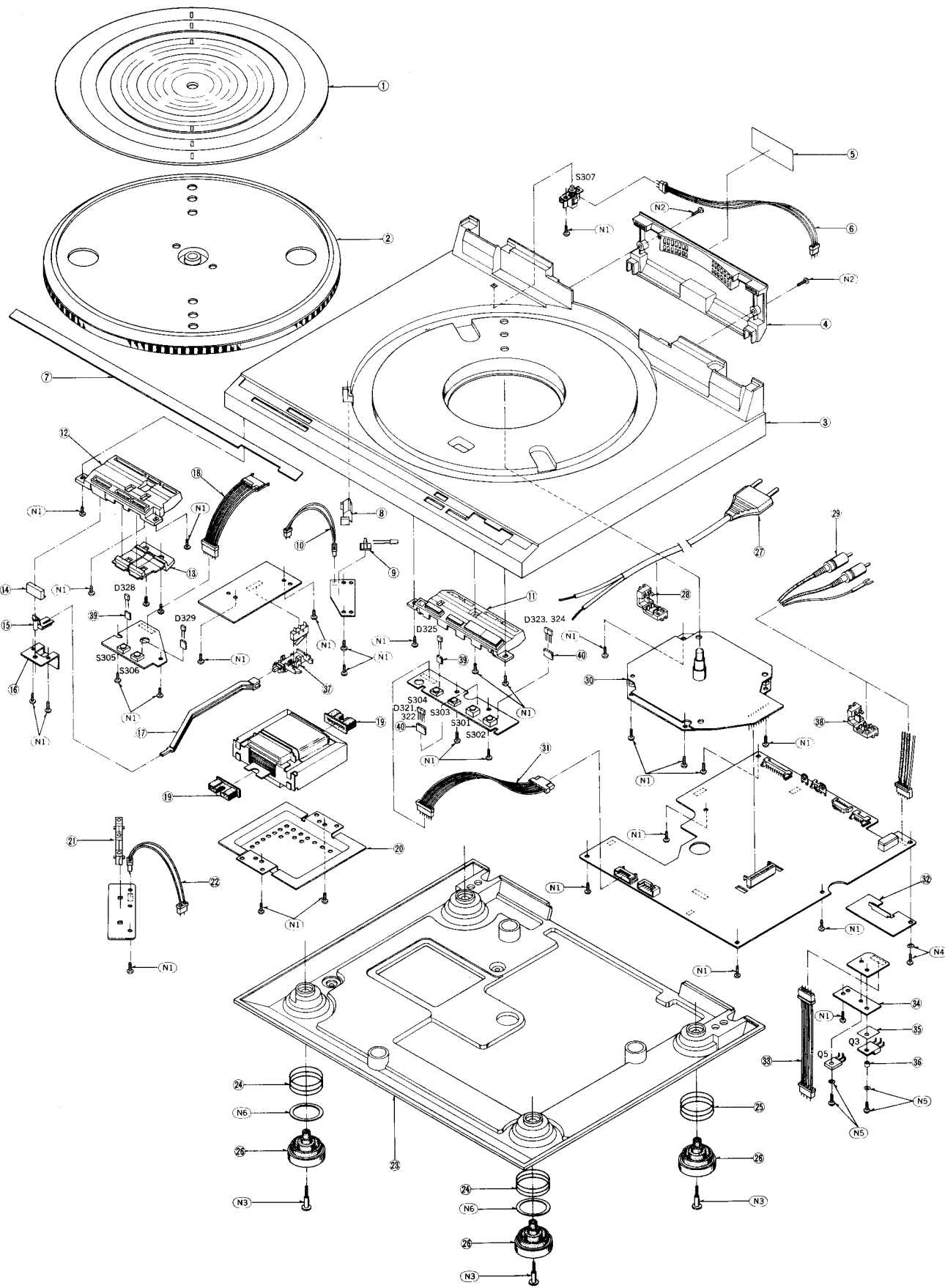
* [EH] is available in Holland.

* [XA] is available in East South Asia, Oceania, Africa, Middle Near East and Central South America.

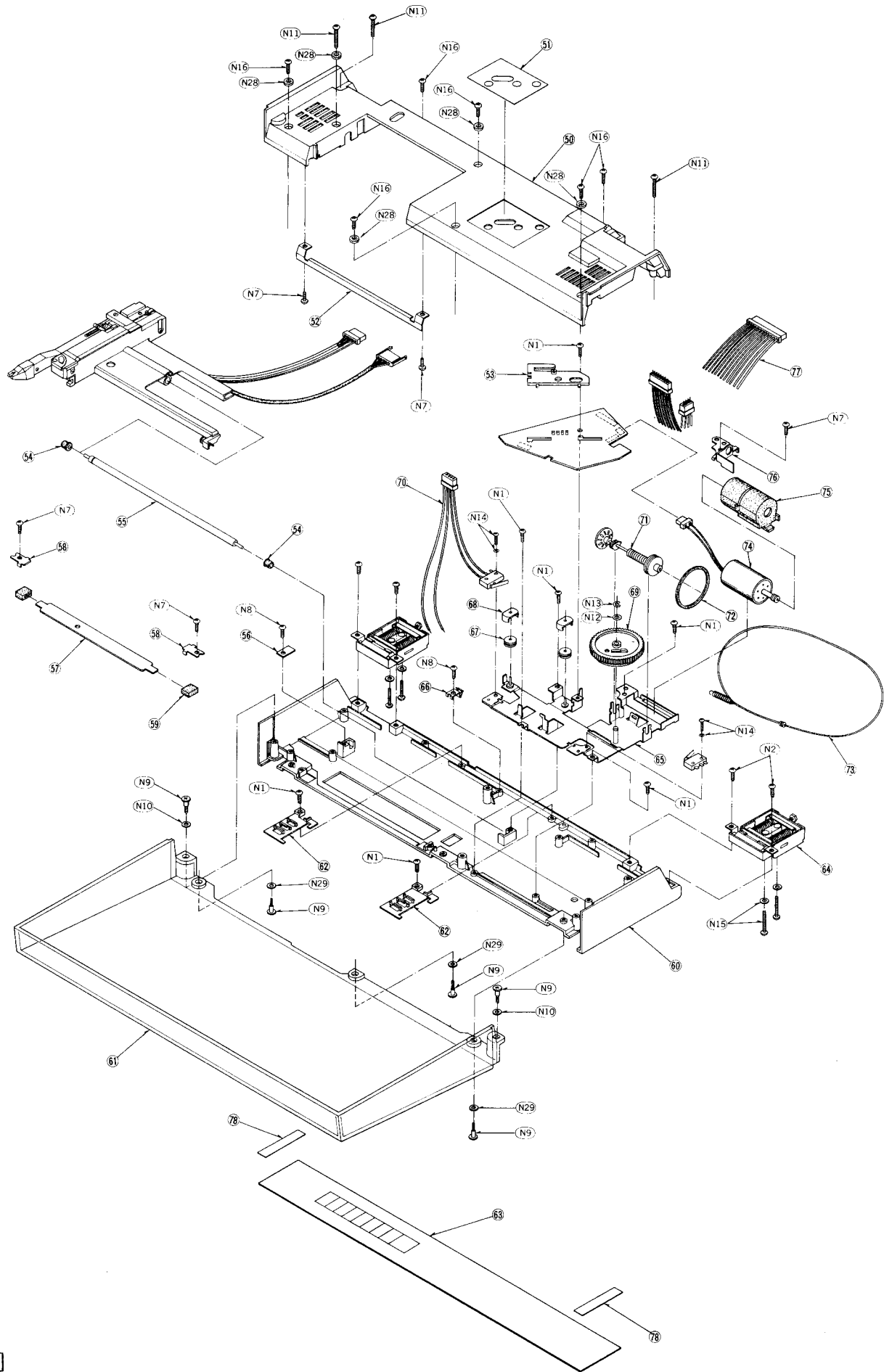
EXPLODED VIEW.....Tonearm



EXPLODED VIEW.....Main Cabinet



EXPLODED VIEW.....Upper Cabinet



REPLACEMENT PARTS LIST...Electrical Parts

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders. 2. Important safety notice: Components indentified by Δ make 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 specify the area. Parts without these indications can be used for all areas.

