

Service Manual

Direct Drive Automatic Turntable System

SL-10

(XG), (XGF), (XGB),
(XAL), (E), (XA), (XGE)



Areas

- * (XG) is available in European.
- * (XGF) is available in France.
- * (XGB) is available in Belgium.
- * (XAL) is available in Australia.
- * (E) is available in Scandinavia.
- * (XA) is available in Asia, Latin America, Middle East and Africa.
- * (XGE) is available in United Kingdom.

Specifications

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

General

Power supply: ~ 110-120/220-240V, 50Hz or 60Hz
DC 12 V (DC input jack)

Power consumption: 20 W (AC)
6 W (DC)

Dimensions: 31.5 x 8.8 x 31.5 cm
(12-1/2" x 3-1/2" x 12-1/2")

Weight: 6.5 kg (14.3 lb.)

Turntable section

Type: Quartz direct drive
Automatic turntable
Auto start/Auto lead-in
Auto return
Auto stop
Repeatplay
Auto speed select
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 30 cm (12 inches)

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: 105 mm (3-31/32")

Tracking error angle: Within $\pm 0.1^\circ$

Effective mass: 9 g (including cartridge)

Resonance frequency: 12 Hz

Tonearm drive motor: Coreless DC motor

Cartridge section

Type: Moving coil stereo cartridge
Coreless twin-ring coil type

Cantilever: Pure boron pipe

Damper: TTDD (Technics Temperature Defense Damper)

Frequency response: 10 Hz to 60 kHz
10 Hz to 10 kHz ± 0.5 dB

Output voltage: 0.2 mV at 1 kHz,
5 cm/s. zero to peak lateral velocity
(0.56 mV at 1 kHz, 10 cm/s. zero to peak 45° velocity [DIN 45 500])

Channel separation:

Channel balance: More than 25 dB at 1 kHz

DC resistance: More than 20 dB at 10 kHz

Impedance: Within 1 dB at 1 kHz

Compliance (dynamic): 30 Ω Pure resistance

Vertical tracking angle: 12×10^{-6} cm/dyne at 100 Hz

Stylus pressure range: 20°

Stylus tip: 1.25 \pm 0.25 g (12.5 \pm 2.5 mN)
0.2 x 0.7 mil (5 x 8 μ m)
Elliptical stylus

Effective mass: Block diamond tip
0.23 mg

Weight: 6.0 g (cartridge only)

Replacement cartridge: EPS-310MC

MC pre-preamp section

Rumble: -70 dB (IHF A)

Frequency response: 20 Hz to 20 kHz ± 0.5 dB

Output level: 2.5 mV

Overall distortion: 0.02% (connected to Technics SU-70A11)

Technische Daten

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

Allgemein Daten

Stromversorgung: ~110-120/220-240 V, 50/60 Hz Wechselstrom
12V Gleichstrom (Ausgestattet mit Gleichstrom-Eingangsbuchse)

Leistungsaufnahme: 20 W (Wechselstrom)
6W (Gleichstrom)

Abmessungen (B x H x T) Gewicht: 31,5 x 8,8 x 31,5 cm
6,5 kg

Plattenspieler

Typ: Quarz-Direktantrieb
Automatischer Plattenspieler
Auto-Start/Auto-Zuführung
Rückföhrautomatik
Stop-Automatik
Wiederhol-Betrieb
Automatische Drehzahlwahl
Automatische Plattengrößewahl
2-Geschwindigkeiten-Suchfunktionen
Plattenpräsenz-Registrierung

Antrieb: Direktantrieb
Motor: Kollektorloser Gleichstrommotor
Antriebsregel-Methode: Quarz-Steuerung (QPL)
Plattenteller: Aluminium-Druckguß
Durchmesser 30 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.

Rumple-Fremdspannungsabstand: -56 dB (IEC 98A unbewertet)

Rumpel-Geräuschspannungsabstand: -78 dB (IEC 98A bewertet)

Tonarm

Typ: Dynamisch ausbalancierter Tangential-Tonarm mit Kardanaufhängung mit 4-Punkt-Drehlager

Effektive Länge: 105 mm
Spurfehlerwinkel: Innerhalb $\pm 0,1^\circ$
Effektive Masse: 9 g (einschließlich Tonabnehmer)
Resonanzfrequenz: 12 Hz
Tonarm-Antriebsmotor: Kernloser Gleichstrommotor

Tonabnehmer

Typ: Dynamischer Stereo-Tonabnehmer (MC), Kernloser Doppelringspulen-Typ

Nadelträger: Röhre aus reinem Bor
Dämpfer: TTDD (Technics Temperature Defense Damper)
Frequenzgang: 10 Hz bis 60 kHz
10 Hz bis 10 kHz $\pm 0,5$ dB
Ausgangsspannung: 0,2 mV bei 1 kHz
5 cm/s. Null-zu-Spitze, lateral [0,56 mV bei 1 kHz 10 cm/s. Null-zu-Spitze, 45° (DIN 45 500)]
Mehr als 25 dB bei 1 kHz
Mehr als 20 dB bei 10 kHz
Innerhalb 1 dB bei 1 kHz

Kanalernnung:
Kanalabweichung:
Gleichstromwiderstand: 30 Ω
Impedanz: 30 Ω (Reiner Widerstand)
Nachgiebigkeit: 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: 0,2 x 0,7 Mil (5 x 18 μ m)
Elliptisch geschliffene Blockdiamantspitze
0,23 mg (nur Tonabnehmer)

Effektive Masse: 0,23 mg (nur Tonabnehmer)
Gewicht: 6,0 g
Ersatz-Tonabnehmer: EPS-310MC

Vor-Vorverstärker für dynamischen

Tonabnehmer (MC)
Rumpelabstand: -70 dB (IHF A)
Frequenzgang: 20 Hz bis 20 kHz $\pm 0,5$ dB
Ausgangspegel: 2,5 mV
Gesamtclirrfaktor: 0,02% (angeschlossen an Technics SU-70AII)

Spécifications

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 ou 60 Hz
12V C.C. (Equipé d'un jack d'entrée C.C.)

Consommation: 20 W (C.A.)
6 W (C.C.)

Dimensions: (L x H x P): 31,5 x 8,8 x 31,5 cm
Poids: 6,5 kg

Platine de lecture

Typ: Entraînement direct à quartz
Platine automatique
Départ automatique/Entrée automatique
Retour automatique
Arrêt automatique
Audition répétée
Sélecteur de vitesse automatique
Sélecteur de dimension automatique
Pose et relevage lent/rapide (fonction exploratrice à 2 vitesses)
Détection de la présence d'un disque

Système d'entraînement: Entraînement direct
Motor: Moteur C.C. sans balai
Groupe de réglage: Réglage d'accrochage de phase par quartz

Plateau de lecture: Aluminium moulé sous pression
Diamètre 30 cm

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

Déviatlon de la vitesse: En deçà de $\pm 0,002\%$
Pleurage et scintillement: 0,012% de valeur efficace*
0,025% de valeur efficace (JIS C5521)
 $\pm 0,035\%$ 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

Typ: Bras de lecture d'alignement linéaire de type à équilibre dynamique avec suspension à la cardan à 4 pivots.

Longueur effective: 105 mm
Angle d'erreur de piste: En deçà de $\pm 0,1^\circ$
Masse réelle: 9 g (y compris la celluel pick-up)
Fréquence de résonance: 12 Hz
Moteur d'entraînement du bras de lecture: Moteur C.C. sans noyau

Cellule pick-up

Typ: Cellule pick-up stéréo à bobine mobile (MC)
Type de bobine à enroulement toroïdal jumelé sans noyau
Tube à bore pur
Porte-à-faux: Tube à bore pur
Amortisseur: TTDD (Technics Temperature Defense Damper)
Réponse en fréquence: 10 Hz à 60 kHz
10 Hz à 10 kHz $\pm 0,5$ dB
0,2 mV à 1 kHz; 5 cm/s., zéro à vitesse latérale de crête (0,56 mV à 1 kHz; 10 cm/s., zéro à vitesse 45° de crête [DIN 45 500])
Plus de 25 dB à 1 kHz
Plus de 20 dB à 10 kHz
Séparation de canal: En deçà de 1 dB à 1 kHz
30 Ω
30 Ω (Résistance pure)
 12×10^{-6} cm/dyne à 100 Hz
Angle d'alignement vertical: 20°
Plage de la force verticale: 1,25 \pm 0,25 gramme (12,5 \pm 2,5mN)
Extrémité de la pointe de lecture: 0,2 x 0,7 mil (5 x 18 μ m)
Forme elliptique
Ensemble d'une pointe en diamant
0,23 mg
6,0 grammes (cellule seule)

Equilibrage des canaux: En deçà de 1 dB à 1 kHz
Résistance C.C.: 30 Ω
Impédance: 30 Ω (Résistance pure)
Elasticité (dynamique): 12×10^{-6} cm/dyne à 100 Hz
Masse réelle: 0,23 mg
Poids: 6,0 grammes (cellule seule)
Remplacement de la celluel: EPS-310MC

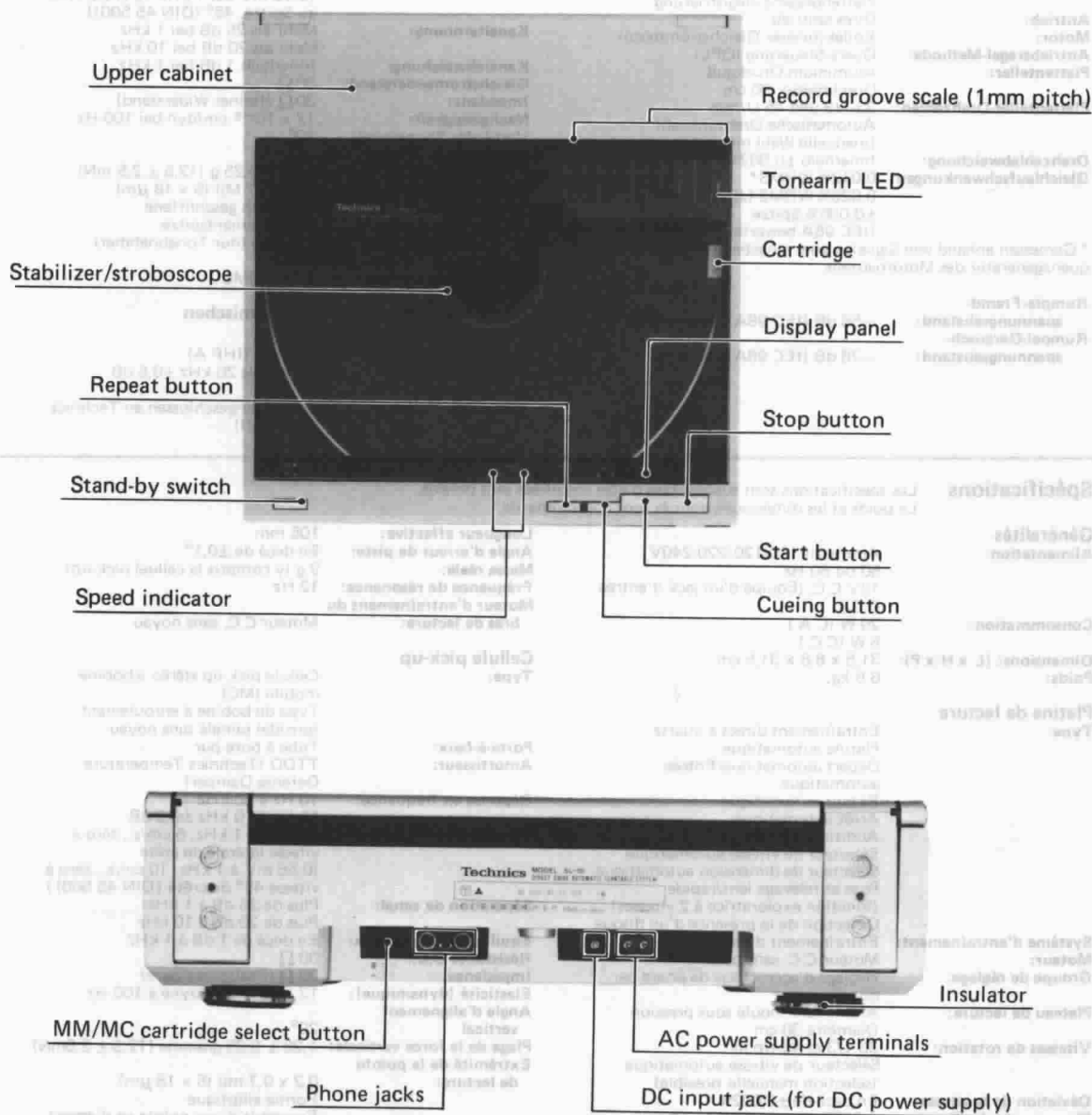
Section du pré-préamplificateur MC

Ronflement: -70 dB (IHF A)
Réponse en fréquence: 20 Hz à 20 kHz $\pm 0,5$ dB
Niveau de sortie: 2,5 mV
Distorsion globale: 0,02% (connectée à SU-70AII de Technics).

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LOCATION OF CONTROLS



■ FEATURES

The world's first high-performance DD turntable with the compact dimensions of an LP record jacket.

The SL-10 cabinet is made of die-cast aluminum and divided into upper and lower halves having extremely precise dimensions. The upper half contains the linear tracking tonearm and drive mechanism (with micro-computer and optical sensor) while the lower half contains Technics' original integral rotorplatter DD motor and its drive and servo-control circuitry.

The width and depth of the unit's dimensions are exactly the same as those of a standard LP record jacket, so the turntable takes up minimum space.

[Photo 7]

Just put on a record and press the start button.

Thanks to the optical sensor and microcomputer, both record size and record speed are detected automatically so all you have to do is press the start button to begin play. At the end of the record, the tonearm automatically rises and returns to the start position.

When there is no record on the turntable, the tonearm does not move, so there is no danger of harming the stylus accidentally.

Complete multi-function control capability.

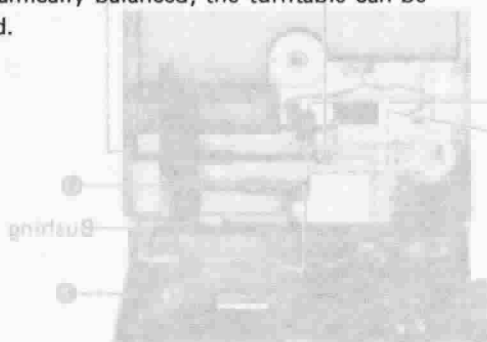
Besides the simple, basic operating procedure described above, you also have complete manual control over all tonearm and turntable functions.

[Photo 8]

Dynamic balanced linear tracking tonearm employs optical sensor and groove deflection angle detection for extremely stable and accurate tracking.

The linear tracking tonearm moves across the record surface in the same way as the cutter head used to make the record in the first place. Therefore there is virtually no tracking error or skating force.

Located by the stylus is an optical sensor that detects tracking conditions by means of groove deflection angle. Based on this information, tonearm movement is controlled so as to maintain optimum tracking at all times. Because the tonearm is dynamically balanced, the turntable can be played flat or leaned.



[Photo 9]

A precision coreless DC motor is used for tonearm drive to assure quiet and accurate control.

The coreless DC motor and slide bearing of minimum friction assure extremely precise tonearm movement.

A 4-point pivot bearing gimbal suspension developed by Technics reduces friction and raises sensitivity while contributing to smooth tracing ability.

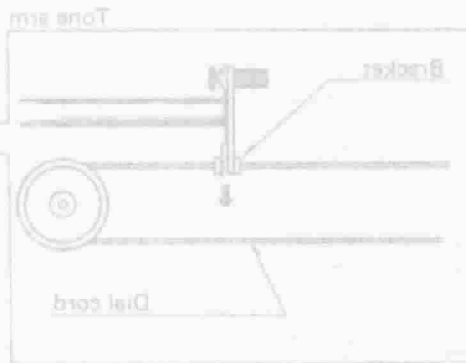
Equipped with a high performance MC cartridge employing pure boron pipe cantilever and coreless twin ring coil for excellent mechanical performance characteristics and exceedingly faithful musical reproduction.

This cartridge employs the same pure boron pipe cantilever originally developed by Technics for the 305MC cartridge. Besides this world's first, the cartridge also features coreless twin-ring construction to significantly reduce effective mass while raising output.

Built-in pre-preamp for MC cartridge with convenient MM/MC cartridge select button.

Other advanced features:

- Technics' original integral rotor-platter structure combines motor rotor and platter for more stable performance.
- Full cycle detection FG servo with quartz phase locked control assures unbeatable rotational accuracy.
- Dial scale and tonearm LED indicator on outside of upper cabinet make it easy to check on tonearm position.
- Record stabilizer and stroboscope built-in.
- 45 rpm single-play adaptor is located in turntable platter for pop-up convenience.
- Underside of unit employs damping material to absorb external vibrations and prevent acoustic breakthrough.
- Can be run on either AC or DC (12V) current. DC adaptor optionally available for car battery use.

