Quartz PLL DIRECT DRIVE 2-motor

FULL AUTOMATIC TURNTABLE

PL-570

SERVICE MANUAL

PIONEER®

Type	Voltage	Remarks
KCT	120V only	CSA (Canada) approved model, not provided phono cartridge.
KUT	120V only	UL (U.S.A.)approved model, not provided phono cartridge.

CONTENTS

1. SPECIFICATIONS

Motor and Turntable

Motor ..... Quartz PLL Hall motor
Turntable Platter ..... 324mm diam. aluminum alloy die-cast
Internal Mass ..... 340kg·cm² (including platter mat mass)
Speeds ..... 33-1/3 and 45rpm
Speeds Control Range ..... ±6%
Wow and Flutter ..... Less than 0.025% (WRMS)
Signal-to-Noise Ratio ..... More than 70dB (DIN-B)

Rotational Characteristics

Build-up Time ..... Within 240° rotation at 33-1/3rpm
Speed Deviation ..... Less than 0.003%
Speed vs. Load Characteristics .. Stable up to 120 grams drag load
Speed Drift ..... Less than 0.0003%/h at 33-1/3rpm
Less than 0.00004%/degree temp. change at 33-1/3rpm

Tonearm

Type ..... Static-balance type, S-shaped pipe arm
Effective Arm Length 237mm
Overhang 15mm
Usable Cartridge Weight ..... 4g (min.) to 13.5g (max.)
(For cartridge weighs over 9 grams, attach the sub weight)
Arm Height Adjust Range ..... ±5mm

Subfunctions

Warren motor for automatic functions
Anti-skating force control
Lateral balancer
Stylus pressure direct-readout counterweight
Arm height adjusting device
Cueing device
Headshell stand
Strobe light
Free stop hinges
Insulator feet

Semiconductors

ICs 4
Transistors 9
Diodes 12
Hall Elements 3
LED 1
Photo Transistor 1

Miscellaneous

Power Requirements ..... AC 120V 60Hz
Power Consumption 11W
Dimensions ..... 490(W) x 200(H) x 390(D)mm
19-5/16(W) x7-7/8(H) x 15-3/8(D)in.
Weight ..... 13.5kg/29 lb 11 oz

Accessories

45rpm adaptor 1
Overhang gauge 1
Screwdriver 1
Sub weight 1
Cartridge mounting screws 6
Cartridge mounting nuts 2
Cartridge mounting washers 2
Operating instructions 1

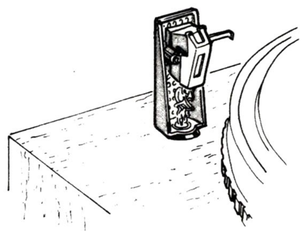
NOTE:
Specifications and design subject to possible modification without notice, due to improvements.

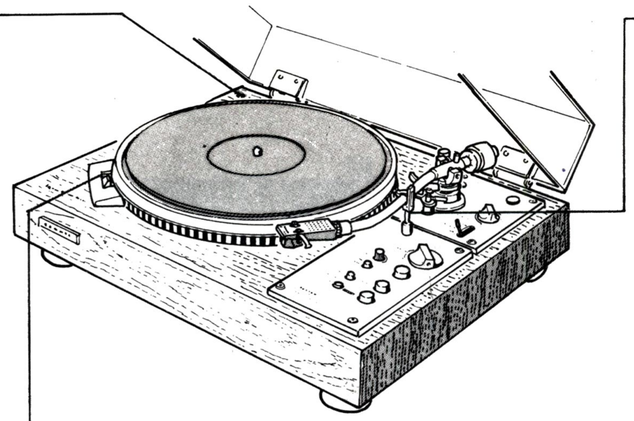
2. PANEL FACILITIES

HEADSHELL STAND

Store your spare cartridge here. Insert cartridge, aligning cartridge guide pin with groove in the headshell stand. The 45rpm adaptor can also be kept here.

NOTE:
Depending on how the headshell is inserted, it can contact the platter or dust cover. Be careful to insert it with the finger lift pointed inward.



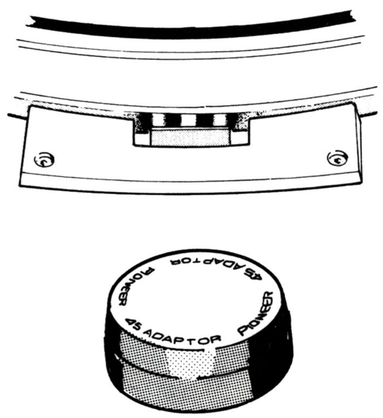


STROBE LIGHT

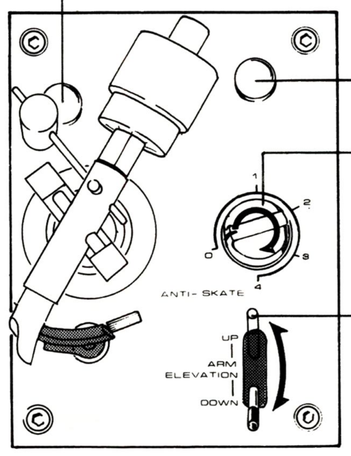
When the platter rotates, this lamp lights stroboscopically.

45 RPM ADAPTOR

Place over the center shaft when playing 45rpm EP (large hole) records.



* This plug should not be removed.



ADJUSTMENT OF AUTOMATIC DESCENT POSITION

There is a plug covering the adjusting screw.

ANTI-SKATE KNOB

Set to the same value as used for tracking force.

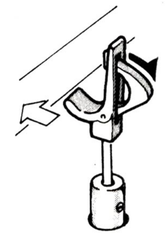
ARM ELEVATION LEVER

Controls ascent and descent of the tonearm.

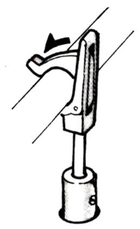
UP . . . . . To raise the tonearm from the record surface.
DOWN . . . To lower the tonearm to the record surface. The ARM ELEVATION lever must be in this position for automatic play.

ARM REST

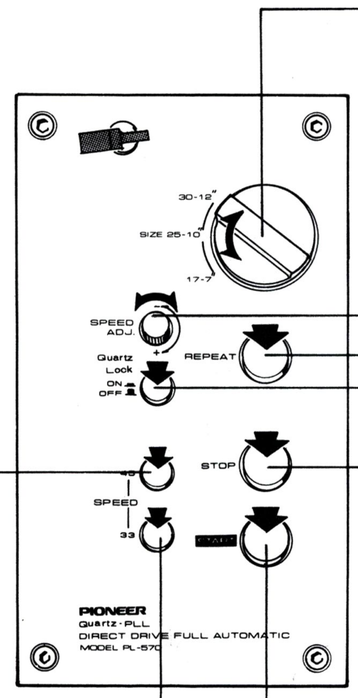
The arm rest supports the tonearm when it is not in use. When the turntable is not being used for a while, close the clamp around the tonearm as shown in the figure on the right.



Opening the clamp



Closing the clamp



RECORD SIZE SELECTOR

When using automatic play the record size should be set by this selector.

30-12" . . . . . 30cm (12 inch) LP Records
25-10" . . . . . 25cm (10 inch) LP Records
17-7" . . . . . 17cm (7 inch) LP Records or 45 RPM-Records

SPEED ADJUSTMENT KNOB

To adjust the pitch of a record being played place the Quartz lock switch in the OFF position, and vary platter speed by means of the SPEED ADJ. knob. Turning the knob in the (+) direction increases speed (and pitch), by up to 6%. Turning in the (–) direction decreases speed and pitch by the same amount.

REPEAT BUTTON

If this button is depressed before pressing the START button, the record will automatically repeat.

QUARTZ LOCK SWITCH

When this button is depressed (ON ▬) a quartz oscillator provides the reference signal by which the PLL circuit controls platter speed. In this position, platter speed will be precisely the rated speed 45 or 33-1/3 RPM, depending on the setting of the speed switching button.

STOP BUTTON

If this button is pressed while a record is playing, the tonearm will return to the arm rest and the motor will be turned off. Use the STOP button to cancel the REPEAT function.

START BUTTON

When the START button is depressed, the platter will begin to rotate, the tonearm will be brought to the record surface automatically, and play will begin.
Before pressing the START button the RECORD SIZE selector should be at the proper setting. If this has been done, the stylus will automatically descend at the lead-in groove of the record.

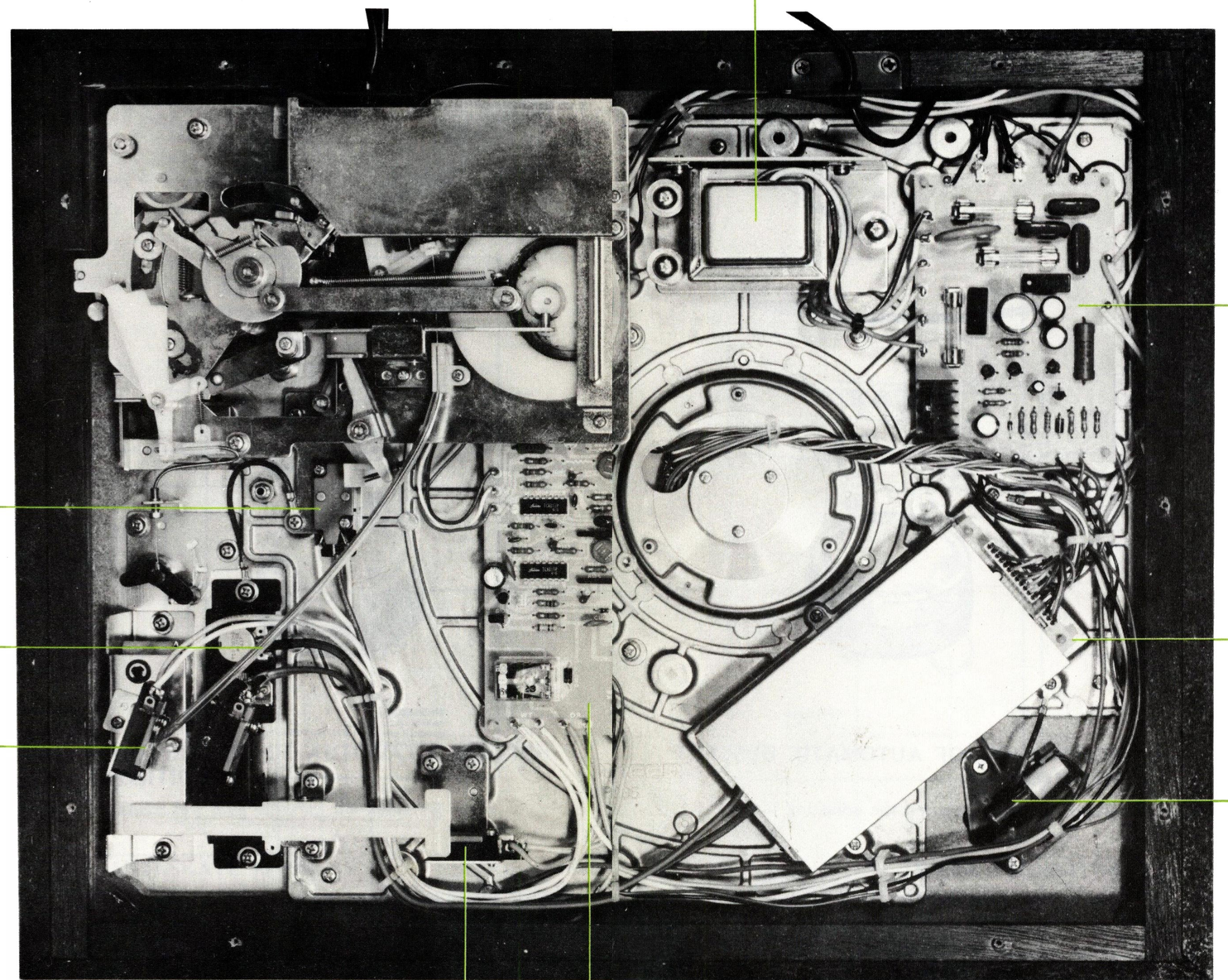
33-1/3 RPM BUTTON

Depress this button when playing a 33-1/3rpm record.

45 RPM BUTTON

Depress this button when playing a 45rpm record.

3. PARTS LOCATIONS



Head shell stand
PNW-073

Cabinet
PMM-098

Name plate
PAM-049

Name plate
PXT-189

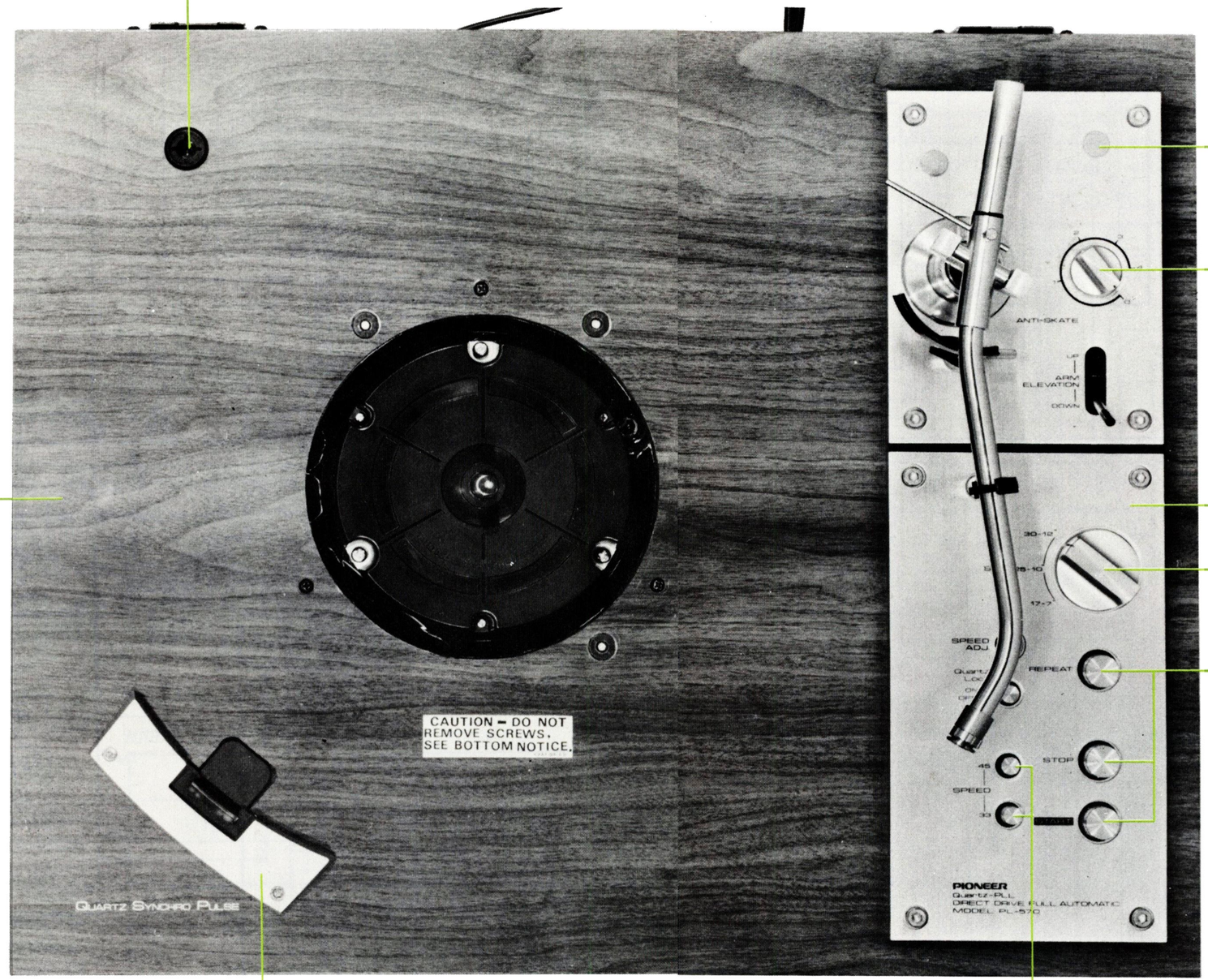
Knob (ANTI-SKATE)
PAA-022

Name plate
PXT-186

Knob (SIZE)
PAA-024

Button unit
PAD-019

Button unit
PAD-018

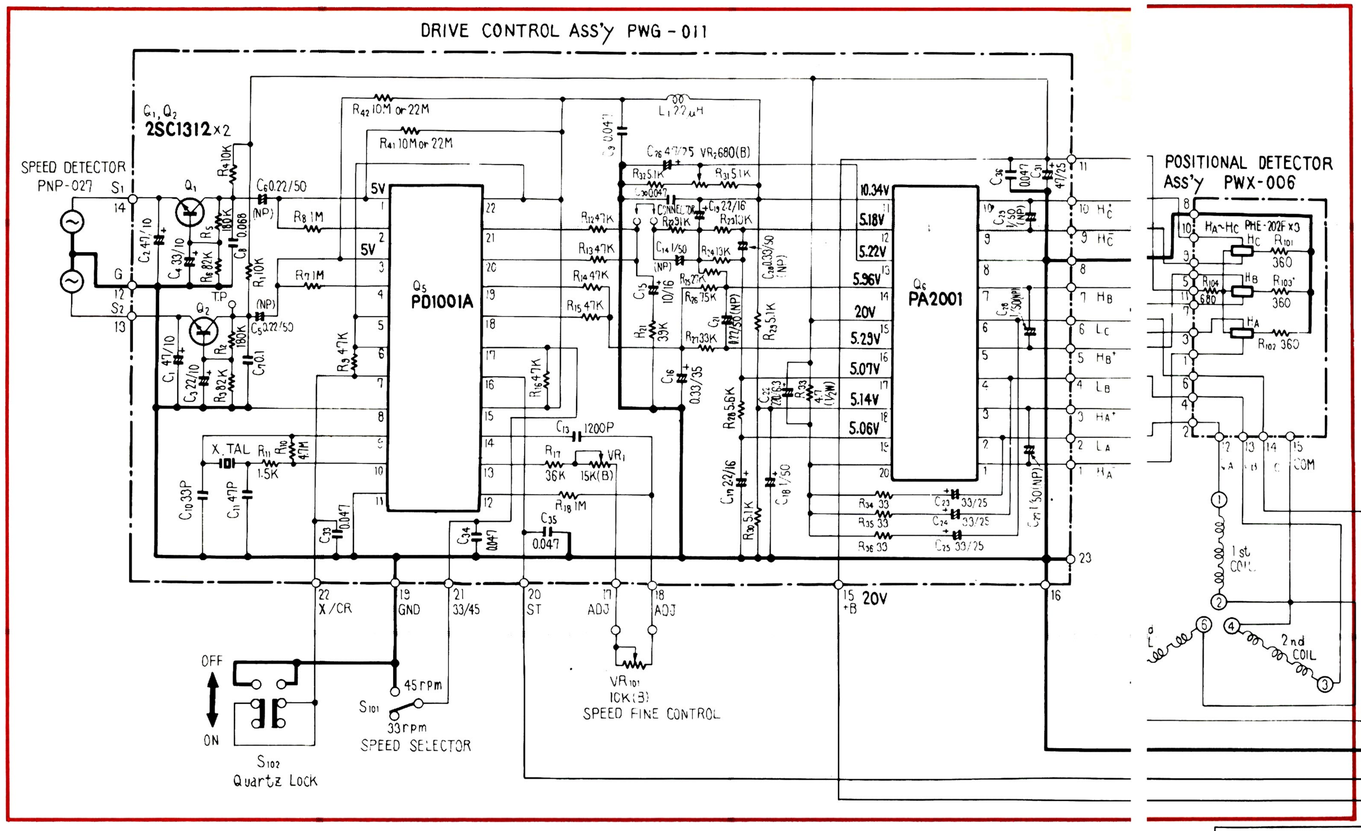


4. SCHEMATIC DIAGRAMS, P.C. BOARD PATTERNS AND PARTS LIST

4.1 SCHEMATIC DIAGRAM

PXM-049 see page 47.

NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts lists.



CAUTION

When Handling IC PCX-017 (TC4011P), Please Observe:

IC PCX-017 (Q_{103}, Q_{104} in the Auto-return detector Ass'y PWX-011) is a C-MOS IC of extremely low power consumption and very high input impedance. Unless handled with special care, it could be damaged by static electricity induction. This IC is supplied with a shorting cap (of aluminum foil) attached. When soldering or performing other repair work, always attach this cap as shown below. Remove the cap after the repair has been completed.