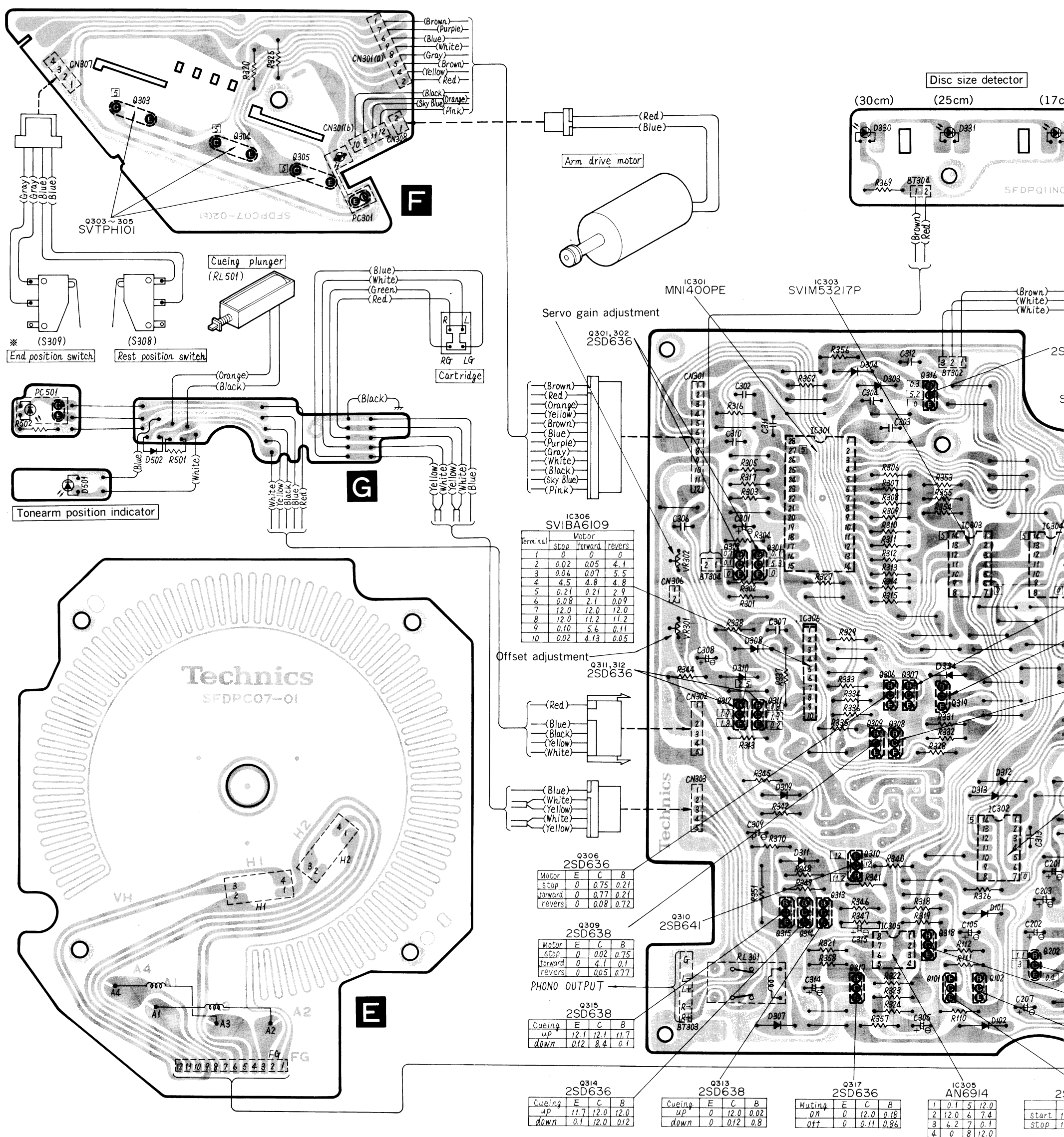
Ref. No.	Part No.	Part Name & Description
INTEGRATED CIRCUITS		
IC101	AN6635	IC, Drive
IC201	AN6680	IC, Control
IC301	MN1400PE	IC, Micro-Computer
IC302	SVIM53200P	IC, Nand Gate
IC303	SVIM53217P	IC, Buffer
IC304	SVIM53216P	IC, Inverter
IC305	AN6914	IC, Comparer
IC306	SVIBA6109	IC, Arm Motor Drive
TRANSISTORS		
Q1, 102	2SD636	Transistor, Regulator & Drive Detector
Q2	2SD638	Transistor, Regulator
Q3	2SC1826	Transistor, Regulator
Q4, 101	2SB641	Transistor, Regulator & Drive Detector
Q5	2SC1846-R	Transistor, Regulator
Q201, 203	2SD636	Transistor, Regulator & Switching
Q202	2SC1328-T	Transistor, FG Amplifier
Q301, 302	2SD636	Transistor, Switching
Q303 ~ 305	SVTPH101-Q2	Photo Transistor, Disc Size Detector
Q306, 308	2SD636	Transistor, Buffer
Q307, 309	2SD638	Transistor, Buffer
Q310	2SB641	Transistor, Switching
Q311, 312	2SD636	Transistor, Offset & Servo Amplifier
Q313, 315	2SD638	Transistor, Cueing Relay Driver
Q314, 316 ~ 319	2SD636	Transistor, Switching & Muting Relay Driver
Q331, 332	2SB641	Transistor, Switching
DIODES		
D1	Δ SVDSIRBA20Z	Diode, Rectifier
D2	MA1051A	Diode, 5.1V Zener
D101, 201, 334	MA162A	Diode
301 ~ 307, 502, 309 ~ 311, 333		
D103	RVDRD6R8EB	Diode, 6.8V Zener
D202	SVDGD4205ALC	Light Emitting Diode, Strobe
D308	MA26TO-A	Diode
D102, 312, 313	20A90	Diode
326, 327		
D321 ~ 325	SVDP85531K	Light Emitting Diode, Red
328, 329		
D330 ~ 332	SVDP85531K	Light Emitting Diode, Red
D501	SVDP85531K	Light Emitting Diode, Red
PHOTO INTERRUPTERS		
PC301	ON1161	Photo Interrupter, Arm Position Detector
PC501	ON1108	Photo Interrupter, Offset Angle Detector
HALL ELEMENT		
H1, 2	H-300A	Hall Element, Turntable Position Detector
CRYSTAL		
X201	SVQU306115	Crystal, 4.19328MHz Counter Oscillator
RELAY		
RL301	SFDYQ11N01	Relay, Muting
RL501	SFDZC07-01E	Plunger, Cueing
SWITCHES		
S301, 302	EVQQBR08K	Switch, Start & Stop
S303 ~ 306	EVQQB04K	Switch, Repeat Cueing & Speed Selector
S307	ESB6247	Switch, Reset Switch