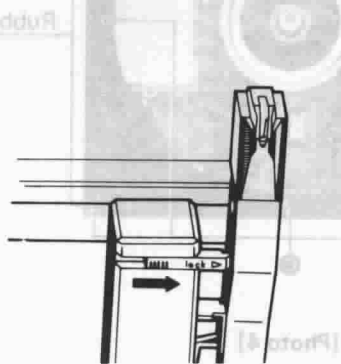


[Photo 10]

DISASSEMBLY INSTRUCTIONS

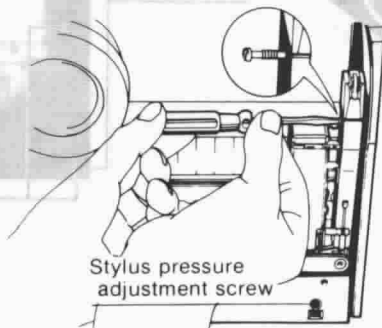
How to remove the cartridge

1. Turn off the stand-by switch.
2. Open the upper cabinet all the way.
3. Slide the arm lock over so it locks the tonearm in place. (See Fig. 1)

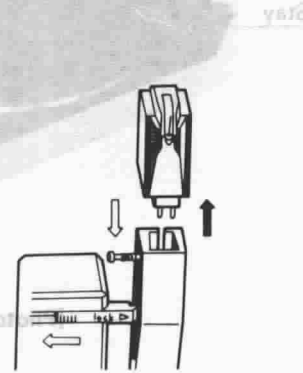


[Fig. 1]

4. Use the accessory screwdriver to unscrew the cartridge. (As shown in the diagram, loosen the screw until the cartridge can be freely removed.) (See Fig. 2)
5. Pull off the cartridge. (See Fig. 3)



[Fig. 2]

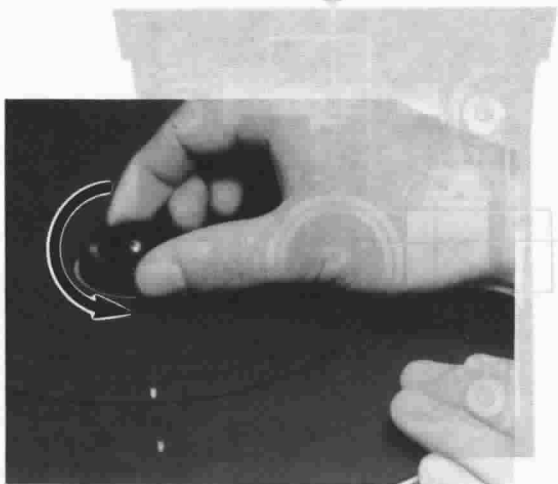


[Fig. 3]

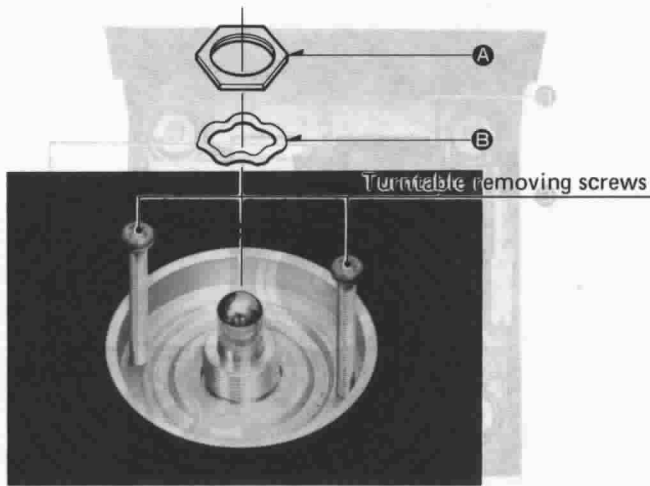
How to remove the turntable

1. Don't rotate the turntable with a hand then remove the 45 Adaptor by turned counterclockwise. (See Photo 1)
2. Remove 1 nut **A** and 1 washer **B** of turntable.

3. Install 2 setscrews for center hole of turntable, then glip up can be replaced. (See Photo 2)
- Note: Turntable screw is used as long about 30 mm.



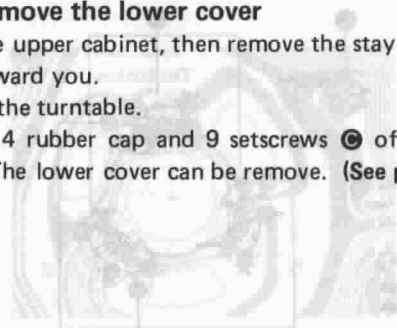
[Photo 1]



[Photo 2]

How to remove the lower cover

1. Open the upper cabinet, then remove the stay by pulling it out toward you.
2. Remove the turntable.
3. Remove 4 rubber cap and 9 setscrews **C** of the lower cover. The lower cover can be remove. (See photo 3, 4)

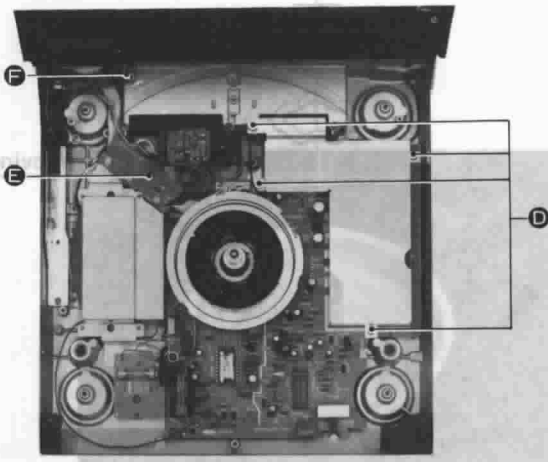




[Photo 3]

How to remove drive P.C.B.

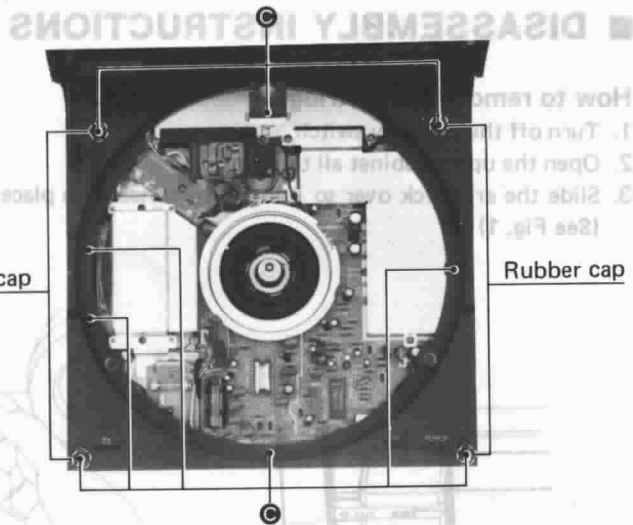
1. Remove the lower cover.
2. Remove 4 setscrews **D** of the shield cover.
3. Remove 1 setscrew **E** of the LED P.C.B. and 1 set-screw **F** of the IC1. (See Photo 5)



[Photo 5]

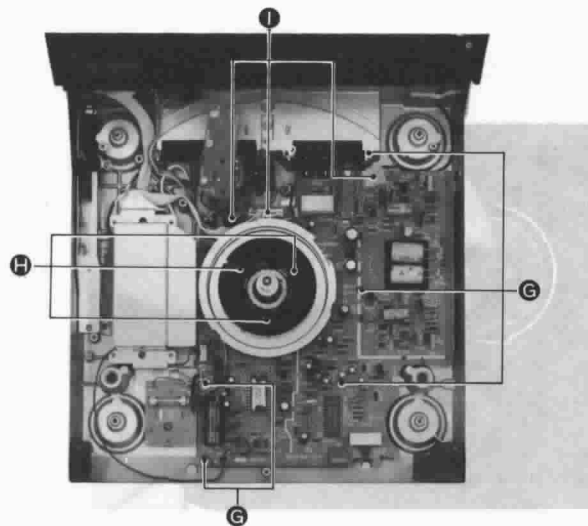
How to remove stator frame ass'y

1. Remove the drive P.C.B.
2. Disconnect 18 soldered parts **J** of the stator frame coil and 4 soldered parts **L** of the F.G detector coil. Then remove 3 setscrews **K** of the stator frame coil. The F.G detector coil and stator frame coil can be remove. (See Fig. 4)

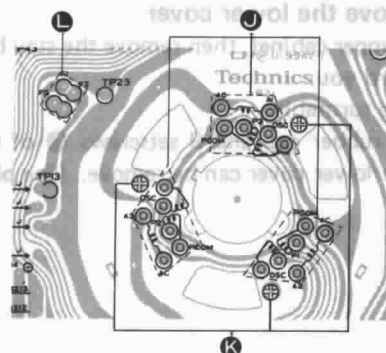


[Photo 4]

4. Remove 5 setscrews **C** of the drive P.C.B. and 3 set-screws **H** of the stator cover.
5. Remove 3 connectors **I** then drive P.C.B. can be remove. (See Photo 6)



[Photo 6]



[Fig. 4]

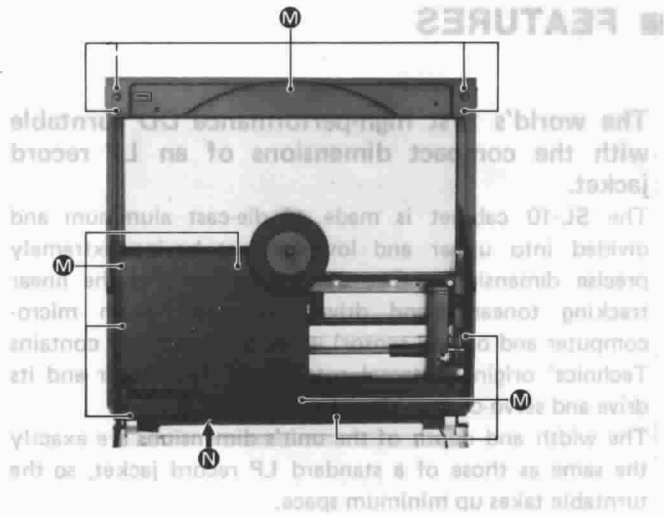
How to
 1. Remov
 2. Remov
 3. Open
 the up
 Note:

How to
 tion P.C.
 1. Remov
 2. Remov
 screws
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 screw
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How to
 1. Remov
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How to remove the upper cover

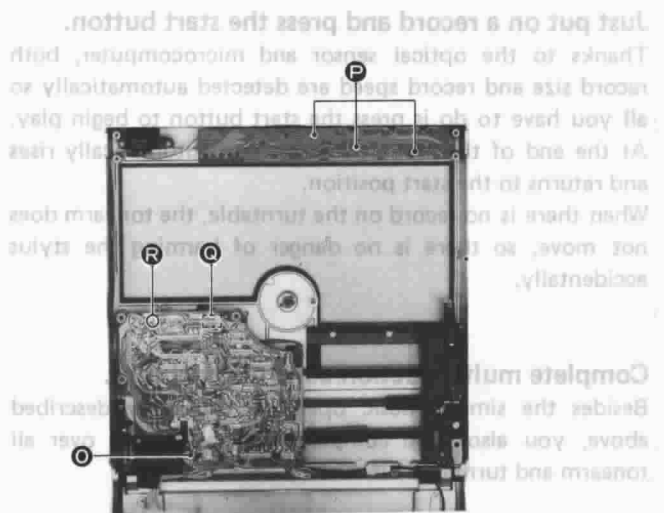
1. Remove the cartridge.
 2. Remove the stay.
 3. Open the upper cabinet. Remove 12 setscrews **M** of the upper cover.
- Note: Push the cover switch **N**, then remove the upper cover. (See Photo 7)



[Photo 7]

How to remove the control P.C.B. and the operation P.C.B.

1. Remove the upper cover.
2. Remove 1 setscrew **Q** of the control P.C.B. and 3 setscrews **P** of the operation P.C.B.
3. Remove 1 connector **R** of the limit switch and 1 setscrew **S** of the IC405. The control P.C.B. and operation P.C.B. can be removed. (See Photo 8)

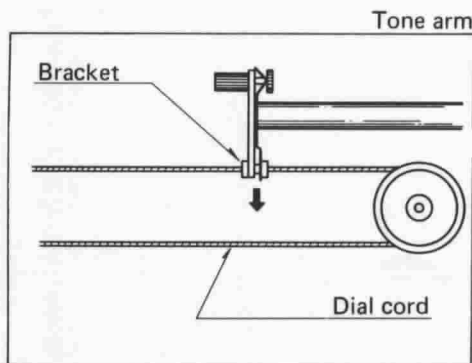


[Photo 8]

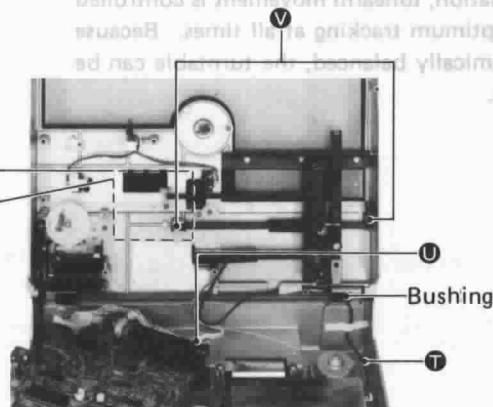
How to remove the tone arm

1. Remove the lower cover.
2. Remove the shield cover.
3. Remove 1 connector **U** of the tone arm. (See Photo 9).
4. Remove the cartridge.
5. Remove the upper cover.
6. Remove the control P.C.B.

7. Remove 1 connector **U** of the control P.C.B., then remove bushing and remove 1 connector **T** of the control P.C.B.
8. Remove the rope bracket. (See Fig. 5)
9. Remove 2 setscrews **V** of the tone arm. (See Photo 9)



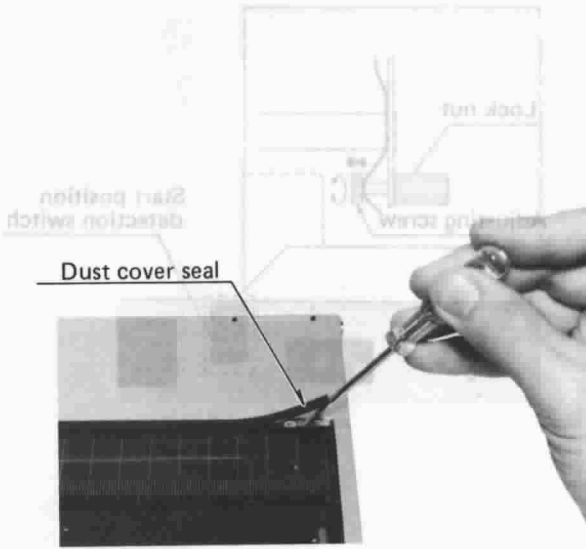
[Fig. 5]



[Photo 9]

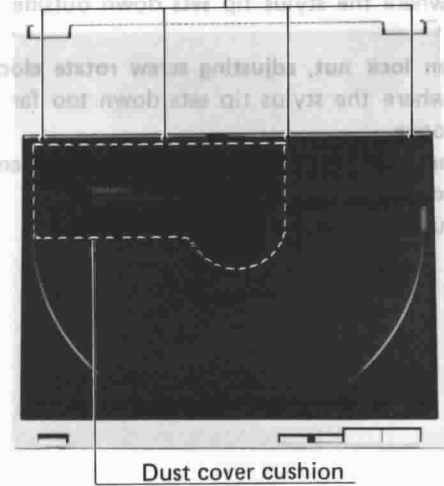
How to remove the dust cover

1. Brake the seal using with a screw driver. (See Photo 10)



[Photo 10]

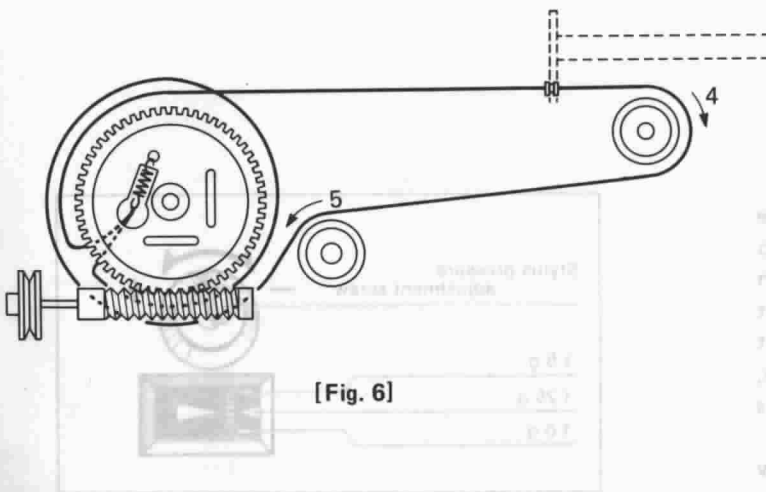
2. Remove 4 setscrews **W** of the dust cover. The dust cover and the dust cover cushion can be removed. (See Photo 11)



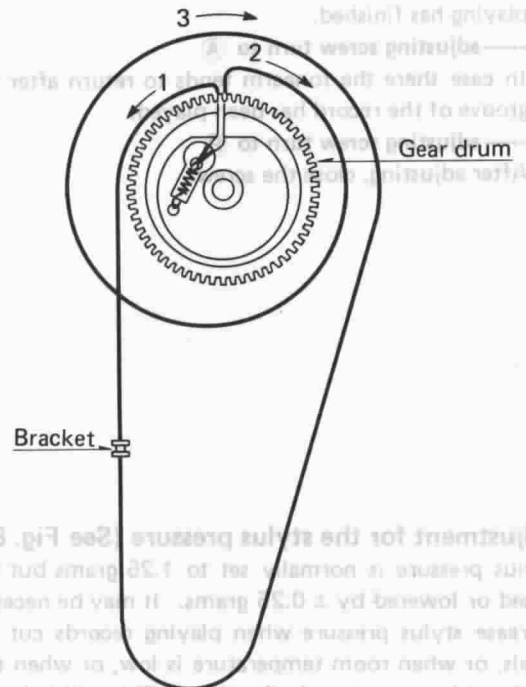
[Photo 11]

How to install the dial cord

1. Install the spring to Gear drum.
2. Direct the cord in the order from 1 to 5. (See Fig. 6)
3. Turn the worm Gear, Install the bracket to the arm. (See Fig. 7)



[Fig. 6]



[Fig. 7]

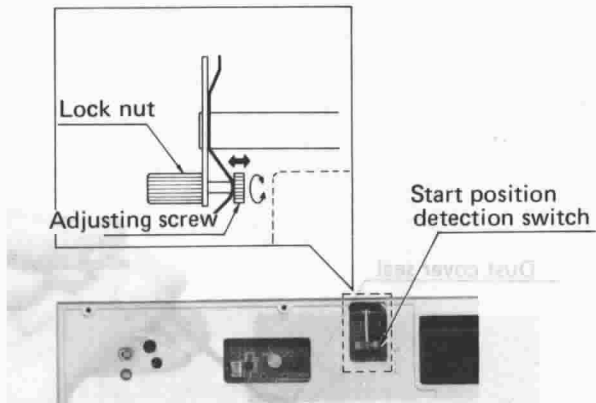
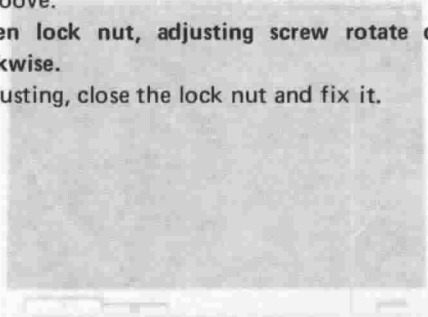
ADJUSTMENT

ENGLISH

Adjustment for automatic start position

(Adjustment by 30 cm record)

1. Remove the dust cover.
2. Confirm the arm position (start position)
3. Adjust the auto start adjusting screw. (See Photo 12)
 In case where the stylus tip sets down outside of the record.
 —loosen lock nut, adjusting screw rotate clockwise.
 In case where the stylus tip sets down too far in the record groove.
 —loosen lock nut, adjusting screw rotate counter-clockwise.
4. After adjusting, close the lock nut and fix it.

