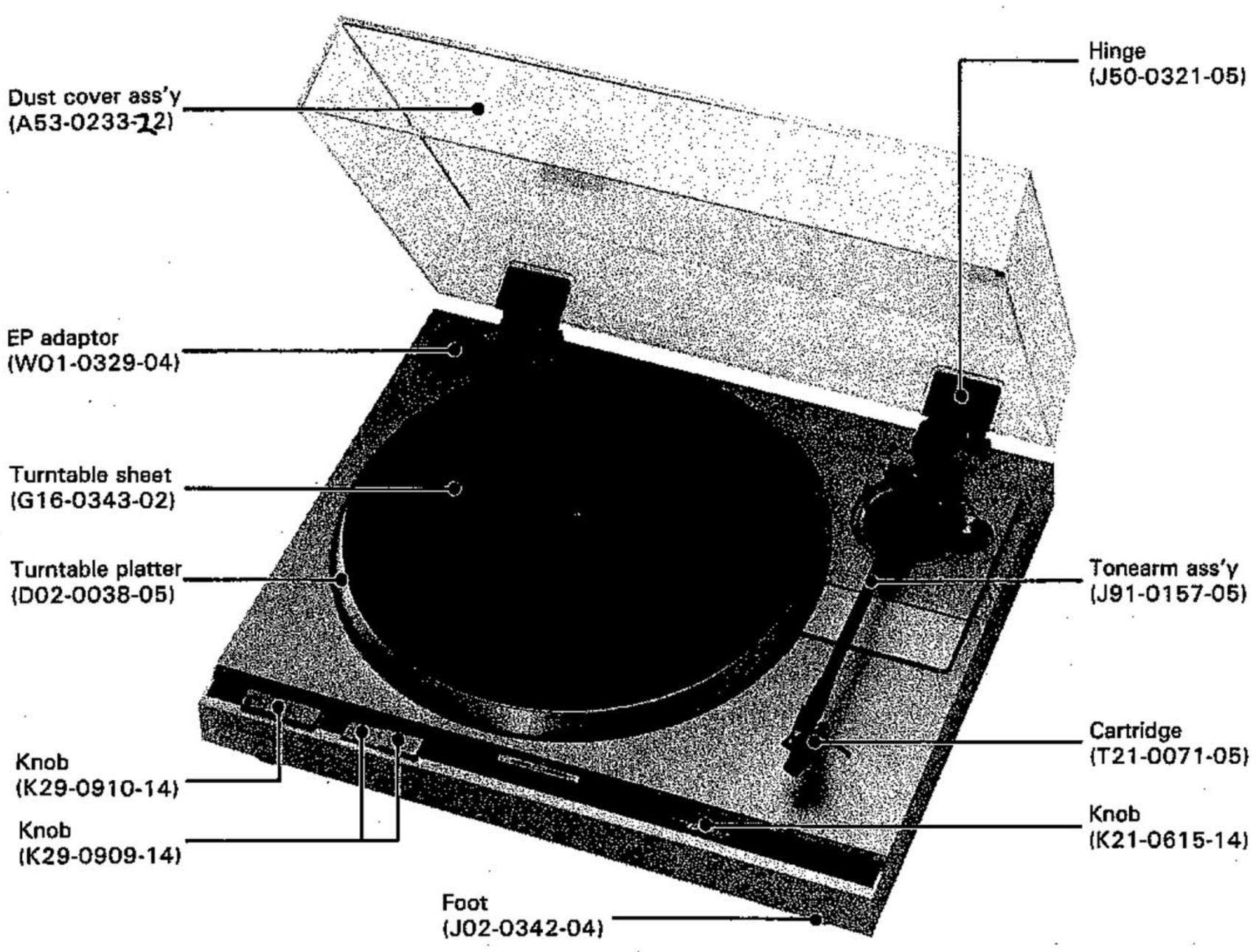
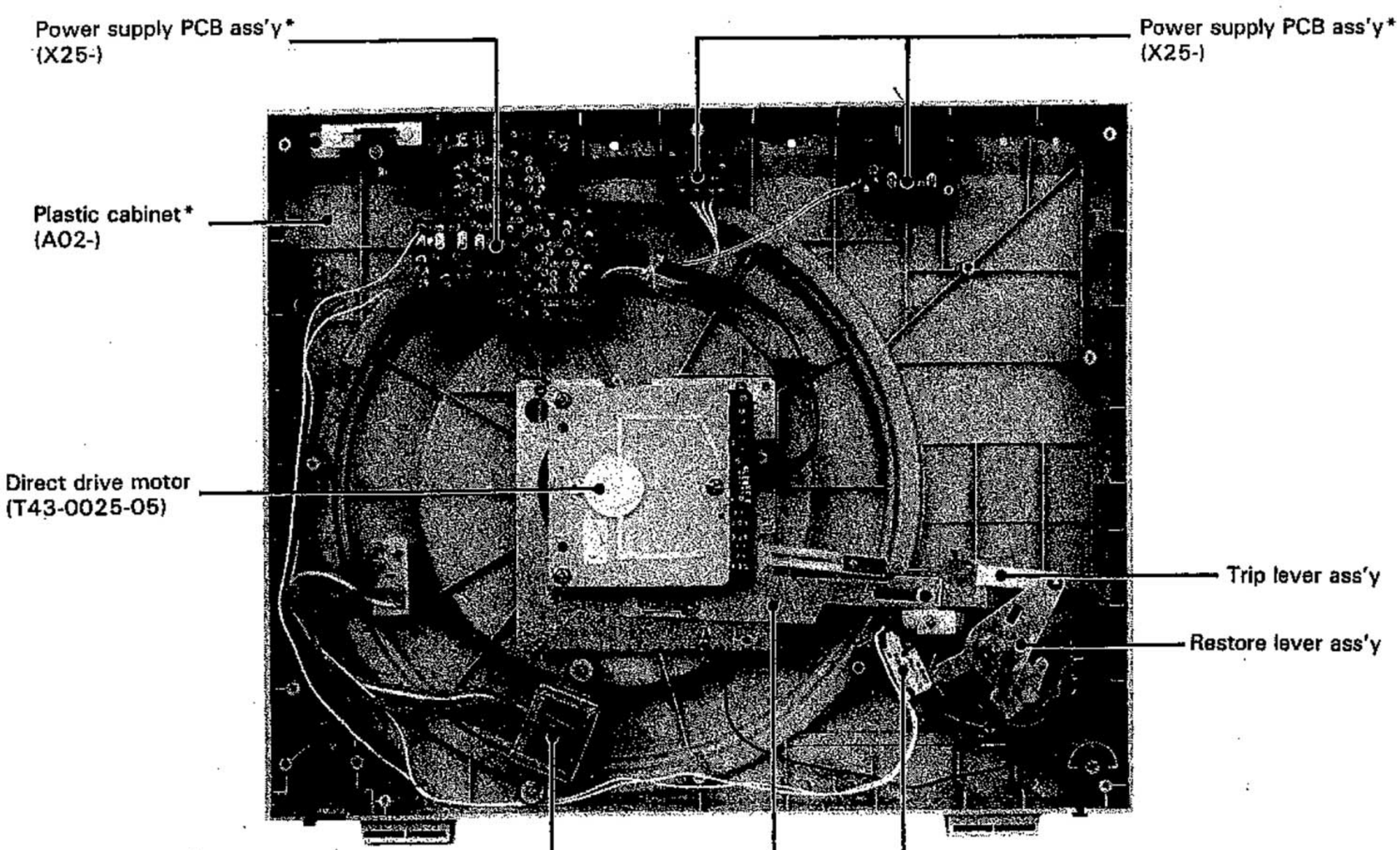
SERVICE MANUAL