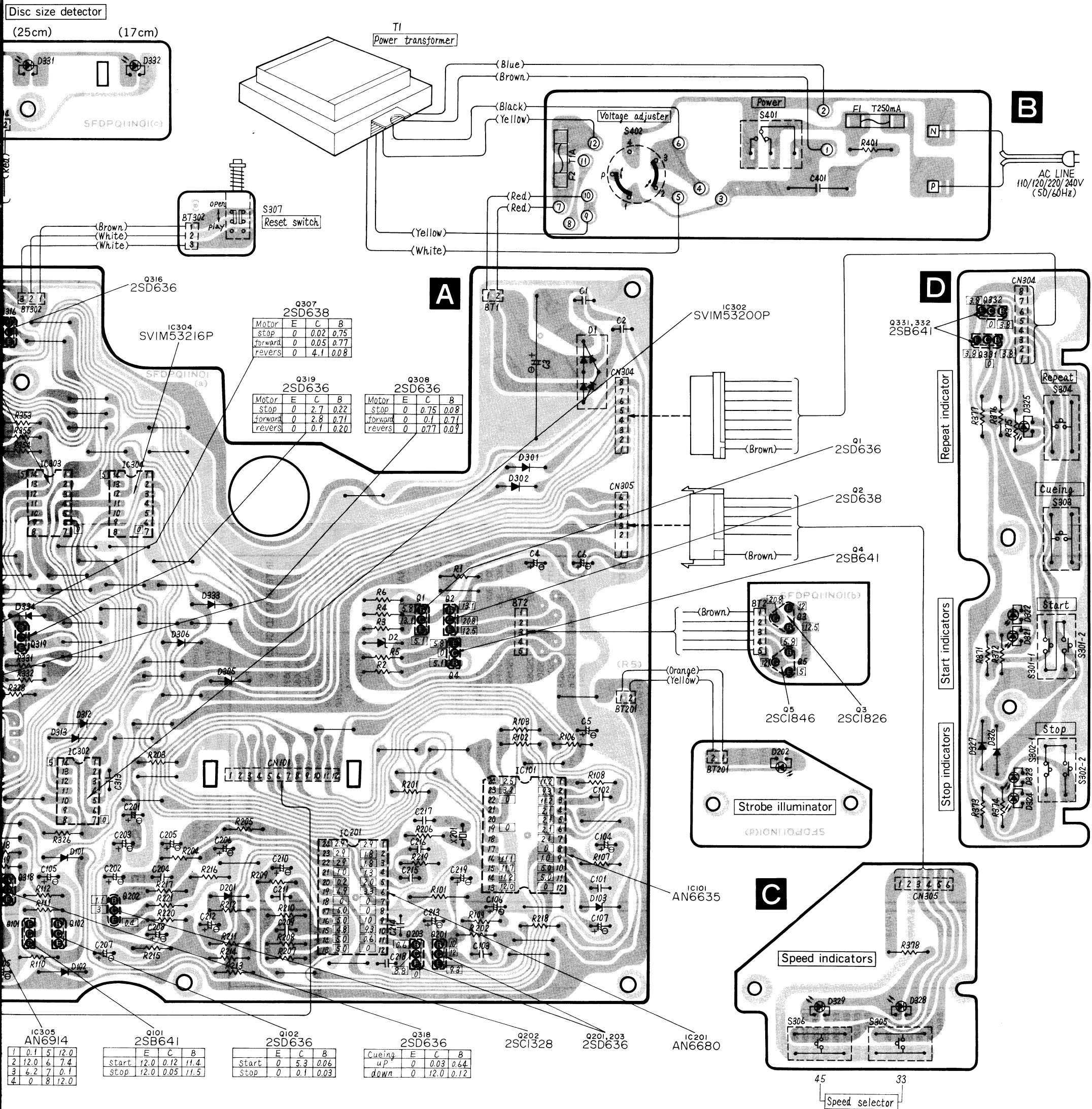
Ref. No.	Part No.	Part Name & Description
S308, 309	Δ SFDSD2MSL-4	Switch, Rest & End Detector
S401	Δ SFDSS5GLS	Switch, Power Source
S402	Δ SFDSHXW01317	Switch, Voltage Adjuster
VARIABLE RESISTORS		
VR301	EVNM0AA00B14	Offset Adjustment, 10kΩ (B)
VR302	EVNM0AA00B13	Servo Gain Adjustment, 1kΩ (B)
TRANSFORMER		
T1	Δ SLT66PS5E	Transformer, Power Source
FUSE		
F1	Δ XBAS2C025T1A	Fuse, 250V, 250mA
F2	Δ XBA2C10TR0	Fuse, 250V, 1A
RESISTORS		
R1	ERD25FJ562	Carbon, 5.6kΩ, 1/4W, ± 5%
R2	ERD25FJ222	Carbon, 2.2kΩ, 1/4W, ± 5%
R3, 4	ERD25FJ562	Carbon, 5.6kΩ, 1/4W, ± 5%
R5	ERD25FJ102	Carbon, 1kΩ, 1/4W, ± 5%
R6	ERD25FJ683	Carbon, 68kΩ, 1/4W, ± 5%
R101	ERX1ANJ1R5	Metal Film, 1.5Ω, 1W, ± 5%
R102	ERD25FJ562	Carbon, 5.6kΩ, 1/4W, ± 5%
R103	ERD25FJ152	Carbon, 1.5kΩ, 1/4W, ± 5%
R106	ERD25FJ271	Carbon, 270Ω, 1/4W, ± 5%
R107	ERD25TJ563	Carbon, 56kΩ, 1/4W, ± 5%
R108, 109	ERD25FJ101	Carbon, 100Ω, 1/4W, ± 5%
R110	ERD25TJ473	Carbon, 47kΩ, 1/4W, ± 5%
R111	ERD25FJ103	Carbon, 10kΩ, 1/4W, ± 5%
R112	ERD25FJ222	Carbon, 2.2kΩ, 1/4W, ± 5%
R201	ERD25FJ331	Carbon, 330Ω, 1/4W, ± 5%
R202	ERD25FJ222	Carbon, 2.2kΩ, 1/4W, ± 5%
R203	ERD25FJ470	Carbon, 47Ω, 1/4W, ± 5%
R204	ERD25FJ272	Carbon, 2.7kΩ, 1/4W, ± 5%
R205	ERD25TJ124	Carbon, 120kΩ, 1/4W, ± 5%
R206	ERD25FJ391	Carbon, 390Ω, 1/4W, ± 5%
R207	ERD25TJ273	Carbon, 27kΩ, 1/4W, ± 5%
R208	ERD25TJ224	Carbon, 22kΩ, 1/4W, ± 5%
R209	ERD25TJ823	Carbon, 82kΩ, 1/4W, ± 5%
R210	ERD25FJ392	Carbon, 39kΩ, 1/4W, ± 5%
R211, 212	ERD25TJ223	Carbon, 22kΩ, 1/4W, ± 5%
R213	ERD25FJ103	Carbon, 10kΩ, 1/4W, ± 5%
R214	ERD25FJ471	Carbon, 470Ω, 1/4W, ± 5%
R215	ERD25TJ683	Carbon, 68kΩ, 1/4W, ± 5%
R216	ERD25FJ103	Carbon, 10kΩ, 1/4W, ± 5%
R217	ERD25FJ471	Carbon, 470Ω, 1/4W, ± 5%
R218	ERD25FJ181	Carbon, 180Ω, 1/4W, ± 5%
R219	ERD25TJ223	Carbon, 22kΩ, 1/4W, ± 5%
R220	ERD25FJ272	Carbon, 2.7kΩ, 1/4W, ± 5%
R221	ERD25FJ181	Carbon, 180Ω, 1/4W, ± 5%
R301	ERD25TJ183	Carbon, 18kΩ, 1/4W, ± 5%
R302	ERD25FJ102	Carbon, 1kΩ, 1/4W, ± 5%
R303	ERD25FJ222	Carbon, 2.2kΩ, 1/4W, ± 5%
R304	ERD25FJ150	Carbon, 15Ω, 1/4W, ± 5%
R305	ERD25FJ102	Carbon, 1kΩ, 1/4W, ± 5%
R306, 307	ERD25FJ472	Carbon, 4.7kΩ, 1/4W, ± 5%
R308, 309	ERD25FJ222	Carbon, 2.2kΩ, 1/4W, ± 5%
R310, 311	ERD25TJ473	Carbon, 47kΩ, 1/4W, ± 5%
R312	ERD25FJ472	Carbon, 4.7kΩ, 1/4W, ± 5%
R313, 314	ERD25TJ223	Carbon, 22kΩ, 1/4W, ± 5%
R315, 316	ERD25TJ223	Carbon, 22kΩ, 1/4W, ± 5%
R317	ERD25TJ473	Carbon, 47kΩ, 1/4W, ± 5%
R318	ERD25TJ104	Carbon, 100kΩ, 1/4W, ± 5%
R319	ERD25FJ101	Carbon, 100Ω, 1/4W, ± 5%
R320	ERD25FJ103	Carbon, 10kΩ, 1/4W, ± 5%

Continued on page 29

* S309 (end detection switch) will be replaced by MN1400PE of which the end detection unit is built into MN1400PA (IC301) in the course of manufacture.

