DENON

Hi Fi Component

SERVICE MANUAL

FULLY AUTOMATIC

DIRECT DRIVE TURNTABLE SYSTEM

MODEL DP-35F/45F SERIES

U.S. and Canadian models do not include cartridge.



DP-35F



DP-45F

NIPPON COLUMBIA CO., LTD.

TABLE OF CONTENTS

FEATURES 1
SPECIFICATIONS 2
BLOCK DIAGRAM OF DP-35F 3
BLOCK DIAGRAM OF DP-45F 4
PART NAMES AND FUNCTION 5
ADJUSTMENT METHOD ..... 6~7
PARTS LIST OF EXPLODED VIEW 8
PARTS LIST OF P.W. BOARD ..... 9~10
EXPLODED VIEW OF MAIN PARTS (DP-35F) 11
EXPLODED VIEW OF MAIN PARTS (DP-45F) 12
SCHEMATIC DIAGRAM OF DP-35F 13
P.W. BOARD OF KU-5021 MOTOR SERVO UNIT 14
SCHEMATIC DIAGRAM OF DP-45F 15
P.W. BOARD OF KU-5020 MOTOR SERVO UNIT 16
CONNECTIONS OF P.W. BOARD 17
P.W. BOARD OF KU-5014/5010 MOTOR DRIVE UNIT 18

FEATURES

1. Microprocessor controlled, contactless servo tonearm

A unique microprocessor controlled, contactless servo tonearm ensures safe, easy to use automatic operation with no deterioration in sound quality.

2. Q-damping method (Dynamic servo tracer)

Low frequency resonance caused by the cartridge compliance and the effective tonearm mass is electronically damped both horizontally and vertically to effectively suppress crosstalk and inter-modulation distortion. The dynamic servo tracer maximizes the performance of the law mass tonearm and results in a record reproduction of excellent sound image with minimum noise and distortion.

3. Low mass straight arm

Having an outstanding tracing ability, this arm maximizes the performance of the high compliance cartridge to the full extent. Even with the most up-to-date high grade records, its tracing ability is excellent.

4. Location function (DP-45F)

Just by pressing the locate button, the tonearm is moved to any desired location where the record play is started.

5. Record size detector and automatic speed selector (DP-45F)

The record size and the speed are automatically set, when playing 12 inch records (33 1/3 rpm) or 7 inch records (45 rpm) in the automatic play mode. The unit provides a safety measure which causes the tonearm to stop and return to the arm rest to protect the stylus tip when there is no record on the turntable, even if the start button is pressed.

6. DENON quartz on bi-directional servo

The ultimate in rotational accuracy is realized by the combination of a magnetic pulse detector and a quartz lock, with the addition of a bi-directional servo. On the DP-45F, with the utilization of the bi-directional servo and a quick response electronic brake, an even steadier rotational performance has been achieved.

7. Newly developed cartridge

The low mass MM type cartridge DL-60 with an elliptically shaped stylus minimizes tracing distortion and contributes to the clarity of the reproduced sound.

NOTE:

U.S. & Canadian models do not include cartridge.

SPECIFICATIONS

- **Phono motor section**

Drive system :	Servo controlled direct drive
Turntable speeds :	33-1/3, 45 rpm
Wow & flutter :	Below 0.012% wrms (servo system) Below 0.02% wrms (JIS)
S/N ratio :	Over 78 dB (DIN-B)
Rise time :	Normal speed within 2 seconds (at 33-1/3 rpm)
Turntable platter :	Aluminum die-cast; 300 mm diameter
Motor :	Linear drive motor
Speed control system :	Speed servo by frequency detection and phase servo control
Speed deviation :	Below 0.002%
Load characteristics :	0% (80 g stylus force; outermost groove)

- **Tonearm section**

Arm type :	Dynamically balanced, straight tube tonearm
Effective length :	220 mm
Overhang :	16 mm
Tracking error :	Within 3°
Automatic mechanism :	Electronically controlled, fully automatic
Adjustable stylus force range :	0 ~ 3.0 g (1 scale=0.1 g)
Suitable cartridge weight range :	Approximately 4.0 ~ 9.0 g (including screws, nuts)

- **Cartridge section :**

DL-60

Type :	Moving magnet (MM)
Output voltage :	2.5 mV
Frequency response :	20 Hz ~ 30 kHz
Tracking force :	1.8 ± 0.3 g

- **General**

Power supply :	50/60 Hz, Voltage is shown on rating label
Power consumption :	Approx. 8W
Dimensions :	434 (W) x 135 (H) x 412 (D) mm 17 (W) x 5.3 (H) x 16.2 (D) in
Weight :	Approx. 7 kg Approx. 15 lb.

- U.S. and Canadian models do not include cartridge.

Above specifications and outward appearance may be altered in future for improvement.

WARNING:

1. Component parts

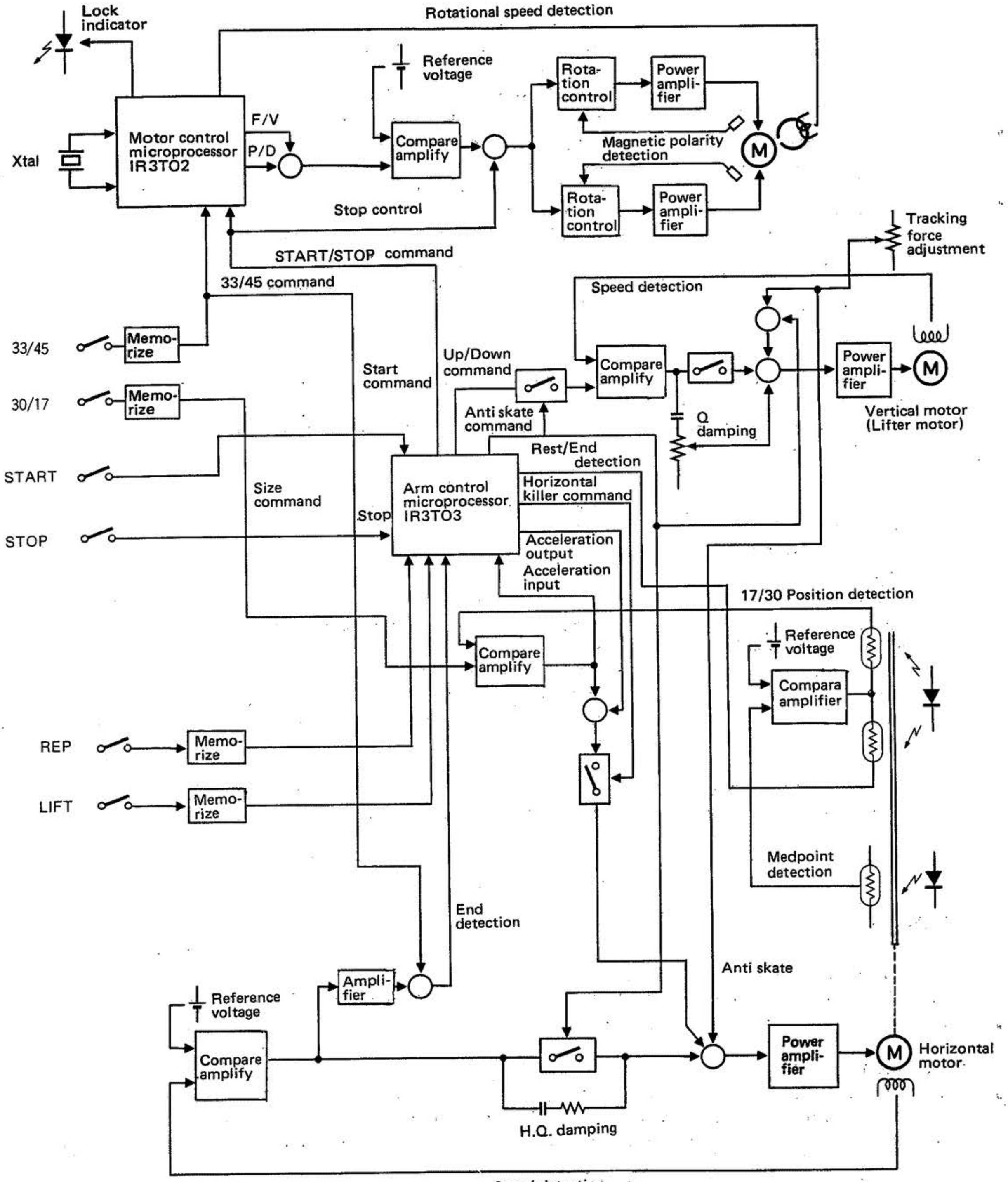
Parts marked with ⚠ and/or shading in this service manual have special characteristics important to safety. Be sure to use the specified parts for replacement.

2. Leakage current

Before returning the appliance to customer, test the leakage current when the power plug is connected. Use a calibrated (with an error of not more than 5%) leakage current tester and measure the leakage current from any exposed metal to the earth ground. Reverse the power plug polarity and test the above again.