Also, this type of IC must not be inserted in a polystyrene package for storage.

RESISTORS; IN OHM, 1/4W, ±5 TOLERANCE UNLESS OTHERWISE NOT K : kΩ M : MΩ

CAPACITORS; IN μF UNLESS OTHERWISE NOTED P : pF

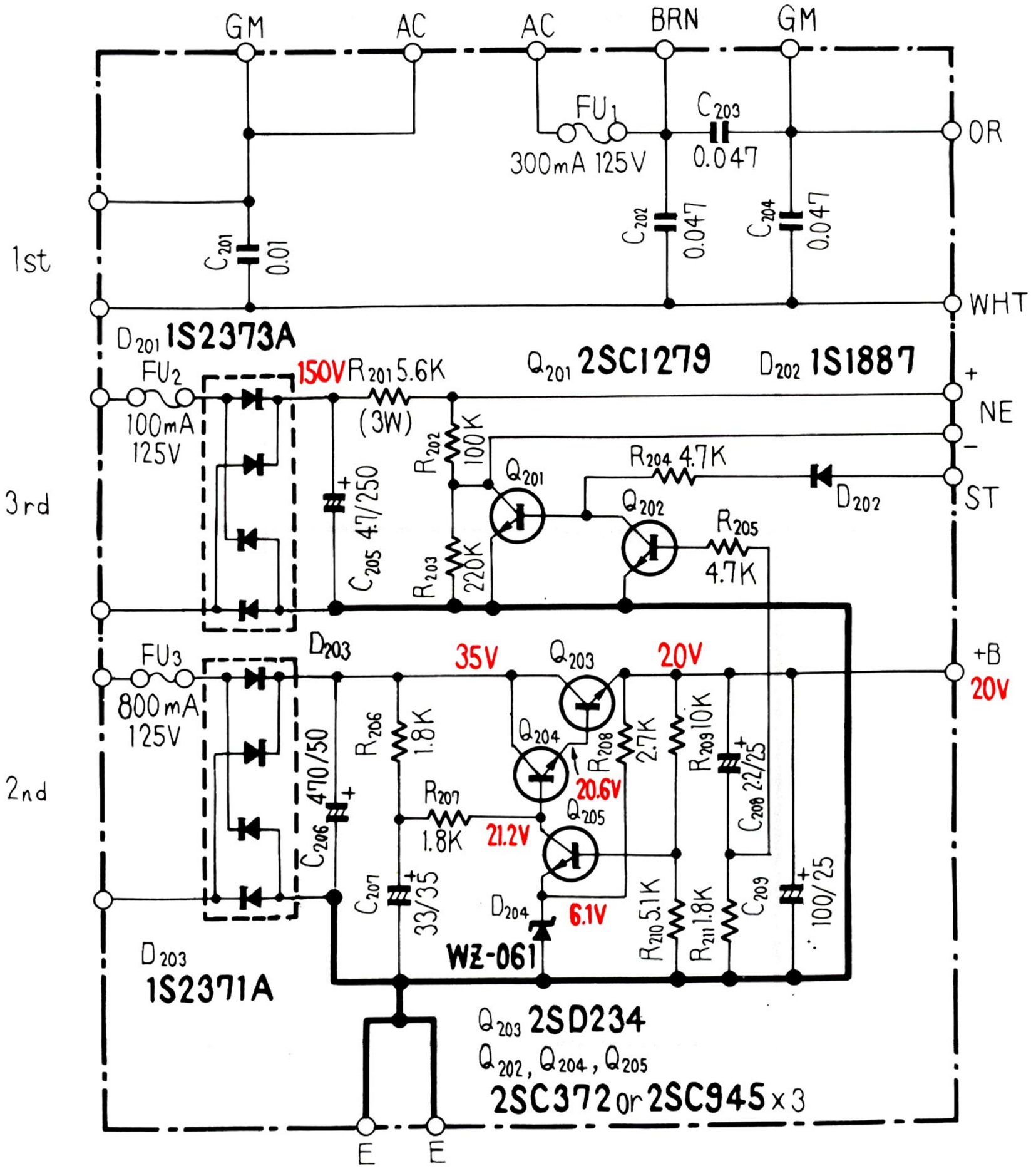
MISCELLANEOUS-PARTS

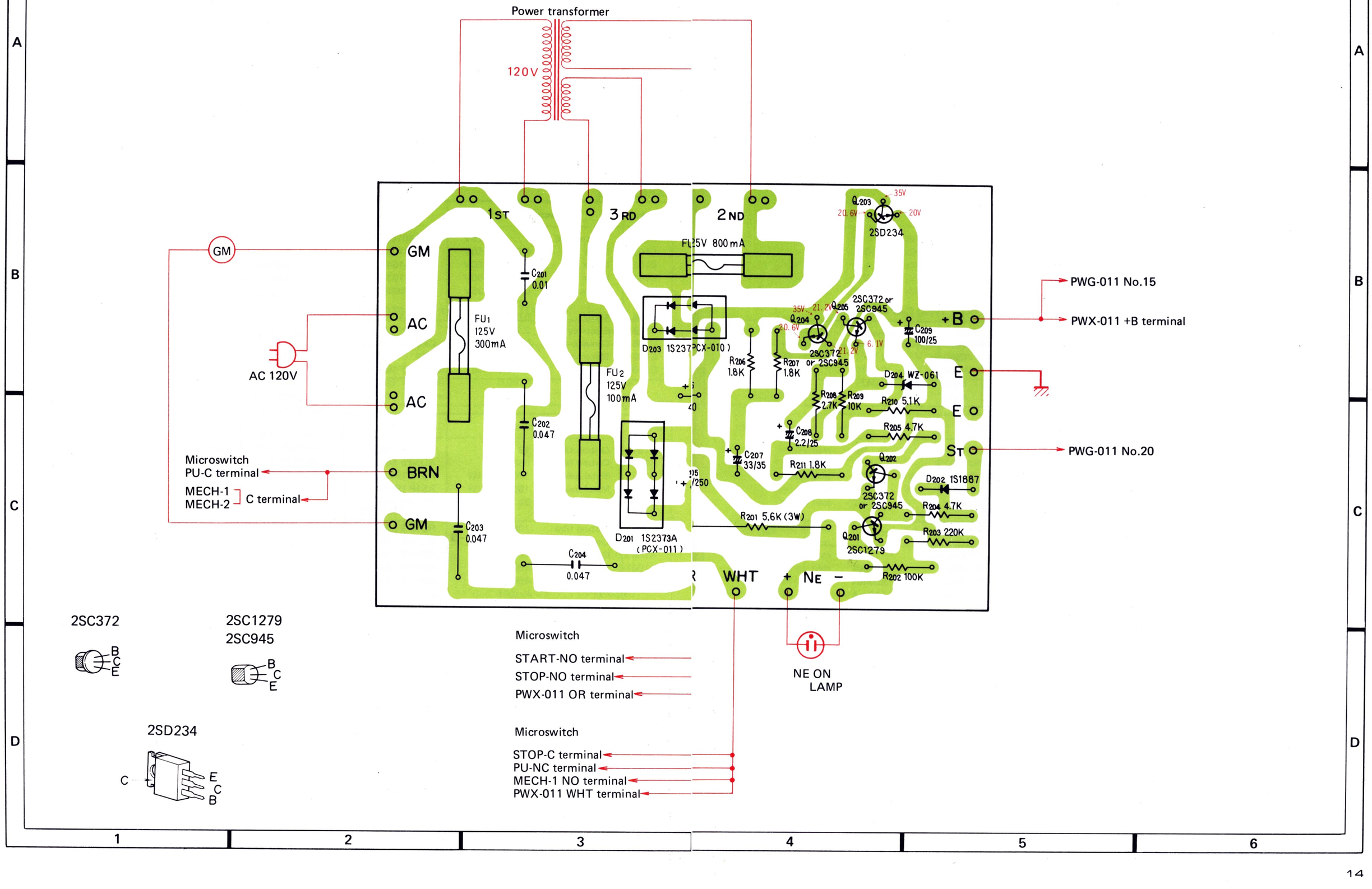
NOTE:
- *Capacitors: in μF unless otherwise noted p:pF*
- *Resistors: in Ω, ¼W unless otherwise noted k:kΩ, M:MΩ*

Symbol	Description	Part No.
	Drive control assembly	PWG-011
	Positional detector assembly	PWX-066
	Auto return detector assembly	PWX-011
	Power supply assembly	PWR-828 (KUT)
	Power supply assembly	PWR-830 (KCT)
S101	Microswitch (SPEED SELECTOR)	KSF-016
S102	Microswitch (Quartz Lock)	PSG-001
	PUSW Microswitch	KSF-023
	START SW, STOP SW Microswitch	KSF-016
	MECH 1 SW, MECH 2 SW Microswitch	KSF-023
VR101	SPEED CONTROL 10k-B	PCS-003
GM	Timing motor	PXM-048 (KUT)
	Timing motor	PXM-053 (KCT)
	Power transformer	PTT-021
NEON	Neon lamp	PEL-019
	Photo transistor PH-101-L	
	LED SE 302A	

4.2 POWER SUPPLY ASSEMBLY (PWR-828) and (PWR-830)

PWR-828 (KUT)
PWR-830 (KCT)





Parts List of Power Supply Assembly (PWR-828) and (PWR-830)

SEMICONDUCTORS

Symbol	Description	Part No.
Q201	Transistor	2SC1279-S
Q202	Transistor	2SC372-Y or 2SC945-P or 2SC945-Q
Q203	Transistor	2SD234
Q204	Transistor	2SC372-Y or 2SC945-P or 2SC945-Q
Q205	Transistor	2SC372-Y or 2SC945-P or 2SC945-Q
D201	Bridge rectifiers	PCX-011
D202	Diode	1S-1887
D203	Bridge rectifiers	PCX-010
D204	Zener diode	WZ-061

CAPACITORS

* Mark is KUT type only.

Symbol	Description			Part No.
* C201	Ceramic	0.1		PCL-021
* C202	Myler	0.047		KCE-005
* C203	Myler	0.047		KCE-005
* C204	Myler	0.047		KCE-005
C205	Electrolytic	4.7	250V	CEA 4R7P 250
C206	Electrolytic	470	50V	CEA 471P 50
C207	Electrolytic	33	35V	CEA 330P 35
C208	Electrolytic	2.2	25V	CEB 2R2P 25
C209	Electrolytic	100	25V	CEA 101P 25

RESISTORS

Symbol	Description			Part No.
R201	Metal oxide	5.6k	3W	RS3P 562J
R202	Carbon film	100k		RD¼PS 104J
R203	Carbon film	220k		RD¼PS 224J
R204	Carbon film	4.7k		RD¼PS 472J
R205	Carbon film	4.7k		RD¼PS 472J
R206	Carbon film	1.8k		RD¼PS 182J
R207	Carbon film	1.8k		RD¼PS 182J
R208	Carbon film	2.7k		RD¼PS 272J
R209	Carbon film	10k		RD¼PS 103J
R210	Carbon film	5.1k		RD¼PS 512J
R211	Carbon film	1.8k		RD¼PS 182J

PWR-830 (KCT type) CAPACITORS

Symbol	Description		Part No.
C201	Ceramic	0.1	PCL-020
C202	Myler	0.047	PCL-019
C203	Myler	0.047	PCL-019
C204	Myler	0.047	PCL-019

OTHERS

Symbol	Description		Part No.
	Fuse clip		K91-006
FU1	Fuse	300mA	PEK-009
FU2	Fuse	800mA	PEK-013
FU3	Fuse	100mA	PEK-010
	Heat sink		PNS-001

4.3 AUTO RETURN DETECTOR ASSEMBLY (PWX-011)

Part List

SEMICONDUCTORS

Symbol	Description	Part No.
Q101	Transistor	2SC 945-porQ
Q102	Transistor	2SD 471
Q103	IC	PCX-017 (TC4011P)
Q104	IC	PCX-017 (TC4011P)
D101	Zener diode	PCX-020 (WZ-150)
D102	Diode	1S1885

CAPACITORS

Symbol	Description			Part No.
C101	Electrolytic	1	25V	CSZA010K25
C102	Mylar	0.01	50V	CQMA103K50
C103	Mylar	0.1	50V	CQMA104K50
C104	Mylar	0.01	50V	CQMA103K50
C105	Electrolytic	0.68	35V	CSZAR68K35
C106	Mylar	0.01	50V	CQMA103K50
C107	Electrolytic	2.2	16V	CSZA2R2K16
C108	Ceramic	0.1	50V	CKDYF104Z50
C109	Electrolytic	100	16V	CEA101P16
C110	Ceramic	0.1	50V	CKDYF104Z50

RESISTORS

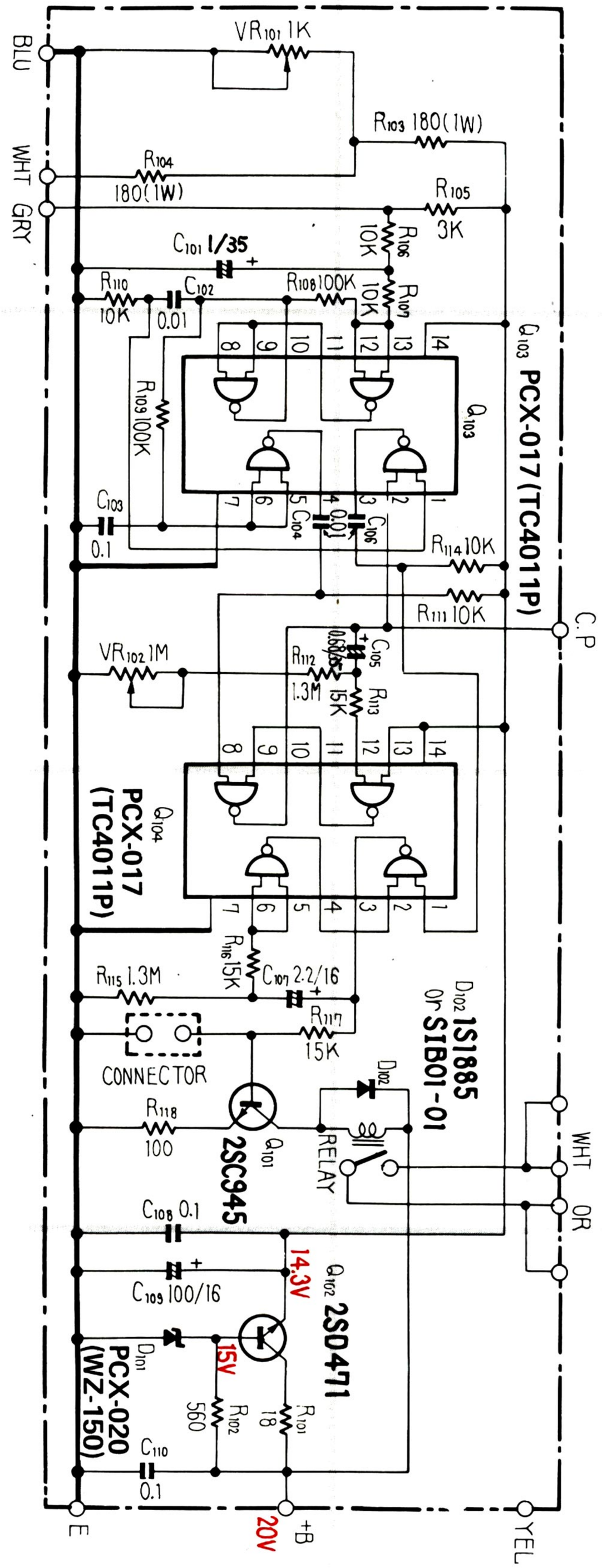
Symbol	Description			Part No.
R101	Carbon film	18		RD¼PS 180J
R102	Carbon film	560		RD¼PS 561J
R103	Metal oxide	180	1W	RS1P 181J
R104	Metal oxide	180	1W	RS1P 181J
R105	Carbon film	3k		RD¼PS 302J
R106	Carbon film	10k		RD¼PS 103J
R107	Carbon film	10k		RD¼PS 103J
R108	Carbon film	100k		RD¼PS 104J
R109	Carbon film	100k		RD¼PS 104J
R110	Carbon film	10k		RD¼PS 103J
R111	Carbon film	10k		RD¼PS 103J
R112	Metal film	1.3M	½W	RN½SS 1304G
R113	Carbon film	15k		RD¼PS 153J
R114	Carbon film	10k		RD¼PS 103J
R115	Metal film	1.3M		RN½SS 1304G
R116	Carbon film	15k		RD¼PS 153J
R117	Carbon film	15k		RD¼PS 153J
R118	Carbon film	100		RD¼PS 101J
VR101	Semi-fixed	470-B		PCP-010
VR102	Semi-fixed	1M-B		PCP-008

CAUTION

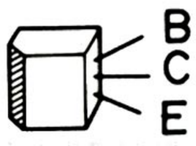
When Handling IC PCX-017 (TC4011P), Please Observe:

IC PCX-017 (Q_{103}, Q_{104} in the Auto-return detector Ass'y PWX-011) is a C-MOS IC of extremely low power consumption and very high input impedance. Unless handled with special care, it could be damaged by static electricity induction. This IC is supplied with a shorting cap (of aluminum foil) attached. When soldering or performing other repair work, always attach this cap as shown below. Remove the cap after the repair has been completed.

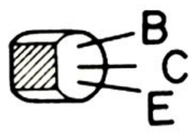
Also, this type of IC must not be inserted in a polystyrene package for storage.