At the time of servicing, it is possible to replace MN1400PA with MN1400PE, but not MN1400PE with MN1400PA. Incidentally, MN1400PE will be supplied as repair parts.

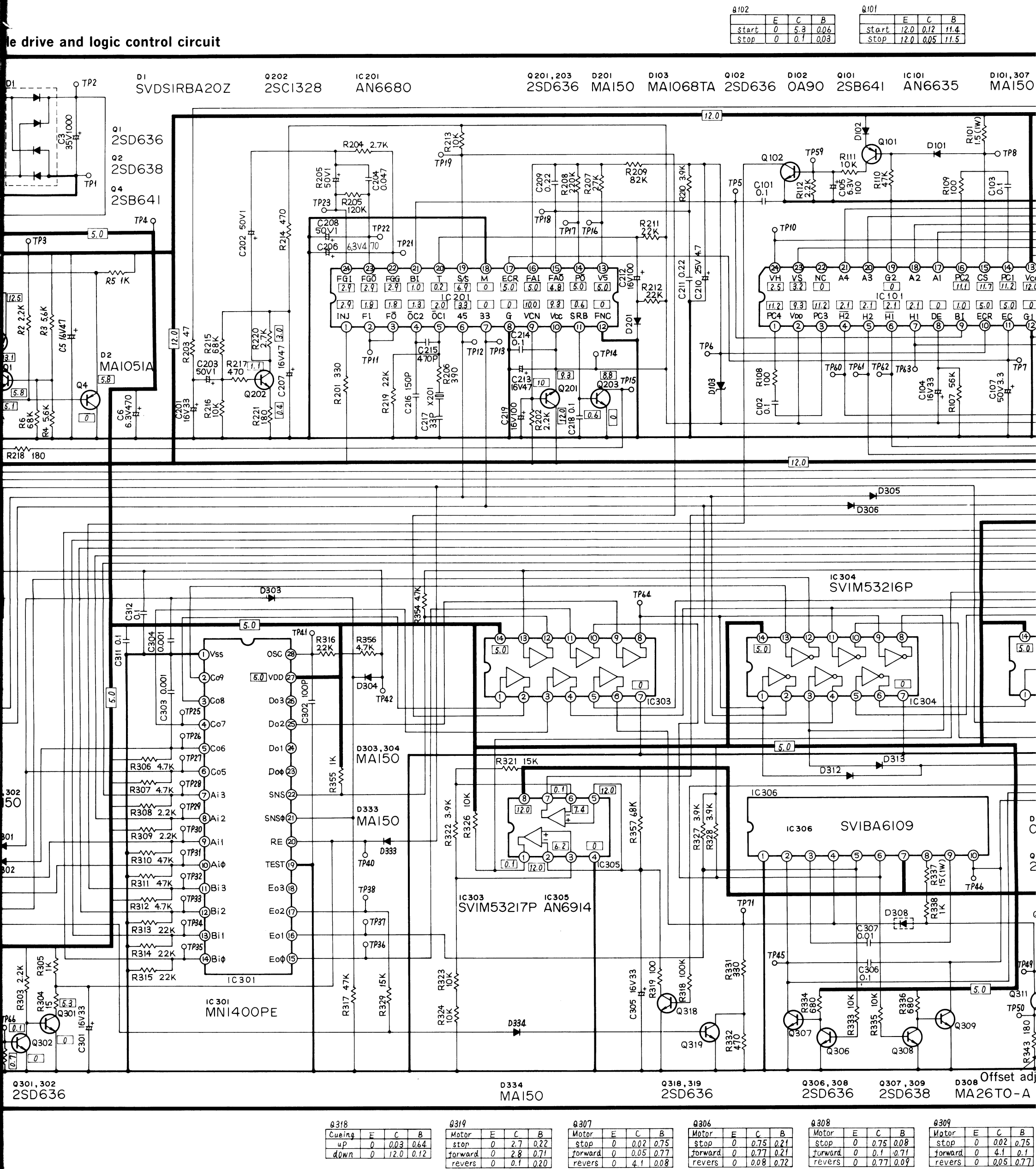




(This schematic diagram may be at any time with the development of new technology.)



le drive and logic control circuit



Q102	E	C	B
	start	0	5.3
	stop	0	0.1

Q101	E	C	B
	start	12.0	0.12
	stop	12.0	0.05

Q301, 302	2SD636	D334	MA150	Q318, 319	2SD636	Q306, 308	2SD636	Q307, 309	2SD638	D308	Offset adj
											MA26T0-A

Q318	E	C	B
Cueing	0	0.03	0.64
up	0	0.03	0.64
down	0	12.0	0.12

Q319	E	C	B
Motor	0	2.7	0.22
stop	0	2.8	0.71
forward	0	0.1	0.20

Q307	E	C	B
Motor	0	0.02	0.75
stop	0	0.05	0.77
forward	0	4.1	0.08

Q306	E	C	B
Motor	0	0.75	0.21
stop	0	0.77	0.21
forward	0	0.08	0.72

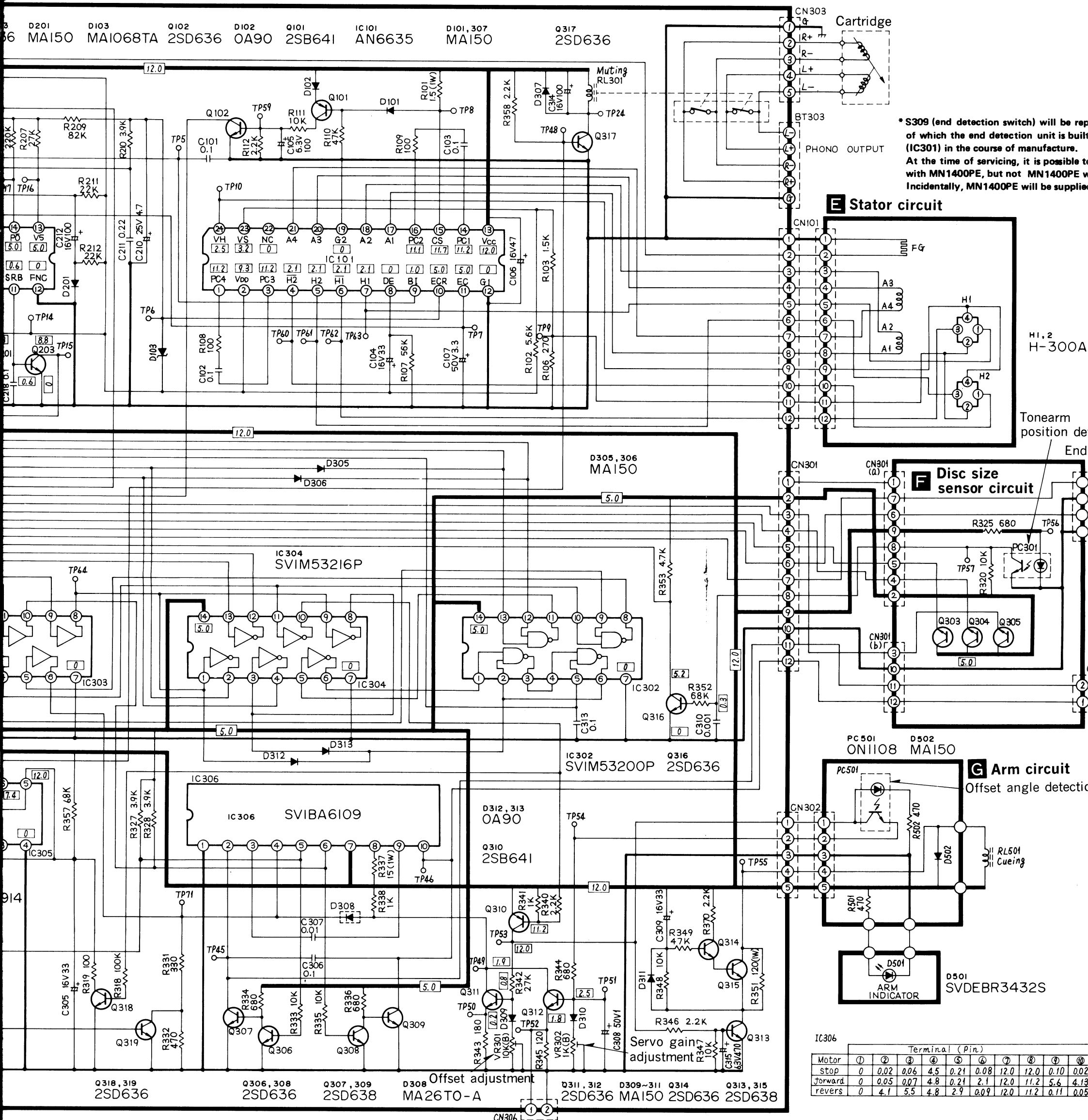
Q308	E	C	B
Motor	0	0.75	0.08
stop	0	0.1	0.71
forward	0	0.77	0.09