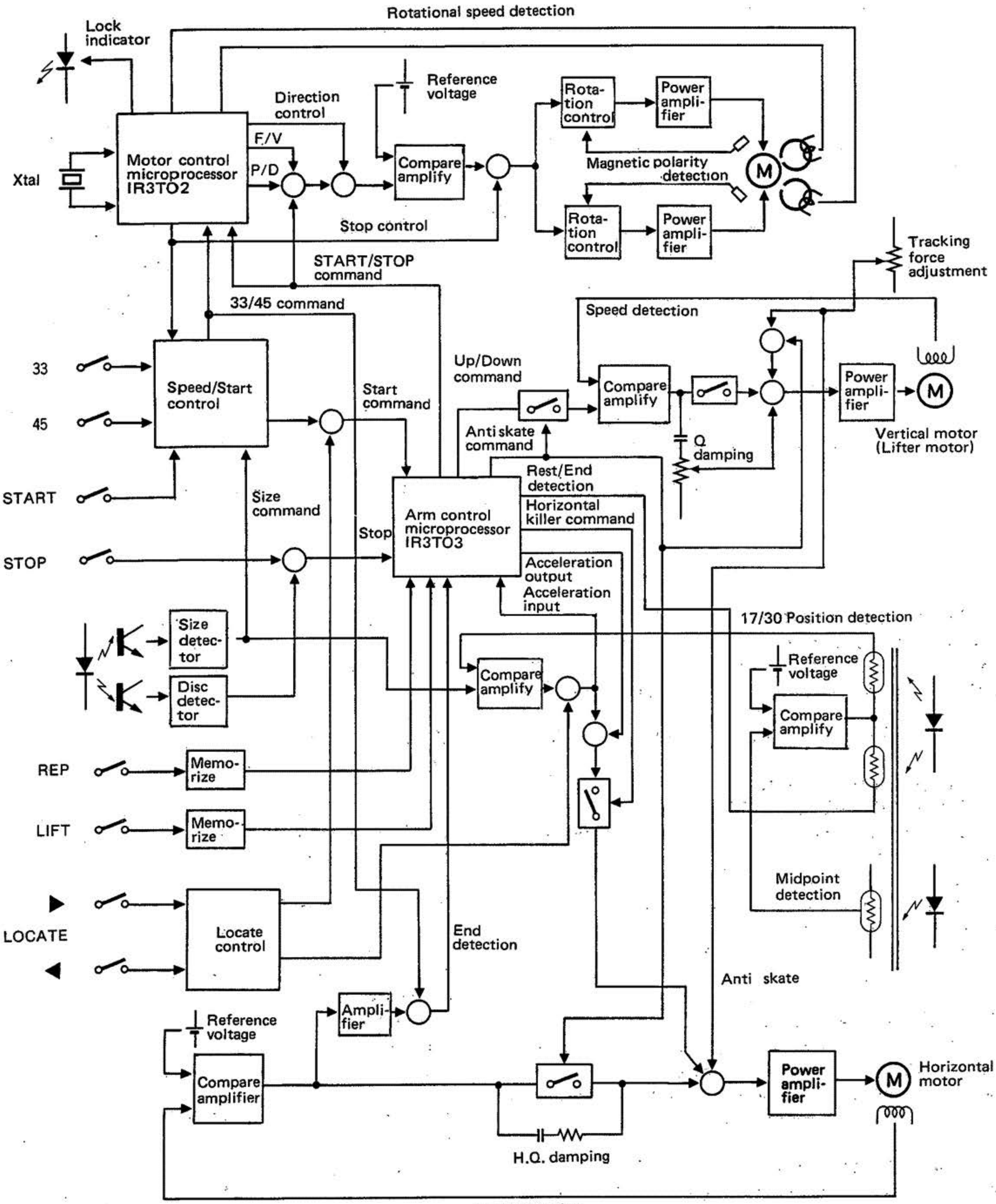
Any current measured MUST NOT EXCEED 0.5 milliamps. Corrective measure must be taken if it exceeds the limit.

BLOCK DIAGRAM OF DP-35F

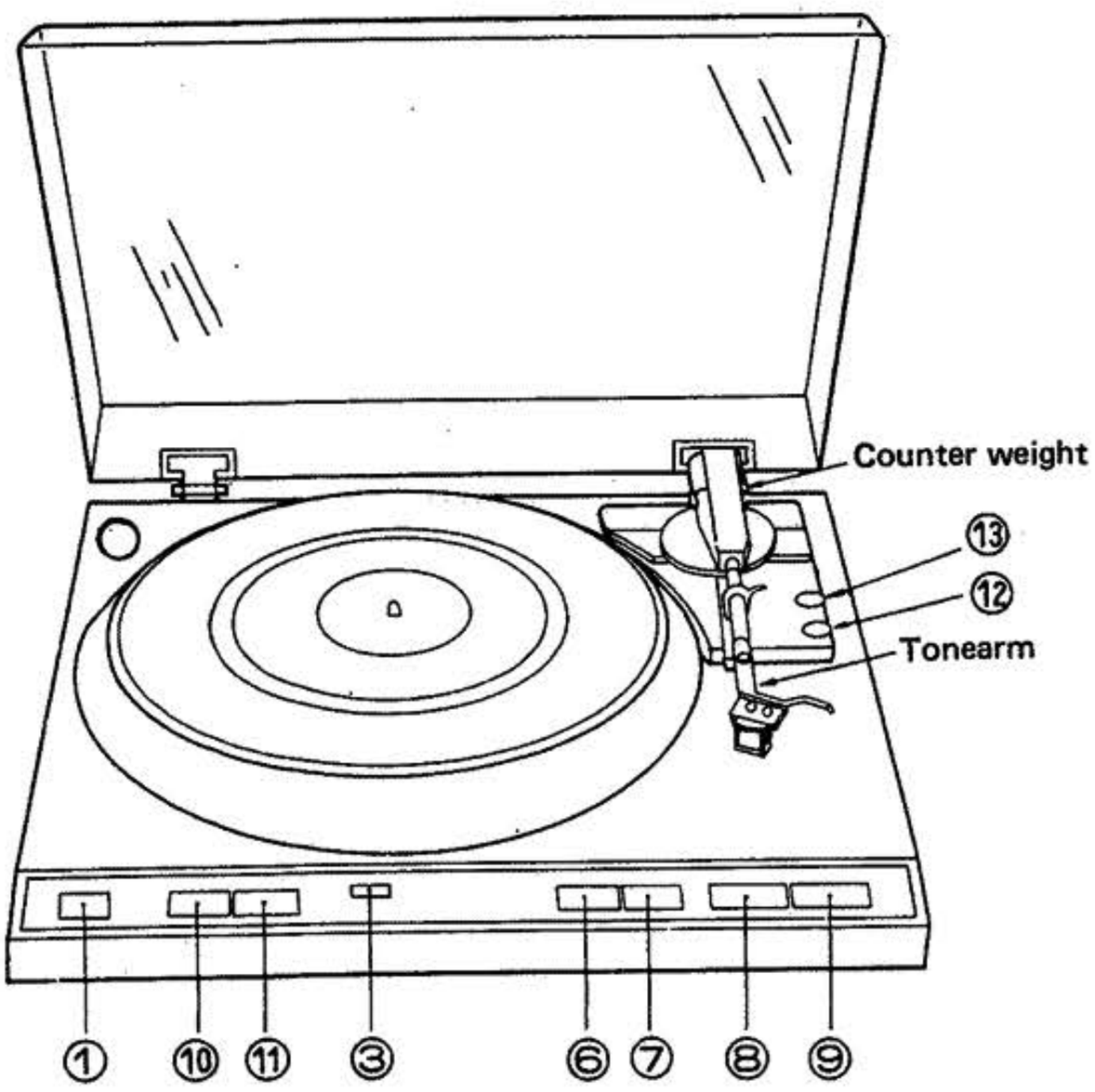


Speed detection

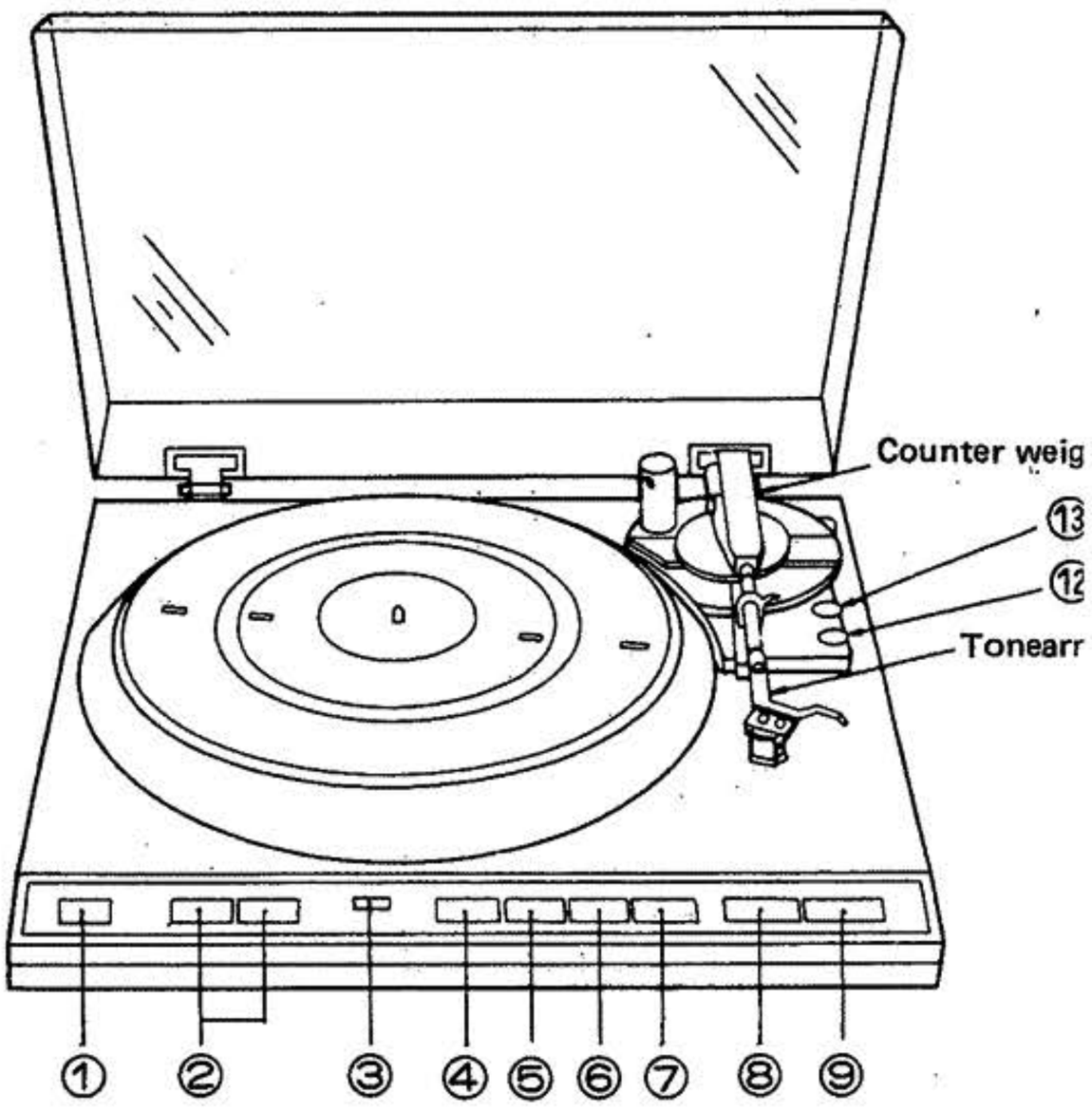
BLOCK DIAGRAM OF DP-45F



PART NAMES AND FUNCTION



DP-35F



DP-45F

1. Power switch POWER

This turns the power supply on and off. Push the button down until it locks. When power is turned on, the (LOCK) indicator will light up. When turning the power off, press the button until the lock is disengaged. Be sure to return the tonearm to the arm rest and hold it in with the clamp.

2. Speed selector button 33. START. 45 (DP-45F)

For playing records manually, press the button corresponding to the record speed.

33 1/3 rpm records . . . . . (33. Start)
45 rpm records . . . . . (45. Start)

In the automatic play mode, the switch will automatically be set to "33" for 12 inch records and "45" for 7 inch records.

3. Lock indicator LOCK

The (LOCK) indicator will light up when the power is turned on. After starting play, the lamp will flicker until the proper turntable speed is reached. Once the proper speed has been attained, the lamp will stay lit.