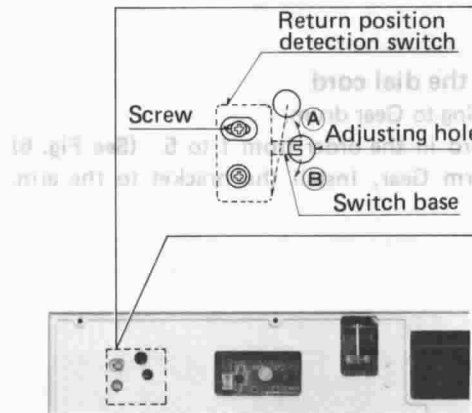
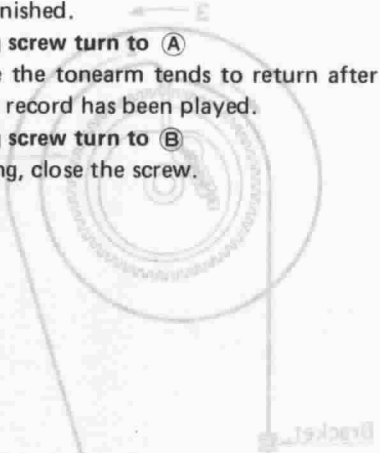


[Photo 12]

Adjustment for automatic return position

(Adjustment by 17cm record)

1. Remove the dust cover.
2. Adjust the switch position to (A) or (B) using a screw driver. (See Photo 13)
 In case where the tonearm tends to return before the playing has finished.
 —adjusting screw turn to (A)
 In case there the tonearm tends to return after the last groove of the record has been played.
 —adjusting screw turn to (B)
3. After adjusting, close the screw.

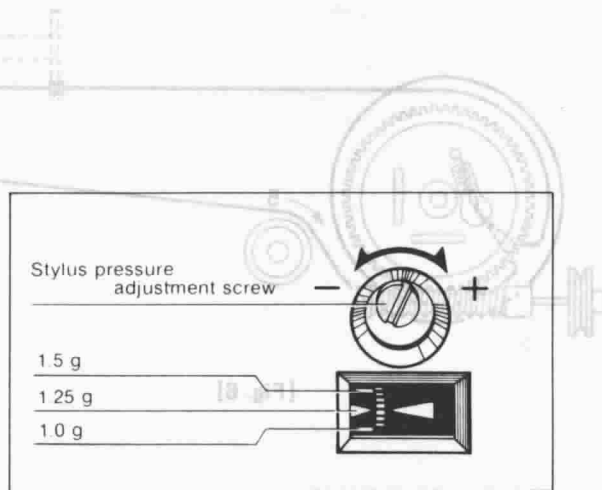


[Photo 13]

Adjustment for the stylus pressure (See Fig. 8)

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.

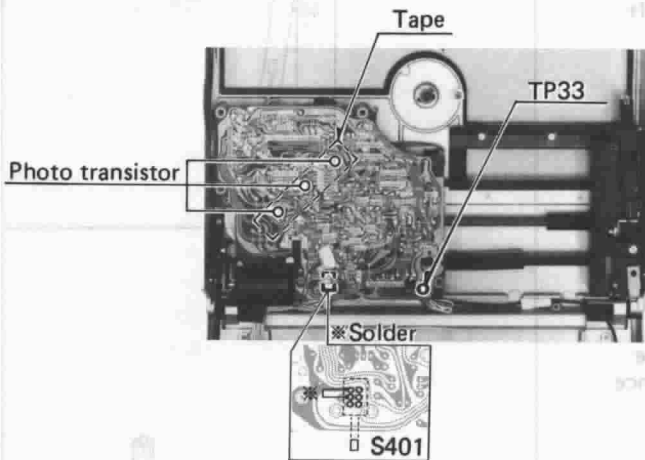
Note: Do not turn the stylus pressure adjustment. Screw further than the set limits (1.5g ~ 1.0g)



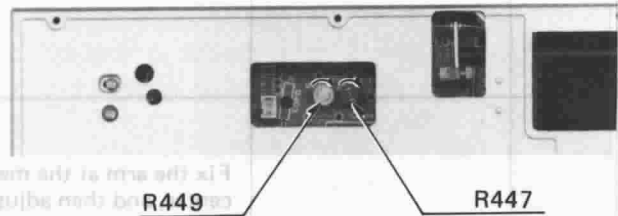
[Fig. 8]

Adjustment for tone arm

- Adjustment point



[Photo 14]



[Photo 15]

After replacement of tonearm parts, be sure to make the adjustment according to the following procedure.

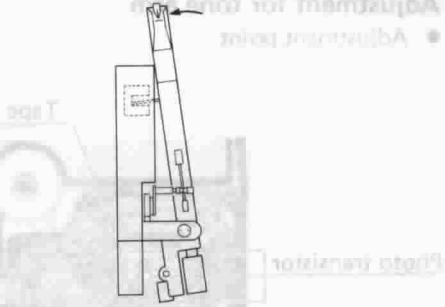
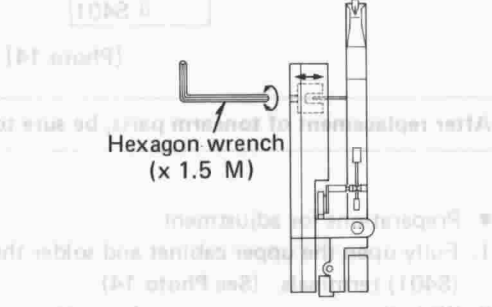
● Preparations for adjustment

1. Fully open the upper cabinet and solder the cover switch (S401) terminals. (See Photo 14)
2. With the upper cover opened, set the power switch to "ON" and cover the photo transistor with tape, then turn on the start button.
3. Make sure that the turntable rotates and the arm stops at the 30 cm record start position and the cueing down.
4. Completely turn the semi-fixed volume R447 and R449 clockwise (Temporary adj.)

● Tools and instruments necessary for adjustment

1. Screw driver
2. Hexagon wrench (1.5M)
3. DC VTVM or circuit tester.

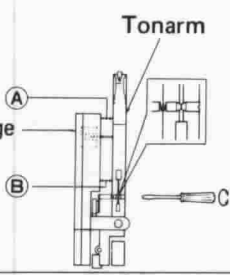
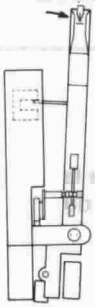
Step	Item	Description	Adjusting method
1	Mechanical center adjustment of arm	Fix the arm in V-groove of cueing lever, and then turn the adjusting screw of cueing lever so that the arm base is paralleled with the arm. Note: Check the parallelism visually.	
2	Maximum sensitivity adjustment of servo circuit	After finishing the preparatory steps 1 ~ 4, connect the DC VTVM (or circuit tester) between TP33 and earth. Fully swing the arm to the right by hand, then read the voltage. (*1) • About 7.6V	

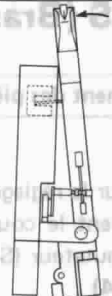
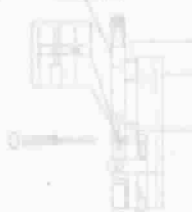
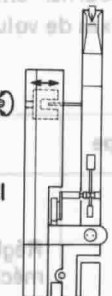

<p>3</p>	<p>Minimum sensitivity adjustment of servo circuit</p>	<p>Fully swing the arm to the left by hand, then read the voltage. (*2) About 0.4V</p>	
<p>4</p>	<p>Electrical center adjustment of arm</p>	<p>Fix the arm at the mechanical center, and then adjust the hexagonal screw to obtain the central voltage of the difference between *1 and *2. Turning the screw clockwise decreases the voltage Turning it counterclockwise increases the voltage The voltage must be adjusted as follows</p> $\frac{*1 \quad *2}{2} (7.6 V - 0.4V) + 0.4V = 4.0V$ <p>Note: *1 and *2 vary depending on the set.</p>	
<p>5</p>	<p>Servo sensitivity adjustment</p>	<p>After the above adjustment, connect the 2-pin connector between TP30 and earth in the adjusting hole</p>	<p>Turn R449 counter clockwise so that the VTVM (or circuit tester) indicates 0.72V.</p>
<p>6</p>	<p>Offset angle adjustment</p>	<p>Subsequently, put a 1 mm pitch record disc on the turntable to start performance.</p>	<p>Turn R447 counterclockwise so that the VTVM (or circuit tester) indicates 0.6V.</p>

JUSTIERUNG (Tonarm) DEUTSCH

Nehmen Sie die Neueinstellungen nach Auswechseln des Tonarms gemäß den folgenden Vorgängen vor.

- Vorbereitungen für Einstellungen
 - Notwendige Werkzeuge und Geräte für die Einstellungsvorgänge
1. Öffnen Sie die Oberabdeckung völlig, und verlöten Sie die Ausgangsanschlüsse des Abdeckungsschalters (S401) um diesen Schalter eingeschaltet zu halten und normalen Betrieb zu ermöglichen. (Siehe Foto 14)
 1. Schlitzschraubenzieher (—)
 2. Stellen Sie den Netzschalter bei geöffneter Abdeckung auf die "ON" (EIN) Position, decken Sie die Photodiode mit Tape ab und drücken Sie den Startknopf.
 2. Sechseckiger Bolzenschlüssel (1.5M)
 3. Versichern Sie sich, daß sich der Plattenteller dreht, der Tonarm an der Anfangsposition für 30 cm Schallplatten anhält und der Ablifthebel sich herunterbewegt.
 3. Gleichstromvoltmeter oder Tester
 4. Drehen Sie die halbeinstellbaren Widerstände R447 und R449 bis zum Anschlag im Uhrzeigersim. (Vorläufige Einstellung)

Schritt	Einstellgegenstand	Beschreibung	Einstellmethode
1	Mechanische Mitteleinstellung des Tonarms	Legen Sie den Tonarm in die V-Rille des Ablifthebels ein, und drehen Sie die Einstellschraube des Ablifthebels bis die Armgrundlage gleichlaufend (parallel) mit dem Tonarm eingestellt ist. Anmerkung: Führen Sie Sichtprüfungen der Parallelität aus.	
2	Einstellung auf maximale Empfindlichkeit des Servo-Kreises	Verbinden Sie das Gleichstromvoltmeter (oder Tester) zwischen TP33 und Erde, nachdem die vorbereitenden Schritte 1 bis 4 ausgeführt worden sind. (*1) Ungefähr 7.6 Volt.	

<p>3</p>	<p>Einstellung auf minimale Empfindlichkeit des Servo-Kreises</p>	<p>Bewegen Sie den Tonarm mit der Hand völlig nach Rechts (bis zum Anschlag), und lesen Sie dann die angezeigte Spannung ab. (*2) .Ungefähr 0.4Volt</p>	
<p>4</p>	<p>Elektrische Mittelleinstellung des Tonarms</p> 	<p>Bringen Sie den Tonarm auf Seine mechanische Mittelposition, und adjustieren Sie die Sechseckige Schraube um eine Mittelspannung Zwischen den Unterschieden von *1 und *2 zu erhalten.</p> <p>Drehen der Schraube im Uhrzeigersinn verringert die Spannung. Drehen der Schraube entgegen dem Uhrzeigersinn erhöht die Spannung.</p> <p>Die Spannung muß wie folgt eingestellt werden. *1 *2 $\frac{7,6V - 0,4V}{2} + 0,4V = 4,0 \text{ Volt}$</p> <p>Anmerkung: *1 und *2 sind, vom Gerätetyp abhängig, unterschiedlich.</p>	 <p>Sechseckiger Bolzenschlüssel (x 1.5M)</p>
<p>5</p>	<p>Einstellung der Servo-Empfindlichkeit</p> 	<p>Nach Austüfung der vorstehenden Einstellungen, verbinden Sie das 2-Stift Verbindungsstück mit TP30 und Erde im Adjustierloch.</p>	<p>Drehen Sie R449 entgegen dem Uhrzeigersinn um die, auf dem Röhren-voltmeter (order tester) angezeigte Spannung, auf 0,72V kommen zu lassen</p>
<p>6</p>	<p>Einstellung des Reibungswinkels</p>	<p>Legen Sie eine 1-mm Abstimmerschallplatte auf den Plattenteller um mit dem Abspielvorgang zu beginnen.</p>	<p>Drehen Sie den Widerstand R447 entgegen dem Uhrzeigersinn um auf dem Röhrevoltmeter (order tester) 0,6V. anzeigen zu lassen.</p>

REGLAGES (Bras acoustique)

FRANCAIS

Après le remplacement des pièces du bras acoustique, S'assurer d'effectuer le réglage en fonction du procédé suivant.

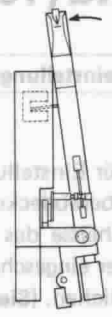


● Préparations pour le réglage

1. Ouvrir entièrement le couvercle supérieur et souder les bornes du commutateur (S401) du couvercle (Photographie 14)
2. Quand le couvercle supérieur est ouvert, placer le commutateur d'alimentation sur la position "ON" et couvrir la diode photoélectrique à l'aide de Une bande adhésive pur allumer le bouton de départ.
3. S'assurer que le plateau tourne et que le bras s'arrête sur la position de départ d'un disque de 33 tours et que le levier de mise en pile se baisse.
4. Tourner entièrement à droite les R447 et R449 semi-fixes de volume. (Réglage provisoire).

● Outils et appareils nécessaires au réglage

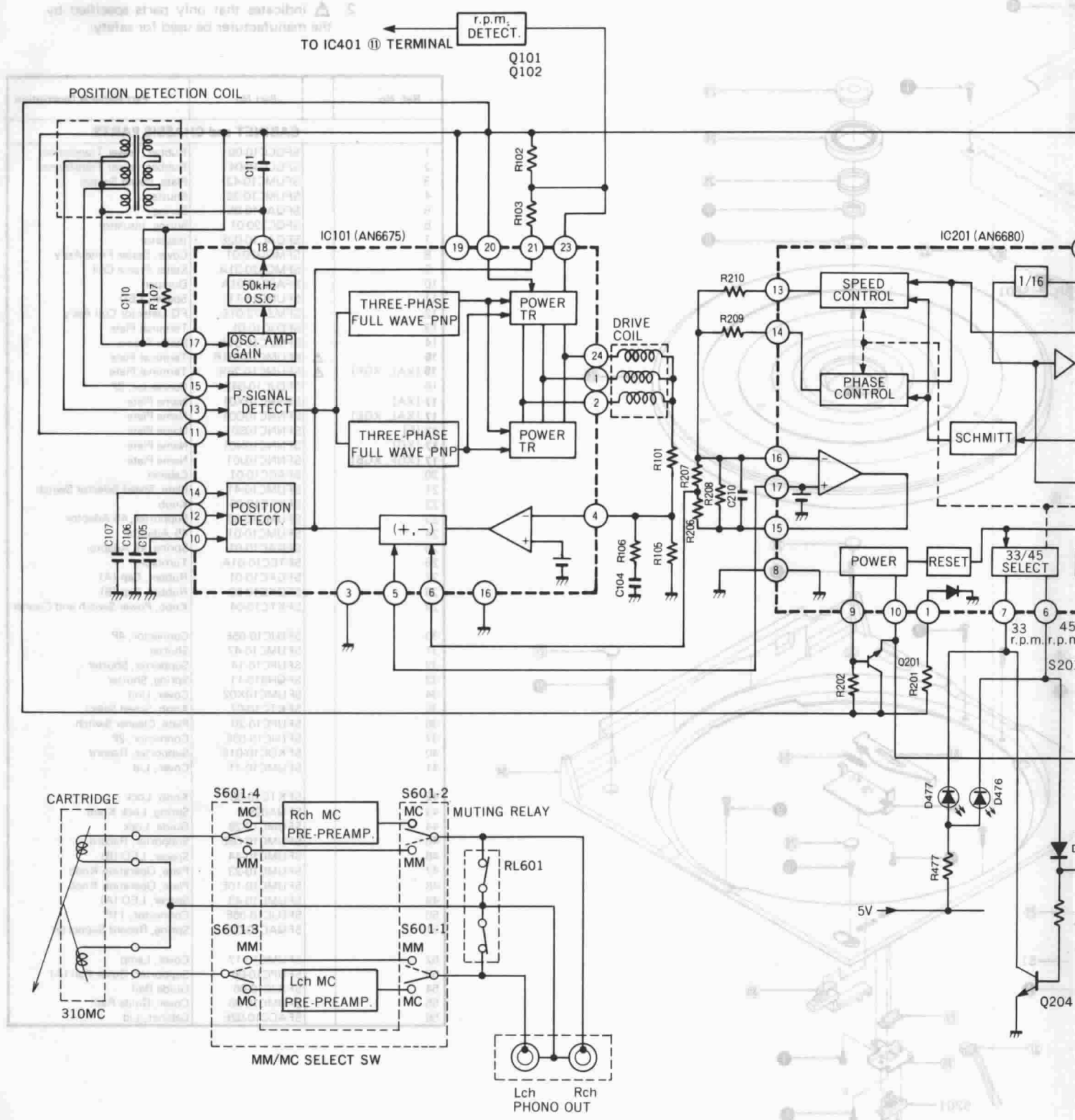
1. Tournevis à tête palte
2. Clé hexagonale (1.5 M)
3. DC VTVM ou testeur