Q309	E	C	B
Motor	0	0.02	0.75
stop	0	4.1	0.1
forward	0	0.05	0.77

Q102	E	C	B
start	0	5.3	0.06
stop	0	0.1	0.03

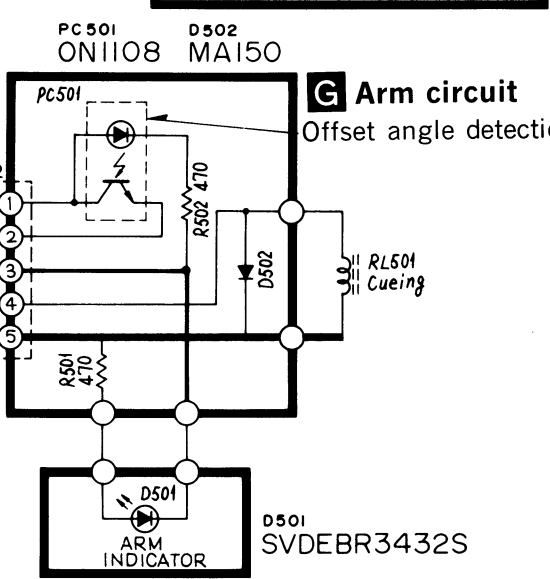
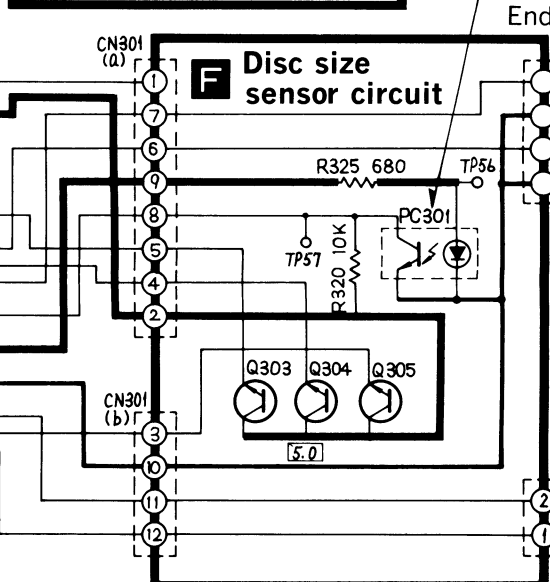
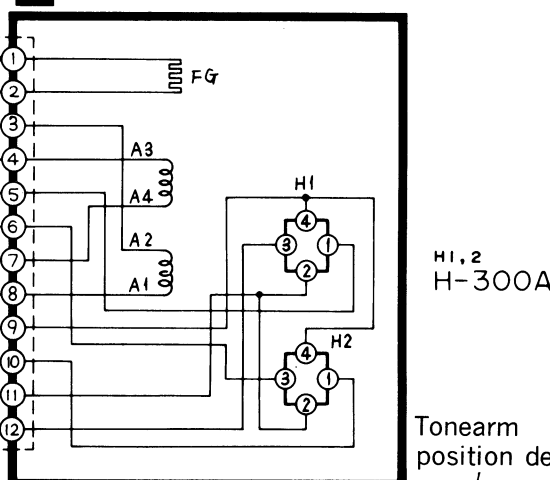
Q101	E	C	B
start	12.0	0.12	11.4
stop	12.0	0.05	11.5

Q317	E	C	B
Muting	0	12.0	0.18
on	0	0.11	0.86
off	0	0.11	0.86



* S309 (end detection switch) will be replaced by S309 (end detection switch) of which the end detection unit is built into the IC301 in the course of manufacture. At the time of servicing, it is possible to replace with MN1400PE, but not MN1400PE with S309. Incidentally, MN1400PE will be supplied.

E Stator circuit



IC306	Terminal (Pin)	1	2	3	4	5	6	7	8	9	10
Motor	stop	0	0.02	0.06	4.5	0.21	0.08	12.0	12.0	0.10	0.02
forward	0	0.05	0.07	4.8	0.21	2.1	12.0	11.2	5.6	4.13	0.05
revers	0	4.1	5.5	4.8	2.9	0.09	12.0	11.2	0.11	0.05	0.05

Q307	Motor	E	C	B
stop	0	0.02	0.75	0.75
forward	0	0.05	0.77	0.77
revers	0	4.1	0.08	0.08

Q306	Motor	E	C	B
stop	0	0.75	0.21	0.21
forward	0	0.77	0.21	0.21
revers	0	0.08	0.72	0.72

Q308	Motor	E	C	B
stop	0	0.75	0.08	0.08
forward	0	0.1	0.71	0.71
revers	0	0.77	0.09	0.09

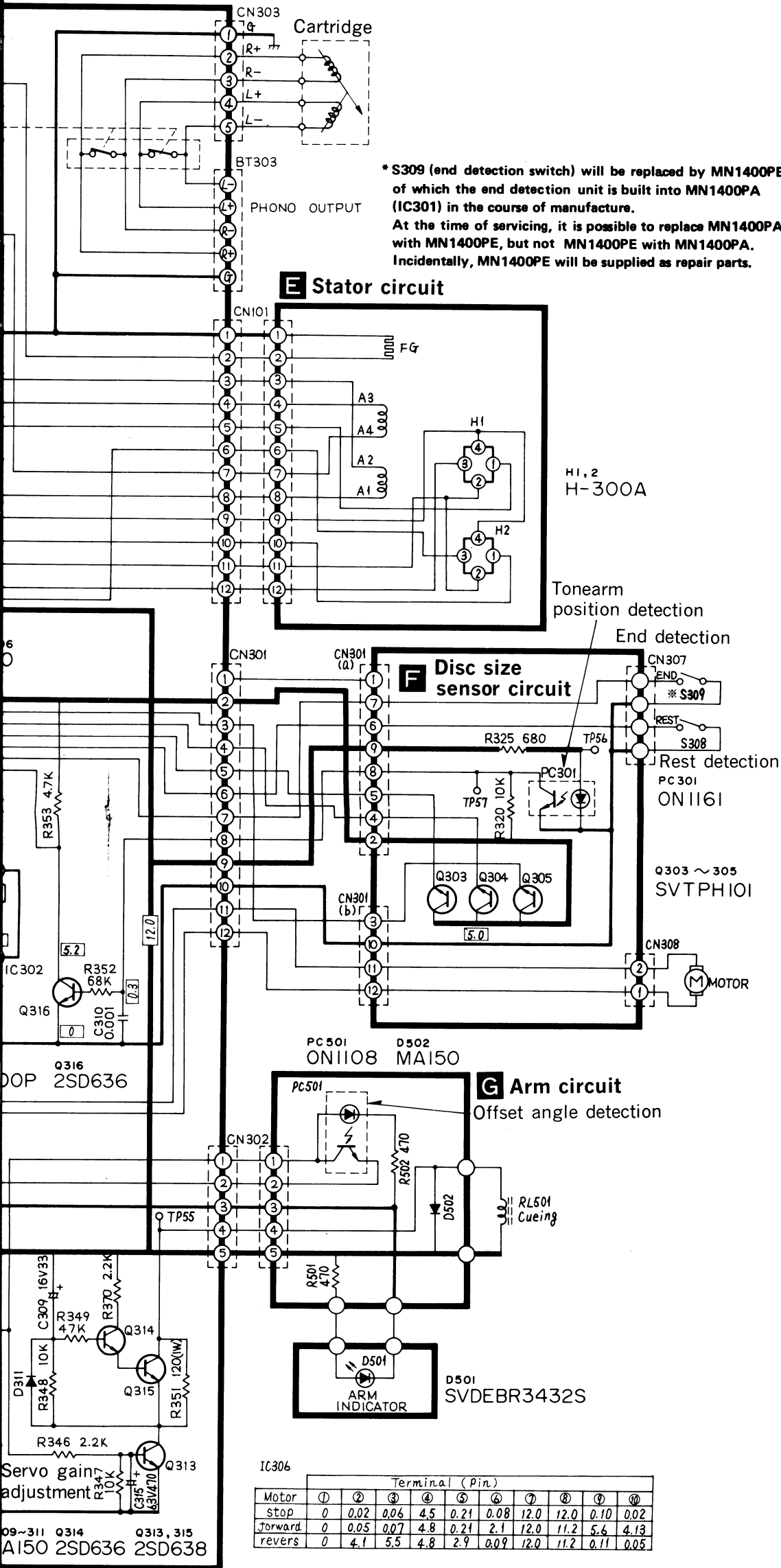
Q309	Motor	E	C	B
stop	0	0.02	0.75	0.75
forward	0	4.1	0.1	0.1
revers	0	0.05	0.77	0.77