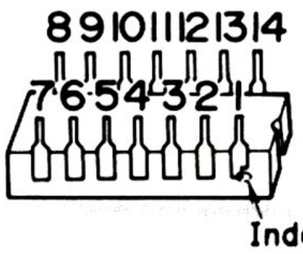
2SD-471

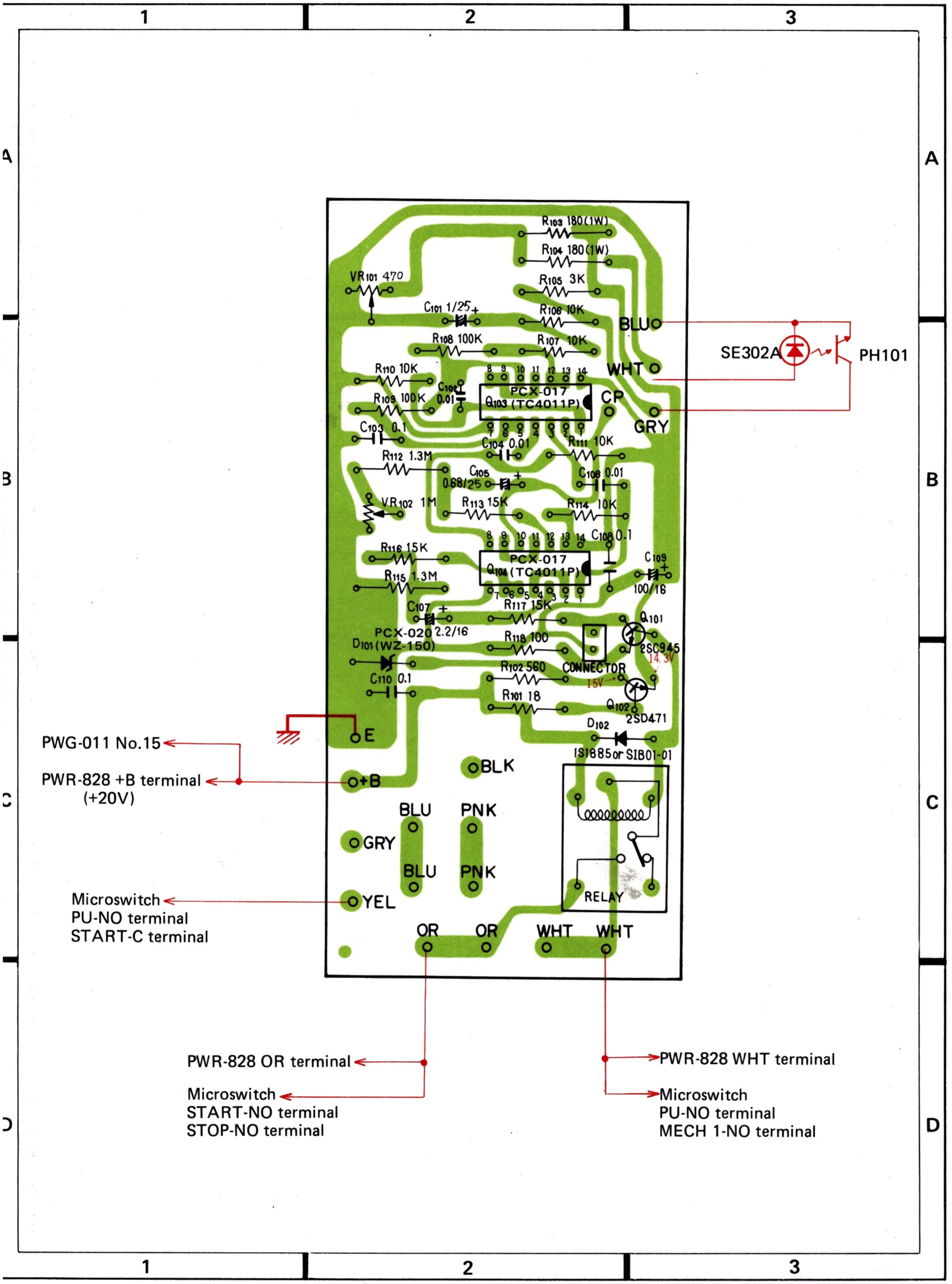


2SC945

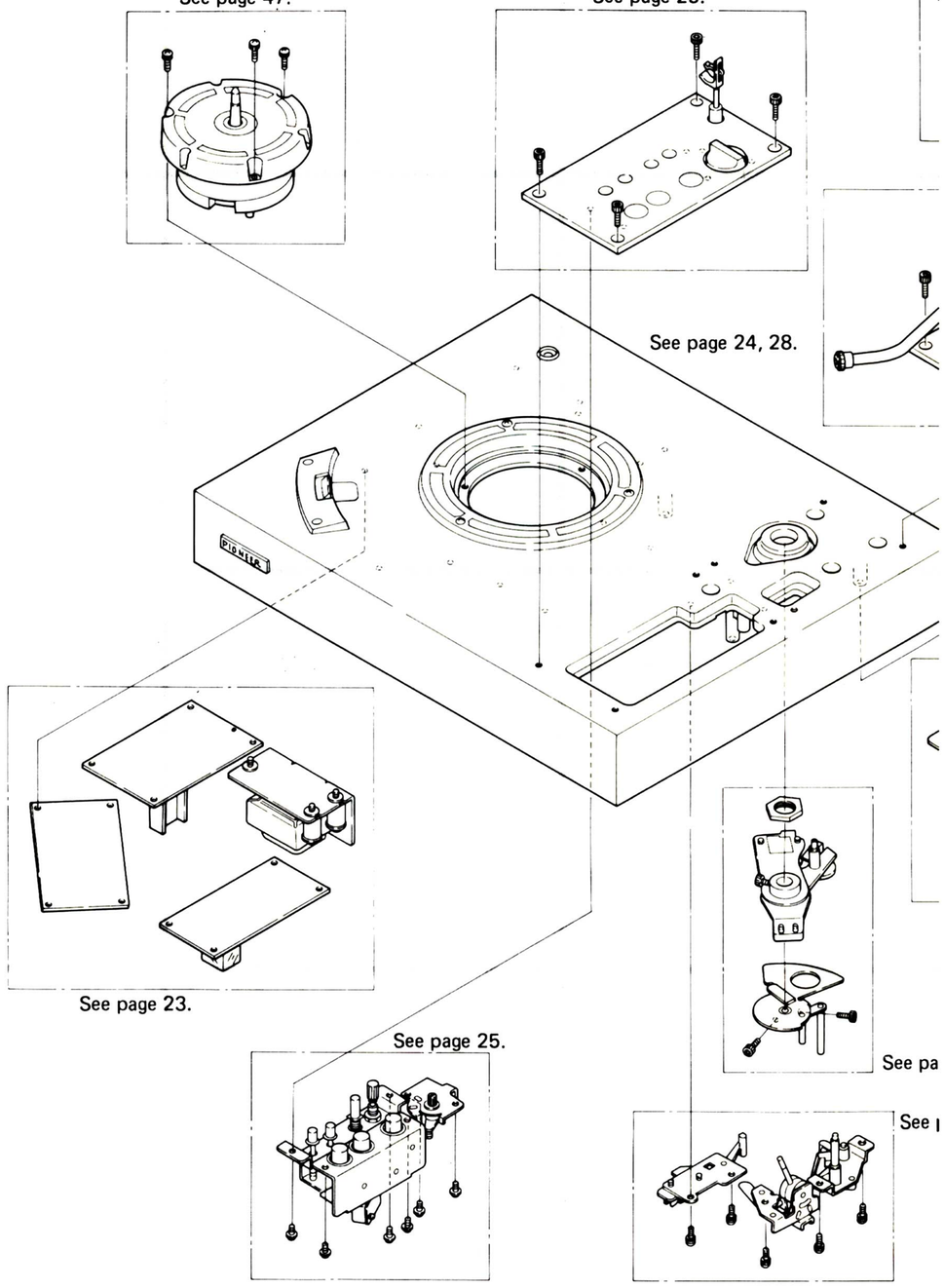


PCX-017



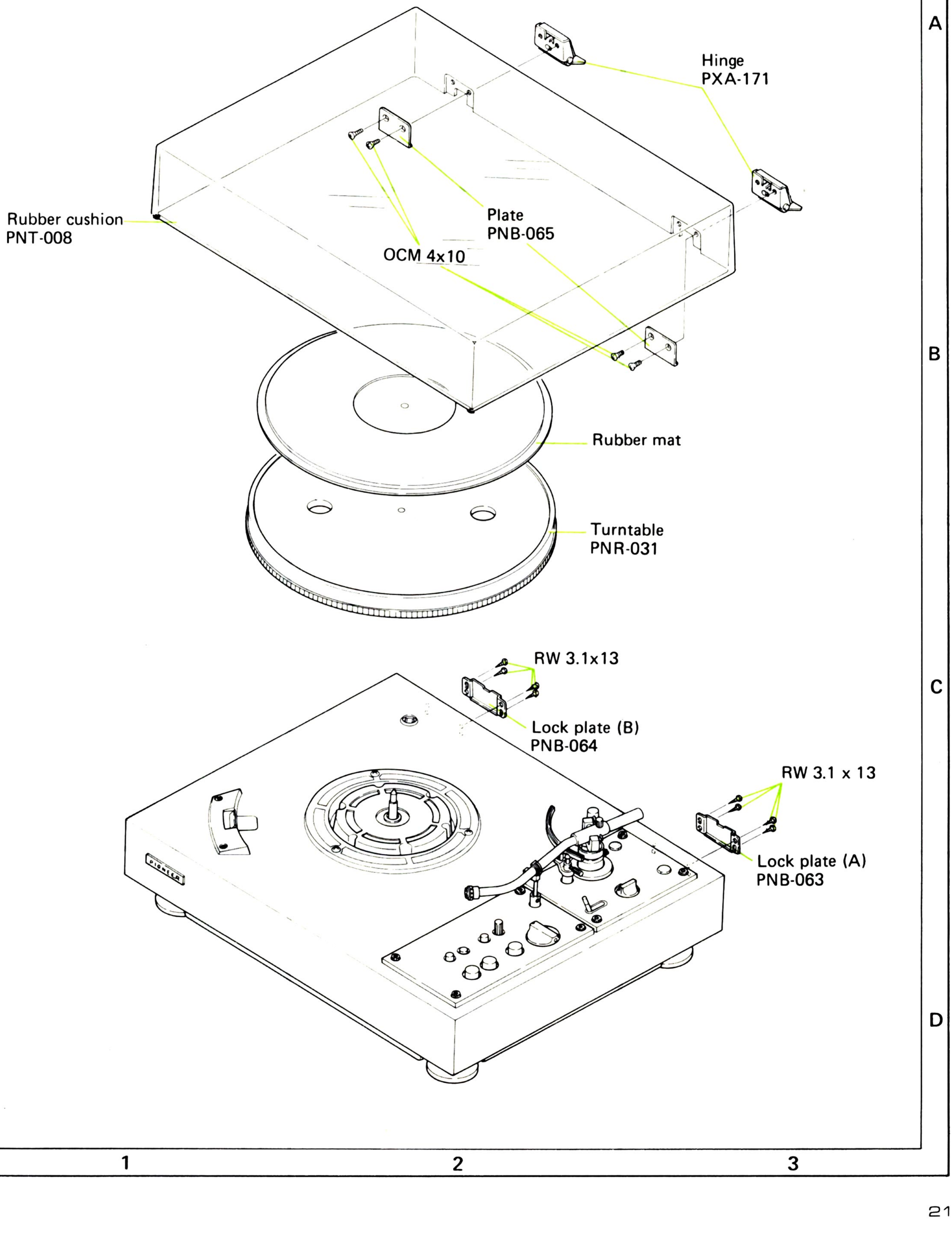


5. EXPLODED VIEWS



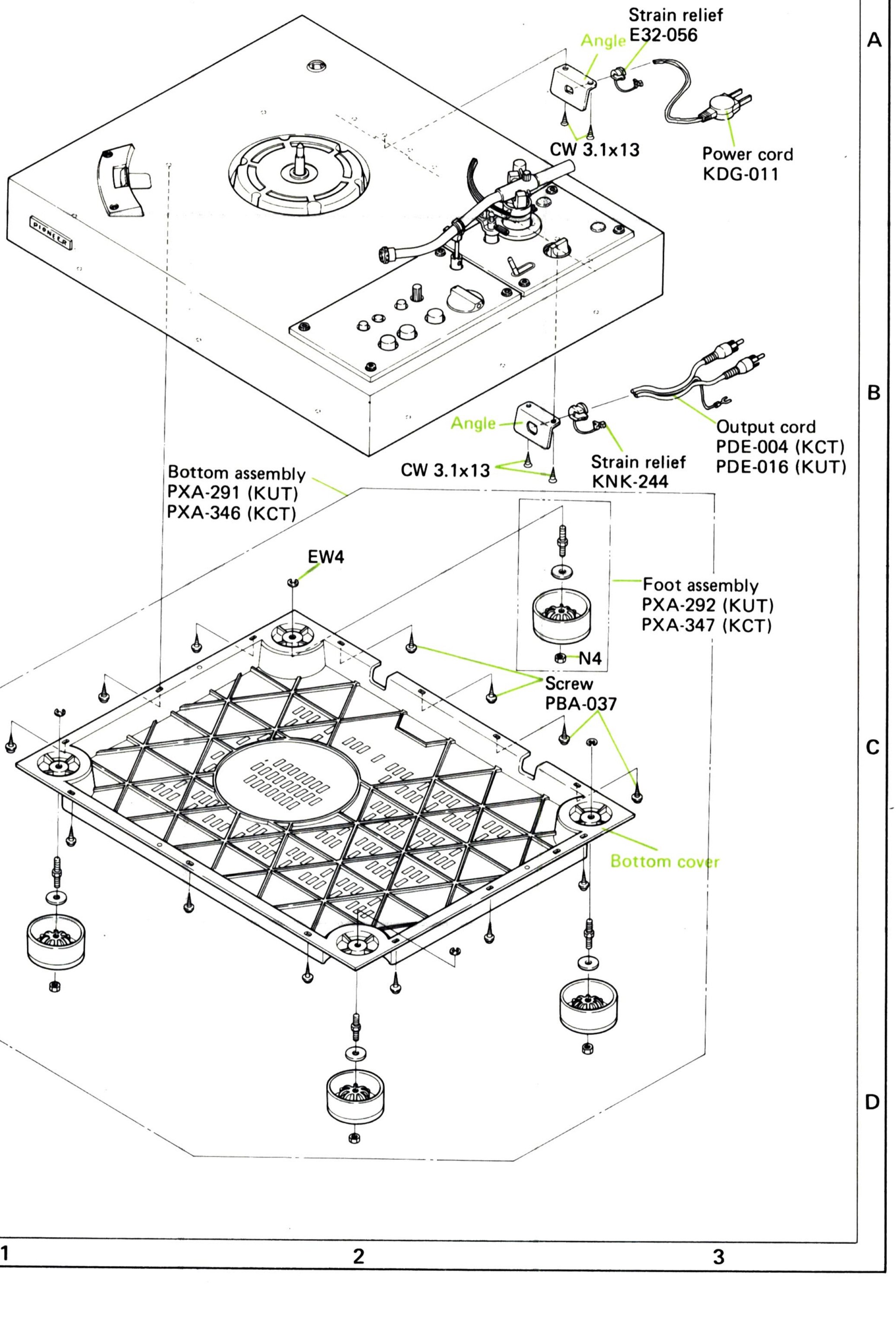
5.1 DUST COVER

NOTE:
Parts indicated in green type cannot be supplied.



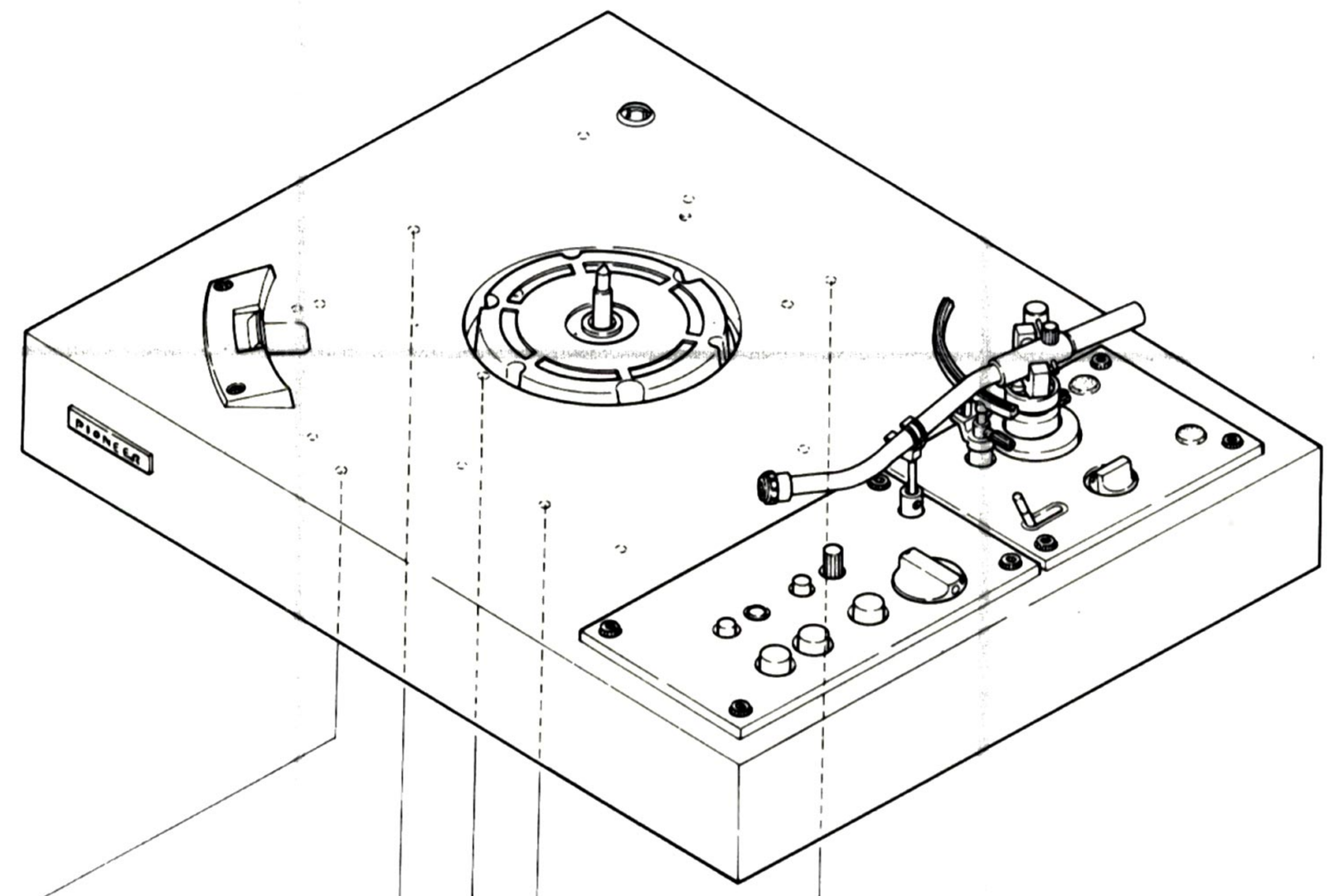
5.2 BOTTOM PLATE

NOTE:
Parts indicated in green type cannot be supplied.



5.3 P.C. BOARD

NOTE:
Parts indicated in green type cannot be supplied.



P.C. Board holder

Drive control assembly
PWG-011

Shield case

PSA3x6

P.C. Board holder

Auto return detector assembly
PWX-011

Rubber cushion
PEB-037

Angle

Rubber cushion
PEB-037

P.C. Board holder

Power supply assembly
PWR-828 (KUT)
PWR-830 (KCT)