Etape	Article	Description	Méthode de réglage
1	Réglage du centre mécanique du bras	Fixer le bras dans le sillon en V du levier de mise en pile et tourner la vis de réglage du levier de mise en pile de telle sorte que la base du bras soit parallèle au bras. Note: Vérifier le parallélisme à l'oeil.	
2	Réglage de la sensibilité maximale du circuit servo	Après la fin des étapes préparatoires 1 à 4, brancher le DC VTVM (ou le testeur) entre TP33 et la terre. Porter le bras entièrement à droite à la main, et lire la tension. (*1) • Environ 7.6V	

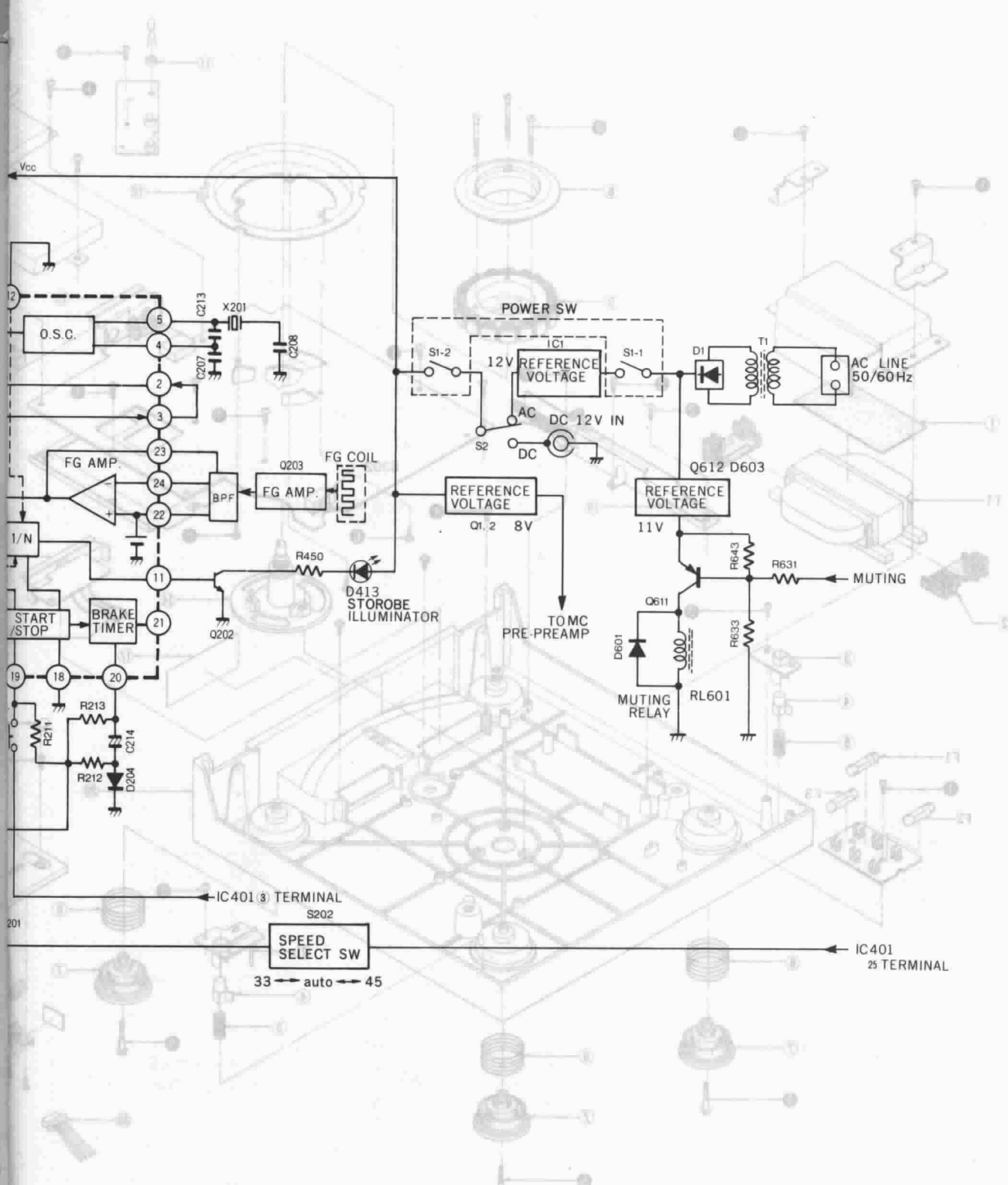
<p>3</p>	<p>Réglage de la sensibilité minimal du circuit servo</p>	<p>Porter le bras à gauche à la tension. (*2) • Environ 0.4V</p>	
<p>4</p>	<p>Réglage du centre électrique du bras</p>	<p>Placer le bras au centre mécanique et régler la vis à tête hexagonale pour obtenir la tension centrale de la différence entre *1 et *2</p> <p>Tourner la vis de réglage à droite pour réduire la tension.</p> <p>Tourner la vis de réglage à gauche pour augmenter la tension.</p>	
	<p>La tension doit être réglée de la façon suivante.</p>	<p>*1 *2 $\frac{7.6V - 0.4V}{2} + 0.4V = 4.0V$</p> <p>Note: *1 et *2 varient en fonction de l'appareil.</p>	<p>Ci néhâgonale (x 1.5M)</p>
<p>5</p>	<p>Réglage de la sensibilité du servo</p>	<p>Après réglage ci-dessus, brancher le connecteur à deux broches entre TP30 et la terre dans le trou de réglage.</p>	<p>Tourner la R449 à gauche de telle sorte que le VTVM (ou le testeur) indique 0.72V.</p>
<p>6</p>	<p>Réglage de l'angle de compensation</p>	<p>Placer un disque d'un pas de 1 mm sur le plateau pour démarrer la lecture.</p>	<p>Tourner la R447 à gauche de telle sorte que le VTVM (ou le testeur) indique 0,6V.</p>

REPLACEMENT BLOCK DIAGRAM

Notes: 1 Part number not indicated on most mechanical parts.
 2 Use this part number for parts order.
 3 Δ indicates that only parts specified by the manufacturer be used for safety.



EXPLODED VIEW



Vcc

POWER SW

12V REFERENCE VOLTAGE

DC 12V IN

AC LINE 50/60 Hz

FG AMP

FG AMP

BPF

FG COIL

REFERENCE VOLTAGE 01, 2 8V

REFERENCE VOLTAGE 11V

D413 STROBE ILLUMINATOR

TOMC PRE-PREAMP

MUTING RELAY RL601

MUTING

START STOP

BRAKE TIMER

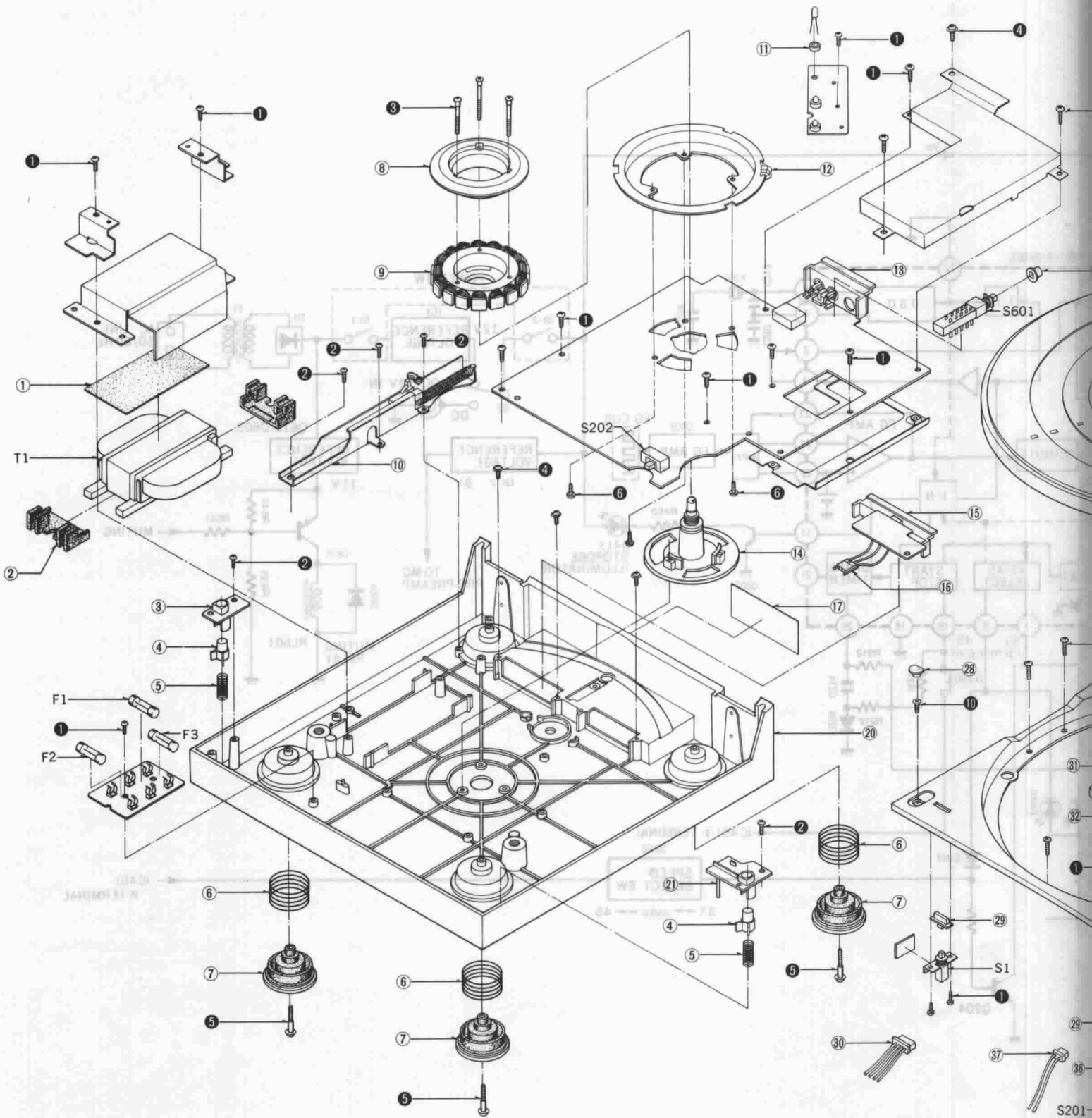
SPEED SELECT SW S202

33 auto 45

IC401 25 TERMINAL

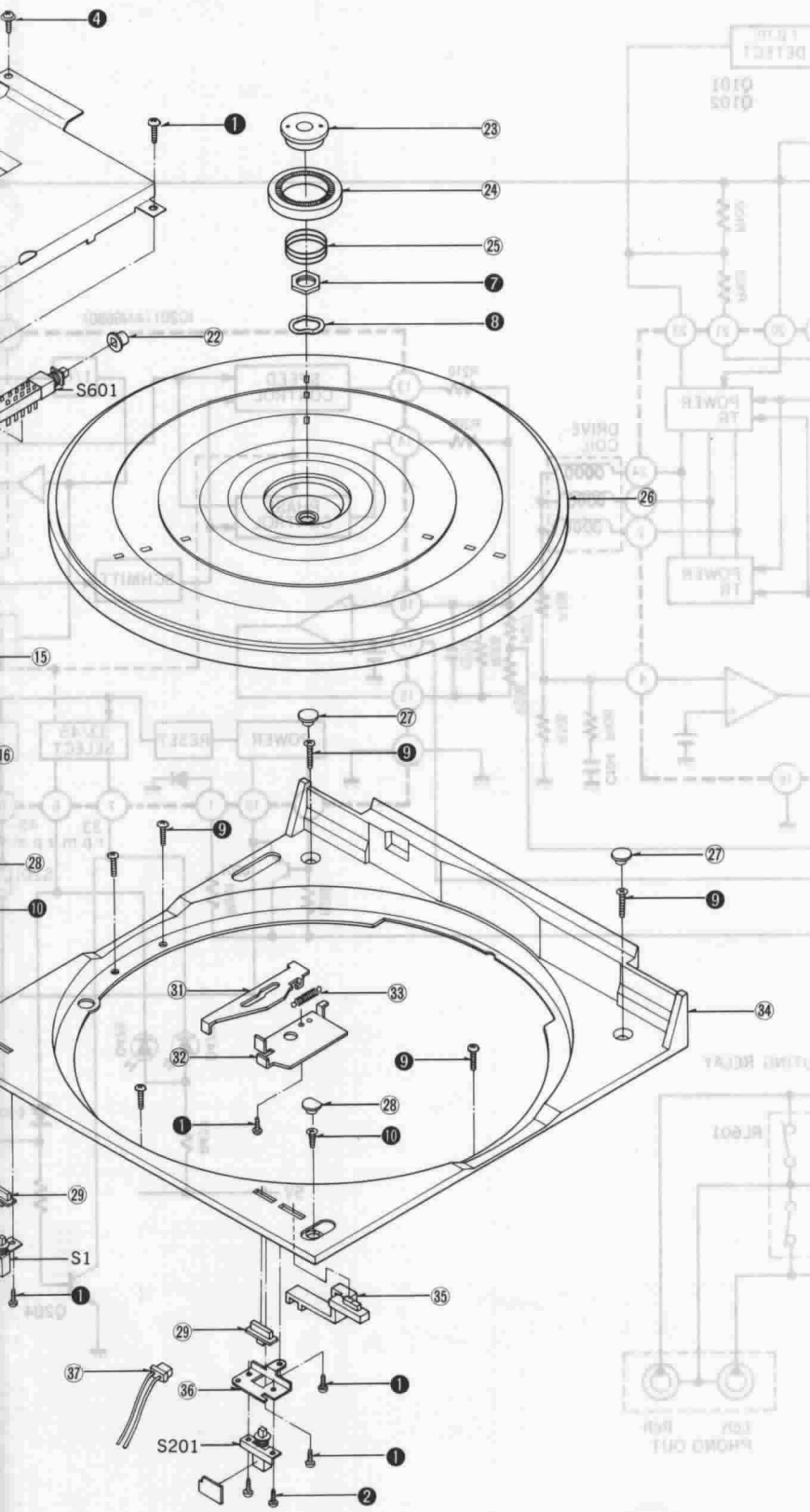
IC401 8 TERMINAL S202

EXPODED VIEW



REPLACEMENT PARTS LIST

- Notes:**
1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.
 2. **Δ** indicates that only parts specified by the manufacturer be used for safety.



Ref. No.	Part No.	Part Name & Description
CABINET and CHASSIS PARTS		
1	SFGCC10-09	Rubber, Power Transformer
2	SFGCC10-04	Rubber, Power Transformer
3	SFUMC10-42	Plate, Power Switch
4	SFUMC10-36	Shutter
5	SFQAC10-05	Spring
6	SFQC320-01	Spring, Insulator
7	SFGAC10-02E	Insulator
8	SFMGQ20-01	Cover, Stator Frme Ass'y
9	SFMG520-31A	Stator Frame Coil
10	SFASC10-01A	Dumper
11	SFUM015-11	Spacer, LED
12	SFMZ172-01E	FG Detector Coil Ass'y
13	SFDJC10-01	Terminal Plate
14	SFMZC10-01A	Stator Frame
15	SFUMC10X01R	Terminal Plate
15 [XAL, XGF]	SFUMC10-26R	Terminal Plate
16	SFDJC10-04E	Connector, 3P
17 [XA]	SFNNC10X01	Name Plate
17 [XAL, XGE]	SFNNC10G01	Name Plate
17 [E]	SFNNC10S01	Name Plate
17 [XG]	SFNNC10N01	Name Plate
17 [XGF, XGB]	SFNNC10J01	Name Plate
20	SFACC10-01	Cabinet
21	SFUMC10-41	Plate, Speed Selector Switch
22	SFKTC10-05	Knob
23	SFUMC10-02	Supporter, 45 Adaptor
24	SFUMC10-01	45 Adaptor
25	SFQAC10-01	Spring, 45 Adaptor
26	SFTEC10-01A	Turntable
27	SFGKC10-01	Rubber, Cap (A)
28	SFGKC10-02	Rubber, Cap (B)
29	SFKTC10-04	Knob, Power Switch and Cleaner
30	SFDJC10-05E	Connector, 4P
31	SFUMC10-47	Shutter
32	SFUPC10-14	Supporter, Shutter
33	SFQH910-11	Spring, Shutter
34	SFUMC10X02	Cover, Unit
35	SFKTC10-07	Knob, Speed Select
36	SFUPC10-20	Plate, Cleaner Switch
37	SFDJC10-03E	Connector, 2P
40	SFKDC10-01E	Supporter, Record
41	SFUMC10-11	Cover, Lid
42	SFKTC10-06	Knob, Lock
43	SFQA829-2	Spring, Lock Knob
44	SFUMC10-28	Guide, Lock
45	SFUMC10-08E	Supporter, Record
46	SFUMC10-44	Spacer, LED (B)
47	SFUMC10-23	Plate, Operation Knob
48	SFUMC10-10E	Plate, Operation Knob
49	SFUMC10-43	Spacer, LED (A)
50	SFDJC10-06E	Connector, 11P
51	SFQAC10-02	Spring, Record Supporter
52	SFUMG10-17	Cover, Lamp
53	SFUPC10-06	Supporter, Guide Rail (A)
54	SFXJC10-06	Guide Rail
55	SFUMC10-30	Cover, Guide Rail
56	SFACC10-02E	Cabinet, Lid

Ref. No.	Part No.	Part Name & Description
57	SFUMC10-31	Supporter, Power Switch
58	SFUMC10-24	Plate, Power Switch
59	SFQAC10-06	Spring, Power Switch
60	SFKTC10-01	Knob, Power Switch
61	SFUMC10-09	Supporter, Power Switch
62	SFGCC10-03	Cushion, Dust Cover
63	SFADC10X01	Dust Cover
64	SFUMC10-35	Bushing (R)
65	SFXWC10-03	Spacer
66	SFUPC10-05	Supporter, Guide Rail (B)
67	SFUPC10-23A	Plate, Pulley
68	SFDJC10-02E	Connector, 4P
69	SFUPC10-01	Plate, Return Switch
70	SFUMC10-34	Bushing (L)
71	SFASC10-02A	Stay Ass'y
72	SFGCC10-02	Cushion, Dust Cover (A)
73	SFKKC10-01	Supporter, Dust Cover
74	SFUMC10-05	Drum, Arm Drive
75	SFUPC10-02A	Plate, Arm Drive
76	SFGBC10-01	Belt, Arm Drive
77	SFUMC10-39	Holder, Lmap
78	SFUMC10-48	Holder, LED
79	SFUMC10-18	Cover, Wire
80	SFDJ10-07E	Connector, 10P
81	SFUMC10-06	Cover, Motor
82	SFGCC10-01	Rubber, Motor
83	SFMHC10-01E	Motor, Arm Drive
84	SFUZC10-01E	Lope