4. Locate button ◄ LOCATE (DP-45F)

Press this button to move the tonearm to the left, towards the record center, to start the record at any desired location.

5. Locate button ► LOCATE (DP-45F)

Press this button to move the tonearm to the right, away from the record center, to start the record at any desired location.

6. Arm lifter button UP LIFTER

Press this button to raise or lower the tonearm during play, or when playing records manually. The "UP" indicator will light up.

7. Repeat button REPEAT

Press this button for playing the same record repeatedly: the "ON" indicator will light up.

8. Start button START

Press this button to start records automatically.

9. Stop button STOP

Press this button to stop a record during play.

10. Size button SIZE (DP-35F)

Before playing a record, press the button corresponding to its record size.
For 30 cm (12 inch) records, the (30) indicator will light.
For 17 cm (7 inch) records, the (17) indicator will light.

11. Speed button (DP-35 SPEED)

Before playing a record, press the button corresponding to its record speed.
The (33) indicator will light for 33 1/3 rpm records.
The (45) indicator will light for 45 rpm records.

12. Stylus force adjustment knob STYLUS FORCE

This is used to adjust the stylus force.

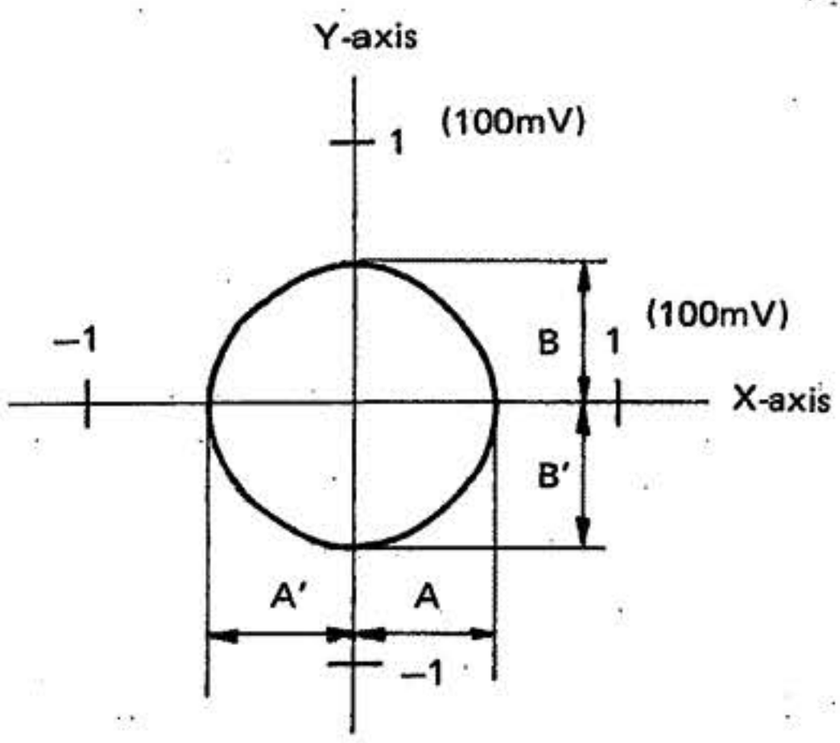
13. Q-damping adjustment knob Q-DAMPING

ADJUSTMENT METHOD

• PHONO MOTOR ADJUSTMENT

1. Off-set adjustment

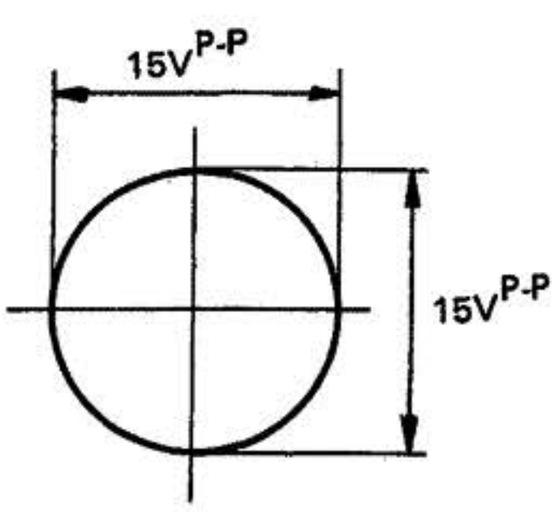
1) Set the X-axis and Y-axis sensitivity of the oscilloscope to 100mV/cm by using a 10:1 probe.
2) Connect the X-axis terminal of the probe with TP-203 on the motor drive base board and the Y-axis terminal of the probe with TP-204. Use pin No. 8 as the ground.
3) Connect pin No. 5 and pin No. 8 and make a low resistance circuit on the input terminal.
4) Stop the rotor at the maximum position of the X-axis amplitude of the Lissajous' figure of the oscilloscope while turning the motor by hand.
5) Set the maximum amplitude at the X-axis by adjusting VR-201. A = A'
6) Stop the rotor at the maximum position of the Y-axis amplitude of the Lissajous' figure.
7) Set the maximum amplitude at the Y-axis by adjusting VR-202. B = B'
8) Adjust the center of the circle to ± 50mV.



9) Disconnect pin No. 5 and pin No. 8 after adjutment.

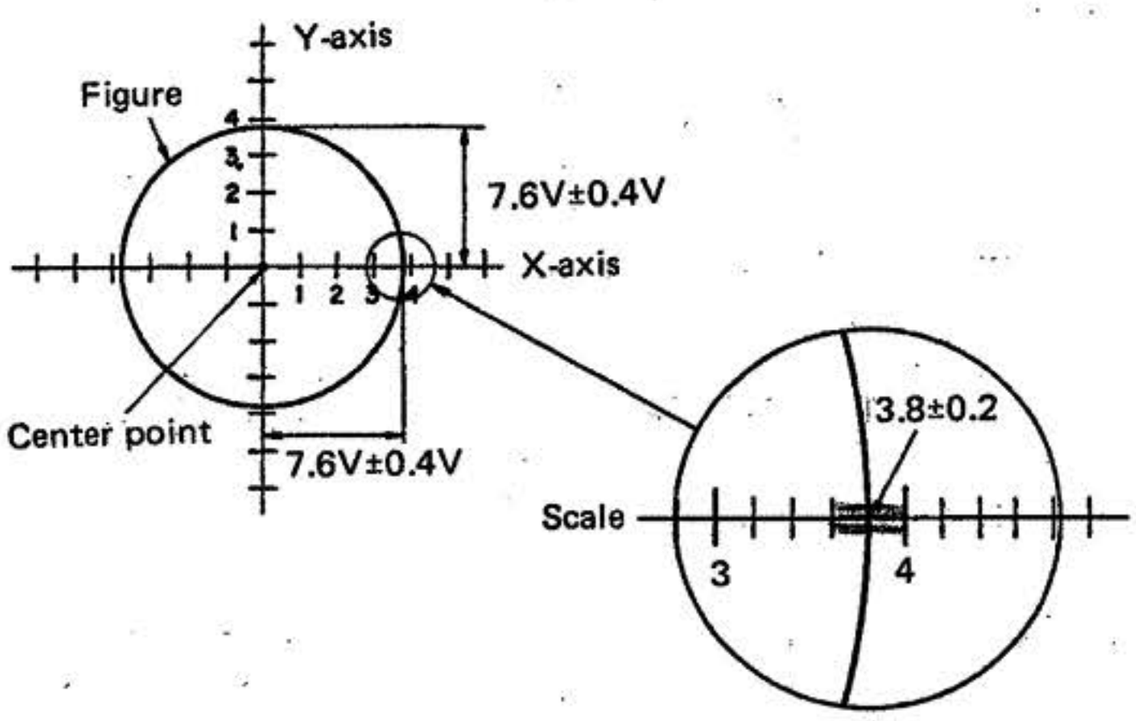
2. Amplitude adjustment

1) Check the X-axis and Y-axis sensitivity of the oscilloscope by using ± 5V power supply.
2) In case of DP-45F, cover the photo transistor of the size detecting light receiver with a black rubber sheet or something to avoid that light enters.
3) Remove the arm from the arm rest and remove the turntable. Then, turn the motor with full speed.
4) Set the amplitude of the X-axis and Y-axis of the Lissajous' figure to 15 VP-P by adjusting VR-203 and VR-204. Make sure that there is no voltage difference between the X-axis and the Y-axis.



3. Center adjustment

1) Adjust the X-axis and Y-axis sensitivity of the oscilloscope to 2V/cm.
2) Set the amplitude of the X-axis and Y-axis of the Lissajous' figure to exactly the same point from the center by adjusting VR-205 and VR-206. After the adjustment, the amplitude should be as shown in the figure below.



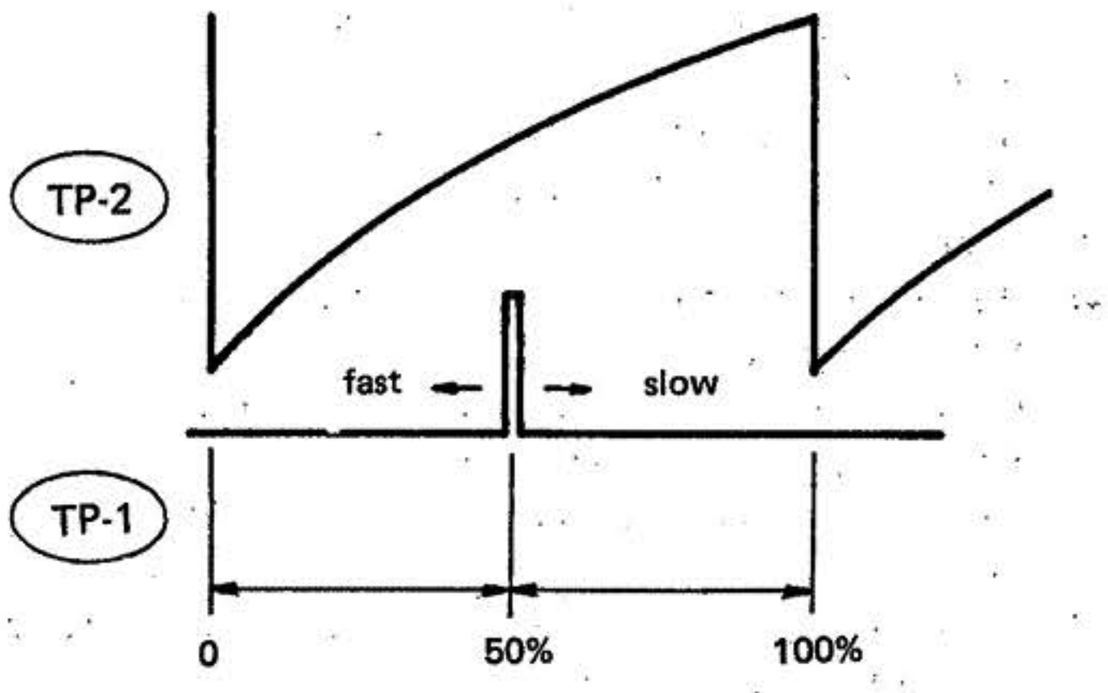
4. Adjusting the head gap

Adjust, so that the gap between the turntable magnetic coating surface and the detection head is 0.18 mm.