KENWOOD®

KD-40R

DIRECT DRIVE AUTOMATIC RETURN TURNTABLE

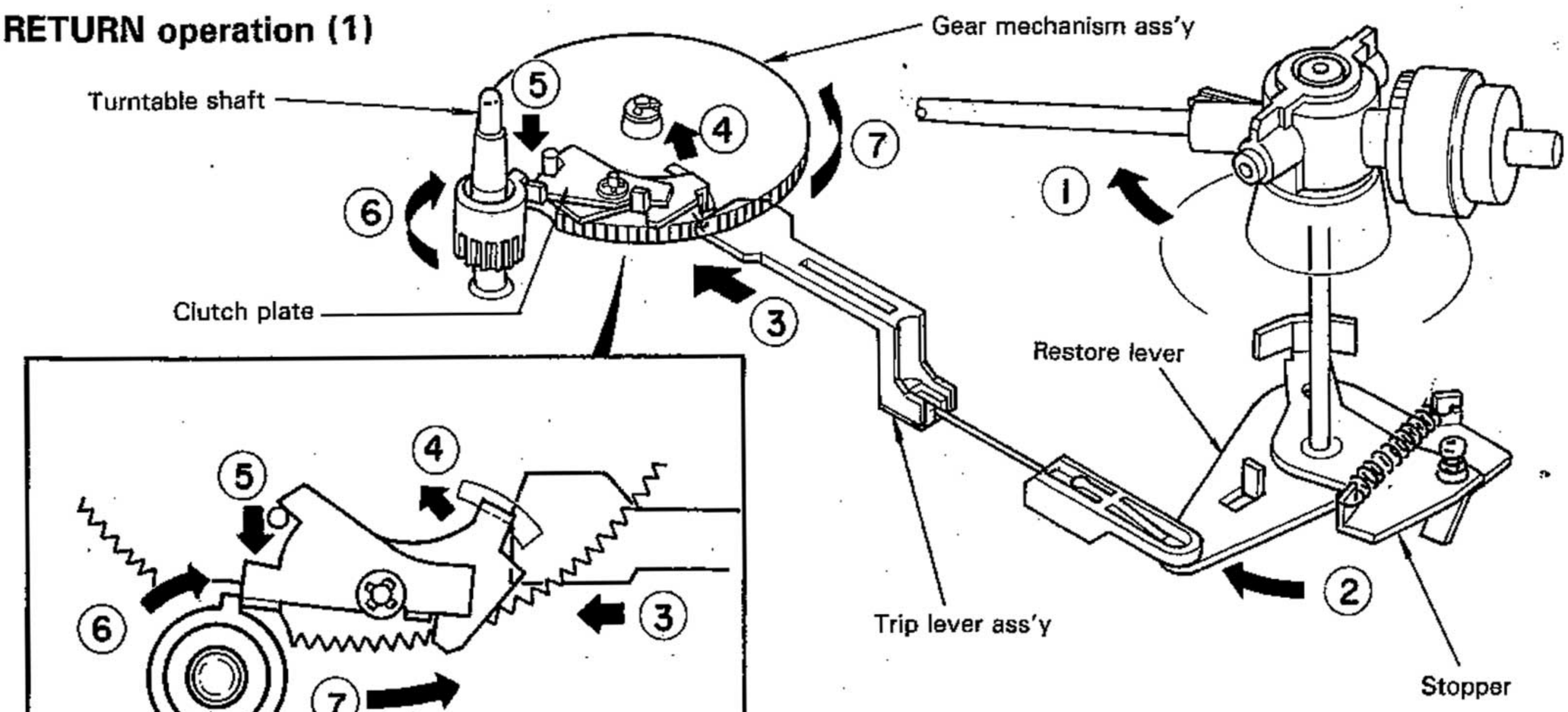




*Refer to Parts List (P8)

MECHANISM OPERATION

1. AUTO RETURN operation (1)



<AUTO RETURN operation (1)>

①~③ : The trip lever assembly moves in the direction indicated by arrow ③ as the tonearm traces the groove on the disk.

④ : When the tonearm reaches the end groove, the trip lever assembly pushes the lower projection of the clutch plate.

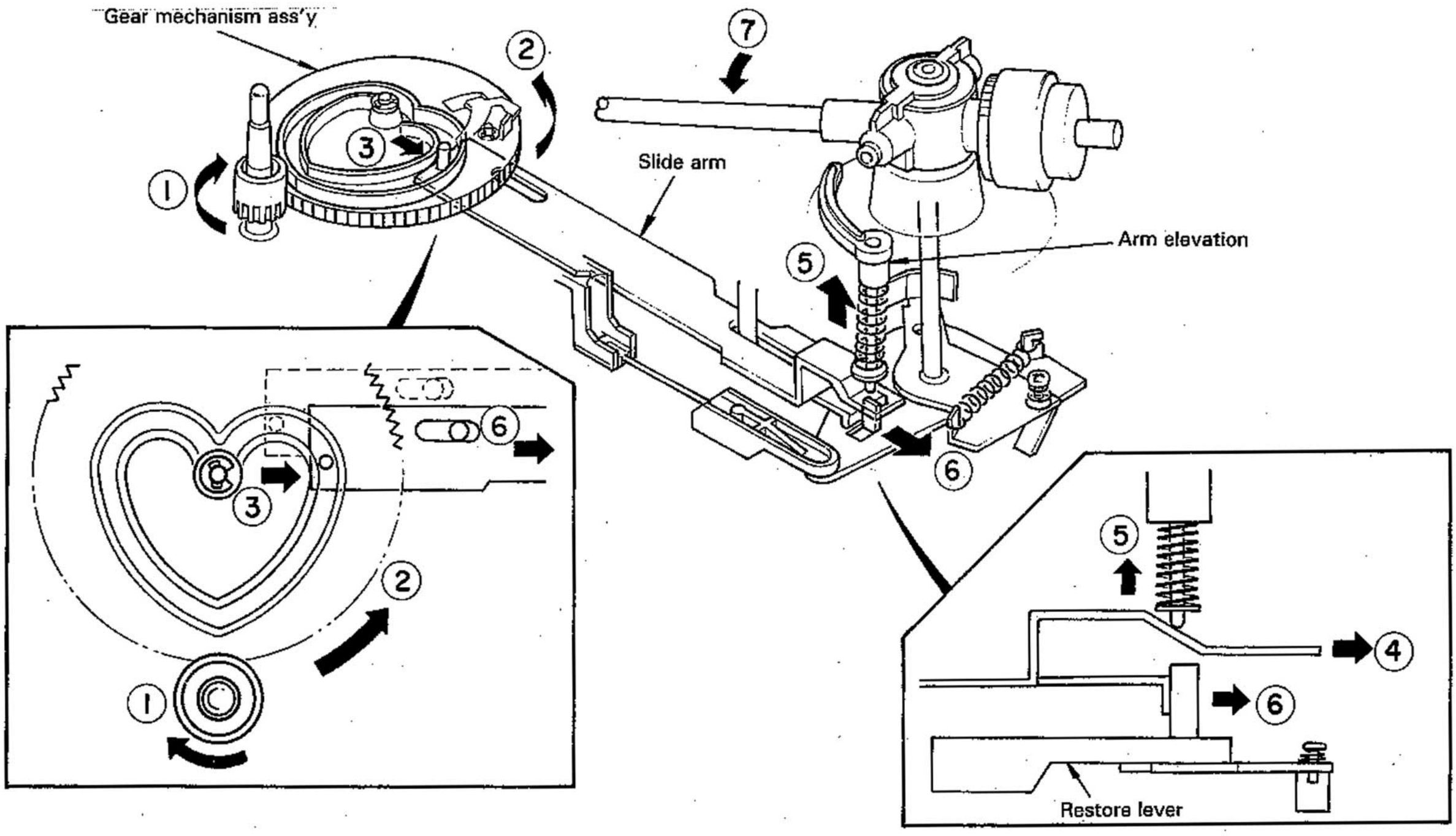
⑤~⑦ : The upper projection of the clutch plate is pushed by the projection on the turntable shaft gear. The gear mechanism assembly is turned in the direction of arrow ⑦

2. AUTO RETURN operation (2)

①~③ : As the gear mechanism assembly turns, the projection on the slide arm moves along the heart shaped groove.

④~⑥ : The slide arm moves in the direction of arrow ⑥ to push the arm elevator up and push the projection of the restore lever forward.

⑦ : The tonearm assembly moves in the direction of arrow ⑦ as the restore lever moves.