Q314	Cueing	E	C	B
up	11.7	12.0	12.0	12.0
down	0.1	12.0	0.12	0.12

Q313	Cueing	E	C	B
up	0	12.0	0.02	0.02
down	0	0.12	0.8	0.8

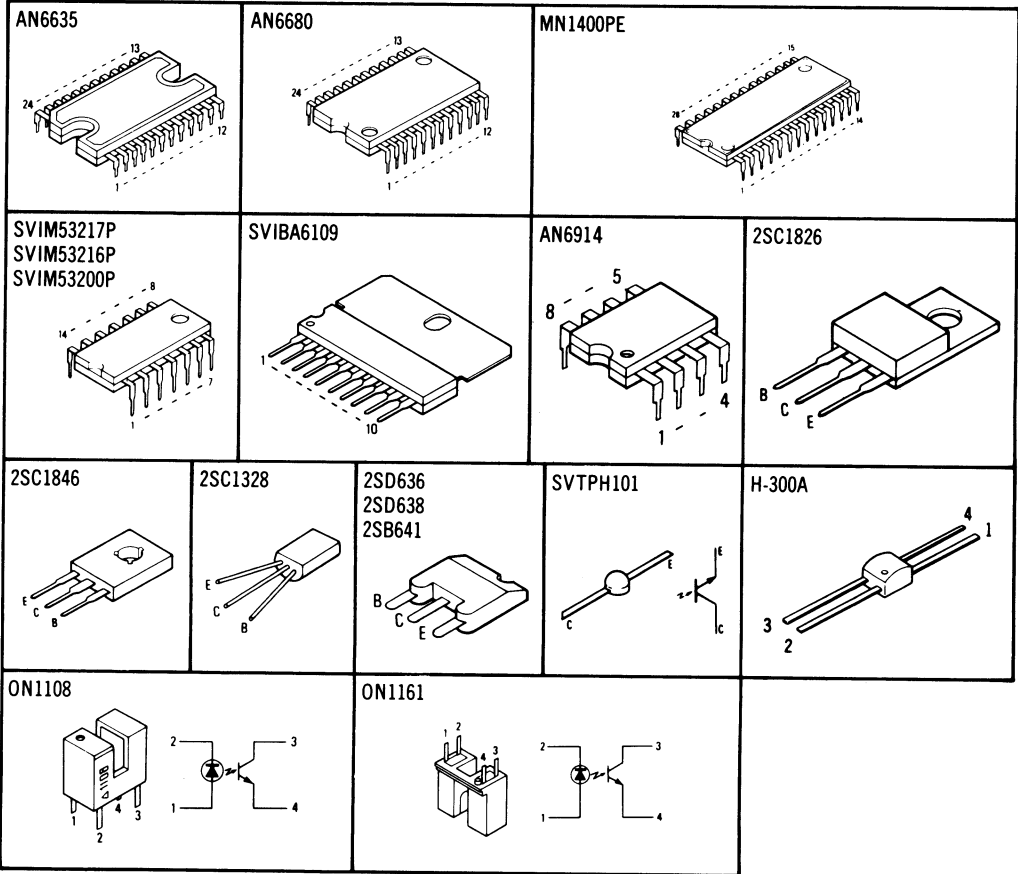
Q315	Cueing	E	C	B
up	12.1	12.1	11.7	11.7
down	0.12	8.4	0.1	0.1

B
0.18
0.86



- Notes:
- S301-1, 301-2** : Start switch in "off" position. (not push condition).
 ◀◀ Moves inward (S301-1)
 ▶▶ Moves faster (S301-2)
 - S302-1, 302-2** : Stop switch in "off" position. (not push condition).
 ▶▶ Moves outward (S302-1)
 ▶▶ Moves faster (S302-2)
 - S303** : Cueing switch in "▼" position. (not push condition).
 - S304** : Repeat switch in "off" position. (not push condition).
 - S305, 306** : Speed select switch in "off" position. (not push condition).
 S305. 33-1/3 r.p.m. S306. 45 r.p.m.
 - S307** : Reset switch in "on" position.
 - S308** : Rest position switch in "off" position.
 - S309** : End position switch in "off" position.
 - S401** : Power switch in "on" position.
 - S402** : Voltage adjuster switch in "220 - 240V" position.
 110 - 120V ↔ 220 - 240V
 - The value in is the standard voltage for this unit operated at 33-1/3r.p.m., which was measured by DC electronic voltmeter (high impedance) on the basis of the chassis. Accordingly, the voltage value may sometimes include a slight error depending on the internal impedance of the DC voltmeter (tester, etc.) used for the measurement.
 - + ⊕ voltage line.
 - Important safety Notice:
 Components identified by Δ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

• Terminal guide of transistor, IC's and photo interrupters.



• Reference voltage and waveform at each IC terminal (pin)

This indicated voltage values and waveform are measured by oscilloscope at 33r.p.m. rotation.

IC101 (AN6635)