5. Lock adjustments for 45 rpm

Hereafter, the earth reference point of the measuring instrument should be connected to wrapping terminal 35 of the servo control circuit board.

1) Connect the two-channel oscilloscope to TP-1 and TP-2.
2) Set the speed selector to 45 rpm.
3) Take the arm off the arm rest and move it toward the turntable to rotate the phonomotor.
4) Adjust VR-1 so that the pulse from TP-1 is positioned to 50% of the triangular wave length from T.P. 2.



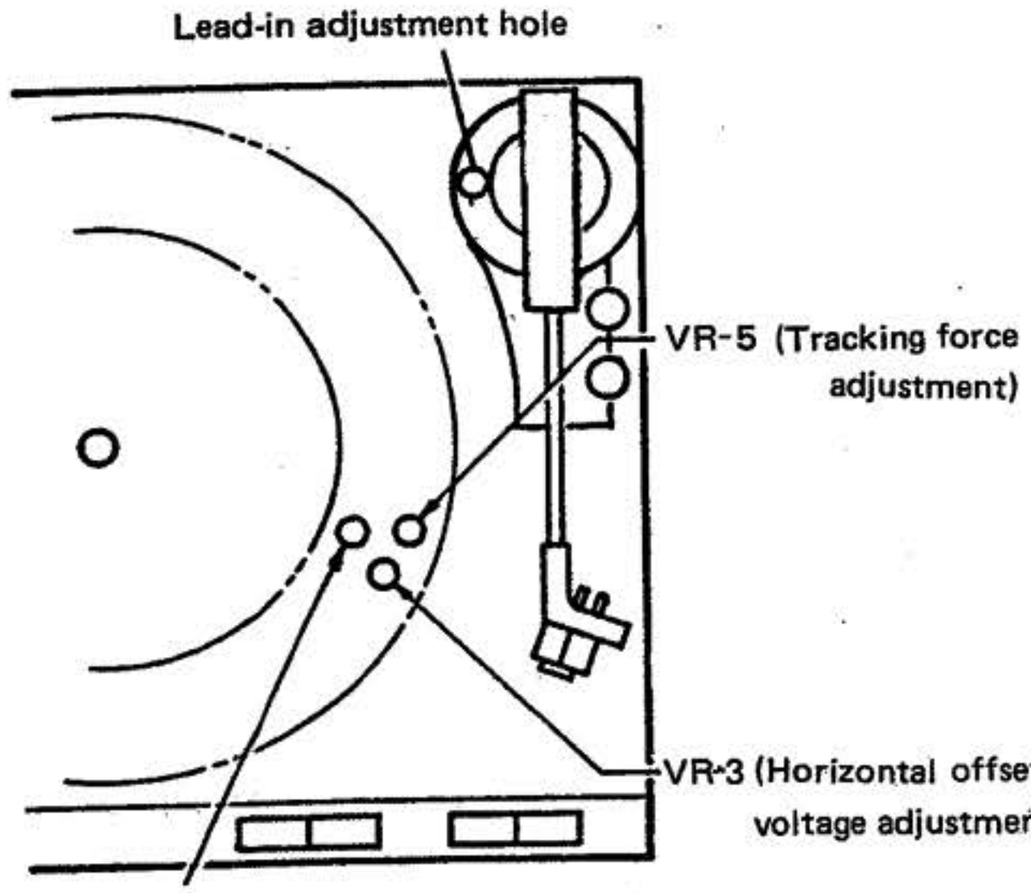
6. Lock adjustments for 33 rpm

1) Connect the oscilloscope in the same manner as the 45 rpm lock adjustments. Set the speed selector to 33 rpm.
2) Make sure that the sampling pulse is positioned between 40% and 80% of the triangular wave length.

NOTE:

Phase lock position for 33 rpm is fixed (relative to 45 rpm) by R12 (metal film resistor).

• ADJUSTING THE ARM CONTROL SECTION



1. Adjusting the horizontal OP amp. offset voltage

1) Fix the tonearm to the arm rest and connect the oscilloscope to TP-8.
2) Set the lifter switch to the UP condition.
3) Turn VR-3 and adjust to 0V±0.01V.

2. Adjusting the lifter OP amp. offset voltage

1) Fix the tonearm to the arm rest and connect the oscilloscope to TP-6.
2) Set the lifter switch to the DOWN condition.
3) After about 7 seconds, adjust to 0V±0.01V by turning VR-4.

3. Adjusting the tracking force

1) Turn the power supply switch OFF.
2) Take the arm off the arm rest. Rotate the balance weight so that the tonearm becomes parallel to the turntable surface when let go.
3) Return the arm to the arm rest and turn the power supply switch ON.
   (Note) In case of DP-45F, cover the size detecting photo transistors (2 pieces) with a rubber sheet or something to avoid that light enters.
4) Wait seven seconds after the arm has lowered. Place the cartridge stylus tip onto a stylus force gauge and set the stylus force adjustment knob to 1.5 g.
   (Note) At this time, the stylus tip height should be adjusted so that it is about the same height as during play.
5) Turn VR-5 and adjust, so that the stylus force gauge reads 1.5 g. (Turn VR slowly.)

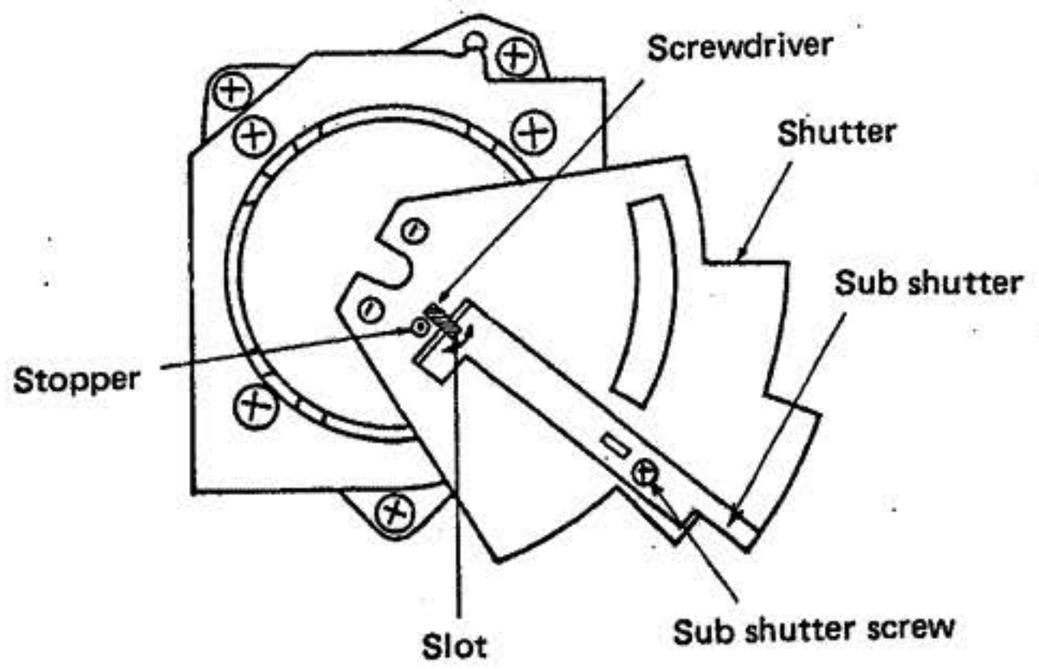
4. Adjusting the 30 cm lead-in position

1) Place a 30 cm record on the turntable and set the record size selector switch to "30".
   (Note) Keep the bottom cover closed.
2) Move the arm so that the stylus tip is at approximately the 30 cm lead-in position. Insert a small flat-headed screwdriver into the lead-in adjustment hole; move the arm back and forth and fit the screw driver into the groove of the cam inside gently.
3) After turning the screwdriver, pull it out once. Press the start switch and adjust so that the stylus position stops at the 30 cm lead-in position.
   (Note) The 30 cm lead-in adjustments cannot be performed unless the stylus tip position is approximately in the 30 cm lead-in position. In addition, if the screwdriver is left inserted, the arm will not move.

5. Adjusting the 17 cm lead-in position

Adjust as necessary, such as when parts of the sensor section have been replaced.
However, the following procedures should only be used when a discrepancy is found for the 17 cm lead-in position, after the 30 cm lead-in position has been adjusted.

1) Set the record size selector to 17 cm.
   (Note) In case of DP-45F, the size is automatically changed by placing a 17 cm record on the turntable.
2) By continuously pressing the start switch, the arm will move over and stop. At this time, check now many millimeters, toward the inside or outside, the stylus tip deviates from the required 17 cm lead-in position.
3) Take off the bottom cover of the cabinet and check the adjustment scale position of the shutter. (One adjustment scale corresponds to a stylus tip movement of 0.5 mm.)
4) Untighten the screw holding the sub shutter and place a small flat-headed screwdriver into the slot of the shutter. When the stylus position is toward the inside, compared to the required position, move the sub shutter toward the right of the scale; when the stylus position is toward the outside, move the sub shutter toward the left. When completed, tentatively tighten the screw holding the sub shutter.
5) After the adjustments are made, press the start switch and check whether or not the stylus stops at the 17 cm lead-in position.
6) If the stylus stops at the required position, then tighten the sub shutter screw.



