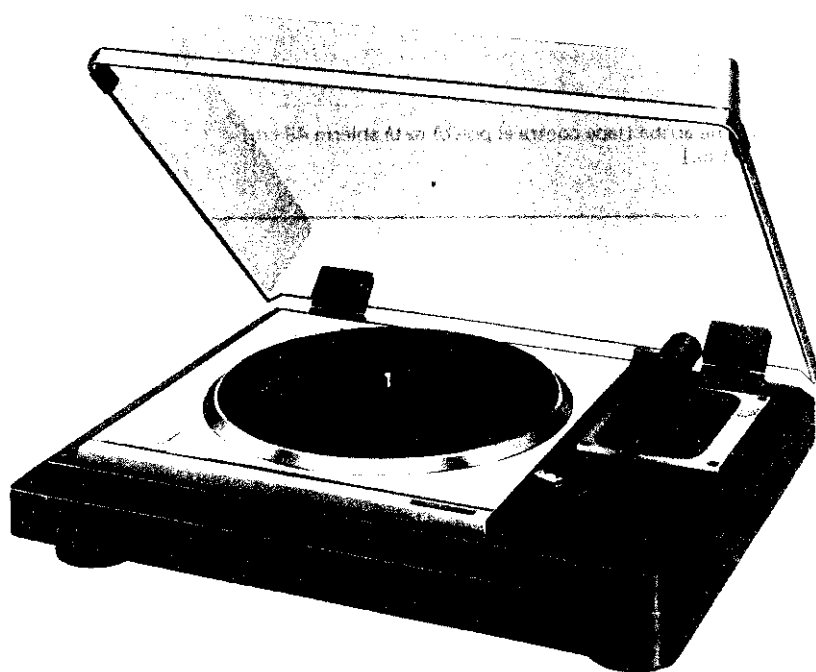


Service Manual

Turntable System SL-1000MK3

[E], [EK], [XL], [EG], [EB],
[EF], [XA], [XM], [EH], [Ei], [EC]



Areas

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

This SL-1000MK3 is made up of the SP-10MK3 (Quartz Direct Drive Turntable), EPA-100MK2 (Universal Tonearm), and SH-10B5 (Turntable Base).

English

Specifications

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

Power supply	: ~ 110, 120, 220, 240V 50 or 60 Hz
Power consumption	: 32.5 W
Dimensions (W x H x D)	: 56.1 x 17.5 x 46.6cm [Maximum height when top (dust cover) is open 48cm, Except for control unit.]
Weight	: 44kg

Deutsch

TECHNISCHE DATEN

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

Stromversorgung	: ~ 110, 120, 220, 240 V, 50/60 Hz Wechselstrom
Leistungsaufnahme	: 32,5 W
Abmessungen (B x H x T)	: 56,1 x 17,5 x 46,6 cm [Maximale Höhe bei vollständig geöffneter Staubabdeckung: 48 cm, Ohne Steuereinheit.]
Gewicht	: 44 kg

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Français

CARACTERISTIQUES

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

Alimentation	: Alternatif ~ 110, 120, 220, 240V, 50 ou 60Hz
Consommation	: 32,5W
Dimensions (L x H x P)	: 56,1 x 17,5 x 46,6cm [Hauteur maximum lorsque le dessus (couvercle protège-poussière) est ouvert 48 cm, Excepté pour la Unité de contrôle.]
Poids	: 44kg

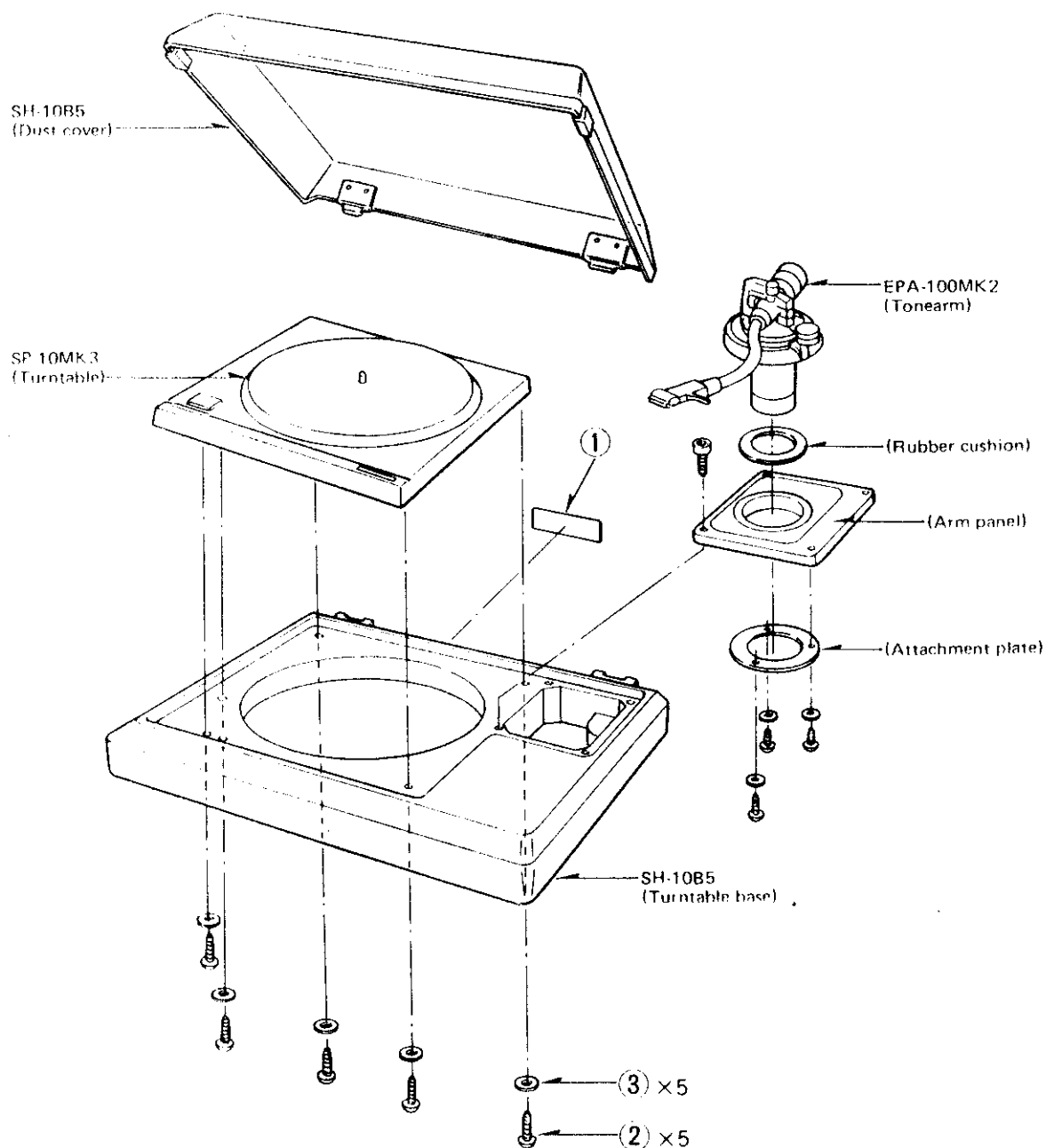
Español

ESPECIFICACIONES

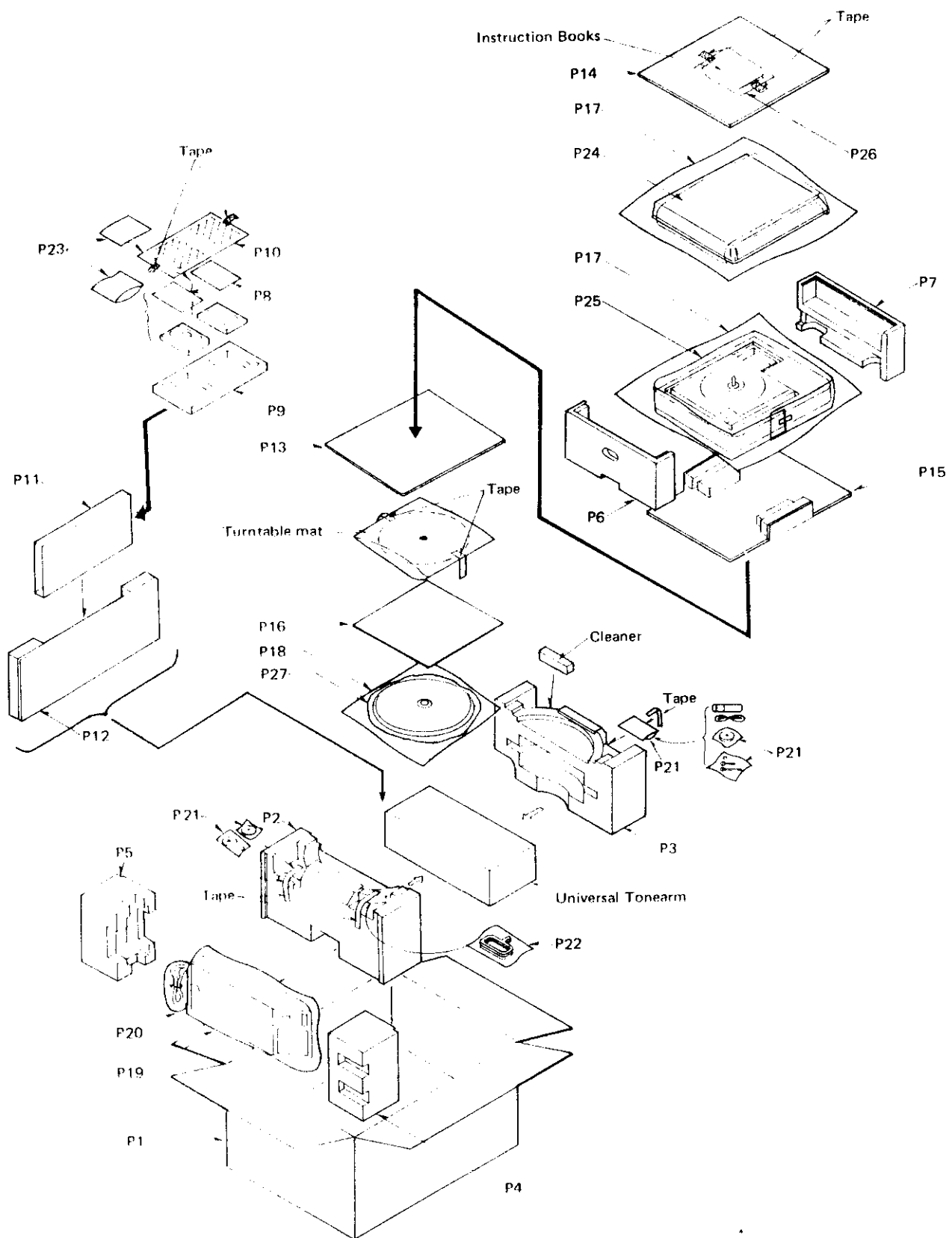
Las especificaciones quedan sujetas a cambios sin aviso previo.
El peso y las dimensiones indicados son aproximados.

Alimentación de corriente	: ~ 110, 120, 220, 240 V, 50 ó 60 Hz
Consumo de corriente	: 32,5 W
Dimensiones	: 56,1 x 17,5 x 46,6 cm
(Ancho x alto x profundo)	: [Altura máxima cuando la parte de arriba (tapa contra el polvo) está abierta 48 cm, Excepto para el Unidad de control.]
Peso	: 44 kg

EXPLODED VIEWS



■ PACKINGS



REPLACEMENT PARTS LIST

- Notes:**
1. Part numbers are indicated on most mechanical parts. Please use this parts number for parts order.
 2. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
 3. The parenthesized numbers in the column of description stand for the quantity per set.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	SFNN113M01	Name Plate (1)	A17	SFXZ103-01	Hexagonal Wrench, Arm Panel (1)	P10	SFHD106N03	Pad, Arm Panel (1)
2	XSN5+35FZS	Mounting Screw (Turntable) (5)	A18	SFWO010	Oil Kit (1)	P11	SFHD106N02	Case, Arm Panel (1)
3	SFXW650-2	Mounting Washer (Turntable) (5)	A19	SFWF010	Adaptor, 45rpm (1)	P12	SFHD113N01	Pad, Arm Panel (1)
ACCESSORIES			A20	SFEL02R-01E	Ground Wire (1)	P13	SFHD109N01	Pad, Top (Turntable Platter) (1)
A1	SFNU113S01	Instruction Book (SL-1000MK3) (1)	A21	SFWZ109N01E	Handle, Turntable (2)	P14	SFHD103-01	Pad, Top (Turntable Base) (1)
A2	SFNU109S01	Instruction Book (SP-10MK3) (1)	A22	XSN5+60FZS	Screw, Φ 5 x 60 (5)	P15	SFHD113N02	Pad, Middle (1)
A3	SFNU106S01	Instruction Book (SH-10R5) (1)	A23	XSN5+43FZS	Screw, Φ 5 x 43 (5)	P16	SFHD109N02	Pad, Turntable Platter (1)
A4	SFPDS1M202	Instruction Book (EPA-100MK-2) (1)	A24	SFWZ109N02A	Spanner, Turntable (1)	P17	SFYF60A80	Polyethylene Bag, Turntable and Dust Cover (1)
A5	SFNZ109M04	Caution Book (Cleaner) (1)	A25	SFWK109N01	Cloth, Cleaning (1)	P18	SFYF45C50	Polyethylene Bag, Turntable Platter (1)
A6	SFPDS1M209	Damping Selector Diagram (1)	A26 (XA, XM) only	SFDK11911R	2P Plug (1)	P19	SFYF28A55	Polyethylene Bag, Control Unit (1)
A7	SFHZ106N01	Turntable Installation Diagram (1)	PACKING PARTS			P20	SFYF10A30	Polyethylene Bag, AC Cord (1)
A8	SFHZ109M01	Mounting Man (1)	P1 (Other Areas)	SFHP113M01	Carton Box (1)	P21	SFYF09A15	Polyethylene Bag, Accessories (1)
A9	SFHZ106M11	Caution Label, Cleaning (1)	P1 (FF) only	SFHP113L01	Carton Box (1)	P22	SFYF12A15	Polyethylene Bag, Handle (1)
A10	SFWZ109N03	Cleaner, Turntable (1)	P2	SFHH113N01	Pad, Left (1)	P23	SFYF17A25	Polyethylene Bag, Arm Panel (2)
A11	SFHP109N02	Case, Cleaner (1)	P3	SFHH113N02	Pad, Right (1)	P24	SFHZ144X02	Sheet, Dust Cover (1)
A12	SFHZ109N05	Label, Cleaner (2)	P4	SFHH113N03	Pad, Front (Control Unit) (1)	P25	SFHZ106N01	Pad (1)
A13	SFWK106N01	Cloth, Cleaning (1)	P5	SFHH113N04	Pad, Rear (Control Unit) (1)	P26	SFYF27A40	Polyethylene Bag, Instruction Book (1)
A14	SFAZ106N02A	Arm Panel (1)	P6	SFHH101-0R	Pad, Left (Turntable Base) (1)	P27	SFHZ109N03	Anti-Rust Paper (1)
A15	SFAZ106N03A	Arm Panel (1)	P7	SFHH106N01	Pad, Right (Turntable Base) (1)	P28	SFHZ109N01	Sheet, Cord (1)
A16	XVES5B7OXIS	Arm Panel Fixing Screw (4)	P8	SFHZ106N02	Sheet, Arm Panel (2)			
			P9	SFHH106N02	Pad, Arm Panel (1)			

Service Manual

QUARTZ Direct Drive Turntable
SP-10MK3



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 or 60Hz
Power consumption: 32.5 W
Dimensions (H×W×D):
(Turntable unit)
11.3×36.9×36.9 cm
4-7/16×14-17/32×14-17/32 inches
(Control unit)
9.6×16.6×41 cm
3-3/4×6-17/32×16-1/8 inches
Weight:
18 kg (40 lb) (Turntable unit)
6 kg (13 lb) (Control unit)

■ Turntable section

Type: Direct drive turntable with quartz synthesizer pitch control
Turntable platter: Copper alloy and die-cast aluminum diameter 32 cm (12-19/32"), weight 10 kg (22 lb)
Moment of Inertia: 1.1 ton·cm² (1,100 kg·cm²)
Motor: Quartz-phase-locked, ultra-low speed, brushless DC motor

Turntable speeds: 33-1/3, 45 and 78.26 rpm
Turntable speed fine adjustment: Quartz locked, pitch adjustable in 0.1% steps up to ±9.9%
Starting torque: 16 kg·cm
Start-up time: 0.25 s. (33-1/3 rpm)
Braking time: 0.3 s. (33-1/3 rpm)
Speed fluctuation due to load torque: 0% within 10 kg·cm
Speed drift: Within ±0.001%
Wow and flutter: 0.015% WRMS (JIS C5521)
±0.021% weighted zero to peak (DIN 45500, IEC 98A weighted)
(System tested: SP-10MK3 + SH-10B5 + EPA-250 + EPC-100CMK3)
Rumble: -92 dB DIN B (IEC 98A weighted)
-60 dB DIN A (IEC 98A unweighted)

Technics

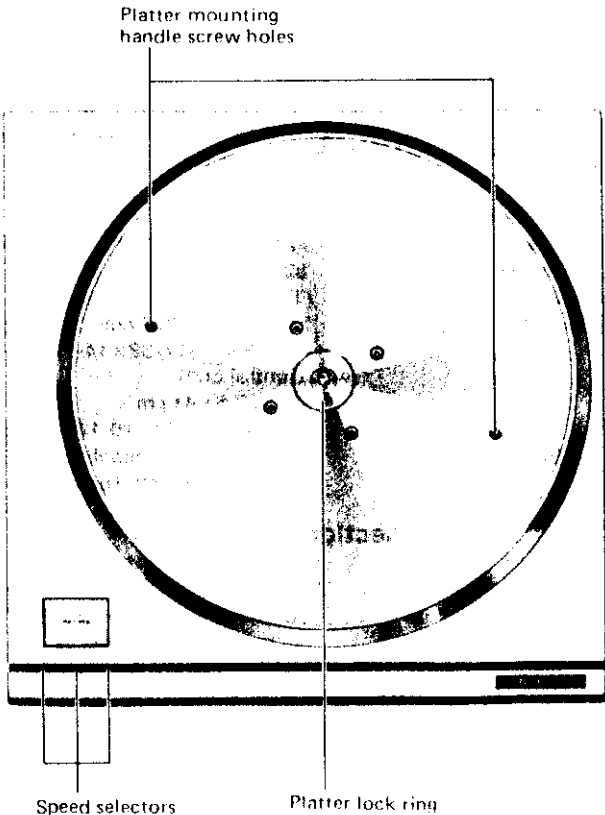
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LOCATION OF CONTROLS

- Turntable unit



DEUTSCH

■ TECHNISCHE DATEN

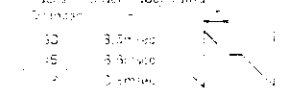
■ Allgemeine Daten		Drehzahl-
Stromversorgung:	~ 110-240V 50/60 Hz, 100-240V AC, 0,5A	Feinregulierung:
Leistungsaufnahme:	32 VA	Anlaufdrehmoment:
Abmessungen	(Plattenspieler ohne Motor)	Hochlaufzeit:
(H x B x T):	113 x 380 x 76,0 mm	Bremszeit:
	(Steilereinheit)	Drehzahlschwankungen
	9,5 x 16,6 x 41 mm	aufgrund von
Gewicht:	13 kg (Plattenspieler ohne Motor)	Lastdrehmoment:
	6 kg (Steilereinheit)	Drehzahlabweichung:
		Gleichlaufschwankungen:
■ Plattenspieler		
Typ:	Direktantriebs-Plattenspieler mit Quartz-Syntheschall-Drehzahlregelung	
Plattenteller:	Kupferlagerung und Aluminium-Schritzguß, Durchmesser 32 cm, Gewicht 10 kg	
Trägheitsmoment:	1,1 Tonnen cm ²	
Motor:	Quarzphasen-gesteuerter, ultralangsam-er, kollektortloser Gleichstrommotor	
Plattenteller-Drehzahlen:	33-1/3 45 und U/min 78,26 U/min	
		Rumpel-Fremdspannungsabstand:
		Rumpel-Geräuschspannungsabstand:

■ JUSTIERUNGEN

● Zu verwendende Instrumente und Einstellungen

1. Gleichstrom-Voltmeter
2. Oszilloskop
3. Gleichstromversorgung
4. Den Drehzahlregler auf 0% einstellen.

Gegenstand	Vorbereitungen	Zu justierende Teile	Justiermethode
Konstantspannungs-Stromversorgung	1. Die Anschlüsse CN1, CN2 und CN3 herausziehen. 2. Das Gleichstrom-Voltmeter entweder an den CN1-Anschluß 3: (+) und BT1-Anschluß 3: (-) oder die negative Seite von C3 anschließen. 3. Den Netzschalter einschalten.	VR1	1. VR1 auf einen Ausgang von 31,8V abgleichen.
	1. Die Anschlüsse CN1, CN2 und CN3 herausziehen. 2. Das Gleichstrom-Voltmeter entweder an den CN1-Anschluß 3: (+) und BT1-Anschluß 3: (-) oder die negative Seite von C3. 3. Den Netzschalter einschalten.	VR2	1. VR2 auf einen Ausgang von -31,8V abgleichen.
Kristalloszillation	1. Das Oszilloskop an C202 Stift 7 und den Erdungsanschluß 3 anschließen. 2. Den Netzschalter einschalten.	C211	1. C211 so justieren, daß der Zyklus 3,31 µsec (262,38 kHz) beträgt.

Gegenstand	Vorbereitungen	Zu justierende Teile	Justiermethode
VS-Spannung	1. Das Gleichstrom-Voltmeter an CN206 Anschluß 3 (+) und CN206 Anschluß 1 (-) anschließen. 2. Den Netzschalter einschalten und den Drehzahl-Wahlschalter auf "33 U/min." einstellen.	VR201	1. VR201 so justieren, daß die Ausgangsspannung 2,1V beträgt.
RS-Strom	1. Das Gleichstrom-Voltmeter an CN206 Anschluß ③ (+) und CN206 Anschluß ④ (-) anschließen. 2. Den Netzschalter einschalten und den Drehzahl-Wahlschalter auf "33 U/min." einstellen. 3. Die Start-Taste drücken.	VR206	1. VR206 so justieren, daß die Ausgangsspannung 0V beträgt.
Synchronisierungs-Position	1. Das Oszilloskop an CN206 Anschluß ② (+) und CN206 Anschluß 1 (-) anschließen. 2. Den Netzschalter einschalten und die Start-Taste drücken.	VR203 33 U/min. VR204 45 U/min. VR205 59 U/min.	1. Den Drehzahl-Wahlschalter nacheinander auf "33", "45" und "59" umschalten und VR203, VR204 und VR205 so justieren, daß die Zeiten gemäß nachstehender Tabelle sind. 
Bremse (elektrisch)	1. Den Anschluß 3 CN203 herausziehen. - Bei geuster mechanischer Bremse: 2. Den Netzschalter einschalten und den Drehzahl-Wahlschalter auf "33 U/min." einstellen. 3. Die Start-Taste drücken.	VR202	1. Die Stoptaste drücken. 2. VR202 so justieren, daß der Bereich des Winkels um den Stopp der Drehung $30^\circ < 30^\circ$ beträgt.
Offset-Spannung	1. 40mV zwischen CN203 Anschlüsse ② und ③ mit der Gleichspannungsversorgung anlegen. 2. Das Gleichstrom-Voltmeter zwischen CN102 Anschlüsse ③ und ④ anschließen. 3. Den Netzschalter einschalten und die Start-Taste drücken.	VR101	1. VR101 so justieren, daß die Ausgangsspannung 10mV beträgt.
Mittelspannung	1. Das Gleichstrom-Voltmeter zwischen CN102 Anschlüsse ① und ② anschließen. 2. Den Netzschalter einschalten und die Start-Taste drücken.	VR102	1. VR102 so justieren, daß die Ausgangsspannung 0V beträgt.

* Justiermethode ohne Gleichstromversorgung für die Offsetspannungs-Justierung

1. 3 Widerstände an die Antriebsschaltungs-Platine anlöten. (Siehe Abb. 21)
2. Den CN203-Stecker herausziehen. (Steuerschaltungs-Platine).
3. CN203 Anschluß ③ an BT102 Anschluß ③, und CN203 Anschluß ④ an BT102 Anschluß ④ über Anschlußdrähte mit Klemmen anschließen.
4. Das Gleichstrom-Voltmeter zwischen CN102 Anschlüsse ③ und ④ anschließen.
5. Den Netzschalter einschalten und die Start-Taste drücken.
6. VR101 so justieren, daß das Gleichstrom-Voltmeter 10mV anzeigt.
7. Die 3 Widerstände und die Anschlußdrähte entfernen.