<AUTO RETURN operation (2)>

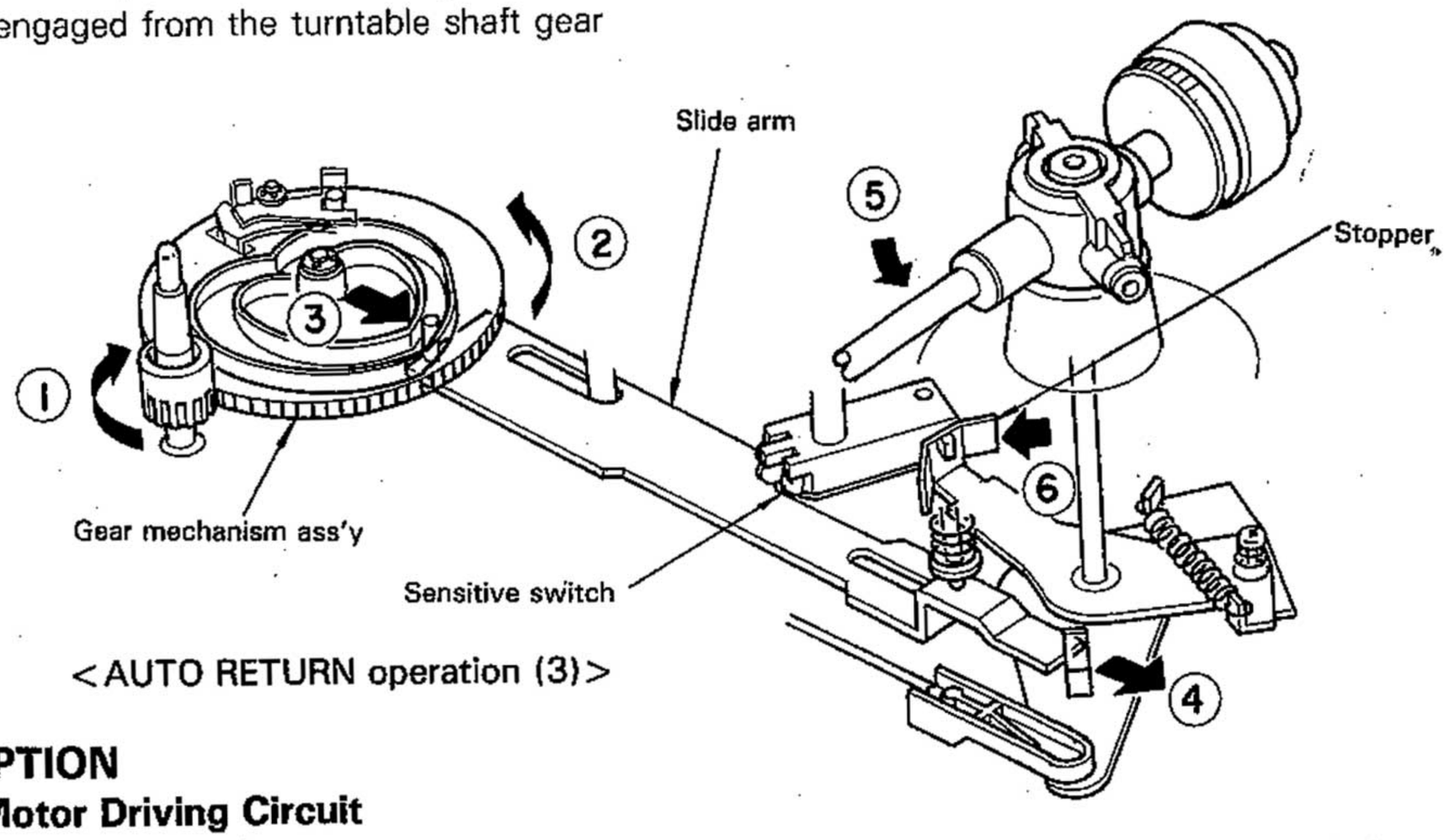
MECHANISM OPERATION/CIRCUIT DESCRIPTION

3. AUTO RETURN operation (3)

①~⑥ : When the projection on the slide arm reaches the position shown below, the tonearm assembly is returned to the arm rest and the sensitive switch is pressed to turn the power OFF. When the gear mechanism assembly returns to the original position, it is disengaged from the turntable shaft gear and stops.

4. CUT operation

The cut bar pushes the clutch plate so that the same operation as in AUTO RETURN is carried out.



<AUTO RETURN operation (3)>

CIRCUIT DESCRIPTION

DD (Direct Drive) Motor Driving Circuit

A brushless DC motor is used for the DD motor. Counter electromotive force generated across each stator coil is used to control motor speed.

1. Transistor operation

Q01 ~ Q03 : Forms the three-phase switching circuit which supplies power to stator coils S1 ~ S3.

Q04 ~ Q06 : Forms the rotor position detection circuit. The bases of Q04 ~ Q06 are connected to position detecting coils L1 ~ L3, respectively. The inductance of each coil is maximized when the S-pole of the rotor passes by the coil. The oscillator output signal (about 50 kHz) from Q07 is applied to the base of each transistor and the coil impedance is maximized when the coil inductance is greatest. Coil impedance is given by

$$Z = 2\pi fL$$

Z : impedance
f : oscillator frequency
L : inductance

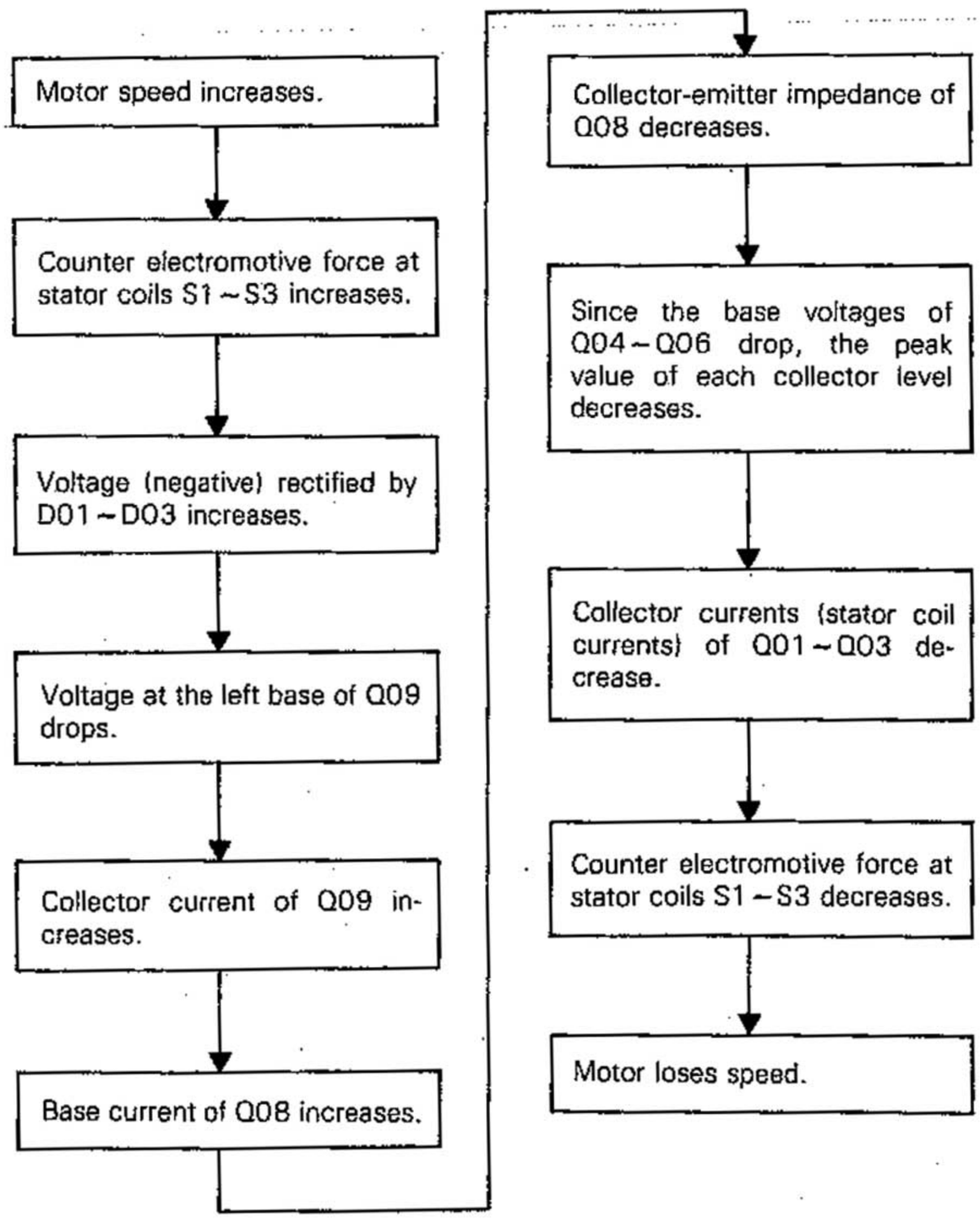
Therefore, the base voltage is maximized when the S-pole of the rotor passes by the coil. When the base voltage is more than the threshold, the transistor is ON. Although 50 kHz is applied to the base of each transistor, the collector level does not alternate at 50 kHz because of a capacitor connected to the collector. Thus, the collector level alternates according to the rotor movement. This collector level is applied to the base of switching transistors Q01 ~ Q03.

Q07 : 50 kHz colpitts oscillator

Q08 : Controls voltage applied to the bases of Q04 ~ Q06

Q09 : Error amplifier which detects the speed signal and controls the collector-emitter impedance of Q08

2. Speed control chart



CIRCUIT DESCRIPTION/ADJUSTMENT

3. Other

The reference voltage for detecting the motor speed is generated by zener diode ZD01. C12 and R26, and C13 and R16, form low pass filters, respectively, to smooth counter electromotive force. Q09 is a pair-transistor which has stable temperature characteristics. C15 and R15 form a feedback loop in the error amplifier circuit.

LED driving circuit (X25-1610-10)

(1) IC1

IC1 (RC-4558) is a window comparator. Relationship between the input and output levels is shown in Fig. 1.