PARTS LIST OF EXPLODED VIEW

Ref. No.	Part No.	Part Name	Remarks
1	4713303045	3x6 CBS	
2	4711303018	3x6 CPS	
3	4751003006	3W	
4	4438545201	COLLER	
5	4638225004	SPRING	
6	4711810019	2x3 CPS	
7	4338241100	SHUTTER	
8	3418025205	MAGNET ASS'Y	
9	4761003009	3E RING	
10	4751005004	4W	
11	3158451003	FRICTION WASHER	
12	4248019202	ADJUST CAM	
13	4730811002	3x12 CBTS (2)	DP-35F
	4733808012	3x12 CBTS (1)	DP-45F
14	2398013215	COIL ASS'Y	
15	4338175108	YOKE (A) ASS'Y	
16	3158712108	LATERAL WEIGHT	
17	4744304000	3x3 BSS (D)	
18	4730306012	3x12 CBRTS (1)	
19	4428030108	VOLUME BRACKET	
20	1128085003	VOLUME KNOB	DP-35F
	1128085029	VOLUME KNOB	DP-45F
21	4756133007	14N	
22	3158896202	TONE ARM ASS'Y	
23	3158899005	BALANCE WEIGHT ASS'Y	
24	3158553024	HEAD SHELL ASS'Y	
25	DL-0060	PICK UP CARTRIDGE	E2,EP,E1, EA,EG,EK
26	4713808003	3x25 CBS	
27	4731808001	3x12 CPTS (2)	DP-35F
	4731806003	3x20 CPTS (1)	DP-45F
28	2178081030	MOTOR ASS'Y	DP-35F
	2178081027	MOTOR ASS'Y	DP-45F
29	KU-5021*1	OUTPUT P.C.B.	DP-35F
	KU-5020*1	OUTPUT P.C.B.	DP-45F
30	KU-5021*3	LEAD IN LED P.C.B.	DP-35F
	KU-5020*3	LEAD IN LED P.C.B.	DP-45F
31	4730355018	3x10 CBRTS	DP-35F
	4730305013	3x10 CBRTS (1)	DP-45F
32	4418846014	WASHER	
33	4418814509	HEAD SUPPORT	
34	3918423006	MAGNETIC HEAD	DP-35F
	3918425004	MAGNETIC HEAD ASS'Y	DP-45F
35	4700009019	3x6 CPS. W	
36	KU-50206	P.C.B. SUPPORT	
37	1468150504	FRAME	E2,EA,EU, EC, EK, EG
	1468150517	FRAME	E1,
38	4732309017	3x16 CFTS (1)	
39	4218217209	REC. TURNTABLE	DP-35F
	4218358003	REC. TURNTABLE	DP-45F
40	4218288005	RUBBER SHEET	DP-35F
	4218361003	RUBBER SHEET	DP-45F
41	4730356033	3x12 CRTS (2)	DP-35F
	4733810000	2.6x12 CBRTS (1)	DP-45F
42	1058091303	BOTTOM COVER	
43	4751106042	WASHER	
44	1048079102	INSULATOR ASS'Y	

Ref. No.	Part No.	Part Name	Remarks
45	4638631203	SPRING	
46	KU-5021	SERVO CONTROL UNIT	DP-35F
	KU-5020	SERVO CONTROL UNIT	DP-45F
47	KU-5021*7	POWER SW P.C.B.	DP-35F
	KU-5020*7	POWER SW P.C.B.	DP-45F
48	KU-5021*8	LOCK LED P.C.B.	DP-35F
	KU-5020*8	LOCK LED P.C.B.	DP-45F
49	1138161302	BUTTON (A)	
50	1138162110	BUTTON (B)	DP-35F
	1138162107	BUTTON (B)	DP-45F
51	4438158067	COLLAR	DP-35F
	4438158096	COLLAR	DP-45F
52	4620027003	RUBBER BUSH	DP-35F
	1298010005	CUSHION RUBBER	DP-45F
⚠ 53	2339045213	POWER TRANS	E2,EA,EG, EK
	2339049112	POWER TRANS	EC
	2339046212	POWER TRANS	EP,E1
	2334072210	POWER TRANS	EU
54	1038232108	CABINET	E2,EC,EU, EA,EG,EK
	1038232111	CABINET	EP,E1
	1018376314	CABINET ASS'Y	DP-45F
55	4730308010	3x14 CBRTS (1)	DP-45F
56	1038229409	FRONT PANEL	DP-45F
57	1038233107	SUB PANEL	DP-35F
	1038230401	SUB PANEL	DP-45F
58	1468151008	DUST COVER ASS'Y	
59	4628023009	BUSHING	
60	4018041015	HINGE	
⚠ 61	MD-3802	BUSHING	
	MD-2982H	CORD BUSH	EA only
⚠ 62	2062002031	AC CORD	E2,EG
	2062019008	AC CORD	EC,EU
	2006031026	AC CORD	E1
	2062024006	AC CORD	EK
	2006019307	AS 3P AC CORD	EA
63	EP-7376	CORD BUSH	DP-45F
64	2033642103	OUTPUT CORD ASS'Y	
	2031640000	OUTPUT CORD ASS'Y	EU only
65	4338243001	SUB SHUTTER	
66	4730460013	4x20 CBRTS (2)	DP-35F
	4733811009	3x25 CBRTS (2)	DP-45F
67	KU-5020*4	SIZE DET. P.C.B.	
68	4730356017	3x12 CBRTS (2)	
69	4318086000	FRICTION SHEET	
70	KU-5020*5	SIZE DET. P.C.B	
71	3158911103	ARM REST ASS'Y	
72	4418314009	BUSH PLATE	
73	4498066209	LED STAND	
74	3939220000	LED WITH WIRE	
75	1468153103	LED COVER	
76	4733812008	3x12 CBTS (1)	
⚠ 77	2123315023	VOLTAGE SELECTOR	E1
78	4428092007	SELECTOR BRACKET	E1
79	4730204017	2.6x8 CRTS (1)	E1
80	4730253013	2.6x6 CBRTS	E1

PARTS LIST OF P.W. BOARD

KU-5020 SERVO CONTROL UNIT (DP-45F)

Ref. No.	Part No.	Part Name	Remarks
SEMICONDUCTOR GROUP			
IC1	2630173004	IR3T02	
IC2	2630174003	IR3T03	
IC4	2630237005	LA6358	
IC3,5	2630257001	M5218P	
IC6	2630198005	NJM4556	
IC12	2630147001	μPC78M05H	
IC13	2630160004	μPC7905H	
IC7	2620276005	HD14066BP	
IC9, 10	2620218005	HD7403P	
IC11	2620057004	HD7473P	
TR1, 2	2710102005	2SA1015 (Y)	
8, 18, 19			
23, 24			
TR4 ~ 7	2730198002	2SC 1815 (Y)	
9 ~ 17			
TR3	2740038002	2SD467 (C)	
D7 ~ 10	2760237001	RV06	
D1 ~ 6	2760049008	IS2076	
11 ~ 38			
TH1	2760311008	THERMISTER (1KΩ)	
LED6, 9, 10	3939041001	LED (LN81RCP-HL)	RED
LED3 ~ 5	3939213004	LED (GL-5EG23)	GREEN
TP1, 2	3939157005	TPS605	
LED1	3939185006	LED (NL0202GP3)	
CD1, 2	3939053002	CDS	
CD3	3939053028	CDS	
RESISTOR GROUP			
			Metal film
R20	2452195008	RN14K2E332G	3.3KΩ ¼W
R19	2452201002	RN14K2E562G	5.6KΩ ¼W
R12	2452215001	RN14K2E223G	22KΩ ¼W
R11	2452223006	RN14K2E473G	47KΩ ¼W
			Volume
VR1	EP-5462H15	SOLID VOLUME	22KΩ
VR3 ~ 5	2116000073	VO8PB203	20KΩ
VR6, 7	2118024015	V16V20KB502	5KΩ
CAPACITOR GROUP			
			Ceramic
C39, 40	2531004007	CK45B1H102K	1000PF 50V
70, 73			
77, 78			
84 ~ 86			
C14	2531008003	CK45B1H472K	4700PF 50V
C57	2531024003	CK45F1H103Z	0.01μF 50V
C25, 26, 29	2531027000	CK45F1H104Z	0.1μF 50V
30, 33, 34			
37, 41, 56			
58, 61, 62			
79			
C7, 8	2533619005	CC45SL1H470J	47PF 50V
C46	2533627000	CC45SL1H101J	100PF 50V
C1, 2, 11	2533637003	CC45SL1H271J	270PF 50V
13, 65			
C21, 22	2544129005	CE04W1A470=	47μF 10V
C6, 23	2544132005	CE04W1C100=	10μF 16V
28, 31, 32			
38, 45, 47			
48, 51, 53			
87			
			Electrolytic
C63, 69	2544135002	CE04W1C470=	47μF 16V
80			
C9, 24, 27	2544136001	CE4W1C101=	100μF 16V
50, 68			
C3, 10	2544146004	CE4W1H010=	1μF 50V
12, 17, 18			
20, 66, 67			
55			
C35, 36	2544086009	CE04W1E222=	2200μF 25V
C64	2544019005	CE04W1C221=	220μF 16V
			Film
C19	2551070008	CQ93M1H682K	0.0068μF 50V
C4, 5, 49	2551072006	CQ93M1H103K	0.01μF 50V
C52	2551075003	CQ93M1H183K	0.018μF 50V
C16, 44	2551122008	CQ93M1H473J	0.047μF 50V
C60	2551078000	CQ93M1H333K	0.033μF 50V
C15	2554194017	CQ93P1H473J	0.047μF 50V
OTHER PARTS GROUP			
	4178028101	HEAT SINK	
	4428030108	VOLUME BRACKET	
	3998025000	CRYSTAL (4.5MHZ)	
	2129180003	PUSH SWITCH	
	2129218001	PUSH SWITCH	
	4438568107	LED HOLDER	
	2050158049	4P WRAPPING TERMINAL	
	2050158036	3P WRAPPING TERMINAL	

● The carbon resistors rated at ¼W are not listed herein.

KU-5021 SERVO CONTROL UNIT (DP-35F)

Ref. No.	Part No.	Part Name	Remarks
SEMICONDUCTOR GROUP			
IC7	2620276005	HD14066BP	
IC8, 11	2620057004	HD7473P	
IC1	2630173004	IR3T02	
IC2	2630174003	IR3T03	
IC4	2630237005	LA6358	
IC3, 5	2630257001	M5218P	
IC6	2630198005	NJM4556	
IC12	2630147001	μPC78M05H	
IC13	2630160004	μPC7905H	
TR1, 2, 22	2710102005	2SA1015 (Y)	
TR4 ~ 7	2730198002	2SC1815 (Y)	
9~11,16,17			
19 ~ 21			
TR3	2740038002	2SD467 (C)	
D1, 4~6,	2760049008	1S2076	
11 ~ 13			
16, 17			
36 ~ 38			
D7 ~ 10	2760237001	RV06	
TH1	2760311008	THERMISTER (1KΩ)	
LED. 3~5	3939213004	LED (GL-5EG23)	GREEN
7, 8			
LED1	3939185006	LED (LN0202GP3)	
LED6,9,10	3939041001	LED (LN81RCP (HL))	RED
CD1	3939053028	CDS (10-15KΩ)	
CD2, 3	3939053002	CDS	
RESISTOR GROUP			
			Metal film
R20	2452195008	RN14K2E332G	3.3KΩ ¼W
R19	2452201002	RN14K2E562G	5.6KΩ ¼W
R12	2452215001	RN14K2E223G	22KΩ ¼W
R11	2452223006	RN14K2E473G	47KΩ ¼W
			Variable resistor
VR1	EP-5462H15	SOLID VOLUME	22KΩ
VR3 ~ 5	2116000073	V08PB203	20KΩ
VR6, 7	2118024015	V16V20KB502	5KΩ
CAPACITOR GROUP			
			Ceramic
C39, 40	2531004007	CK45B1H102K	1000PF 50V
C14	2531008003	CK45B1H472K	4700PF 50V
C25,26,29	2531027000	CK45F1H104Z	0.1μF 50V
30,33,34			
37,41			
C7, 8	2533619005	CC45SL1H470J	47PF 50V
C42, 46	2533627000	CC45SL1H101J	100PF 50V
C11,13,43	2533637003	CC45SL1H271J	270PF 50V
			Electrolytic
C21, 22	2544129005	CE04W1A470=	47μF 10V
C6,23,28	2544132005	CE04W1C100=	10μF 16V
31,32,38			
45,48,53			
C63, 69	2544135002	CE04W1C470=	47μF 16V
C9, 24	2544136001	CE04W1C101=	100μF 16V
27, 50			