• Justierung der mechanischen Bremse

1. Justierung der Hebelbremse

1. Den Plattenteller abnehmen.
2. Die Hebelbremse-Justierschraube lösen.
3. Das Solenoid nach links und rechts bewegen, so daß ein Abstand von ca. 2mm zwischen dem Solenoid und dem Stoppergummi entsteht.

4. Die Hebelbremse-Justierschraube anziehen.

5. Den Plattenteller aufsetzen und überprüfen, daß der Plattenteller sich nicht bewegt, wenn der Netzschalter ausgeschaltet ist.

2. Justierung der Bandbremse

* Überprüfung der Bandposition

1. Den Plattenteller abnehmen.
2. Die innere Peripherie des Bandes sollte mit der inneren Peripherie des Gehäuses übereinstimmen.
3. Falls sie voneinander abweichen, durch Lösen der Justierschrauben an zwei Stellen justieren.

* Überprüfung des Bremswinkels

1. Den Plattenteller drehen.
2. Die Stoptaste drücken und überprüfen, daß der Bereich des Winkels zum Stoppen der Drehung 40° oder weniger beträgt.
3. Falls der Stoppwinkel über 40° beträgt, zuerst die elektrische Bremse justieren.
4. Anschließend die Justierungsplatten-Einstellschraube lösen und den Justierknopf so drehen, daß der Winkel 40° oder weniger wird.

FRANÇAIS

■ CARACTERISTIQUES

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

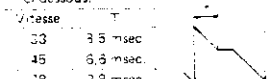
■ Généralités		
Alimentation:	Alternatif 110-120-220-240V 50 ou 60 Hz 32 A	Vitesses de rotation: 33 1/3, 45 et 78,26 t/p.m.
Consommation:	1,5 W (à l'arrêt) 11,2 W (à 33 t/p.m.) 17,1 W (à 45 t/p.m.) 24,4 W (à 78,26 t/p.m.)	Réglage précis de la vitesse de la platine: Blocage par quartz, écart réglable par étapes de 0,1% jusqu'à ±0,5% (16 kg.cm)
Dimensions: (H x L x P)	117 x 136 x 36,9 mm 117 x 136 x 36,9 mm 117 x 136 x 36,9 mm	Couple de démarrage: 0,25 kg.cm (33 t/p.m.) 0,25 kg.cm (45 t/p.m.) 0,25 kg.cm (78,26 t/p.m.)
Poids:	0,4 kg (à l'arrêt) 0,4 kg (à 33 t/p.m.) 0,4 kg (à 45 t/p.m.) 0,4 kg (à 78,26 t/p.m.)	Variation de la vitesse due au couple de charge: 1% (à 33 t/p.m.) 1% (à 45 t/p.m.) 1% (à 78,26 t/p.m.)
■ Platine de lecture		Déviation du nombre de tours: 0,021% (à 33 t/p.m.) 0,021% (à 45 t/p.m.) 0,021% (à 78,26 t/p.m.)
Type:	Platine à entraînement direct avec réglage d'écart à synthétiseur à quartz.	Pleurage et scintillement: 0,015% de valeur efficace (à 33 t/p.m.) 0,015% de valeur efficace (à 45 t/p.m.) 0,015% de valeur efficace (à 78,26 t/p.m.)
Plateau de la platine:	Alliage en cuivre et aluminium moulé sous pression. Diamètre de 32 cm, poids de 10 kg, 1,7 tonne/cm ² (11,100 kg/cm ²). Moteur à C.C. sans balai, à vitesse ultra-faible et à accrochage de phase par quartz.	Ronflement: -92 dB DIN 3 (IEC 98A pondéré) -60 dB DIN A (IEC 98A non-pondéré)
Moment d'inertie:		
Moteur:		

■ RÉGLAGES

● Instruments utilisés et réglages

1. Voltmètre à C.C.
2. Oscilloscope
3. Alimentation en courant C.C.
4. Régler la commande d'écart sur 0%.

Article	Préparatifs	Eléments de réglage	Méthode de réglage
Alimentation en tension constante	1. Retirer les connecteurs CN1, CN2 et CN3. 2. Brancher le voltmètre à C.C. soit à la borne ③ (+) de CN1 et à la borne ④ (-) de BT1 soit au côté négatif de C3. 3. Tourner l'interrupteur d'alimentation sur "on" (marche).	VR1	1. Ajuster VR1 de façon à ce que la tension de sortie soit de 31,8V.
	1. Retirer les connecteurs CN1, CN2 et CN3. 2. Brancher le voltmètre à C.C. soit à la borne ③ (+) de CN1 et à la borne ④ (-) de BT1 soit au côté négatif de C3. 3. Tourner l'interrupteur d'alimentation sur "on" (marche).	VR2	1. Ajuster VR2 de façon à ce que la tension de sortie soit de -31,8V.
Oscillateur à cristal	1. Brancher l'oscilloscope à l'ergot ⑦ de IC202 et à la borne de mise à la terre. 2. Tourner l'interrupteur d'alimentation sur "on" (marche).	C211	1. Ajuster C211 de façon à ce que le cycle soit de 3,81 μsec. (262,08 kHz).

Article	Préparatifs	Eléments de réglage	Méthode de réglage
Tension VS	1. Brancher le voltmètre à C.C. à la borne ③ (+) de CN206 et à la borne ④ (-) de CN206. 2. Tourner l'interrupteur d'alimentation sur "on" (marche) et régler le sélecteur de vitesse sur "33 t.p.m." (t/p.m.).	VR201	1. Ajuster VR201 de façon à ce que la tension de sortie soit de 2,1V.
Courant RS	1. Brancher le voltmètre à C.C. à la borne ③ (+) de CN206 et à la borne ④ (-) de CN206. 2. Tourner l'interrupteur d'alimentation sur "on" (marche) et régler le sélecteur de vitesse sur "33 t.p.m." (t/p.m.). 3. Appuyer sur la touche de démarrage.	VR206	1. Ajuster VR206 de façon à ce que la tension de sortie soit de 0V.
Position de synchronisation	1. Brancher l'oscilloscope à la borne ② (-) de CN206 et à la borne ④ (-) de CN206. 2. Tourner l'interrupteur d'alimentation sur "on" (marche) et appuyer sur la touche de démarrage.	VR203 33 t.p.m. VR204 45 t.p.m. VR205 78 t.p.m.	1. Commuter le sélecteur de vitesse sur "33", "45" et "78" et ajuster VR203, VR204 et VR205 de façon à ce que la durée de l'impulsion soit telle que dans le cadre ci-dessous: 
Frein (électrique)	1. Retirer le connecteur CN202 (avec le frein mécanique libéré). 2. Tourner l'interrupteur d'alimentation sur "on" (marche) et régler le sélecteur de vitesse sur "33 t.p.m." (t/p.m.). 3. Appuyer sur la touche de démarrage.	VR202	1. Appuyer sur la touche d'arrêt. 2. Ajuster VR202 de façon à ce que la plage de l'angle pour l'arrêt de la rotation soit de 90° ~ 180°.
Tension de suppression	1. Appliquer 40mV entre les bornes ② et ③ de CN203 avec l'alimentation en courant C.C. 2. Brancher le voltmètre à C.C. entre les bornes ③ et ④ de CN102. 3. Tourner l'interrupteur d'alimentation sur "on" (marche) et appuyer sur la touche de démarrage.	VR101	1. Ajuster VR101 de façon à ce que la tension de sortie soit de 10mV.
Tension intermédiaire	1. Brancher le voltmètre à C.C. entre les bornes ① et ② de CN102. 2. Tourner l'interrupteur d'alimentation sur "on" (marche) et appuyer sur la touche de démarrage.	VR102	1. Ajuster VR102 de façon à ce que la tension de sortie soit de 0V.

* Méthode de mise au point sans alimentation en courant C.C. pour le réglage de la tension de suppression.

1. Souder 3 résistances à la plaquette à circuits imprimés du circuit d'attaque. (Se référer à la Fig. 21.)
2. Retirer le connecteur CN203. (Plaquette à circuits imprimés du circuit de commande.)
3. Connecter la borne ⑤ de CN203 à la borne ⑤ de BT102 et la borne ④ de CN203 à la borne ④ de BT102, en utilisant un fil de jonction avec pince, etc.
4. Brancher le voltmètre à C.C. entre les bornes ③ et ④ de CN102.
5. Tourner l'interrupteur d'alimentation sur "on" (marche) et appuyer sur la touche de démarrage.
6. Ajuster VR101 de façon à ce que la lecture du voltmètre à C.C. soit de 10mV.
7. Retirer les trois résistances et le fil de jonction.

3. Déplacer le solénoïde de droite à gauche de façon à ce que l'intervalle entre le solénoïde et le caoutchouc de la pièce d'arrêt soit d'à peu près 2 mm.
4. Serrer la vis de réglage du frein à levier.
5. Monter la platine et vérifier qu'elle ne bouge pas avec l'interrupteur d'alimentation réglé sur "off" (hors circuit).

2. Ajustement du frein du ruban

* Vérifier la position de la bande.

1. Retirer la platine.
2. La périphérie interne de la bande devra coïncider avec la périphérie interne du logement.
3. Si elles sont déviées, ajuster en desserrant les vis de réglage aux deux endroits.

* Vérifier l'angle de freinage

1. Faire tourner la platine.
2. Appuyer sur la touche d'arrêt et vérifier que la plage de l'angle pour l'arrêt de la rotation soit de 40° ou moins.
3. Si l'angle d'arrêt est au-dessus de 40°, régler préalablement le frein électrique.
4. Ensuite, desserrer la vis de réglage de la plaque d'ajustage et tourner le bouton de réglage de façon à ce que l'angle soit de 40° ou moins.

● Réglage du frein mécanique

1. Ajustement du frein du levier

1. Retirer la platine.
2. Desserrer la vis de réglage du frein à levier.

ESPAÑOL

■ ESPECIFICACIONES

Las especificaciones quedan sujetas a cambios sin aviso previo.
El peso y las dimensiones indicados son aproximados.

■ En general		
Alimentación de corriente:	~ 110-120/220-240 V, 50/60 Hz	
Consumo de corriente:	32.5 W	
Dimensiones:	11.3 x 36.9 x 36.9 mm	
(Alto x Ancho x Prof.)	1. Estructura del plato giratorio	
	3.6 x 18.6 x 18.6 mm	
Peso:	18 kg (Estructura del plato giratorio)	
	0.4 kg (Estructura de control)	
■ Sección del plato giratorio		
Tipo:	Plato giratorio de perfilamiento directo con control de altura de sonido por sintetización de cuarzo	
Platillo del plato giratorio:	Aleación de cobre y aluminio fundido Diámetro de 32 cm (12 19/32")	
	Peso: 10 kg (22 lbs.)	
	1,1 t·cm ² (1,100 kg·cm ²)	
Momento de inercia:		
Motor:	Motor de corriente continua sin escobillas con velocidad ultrarápida de enganche de fase por cuarzo	
Velocidades del plato giratorio:	33-1/3, 45 y 78.26 rpm	
Ajuste exacto de la velocidad del plato giratorio:		Ajuste de la altura de sonido en pasos de 0.1% hasta aproximadamente 9.9%, con el paso por cuarzo
Par motor de arranque:		16 kg·cm
Tiempo de puesta en marcha:		0.25 s (100-110 V)
Tiempo de frenado:		0.2 s (100-110 V)
Variación de velocidad debido al par de carga:		0.5% dentro de 10 segundos
Desplazamiento de velocidad:		Menos de ±0.001%
Ululaciones y trémolo:		0.016% WRMS (JIS C5621) ±0.021%
Ponderado para la prueba (DIN 45 500, IEC38A Ponderado) (Probado por sistemas: SP-10MK3 + SH-10B5 + EPA-250 + EPC-100CMK3)		-92 dB DIN B
Ruido de rodadura:		(IEC 98A Ponderado) -60 dB DIN A
		(IEC 98A No ponderado)

■ AJUSTES

● Instrumentos usados y puestas

1. Voltímetro DV
2. Osciloscopio
3. Fuente de alimentación CC

4. Ponga el control de altura en 0%

Item	Preparaciones	Piezas de ajuste	Método de ajuste
Fuente de alimentación de voltaje constante	1. Saque los conectores CN1, CN2 y CN3. 2. Conecte el voltímetro CC ya al terminal ③ (+) CN1 y terminal ④ (-) BT1 o ya al lado negativo de C3. 3. Ponga el interruptor de corriente en "on".	VR1	1. Ajustar VR1 de manera que el voltaje de salida sea 31.8V.
	1. Saque los conectores CN1, CN2 y CN3. 2. Conecte el voltímetro CC ya al terminal ③ (+) CN1 y terminal ④ (-) BT1 o ya al lado negativo de C3. 3. Ponga el interruptor de corriente en "on".	VR2	1. Ajustar VR2 de manera que el voltaje de salida sea -31.8V.
Oscilación de cristal	1. Conecte el osciloscopio a púa ② de IC202 y terminal de tierra. 2. Ponga el interruptor de corriente en "on".	C211	1. Ajustar C211 de manera que el ciclo sea 3.81 μseg. (262.08 kHz).

Item	Preparaciones	Piezas de ajuste	Método de ajuste
Voltaje VS	1. Conecte el voltímetro CC a terminal ③ (+) CN206 y terminal ④ (-) CN206. 2. Ponga el interruptor de corriente en "on" y fije el selector de velocidad a "33 r.p.m.".	VR201	1. Ajustar VR201 de manera que el voltaje de salida sea 2.1V.
Corriente RS	1. Conecte el voltímetro CC a terminal ⑤ (+) CN206 y terminal ④ (-) CN206. 2. Ponga el interruptor de corriente en "on" y fije el selector de velocidad a "33 r.p.m.". 3. Apriete el botón de arranque.	VR206	1. Ajustar VR206 de manera que el voltaje de salida sea 0V.
Posición de sincronización	1. Conecte el osciloscopio a terminal ② (+) CN206 y terminal ① (-) CN206. 2. Ponga el interruptor de corriente en "on" y apriete el botón de arranque.	VR203: 33 rpm VR204: 45 rpm VR205: 78 rpm	1. Conmutar el selector de velocidad a "33", "45" y "78" y ajustar VR203, VR204 y VR205 de manera que el tiempo T este como en la tabla de abajo. Velocidad T 33 3.5 ms 45 6.5 ms 78 11.3 ms
Freno eléctrico	1. Saque el conector CN202. (Con el freno mecánico serrado). 2. Ponga el interruptor de corriente en "on" y fije el selector de velocidad a "33 r.p.m.". 3. Apriete el botón de arranque.	VR202	1. Apriete el botón de arranque. 2. Ajustar VR202 de manera que la gama de ángulo para parada de rotación sea 30° ~ 180°
Contravoltaje	1. Aplique 40mV entre terminales ② y ③ CN203 mediante la fuente de alimentación CC. 2. Conecte el voltímetro CC entre terminales ③ y ④ CN102. 3. Ponga el interruptor de corriente en "on" y apriete el botón de arranque.	VR101	1. Ajustar VR101 de manera que el voltaje de salida sea 10mV
Voltaje medio	1. Conecte el voltímetro CC entre terminales ① y ② CN102. 2. Ponga el interruptor de corriente en "on" y apriete el botón de arranque	VR102	1. Ajustar VR102 de manera que el voltaje de salida sea 0V

* Método de ajuste sin fuente de alimentación CC para ajuste de contravoltaje

1. Suelde 3 resistores al circuito excitador p.c.B. (Refiera a la Fig. 21)
2. Saque el conector CN203. (Circuito de control p.c.B.)
3. Conecte el terminal ⑤ de CN203 al terminal ⑤ de BT102 y el terminal ④ de CN203 al terminal ④ de BT102, usando un hilo conductor con presilla, etc.
4. Conecte el voltímetro de CC entre terminales ③ y ④ de CN102.
5. Ponga el interruptor de la corriente en "on" (conectado) y apriete el botón de arranque.
6. Ajuste VR101 de manera que la lectura del voltímetro de CC sea 10mV.
7. Remueva los 3 resistores y el hilo conductor.

● Ajuste del Freno Mecánico

1. Ajuste del freno de palanca

1. Remueva el plato giradiscos.
2. Afloje el tornillo de ajuste de freno de palanca.
3. Mueva el solenoide de derecha a izquierda de manera que la separación entre el solenoide y el caucho de retenedor sea unos 2 mm.
4. Apriete el tornillo de ajuste de freno de palanca.
5. Monte el plato giradiscos y compruebe para ver que el plato giradiscos no se mueva con el interruptor de la corriente puesto en "off" (desconectado).

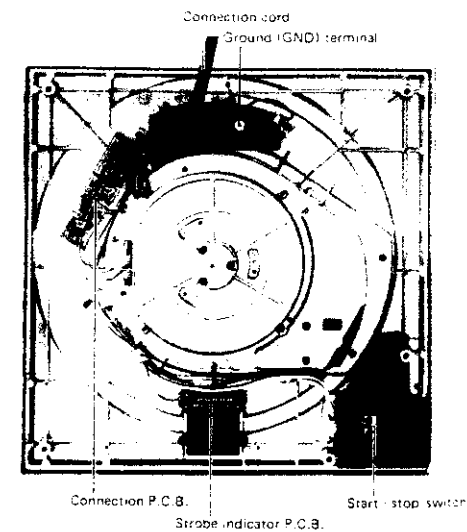
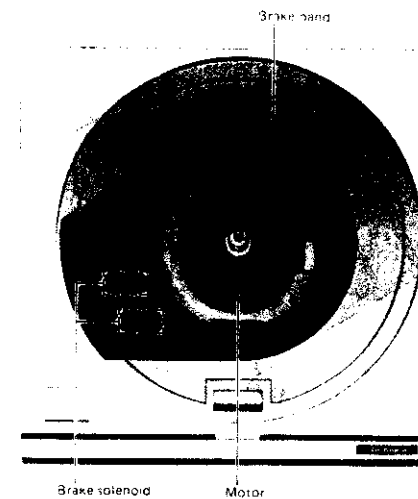
2. Ajuste del freno de banda

● Comprobación de la posición de banda

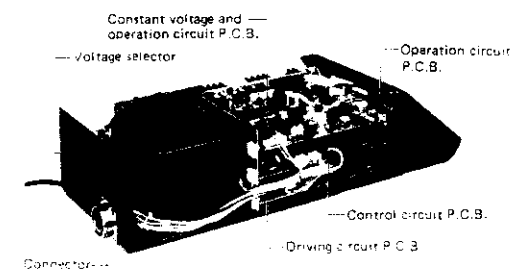
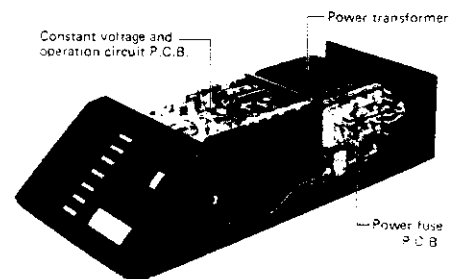
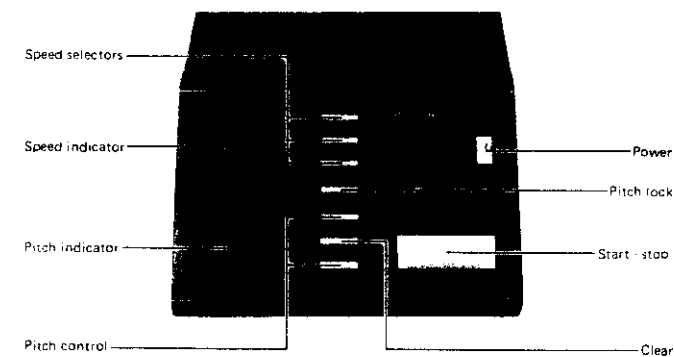
1. Remueva el plato giradiscos.
2. La periferia interna de la banda debería coincidir con la periferia interna de la caja.
3. Si ellas están desviadas, ajústelo aflojando los tornillos de ajuste en 2 posiciones.

● Comprobación del ángulo de freno

1. Gire el plato giradiscos.
2. Apriete el botón de arranque y compruebe para ver que la gama de ángulo para parada de la rotación sea 40° o menos.
3. Si el ángulo de parada es mas de 40°, ajuste, de antemano, el freno eléctrico.
4. A continuación, afloje el tornillo de sujeción de placa de ajuste y gire la perilla de ajuste de manera que el ángulo sea 40° o menos.



• Control unit



DISASSEMBLY INSTRUCTIONS

1. Control unit

• How to remove the cabinet

1. Remove the 8 setscrews (Fig. 1 : ① ~ ⑧) of the cabinet.

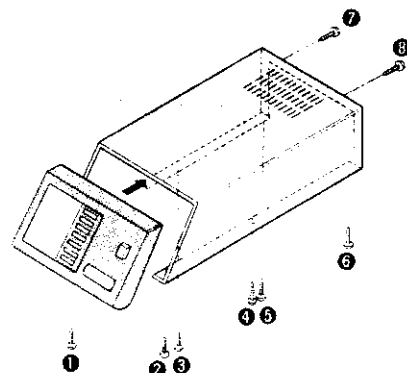


Fig. 1

• How to remove the front panel

1. Remove the cabinet.
2. Remove the 4 setscrews (Fig. 2 : ⑨ ~ ⑫) of the front panel.
3. Pull out the connectors CN2 and CN403 of the constant voltage and operation circuit P.C.B., and remove the panel in the direction of the arrow. (Fig. 2)

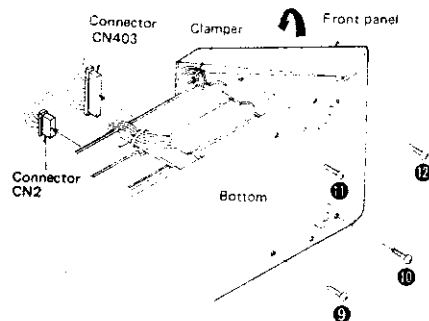


Fig. 2

• How to remove the operation circuit P.C.B.

1. Remove the cabinet and front panel.
2. Remove the bracket.
3. Remove the 3 setscrews (Fig. 3 : ⑬ ~ ⑮) of the printed circuit board.
4. Loosen 2 claws upward to remove them from the printed board. (Fig. 3)
5. Remove the printed circuit board in the direction of the arrow A. (Fig. 3)

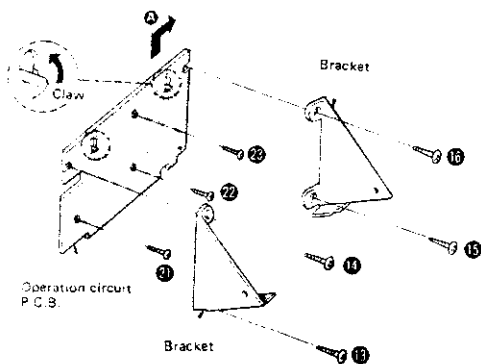


Fig. 3

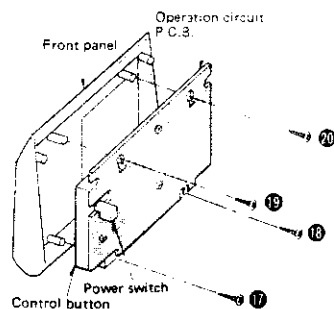


Fig. 4

- How to remove the control buttons (Start/stop, speed selector pitch control) and the power switch.

1. Remove the cabinet and front panel.
2. Remove the operation circuit P.C.B.
3. Remove the setscrews ⑲ and ⑳ in Fig. 5 to remove the power switch.
4. Remove the setscrews ㉑ ~ ㉓ in Fig. 5 to remove the speed selector/pitch control button.
5. Remove the setscrews ㉔ in Fig. 5 to remove the start/stop button.

Note: The setscrews of the start/stop button and the speed selector/pitch control button are adjusted so that the screw tips slightly touch the buttons (to attain smooth switching). If further adjustment is needed, refer to Fig. 5 (A) and (B).

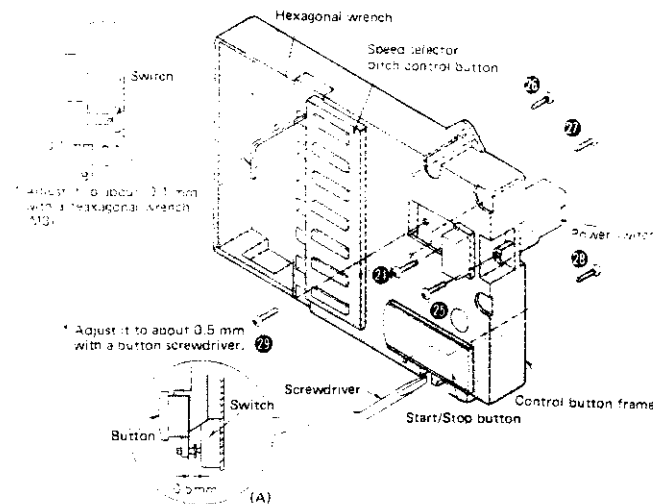


Fig. 5

• How to remove the constant voltage and operation circuit P.C.B.