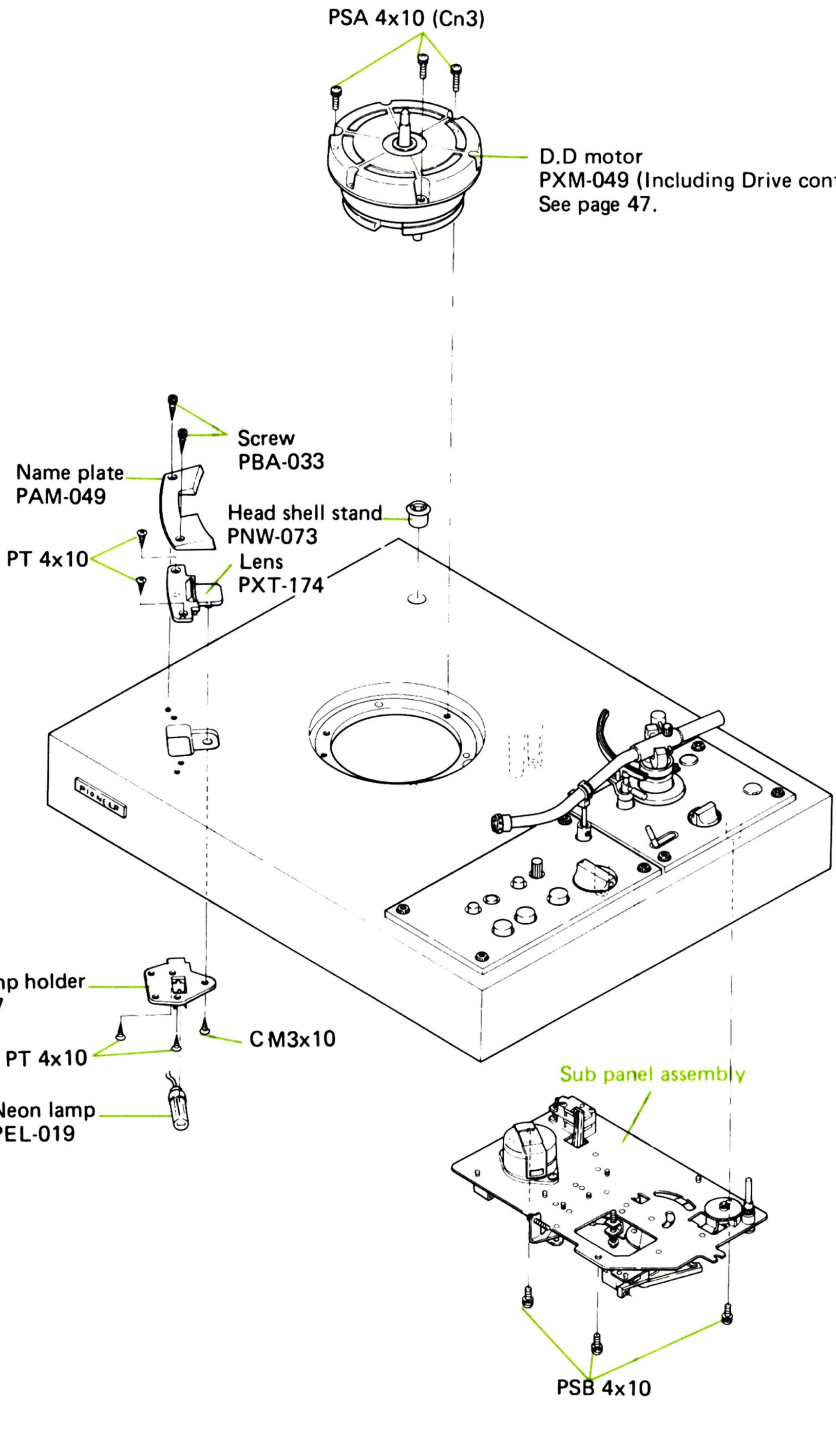
PSA 4x6

Power transformer
PTT-021

Screw
KBA-025

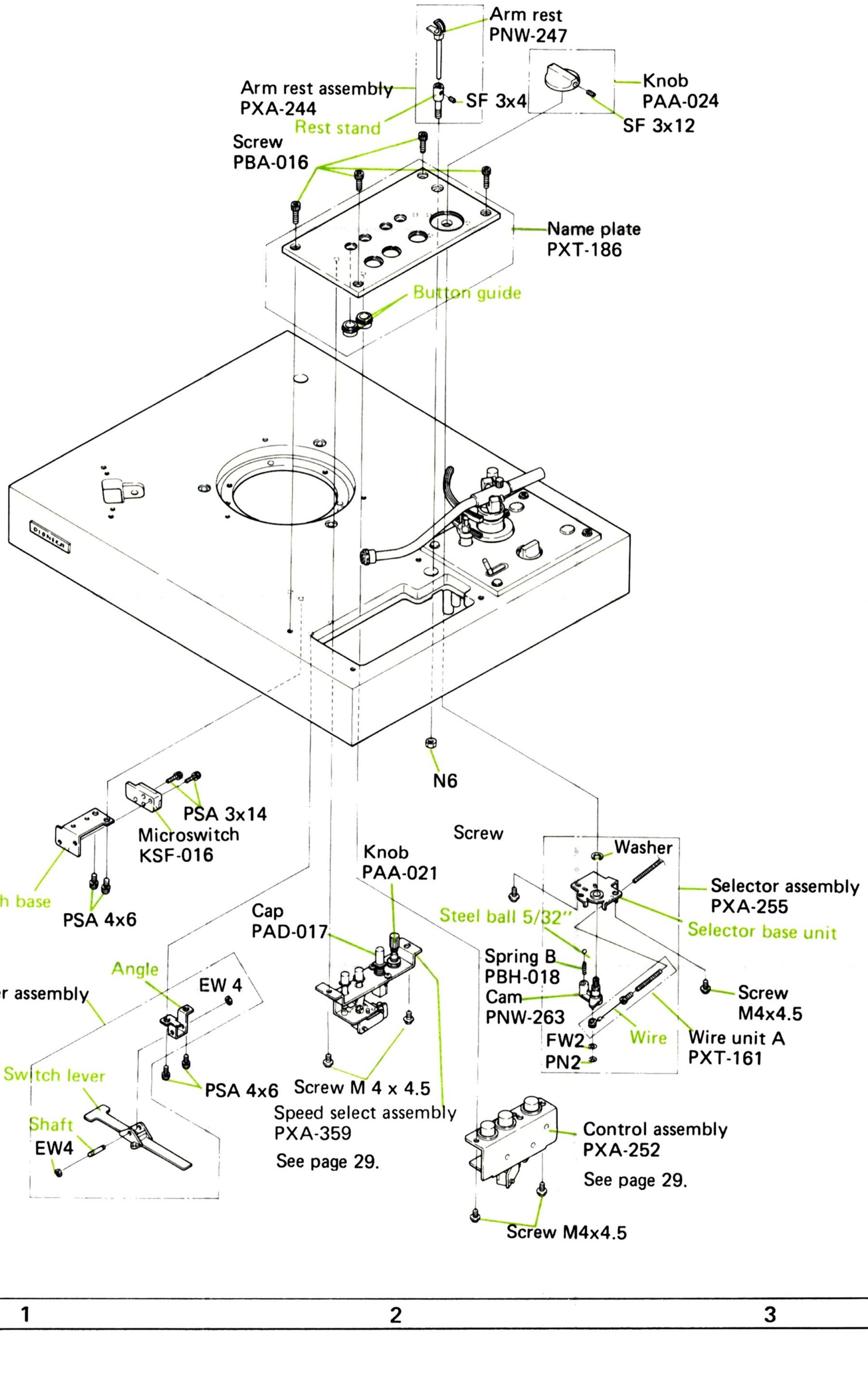
5.4 MOTOR and STROBE LIGHT

NOTE:
Parts indicated in green type cannot be supplied.



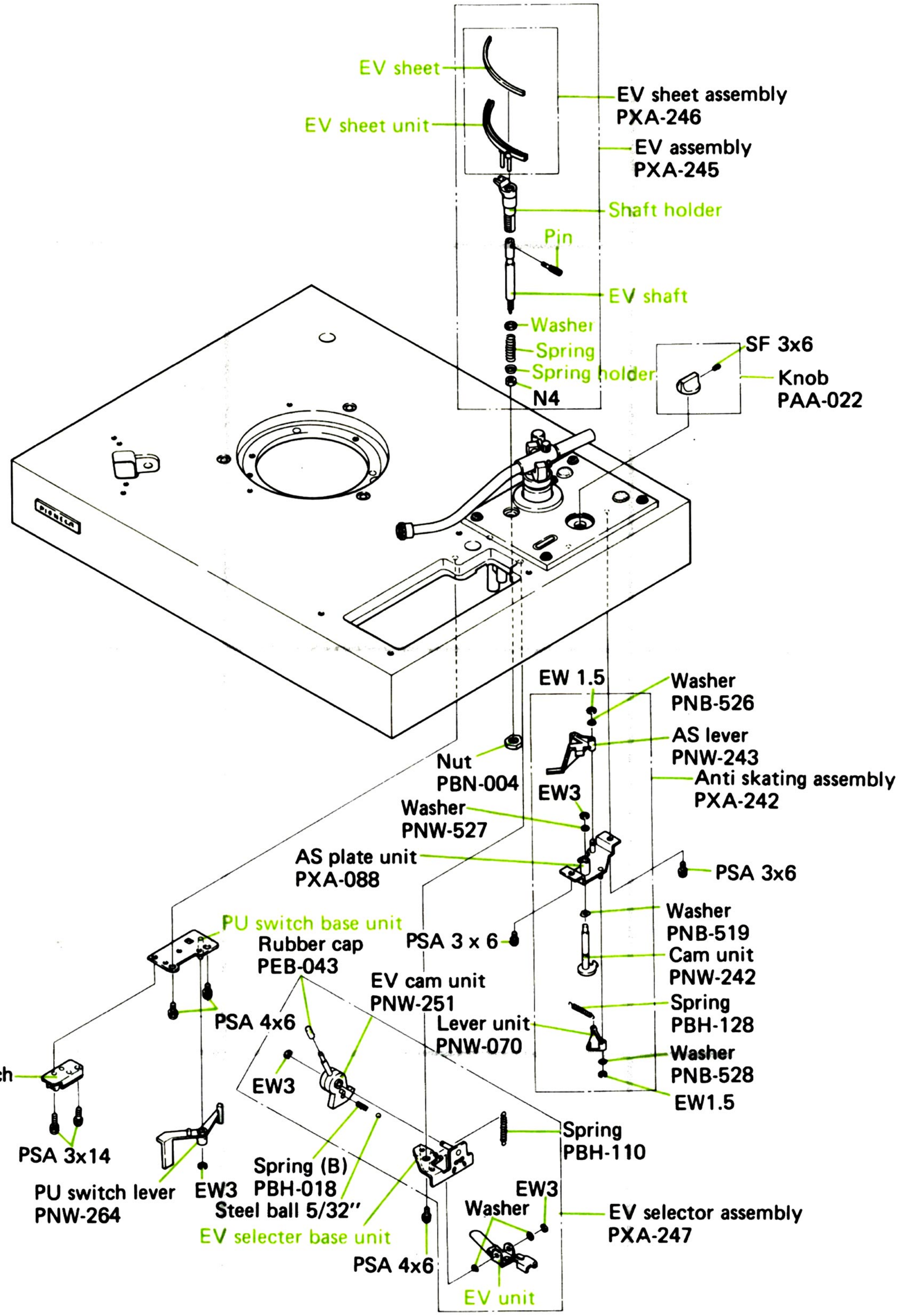
5.5 CONTROL PANEL

NOTE:
Part indicated in green type cannot be supplied.



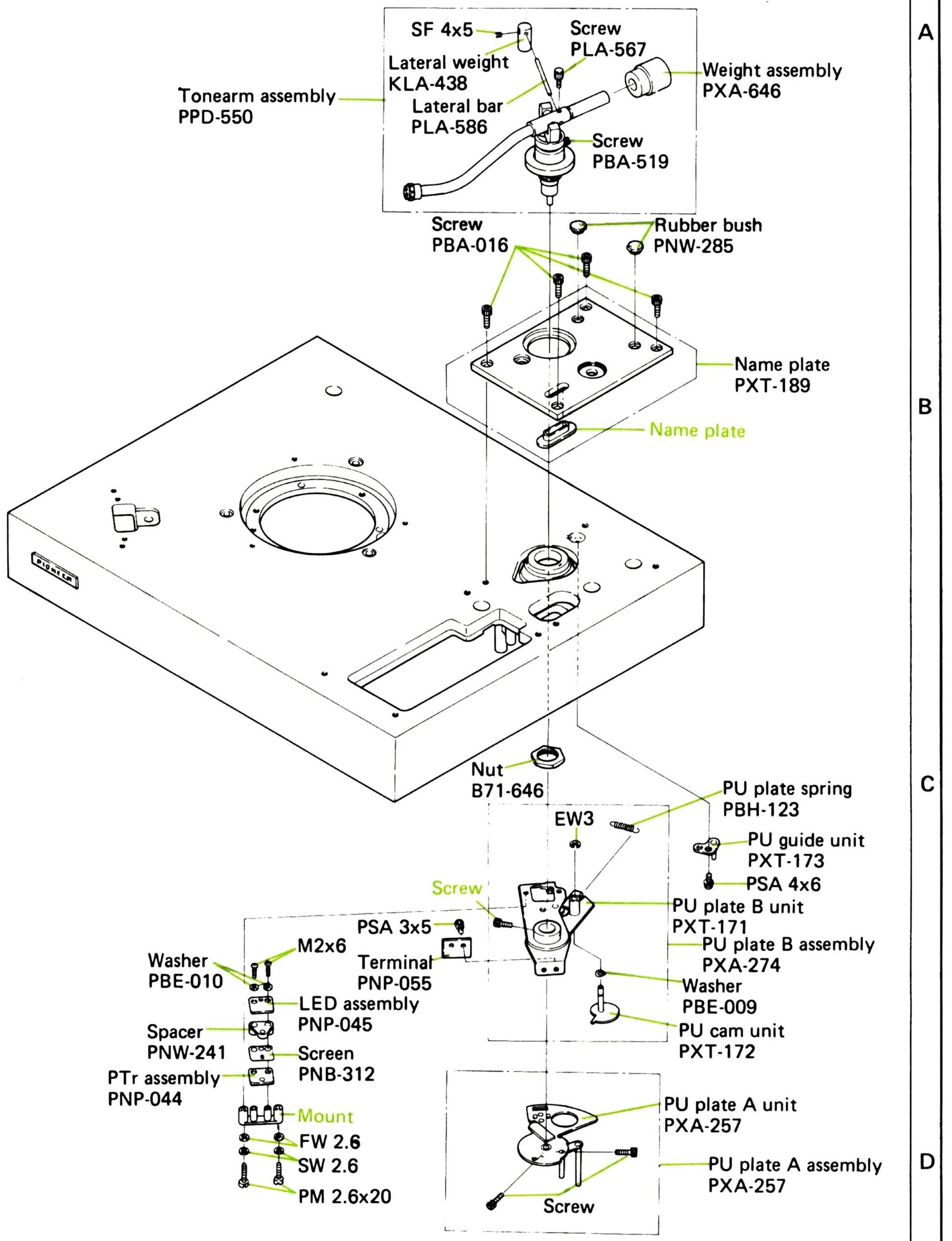
5.6 ARM ELEVATION

NOTE:
Parts indicated in green type cannot be supplied.



5.7 TONE ARM

NOTE:
Parts indicated in green type cannot be supplied.



5.8 CABINET

NOTE:
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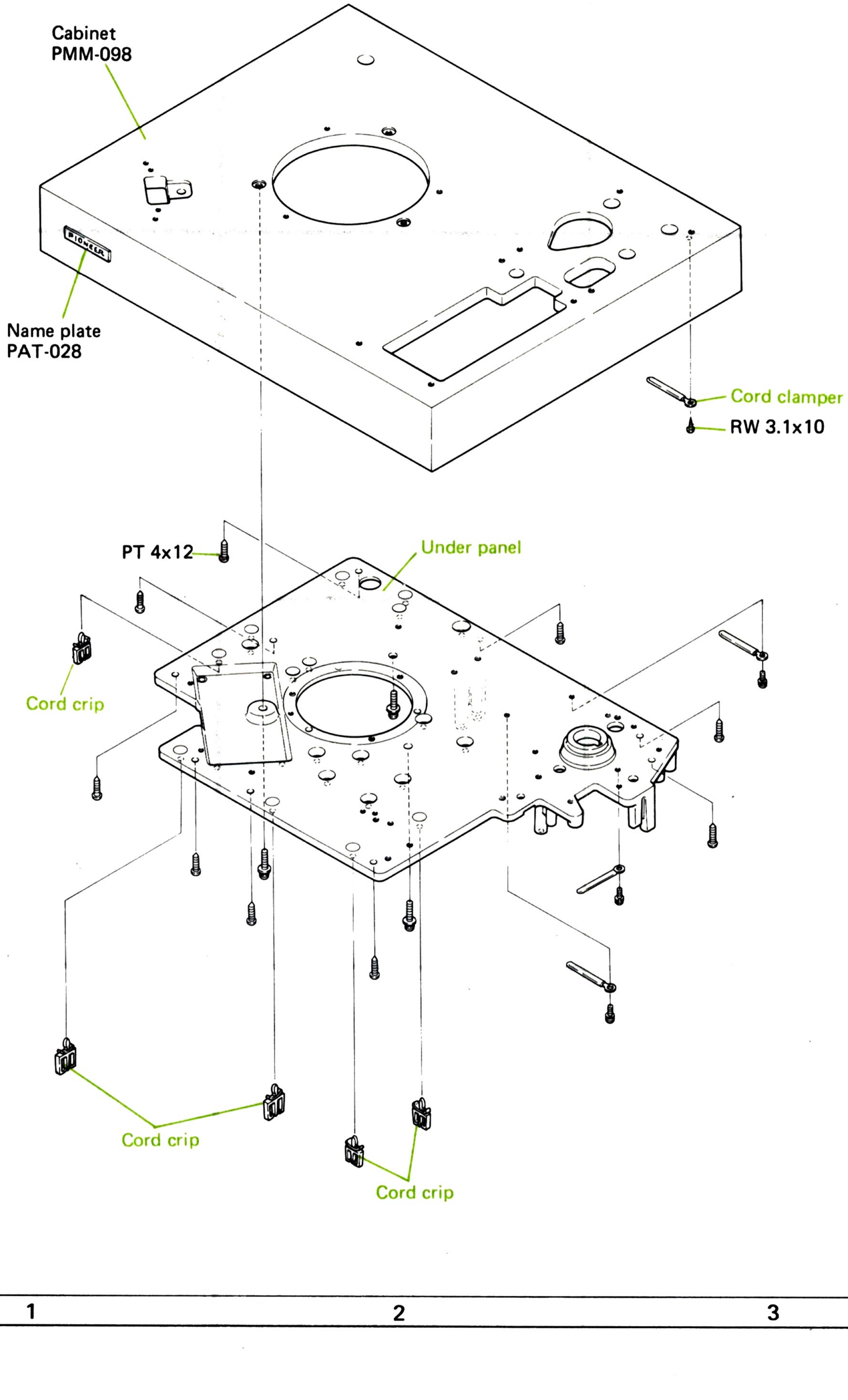