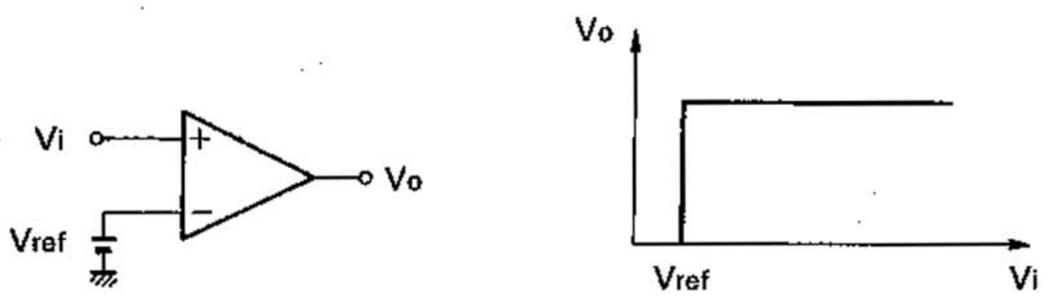


Fig. 1 Relationship between input and output levels

This operational amplifier has a very high amplification aspect. Therefore, the input-output characteristic curve shows a very sharp rise, as shown in Fig. 1. This means that a constant level appears at the output when the input level exceeds the reference voltage V_{ref} and no voltage appears when the input level is less than V_{ref}. Thus, this operational amplifier can be used to determine whether the input level is larger or smaller than V_{ref}.

In the KD-40R, two operational amplifiers with different reference voltages are used.

(2) Q2~Q5

Q2 through Q5 form a logic circuit. Two window comparator output signals are applied to it and its output drives the speed indicator LEDs.

The voltage from the power supply (V_{ref}) is applied to the inverting input terminal of one operational amplifier directly and to that of the other operational amplifier via R7. Therefore, the reference voltages are different. The voltage applied to the non-inverting terminals of both operational amplifier from the motor varies according to the motor speed. This voltage is compared with each reference voltage to determine the output level of each operational amplifier. See Table 1.

Motor speed	Motor voltage	Pin 1 of IC1	Pin 7 of IC1	Q2	Q3	Q4	Q5	D6 (RED)	D7 (GRN)	D8 (RED)
Fast	High	H	H	ON	ON	OFF	OFF	ON	OFF	OFF
Correct	Medium	L	H	OFF	ON	ON	OFF	OFF	ON	OFF
Slow	Low	L	L	OFF	OFF	OFF	ON	OFF	OFF	ON

Table 1 Logic state according to motor speed

Conditions when each LED lights are as follows.

(a) D6 : When Pin 1 of IC1 is "H", Q2 is ON and D6 lights.

(b) D7 : When the motor speed is correct, Q2 and Q5 are OFF and D4 and D5 are reverse biased. At this time, Q4 is ON and D7 lights.

(c) D8 : When Pin 7 of IC1 is "L", Q3 is OFF, Q5 is ON and D8 lights.