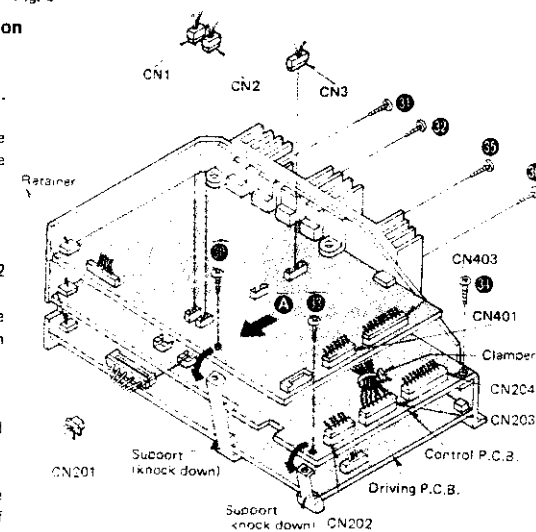
1. Remove the cabinet and front panel.
2. Pull out 4 connectors (CN2, CN3, CN202 and CN403). (Fig. 6)
3. Remove the 3 setscrews (Fig. 6 : ④① ~ ④③) of the printed circuit board and remove the board in the direction of the arrow A.

• How to remove the control circuit P.C.B.

1. Remove the cabinet and front panel.
2. Pull out 6 connectors (CN1, CN2, CN3, CN401, CN202 and CN204). (Fig. 6)
3. Remove the 3 setscrews (Fig. 6 : ④④, ④⑤, ④⑥) of the printed board and remove the board in the direction of the arrow A.

• How to remove the driving circuit P.C.B.

1. Remove the cabinet and front panel.
2. Pull out 5 connectors (CN1, CN2, CN401, CN202 and CN201). (Fig. 6)
3. Cut off the lead wire clumper of CN203.
4. Remove the 4 setscrews (Fig. 6 : ④⑦, ④⑧, ④⑨, ④⑩) of the printed board and remove the board in the direction of the arrow A.



* To mount each P.C.B., fit it in the P.C.B. retainer and support rod groove.

Fig. 6

• How to remove the power fuse P.C.B.

1. Remove the cap.net.
2. Remove the 2 setscrews (Fig. 7 : ④, ⑤) of the printed circuit board.

2. Turntable unit

• How to remove the turntable platter

1. Turn off the power switch. (Check that the brake solenoid is "OFF".)
2. Turn the platter lock ring counterclockwise by using the wrench (attached) to remove the ring. (Fig. 8)
3. Completely fasten the platter mounting handle (attached) into the screw holes (2 portions). (Fig. 8)
4. Slowly lift up the turntable platter, holding the platter mounting handle.

Note: The platter weighs 10 kg. Take care not to drop it when lifting.

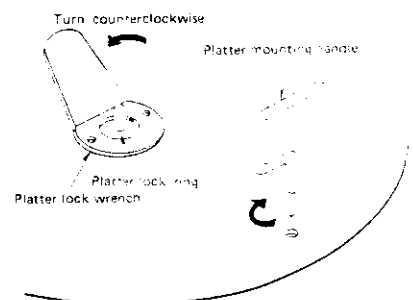
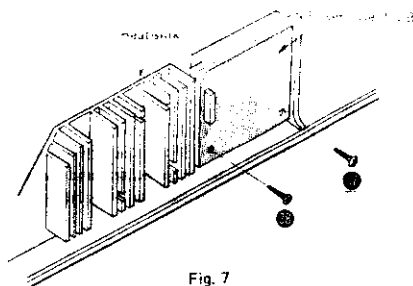


Fig. 8

• How to remove the bottom cover

1. Remove the turntable platter.
2. Place a proper base under the panel on either side so that external forces will not be applied to the center spindle. (Fig. 9)
3. Remove the 15 setscrews (Fig. 10 : ①) of the bottom cover.

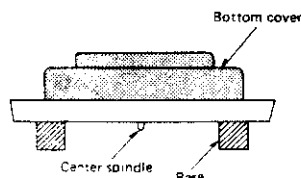


Fig. 9

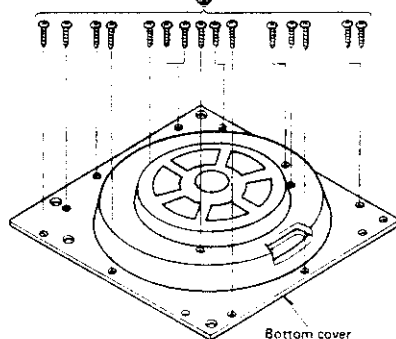


Fig. 10

• How to remove the brake

1. Remove the turntable platter.
2. Remove the 7 setscrews (Fig. 11 : ① ~ ⑦) of the panel cover.
3. Remove the housing rubber.
4. Pull out the lead connector of the solenoid. (Fig. 12)
5. Remove the 4 setscrews (Fig. 12 : ⑧ ~ ⑪) of the brake and lift up the brake.
6. When removing the brake band, remove 2 setscrews (Fig. 12 : ⑫, ⑬).

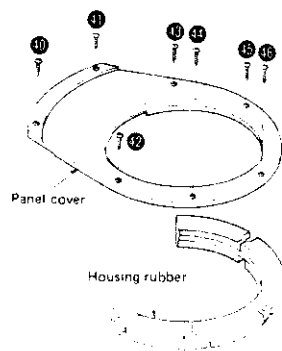


Fig. 11

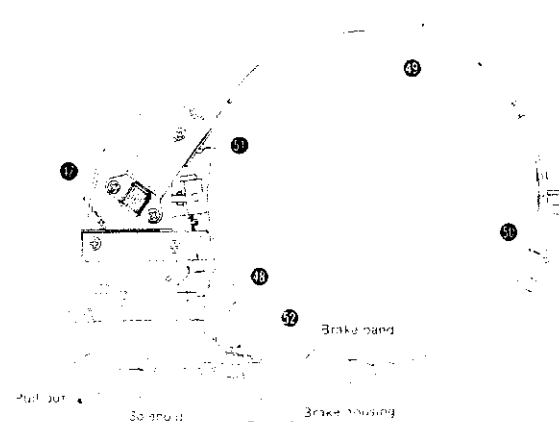


Fig. 12

• How to remove the motor

1. Remove the brake.
2. Remove the 4 setscrews (Fig. 13 : ① ~ ④) of the stator frame. (Use the hexagonal wrench (M4)).
3. Pull out the connector and lift it up to remove the motor.

Notes: 1. When inserting the connector, remove the bottom cover beforehand. (See Fig. 14)

2. The DC resistance of armature drive coil is about 22Ω. (There are 3 coils — 1st (Green), 2nd (Red), and 3rd (Blue). The difference in resistance between the layers is less than 1Ω.)

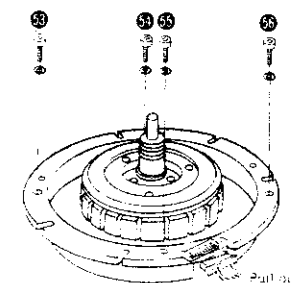


Fig. 13

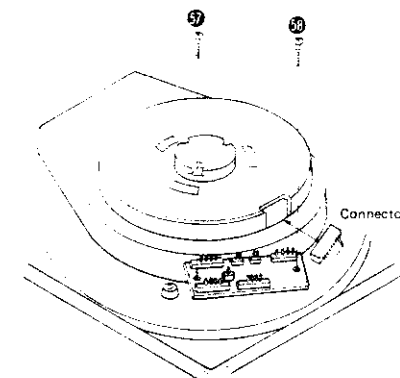


Fig. 14

• How to remove the connection P.C.B.

1. Remove the bottom cover.
2. Remove the 2 setscrews (Fig. 14 : ⑤, ⑥) of the printed board to remove the board.

• How to remove the strobe LED P.C.B.

1. Remove the bottom cover.
2. Shift the claws which fasten the printed circuit board in the direction of the arrow to remove the board. (Fig. 15)

• How to remove the speed selector P.C.B.

1. Remove the bottom cover.
2. Remove the 5 setscrews (Fig. 15 : ① ~ ⑤) of the speed selector P.C.B.
3. Remove the setscrews ⑥, ⑦ in Fig. 15 to remove the start/stop switch.
4. Remove the 2 setscrews (Fig. 16 : ①, ②) of the start/stop button.
5. Remove the 3 setscrews (Fig. 16 : ③ ~ ⑤) of the speed selector button.
6. Shift the claws (2 portions) in the direction of the arrow to remove the board.

* For the speed selector and start/stop button screw adjustment refer to Fig. 5 on page 5.

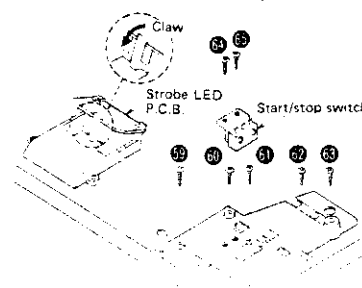


Fig. 15

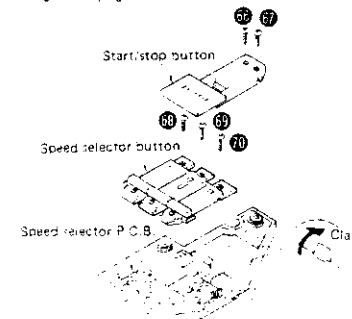


Fig. 16

■ HOW TO CHECK THE PRINTED CIRCUIT BOARD

- Operation circuit P.C.B.

1. Remove the cabinet.
2. Remove the 4 setscrews (Fig. 17 : ㉔ ~ ㉗) of the front panel.
3. Cut off the clammer, remove the front panel in the direction of the arrow and check the printed board from the back side.
4. When replacing the parts of the P.C.B., remove the P.C.B. (Refer to "How to remove the operation circuit P.C.B.")

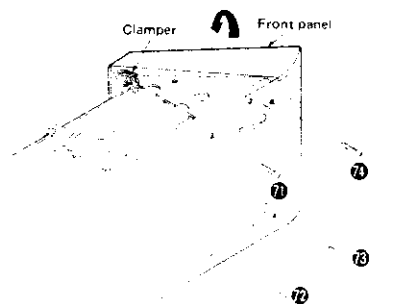


Fig. 17

- Constant voltage and operation circuit P.C.B.

1. Remove the top cover and front panel.
2. Check from above the printed circuit board.
3. When replacing the parts on the printed circuit board, remove the P.C.B. (Refer to "How to remove the constant voltage and operation circuit P.C.B.")

Note: Do not check the conduction of the printed board with the heat-sink removed. (Keeping it energized for a long period of time may damage the parts.)

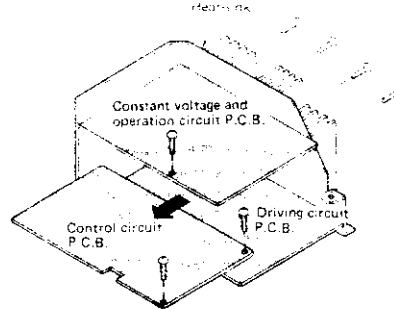


Fig. 18

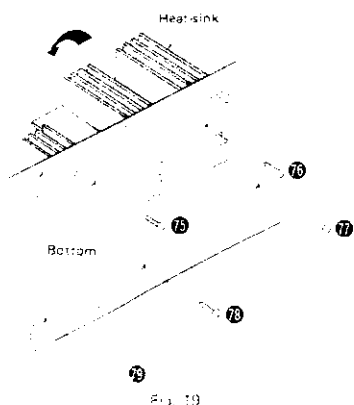
- Control circuit P.C.B.

1. Remove the cabinet and front panel.
2. Remove the printed circuit board. (Refer to "How to remove the control circuit P.C.B.")
3. Connect the connector and check the conduction.

- Driving circuit P.C.B.

- Remove the cabinet and front panel. Fig. 18
- Remove the 3 setscrews (Fig. 19 : ㉔ ~ ㉖) of the heat-sink and 2 setscrews (Fig. 19 : ㉗, ㉘) of the printed board support, shift down the board in the direction of the arrow and check it from the back side. (Fig. 20)
- When replacing the parts of the printed board, remove either the driving circuit P.C.B. (Refer to "How to remove the driving circuit P.C.B.") or the control circuit P.C.B. (Refer to "How to remove the control circuit P.C.B.")

Note: Do not check the conduction of the driving circuit P.C.B. with the heat-sink removed. (If it is energized for a long period of time, the protection circuit will operate to stop the turntable. It may also damage the parts.)



21. 19

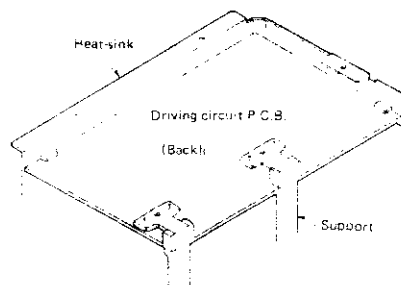


Fig. 20

■ MEASUREMENTS AND ADJUSTMENT

- Instruments used and settings

1. DC voltmeter
2. Oscilloscope
3. DC Power Supply.
4. Set the gain control to 0%.

Item	Preparations	Adjusting Parts	Adjusting Method								
Constant Voltage	1. Pull out the connectors CN1, CN2 and CN3. 2. Connect the DC voltmeter to either CN1 terminal ③ (+) and BT1 terminal ③ (-) or the negative side of C2. 3. Turn the power switch "on". 4. Pull out the connector (CN1), CN2 and CN3. 2. Connect the DC voltmeter to either CN1 terminal ① (+) and BT1 terminal ③ (-) or the negative side of C3. 3. Turn the power switch "on".	VR1 VR2	1. Adjust VR1 so that the output voltage is 31.8V. 1. Adjust VR2 so that the output voltage is 31.8V.								
Crystal Oscillation	1. Connect the oscilloscope to IC202 pin 7 and ground terminal. 2. Turn the power switch "on".	C211	1. Adjust C211 so that the pulse is 3.81 μsec ±262.08 kHz.								
VS Voltage	1. Connect the DC voltmeter to CN206 terminal ⑤ (+) and CN206 terminal ① (-). 2. Turn the power switch "on" and set the speed selector to "33 r.p.m.".	VR201	1. Adjust VR201 so that the output voltage is 2.1V.								
RS Current	1. Connect the DC voltmeter to CN206 terminal ⑤ (+) and CN206 terminal ④ (-). 2. Turn the power switch "on" and set the speed selector to "33 r.p.m.". 3. Press the start button.	VR206	1. Adjust VR206 so that the output voltage is 0V.								
Synchronizing position	1. Connect the oscilloscope to CN206 terminal ② (-) and CN206 terminal ① (-). 2. Turn the power switch "on" and press the start button.	VR203 (33 r.p.m.) VR204 (45 r.p.m.) VR205 (78 r.p.m.)	1. Switch over the speed selector to "33", "45" and "78" and adjust VR203, VR204 and VR205 so that the time T is as in the table below: <table><tr><th>Speed</th><th>T</th></tr><tr><td>33</td><td>8.5msec</td></tr><tr><td>45</td><td>6.6msec</td></tr><tr><td>78</td><td>3.8msec</td></tr></table> 	Speed	T	33	8.5msec	45	6.6msec	78	3.8msec
Speed	T										
33	8.5msec										
45	6.6msec										
78	3.8msec										
Brake (electric)	1. Pull out CN202 connector, (With mechanical brake released) 2. Turn the power switch "on" and set the speed selector to "33 r.p.m." 3. Press the start button.	VR202	1. Press the stop button. 2. Adjust VR202 so that the range of angle for stop of the rotation is 90° ~ 180°.								
Offset voltage	1. Apply 40mV between CN203 terminals 2, and 3; by the DC power supply. 2. Connect the DC voltmeter between CN102 terminals ③ and 4. 3. Turn the power switch "on" and press the start button.	VR101	1. Adjust VR101 so that the output voltage is 10mV.								
Middle voltage	1. Connect the DC voltmeter between CN102 terminals ① and 2. 2. Turn the power switch "on" and press the start button.	VR102	1. Adjust VR102 so that the output voltage is 0V.								

• Adjusting method without DC power supply for offset voltage adjustment

1. Solder 3 resistors to the driving circuit P.C.B. (Refer to Fig. 21)
2. Pull out CN203 connector. (Control circuit P.C.B.)
3. Connect CN203 terminal ⑤ to BT102 terminal ⑤ and CN203 terminal ④ to BT102 terminal ④, using lead wire with clip, etc.
4. Connect the DC voltmeter between CN102 terminals ③ and ④.
5. Turn the power switch "on" and press the start button.
6. Adjust VR101 so that the DC voltmeter reading is 10mV.
7. Remove the 3 resistors and lead wire.

• Adjustment of the mechanical brake

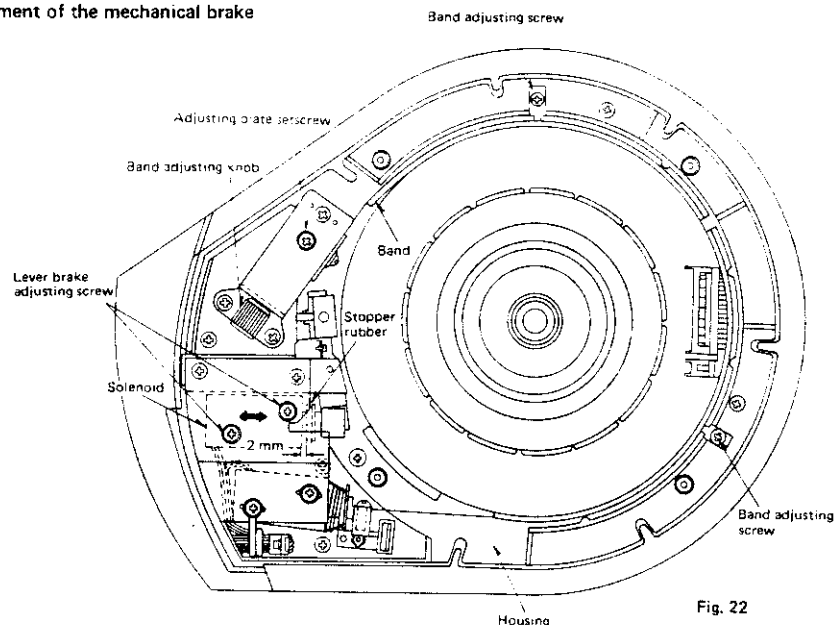


Fig. 22

1. Adjustment of the lever brake

1. Remove the turntable platter.
2. Loosen the lever brake adjusting screw.
3. Shift the solenoid right and left so that the clearance between the solenoid and stopper rubber is about 2 mm.
4. Tighten the lever brake adjusting screw.
5. Mount the turntable and check to see that the turntable does not move with the power switch set to "off".

2. Adjustment of the band brake

• Check of the band position

1. Remove the turntable.
2. The inner periphery of the band should match the inner periphery of the housing.
3. If they are deflected, adjust it by loosening the adjusting screws at two portions.

• Check of the brake angle

1. Turn the turntable.
2. Press the stop button and check to see that the range of angle for stop of the rotation is 40° or less.
3. If the stopping angle is over 40°, adjust the electric brake beforehand. (Refer to page 9.)
4. Next, loosen the adjusting plate setscrew and turn the adjusting knob so that the angle is 40° or less.

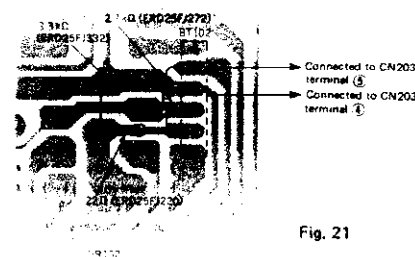
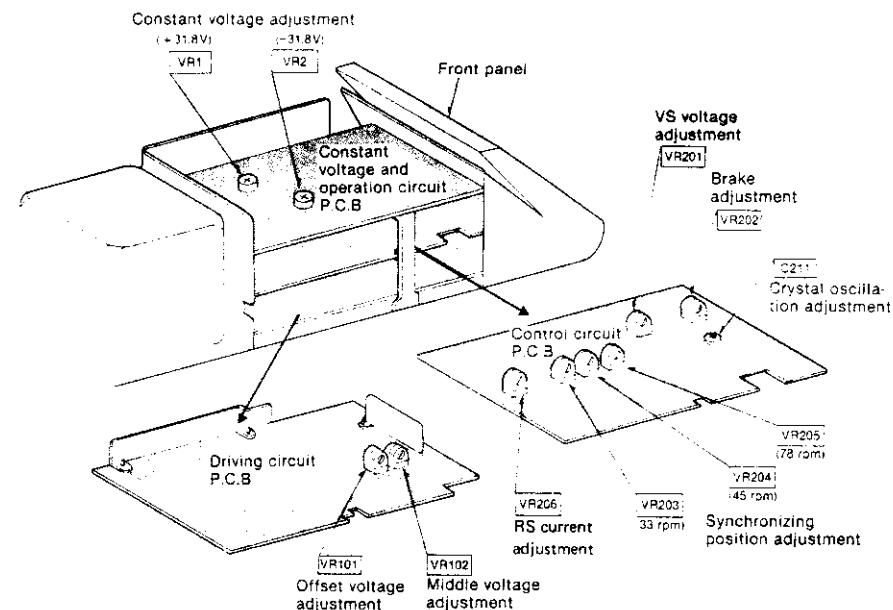


Fig. 21

• Adjustment points



RESISTORS & CAPACITORS

- Notes:**
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 2. Important safety notice: Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only, manufacturer's specified parts.
 3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
 4. The "S" mark is service standard parts and may differ from production parts.
 5. Unless otherwise specified:
All resistors are in OHMS: Ω $\times$ = 100 Ω , M = 1000k Ω
All capacitors are in MICROFARADS: μ F: P = μ F

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value

Resistor Type	Wattage	Tolerance
ERD : Carbon	25	1/4W
ERG : Metal Oxide	50	1/2W
ERX : Metal Film	1	1W
	2	2W

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
RESISTORS											
R1	S ERD25FJ102	1k	R109	S ERD25FJ393	39k	R135	S ERD25FJ103	10k	R164	S ERD25FJ332	33k
R2	S ERD25FJ332	33k	R110	S ERD25FJ223	22k	R137	S ERD25FJ150	15	R201	S ERD25FJ472	47k
R3	S ERD25FJ152	15k	R111	S ERD25FJ562	56k	R139	S ERD25FJ150	15	R202	S ERD25FJ471	47k
R4	S ERD25FJ332	33k	R112	S ERD25FJ332	33k	R140	Δ ERD25FCG101	10k	R203	S ERD25FJ222	22k
R5	S ERD25FJ273	27k	R114	S ERD25FJ183	18k	R141	142 S ERD25FJ151	15k	R204	S ERD25FJ563	56k
R6	S ERD25FJ682	68k	R115	S ERD25FJ471	47k	R143	144 S ERD25FJ151	15k	R205	S ERD25FJ123	12k
R7	S ERD25FJ103	10k	R116	S ERD25FJ102	1k	R145	146 S ERD25FJ151	15k	R206	S ERD25FJ473	47k
R8	S ERD25FJ682	68k	R117	S ERD25FJ562	56k	R147	S ERD25FJ471	47k	R207	S ERD25FJ123	12k
R9	S ERD25FJ103	10k	R118	S ERD25FJ471	47k	R148	S ERD25FJ271	27k	R208	S ERD25FJ473	47k
R10	S ERD25FJ102	1k	R119	S ERD25FJ221	22k	R149	S ERD25FJ151	15k	R209	S ERD25FJ103	10k
R11	S ERD25FJ332	33k	R120	S ERD25FJ472	47k	R150	151 S ERD25FJ151	15k	R210	S ERD25FJ222	22k
R12	S ERD25FJ103	10k	R121	S ERD25FJ103	10k	R152	S ERD25FJ471	47k	R211	S ERD25FJ332	33k
R13	S ERD25FJ560	56k	R122	S ERD25FJ222	22k	R153	S ERD25FJ104	10k	R212	S ERD25FJ222	22k
R14	S ERD25FJ182	18k	R123	S ERD25FJ470	47k	R154	S ERD25FJ101	10k	R213	S ERD25FJ822	82k
R15	S ERD25FJ122	12k	R124	125 S ERD25FJ472	47k	R155	S ERD25FJ102	1k	R214	S ERD25FJ153	15k
R16	S ERD25FJ102	1k	R126	S ERD25FJ222	22k	R156	S ERD25FJ471	47k	R215	S ERD25FJ472	47k
R17	S ERD25FJ102	1k	R127	128 S ERD25FJ103	10k	R157	S ERD25FJ103	10k	R216	S ERD25FJ183	18k
R18	S ERD25FJ102	1k	R129	S ERD25FJ153	15k	R158	S ERD25FJ154	15k	R217	S ERD25FJ333	33k
R19	S ERD25FJ474	47k	R130	S ERD25FJ132	13k	R159	160 S ERD25FJ153	15k	R218	S ERD25FJ563	56k
R20	S ERD25FJ472	47k	R131	S ERD25FJ133	13k	R161	S ERD25FJ153	15k	R219	S ERD25FJ123	12k
R21	S ERD25FJ101	10k	R132	S ERD25FJ133	13k	R162	S ERD25FJ153	15k	R220	S ERD25FJ273	27k
R22	S ERD25FJ473	47k	R133	S ERD25FJ133	13k	R163	S ERD25FJ153	15k	R221	S ERD25FJ273	27k