5.9 SPEED SELECTOR

NOTE:
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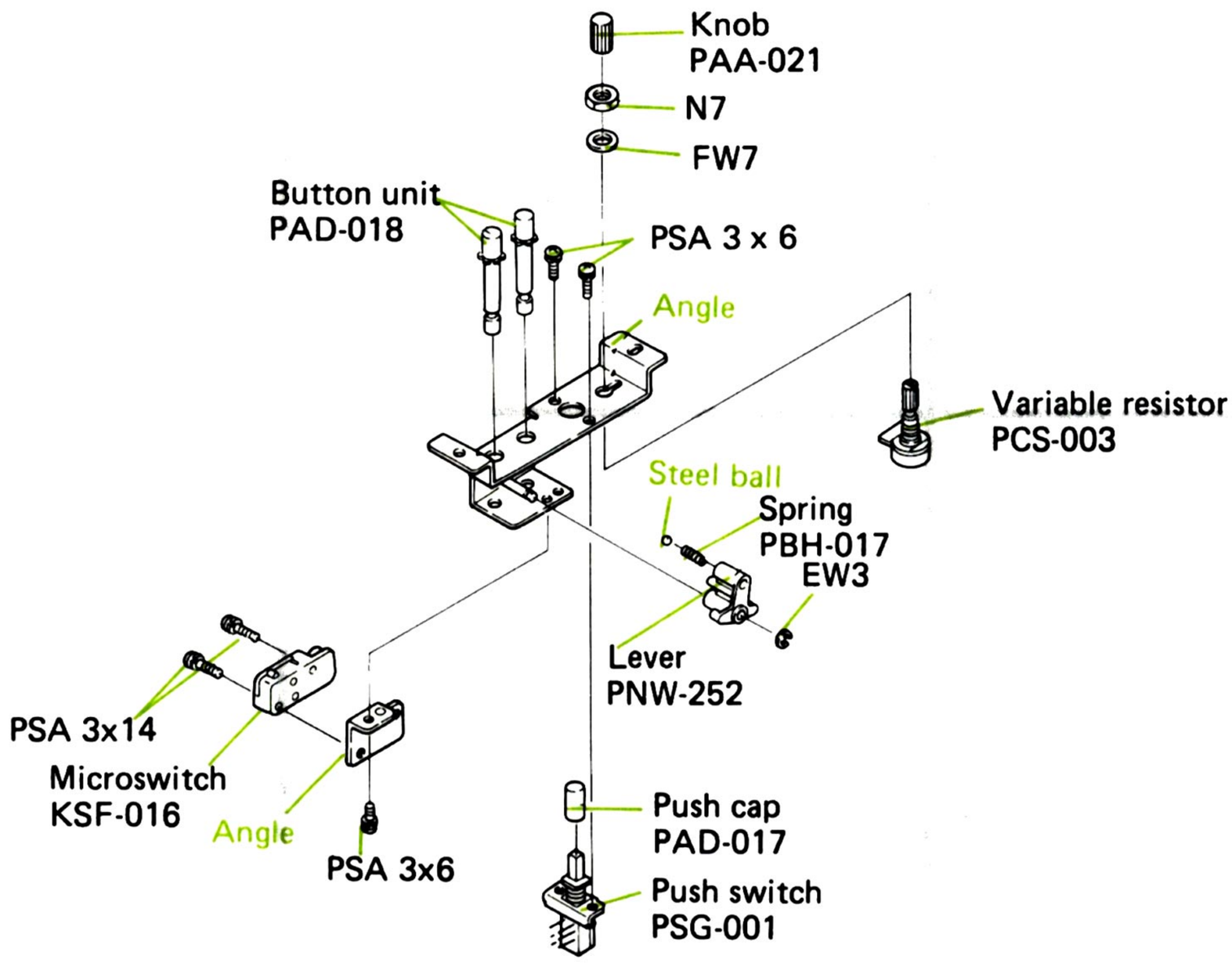
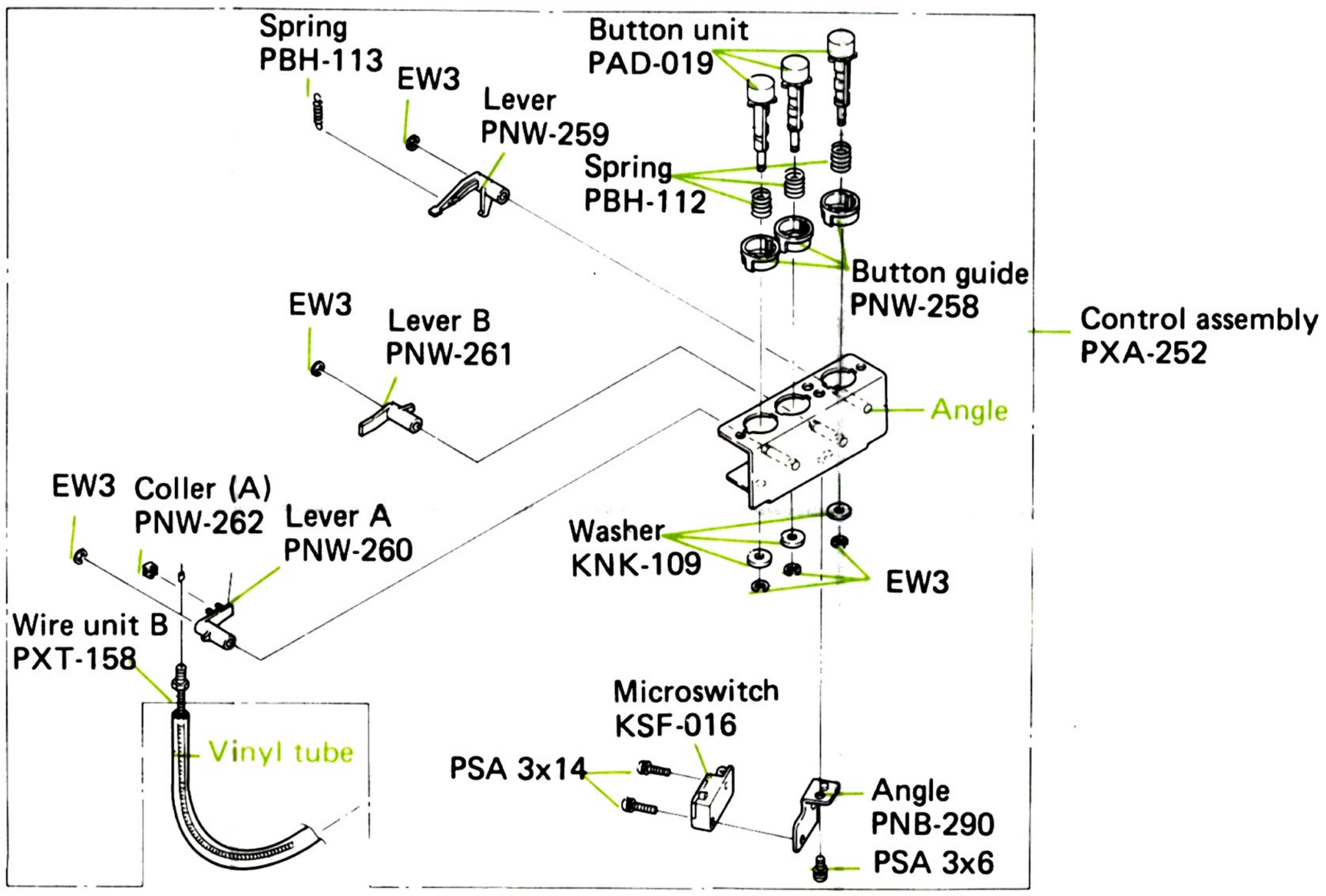
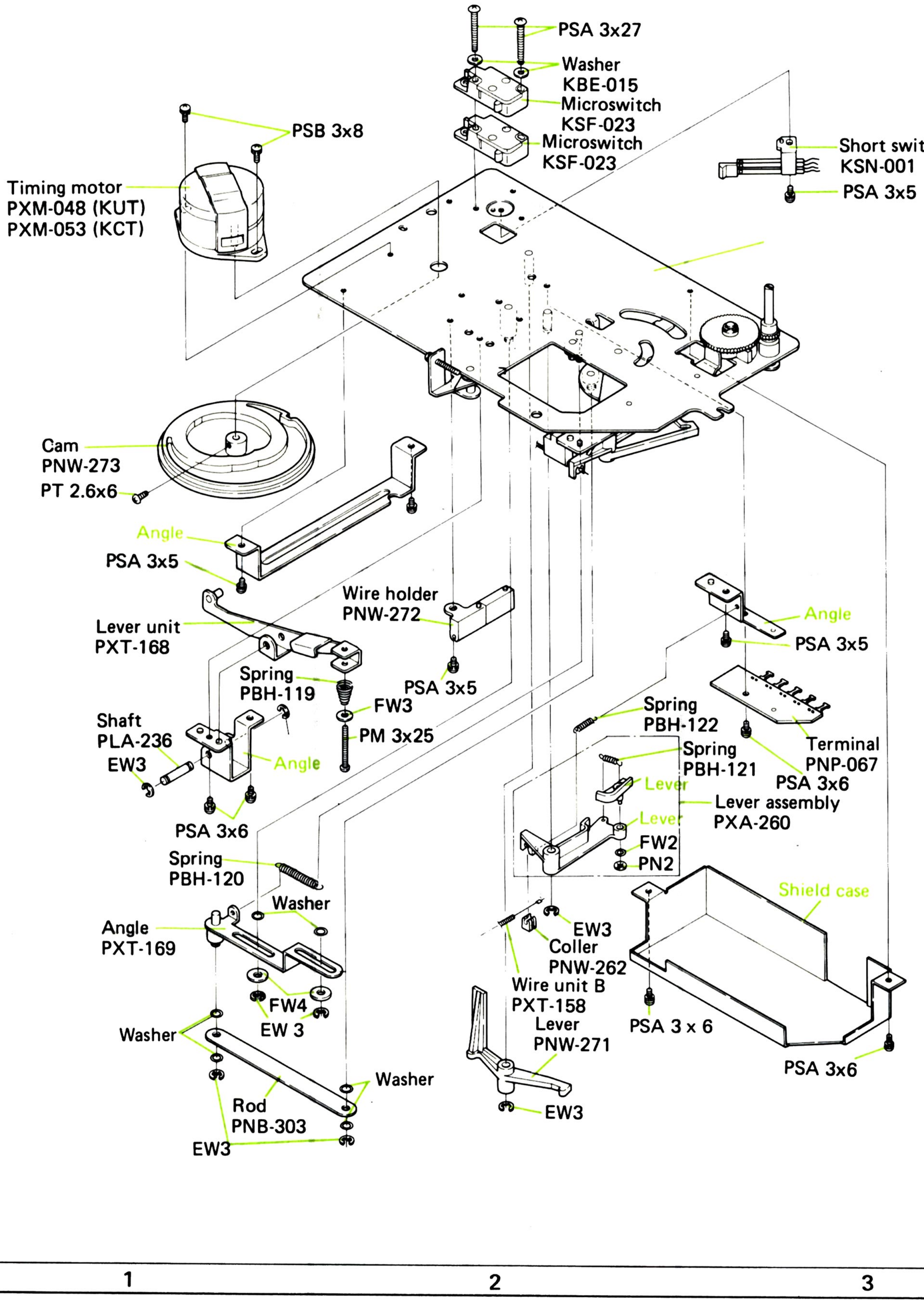


5.10 CONTROL ASSEMBLY



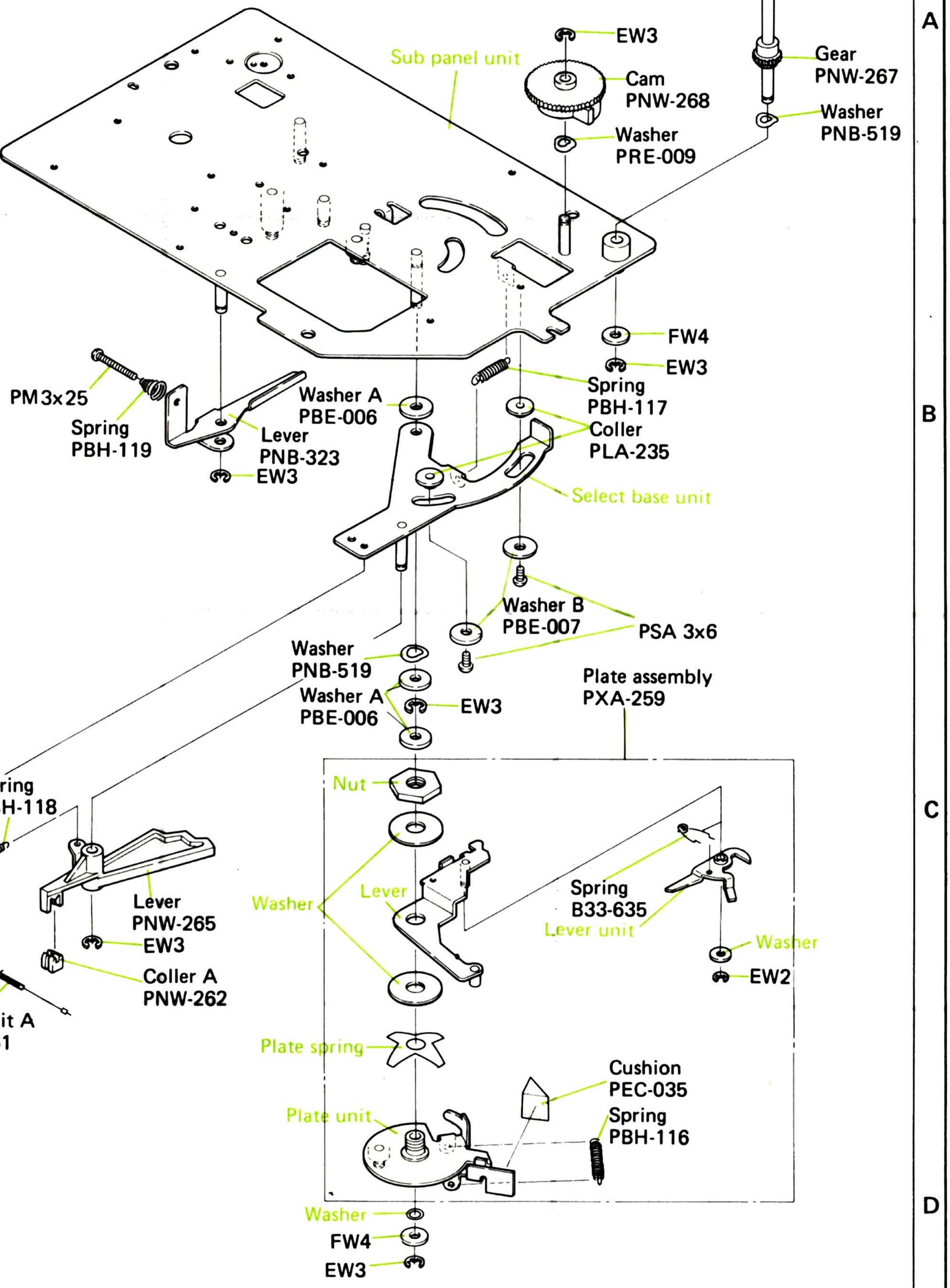
5.11 SUB PANEL-1

NOTE:
Parts indicated in green type cannot be supplied.

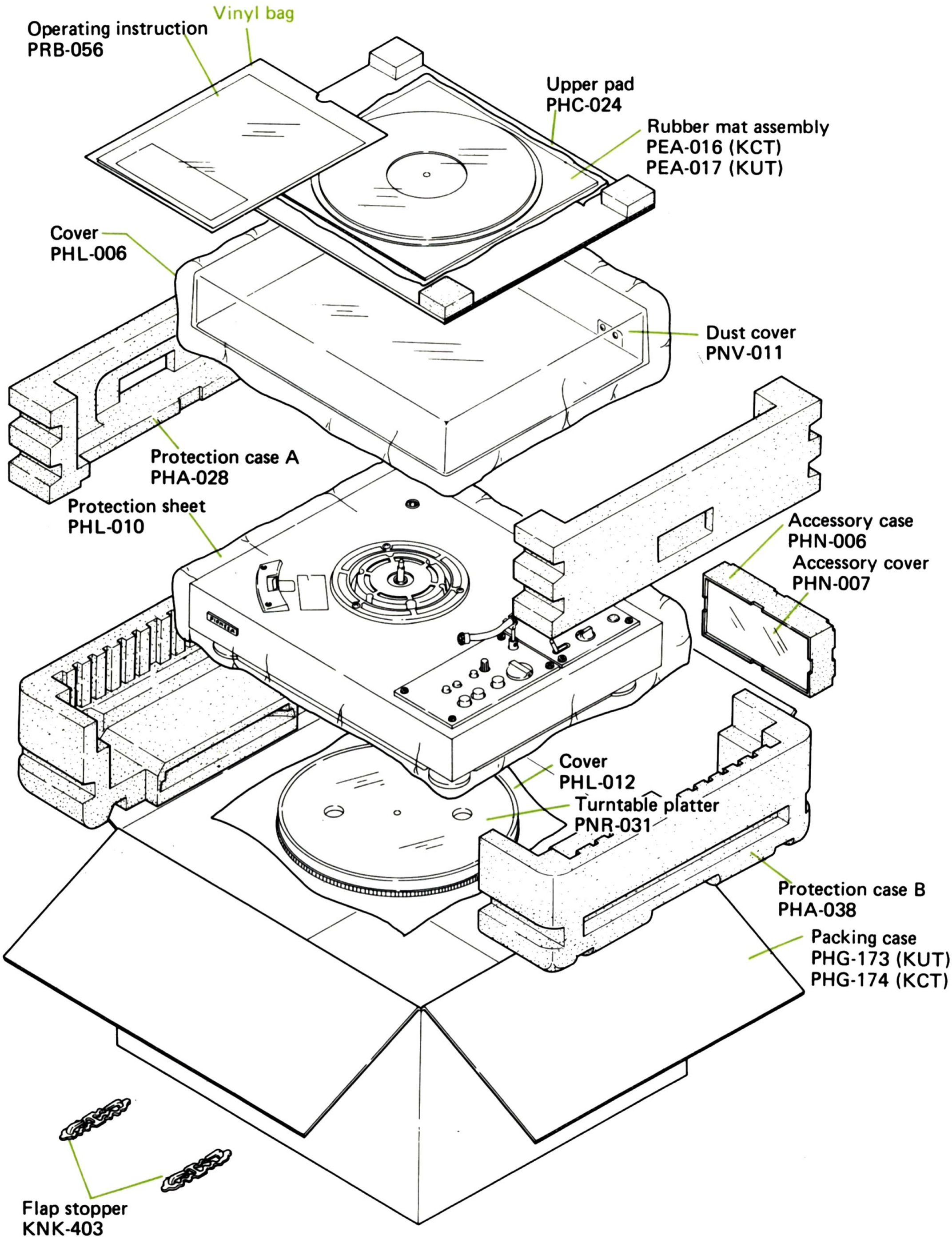


5.12 SUB PANEL-2

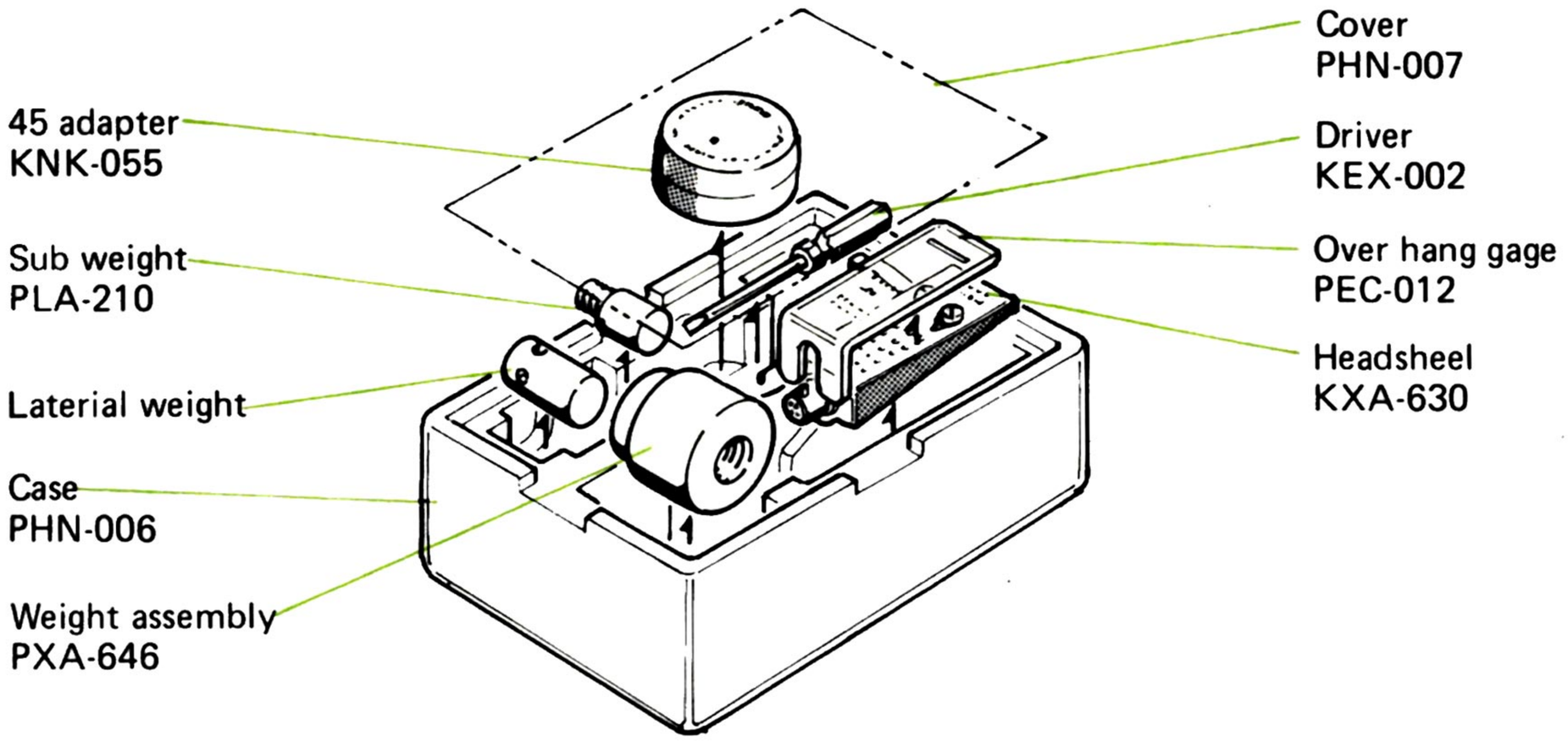
NOTE:
Parts indicated in green type cannot be supplied.



5.13 PACKING



ACCESSORY



The following symbols stand for screws, washers and nuts as shown in exploded view.