Ref. No.	Part No.	Part Name	Remarks
C12, 17	2544146004	CE04W1H010=	1μF 50V
18, 20			
66, 67			
71, 72			
C47, 55	2544147003	CE04W1H2R2=	2.2μF 50V
C36	2542037005	CE02W1E102=	1000μF 25V
C35	2542038004	CE02W1E222=	2200μF 25V
			Film
C19	2551070008	CQ93M1H682K	0.0068μF 50V
C4,5	2551072006	CQ93M1H103K	0.01μF 50V
49, 54			
C52	2551075003	CQ93M1H183K	0.018μF 50V
C60	2551078000	CQ93M1H333K	0.033μF 50V
C16, 44	2551122008	CQ93M1H473J	0.047μF 50V
C15	2554194017	CQ93P1H473J	0.047μF 50V
OTHER PARTS GROUP			
	4178028101	HEAT SINK	
	4428030001	VOLUME BRACKET	
	3998025000	CRYSTAL (4.5 MHZ)	
SW9	2129180003	PUSH SWITCH	
SW1 ~ 6	2129218001	PUSH SWITCH	
	4438568107	LED HOLDER	

* The carbon resistors rated at ¼W are not listed herein.

KU-5010/5014 MOTOR DRIVE UNIT

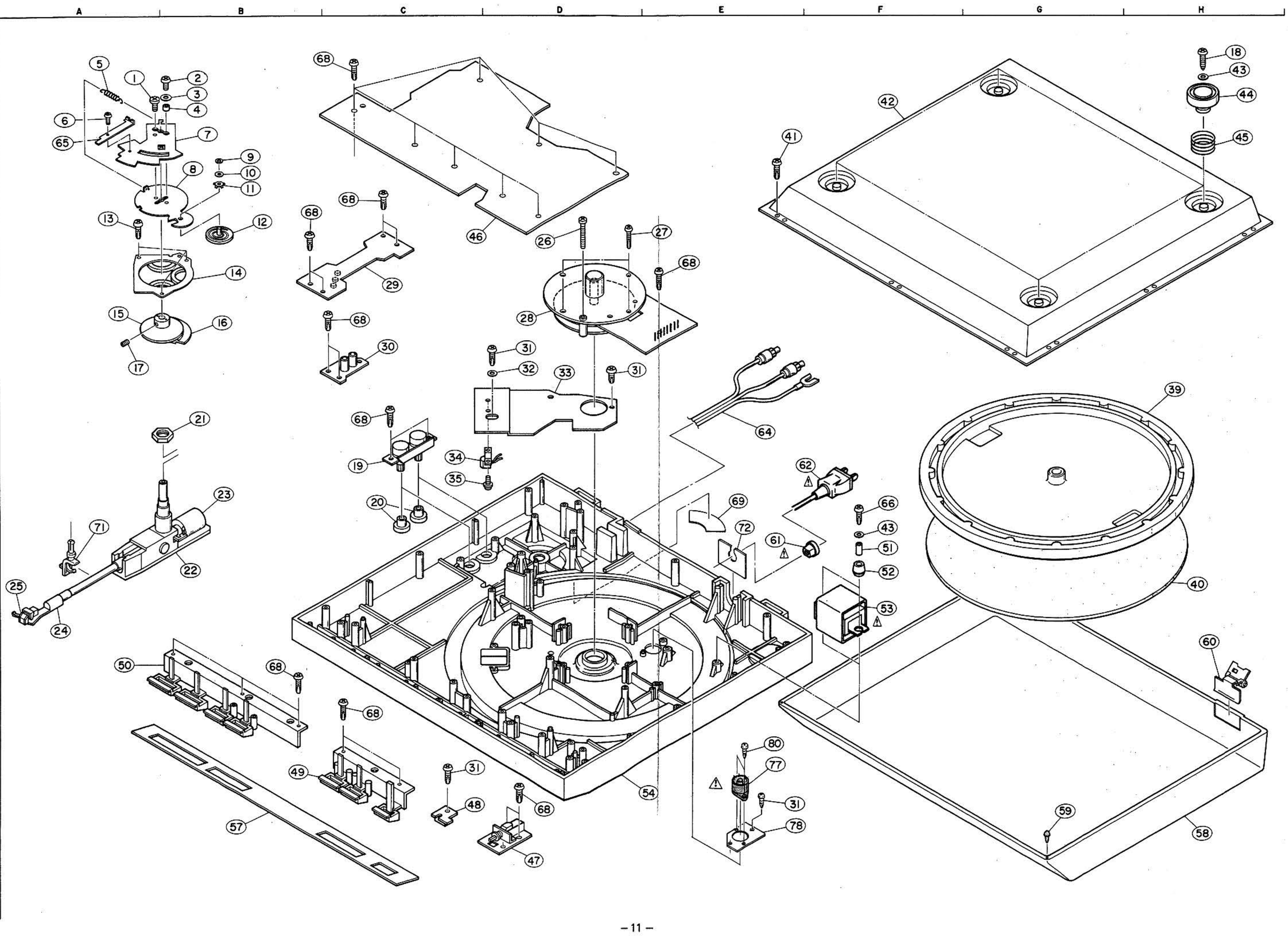
Ref. No.	Part No.	Part Name	Remarks
SEMICONDUCTOR GROUP			
IC201	2630257001	M5218P	
H201, 202	2680042004	H-300A	ORG, PINK
TR202,204	2710105002	2SA966 (Y)	
TR201, 203	2730201009	2SC2236 (Y)	
D201, 203	2760049008	1S2076	
TH201,202	2760311008	THERMISTOR (1KΩ)	
RESISTOR GROUP			
VR203,204	2116000031	V08PB 102 (1KΩ)	
VR201, 202	2116000073	V08PB203 (20KΩ)	
205, 206			
CAPACITOR GROUP			
C205	2531027000	CK45F1H104Z	0.1μF 50V
C202	2544015009	CE04W1C100=	10μF 16V
C203, 204	2551072006	CQ93M1H103K	0.01μF 50V

• The carbon resistors rated at ¼W are not listed herein.

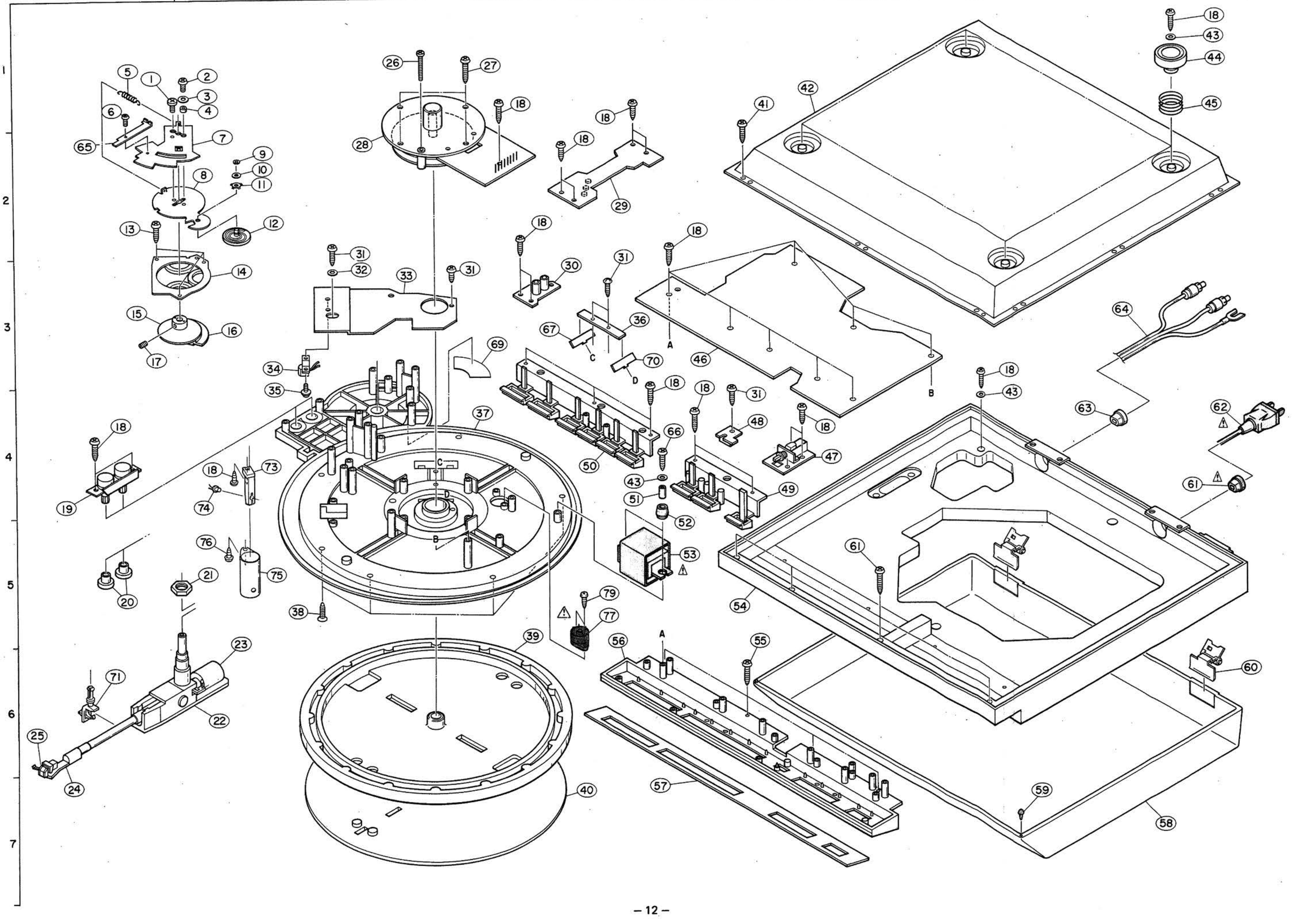
PACKING AND ACCESSORIES GROUP

Ref. No.	Part No.	Part Name	Remarks
	5038044101	PACKING ASS'Y	
	5038045100	PACKING (L)	
	5038046109	PACKING (R)	
	5298006002	45 ADAPTOR	
	5118243000	INSTRUCTION MANUAL	
	2033667007	PLUG ADAPTOR	EP, E1
	3158547001	SHELL ACCESSORY ASS'Y	EU, EC
	5018280338	CARTON CASE ASS'Y	DP-35F
	5018280325	CARTON CASE ASS'Y	DP-45F
	5018281133	CARTON CASE	DP-35F
	5018281120	CARTON CASE	DP-45F
	5028103007	BOTTOM PLATE	
	5028104006	PROTECTION PLATE	
	5028102105	UPPER PLATE	
	5058006006	ENVELOPE	60x100