SP-10MK3

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
R201	\$ ERD25F1027	1	R301	\$ ERD25F1041	1	R401	\$ ERD25F1031	1	R501	\$ ERD25F1023	1
R214	\$ ERD25F1052	1	R314	\$ ERD25F1052	1	R414	\$ ERD25F1033	1	R514	\$ ERD25F1023	1
R236	\$ ERD25F104	70	R336	\$ ERD25F1032	1	R436	\$ ERD25F1033	1	R536	\$ ERD25F1023	1
R237	\$ ERD25F104	100	R337	\$ ERD25F1032	1	R437	\$ ERD25F1033	1	R537	\$ ERD25F1023	1
R238	\$ ERD25F1043	68	R338	\$ ERD25F1032	1	R438	\$ ERD25F1033	1	R538	\$ ERD25F1023	1
R238	\$ ERD25F1471	470	R310	\$ ERD25F1472	47	R344	\$ ERD25F1080	68	R423, 424	\$ ERD25F103	10k
R239	\$ ERD25F1042	1	R311	\$ ERD25F10563	6k	R349	\$ ERD25F10473	47	R425, 426	\$ ERD25F103	10k
R251	\$ ERD25F1273	27k	R321	\$ ERD25F1060	68	R361	\$ ERD25F103	100	R427	\$ ERD25F1033	13k
R252	\$ ERD25F1252	15k	R322	\$ ERD25F1032	12k	R362	\$ ERD25F1091	90	R428, 429	\$ ERD25F153	15k
R253	\$ ERD25F102	1	R323, 324	\$ ERD25F1052	5k	R401, 402	\$ ERD25F103	10k	R430	\$ ERD25F1062	6k
R254	\$ ERD25F102	1	R325	\$ ERD25F1032	5k	R403	\$ ERD25F103	10k	R431	\$ ERD25F104	10k
R255	\$ ERD25F102	1	R326	\$ ERD25F1021	10	R404	\$ ERD25F103	10k	R432, 433	\$ ERD25F1082	6k
R256	\$ ERD25F102	1	R327	\$ ERD25F1032	5k	R404, 405	\$ ERD25F1032	1k	R434	\$ ERD25F103	10k
R257	\$ ERD25F102	5k	R328	\$ ERD25F1032	5k	R406	\$ ERD25F103	10k	R435	\$ ERD25F103	10k
R258	\$ ERD25F102	1	R329	\$ ERD25F1032	5k	R407, 408	\$ ERD25F10470	47	R436	\$ ERD25F103	10k
R259	\$ ERD25F102	1	R330	\$ ERD25F1032	5k	R409	\$ ERD25F10473	47	R437	\$ ERD25F103	10k
R260	\$ ERD25F102	1	R331	\$ ERD25F1032	5k	R410, 412	\$ ERD25F103	10k	R438	\$ ERD25F103	10k
R261	\$ ERD25F102	1	R332	\$ ERD25F1032	5k	R413, 415	\$ ERD25F103	10k	R439	\$ ERD25F103	10k

Numbering System of Capacitor

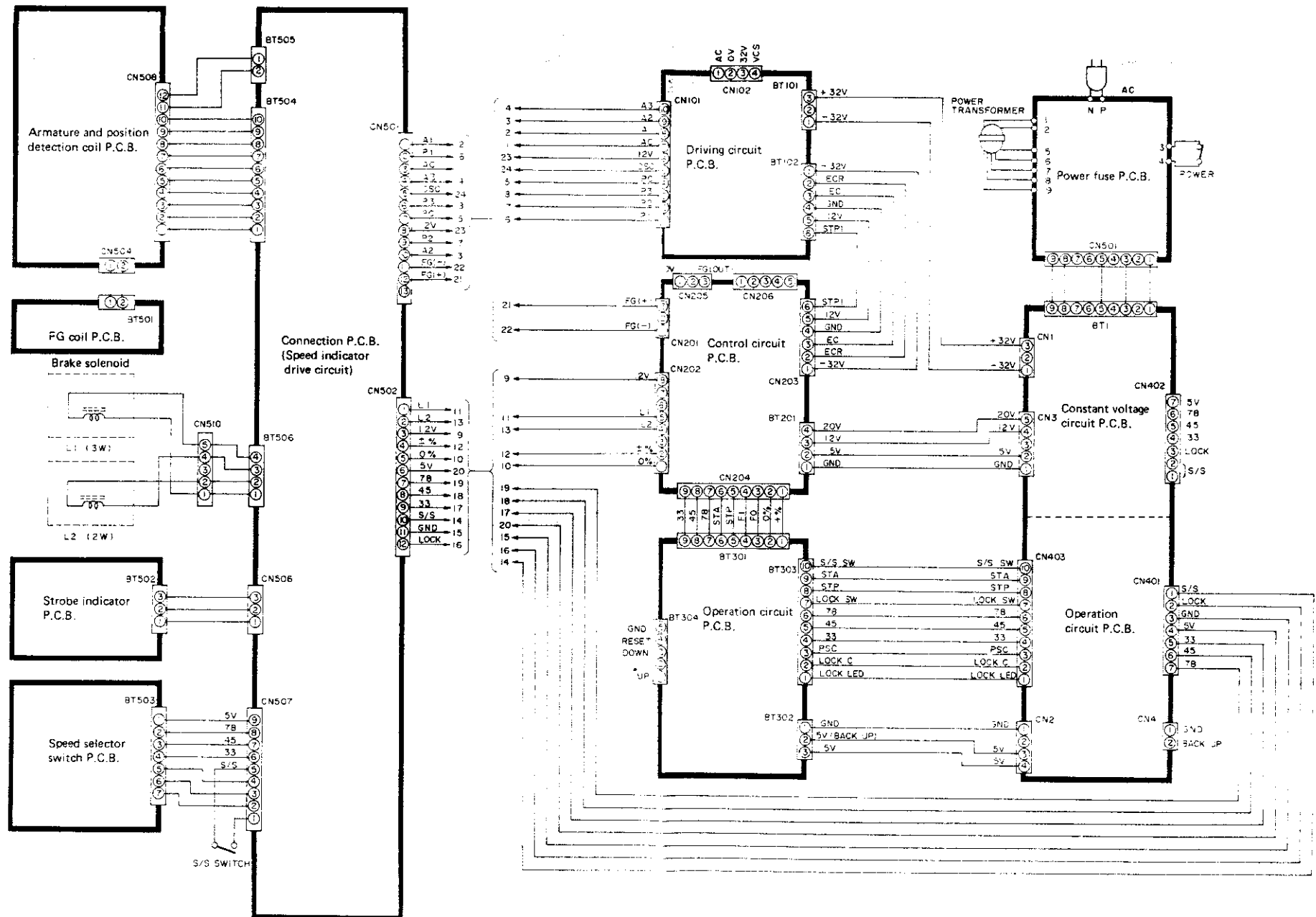
Example 2

ЭКД	14	103	2	Р	ЕССА	30	М	Р47	Р
Трр	Voltage	Value	Tolerance	Peculiarity	Type	Voltage	Peculiarity use	Value	Special use

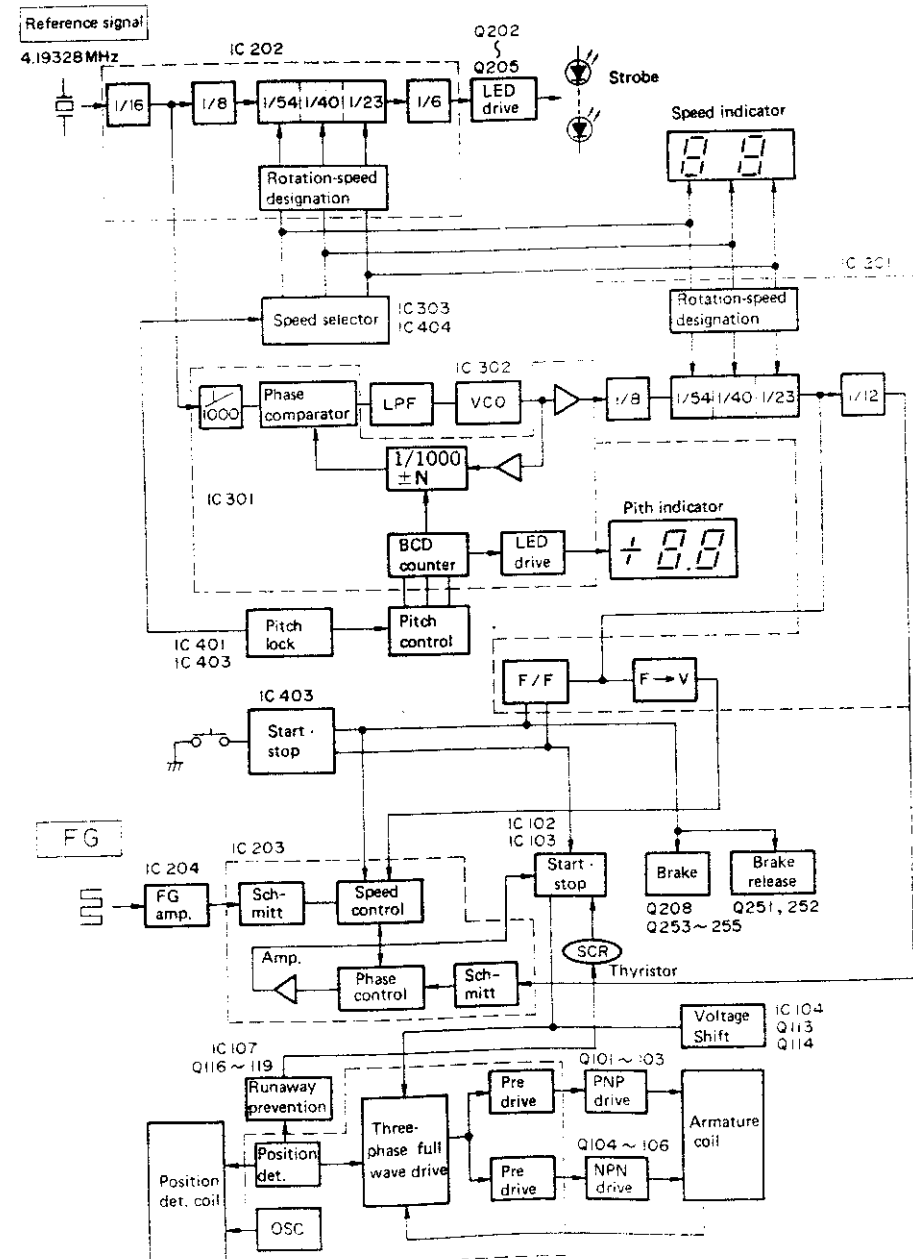
Capacitor Type		Voltage				Tolerance	
		ECEA Type	Others				
ECEA	Electrolytic	1A	10V	1H	500V DC	J	± 5%
ECEA	Non Polar Electrolytic	1C	16V	2H	500V DC	K	± 10%
ECCD	Ceramic	1E	25V	05	50V DC	M	± 20%
ECKD	Ceramic	1V	35V	1	125V DC	Z	+ 80%, -20%
ECQM	Polyester	1H	50V	1A	125V AC	P	+ 100%, -0%
ECQF	Polyester	1J	63V				
ECQV	Polyester	50	50V				
ECBE	Electrolytic	25	25V				
ECQU	Polyester	2A	100V				

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
CAPACITORS											
100	S 100M000000	100	101	S 100M000000	101	102	S 100M000000	102	103	S 100M000000	103
104	S 100M000000	104	105	S 100M000000	105	106	S 100M000000	106	107	S 100M000000	107
108	S 100M000000	108	109	S 100M000000	109	110	S 100M000000	110	111	S 100M000000	111
112	S 100M000000	112	113	S 100M000000	113	114	S 100M000000	114	115	S 100M000000	115
116	S 100M000000	116	117	S 100M000000	117	118	S 100M000000	118	119	S 100M000000	119
120	S 100M000000	120	121	S 100M000000	121	122	S 100M000000	122	123	S 100M000000	123
124	S 100M000000	124	125	S 100M000000	125	126	S 100M000000	126	127	S 100M000000	127
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■ PRINTED CIRCUIT BOARD WIRING CONNECTION DIAGRAM

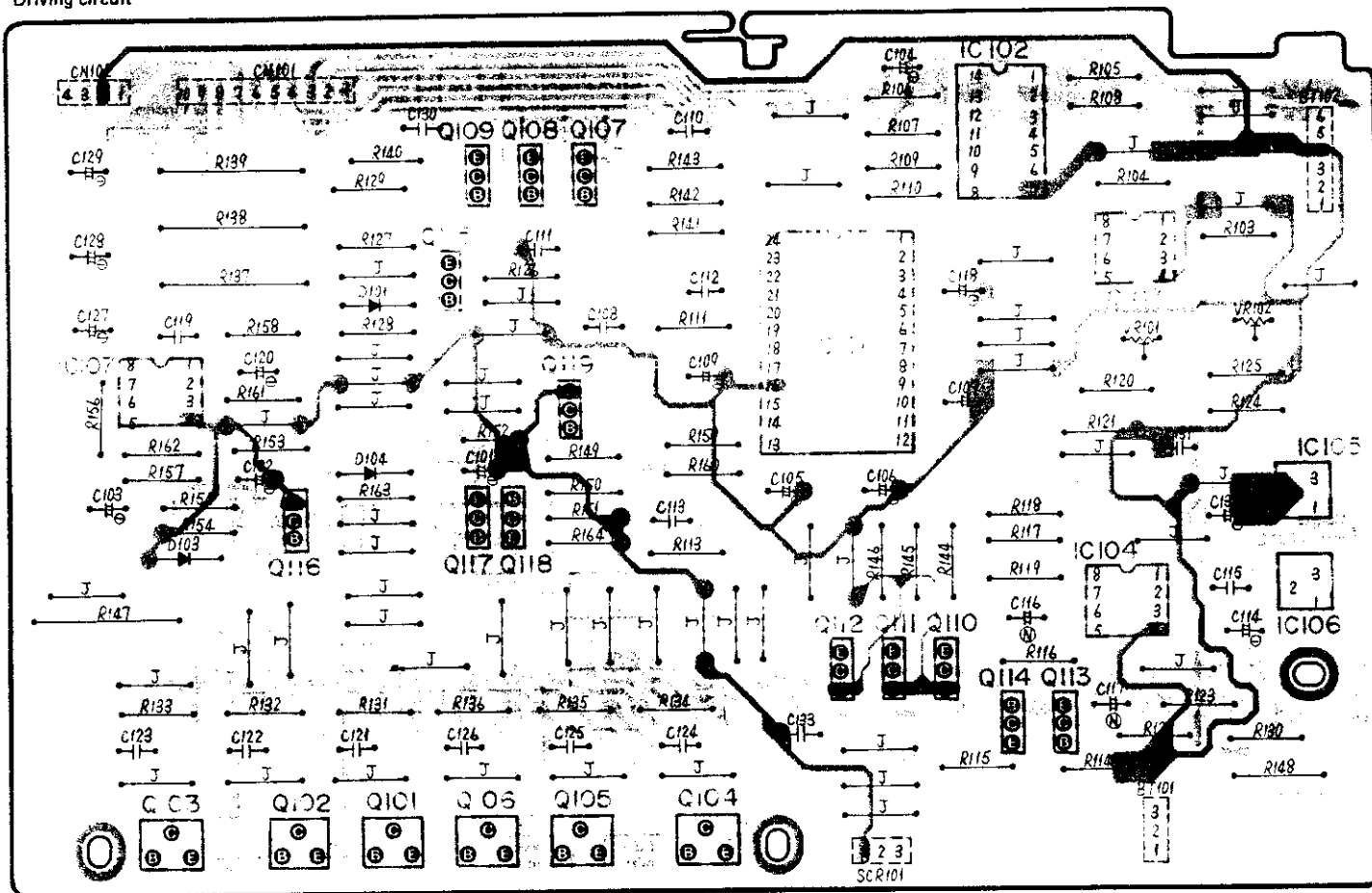


BLOCK DIAGRAM

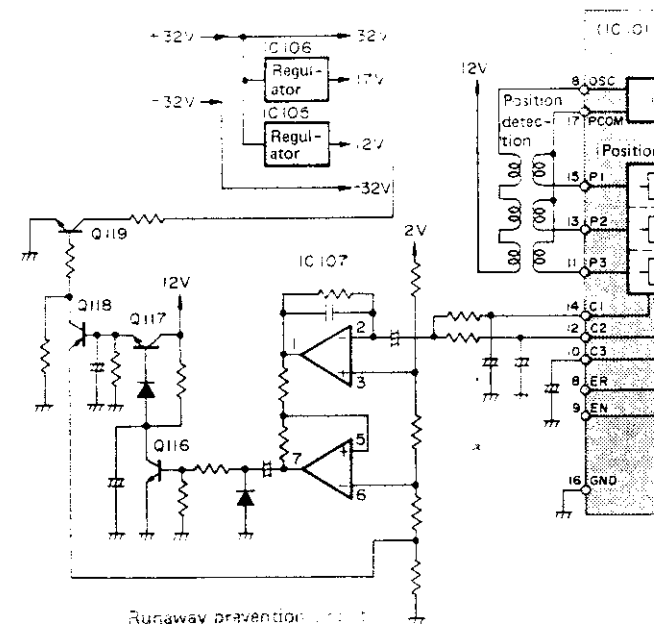
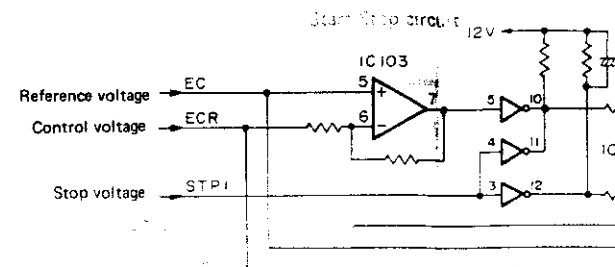


PRINTED CIRCUIT BOARDS

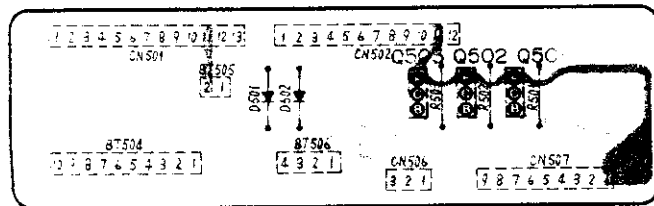
Driving circuit



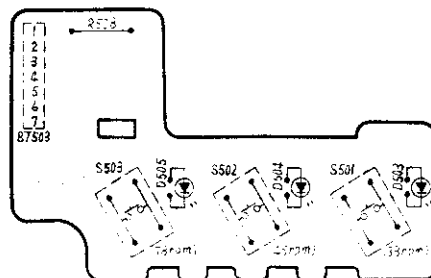
Block diagram of driving circuit



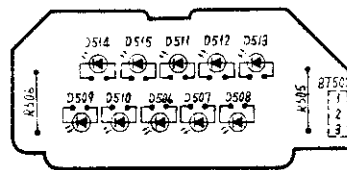
Connection board (Speed indicator drive circuit)



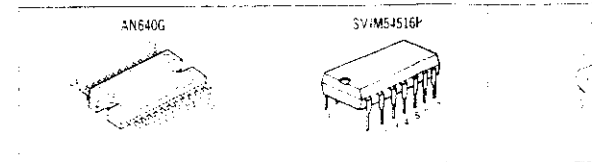
Speed selector switch circuit



Strobe indicator circuit

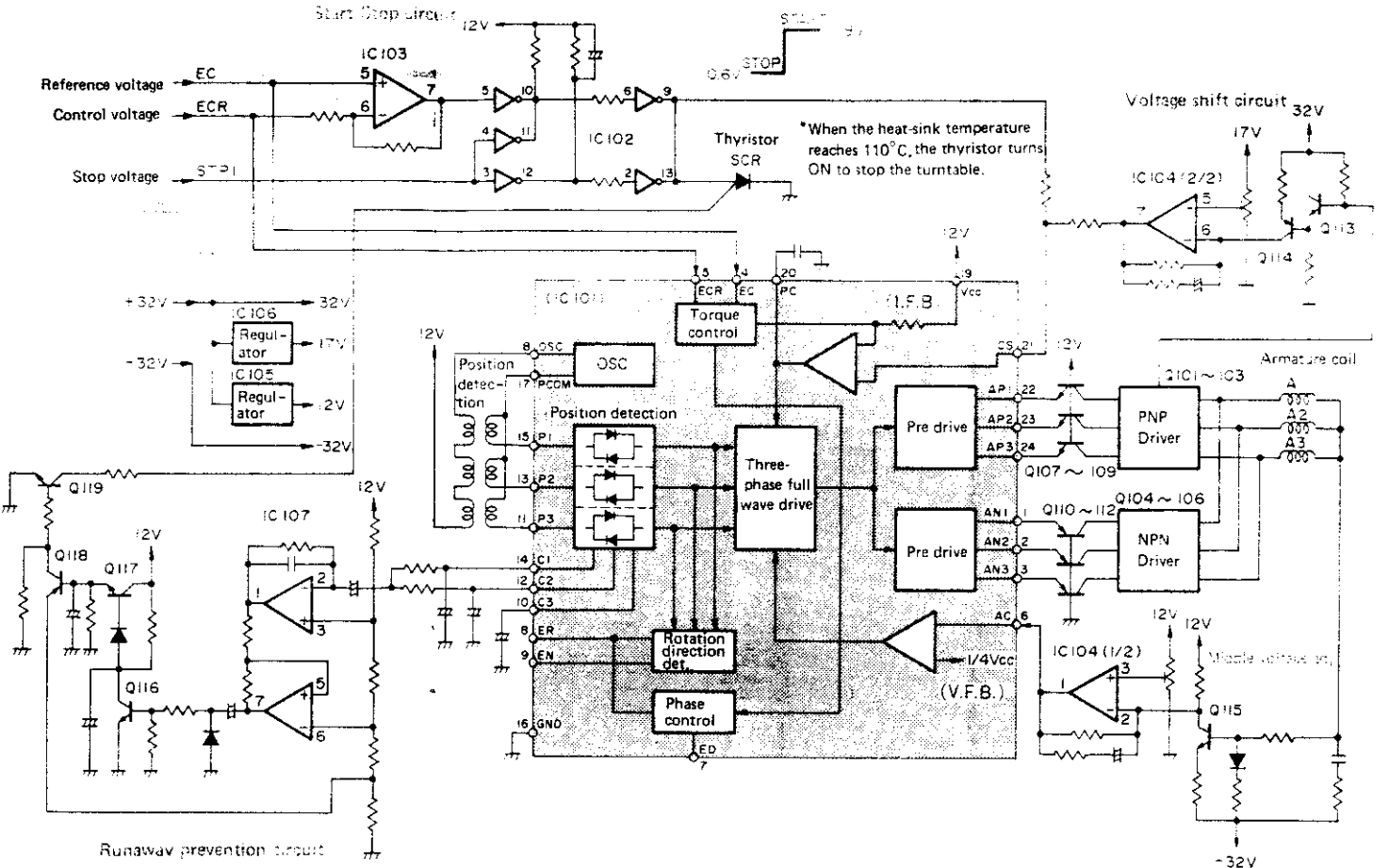
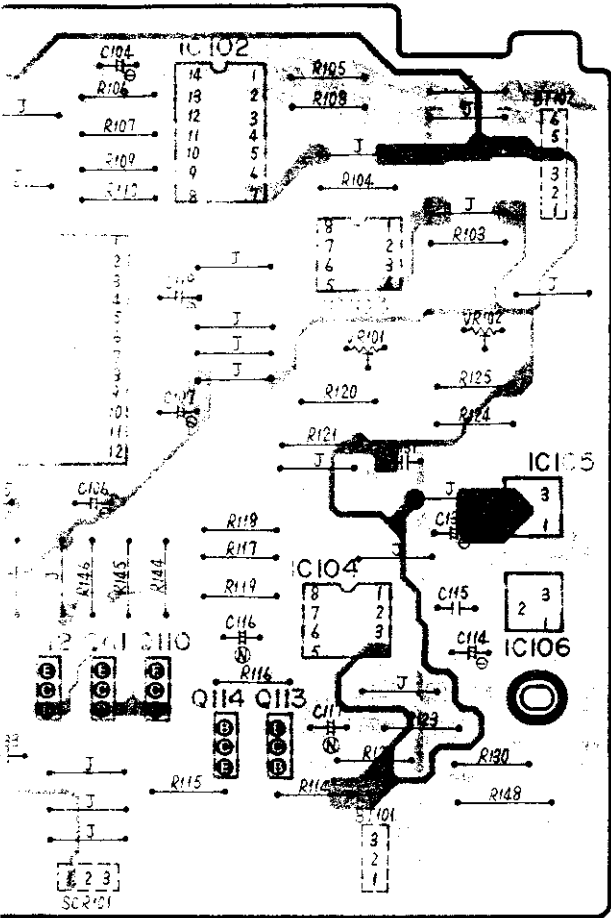