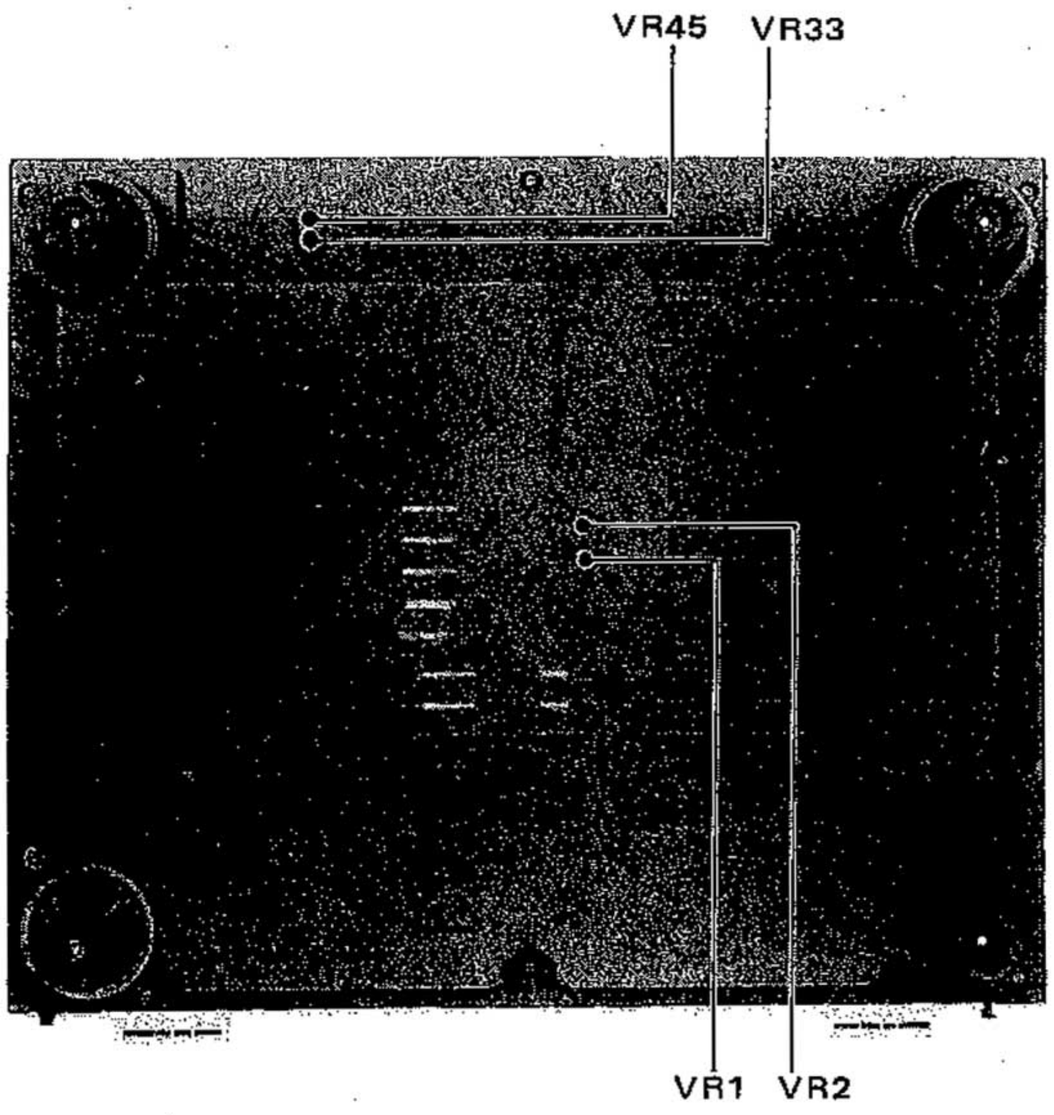
ADJUSTMENT

1. DD Motor Speed Adjustment

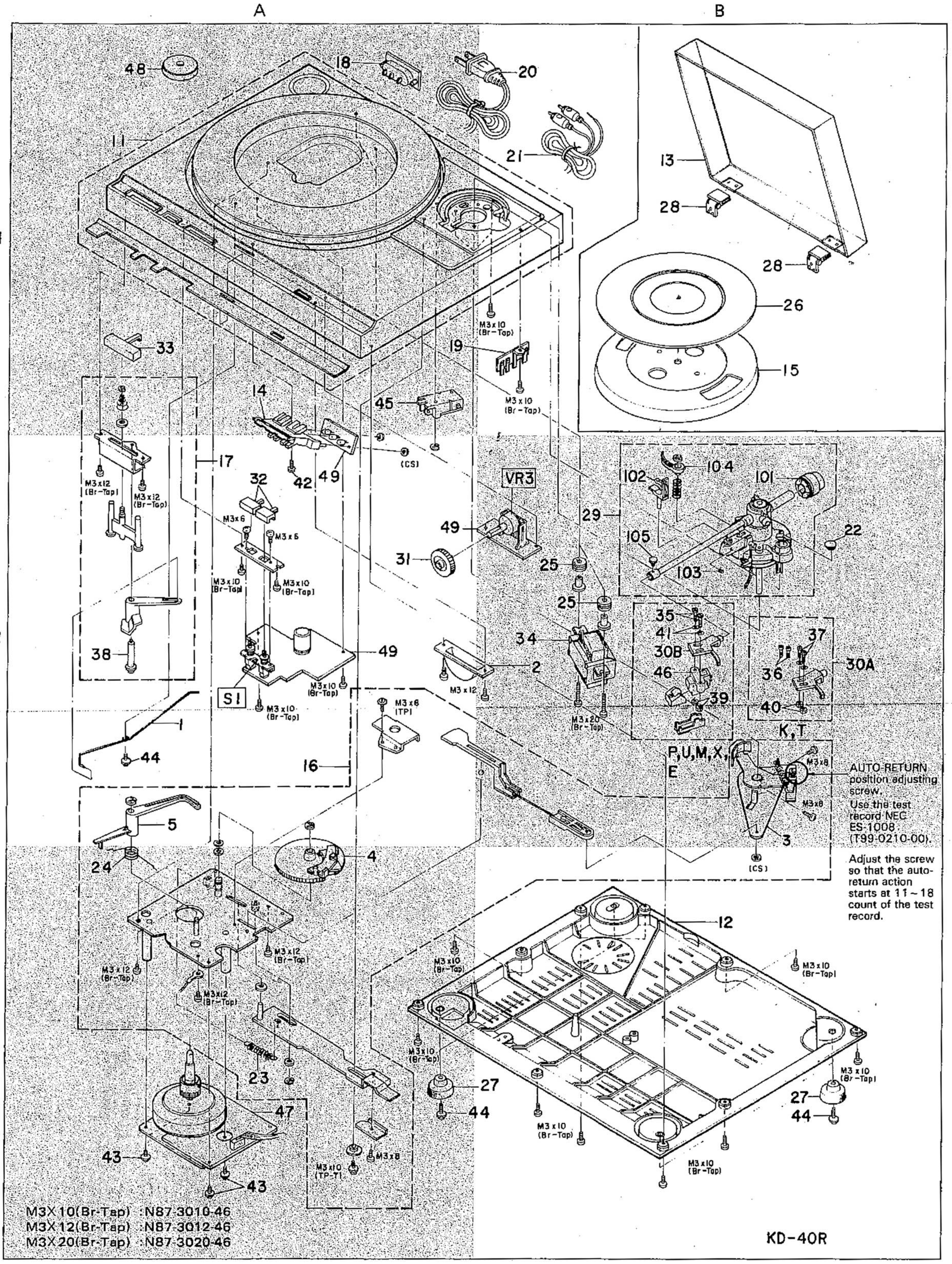
1. Center the SPEED ADJUST potentiometer.
2. Place the stroboscope on the turntable platter.
3. Press the "33" SPEED button and adjust VR33 so that the corresponding stroboscope pattern is stopped.
4. Press the "45" SPEED button and adjust VR45 so that the corresponding stroboscope pattern is stopped.

2. SPEED INDICATOR LED Adjustment

1. Press the "33" SPEED button and adjust VR1 so that the green LED lights.
2. Press the "45" SPEED button and adjust VR2 so that the green LED lights.



EXPLODED VIEW

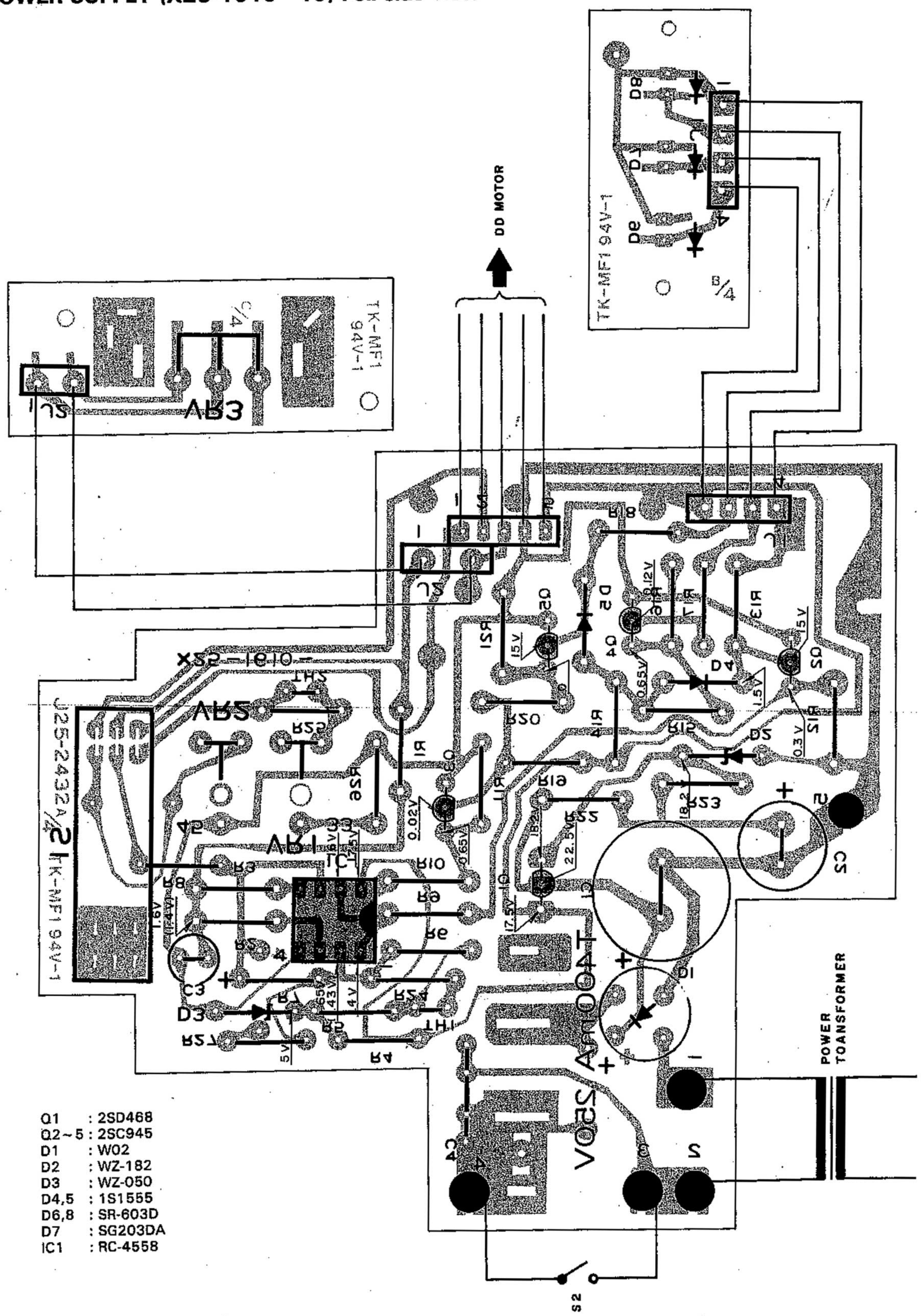


M3X10(Br-Tap) :N87-3010-46
M3X12(Br-Tap) :N87-3012-46
M3X20(Br-Tap) :N87-3020-46

KD-40R

PC BOARD

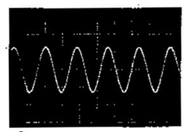
POWER SUPPLY (X25-1610—10) Foil side view



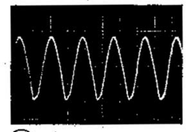
Q1 : 2SD468
Q2~5 : 2SC945
D1 : W02
D2 : WZ-182
D3 : WZ-050
D4,5 : 1S1555
D6,8 : SR-603D
D7 : SG203DA
IC1 : RC-4558

KENWOOD®

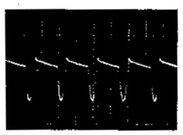
DIRECT DRIVE AU OMATIC RETURN TURNTABLE



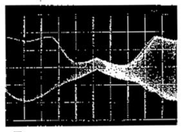
① Q07 Emitter
2V/cm
10μs/cm



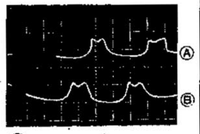
② Q07 Collector
5V/cm
10μs/cm



③ Q07 Base
0.5V/cm
10μs/cm



④ Q04 Base
0.5V/cm
20ms/cm



⑤ Ⓐ: Q01 Collector
Ⓑ: Q02 Collector
5V/cm
50ms/cm

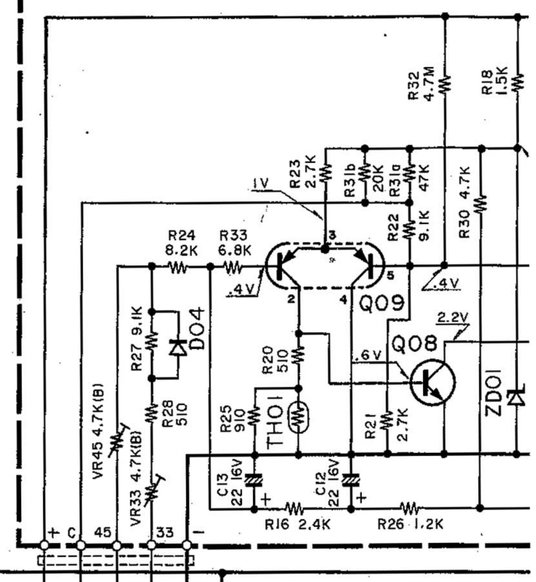
Semiconductor Substitutions	
Name	Substitutions
(X25-1610-10) Q1: 2SD468 D2: WZ-182 IC1: RC4558	Pc≧1W 18V~19V NJM4558 μPC4558 AN6552
(T43-0025-05) Q01~03: 2SA952	Pc≧1W