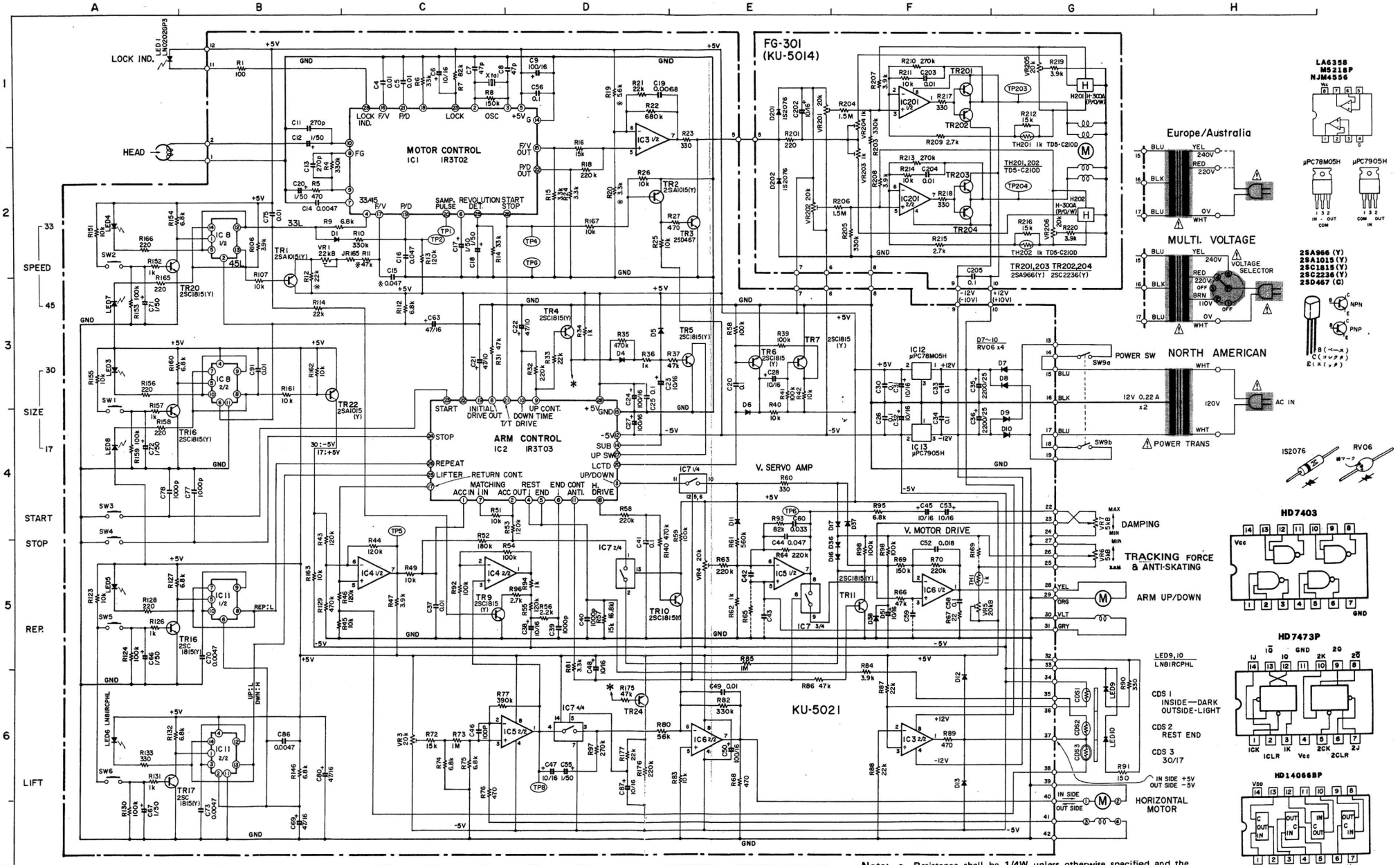
EXPLODED VIEW OF MAIN PARTS (DP-35F)



EXPLODED VIEW OF MAIN PARTS (DP-45F)



SCHEMATIC DIAGRAM OF DP-35F



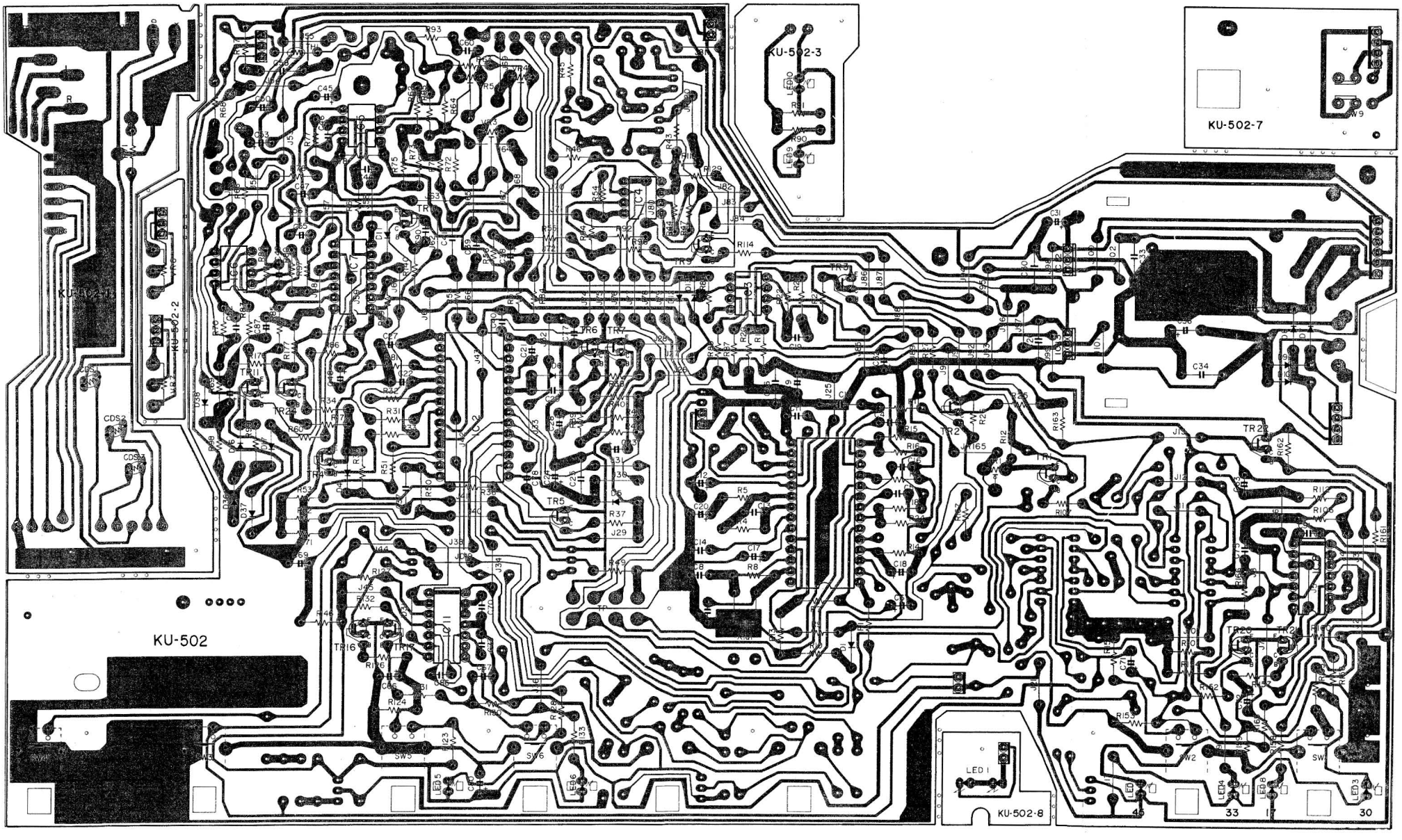
LED3,4,5,7,8	IC8,11	D1,4~6,11	IC3	IC4	IC5	IC6	IC7
GL-5EG23	HD7473P	1S2076	M5218P	LA6358	M5218P	NJM4556	HDI4066BP

ALTERNATIVES: For 2SA1015(Y) : 2SA999(E/F)
For 2SC1815(Y) : 2SC2603(E/F)

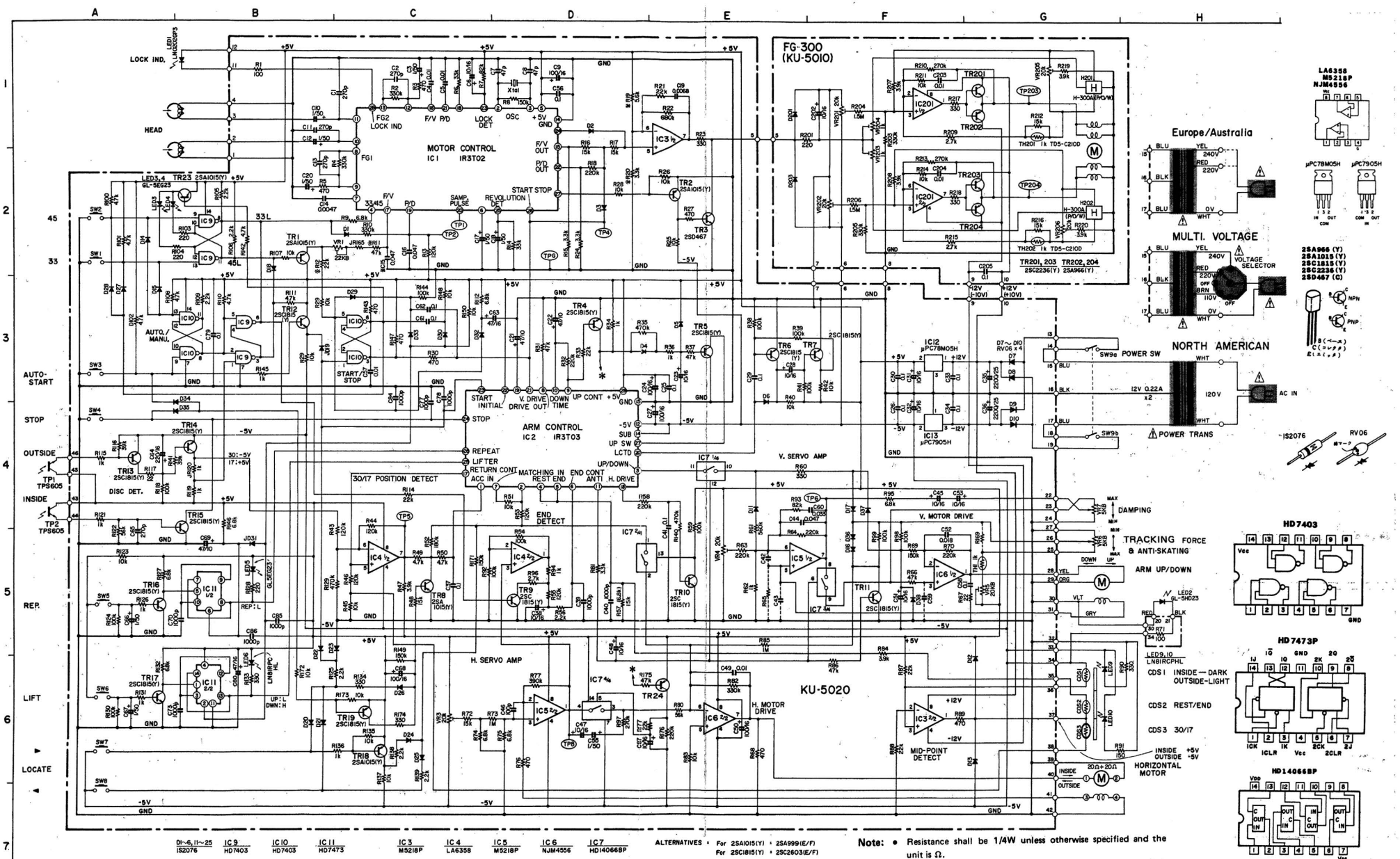
Note:

- Resistance shall be 1/4W unless otherwise specified and the unit is Ω.
- The unit of capacitor is μF, P is pF unless otherwise specified.
- This circuit diagram shows the basic circuit. It is subject to change for the purpose of improvement.
- Parts marked with ⚠ are of importance in respect to the safety, use the specified type without fail.

P. W. BOARD OF KU-5021 MOTOR SERVO UNIT



SCHEMATIC DIAGRAM OF DP-45F



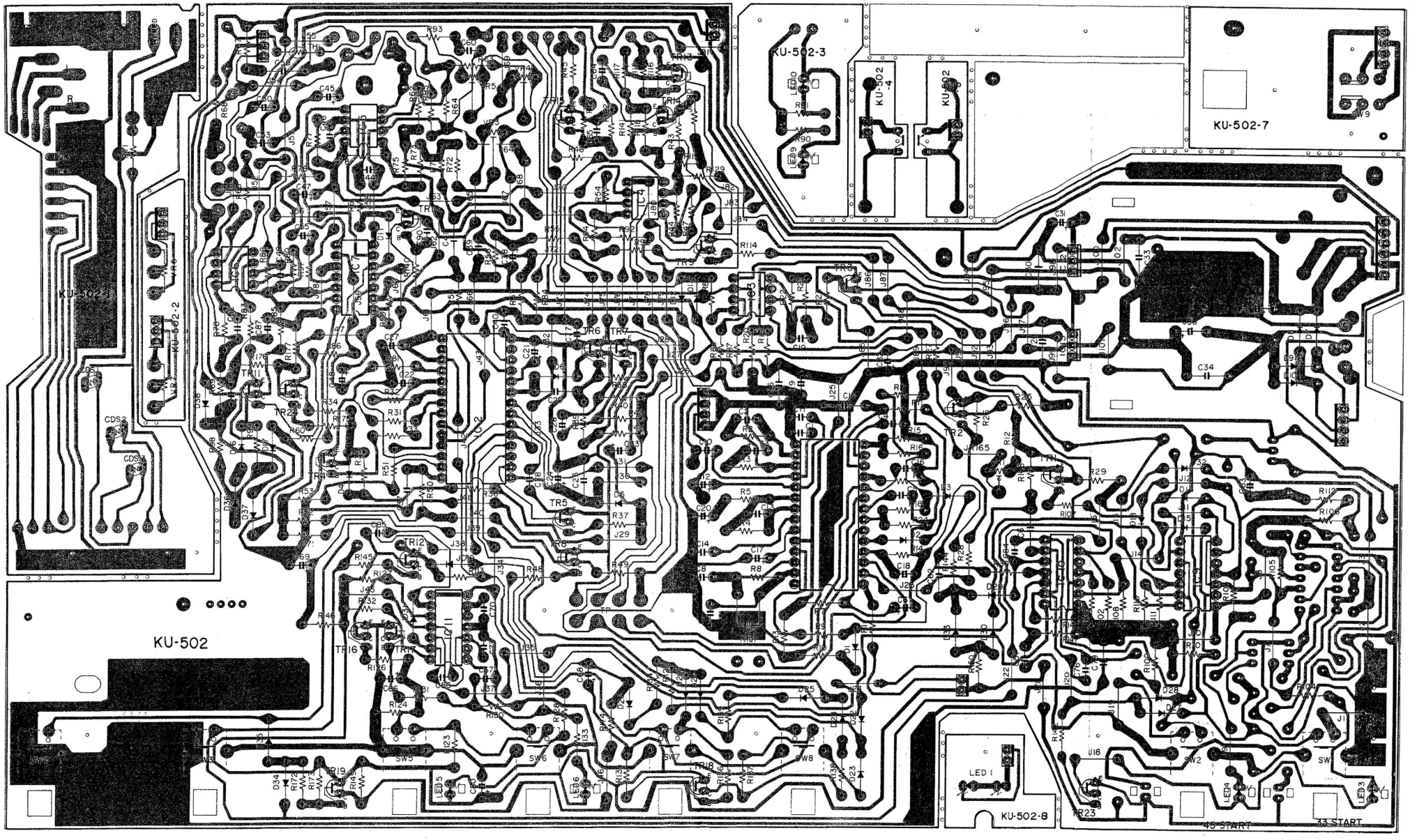
D1~6, 11~25	IC9	IC10	IC11	IC3	IC4	IC5	IC6	IC7
IS2076	HD7403	HD7403	HD7473	M5218P	LA6358	M5218P	NJM4556	HD14066BP

ALTERNATIVES : For 2SA1015(Y) : 2SA999(E/F)
For 2SC1815(Y) : 2SC2603(E/F)

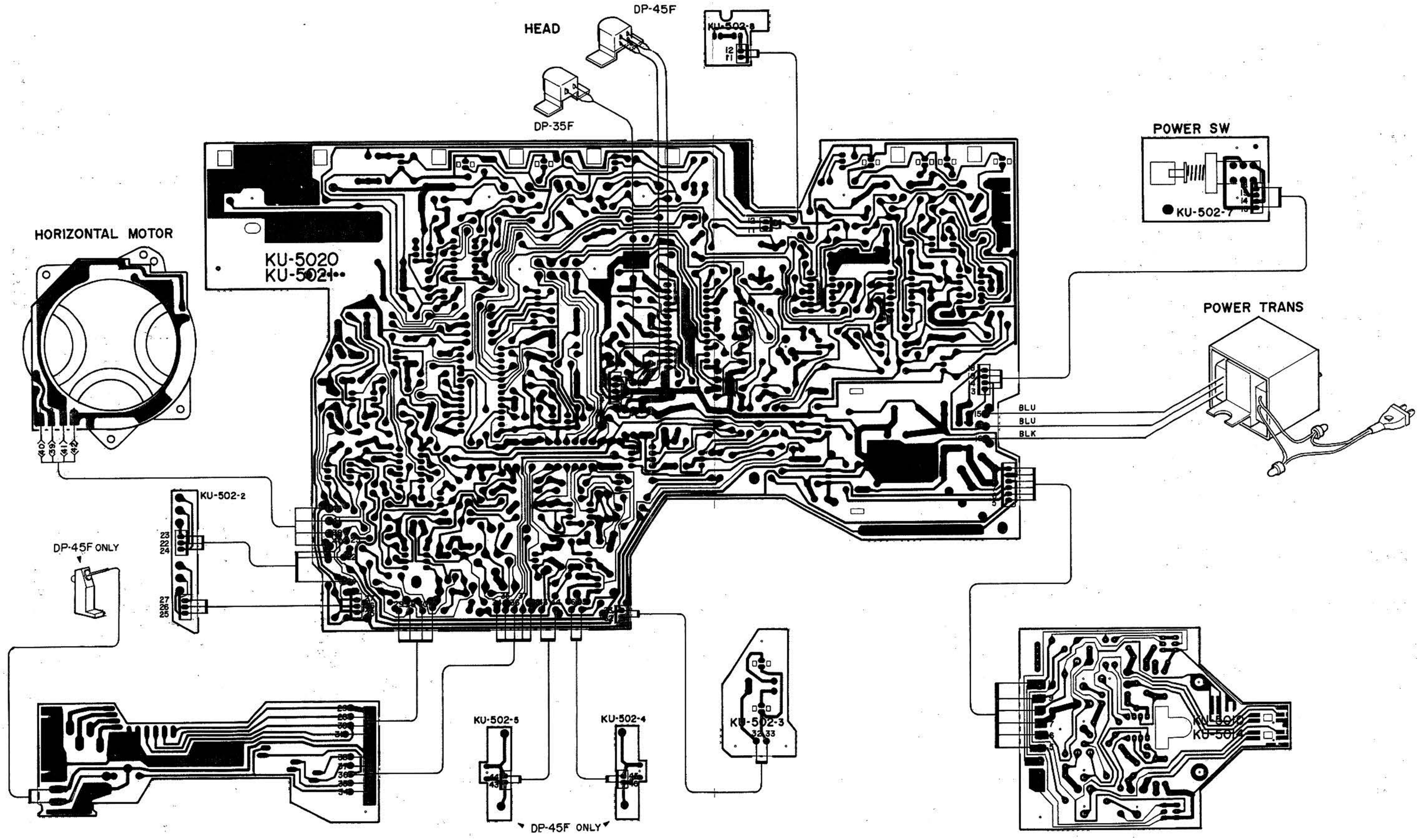
Note:

- Resistance shall be 1/4W unless otherwise specified and the unit is Ω.
- The unit of capacitor is μF, P is pF unless otherwise specified.
- This circuit diagram shows the basic circuit. It is subject to change for the purpose of improvement.
- Parts marked with ⚠ are of importance in respect to the safety, use the specified type without fail.

P. W. BOARD OF KU-5020 MOTOR SERVO UNIT



CONNECTIONS OF P.W. BOARD



P. W. BOARD OF KU-5010/5014 MOTOR DRIVE UNIT