Terminal guide of IC and transistors

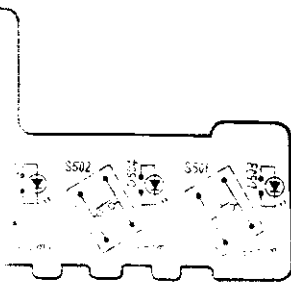


Earth) lines

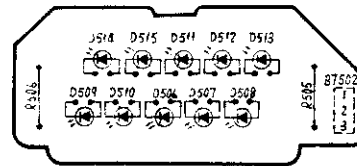
• Block diagram of driving circuit



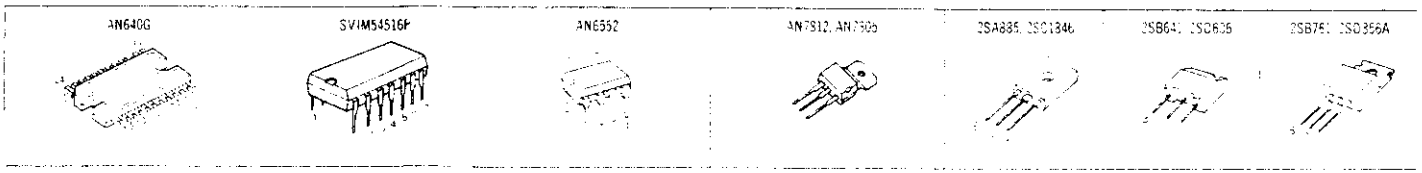
• Switch circuit



• Strobe indicator circuit

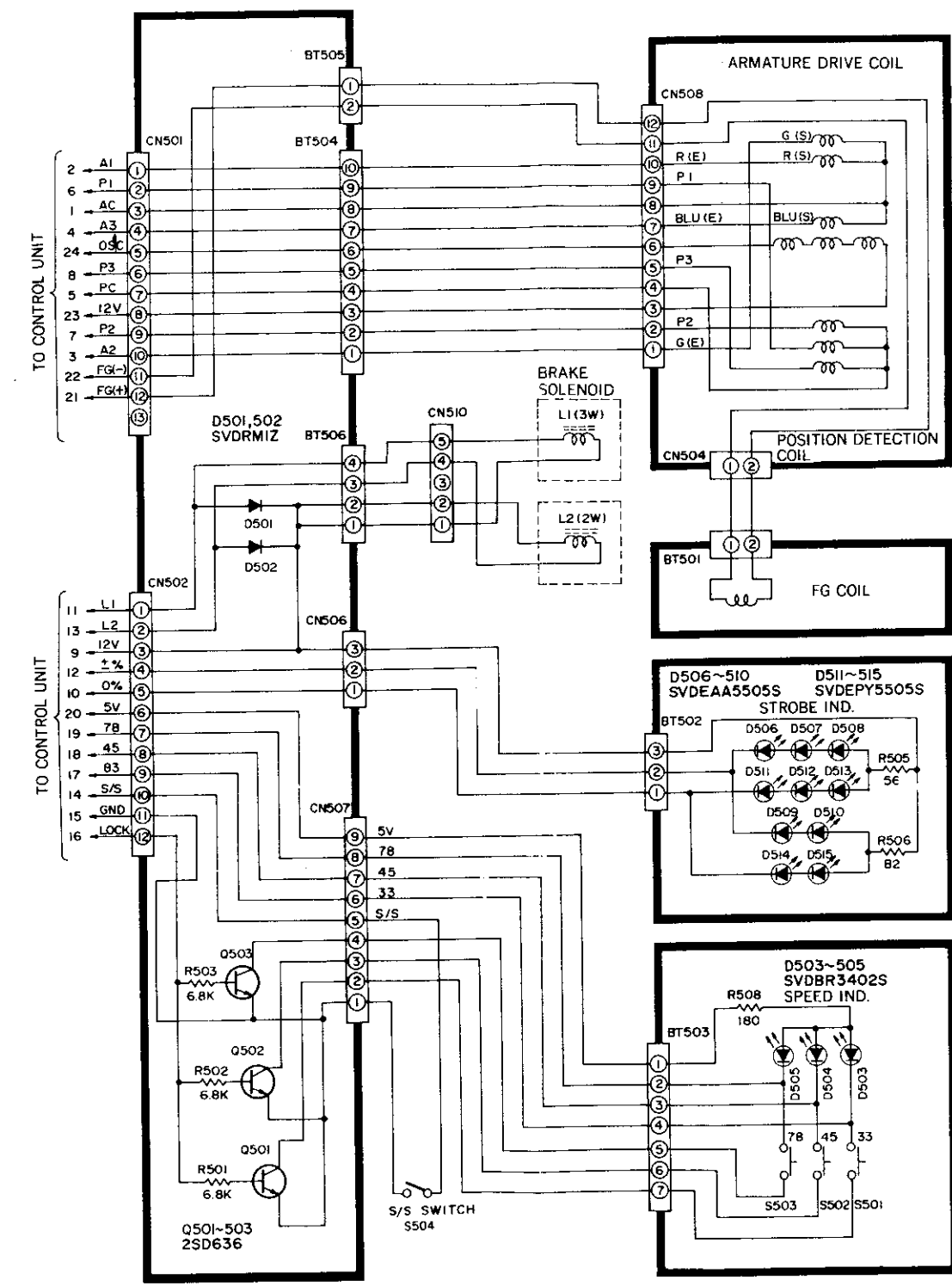


• Terminal guide of IC and transistors



• Turntable unit (Speed selector, strobe indicator and motor coil circuit)

A
E
C
E
F

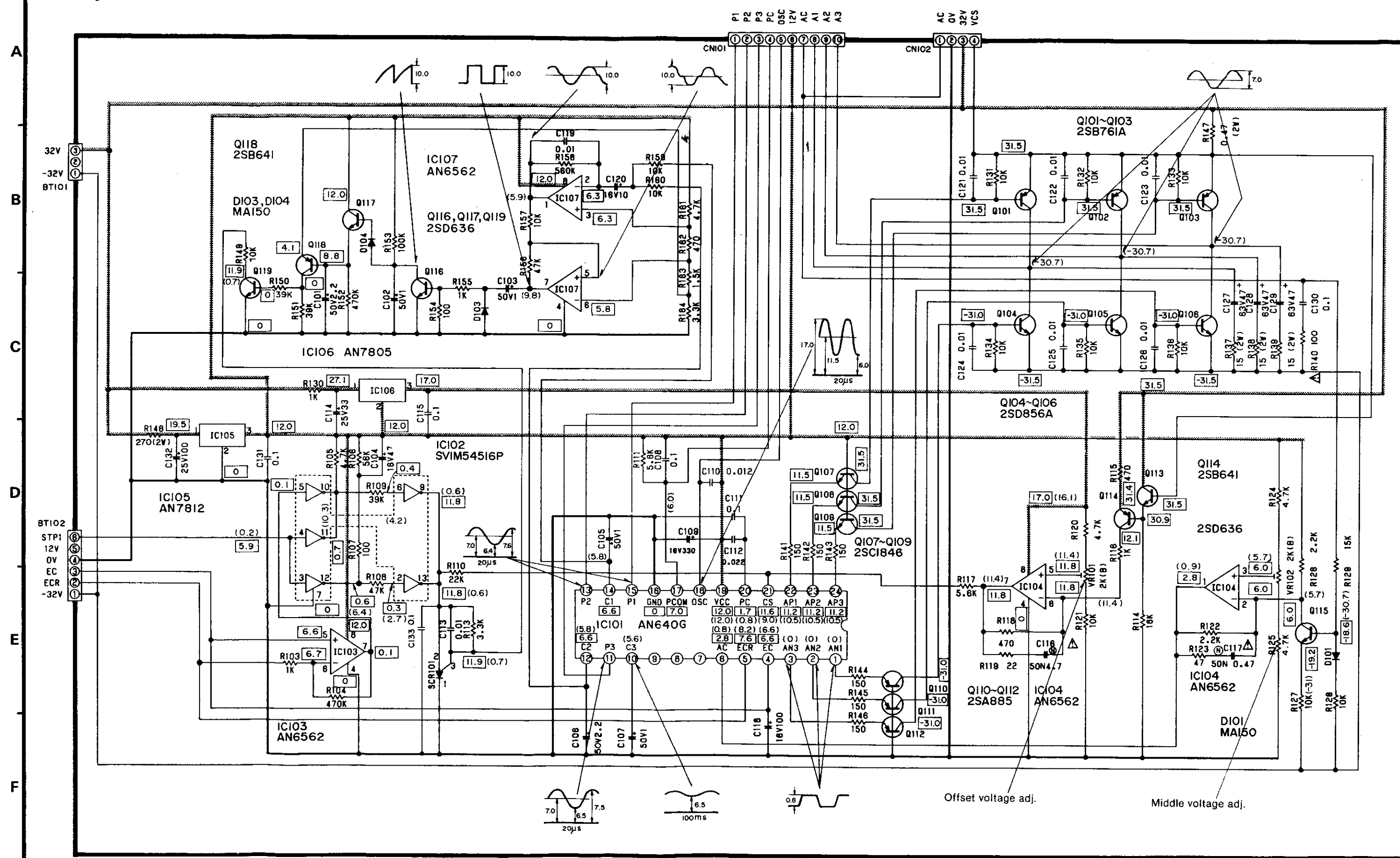


Notes:

- The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
* Those in () are voltage in stop.
* Those in [] are voltage in rotation.
- positive voltage lines.
- Important safety notice:
Components identifier by Δ make have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
- S501** : Speed selector (33 rpm) switch.
- S502** : Speed selector (45 rpm) switch.
- S503** : Speed selector (78 rpm) switch.
- S504** : Start/stop switch.

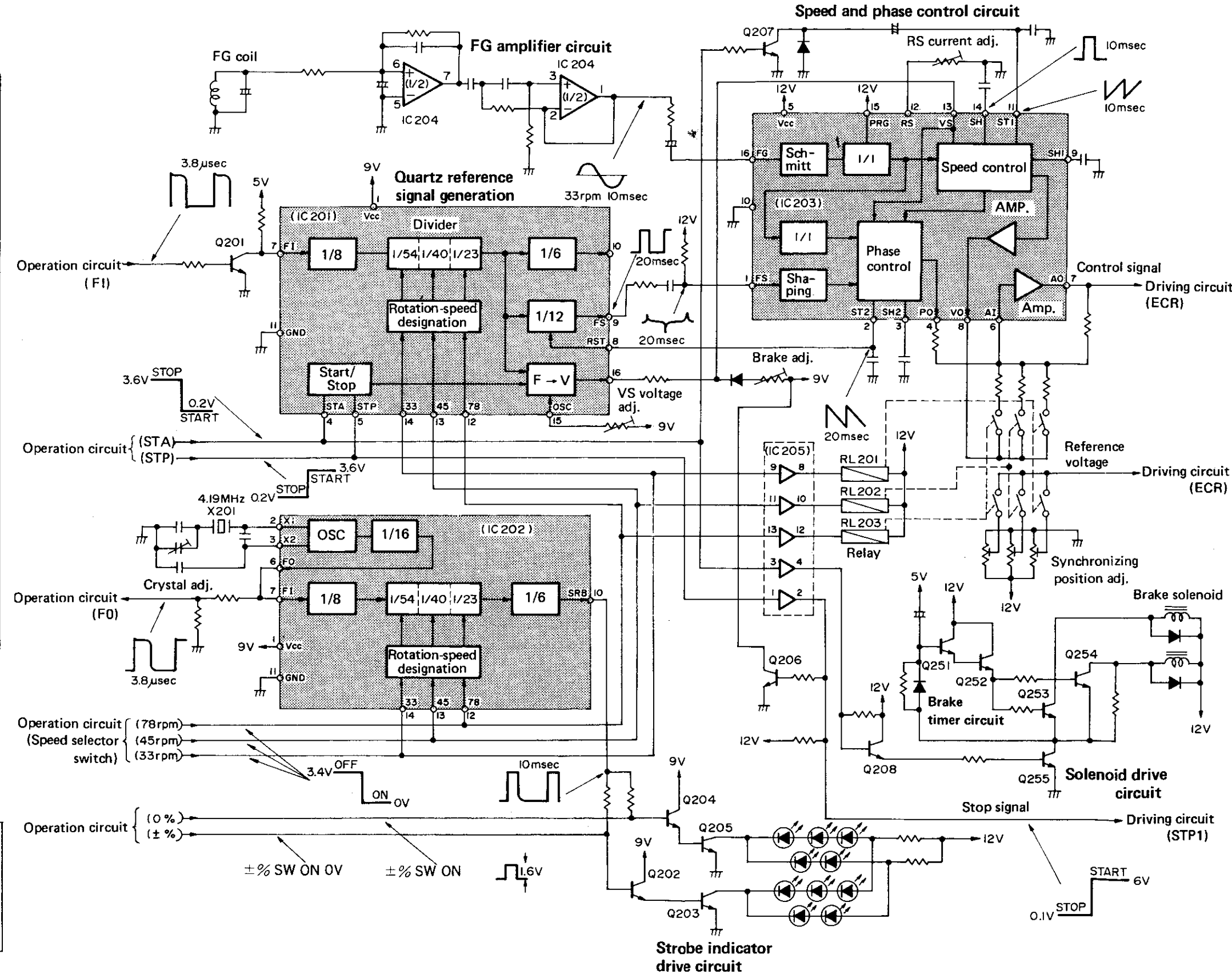
■ SCHEMATIC DIAGRAM (This schematic diagram may be modified at any time with the development of new technology.)

• Driving circuit



• Block diagram of control circuit

• Reference voltage and waveform at each IC pin



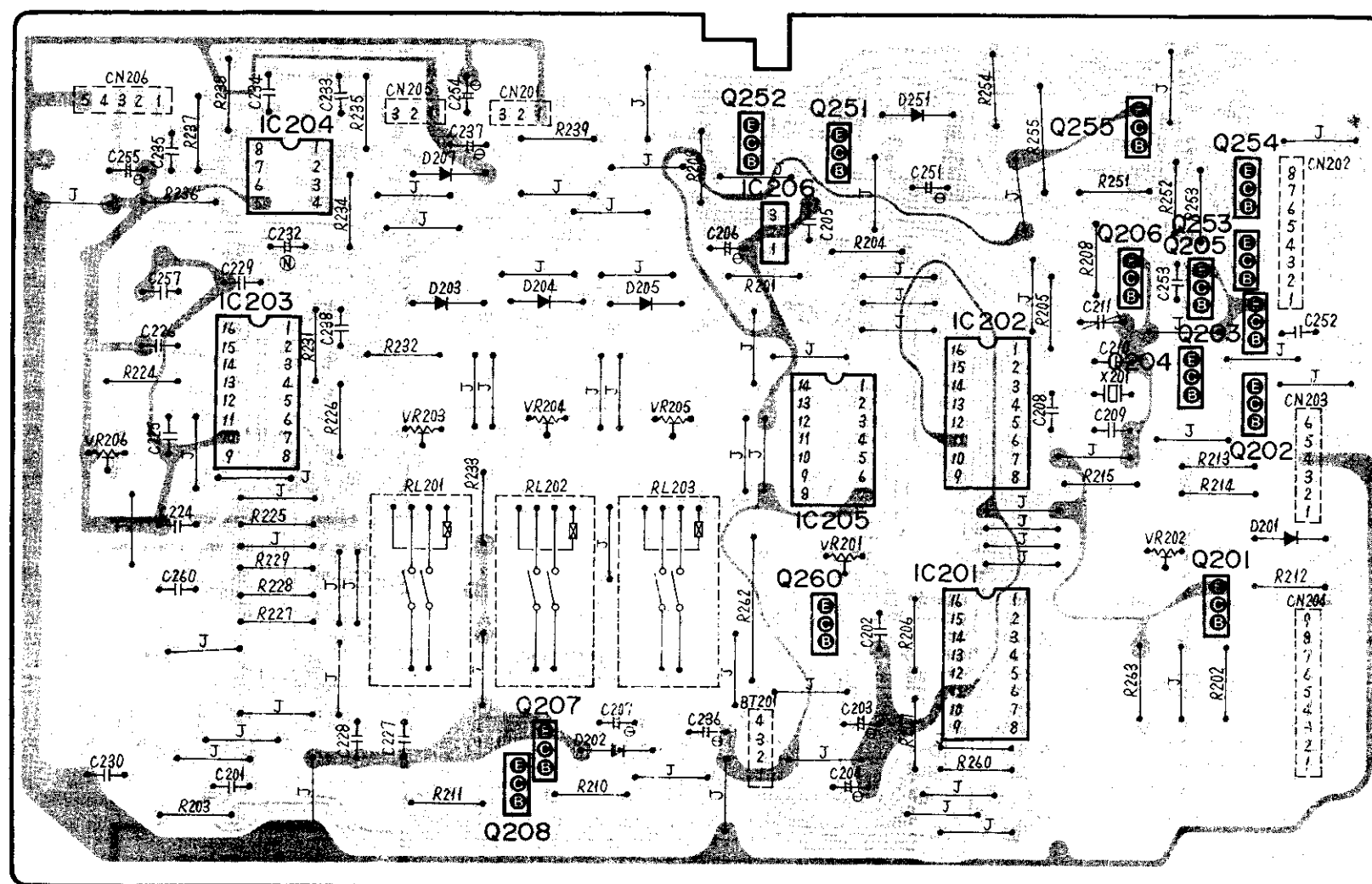
IC201 DN860		IC203 AN660	
No	STOP ROTATION(START)	No	STOP ROTATION(START)
1	9.0 9.0	1	11.8 4.0
4	3.6 0.2	2	0 7.7
5	0.2 3.6	3	6.0 5.0
7	3.8μsec	4	6.2 6.2
8	0 7.7	5	12.0 12.0
9	4.2 4.2	6	6.4 6.4
11	0 0	7	8.2 6.7
12	33,45rpm 3.6 78rpm 0.2	8	5.2 6.4
13	33,78 3.6 45 0.2	9	7.6 6.4
14	45,78 3.6 33 0.2	10	0 0
15	0.2 6.3	11	7.8 6.5
16	0.2 6.3	12	2.6 2.2 4.5 3.0 7.5 5.0
		13	2.6 2.2 4.5 3.0 7.5 5.0
		14	7.5 7.8
		15	12.0 12.0
		16	5.8 3.5

IC202 DN860	
No	STOP ROTATION(START)
1	9.0 9.0
2	1.2 1.2
3	0.6 0.6
6	4.0 4.0
7	3.8μsec 3.0
10	33rpm 10msec 45 7.5 78 4
11	0
12	33,45rpm 3.6 78rpm 0.2
13	33,78 3.6 45 0.2
14	45,78 3.6 33 0.2

PRINTED CIRCUIT BOARD

Ground (Earth) lines

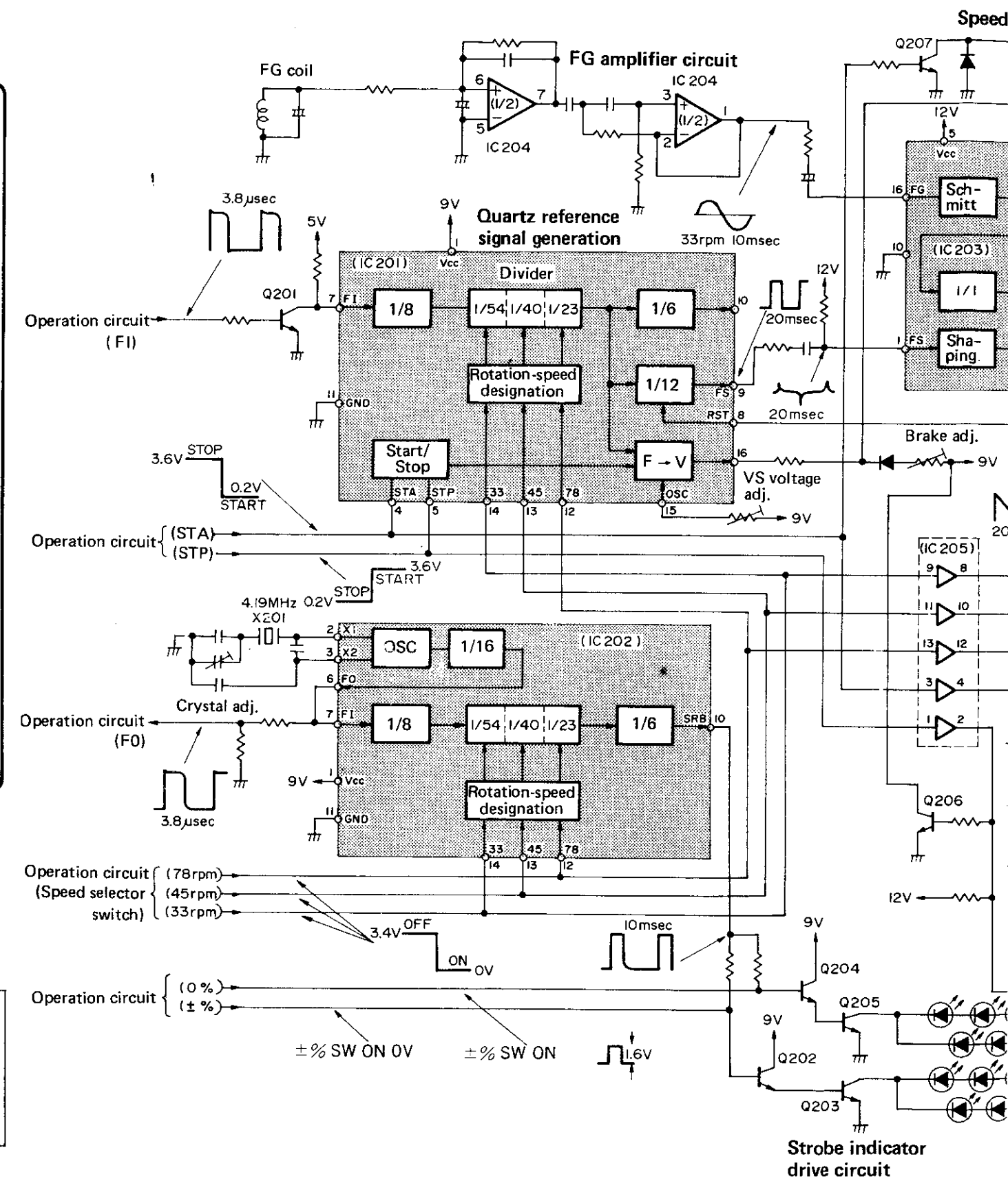
Control circuit



Terminal guide of IC and transistors

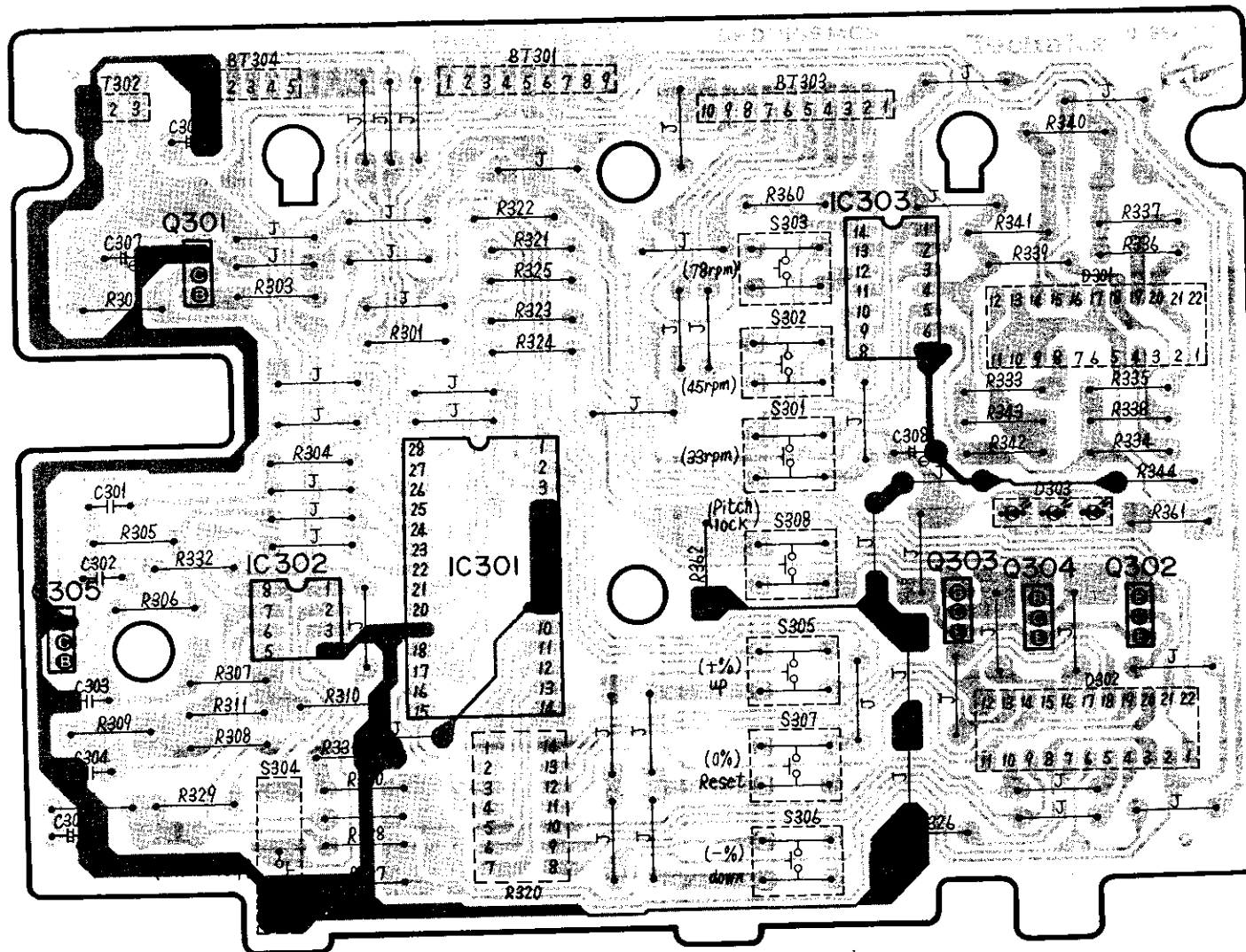
DN860, AN660	AN6552F	SVIM53217P	SVITA78L009	2SC1846	2SC1047	2SD636, 2SD638
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Block diagram of control circuit