Q01~03: 2SA952 or 2SB561
Q04~08: 2SC945 or 2SC2320
Q09 : 2SA798 or 2SA733x2
or 2SA999x2

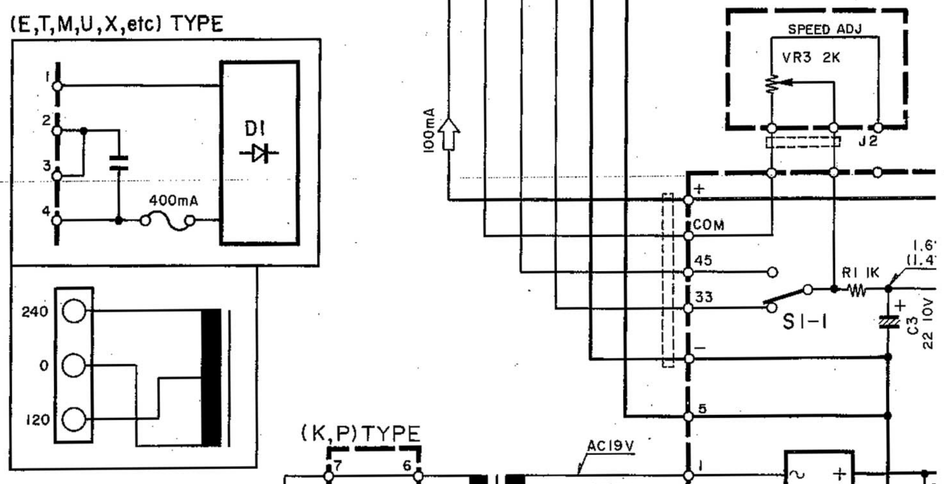
ZD01 : RD5.1EB or HZ5C
D01~03: IS953-B
D04 : ISS53

TH01 : SDT-100

D.D. MOTOR (T43-0025-05)

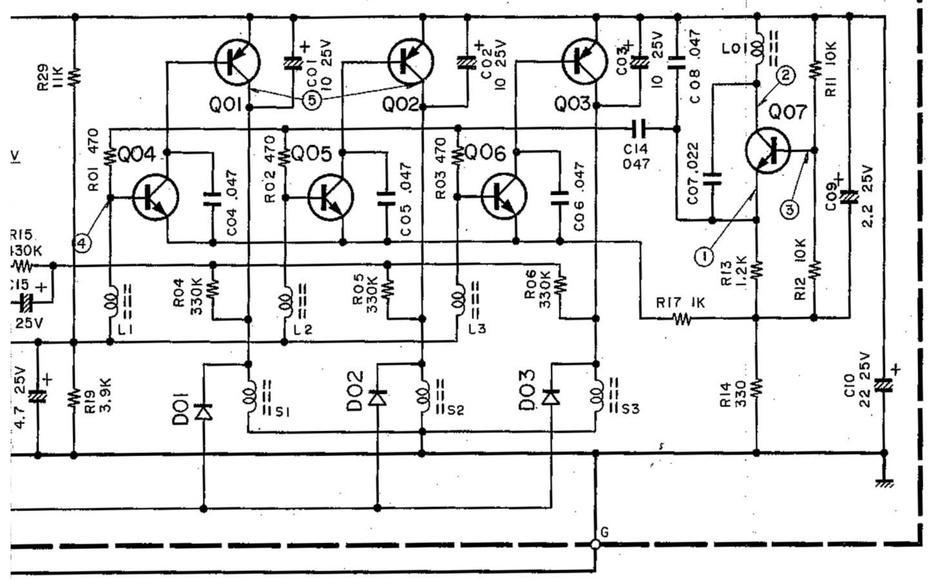


(E,T,M,U,X,etc) TYPE

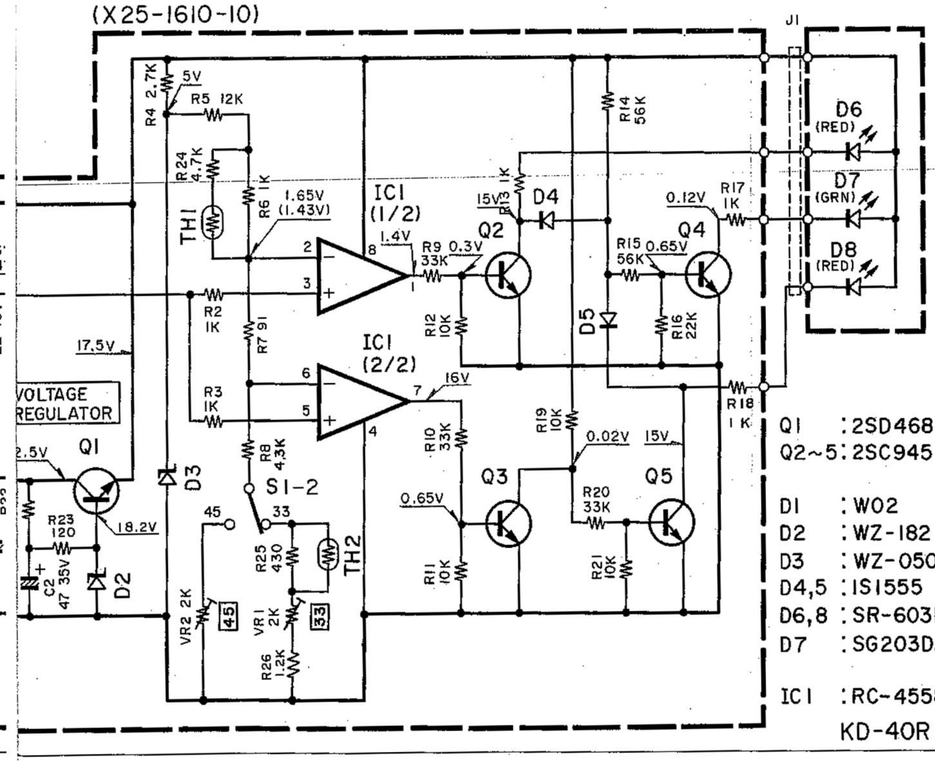


POWER S2 | 33 SPEED 45 S1 | SPEED INDICATOR D6 D7 D8 | SPEED ADJUST VR3

COLPITTS OSCILLATOR



(X25-1610-10)



Q1 : 2SD468
Q2~5: 2SC945

D1 : W02
D2 : WZ-182
D3 : WZ-050
D4,5 : IS1555
D6,8 : SR-603D
D7 : SG203DA

IC1 : RC-4558

KD-40R(K)

SPECIFICATIONS

MOTOR AND TURNTABLE
Drive System..... Direct-drive system
Motor..... 20 pole, 30 slot brust
Turntable Platter..... 31 cm (12-3/16") dia
Aluminum alloy, die-c
Speeds..... 2 speeds, 33-1/3 and
Speed Control Range..... Within ±3%
Wow & Flutter..... Less than 0.03% (WI
Rumble..... DIN weighted better t

TONEARM
Type..... Static-balance type, t
Effective Arm Length..... 225 mm (8-7/8")
Overhang..... 15 mm (9/16")
Tracking Error..... +3°24' to −1°
Tracking Force Variable Range.... 0 to 3 grams
Usable Cartridge Weight..... 4 to 10 grams (with

CARTRIDGE (U.S.A. and U.K. models are not equipp
Furnished Cartridge..... V-50 (Moving Magn
Frequency Response..... 20 – 20,000 Hz
Output Voltage..... 2.5 mV (1,000 Hz,
Load Impedance..... 47 k ohms
Stylus..... 0.7 mil diamond
Optimum Tracking Force..... 1.5 +0.3, −0 gram
Replacement Stylus..... N-50

MISCELLANEOUS
Power Requirements..... AC 120 V, 60 Hz; I
AC 120 V/220-240
Power Consumption..... 8 watts
Dimensions..... W 440 mm (17-5
H 130 mm (5-1/
D 373 mm (14-1
Weight..... 4.5 kg (10.1 lbs.)
Built-in Features..... Auto-return/cut ton
Anti-skating device
Oil-damped cueing
Speed adjustment
45 rpm adaptor sto
Tracking force dire
Built-in insulators
Supplied Accessory..... 45 rpm adaptor

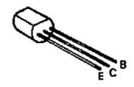
Note: KENWOOD follows a policy of continuous advancem
may be changed without notice.

Kenwood follows a policy of contin
ment. For this reason specifications

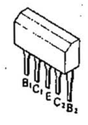
Kenwood poursuit une politique de p
cerne le développement. Pour cette r
jettes à modifications sans préavis.

Kenwood strebt ständige Verbesse
Daher bleiben Änderungen der
vorbehalten.