SCREW, WASHERS and CIRCLIPS

Ref. No.	Part No.	Part Name & Description
90	SFPAM01001A	Tone Arm
91	EPS-310MC	Cartridge
92	SFDNC10-01	Pointer
93	SFPKD01001E	Arm Base
94	SFUPC10-16A	Lift Ass'y
95	SFQSC10-01	Spring, Lift
96	SFKTC10-08	Knob, Lock
97	SFQPC10-02	Spacer, Lock Knob
98	SFUMC10-3B	Supporter, Lock Knob
99	SFQPC10-01	Spacer, Operation
100	SFPKD01002A	Cover, Arm Base
101	SFDPC10-06	Plate, Arm
102	SFDZC10-01E	Plunge, Ass'y
103	SFDJC10-08E	Connector, Arm
104	SFDHC10-01E	Connector, Phono

SCREWS, WASHERS and CIRCLIPS

①	XTV3+8BFN	Screw
②	XTN3+6B	Screw
③	SFXGC10-03	Screw
④	SFPEV17202	Screw
⑤	SFXGQ20-01	Screw
⑥	XTN26+6B	Screw
⑦	XNS12	Nut

Ref. No.	Part No.	Part Name & Description
⑧	SFXWC10-01	Washer
⑨	XTN3+20BFZ	Screw
⑩	XTN3+10BFZ	Screw
⑪	XTN3+8BFZ	Screw
⑫	XSN3+6	Screw
⑬	XWA3B	Washer
⑭	SFXGC10-05	Screw
⑮	SFXGC10-02	Screw
⑯	XTN3+12B	Screw
⑰	XTS26+5JFC	Screw
⑱	XTV3+6BFN	Screw
⑲	SFXWC10-04	Washer
⑳	XYN23+C10BN	Screw
㉑	XYN23+C12BN	Screw
㉒	XTB3+6BFN	Screw
㉓	XUC3FT	Circlip
㉔	SFXW551D2	Washer
㉕	XWC3B	Washer
㉖	SFPEV01001	Screw
㉗	XYN2+C5FZ	Screw
㉘	XSN2+4BV	Screw
㉙	XWE2BW	Washer
㉚	XSN3+6BVS	Screw
㉛	XWA3BFZ	Washer
㉜	XTN2+4B	Screw
㉝	XXA3D4FZ	Screw

ACCESSORIES

A1 [XA, XAL, XG, XGF, XGB]	SFNUC10X01	Instruction Book
A1 [XGE]	SFNUC10G01	Instruction Book
A1 [E]	SFNUC10S01	Instruction Book
A2 [XA] only	SFDK119118	2P Plug
A3	SFCZB30001	Brush
A4	SFCFB20502	Screw Driver
A5 [XA, E, XG, XGF, XGB]	RJA20Z	AC Cord
A5 [XAL]	RJA26Z	AC Cord
A5 [XGE]	RJA43Z	AC Cord
A6	SFWZC10M01	Sheet, for 25.30cm Record
A7	SFWZC10M02	Sheet, for 17cm Record
A8	SFDHC10-02	Phono Cord

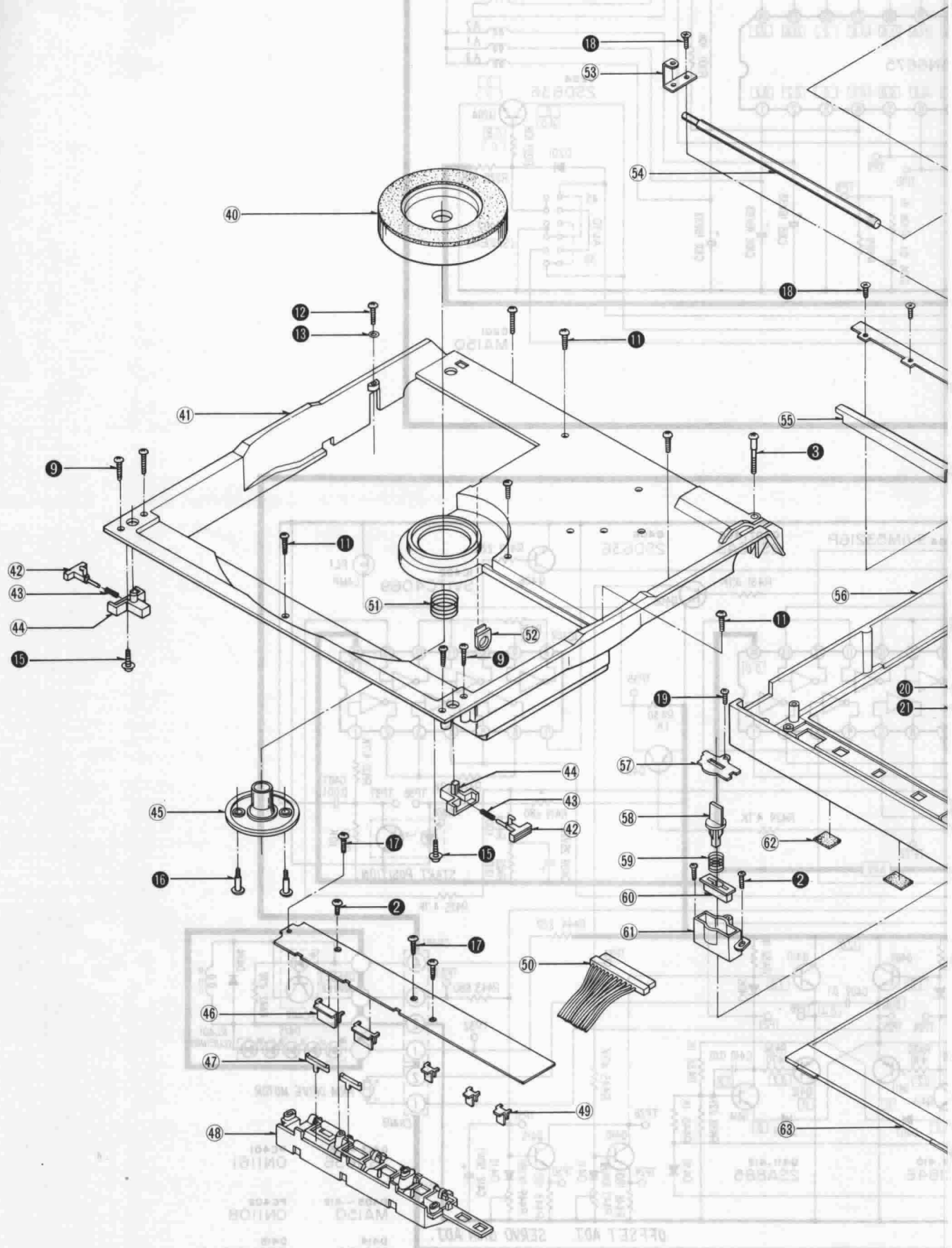
PACKINGS

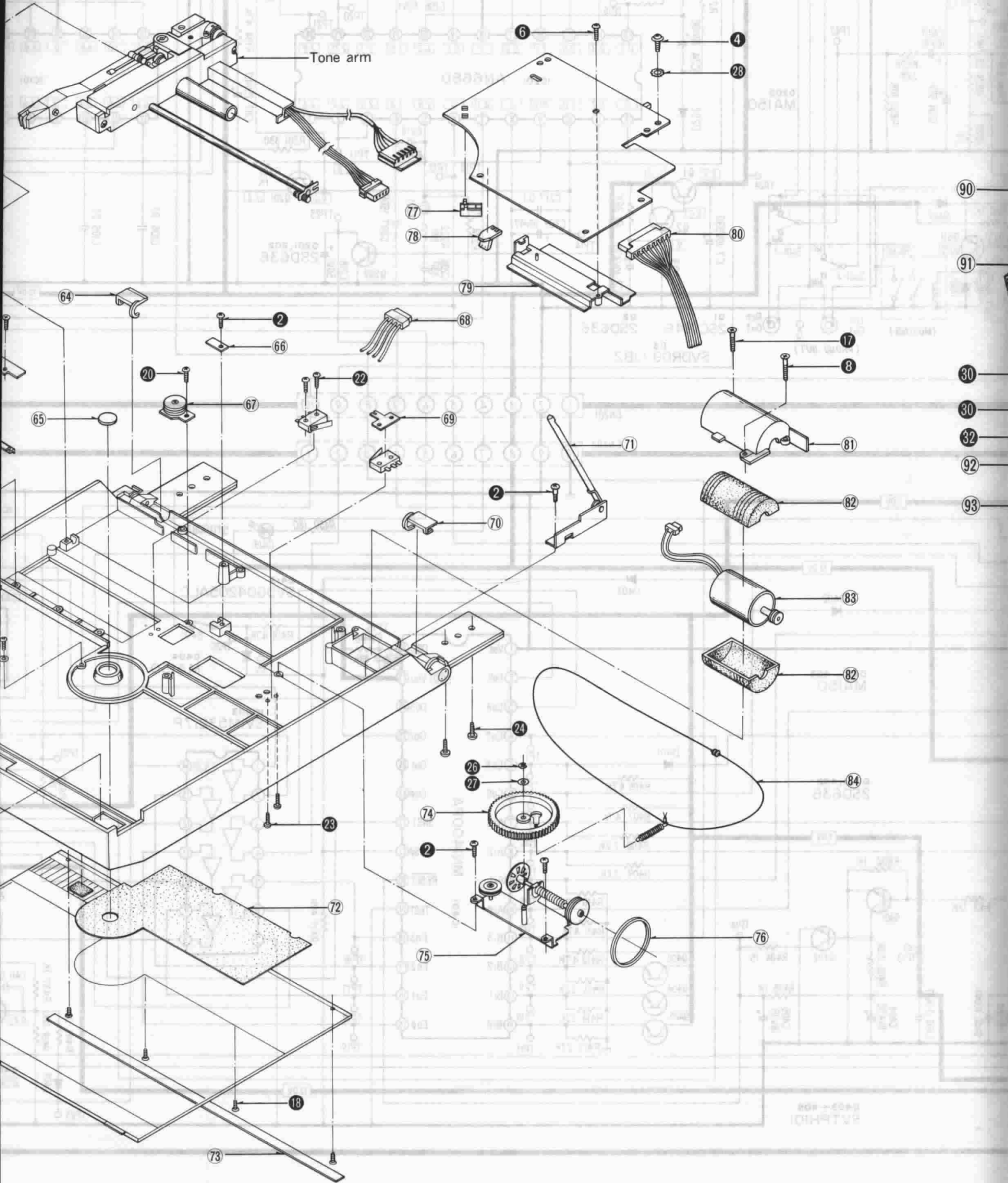
P1	SFHPC10M02	Carton, Outer
P1 [XGF] only	SFHPC10C02	Carton, Outer
P2	SFHPC10-01	Carton, Inner
P2 [XGF] only	SFHPC10C01	Carton, Inner
P3	SFHHC10-01	Pad, Unit
P4	SFHSC10-03	Spacer, Corner (A)
P5	SFHSC10-04	Spacer, Corner (B)
P6	SFHSC10-02	Spacer, Arm
P7	SFHZC10-03	Sheet, Arm Spacer
P8	SFHSC10-01	Spacer, Turntable
P9	XSN4D20FYBS	Screw
P10	XWE4D8BW	Washer
P11	SFYF45A50	Polyethylene Bag, Unit
P12	SPP189	Polyethylene Bag, Cord
P13	SPB1083	Polyethylene Bag, Accessory
P14	SFHZC10-01	Handle

Areas

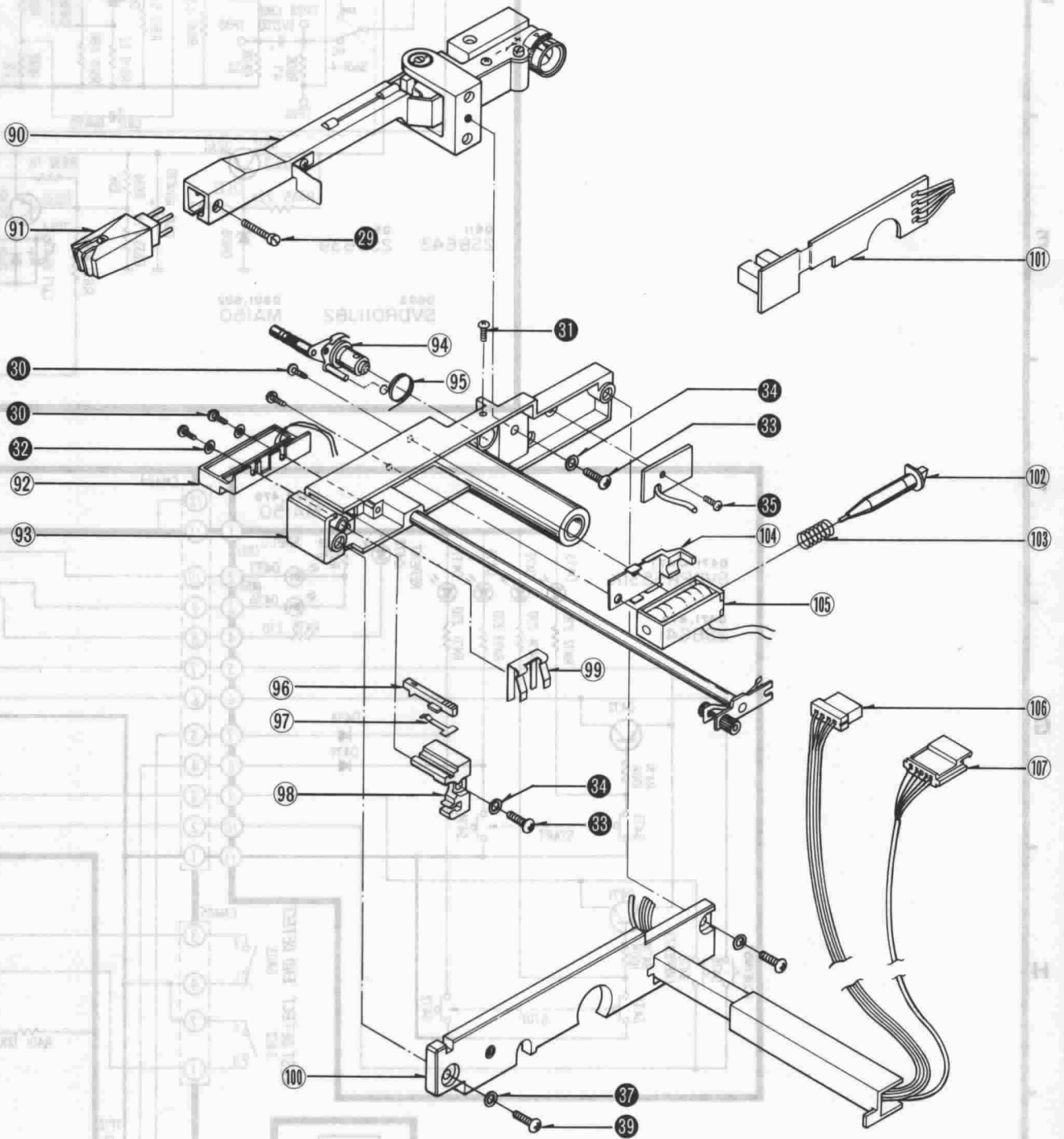
- * (XA) is available in Asia, Latin America, Middle East and Africa.
- * (XAL) is available in Australia.
- * (XG) is available in European.
- * (XGF) is available in France.
- * (XGB) is available in Belgium.
- * (XGE) is available in United Kingdom.
- * (E) is available in Scandinavia.