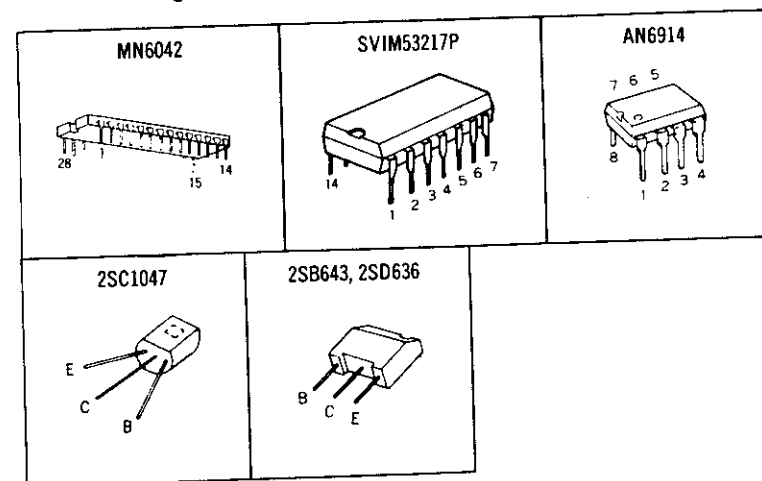


PRINTED CIRCUIT BOARD

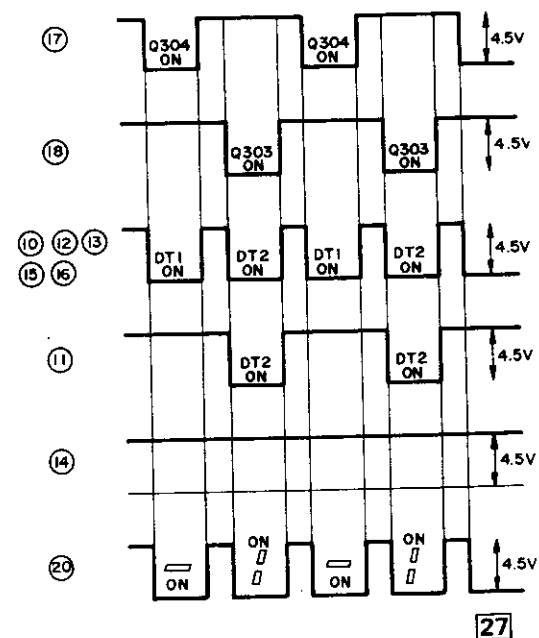
- Operation circuit



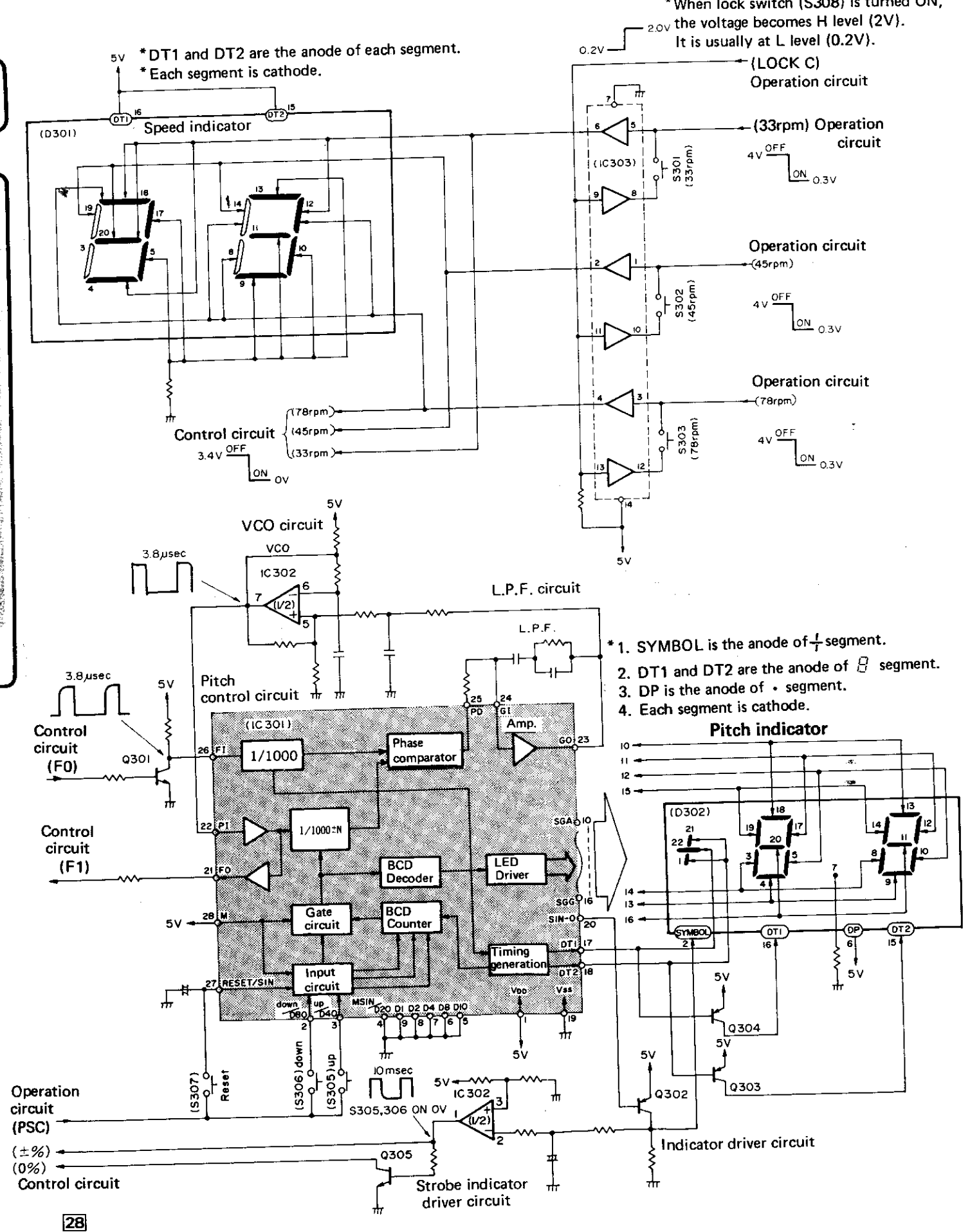
Terminal guide of IC and transistors



- Timing chart (When the pitch has been set to +5.9%)
IC301 pin number



- Block diagram of operation circuit

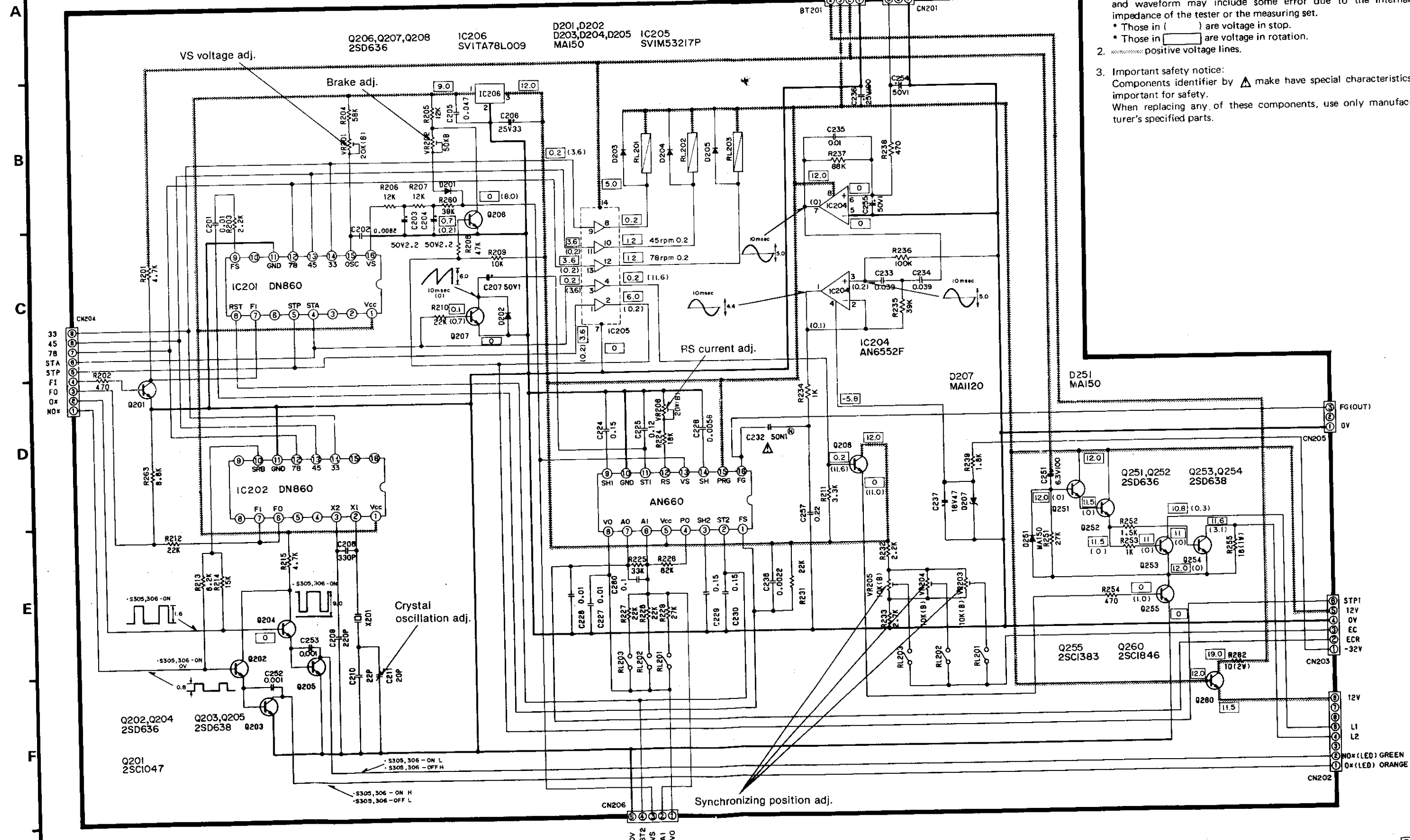


SCHEMATIC DIAGRAM (This schematic diagram may be modified at any time with the development of new technology.)

Control circuit

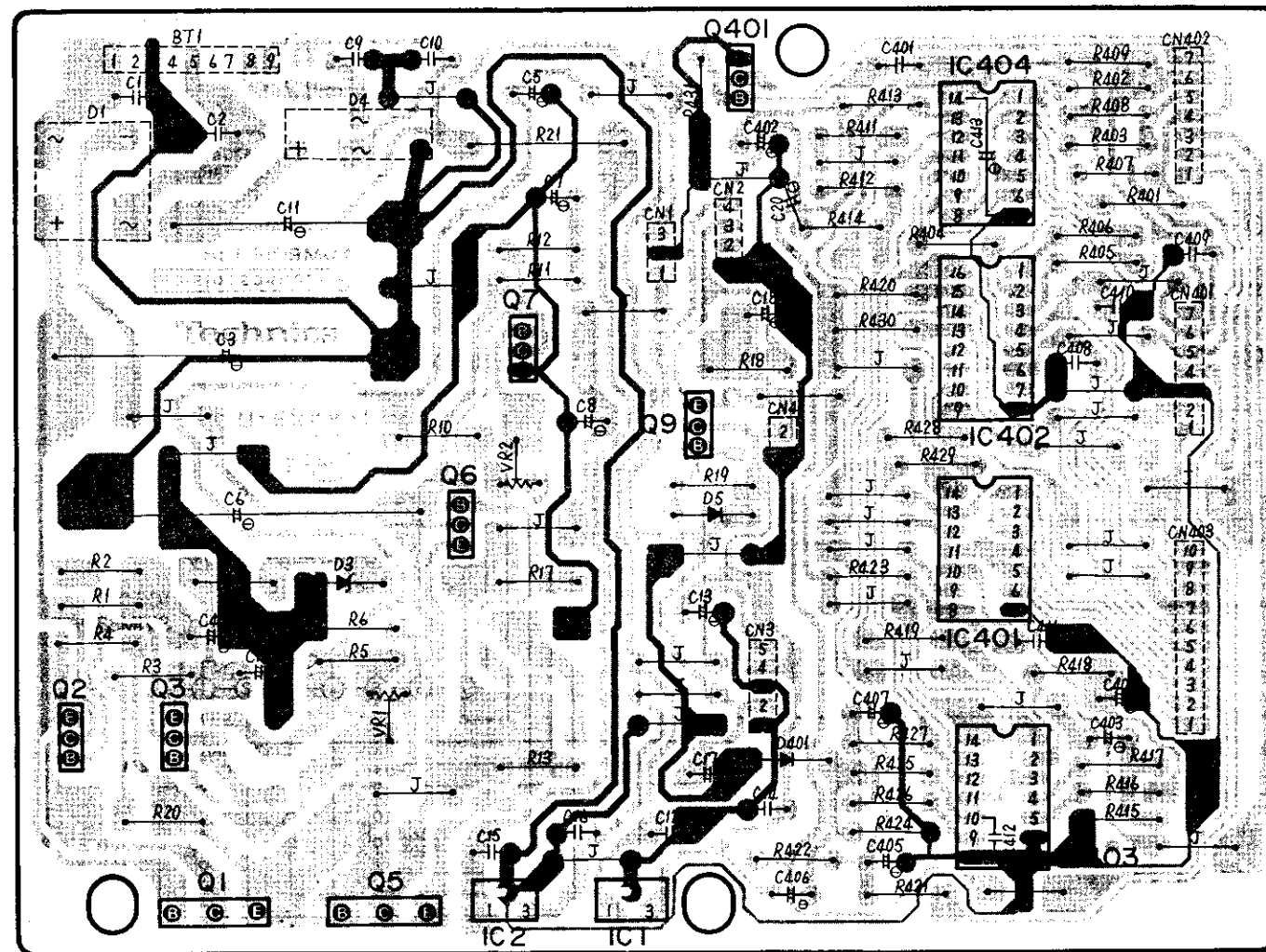
Notes:

- The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
* Those in () are voltage in stop.
* Those in [] are voltage in rotation.
- positive voltage lines.
- Important safety notice:
Components identifier by Δ make have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.



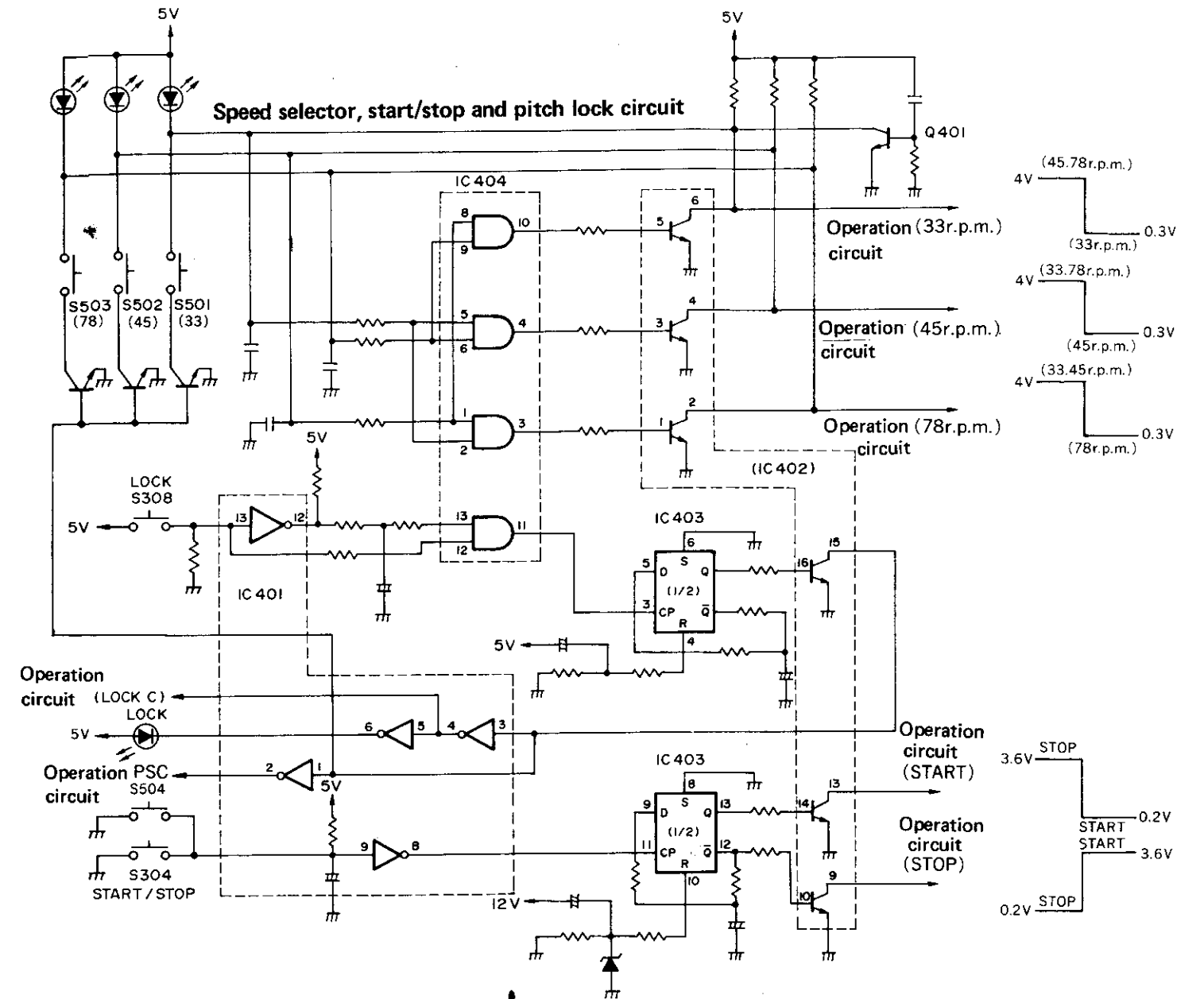
PRINTED CIRCUIT BOARD

Constant voltage and operation circuit

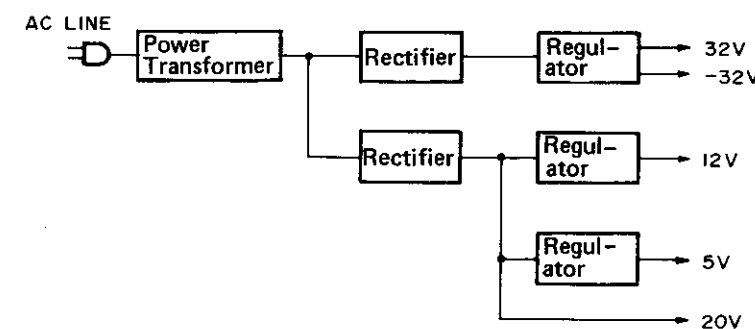
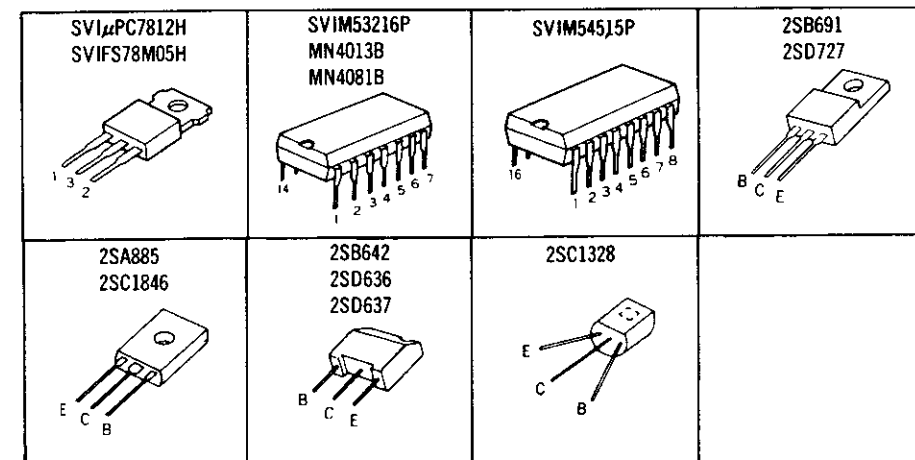


Ground (Earth) lines

Block diagram of constant voltage and operation circuit



Terminal guide of IC and transistors



Reference voltage at each IC pin

IC404 MN4081B

No	STOP	33rpm	45rpm	78rpm
1	4.0	4.0	0.3	4.0
2	0.3	0.3	4.0	4.0
3	0	0	0	5.0
4	0	0	5.0	0
5	0.3	0.3	4.0	4.0
6	4.0	4.0	4.0	0.3
7	0	0	0	0
8	4.0	4.0	0.3	4.0
9	4.0	4.0	4.0	0.3
10	5.0	5.0	0	0
11	0	0	0	0
12	0.1	0.1	0.1	0.1
13	5.0	5.0	5.0	5.0
14	5.0	5.0	5.0	5.0