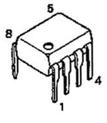
2SD468 (B,C)	2SC945
2SC1740	2SA733
2SC2320	2SA952
2SC2634 (S,T)	2SB561
2SC828	2SA999



2SA798



RC4558P



DC voltages except in parentheses: at 33 rpm and when D7 is ON.
DC voltages in parentheses: at 45 rpm and when D7 is ON.
DC voltages are measured by VOM of 25 kΩ/V input impedance.

PARTS LIST

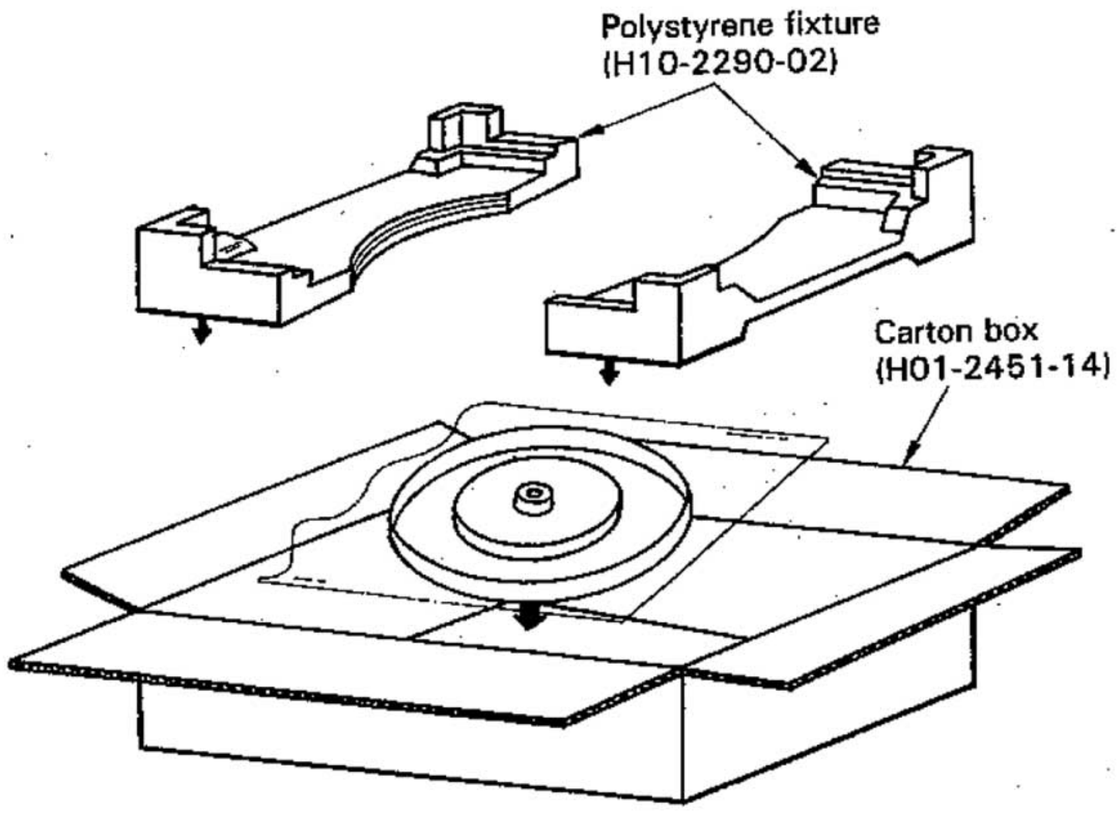
Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Remarks 備考
KD-40R (UNIT)			
1 2A	-	CUT BAR	
2 2A	-	COVER	
3 2B	-	RESTORE LEVER ASSY	
4 2A	-	GEAR MECHANISM ASSY	
5 2A	-	REJECT ARM	
11 1A	A02-0345-01	PLASTIC CABINET	*K
11 1A	A02-0345-01	PLASTIC CABINET	PU
11 1A	A02-0345-01	PLASTIC CABINET	MX
11 1A	A02-0345-01	PLASTIC CABINET	E
11 1A	A02-0348-01	PLASTIC CABINET	*T
12 3B	A40-0553-01	BOTTOM PLATE	
13 1B	A53-0233-12	DUST COVER ASSY	
-	B46-0055-30	WARRANTY CARD	P
-	B46-0060-00	WARRANTY CARD	T
-	B46-0061-30	WARRANTY CARD	K
-	B46-0062-30	WARRANTY CARD	U
-	B46-0063-13	WARRANTY CARD	U
-	B46-0064-20	WARRANTY CARD	X
-	B50-2452-00	INSTRUCTION MANUAL	*K
-	B50-2452-00	INSTRUCTION MANUAL	U
-	B50-2453-00	INSTRUCTION MANUAL	*P
-	B50-2453-00	INSTRUCTION MANUAL	MX
-	B50-2454-00	INSTRUCTION MANUAL	*E
-	B50-2455-00	INSTRUCTION MANUAL	*T
-	B50-2456-00	INSTRUCTION MANUAL	*M
-	B59-0018-00	INSTRUCTION PRINT	U
14 1A	B08-9218-04	INDICATOR	*
15 1B	D02-0038-05	TURNTABLE PLATTER	
16 2A	D40-0510-05	RETURN MECHANISM ASSY	*
17 2A	D40-0516-04	CUT MECHANISM ASSY	*
18 1A	E03-0102-05	3P INLET	UM
18 1A	E03-0102-05	3P INLET	XE
18 1A	E03-0102-05	3P INLET	T
19 1A	E22-0416-05	TERMINAL BOARD	
20 1B	E30-0181-05	POWER CORD	KP
20 1B	E30-1305-15	POWER CORD	UM
20 1B	E30-1328-05	POWER CORD	T
20 1B	E30-1329-05	POWER CORD	E
20 1B	E30-1342-05	POWER CORD	X
21 1B	E30-1351-05	AUDIO CORD	UM
21 1B	E30-1351-05	AUDIO CORD	XE
21 1B	E30-1351-05	AUDIO CORD	T
22 2B	F19-0504-04	HOLE CAP	*
23 3A	G01-1101-08	SPRING	*
24 3A	G01-1102-08	SPRING	*
25 2B	G13-0414-04	CUSHION	
26 1B	G16-0343-02	TURNTABLE SHEET	
-	H01-2451-14	CARTON BOX	*
-	H10-2290-02	POLYSTYRENE FIXTURE	
-	H10-2291-03	POLYSTYRENE FIXTURE	
-	H10-2292-03	POLYSTYRENE FIXTURE	
-	H12-0384-02	PACKING FIXTURE	
-	H21-0609-04	PROTECTION SHEET	KP
-	H21-0609-04	PROTECTION SHEET	UX
-	H21-0609-04	PROTECTION SHEET	ET
-	H25-0029-04	BAG	
-	H25-0078-04	BAG	
-	J61-0019-05	WIRE BAND	M