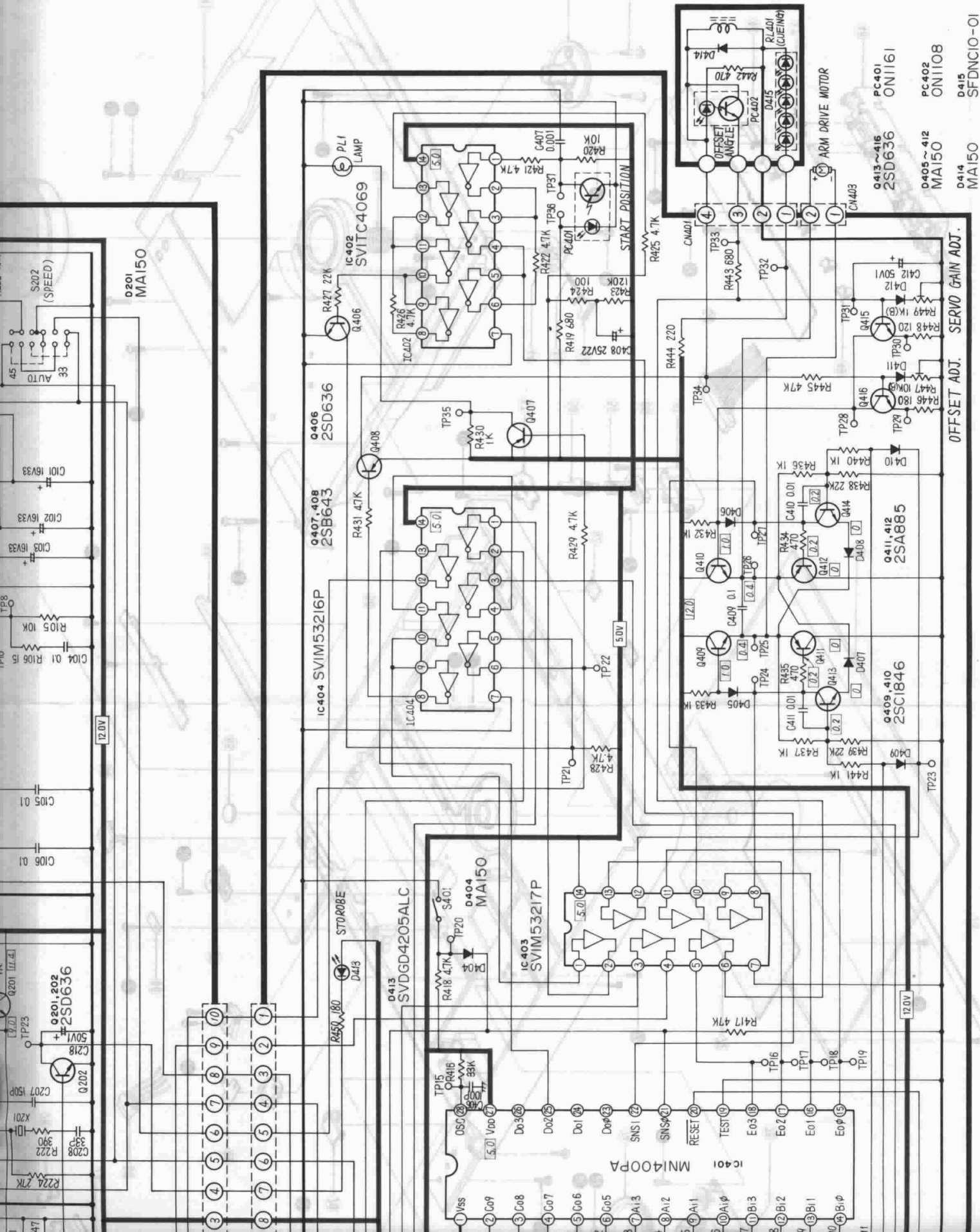
EXPLODED VIEW





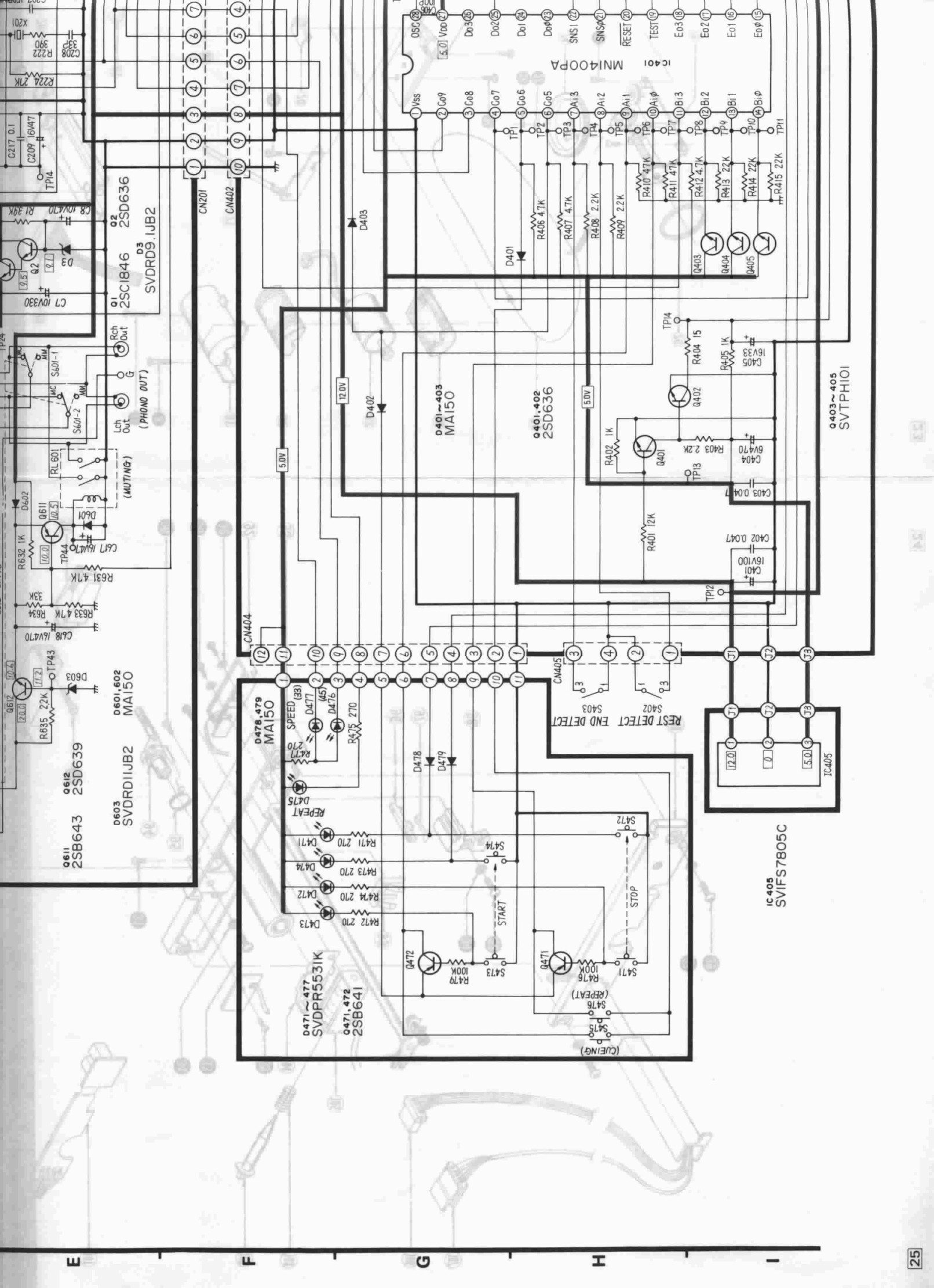
■ EXPLODED VIEW (Tone Arm)





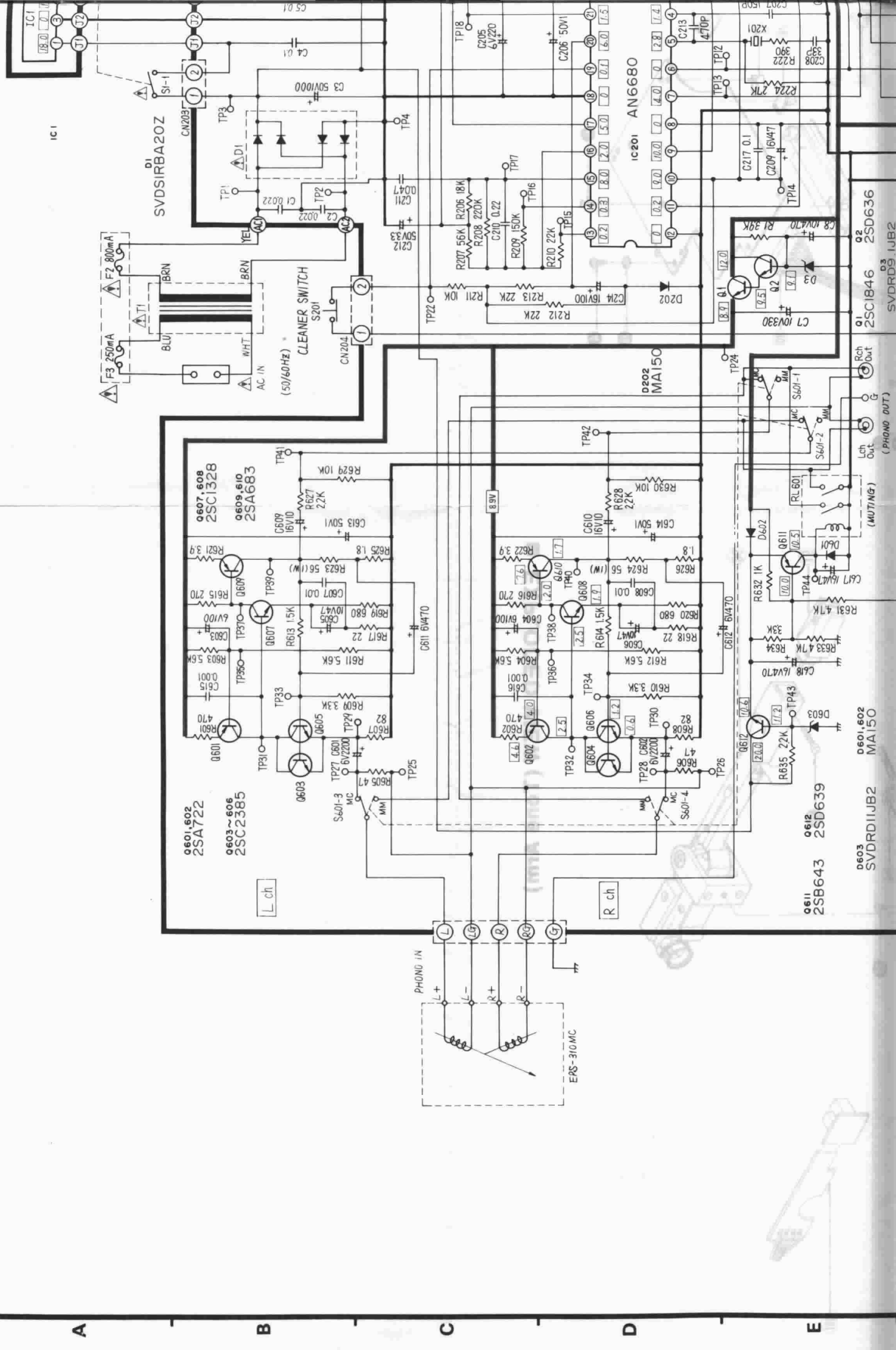
- Q413~416 2SD636
- Q405~412 MA150
- D414 MA150
- PC401 ON1161
- PC402 ON1108
- D415 SFDNC10-01

OFFSET ADJ. SERVO GAIN ADJ.

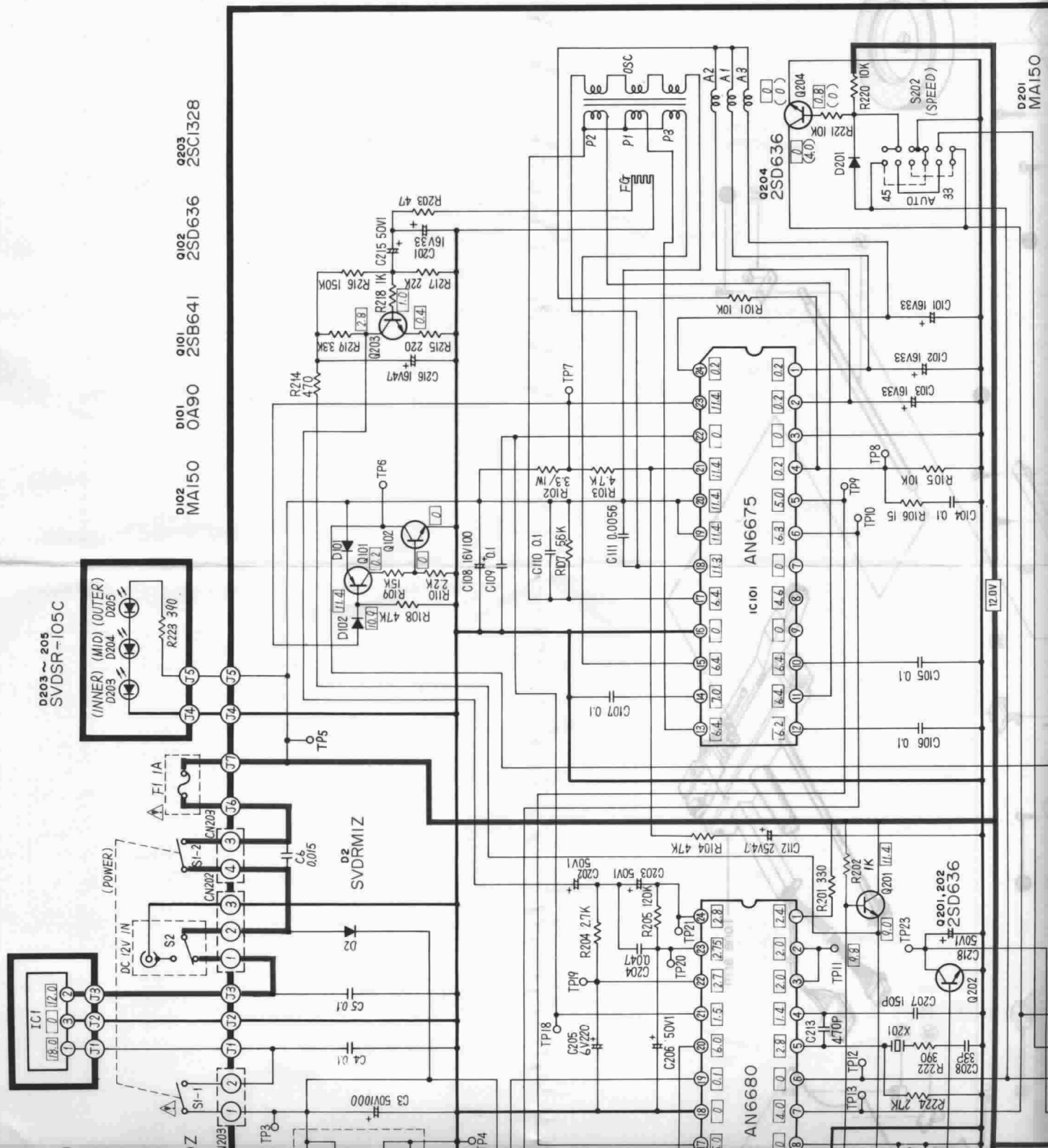


SCHEMATIC DIAGRAM

1 2 3 4 5 6 7



EXPLODED VIEW



D203 ~ 205
SVDSR-105C

(INNER) (MID) (OUTER)
D203 D204 D205
R223 390

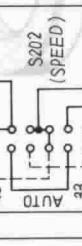
D102 MA150
D101 OA90
Q101 2SB641
Q102 2SD636
Q201 2SD636
Q203 2SC1328

D2
SVDRMIZ

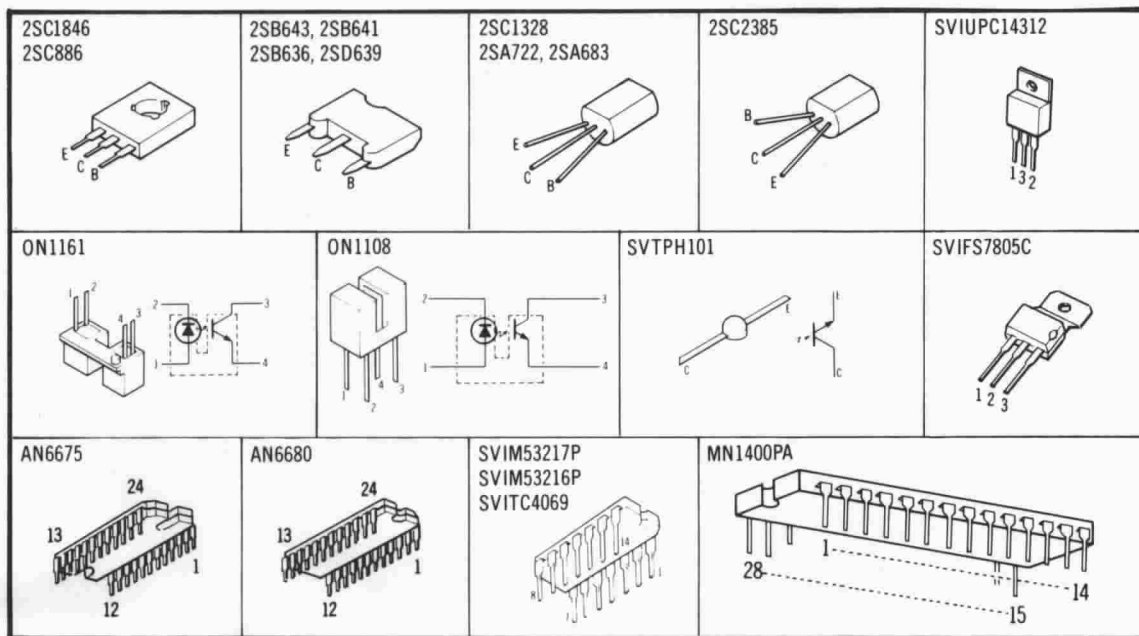
AN6680

IC101 AN6675

D201
MA150



■ TERMINAL GUIDE OF TRANSISTOR AND IC

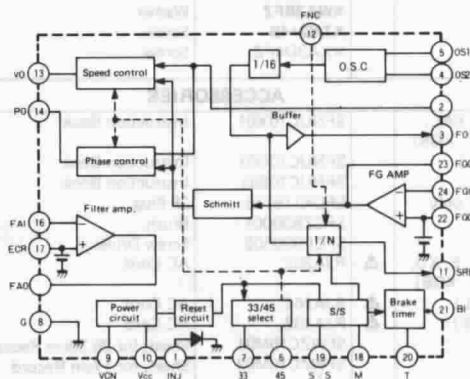


NOTES:

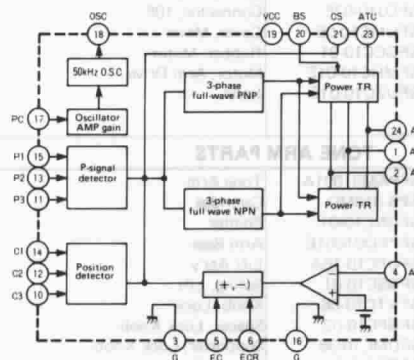
- S1-1, 1-2:** Stand-by Switch in "ON" position.
- S2:** AC-DC Select Switch in "AC" position.
- S201:** Cleaner () switch in "ON" position. (not push condition)
- S202:** Speed Select Switch in "AUTO" position.
- S401:** Cover Switch in "ON" position. (push condition)
- S402:** Start position Switch in "OFF" position. (not push condition)
- S403:** Return position Switch in "OFF" position, (not push condition)
- S471, 472:** Stop Switch in "OFF" position. (not push condition)
- S473, 474:** Start switch in "OFF" position. (not push condition)
- S475:** Cueing switch in "OFF" position (not push condition)
- S476:** Repeat switch in "OFF" position (not push condition)
- S601-1 ~ 601-4:** MC-MM Select switch in "MC" position. (MC MM)
- S701:** Power source switch in "220-240V" position.
- Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
- This schematic diagram may be modified at any time with the development of new technology.
- △ indicates that only parts specified by the manufacture be used for safety.