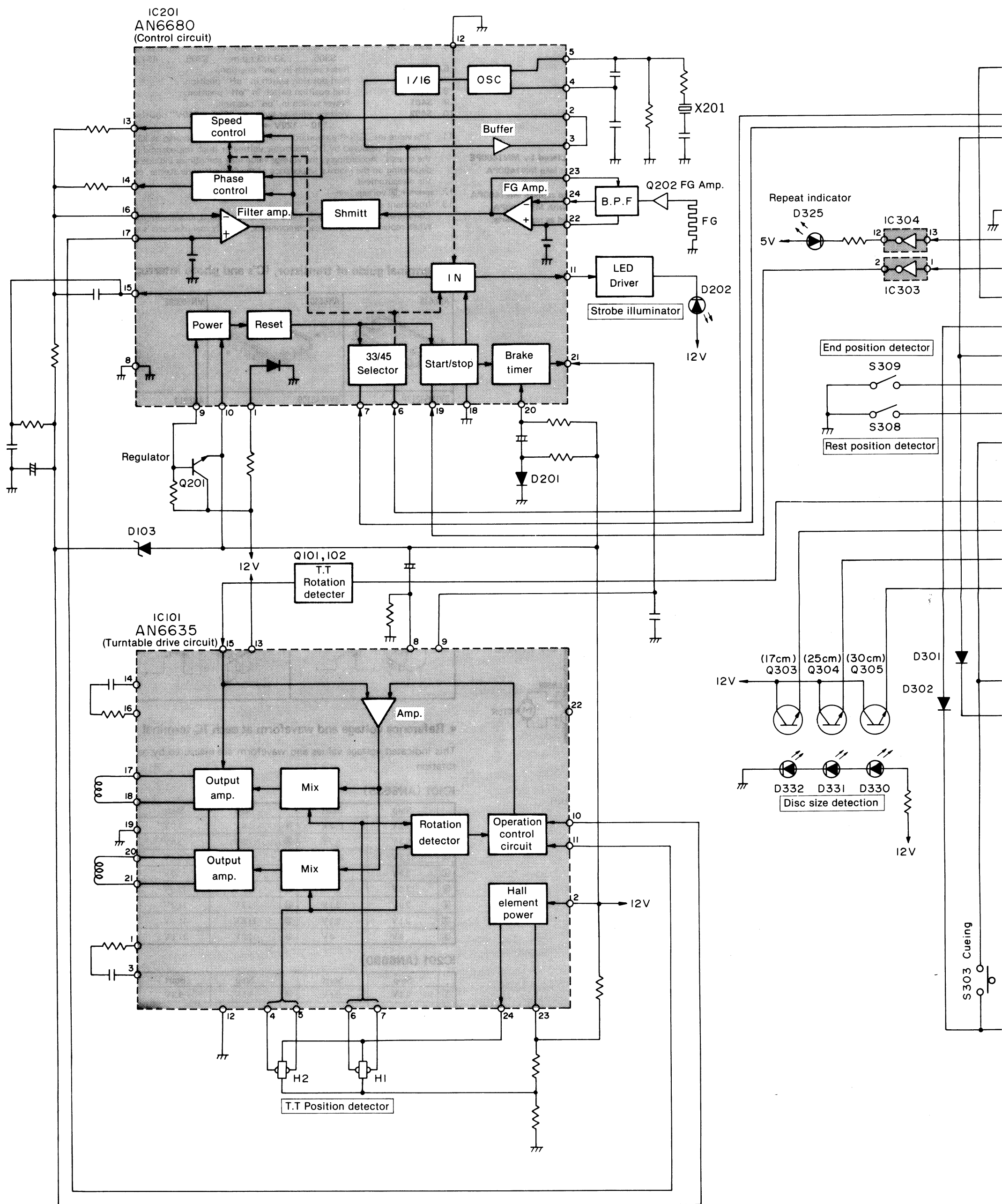
	Stop	Start		Stop	Start		Stop	Start
①	11.2 V	11.2 V	⑨	0 V	1.0 V	⑰	0.6 V	
②	9.3 V	9.3 V	⑩	7.8 V	5.0 V	⑱	0 V	0 V
③	11.2 V	11.2 V	⑪	5.0 V	5.0 V	⑳	0 V	0 V
④	2.0 V	2.1 V	⑫	0 V	0 V	㉑	0 V	0 V
⑤	2.0 V	2.1 V	⑬	12.0 V	12.0 V	㉒	0 V	0 V
⑥	2.0 V	2.1 V	⑭	11.2 V	11.2 V	㉓	3.2 V	3.2 V
⑦	2.1 V	2.1 V	⑮	11.8 V	11.7 V	㉔	2.5 V	2.5 V
⑧	0 V	0 V	⑯	11.2 V	11.1 V			

IC201 (AN6680)

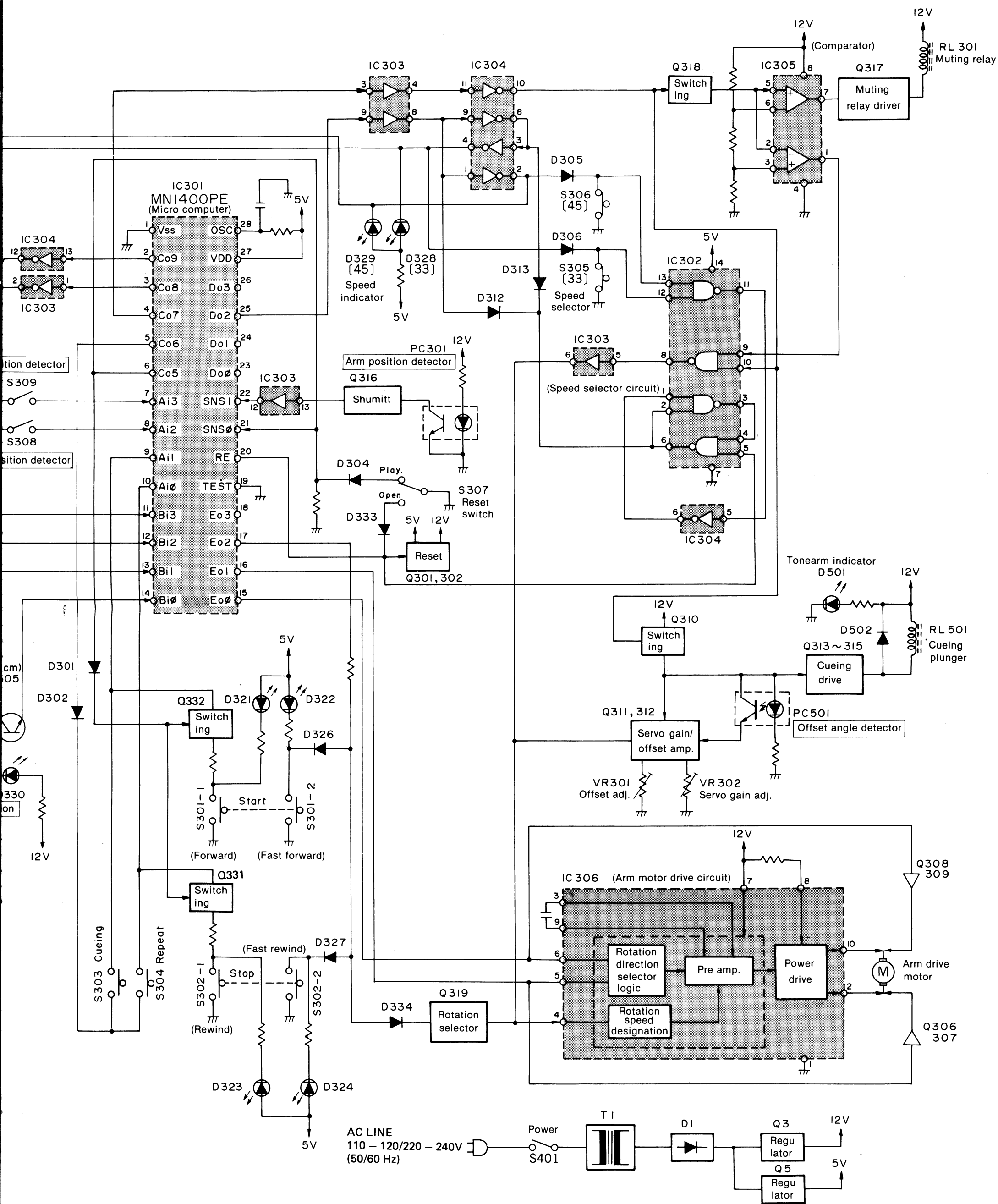
	Stop	Start		Stop	Start		Stop	Start
①	2.4 V	2.4 V	⑩	9.3 V	9.3 V	⑰	5.0 V	5.0 V
②		Same as at left	⑪		Same as at left	⑱	0 V	0 V
③		Same as at left	⑫	0 V	0 V	⑳	0.1 V	6.9 V
④		Same as at left	⑬	0.15 V		㉑	5.0 V	0.2 V
⑤		Same as at left	⑭			㉒	0.1 V	
⑥	3.3 V	3.3 V	⑮			㉓	3.1 V	2.9 V
⑦	0 V	0 V	⑯	8.0 V		㉔	3.1 V	
⑧	0 V	0 V	⑰	1.9 V	5.0 V		2.7 V	2.9 V
⑨	10.0 V	10.0 V						