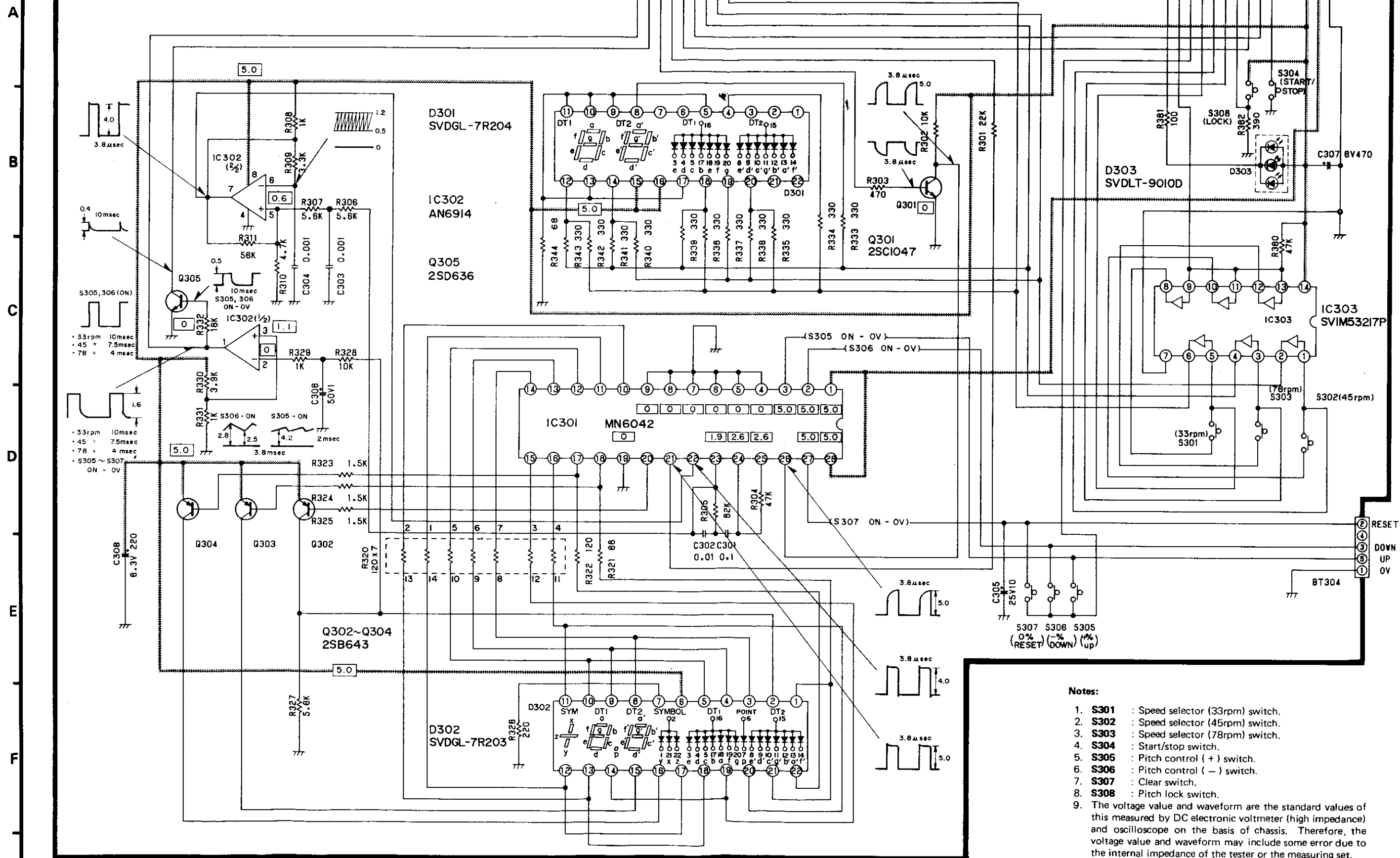
IC402 SVIM54515P

No	STOP	33rpm	45rpm	78rpm
1	0	0	0	0.8
2	4.0	4.0	4.0	0.3
3	0	0	0.8	0
4	4.0	4.0	0.3	4.0
5	0	0.8	0	0
6	4.0	0.3	4.0	4.0
7	0	0	0	0
8	0	0	0	0
9	0.2	3.6	3.6	3.6
10	0.8	0	0	0
11	0	0	0	0
12	0	0	0	0
13	3.6	0.2	0.2	0.2
14	0	0.8	0.8	0.8
15	3.2	3.2	3.2	3.2
16	0	0	0	0

SCHEMATIC DIAGRAM

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

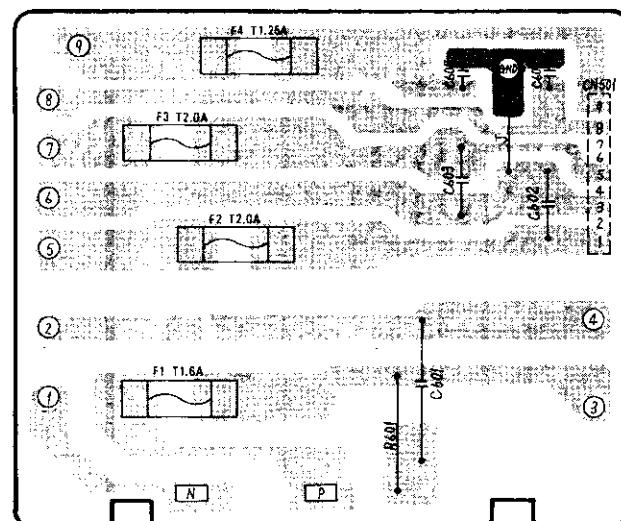
Operation circuit



Notes:

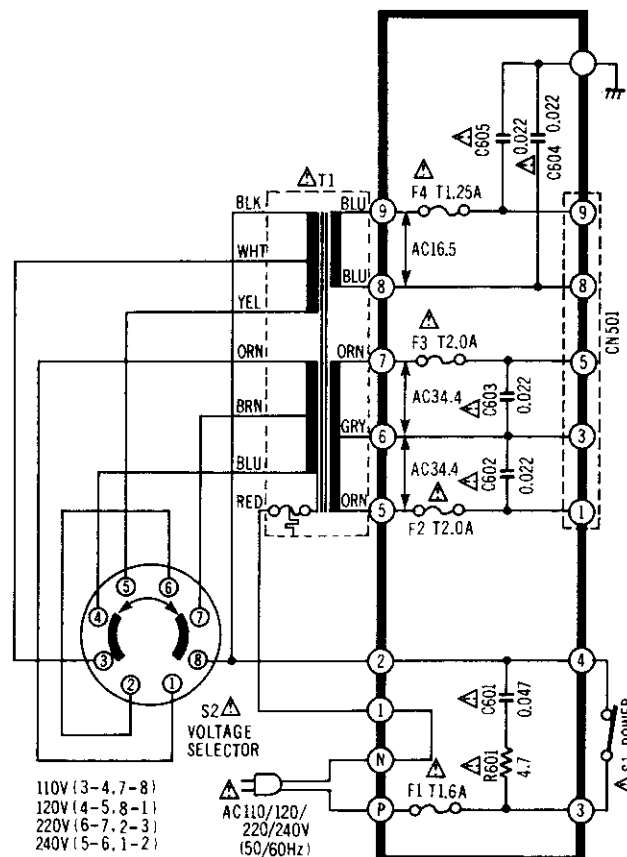
- S301** : Speed selector (33rpm) switch.
- S302** : Speed selector (45rpm) switch.
- S303** : Speed selector (78rpm) switch.
- S304** : Start/stop switch.
- S305** : Pitch control (+) switch.
- S306** : Pitch control (-) switch.
- S307** : Clear switch.
- S308** : Pitch lock switch.
- The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
- Positive voltage lines.

- Power fuse
- Ground (Earth) lines
- Power supply circuit



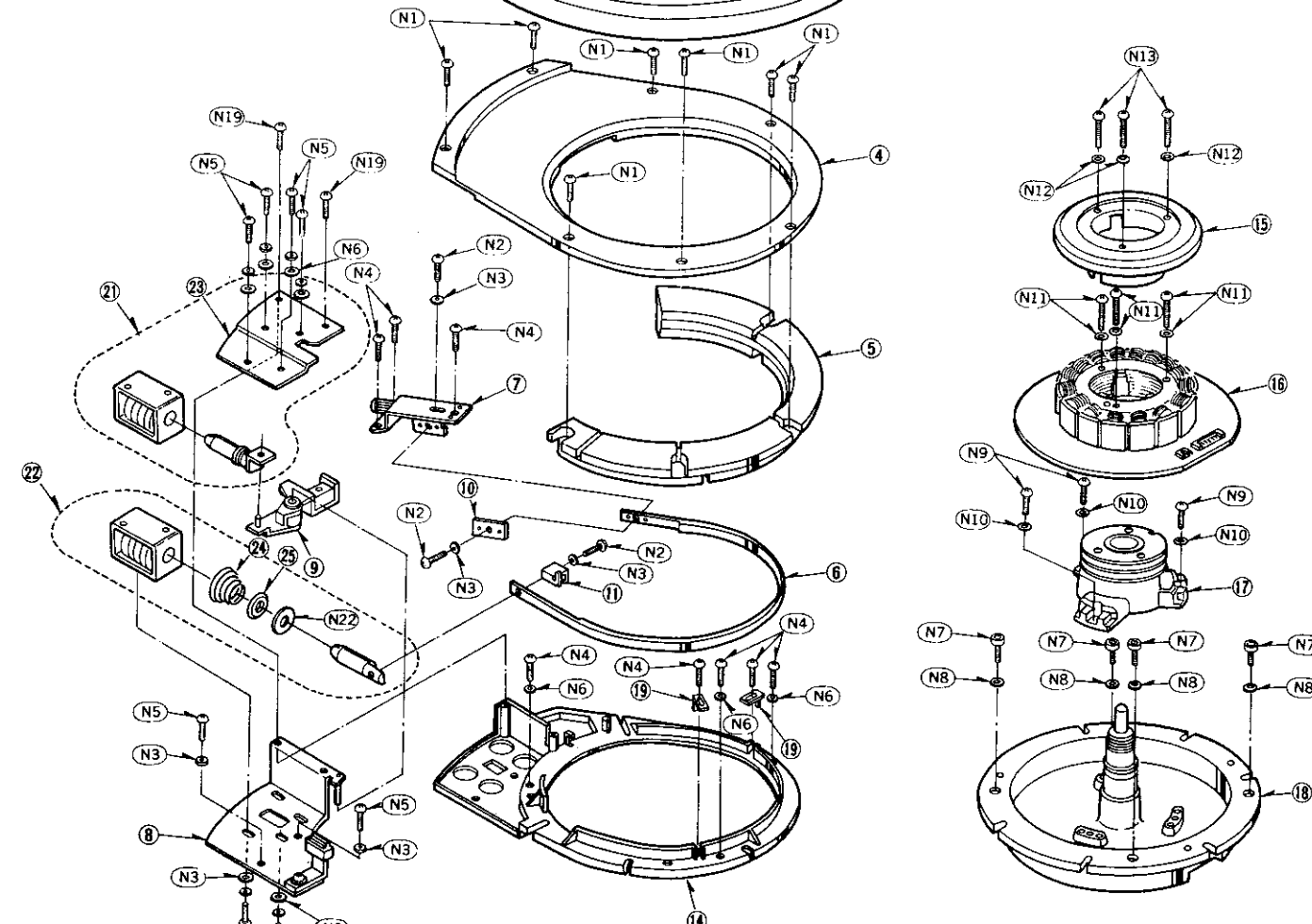
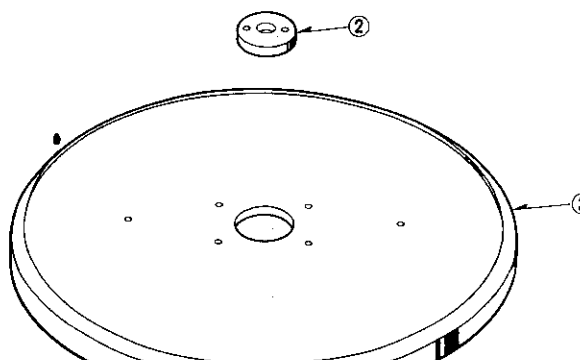
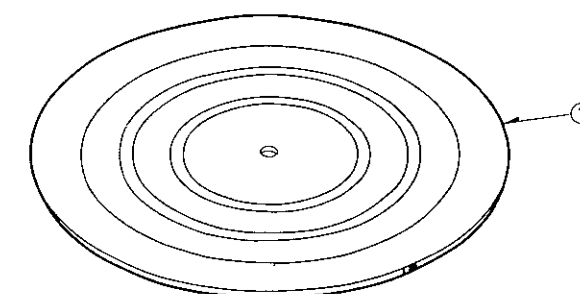
Note:

1. S1 : Power switch in "on" position.
2. S2 : Voltage selector switch in "110V" position.
3. Important safety notice:
Components identified by Δ make have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.



■ EXPLODED VIEWS

- Turntable platter and motor

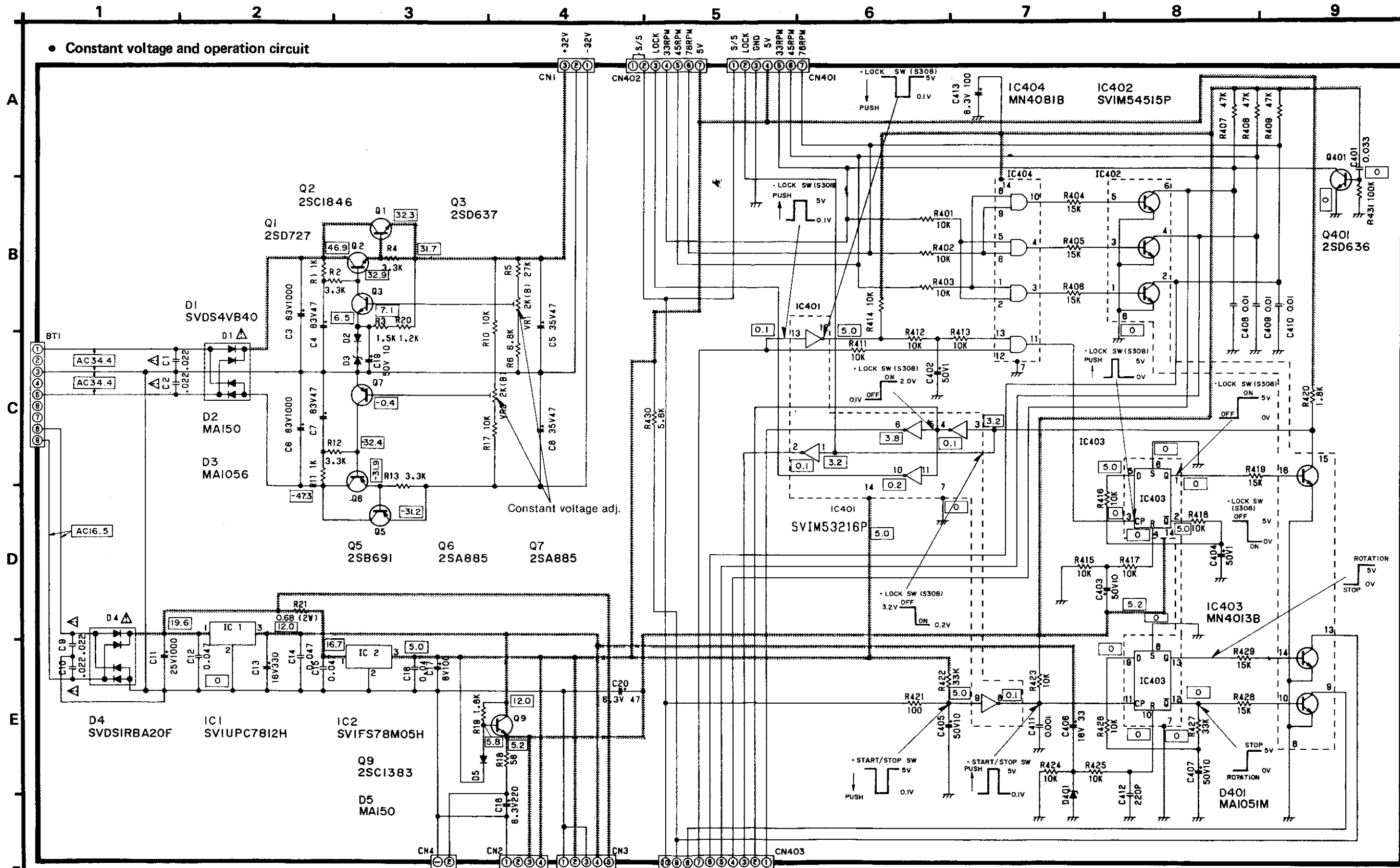


■ REPLACEMENT PARTS LIST...Electric Parts

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

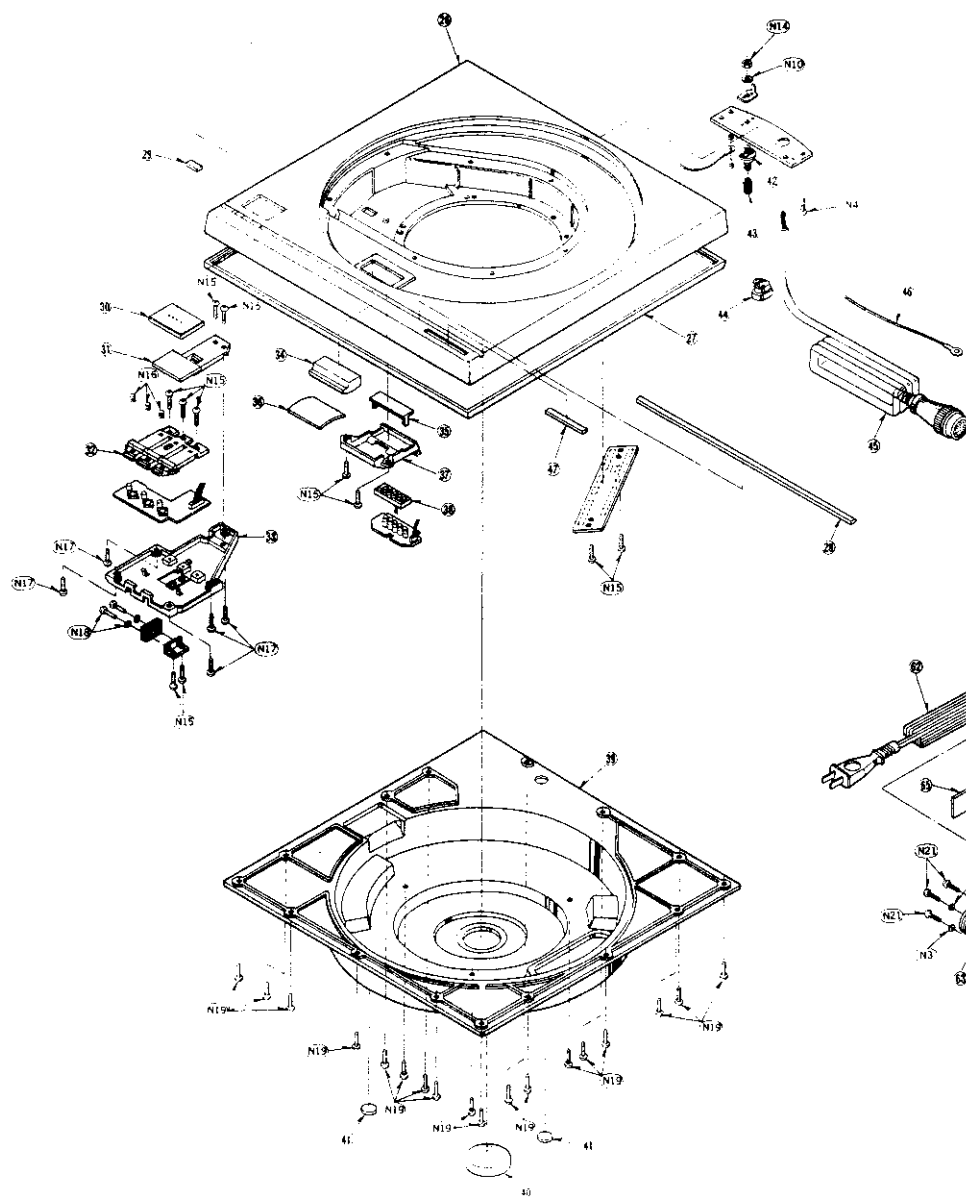
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
INTEGRATED CIRCUITS			DIODES			VARIABLE RESISTORS		
IC1, 105	SVIUPC7812H	Regulator	Q113	2SD636	Voltage Shift	D501, 502	SVDRM1Z	Switching
IC2, 106	SVIFS78M05H	Regulator	Q114	2SB641	Voltage Shift	D503 ~ 505	SVDEBR3402S	Speed Indicator
IC101	AN640G	Turntable Drive	Q115 ~ 117	2SD636	Runaway Prevent	D506 ~ 510	SVDEAA5505S	Strobe Indicator
IC102	SVIM54516P	Inverter	Q118	2SB641	Runaway Prevent	D511 ~ 515	SVDEPY5505S	Strobe Indicator
IC103, 104, 107	AN6562	Operation Amp.	Q119	2SD636	Runaway Prevent	SWITCHES		
IC201, 202	DN860	Control	Q201	2SC1047-D	Buffer	S1	Δ ESB90619S	Power
IC203	AN660	Control	Q202, 204	2SD636	Strobe Drive	S2	Δ ESE37200	Voltage Selector
IC204	AN6552F	FG Amplifier	Q203, 205	2SD636	Strobe Drive	S301 ~ 303	Δ EVQJQR02K	Speed Selector
IC205	SVIM53217P	Relay Drive	Q206 ~ 208	2SD636	Switching	S304	SFDS501	Start/Stop
IC206	SVITA78L009	Regulator	Q251, 252	2SD636	Brake Timer	S305 ~ 308	EVQJQR02K	(Control Unit)
IC301	MN6042	Synthesizer/Pitch Control	Q253, 254	2SD638	Solenoid Drive	S501 ~ 503	EVQJQR02K	Pitch Control
IC302	AN6914	Strobe Drive	Q255	Δ 2SC1383Q	Solenoid Drive	S504	SFDS501	Speed Selector
IC303	SVIM53217P	Speed Selector	Q260	2SC1846	Regulator			(Turntable Unit)
IC401	SVIM53216P	Inverter	Q301	2SC1047-D	Buffer	TRANSISTORS		
IC402	SVIM54515P	Inverter	Q302 ~ 304	2SD643	Pitch Indicator Drive	Q1	2SD727	Regulator
IC403	MN4013B	D-Type Flip-Flop	Q305, 401	2SD636	Switching	Q2	2SC1846	Regulator
IC404	MN4081B	2-Input AND Gate	Q501 ~ 503	2SD636	Speed Indicator Drive	Q3	2SD637	Regulator
						Q5	2SB691	Regulator
						Q6	2SA885	Regulator
						Q7	2SA886	Regulator
						Q9	Δ 2SC1383Q	Regulator
						Q101 ~ 103	2SB761A	Driver
						Q104 ~ 106	2SD856A	Driver
						Q107 ~ 109	2SC1846	Buffer
						Q110 ~ 112	2SA885	Buffer

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

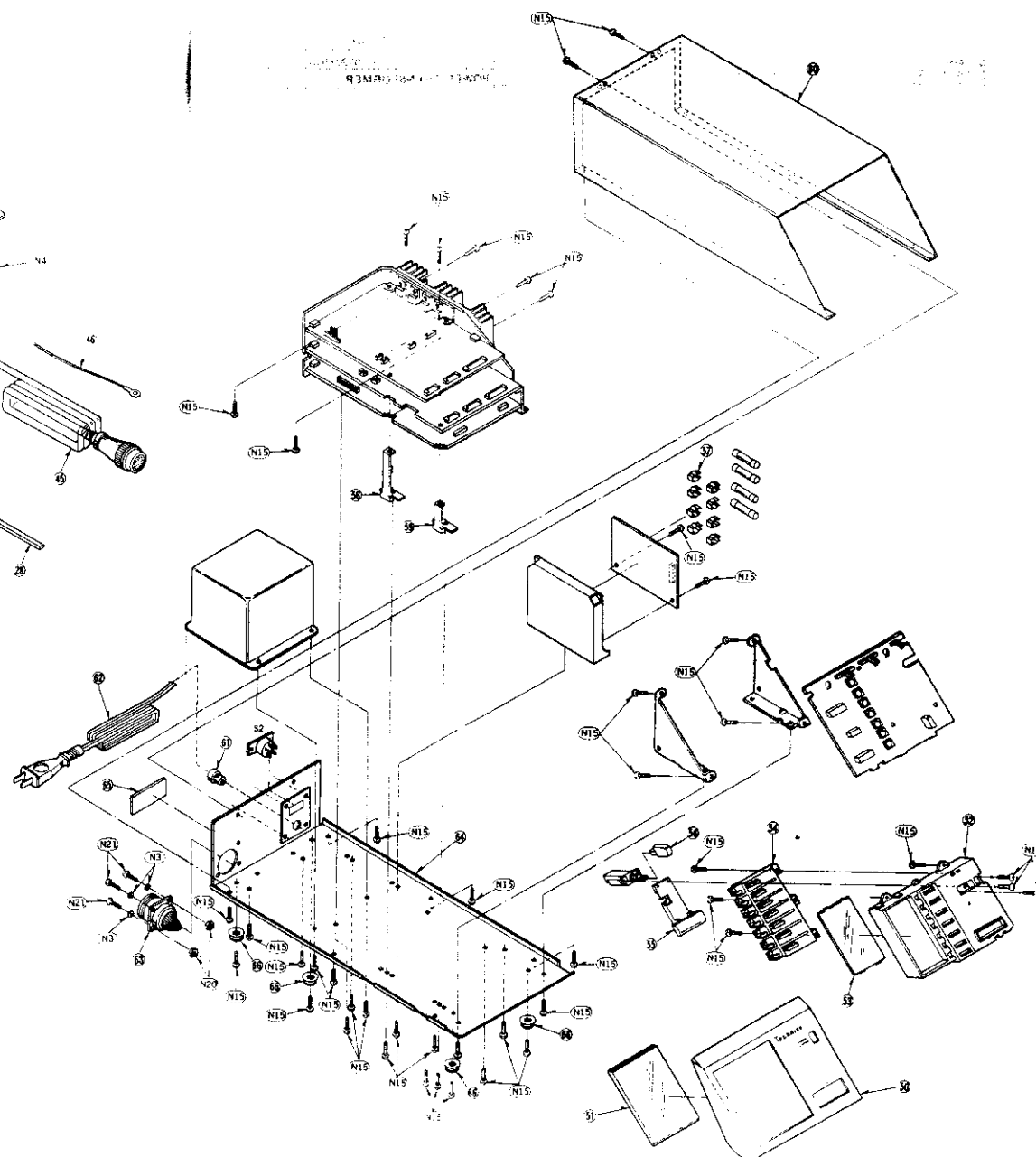


- Notes:**
1. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
* Those in () are voltage in stop.
* Those in [] are voltage in rotation.
 2. positive voltage lines.
 3. Important safety notice:
Components identifier by Δ make have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

• Cabinet



• Control unit



Continued from page 35

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
FUSES			CRYSTAL			VARIABLE CAPACITOR		
1	Δ 1BA2C18T90	T 1.8A	1	Δ 306811	10.125 MHz	1	ECV12920A55N	
2	Δ 1BA2C12TR0	T 1.25A	RELAY			POWER TRANSFORMER		
3, 4	Δ 1BA2C20TR0	T 2.0A	RL201 ~ 203	SFDYC10-01		TT	Δ 1SLT85HE14E	Power Source
COMPONENT COMBINATION			THYRISTOR					
R320	EXBRB7121M	120Ω x 7	SCR101	SVTTT201-110				

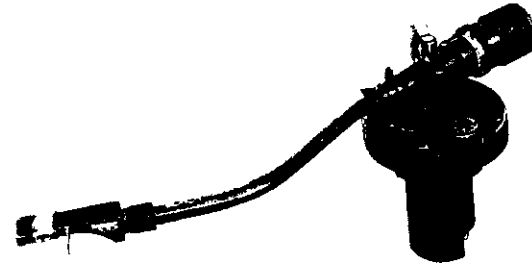
■ REPLACEMENT PARTS LIST... Cabinet and Chassis Parts

- Notes:**
- Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 - 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.
 - Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
 - The "S" mark's service standard parts and may differ from combination parts.
 - The parentheses and numbers in the columns of description stand for the quantity (unit).