■ BLOCK DIAGRAM OF IC

IC201 (AN6680)



IC101 (AN6675)



■ REFERENCE VOLTAGE OF WAVEFORM AT EACH IC

This indicated voltage values and waveform are measured by oscilloscope at 33 rpm rotation.

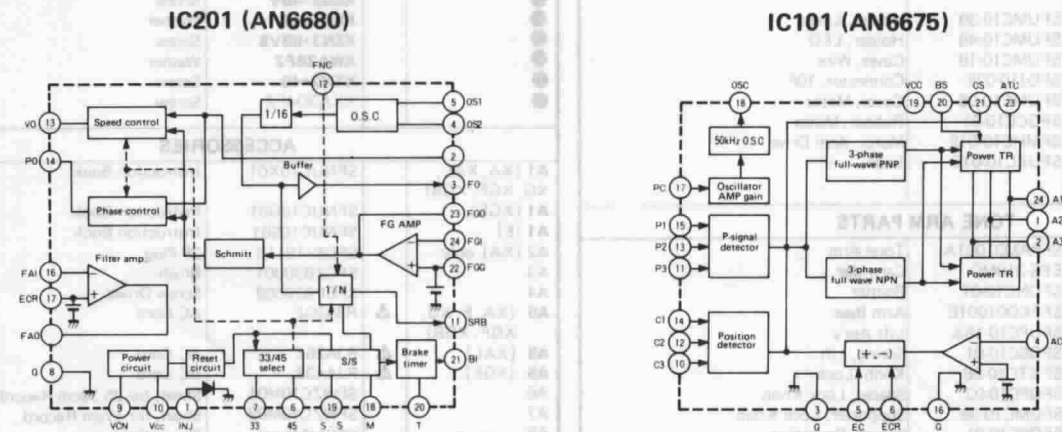
IC101 (AN6675)

	Start	Stop		Start	Stop		Start	Stop
①	4.0V		⑨	0V	0V		22.0V	Same as at
②		0.2V	⑩	6.4V	6.4V			

NOTES:

1. **S1-1, 1-2:** Stand-by Switch in "ON" position.
2. **S2:** AC-DC Select Switch in "AC" position.
3. **S201:** Cleaner () switch in "ON" position. (not push condition)
4. **S202:** Speed Select Switch in "AUTO" position.
5. **S401:** Cover Switch in "ON" position. (push condition)
6. **S402:** Start position Switch in "OFF" position. (not push condition)
7. **S403:** Return position Switch in "OFF" position. (not push condition)
8. **S471, 472:** Stop Switch in "OFF" position. (not push condition)
9. **S473, 474:** Start switch in "OFF" position. (not push condition)
10. **S475:** Cueing switch in "OFF" position (not push condition)
11. **S476:** Repeat switch in "OFF" position (not push condition)
12. **S601-1 ~ 601-4:** MC-MM Select switch in "MC" position. (MC MM)
13. **S701:** Power source switch in "220-240V" position.
14. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
15. This schematic diagram may be modified at any time with the development of new technology.
16. indicates that only parts specified by the manufacture be used for safety.

■ BLOCK DIAGRAM OF IC



■ REFERENCE VOLTAGE OF WAVEFORM AT EACH IC

This indicated voltage values and waveform are measured by oscilloscope at 33 rpm rotation.

IC101 (AN6675)

Start		Stop		Start		Stop		Start		Stop	
①	4.0V			⑨	0V		0V	18			Same as at left
②			0.2V	⑩	6.4V		6.4V	19			
③	0V		0V	⑪			Same as at left	20	11.4V		11.4V
④	2.7V		0.2V	⑫	6.4V		6.2V	21			
⑤	5.0V		5.0V	⑬	2.5V		7.0V	22	0V		0V
⑥	5.0V		6.3V	⑭	6.6V		7.0V	23	11.4V		11.4V
⑦	0V		0V	⑮	6.4V		6.4V				
⑧	4.6V		4.6V	⑯	0V		0V				

IC201 (AN6680)

Start		Stop		Start		Stop		Start		Stop	
①	2.5V		2.4V	⑦	0V		4.0V	15	5.0V		8.0V
②			Same as at left	⑧	0V		0V	16	5.0V		2.0V
③			Same as at left	⑨	10.0V		10.0V	17	5.0V		5.0V
④			Same as at left	⑩	9.0V		9.0V	18	0V		0V
⑤			Same as at left	⑪			Same as at left	19	6.8V		0.2V
⑥	3.5V		0V	⑫	0V		0V	20	0.4V		6.0V
				⑬	4.8V		0.2V	21	1.6V		1.5V
				⑭				22	2.9V		2.7V
								23			2.8V
								24	2.8V		2.8V

(PHONO IN)

(PHONO OUT)

2SD636

G

H

I

J

K

L

M

Q609
2SA683

Q603, 605
2SC2385

Q601
2SA722

Q612
2SD639

Q602
2SA722

Q604, 606
2SC2385

Q610
2SA683

Q608
2SC1328

Q607
2SC1328

Q2
2SD636

Q1
2SC1846

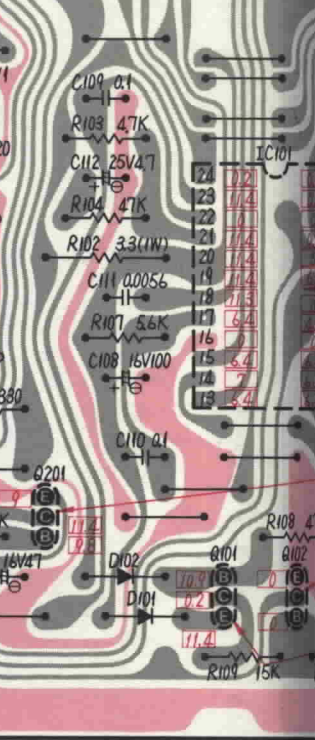
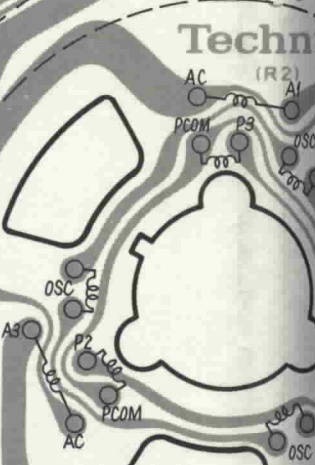
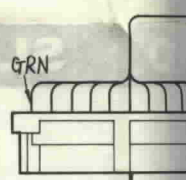
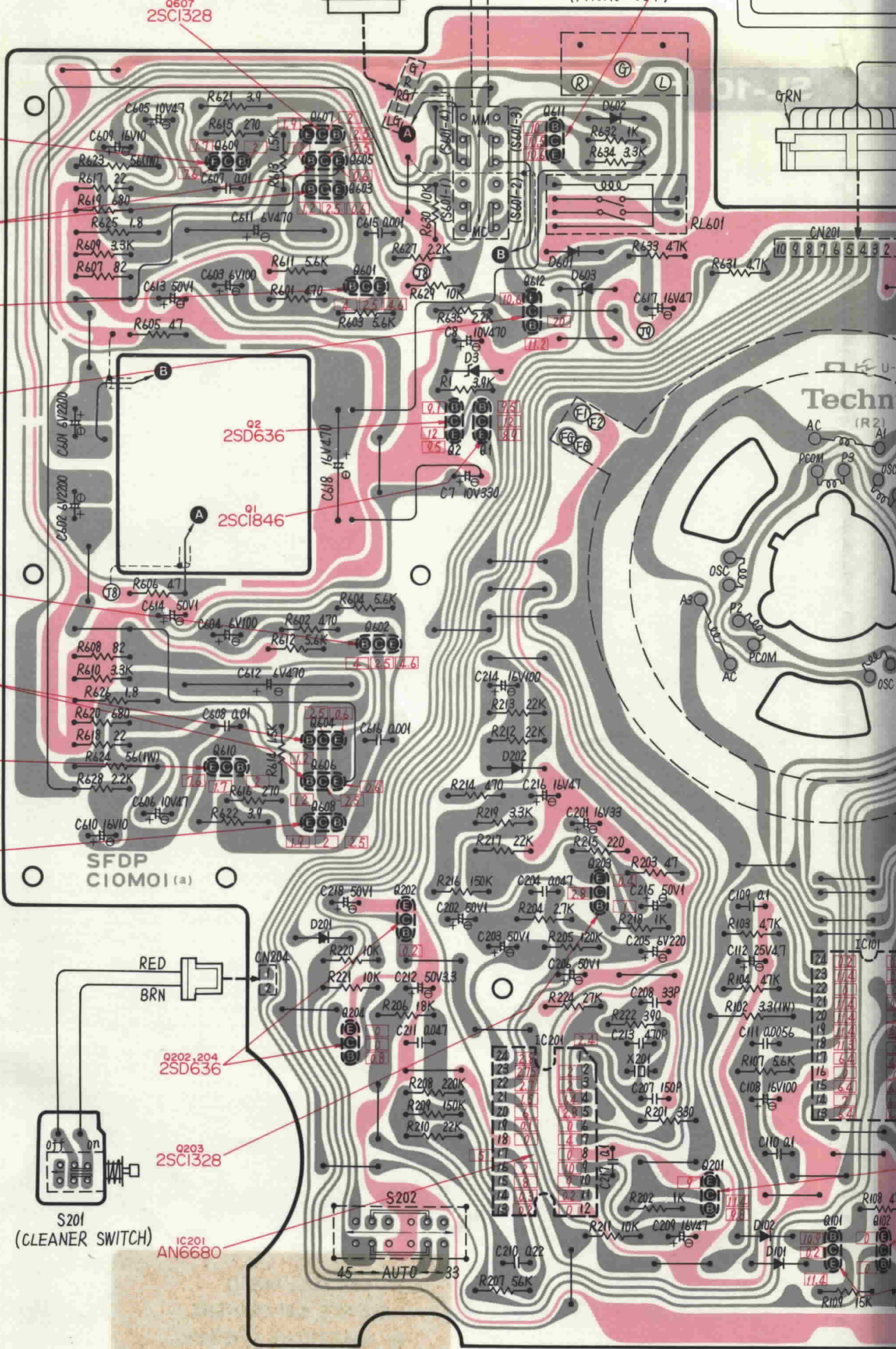
Q202, 204
2SD636

Q203
2SC1328

S201
(CLEANER SWITCH)

IC201
AN6680

(SPEED)



PRINTED CIRCUIT BOARD

Earth (Ground) Lines

1

2

3

4

5

A

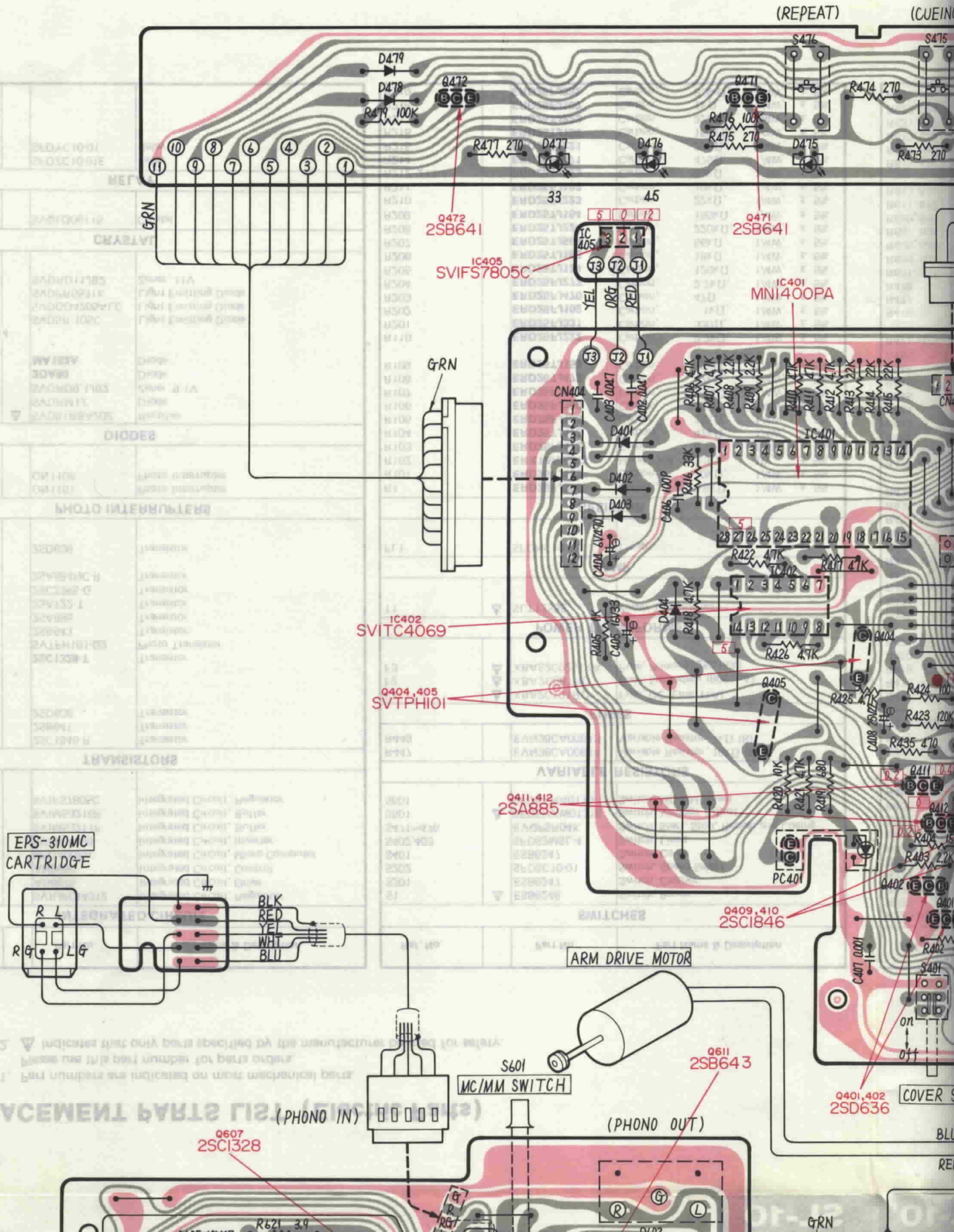
B

C

D

E

F



(REPEAT)

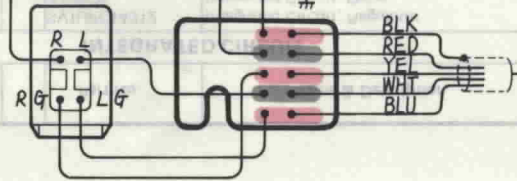
(CUEING)

EPS-310MC
CARTRIDGE

ARM DRIVE MOTOR

MC/MM SWITCH

COVER S



IC402
SVITC4069

Q404, 405
SVTPHIOI

Q411, 412
2SA885

Q409, 410
2SC1846

Q401, 402
2SD636

Q472
2SB641

IC405
SVIF57805C

Q471
2SB641

IC401
MNI400PA

IC401

IC402

Q404, 405

Q411, 412

Q409, 410

Q401, 402

Q472

IC405

Q471

IC401

IC401

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Q409, 410

Q401, 402

Q472

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IC402

Q404, 405

Q411, 412

Q409, 410

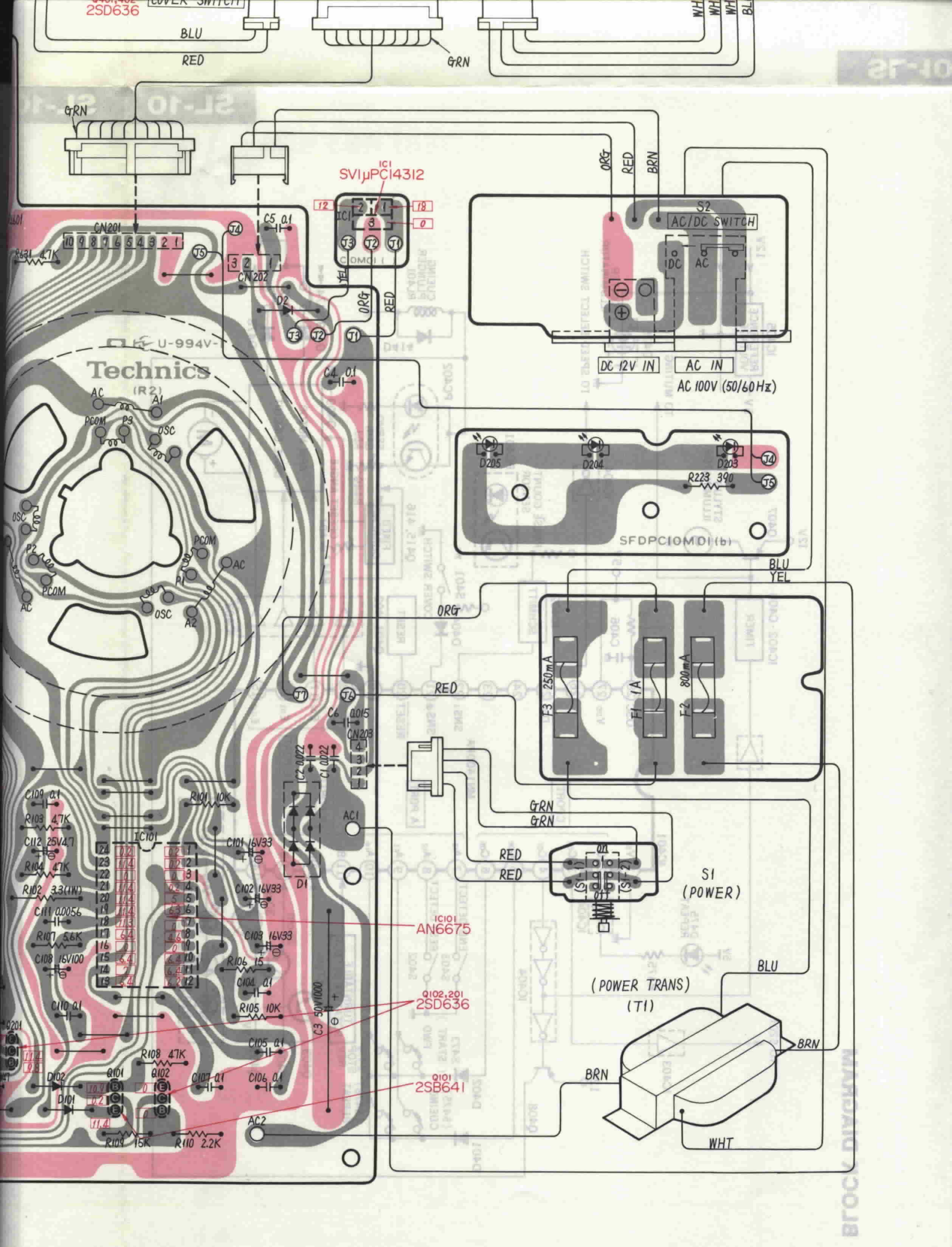
Q401, 402

Q472

IC405

Q471

IC401



2SD636

BLU

RED

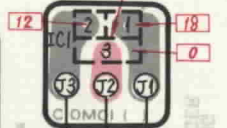
GRN

WH WH WH BL

2F-10

GRN

IC1 SV1 μPC14312



ORG

RED

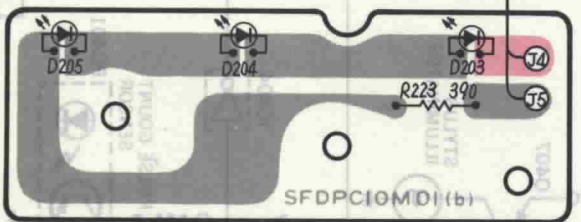
BRN

S2 AC/DC SWITCH

DC 12V IN

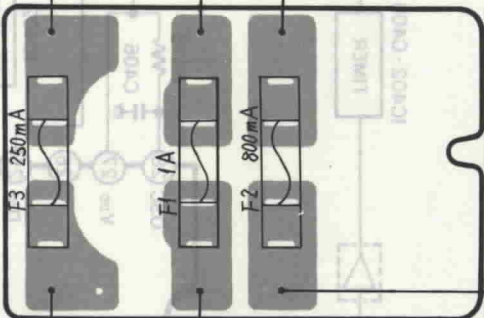
AC IN

AC 100V (50/60Hz)



BLU

YEL



GRN

GRN

RED

RED

S1 (POWER)

(POWER TRANS) (T1)

BLU

BRN

BRN

WHT

Technics

(R2)

AC

PCOM

P3

OSC

AC

PCOM

OSC

AC

PCOM

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BROCK DINGMAN

REPLACEMENT PARTS LIST (Electric Parts)

- NOTES**
- Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 - ▲ indicates that only parts specified by the manufacturer be used for safety.