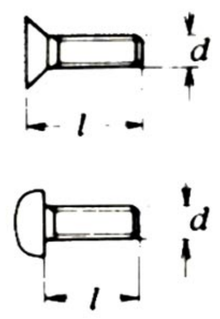
Symbol	Description	Shape
RT	Brazier head tapping screw	
PT	Pan head tapping screw	
PM	Pan head machine screw	
OCM	Oval countersunk head machine screw	
TM	Truss head machine screw	
PSA	Pan head screw with spring lock washer	
PSB	Pan head screw with spring lock washer and flat washer	
CW	Countersunk head wood screw	

Symbol	Description	Shape
EW	E type washer	
FW	Flat washer	
SW	Spring lock washer	
N	Nut	
PN	Push nut	
SF	Slotted set screw (Flat point)	
HS	Hexagon socket headless set screw	
OCW	Oval countersunk head wood screw	

EXAMPLE

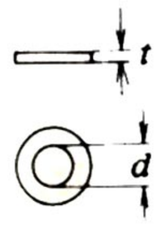
PM・3x8

- 3x8: length in mm (*l*)
- 3: diameter in mm (*d*)
- PM: Symbol



FW・9φx1^{t}

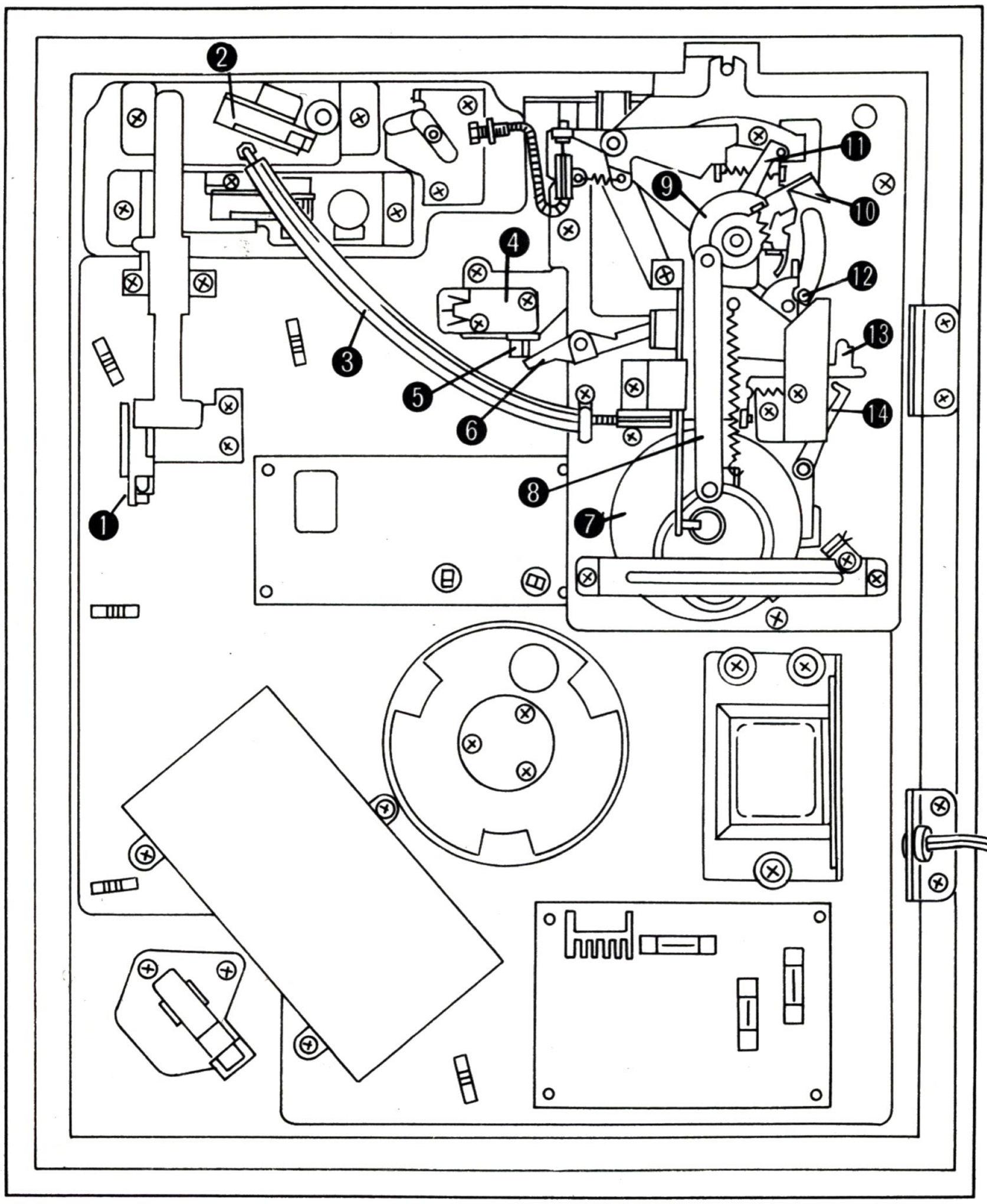
- 1^{t}: thickness in mm (*t*)
- 9φ: diameter in mm (*d*)
- FW: Symbol



6. MECHANICAL FUNCTIONS AND ADJUSTMENT PROCEDURES

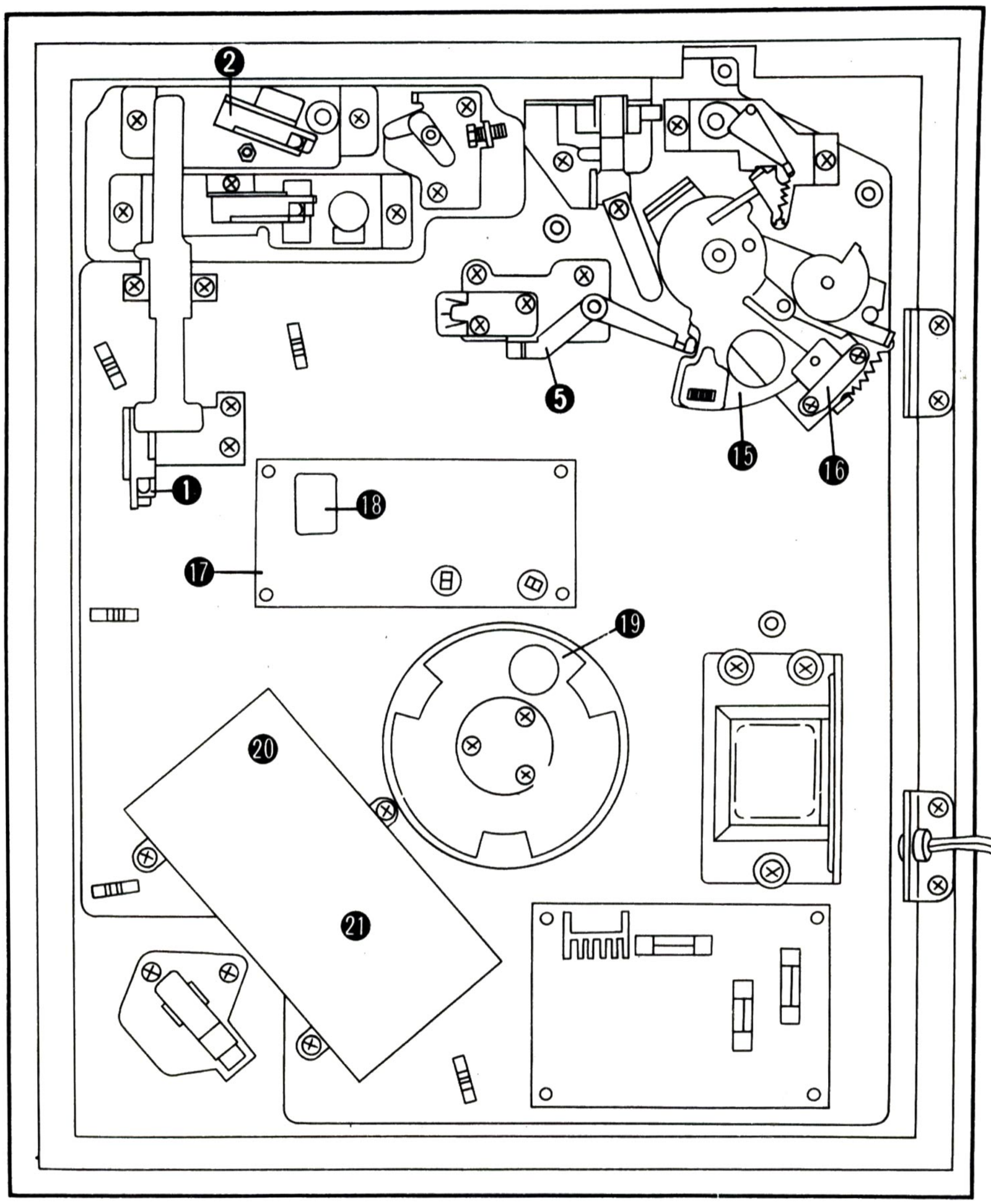
6.1 LOCATION OF MECHANICAL PARTS – 1

Parts designated 'Lever A,' 'Plate A' and the like are not always actually levers and plates. These designations have been chosen only for the sake of simplicity.



① Microswitch B
② Microswitch E
③ Wire A
④ Microswitch A
⑤ Lever A
⑥ Lever D
⑦ Cam A (Grooved Control Disc)
⑧ Plate A (Connecting Rod)
⑨ Plate B (Control Disc)
⑩ Plate C
⑪ Plate F
⑫ Arm Plate Pin
⑬ Lever B
⑭ Lever C

Location of Mechanical Parts – 2



⑮ Arm Plate
⑯ LED + Photo Transistor Ass'y
⑰ Auto Return Detection PCB
⑱ Relay
⑲ DD Motor
⑳ Drive Control PCB
㉑ Power Supply PCB

6.2 SCHEMATIC DIAGRAM OF MICROSWITCHES A THRU E

All mechanical functions are controlled by the grooved control disc (cam A) which is directly attached to the geared motor (GM). The geared motor (GM), the direct drive motor (DDM) and associated circuits are switched on and off by microswitches A thru E. These microswitches perform the following functions.

Microswitch A
On/off switching of DDM and auto-return detection circuit in manual play mode is dependent upon tonearm position.

Microswitch B
Switches GM on and off. Microswitch is on only while START button is being depressed.

Microswitch C
Switches DDM and auto-return detection circuit on and off. Switch is controlled by lever C which is linked to cam A.

Microswitch D
Switches GM on and off. Switch is controlled by lever C which is linked to cam A.

Microswitch E
Switches GM on and off. This microswitch is ON only while STOP button is being depressed. The microswitch is connected in parallel with the relay (RY) in the auto-return detection circuit.

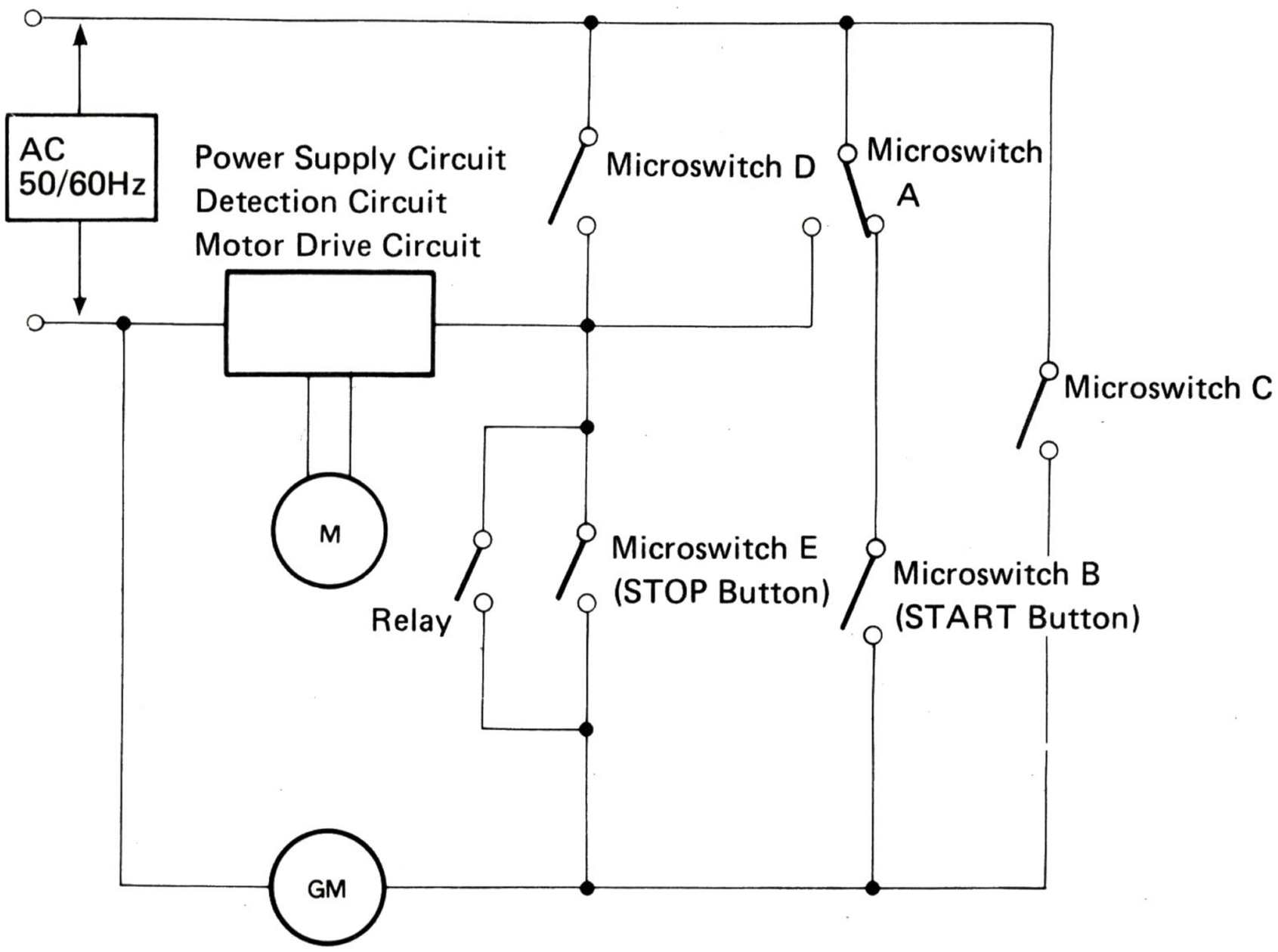


Diagram shows all systems in off position.

Fig. 2

Manual Play Mode

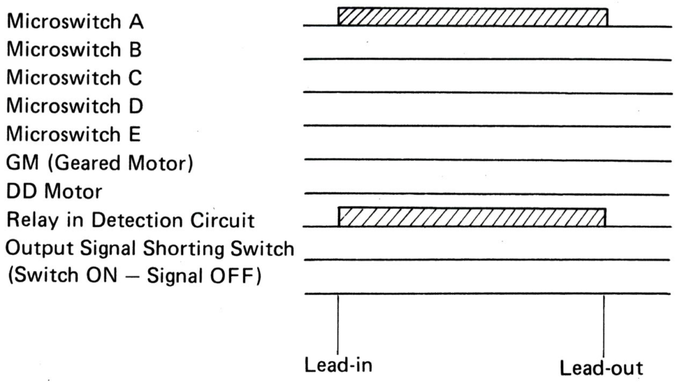


Fig. 3

Auto Lead-in

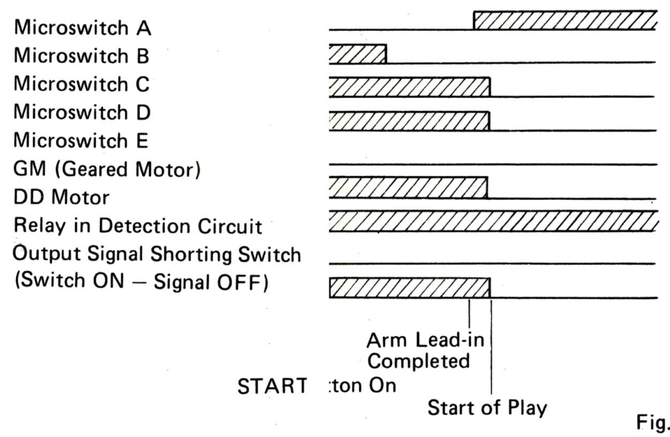


Fig. 4

Auto Return

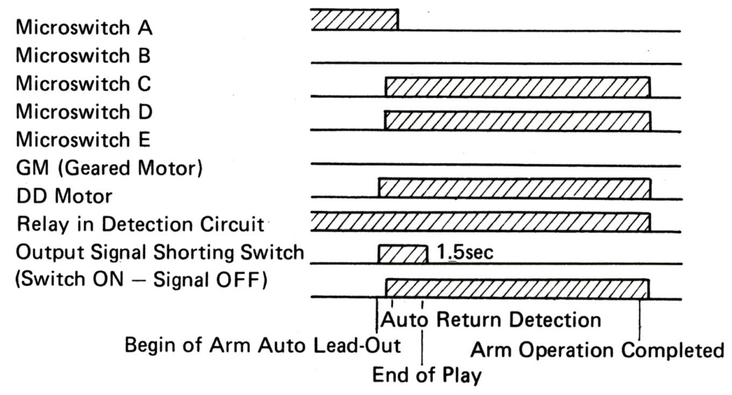


Fig. 5

Auto Repeat

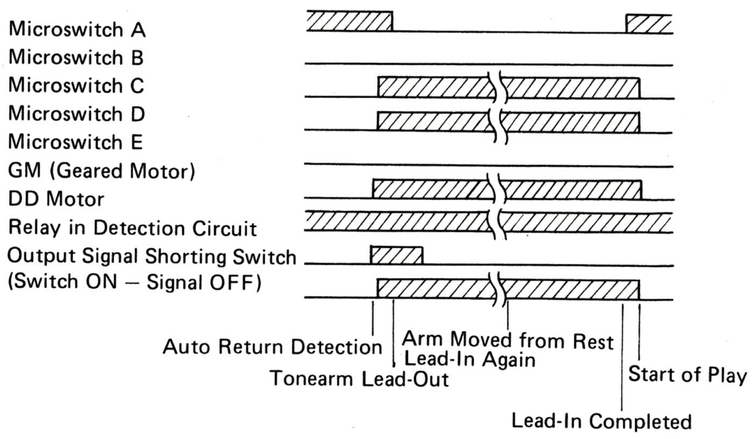


Fig. 6

Auto Return Using STOP Butt

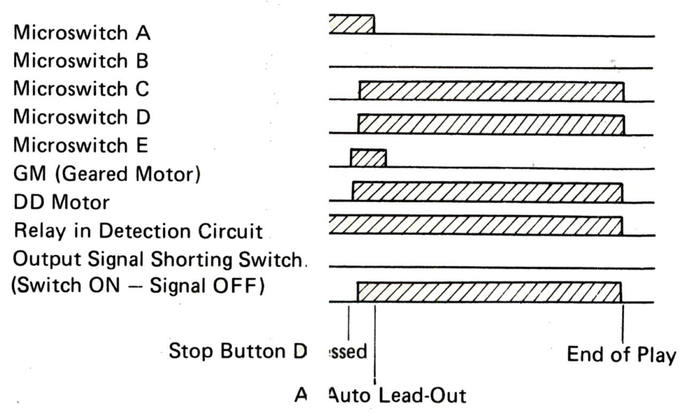


Fig. 7

6.4 MANUAL PLAY

1. When the tonearm is removed from the arm rest and moved towards the record, the tonearm plate also moves. Lever A is freed, microswitch A is switched on, and the platter begins to rotate.
2. When the arm is returned to the arm rest by hand (even before the end of the record), microswitch A is switched off by lever A, and the platter stops rotating.

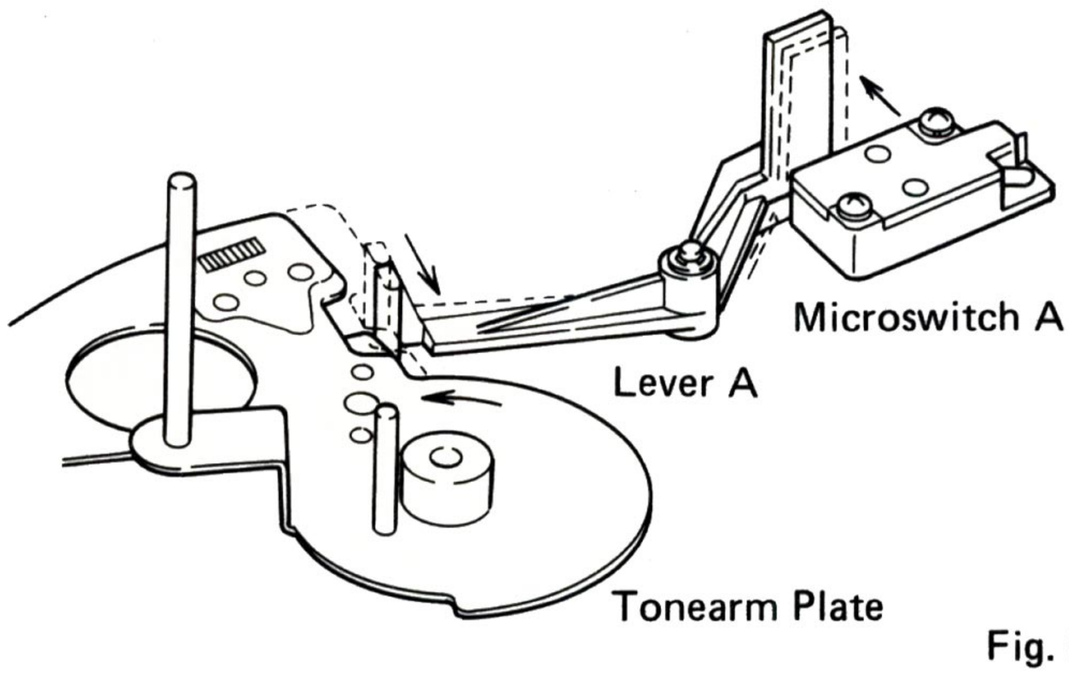


Fig. 8

6.5 AUTO LEAD-IN

1. When the START button is depressed, wire A pulls lever B. Microswitch B is switched on, and cam A (linked to the GM) begins to rotate (Fig. 9).