■ BLOCK DIAGRAM

27



28



Continued from page 22

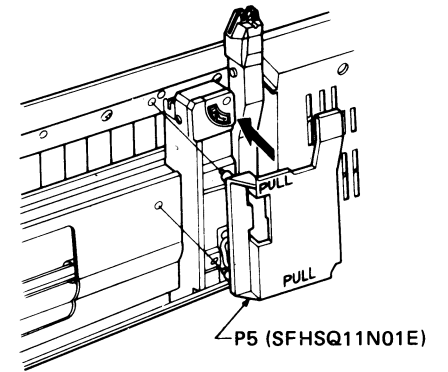
Ref. No.	Part No.	Part Name & Description					Ref. No.	Part No.	Part Name & Description				
R321	ERD25TJ153	Carbon,	15kΩ,	1/4W,	± 5%	CAPACITORS	C1, 2	ECKD1H223PF	Ceramic,	0.022μF,	50V,	± 10%	
R322	ERD25FJ392	Carbon,	3.9kΩ,	1/4W,	± 5%		C3	ECEB1VS102	Electrolytic,	1000μF,	35V		
R323, 324	ERD25FJ103	Carbon,	10kΩ,	1/4W,	± 5%		C4	ECEA1CS330	Electrolytic,	33μF,	16V		
R325	ERD25FJ681	Carbon,	680Ω,	1/4W,	± 5%		C5	ECEA1ES470	Electrolytic,	47μF,	25V		
R326	ERD25FJ103	Carbon,	10kΩ,	1/4W,	± 5%		C6	ECEA0JS471	Electrolytic,	470μF,	6.3V		
R327, 328	ERD25FJ392	Carbon,	3.9kΩ,	1/4W,	± 5%		C101, 102	ECQM1H104KZ	Polyester,	0.1μF,	50V,	± 10%	
R329	ERD25TJ153	Carbon,	15kΩ,	1/4W,	± 5%		C103	ECQM1H104KZ	Polyester,	0.1μF,	50V,	± 10%	
R331	ERD25FJ331	Carbon,	330Ω,	1/4W,	± 5%		C104	ECEA1CS330	Electrolytic,	33μF,	16V		
R332	ERD25FJ471	Carbon,	470Ω,	1/4W,	± 5%		C105	ECEA1AS101	Electrolytic,	100μF,	10V		
R333	ERD25FJ103	Carbon,	10kΩ,	1/4W,	± 5%		C106	ECEA1ES470	Electrolytic,	47μF,	25V		
R334	ERD25FJ681	Carbon,	680Ω,	1/4W,	± 5%								
R335	ERD25FJ103	Carbon,	10kΩ,	1/4W,	± 5%		C107	ECEA50Z3R3	Electrolytic,	3.3μF,	50V		
R336	ERD25FJ681	Carbon,	680Ω,	1/4W,	± 5%		C201	ECEA1CS330	Electrolytic,	33μF,	16V		
R337	ERG1ANJ150	Metal Oxide,	15Ω,	1W,	± 5%		C202	ECEA50Z1	Electrolytic,	1μF,	50V		
R338	ERD25FJ102	Carbon,	1kΩ,	1/4W,	± 5%		C203	ECEA50M1R	Electrolytic,	1μF,	50V		
R340	ERD25FJ222	Carbon,	2.2kΩ,	1/4W,	± 5%		C204	ECQM1H473KZ	Polyester,	0.047μF,	50V,	± 10%	
R341	ERD25FJ102	Carbon,	1kΩ,	1/4W,	± 5%		C205	ECEA50Z1	Electrolytic,	1μF,	50V		
R342	ERD25TJ273	Carbon,	27kΩ,	1/4W,	± 5%		C206	ECEA0JS471	Electrolytic,	470μF,	6.3V		
R343	ERD25FJ181	Carbon,	180Ω,	1/4W,	± 5%		C207	ECEA1ES470	Electrolytic,	47μF,	25V		
R344	ERD25FJ681	Carbon,	680Ω,	1/4W,	± 5%		C208	ECEA50Z1	Electrolytic,	1μF,	50V		
R345	ERD25FJ121	Carbon,	120Ω,	1/4W,	± 5%		C209	ECQV05224JZ	TF,	0.22μF,	50V,	± 5%	
R346	ERD25FJ222	Carbon,	2.2kΩ,	1/4W,	± 5%		C201	ECEA25Z4R7	Electrolytic,	4.7μF,	25V		
R347, 348	ERD25FJ103	Carbon,	10kΩ,	1/4W,	± 5%		C211	ECQV05224JZ	TF,	0.22μF,	50V,	± 5%	
R349	ERD25TJ473	Carbon,	47kΩ,	1/4W,	± 5%		C212	ECEA1ES101	Electrolytic,	100μF,	25V		
R351	ERG1ANJ121	Metal Oxide,	120Ω,	1W,	± 5%		C213	ECEA1ES470	Electrolytic,	47μF,	25V		
R352	ERD25TJ683	Carbon,	68kΩ,	1/4W,	± 5%		C214	ECKF1E104ZV	Ceramic,	0.1μF,	25V,	± 80%	
R353, 354	ERD25FJ472	Carbon,	4.7kΩ,	1/4W,	± 5%		C215	ECCD1H471K	Ceramic,	470pF,	50V,	± 10%	
R355	ERD25FJ102	Carbon,	1kΩ,	1/4W,	± 5%		C216	ECCD1H151K	Ceramic,	150pF,	50V,	± 10%	
R356	ERD25FJ472	Carbon,	4.7kΩ,	1/4W,	± 5%		C217	ECCD1H330K	Ceramic,	33pF,	50V,	± 10%	
R357	ERD25TJ683	Carbon,	68kΩ,	1/4W,	± 5%		C218	ECKF1E104ZV	Ceramic,	0.1μF,	25V,	± 80%	
R358	ERD25FJ222	Carbon,	2.2kΩ,	1/4W,	± 5%		C301	ECEA1CS330	Electrolytic,	33μF,	16V		
R361, 362	ERD25FJ271	Carbon,	270Ω,	1/4W,	± 5%		C302	ECCD1H101K	Ceramic,	100pF,	50V,	± 10%	
R363, 364	ERD25FJ271	Carbon,	270Ω,	1/4W,	± 5%								
R365	ERD25FJ271	Carbon,	270Ω,	1/4W,	± 5%		C303, 304	ECKD1H102KB	Ceramic,	0.001μF,	50V,	± 10%	
R366, 367	ERD25TJ124	Carbon,	120kΩ,	1/4W,	± 5%		C305	ECEA16Z33	Electrolytic,	33μF,	16V		
R368	ERD25FJ271	Carbon,	270Ω,	1/4W,	± 5%		C306	ECQM1H104KZ	Polyester,	0.1μF,	50V,	± 10%	
R369	ERD25FJ331	Carbon,	330Ω,	1/4W,	± 5%		C307	ECQM1H103KZ	Polyester,	0.01μF,	50V,	± 10%	
R370	ERD25FJ222	Carbon,	2.2kΩ,	1/4W,	± 5%		C308	ECEA50Z1	Electrolytic,	1μF,	50V		
R401	ERD50TJ4R7	Carbon,	4.7Ω,	1/2W,	± 5%	C309	ECEA1CS330	Electrolytic,	33μF,	16V			
R501, 502	ERD25FJ471	Carbon,	470Ω,	1/4W,	± 5%	C310	ECQM1H102KB	Polyester,	0.001μF,	50V,	± 10%		
						C311, 312	ECKF1E104ZV	Ceramic,	0.1μF,	25V,	± 80%		
						C313,	ECKF1E104ZV	Ceramic,	0.1μF,	25V,	± 80%		
						C314	ECEA1ES101	Electrolytic,	100μF,	25V			
						C315	ECEA0JS471	Electrolytic,	470μF,	6.3V			
						C401 [E],[EK], [XL]	ECNC4A473MD	Paper,	0.047μF,	450VAC,	± 20%		
						C401	ECQE2A473MZ	Polyester,	0.047μF,	250VAC,	± 20%		

Areas

- * [E] is available in Switzerland and Scandinavia. * [EG] is available in F.R. Germany.
 * [EK] is available in United Kingdom. * [EI] is available in Italy.
 * [XL] is available in Australia. * [EH] is available in Holland.
 * [EF] is available in France. * [XA] is available in East South Asia, Oceania, Africa,
 * [EB] is available in Belgium. Middle Near East and Central South America.

PACKING

1. Make sure that the tonearm is at the start position (the outermost periphery of turntable).
2. Mount the arm spacer. (Do not lock the arm.)



3. Pack the components according to the following procedure.