Ref. No.	Part No.	Part Name & Description
INTEGRATED CIRCUIT		
IC1	SVIUPC14312	Integrated Circuit, Regulator
IC101	AN6675	Integrated Circuit, Drive
IC201	AN6680	Integrated Circuit, Control
IC401	MN1400PA	Integrated Circuit, Micro Computer
IC402	SVITC4069	Integrated Circuit, Inverter
IC403	SVIM53217P	Integrated Circuit, Buffer
IC404	SVIM53216P	Integrated Circuit, Buffer
IC405	SVIFS7805C	Integrated Circuit, Regulator
TRANSISTORS		
Q1, 409, 410	2SC1846-R	Transistor
Q101, 471, 472	2SB641	Transistor
Q2, 102, 201, 202, 204, 401, 402, 406, 413~416	2SD636	Transistor
Q203, 607, 608	2SC1328-T	Transistor
Q403~405	SVTPH101-Q2	Photo Transistor
Q407, 408, 611	2SB643	Transistor
Q411, 412	2SA885	Transistor
Q601, 602	2SA722-T	Transistor
Q603~606	2SC2385-G	Transistor
Q609, 610	2SA684NC-R	Transistor
Q612	2SD639	Transistor
PHOTO INTERRUPTERS		
PC401	ON1161	Photo Interrupter
PC402	ON1108	Photo Interrupter
DIODES		
D1	▲ SVDS1RBA20Z	Rectifier
D2	SVDRM1Z	Diode
D3	SVDRD9.1JB2	Zener, 9.1V
D101	20A90	Diode
D102, 201, 202, 401~412, 601, 602, 478, 479, 414	MA162A	Diode
D203~205	SVDSR-105C	Light Emitting Diode
D413	SVDGD4205ALC	Light Emitting Diode
D471~477	SVDPR5531K	Light Emitting Diode
D603	SVDRD11JB2	Zener, 11V
CRYSTAL		
X201	SVQU306115	Crystal
RELAY		
RL401	SFDZC10-01E	Relay
RL601	SFDYC10-01	Relay

Ref. No.	Part No.	Part Name & Description
SWITCHES		
S1	▲ ESB6248	Switch, Power
S201	ESB6247	Switch, Cleaner
S202	SFDSC10-01	Switch, Speed Select
S401	ESB6247	Switch, Cover
S402,403	SFDS2MSL-4	Switch, Limit
S471~476	EVQP5R04K	Switch, Start, Stop, Repeat and Cueing
S501	▲ SFDSHXW01318	Switch, Voltage Adjust
S601	SFDSTWA0118	Switch, MC-MM Select
VARIABLE RESISTORS		
R447	EVN38CA00B14	Variable Resistor, 10kΩ (B)
R449	EVN38CA00B13	Variable Resistor, 1kΩ (B)
FUSES		
F1	▲ XBA2C10TRO	Fuse, DC Line (1A)
F2	▲ XBA2C08TRO	Fuse, Secondary (800 mA)
F3	▲ XBAS2C025T1A	Fuse, Primary (250 mA)
POWER TRANSFORMER		
T1	▲ SLT12S5E	Power Transformer
LAMP		
PL1	SFDNC10-02	Lmap
RESISTOR		
R1	ERD25FJ392	Carbon, 3.9kΩ, 1/4W, ± 5%
R101	ERD25FJ103	Carbon, 10kΩ, 1/4W, ± 5%
R102	ERX1ANJ3R3	Metal Film, 3.3Ω, 1W, ± 5%
R103	ERD25FJ472	Carbon, 4.7kΩ, 1/4W, ± 5%
R104	ERD25TJ473	Carbon, 47kΩ, 1/4W, ± 5%
R105	ERD25FJ103	Carbon, 10kΩ, 1/4W, ± 5%
R106	ERD25FJ150	Carbon, 15Ω, 1/4W, ± 5%
R107	ERD25FJ562	Carbon, 5.6kΩ, 1/4W, ± 5%
R108	ERD25TJ473	Carbon, 47kΩ, 1/4W, ± 5%
R109	ERD25TJ153	Carbon, 15kΩ, 1/4W, ± 5%
R110	ERD25FJ222	Carbon, 2.2kΩ, 1/4W, ± 5%
R201	ERD25FJ331	Carbon, 330Ω, 1/4W, ± 5%
R202	ERD25FJ102	Carbon, 1kΩ, 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	ERD25TJ183	Carbon, 18kΩ, 1/4W, ± 5%
R207	ERD25TJ563	Carbon, 56kΩ, 1/4W, ± 5%
R208	ERD25TJ224	Carbon, 220kΩ, 1/4W, ± 5%
R209	ERD25TJ154	Carbon, 150kΩ, 1/4W, ± 5%
R210	ERD25TJ223	Carbon, 22kΩ, 1/4W, ± 5%
R211	ERD25FJ103	Carbon, 10kΩ, 1/4W, ± 5%
R212, 213	ERD25TJ223	Carbon, 22kΩ, 1/4W, ± 5%
R214	ERD25FJ471	Carbon, 470Ω, 1/4W, ± 5%
R215	ERD25FJ221	Carbon, 220Ω, 1/4W, ± 5%
R216	ERD25TJ154	Carbon, 150kΩ, 1/4W, ± 5%
R217	ERD25TJ223	Carbon, 22kΩ, 1/4W, ± 5%
R218	ERD25FJ102	Carbon, 1kΩ, 1/4W, ± 5%
R219	ERD25FJ332	Carbon, 3.3kΩ, 1/4W, ± 5%

Ref. No.	Part No.	Part Name & Description
R220, 221	ERD25FJ103	Carbon, 10k Ω , 1/4W, \pm 5%
R222	ERD25FJ391	Carbon, 390 Ω , 1/4W, \pm 5%
R223	ERD25FJ391	Carbon, 390 Ω , 1/4W, \pm 5%
R224	ERD25TJ273	Carbon, 27k Ω , 1/4W, \pm 5%
R401	ERD25TJ123	Carbon, 12k Ω , 1/4W, \pm 5%
R402	ERD25FJ102	Carbon, 1k Ω , 1/4W, \pm 5%
R403	ERD25FJ222	Carbon, 2.2k Ω , 1/4W, \pm 5%
R404	ERD25FJ150	Carbon, 15 Ω , 1/4W, \pm 5%
R405	ERD25FJ102	Carbon, 1k Ω , 1/4W, \pm 5%
R406, 407	ERD25FJ472	Carbon, 4.7k Ω , 1/4W, \pm 5%
R408, 409	ERD25FJ222	Carbon, 2.2k Ω , 1/4W, \pm 5%
R410, 411	ERD25TJ473	Carbon, 47k Ω , 1/4W, \pm 5%
R412	ERD25FJ472	Carbon, 4.7k Ω , 1/4W, \pm 5%
R413~415	ERD25TJ223	Carbon, 22k Ω , 1/4W, \pm 5%
R416	ERD25TJ333	Carbon, 33k Ω , 1/4W, \pm 5%
R417	ERD25TJ473	Carbon, 47k Ω , 1/4W, \pm 5%
R418	ERD25FJ472	Carbon, 4.7k Ω , 1/4W, \pm 5%
R419	ERD25FJ681	Carbon, 680 Ω , 1/4W, \pm 5%
R420	ERD25FJ103	Carbon, 10k Ω , 1/4W, \pm 5%
R421, 422	ERD25FJ472	Carbon, 4.7k Ω , 1/4W, \pm 5%
R423	ERD25TJ124	Carbon, 120k Ω , 1/4W, \pm 5%
R424	ERD25FJ101	Carbon, 100 Ω , 1/4W, \pm 5%
R425, 426	ERD25FJ472	Carbon, 4.7k Ω , 1/4W, \pm 5%
R427	ERD25TJ223	Carbon, 22k Ω , 1/4W, \pm 5%
R428, 429	ERD25FJ472	Carbon, 4.7k Ω , 1/4W, \pm 5%
R430	ERD25FJ102	Carbon, 1k Ω , 1/4W, \pm 5%
R431	ERD25FJ472	Carbon, 4.7k Ω , 1/4W, \pm 5%
R432, 433	ERD25FJ102	Carbon, 1k Ω , 1/4W, \pm 5%
R434, 435	ERD25FJ471	Carbon, 470 Ω , 1/4W, \pm 5%
R436, 437	ERD25FJ102	Carbon, 1k Ω , 1/4W, \pm 5%
R438, 439	ERD25TJ223	Carbon, 22k Ω , 1/4W, \pm 5%
R440, 441	ERD25FJ102	Carbon, 1k Ω , 1/4W, \pm 5%
R442	ERD25FJ471	Carbon, 470 Ω , 1/4W, \pm 5%
R443	ERD25FJ681	Carbon, 680 Ω , 1/4W, \pm 5%
R444	ERD25FJ221	Carbon, 220 Ω , 1/4W, \pm 5%
R445	ERD25TJ473	Carbon, 47k Ω , 1/4W, \pm 5%
R446	ERD25FJ181	Carbon, 180 Ω , 1/4W, \pm 5%
R448	ERD25FJ121	Carbon, 120 Ω , 1/4W, \pm 5%
R450	ERD25FJ181	Carbon, 180 Ω , 1/4W, \pm 5%
R471~475	ERD25FJ271	Carbon, 270 Ω , 1/4W, \pm 5%
R476	ERD25TJ104	Carbon, 100k Ω , 1/4W, \pm 5%
R477	ERD25FJ271	Carbon, 270 Ω , 1/4W, \pm 5%
R479	ERD25TJ104	Carbon, 100k Ω , 1/4W, \pm 5%
R601, 602	ERQ25CKF4700	Metal Film, 470 Ω , 1/4W, \pm 1%
R603, 604	ERD25FJ562	Carbon, 5.6k Ω , 1/4W, \pm 5%
R605, 606	ERO25CKF47R0	Metal Film, 47 Ω , 1/4W, \pm 1%
R607, 608	ERO25CKF82R0	Metal Film, 82 Ω , 1/4W, \pm 1%
R609, 610	ERO25CKF3301	Metal Film, 3.3k Ω , 1/4W, \pm 1%
R611, 612	ERD25FJ562	Carbon, 5.6k Ω , 1/4W, \pm 5%
R613, 614	ERO25CKF1501	Metal Film, 1.5k Ω , 1/4W, \pm 1%
R615, 616	ERD25FJ271	Carbon, 270 Ω , 1/4W, \pm 5%
R617, 618	ERD25FJ220	Carbon, 22 Ω , 1/4W, \pm 5%
R619, 620	ERD25FJ681	Carbon, 680 Ω , 1/4W, \pm 5%
R621, 622	ERD25FJ3R9	Carbon, 3.9 Ω , 1/4W, \pm 5%
R623, 624	ERG1ANJ560	Metal Oxide, 56 Ω , 1W, \pm 5%
R625, 626	ERX12ANJ1R8	Metal Film, 1.8 Ω , 1/2W, \pm 5%

Ref. No.	Part No.	Part Name & Description
R627, 628	ERD25FJ222	Carbon, 2.2k Ω , 1/4W, \pm 5%
R629, 630	ERD25FJ103	Carbon, 10k Ω , 1/4W, \pm 5%
R631	ERD25FJ472	Carbon, 4.7k Ω , 1/4W, \pm 5%
R632	ERD25FJ102	Carbon, 1k Ω , 1/4W, \pm 5%
R633	ERD25TJ473	Carbon, 47k Ω , 1/4W, \pm 5%
R634	ERD25FJ332	Carbon, 3.3k Ω , 1/4W, \pm 5%
R635	ERD25FJ222	Carbon, 2.2k Ω , 1/4W, \pm 5%
CAPACITOR		
C1, 2	ECKD1H223PF	Ceramic, 0.022 μ F, 50V, $+80\%$ -20%
C3	Δ ECEB1HS102	Electrolytic, 1000 μ F, 50V
C4, 5	ECQM1H104KZ	Polyester, 0.1 μ F, 50V, \pm 10%
C6	ECQM1H153KZ	Polyester, 0.015 μ F, 50V, \pm 10%
C7	ECEA1CS331	Electrolytic, 330 μ F, 16V
C8	ECEA1AS471	Electrolytic, 470 μ F, 16V
C101~103	ECEA1CS330	Electrolytic, 33 μ F, 16V
C104~107	ECQM1H104KZ	Polyester, 0.1 μ F, 50V, \pm 10%
C108	ECEA1ES101	Electrolytic, 100 μ F, 25V
C109, 110	ECQM1H104KZ	Polyester, 0.1 μ F, 50V, \pm 10%
C111	ECQM1H562KZ	Polyester, 0.0056 μ F, 50V, \pm 10%
C112	ECEA25Z4R7	Electrolytic, 4.7 μ F, 25V
C201	ECEA1CS330	Electrolytic, 33 μ F, 16V
C202, 203	ECEA50Z1	Electrolytic, 1 μ F, 50V
C204	ECQM1H473KZ	Polyester, 0.047 μ F, 50V, \pm 10%
C205	ECEA1AS221	Electrolytic, 220 μ F, 10V
C206	ECEA50Z1	Electrolytic, 1 μ F, 50V
C207	ECCD1H151K	Ceramic, 150pF, 50V, \pm 10%
C208	ECCD1H330K	Ceramic, 330pF, 50V, \pm 10%
C209	ECEA1ES470	Electrolytic, 47 μ F, 25V
C210	ECQM1H224KZ	Polyester, 0.22 μ F, 50V, \pm 10%
C211	ECQM1H473KZ	Polyester, 0.047 μ F, 50V, \pm 10%
C212	ECEA50Z3R3	Electrolytic, 3.3 μ F, 50V
C213	ECCD1H471K	Ceramic, 470pF, 50V, \pm 10%
C214	ECEA1ES101	Electrolytic, 100 μ F, 25V
C215	ECEA50Z1	Electrolytic, 1 μ F, 50V
C216	ECEA1ES470	Electrolytic, 47 μ F, 25V
C217	ECKD1E104ZFZ	Ceramic, 0.1 μ F, 25V, $+80\%$ -20%
C218	ECEA50Z1	Electrolytic, 1 μ F, 50V
C401	ECEA1ES101	Electrolytic, 100 μ F, 25V
C402, 403	ECKF1H473ZF	Ceramic, 0.047 μ F, 50V, $+80\%$ -20%
C404	ECEA0JS471	Electrolytic, 470 μ F, 6V
C405	ECEA1CS330	Electrolytic, 33 μ F, 16V
C406	ECCD1H101K	Ceramic, 100pF, 50V, \pm 10%
C407	ECQM1H102KZ	Polyester, 0.001 μ F, 50V, \pm 10%
C408	ECEA1ES220	Electrolytic, 22 μ F, 25V
C409	ECQM1H104KZ	Polyester, 0.1 μ F, 50V, \pm 10%
C410, 411	ECQM1H103KZ	Polyester, 0.01 μ F, 50V, \pm 10%
C412	ECEA50Z1	Electrolytic, 1 μ F, 50V
C601, 602	ECEA6Z2200	Electrolytic, 2200 μ F, 6V
C603, 604	ECEA10Z100	Electrolytic, 100 μ F, 10V
C605, 606	ECEA25Z47	Electrolytic, 47 μ F, 25V
C607, 608	ECQM1H103KZ	Polyester, 0.01 μ F, 50V, \pm 10%
C609, 610	ECEA16M10R	Electrolytic, 10 μ F, 16V
C611, 612	ECEB6Z470	Electrolytic, 470 μ F, 6V
C613, 614	ECEA50Z1	Electrolytic, 1 μ F, 50V
C615, 616	ECQM1H102KZ	Polyester, 0.001 μ F, 50V, \pm 10%
C617	ECEA1AS470	Electrolytic, 47 μ F, 10V
C618	ECEB1CS471	Electrolytic, 470 μ F, 16V

■ BLOCK DIAGRAM