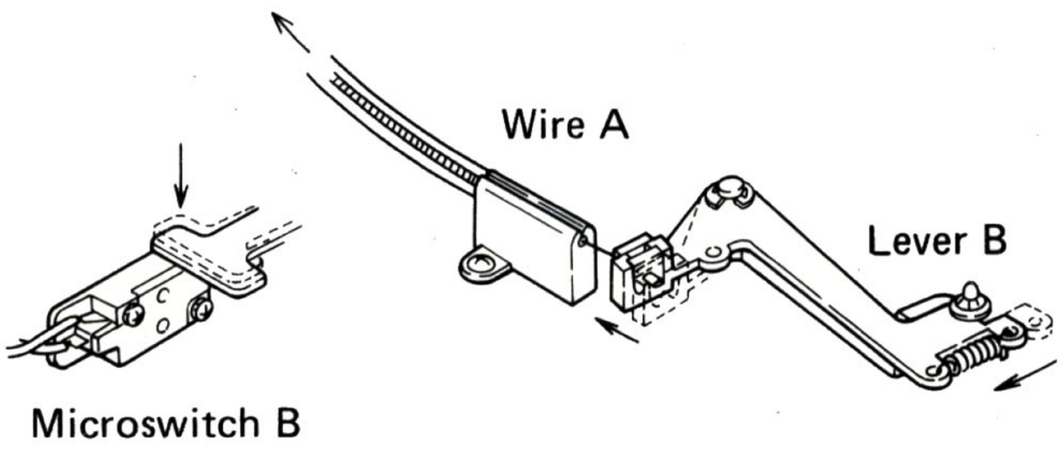
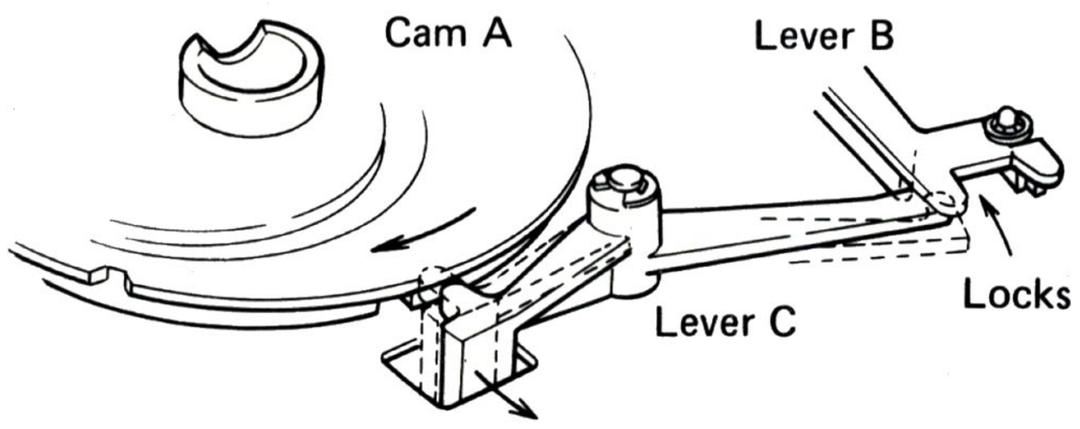


Fig. 9

2. The rotation of cam A causes the following actions:

a) Lever C moves, locking lever B and switching microswitches C and D on (Fig. 10).



Switches Microswitches C and D On.

Fig. 10

b) The output signal shorting switch (S_1) short-circuits the cartridge signal, preventing noise from being heard while tonearm operation is in progress (Fig. 11).

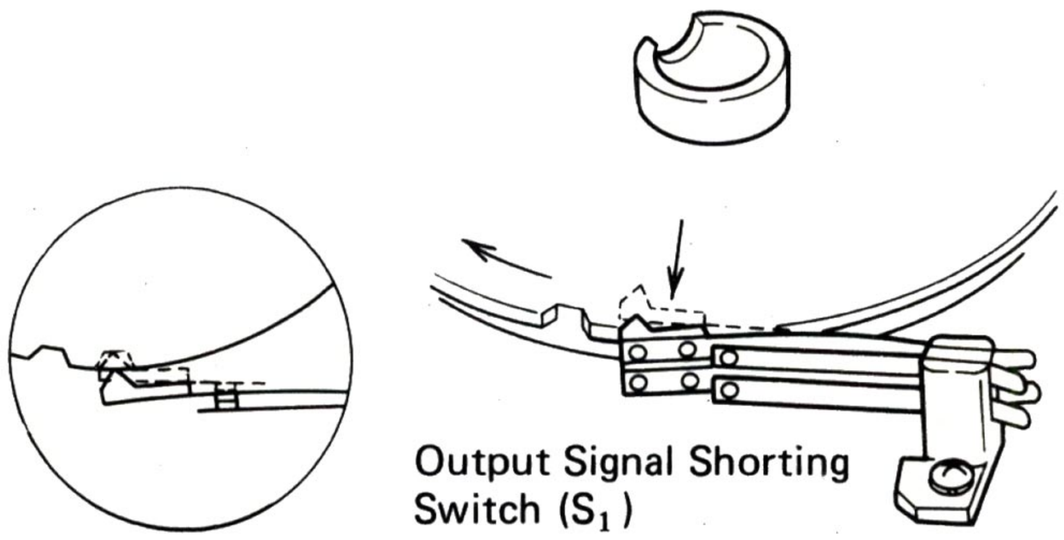


Fig. 11

c) Plate A (connecting rod) sets plate B in motion (Fig. 12)

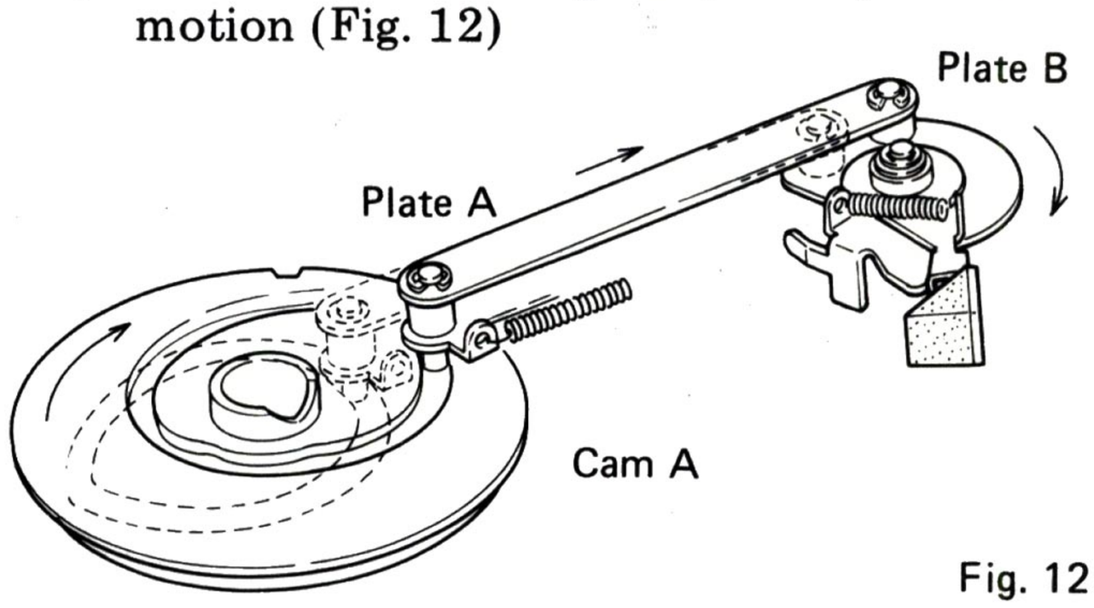


Fig. 12

d) Lever D also moves, raising the arm elevator to UP position and locking microswitch A in ON position (Figs. 13, 14).

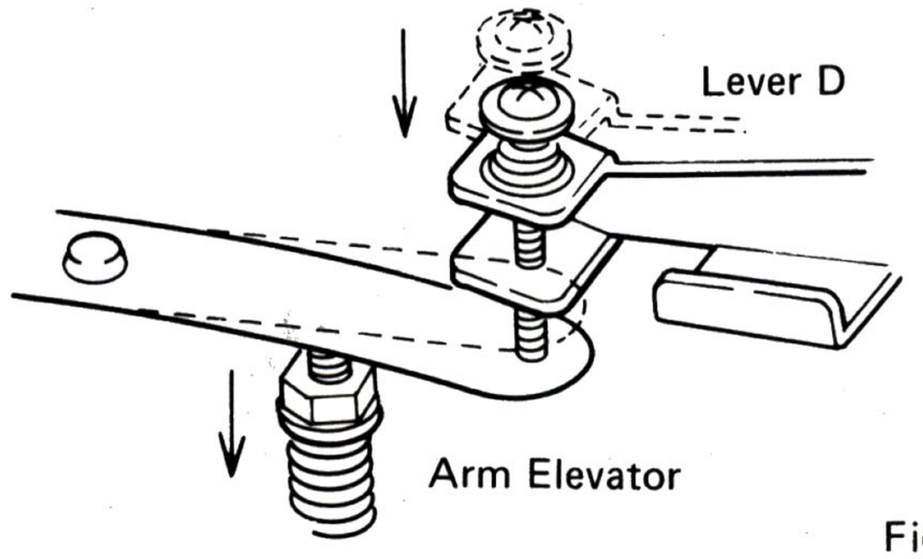


Fig. 13

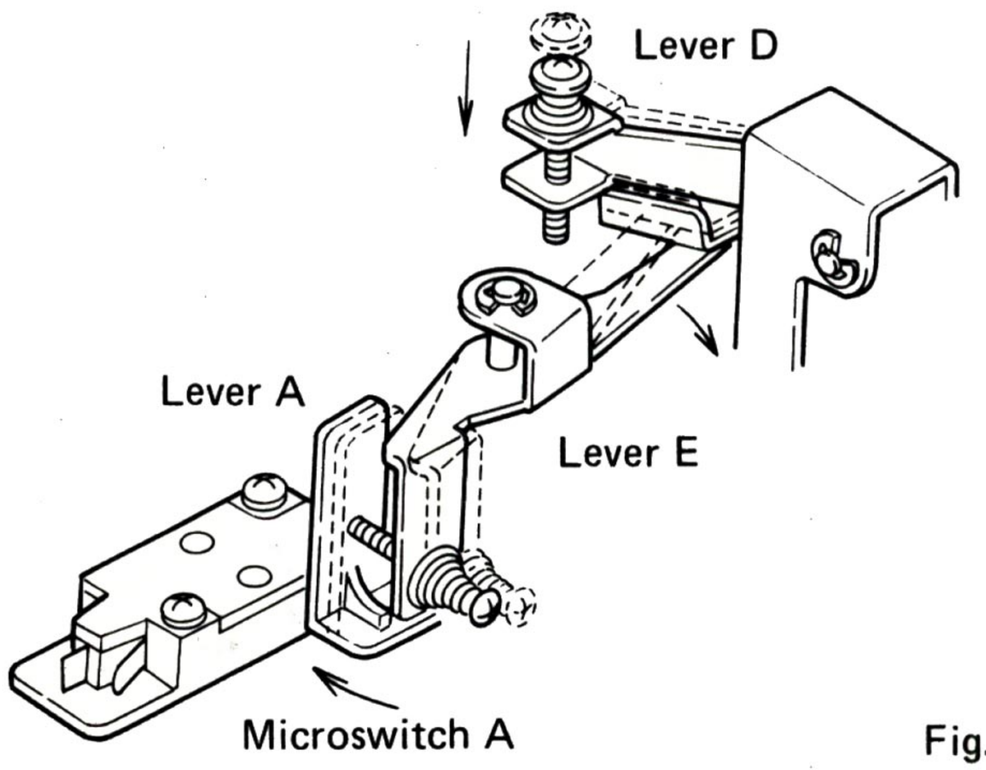


Fig. 14

3. As plate B rotates, plate C (mounted on plate B) moves with it, grasping the tonearm plate in conjunction with plate F (Fig. 15).

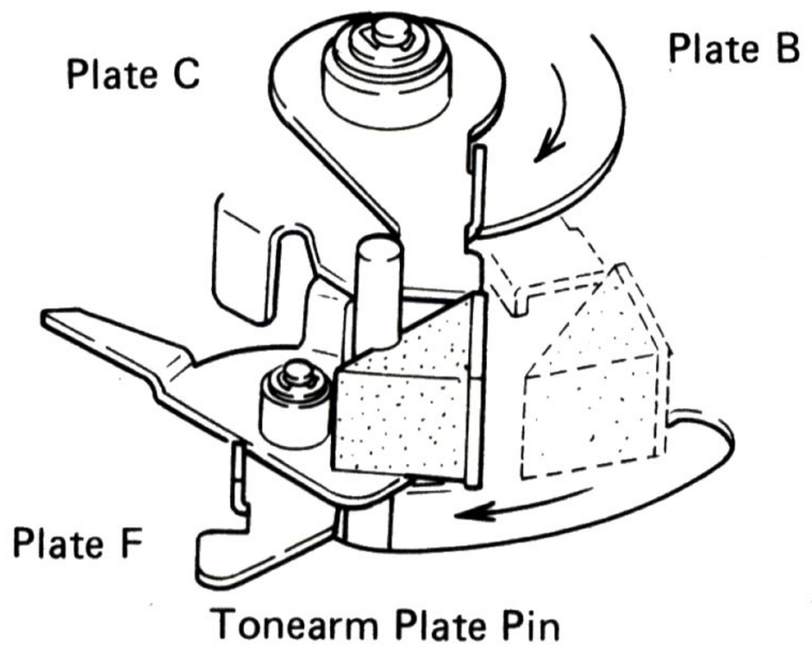


Fig. 15

4. Plate B then reverses its rotational direction. The claw on plate F grasps the arm plate pin, moving the arm into position over the record while plate C also moves. Plate F then stops.

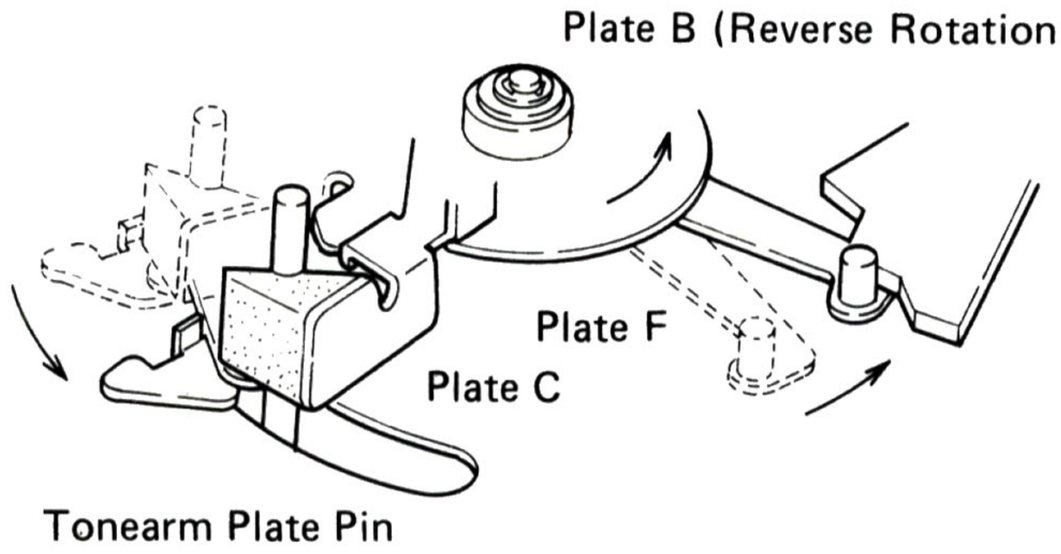


Fig. 16

5. Because of the friction disc, plate B continues to rotate, whereby the claw on plate F releases the pin of the tonearm plate. This frees the tonearm (Fig. 17).

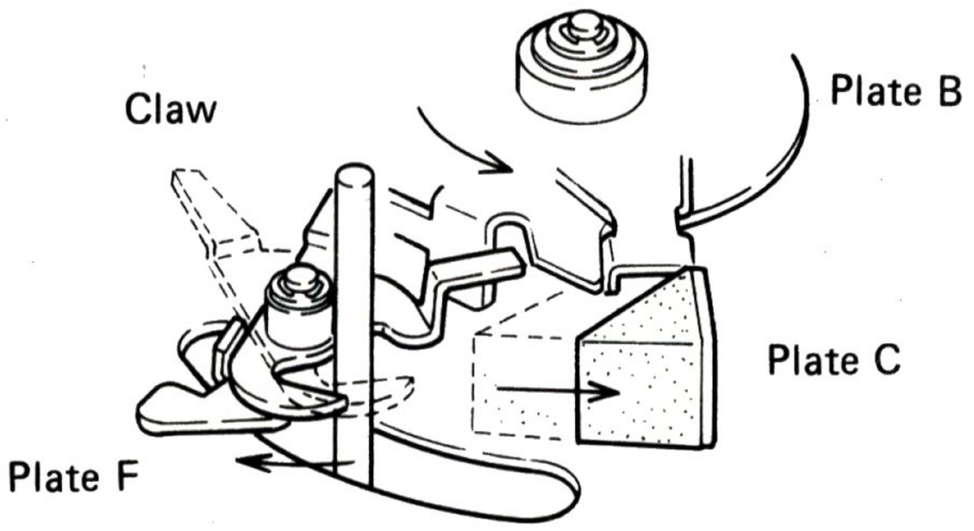


Fig. 17

6. After cam A has made one full rotation, lever D which has held the arm elevator in UP position is returned to its normal position, and the tonearm floats down. At the same time, microswitch A is switched on (Fig. 18).

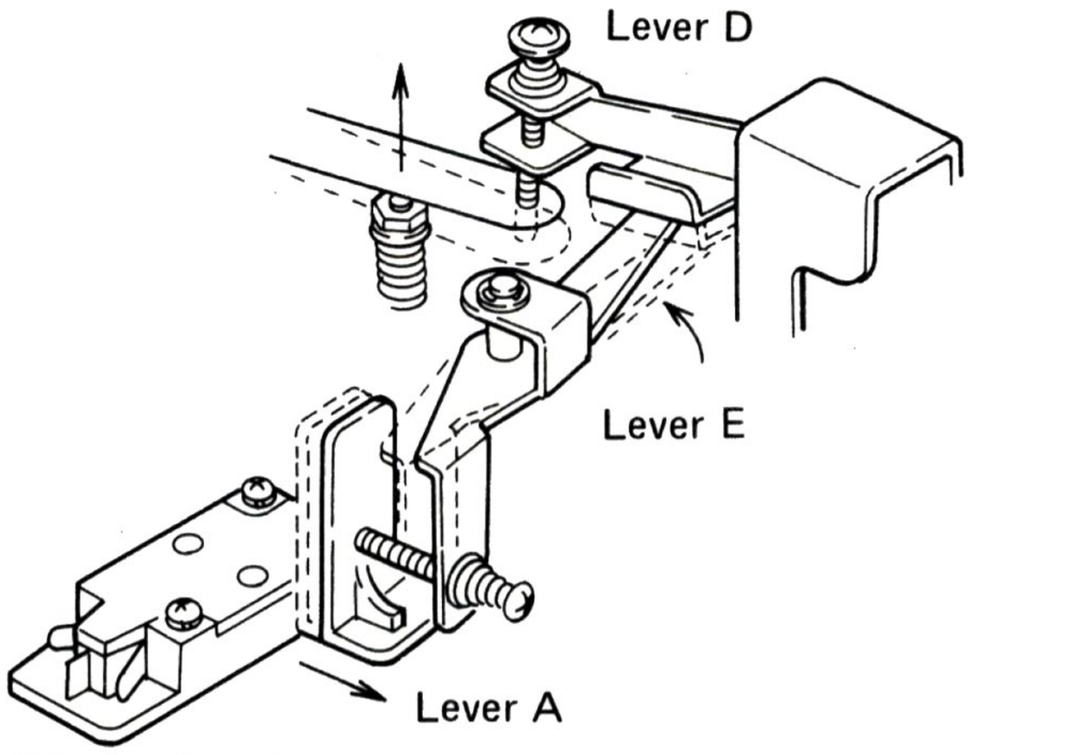


Fig. 18

7. Cam A now stops rotating, microswitches D and C are switched off, the GM stops rotating. As microswitch A is already ON, the turntable continues to rotate.
8. When cam A has stopped rotating, the output shorting switch S_1 opens, letting the phono output signal pass on to the amplifier. Lever C also releases lever B (Fig. 19).