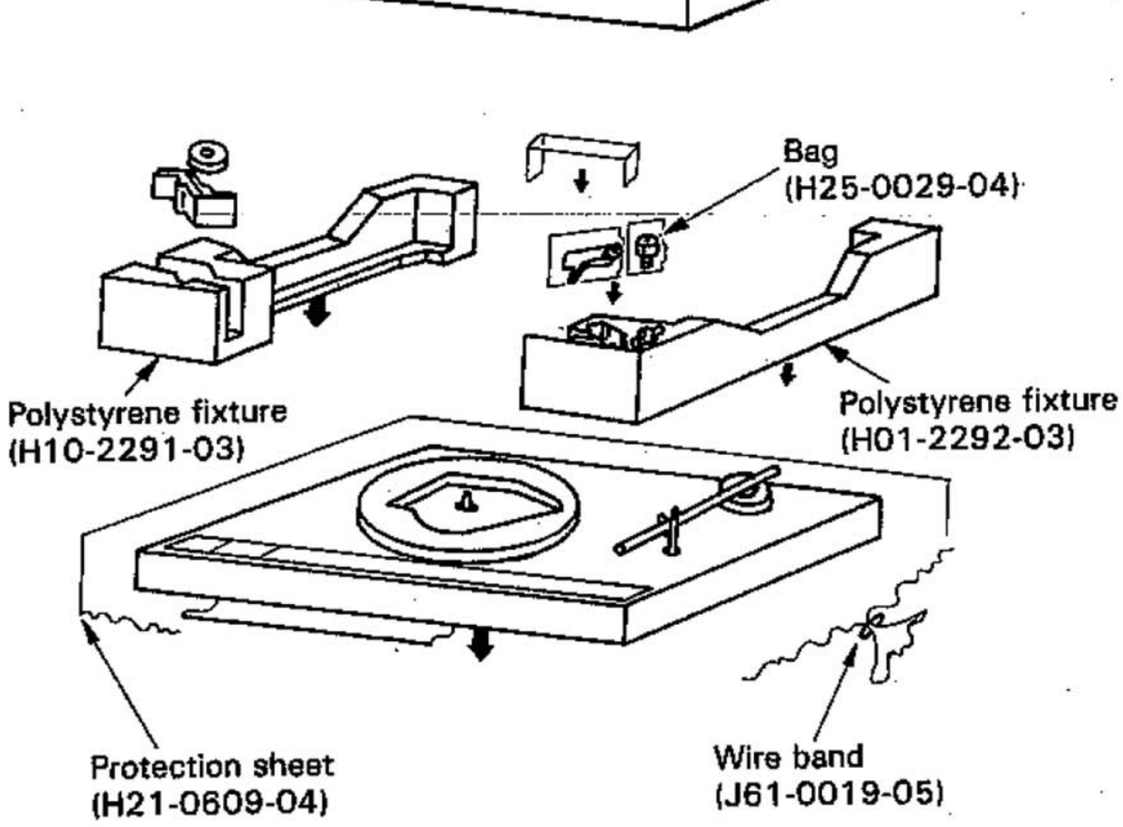
Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Remarks 備考
27 3B	J02-0342-04	FOOT	
28 1B	J50-0321-05	HINGE	
29 2B	J91-0157-05	TONE ARM ASSY	*
30A 2B	J92-0066-05	HEAD SHELL	KP
30B 2B	J92-0067-15	HEAD SHELL	
31 2A	K21-0615-14	KNOB	*
32 2A	K29-0909-14	KNOB	
33 1A	K29-0910-14	KNOB	
34 2B	L01-6391-05	POWER TRANSFORMER	*K
34 2B	L01-6391-05	POWER TRANSFORMER	P
34 2B	L01-6394-05	POWER TRANSFORMER	*U
34 2B	L01-6394-05	POWER TRANSFORMER	MX
34 2B	L01-6394-05	POWER TRANSFORMER	ET
35 2B	N09-0523-08	SCREW M2.6X12	
36 2B	N09-0850-04	SCREW M2.6X10	
37 2B	N09-0851-04	SCREW M2.6X15	
38 2A	N09-0953-05	SCREW	*
39 2B	N14-0070-09	NUT M2.6	
40 2B	N14-0412-04	NUT M2.6	
41 2B	N19-0267-05	WASHER M2.6	
42 2A	N90-3006-46	TP HEAD SCREW M3X6	
43 3A	N90-4008-46	TP HEAD SCREW M4X8	
44 3B	N91-3012-46	TP HEAD SCREW M3X12	
45 1A	S49-2003-05	SWITCH	
46 2B	T21-0071-05	MAGNETIC CARTRIDGE V-50	
47 3A	T43-0025-05	DIRECT DRIVE MOTOR	*
48 1A	W01-0329-04	EP ADAPTOR	*
49 2A,2B	X25-1610-10	POWER SUPPLY PCB ASSY	*K
49 2A,2B	X25-1610-10	POWER SUPPLY PCB ASSY	P
49 2A,2B	X25-1610-81	POWER SUPPLY PCB ASSY	UM
49 2A,2B	X25-1610-81	POWER SUPPLY PCB ASSY	XE
49 2A,2B	X25-1610-81	POWER SUPPLY PCB ASSY	T
POWER SUPPLY (X25-161)			
C1	C24-6547-71	ELECTRO 470UF 35WV	
C2	C24-6547-61	ELECTRO 47UF 35WV	
C3	C24-1747-61	ELECTRO 47UF 50WV	
C4	C46-2333-37	MYLAR 0.033UF M	*
-	F05-4016-05	FUSE 0.4A	U
-	J13-0050-05	FUSE HOLDER	U
VR1 ,2	R12-1303-05	TRIMMING POT, 2K	
VR3	R01-1305-05	POTENTIOMETER	*
S1	S42-2303-05	PUSH SWITCH	
D1	V11-2400-20	W02	
D2	V11-4100-10	WZ-182	
D3	V11-4102-10	WZ-050	
D4 ,5	V11-0076-05	1S1555	
D4 ,5	V11-0271-05	1S2076	
D4 ,5	V11-7700-30	1S2473	*
D6	V11-1202-41	LED SR603D	
D7	V11-1202-70	LED SG2030A	*
D8	V11-1202-41	LED SR603D	
IC1	V30-0426-10	RC4558P	
Q1	V04-0468-10	2SD468(B,C)	
Q2 -5	V03-0297-05	2SC945	
Q2 -5	V03-1740-00	2SC1740	
Q2 -5	V03-2320-00	2SC2320	
Q2 -5	V03-2634-10	2SC2634(S,T)	

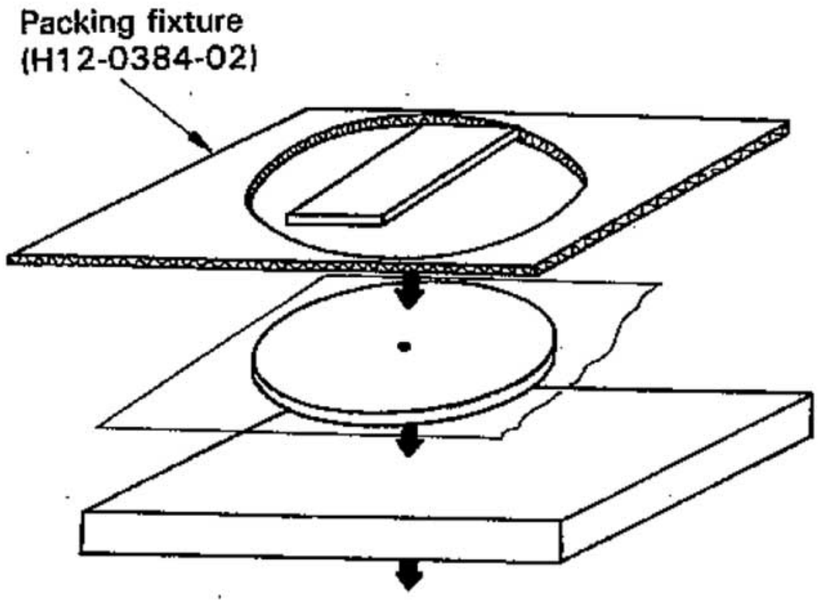
PARTS LIST/PACKING

Ref. No. 参照番号	Parts No. 部品番号	Description 部品名／規格	Re-marks 備考
Q2 -5	V03-9991-05	2SC828	
TH1	V11-6100-10	SDT-100	
TONE ARM ASS'Y (J91-0157-05)			
101 2B	D91-0134-08	WEIGHT	*
102 2B	D39-0159-08	ARM REST	
103 2B	N73-2604-46	SCREW	
104 2B	N19-2007-08	LIFTER PLATE	*
105 2B	N08-0416-08	DRESS SCREW	

PACKING







Note:
Component and circuitry are subject to modification to insure best operation under differing local conditions. This manual is based on, the U.S. (K) standard, and provides information on regional circuit modification through use of alternate schematic diagrams, and information on regional component variations through use of parts list.

Region	Code
U.S.A.	K
Canada	P
PX (Far East)	U
Australia	X
South Africa	S
England	T
Europe and Scandinavia	E
Other Areas	M
Audio Club	H

There is no plan for producing units of S, U and UE types.

A product of
TRIO-KENWOOD CORPORATION
Shionogi Shibuya Building, 17-5, 2-chome Shibuya, Shibuya-ku, Tokyo 150 Japan

KENWOOD ELECTRONICS, INC.
1315 E Watsoncenter Rd. Carson, California 90745, U.S.A.
75 Seaview Drive, Secaucus, New Jersey 07094, U.S.A.
1098 North Tower Lane, Bensenville, Illinois 60106, U.S.A.
TRIO-KENWOOD CANADA INC.
1070 Jayson Court Mississauga, Ontario Canada L4W 2V5
TRIO-KENWOOD ELECTRONICS, N.V.
Leuvensesteenweg 504, B-1930 Zaventem, Belgium
TRIO-KENWOOD ELECTRONICS, GmbH
Rudolf-Braas-Str. 20, 6056 Heusenstamm, West Germany
TRIO-KENWOOD FRANCE S.A.
5, Boulevard Ney, 75018 Paris, France
TRIO-KENWOOD SVENSKA AB
Kemistvagen 10A, 183-21 Taby, Sweden
TRIO-KENWOOD AG
Unterboesch 6331 Huenenberg/ZUG Switzerland
TRIO-KENWOOD (AUSTRALIA) PTY. LTD.
30 Whiting St., Artarmon, N.S.W. 2064, Australia
KENWOOD & LEE ELECTRONICS, LTD.
Wang Kee Building, 5th Floor, 34-37, Connaught Road Central, Hong Kong

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