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
CABINET and CHASSIS PARTS					
• Turntable and Motor Section					
1	SPFM109N01	Turntable Assy	61	SKL1281	Foot, Ser
2	SPFM109N02	Turntable Motor	SCREWS, WASHERS AND NUTS		
3	SPFM109N03	Turntable Bracket	N1	S XTN3+10BFZ	Screw, 3 x 10
4	SPFM109N04	Turntable Pin	N2	S XSN3+6S	Screw, 3 x 6
5	SPFM109N05	Turntable Pin	N3	S XWA3B	Washer, 3
6	SPFM109N06	Turntable Pin	N4	S XTV3+8BPN	Screw, 3 x 8
7	SPFM109N07	Turntable Pin	N5	S XSN3+5S	Screw, 3 x 5
8	SPFM109N08	Turntable Pin	N6	S XWF3	Washer, 3
9	SPFM109N09	Turntable Pin	N7	S XVE4A12FN	Screw, 4 x 12
10	SPFM109N10	Turntable Pin	N8	S XWA4B	Washer, 4
11	SPFM109N11	Turntable Pin	N9	S XSN4+10S	Screw, 4 x 10
12	SPFM109N12	Turntable Pin	N10	S XWA4B	Washer, 4
13	SPFM109N13	Turntable Pin	N11	S XNS+40S	Screw, 4 x 40
14	SPFM109N14	Turntable Pin	N12	SFX0109N01	Washer, 3
15	SPFM109N15	Turntable Pin	N13	SXSB3+35FZS	Screw, 3 x 35
16	SPFM109N16	Turntable Pin	N14	S XNG4E5	Nut, 4
17	SPFM109N17	Turntable Pin	N15	S XTV3+8BPN	Screw, 3 x 8
18	SPFM109N18	Turntable Pin	N16	S XVE2B05FP	Screw
19	SPFM109N19	Turntable Pin	N17	S XTN3+8BPN	Screw, 3 x 8
20	SPFM109N20	Turntable Pin	N18	S XNG23+K10	Screw, 4 x 10
21	SPFM109N21	Turntable Pin	N19	S XNS+101FZ	Screw, 3 x 10
22	SPFM109N22	Turntable Pin	N20	S XNG23	Nut, 3
23	SPFM109N23	Turntable Pin	N21	S XNS+40S	Screw, 4 x 40
24	SPFM109N24	Turntable Pin			
25	SPFM109N25	Turntable Pin			
26	SPFM109N26	Turntable Pin			
27	SPFM109N27	Turntable Pin			
28	SPFM109N28	Turntable Pin			
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94	SPFM109N94	Turntable Pin			
95	SPFM109N95	Turntable Pin			
96	SPFM109N96	Turntable Pin			
97	SPFM109N97	Turntable Pin			
98	SPFM109N98	Turntable Pin			
99	SPFM109N99	Turntable Pin			
100	SPFM109N100	Turntable Pin			

Service Manual

Universal Tonearm
EPA-100MK2



English

Specifications

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

Type :	Universal Tonearm with Variable Dynamic Damping system
Bearings :	Gimbal suspension type with 20 precision ground ruby ball bearings
Tubular tonearm :	Boron titanium
Effective length :	250 mm
Overall range :	322 ~ 350 mm
Arm rear range :	66.5 ~ 94.5 mm
Height adjustment range :	44 ~ 64 mm from base installation surface to center of tube (hellicord part: 20 mm)
Overhang :	15 mm
Offset angle :	21°
Horizontal tracking error angle :	+1°6' (internal parameter of 30 cm record) +2°6' (external parameter of 30 cm record)
Friction :	5 mg (horizontally and vertically)
Effective mass :	22 g (at 6.5 g cartridge weight, 1.25 g stylus pressure)
Resonance frequency :	9.8 Hz (at 6.5 g cartridge weight, 1.25 stylus pressure 12×10^{-6} cm/dyne compliance)

Resonance acute angle (Q): 6 dB or less (at optimum adjustment)

Damping adjustment range :

Damping selector calibrations	Cartridge compliance (100 Hz dynamic) *
4 ~ 5	more than 15×10^{-6} cm/dyne
2 ~ 4	$10 \sim 15 \times 10^{-6}$ cm/dyne
1 ~ 2	$5 \sim 10 \times 10^{-6}$ cm/dyne

Stylus pressure adjustment range :

Headshell weight :	9.5 g (boron-aluminum)
Cartridge mounting dimensions :	12.7 mm (1/2 inch) mounting space
Headshell terminal lug :	1.2φ, for 4φ terminal
Cartridge weight range :	5 ~ 10 g
Arm installation opening :	62 mmφ
DC resistance of PU output cords :	39 mΩ/m
Capacity of PU output cords :	41 pF/m

Technics

TECHNISCHE DATEN

Die angegebenen Gewichts- und Abmessungsdaten sind ungefähre Werte.

Typ:	Universal-Tonarm mit "Variable Dynamic Damping System"	Splitter:	Resonanzwinkel (Q):	6 dB oder weniger (bei optimaler Einstellung)																
Lager:	Kardanische Aufhängung mit 20 präzisionsgeschliffenen Rubin-Kugellagern.	Dämpfungs-Einstellbereich	<table> <tr> <th>Dämpfungswähler-Skalawert</th><th>Tonabnehmer-Nachgiebigkeit (100 Hz-Dynamik)</th></tr> <tr> <td>4 ~ 5</td><td>mehr als 15×10^{-10} cm/dyn</td></tr> <tr> <td>2 ~ 4</td><td>$10 \sim 15 \times 10^{-10}$ cm/dyn</td></tr> <tr> <td>1 ~ 2</td><td>$5 \sim 10 \times 10^{-10}$ cm/dyn</td></tr> </table>		Dämpfungswähler-Skalawert	Tonabnehmer-Nachgiebigkeit (100 Hz-Dynamik)	4 ~ 5	mehr als 15×10^{-10} cm/dyn	2 ~ 4	$10 \sim 15 \times 10^{-10}$ cm/dyn	1 ~ 2	$5 \sim 10 \times 10^{-10}$ cm/dyn								
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Effektive Länge:	350 mm																			
Gesamtbereich:	322 ~ 350 mm																			
Armrückendbereich:	36.5 ~ 34.5 mm																			
Höheneinstellbereich:	14 ~ 64 mm																			
	1 mm der Zirkelmontage-Oberseite der Tonarmrohre																			
	2 mm der Tonarmrohre																			
Überhang:	16 mm																			
Kropfwinkel:	21°																			
horizontaler																				
Spurfehlwinkel:	$\pm 15^\circ$ (horizontaler Fehler 20° im Gesamtwinkel) $\pm 25^\circ$ (vertikaler Fehler 30° im Gesamtwinkel)																			
Mechanischer Widerstand:	5 mg (horizontal und vertikal)																			
Effektive Masse:	22 g (bei 6.5 g Tonabnehmergewicht, 1,25 g Auflagekraft)																			
Resonanzfrequenz:	9.8 hz (bei 6.5 g Tonabnehmergewicht, 1,25 g Auflagekraft), 12×10^{-10} cm/dyn Nachgiebigkeit																			

Spécifications

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

Type:	Bras de lecture universel avec système d'amortissement dynamique réglable.	Angle aigu de résonance (Q):	6 dB ou moins (à un réglage optimum)								
Coussinets:	Type de suspension à la cardan avec 20 coussinets à billes à rubis taillés avec précision.	Plage de réglage de l'amortissement									
Bras de lecture tubulaire:	1. tôle de bore	<table> <tr> <th>Étalonnages du sélecteur d'amortissement</th><th>Elasticité acoustique de la cellule de lecture (à 100 Hz dynamique)</th></tr> <tr> <td>4 ~ 5</td><td>plus de 15×10^{-10} cm/dyn</td></tr> <tr> <td>2 ~ 4</td><td>$10 \sim 15 \times 10^{-10}$ cm/dyn</td></tr> <tr> <td>1 ~ 2</td><td>$5 \sim 10 \times 10^{-10}$ cm/dyn</td></tr> </table>		Étalonnages du sélecteur d'amortissement	Elasticité acoustique de la cellule de lecture (à 100 Hz dynamique)	4 ~ 5	plus de 15×10^{-10} cm/dyn	2 ~ 4	$10 \sim 15 \times 10^{-10}$ cm/dyn	1 ~ 2	$5 \sim 10 \times 10^{-10}$ cm/dyn
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4 ~ 5	plus de 15×10^{-10} cm/dyn										
2 ~ 4	$10 \sim 15 \times 10^{-10}$ cm/dyn										
1 ~ 2	$5 \sim 10 \times 10^{-10}$ cm/dyn										
Longueur effective:	210 mm										
Portée hors tout:	212 ~ 350 mm										
Portée de l'arrière du bras:	50,5 ~ 94,5 mm										
Portée de réglage de la hauteur:	44 ~ 64 mm										
	à partir de la surface d'installation du socle au centre du tube (partie hélicoïdale : 20 mm)										
Décentrage:	15 mm	Plage de réglage de la force d'appui:	0 ~ 2 g								
Angle de décalage:	21°	Poids de la coque porte-cellule:	9,5 g (bore + aluminium)								
Angle d'erreur de piste horizontal:	$\pm 1^{\circ}30'$ (paramètre interne d'un disque de 20 cm) $\pm 2^{\circ}30'$ (paramètre extérieur d'un disque de 30 cm)	Dimensions du montage de la cellule de lecture:	12,7 mm (1/2 pouce) espace de montage								
Friction:	5 mg (horizontalement et verticalement)	Pièce polaire de la coque porte-cellule:	Ø 1,2 pour une norme à broche tétrapolaire								
Masses réelles:	42 g (à un poids de cellule de lecture de 6,5 g), ex. à une force d'appui de la pointe de 1,25 g)	Plage du poids de la cellule de lecture:	5 ~ 10 g								
Fréquence de résonance:	9,3 Hz (à un poids de cellule de lecture de 6,5 g, ex. à une force d'appui de la tête de 1,25 g), élasticité acoustique de 11×10^{-10} cm/dyn	Orifice d'installation du bras:	Ø 62 mm								
		Résistance C.C. des câbles de sortie pick-up:	39 mΩ/m								
		Capacité des câbles de sortie pick-up:	11 pF/m								

! Especificaciones

Stress and the Immune System

Tipo:	Brazo sonoro universal con sistema de amortiguamiento dinámico variable.	Angulo de resonancia agudo (10):	5 dB o menos (en ajuste optimo)								
Cojinetes:	Suspensión cardánica con 20 cojinetes de bolas de rubies precisamente pulimentadas	Radio de ajuste de amortiguamiento	<table> <tr> <th>Calibraciones del selector de amortiguamiento</th><th>Rendimiento del cartucho (dinámico de 100 Hz)</th></tr> <tr> <td>4 ~ 5</td><td>más de 15×10^{-8} cm/din</td></tr> <tr> <td>2 ~ 3</td><td>$10 \sim 12 \times 10^{-8}$ cm/din</td></tr> <tr> <td>1 ~ 2</td><td>$5 \sim 10 \times 10^{-8}$ cm/din</td></tr> </table>	Calibraciones del selector de amortiguamiento	Rendimiento del cartucho (dinámico de 100 Hz)	4 ~ 5	más de 15×10^{-8} cm/din	2 ~ 3	$10 \sim 12 \times 10^{-8}$ cm/din	1 ~ 2	$5 \sim 10 \times 10^{-8}$ cm/din
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4 ~ 5	más de 15×10^{-8} cm/din										
2 ~ 3	$10 \sim 12 \times 10^{-8}$ cm/din										
1 ~ 2	$5 \sim 10 \times 10^{-8}$ cm/din										
Brazo sonoro tubular:	Brazo sonoro tubular de titanio de alta resistencia con acabado nitrificado especial										
Longitud efectiva:	250 mm.										
Alcance total:	322 a 350 mm.										
Alcance posterior del brazo:	14 a 54 mm. Perfora la superficie de instalación del cable al centro del tubo (entre pernos) de 10 mm.										
Parte saliente:	10 mm.	Radio de ajuste de la presión de la aguja:	1 a 2 g.								
Angulo de descentramiento:	1°	Peso de la capsula de la cabeza:	3 g. ± 0.4 g. (aproximado)								
Angulo de error de seguimiento horizontal:	+0.5° (descentramiento) de un tubo de 50 mm. +0.5° (descentramiento) de un diámetro de 20 mm.	Dimensiones de montaje del cartucho:	Espesor de montaje de 12.7 mm. 1.27 cm. (5/16")								
Fricción:	5 milin. (en sentido horizontal y vertical)	Lengüeta del terminal de la capsula de la cabeza:	Terminal para 4 puntillas de 1.29 mm.								
Masa efectiva:	22 g. (con el peso del cartucho en 6.5 g., presión de agua en 1.25 g.)	Radio de peso del cartucho:	Entre 6 x 10 g.								
Frecuencia de resonancia:	3.8 Hz (con peso de cartucho en 6.5 g., presión de agua en 1.25 g., rendimiento de régimen de 12×10^{-6} cm/din)	Agujero para la instalación del brazo:	62 mm Ø								
		Resistencia de C.C. de los cables de salida PU:	39 mil. ohm								
		Capacidad de los cables de salida PU:	11 pF/ohm								

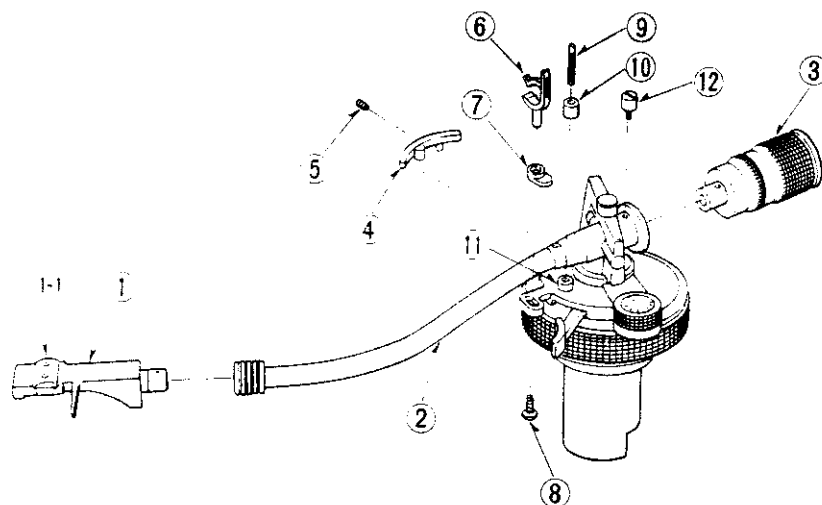
■ REPLACEMENT PARTS LIST

Notes: 1. Part Numbers are indicated on most mechanical parts. Please use this parts number for parts order.
2. The "S" mark is service standard parts and may differ from production parts.
3. The parenthesized numbers in the column of description stand for the quantity are set.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	SFP201M201E	Weighted			ACCESSORIES			
2	SFP201M201E	W/In. Gun	1	SFP201M201E	Weighted	1	SFP201M201E	Weighted
3	SFP201M201E	Gun	2	SFP201M201E	Weighted	2	SFP201M201E	Weighted
4	SFP201M201E	Gun	3	SFP201M201E	Weighted	3	SFP201M201E	Weighted
5	SFP201M201E	Gun	4	SFP201M201E	Weighted	4	SFP201M201E	Weighted
6	SFP201M201E	Gun	5	SFP201M201E	Weighted	5	SFP201M201E	Weighted
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114	SFP201M201E	Gun	113	SFP201M201E	Weighted	113	SFP201M201E	Weighted
115	SFP201M201E	Gun	114	SFP201M201E	Weighted	114	SFP201M201E	Weighted
116	SFP201M201E	Gun	115	SFP201M201E	Weighted	115	SFP201M201E	Weighted
117	SFP201M201E	Gun	116	SFP201M201E	Weighted	116	SFP201M201E	Weighted
118	SFP201M201E	Gun	117	SFP201M201E	Weighted	117	SFP201M201E	Weighted
119	SFP201M201E	Gun	118	SFP201M201E	Weighted	118	SFP201M201E	Weighted
120	SFP201M201E	Gun	119	SFP201M201E	Weighted	119	SFP201M201E	Weighted
121	SFP201M201E	Gun	120	SFP201M201E	Weighted	120	SFP201M201E	Weighted
122	SFP201M201E	Gun	121	SFP201M201E	Weighted	121	SFP201M201E	Weighted
123	SFP201M201E	Gun	122	SFP201M201E	Weighted	122	SFP201M201E	Weighted
124	SFP201M201E	Gun	123	SFP201M201E	Weighted	123	SFP201M201E	Weighted
125	SFP201M201E	Gun	124	SFP201M201E	Weighted	124	SFP201M201E	Weighted
126	SFP201M201E	Gun	125	SFP201M201E	Weighted	125	SFP201M201E	Weighted
127	SFP201M201E	Gun	126	SFP201M201E	Weighted	126	SFP201M201E	Weighted
128	SFP201M201E	Gun	127	SFP201M201E	Weighted	127	SFP201M201E	Weighted
129	SFP201M201E	Gun	128	SFP201M201E	Weighted	128	SFP201M201E	Weighted
130	SFP201M201E	Gun	129	SFP201M201E	Weighted	129	SFP201M201E	Weighted
131	SFP201M201E	Gun	130	SFP201M201E	Weighted	130	SFP201M201E	Weighted
132	SFP201M201E	Gun	131	SFP201M201E	Weighted	131	SFP201M201E	Weighted
133	SFP201M201E	Gun	132	SFP201M201E	Weighted	132	SFP201M201E	Weighted
134	SFP201M201E	Gun	133	SFP201M201E	Weighted	133	SFP201M201E	Weighted
135	SFP201M201E	Gun	134	SFP201M201E	Weighted	134	SFP201M201E	Weighted
136	SFP201M201E	Gun	135	SFP201M201E	Weighted	135	SFP201M201E	Weighted
137	SFP201M201E	Gun	136	SFP201M201E	Weighted	136	SFP201M201E	Weighted
138	SFP201M201E	Gun	137	SFP201M201E	Weighted	137	SFP201M201E	Weighted
139	SFP201M201E	Gun	138	SFP201M201E	Weighted	138	SFP201M201E	Weighted
140	SFP201M201E	Gun	139	SFP201M201E	Weighted	139	SFP201M201E	Weighted
141	SFP201M201E	Gun	140	SFP201M201E	Weighted	140		

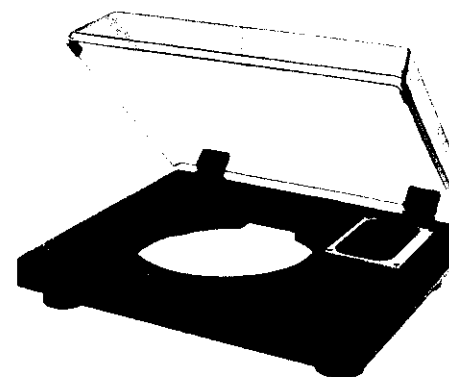
EPA-100MK2

EXPLODED VIEW



Service Manual

Turntable Base/Dust Cover
SH-10B5



Specifications

External dimensions (W x H x D): 56.1 x 17.5 x 46.3 cm
(Maximum height when the dust cover is open 48 cm)
Weight: 19 kg
(Including dust cover, Except for arm panel)
Specifications subject to change without notice.
Weight and dimensions shown are approximate.

TECHNISCHE DATEN

Äußere Abmessungen (B x H x T): 56.1 x 17.5 x 46.3 cm
(Maximale Höhe bei vollständig geöffneter Staubabdeckung 48 cm)
Gewicht: 19 kg
(Einschließlich Staubabdeckung, ohne Tonarmplatte.)
Änderungen der technischen Daten vorbehalten.
Die angegebenen Gewichts- und Abmessungsdaten sind ungefähre Werte.

Spécifications

Dimensions externes (L x H x P): 56.1 x 17.5 x 46.3 cm
(Hauteur maximum lorsque le dessus (couvercle) protégé-pousière est ouvert 48 cm)
Poids: 19 kg
(Couvercle anti-poussières compris, Excepté pour la plaque tonar)

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

Especificaciones técnicas

Dimensiones externas: 56.1 x 17.5 x 46.3 cm
(Ancho x alto x profundo) (Altura máxima cuando la parte de arriba (cabe contra el polvo) está abierta 48 cm)
Peso: 19 kg
(Incluyendo la tapa contra el polvo. Excepto para el panel del brazo.)
Las especificaciones pueden cambiar sin previo aviso.
Los pesos y las dimensiones indicados son aproximados.

Technics

REPLACEMENT PARTS LIST

- Notes: 1. Part numbers are indicated on most mechanical parts. Please refer this part number or parts list for.
2. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
3. The "S" mark is service standard parts and may differ from production parts.
4. The parenthesized numbers in the column of description stand for the quantity pre-set.

Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
CABINET PARTS					
1	SFA0103-01	Dust Cover (1)	8	SFGA106N01A	Insulator/Leg (4)
2	SFUP103-02	Hinge (Dust Cover Side)	SCREWS and WASHERS		
3	3PUP193-10	Bracket, Hinge (Dust Cover Side)	N1 S	END-10BVS	Screw, 4.4 x 10 (4)
4	3PQ2106N03	Rubber Gasket	N2 S	2PUP128	Screw, 4.4 x 10 (2)
	SFA0106N01P	Padlock	N3 S	2PUP8	Bracket, BS (2)
	SFA0106N01A	Lock, Cabinet Side	N4	W25-26-10-11	Screw, 26mm (2)
	3PUP103V1	Bracket, Hinge (Dust Cover Side)			

EXPLODED VIEW