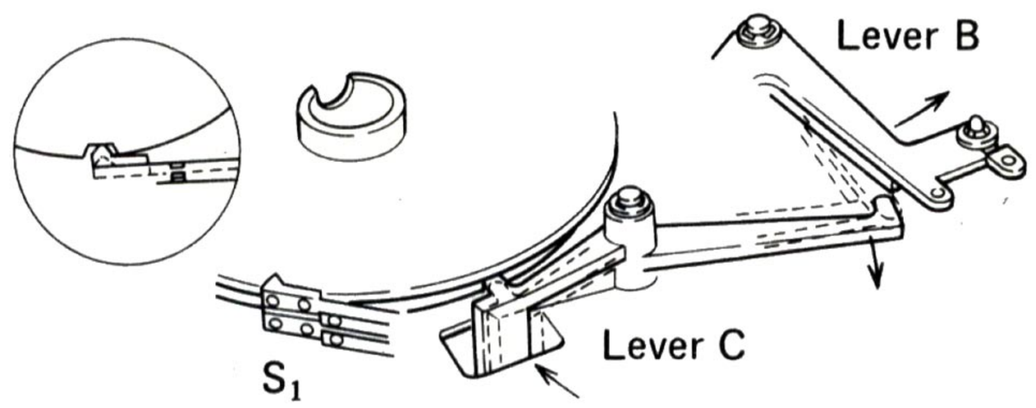


Fig. 19

6.6 AUTO-RETURN

1. The auto-return function makes use of the fact that the lead-out grooves are spaced wider apart, whereby the stylus advances more than 3mm toward the record center per one revolution. This rapid advance causes the auto return detection circuit to operate.
2. As the relay in the auto return detection circuit is energized, the GM (and cam A) begins to rotate.
3. As cam A begins to rotate, the same actions take place as described above under 'Auto Lead-In.' Lever C does not engage lever B, however.
4. As plate B rotates, plate C (mounted on plate B) pushes against the pin of the tonearm plate, returning the tonearm to its rest position.

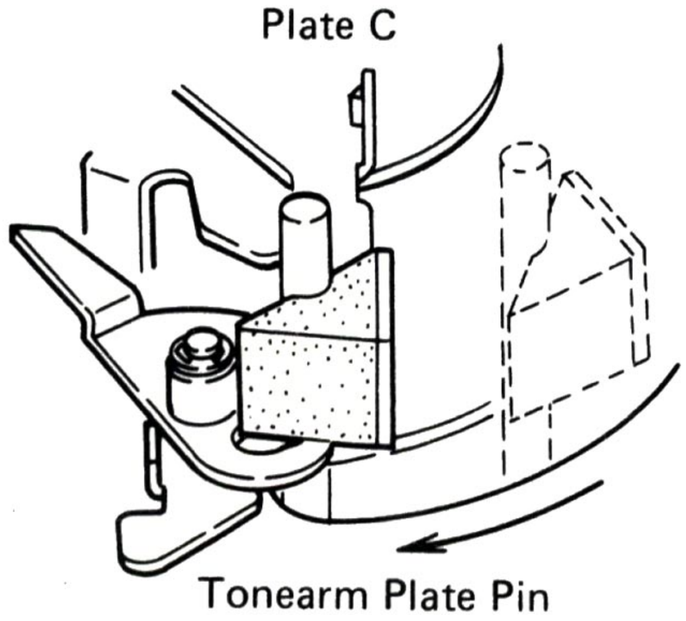


Fig. 20

5. Next, plate B reverses its rotation, and plate C is returned to its original position. As lever B is not locked, it obstructs the movement of plate F. Plate F cannot operate, and the tonearm is not moved from its rest position. (Fig. 21).

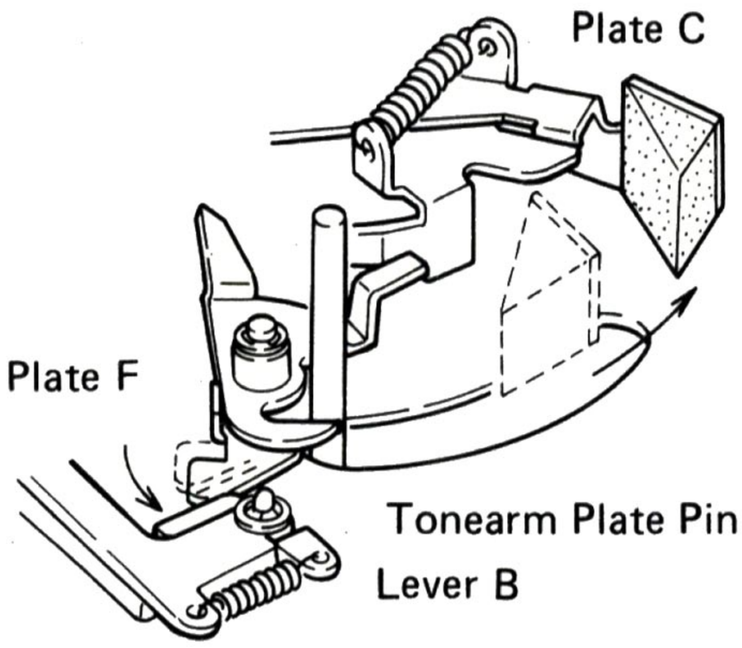


Fig. 21

6. After cam A has made one full turn, microswitches C and D are switched off and the power to all circuits is interrupted.

6.7 AUTO REPEAT

1. When the REPEAT button is depressed, wire A pulls and locks lever B (Fig. 22).

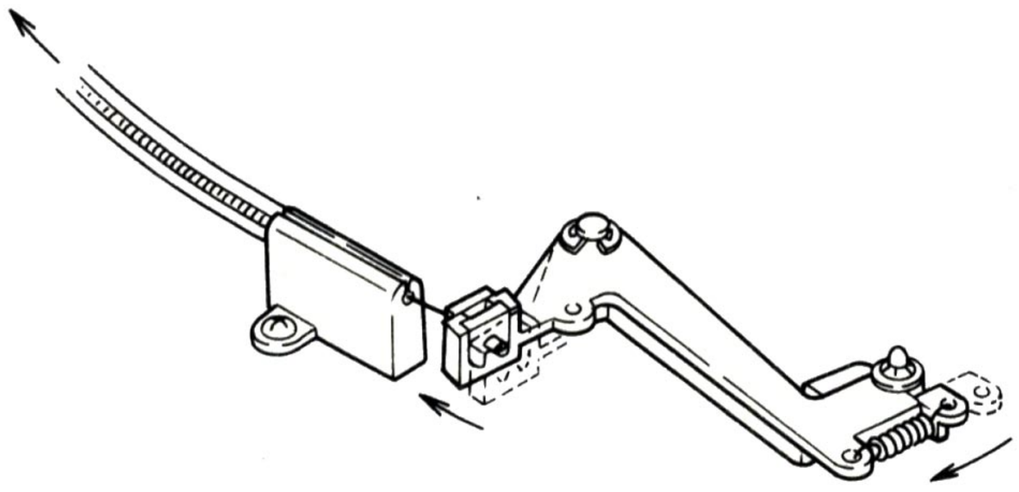


Fig. 22

2. The tonearm returns to its rest (as in auto return mode), but because lever B is locked, plate F pushes against the pin of the tonearm plate, moving the arm over the record again (as in auto lead-in).
3. The record is repeated again and again until the REPEAT button is released by depressing the STOP button.

6.8 AUTO RETURN ACTIVATED BY STOP BUTTON

When the STOP button is depressed during play, microswitch E is switched on and the GM begins to rotate.

The unit then performs all functions as described under 5.6 Auto Return, above.

6.9 MECHANICAL ADJUSTMENT

6.9.1 ARM ELEVATOR

1. Set the ARM ELEVATION lever to UP position. Adjust the height of the arm lifter so that the gap between stylus tip and record surface is 8mm. See Figs. 23, 24.
2. Push the START button to put the unit in operation. Then pull the AC cord from the wall outlet while the arm elevator is in UP position. Now turn the adjusting screw on lever D so that the gap between stylus tip and record surface is 8mm (Fig. 25).

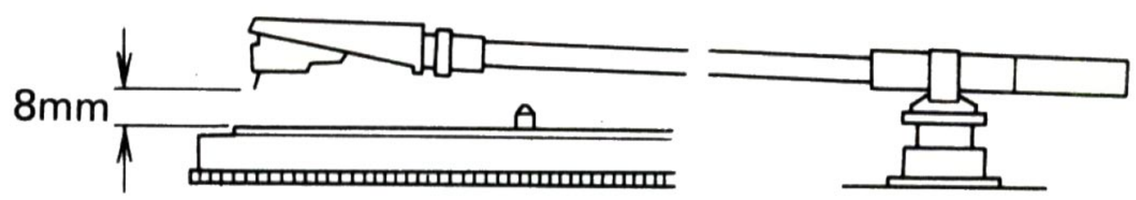


Fig. 23

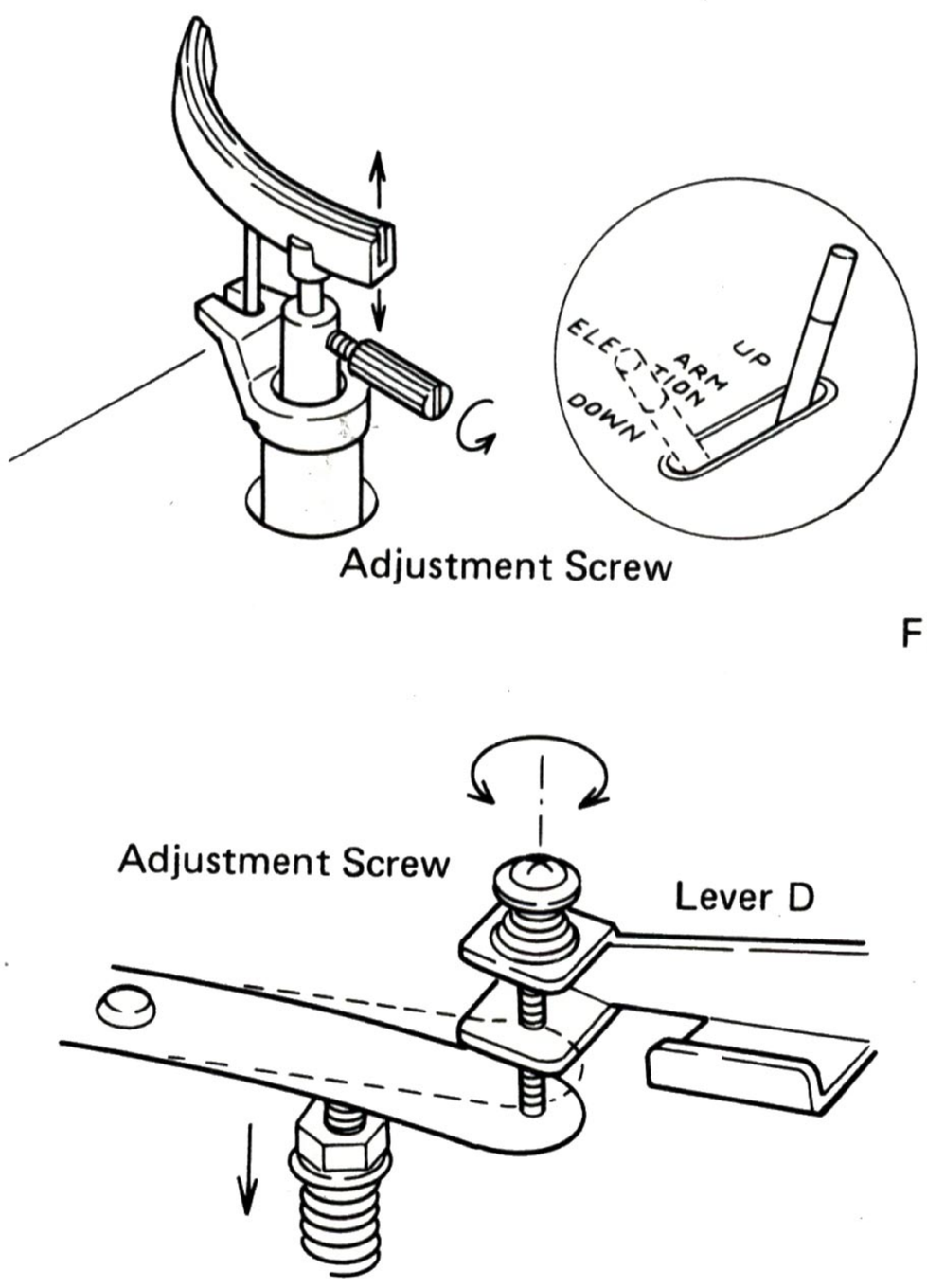


Fig. 24

Fig. 25

6.9.2 Record Size Selector

1. Set the SIZE selector on the control panel at position 30.
2. Turn the wire adjustment screw (Fig. 26) so that lever F touches the edge of the white plastic section at the center.
3. Be sure to lock the adjustment screw after performing this adjustment.

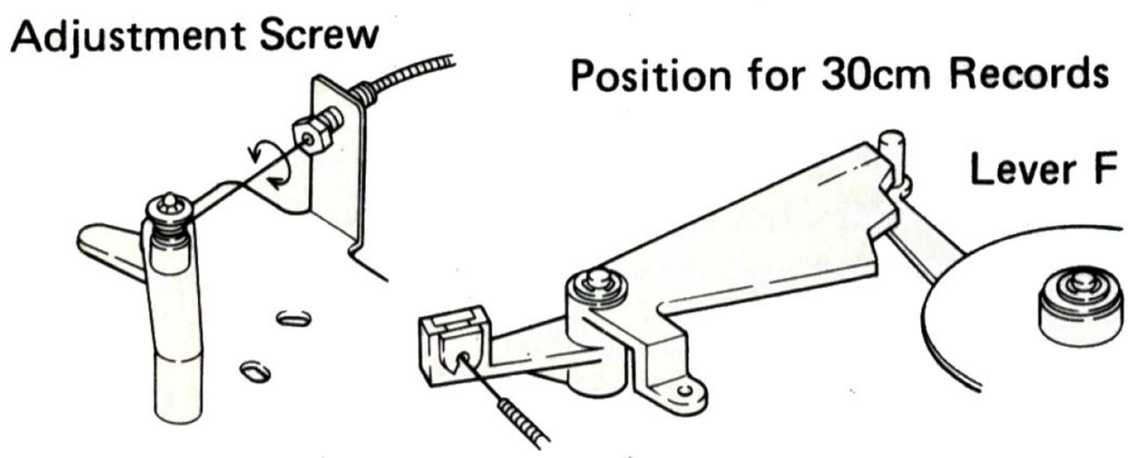


Fig. 26

6.9.3 Relative positions of Levers B and C

1. With the unit switched off, turn the adjustment screw in such a way that levers B and C are positioned relatively to each other as shown in Fig. 27.

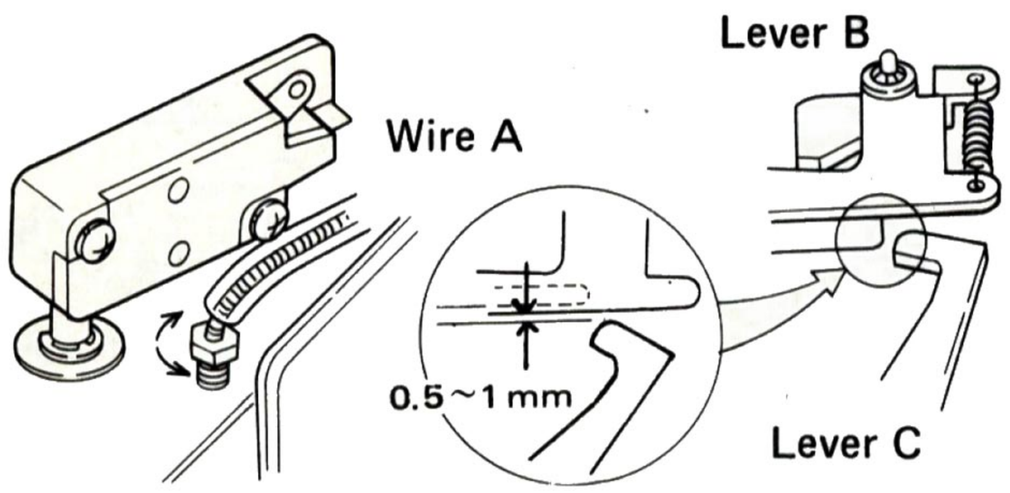


Fig. 27

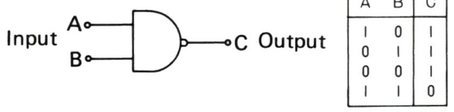
6.9.4 Output Shorting Switch S_1

With the unit switched off, adjust the S_1 mounting screw so that the contact gap is 0.5mm.

7. DESCRIPTION AND ADJUSTMENTS OF AUTO RETURN DETECTION CIRCUIT

NAND gates are employed in the auto return detection circuit. A NAND gate is a logic circuit whose output is 1 if either its A or its B input is 0 (or if both inputs are 0), but whose output is 0 if both inputs A and B are 1.

Symbols and Truth Table of NAND gate



A	B	C
1	0	1
0	1	1
0	0	1
1	1	0

Fig. 28

Detection Principle

As a wire mesh screen (part of the tonearm plate) passes between an LED and a photo transistor (PTr), the PTr is alternately turned on and off. The time of this on-off cycle is compared with a reference time in the NAND gate. If the on-off cycle time is found to be shorter than the reference time, the relay in the auto return detection circuit operates.

The on/off cycle time of the PTr is 8 sec while program grooves are playing, but only 0.8sec when the tonearm has entered the lead-out groove (at a record speed of 33 rpm).

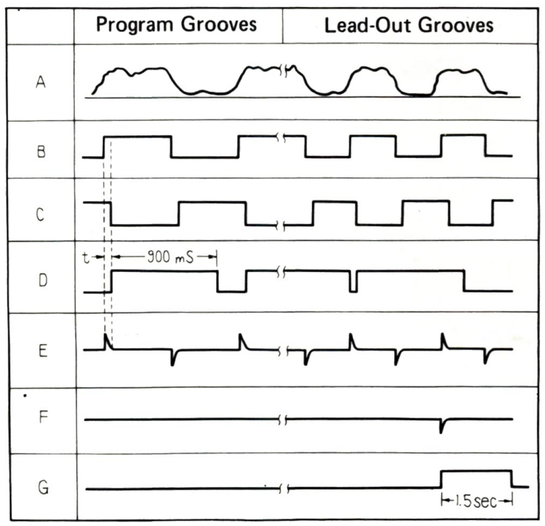


Table 1

7.1 STEP-BY-STEP CIRCUIT OPERATION

3. As turntable rotates, supply voltage +B lights LED.
2. While tonearm is tracking program grooves, tonearm plate obstructs light, and PTr remains off.
3. When stylus advances to within 60mm from turntable center, light from LED reaches PTr through wire mesh screen in tonearm plate, and output A (table 1) is generated.
4. This signal passes through the low pass filter made up of R_{106}, R_{107} and C_{101} where noise due to record eccentricity, etc. is removed. It then triggers the Schmitt circuit.
5. Output B (from the Schmitt circuit) is divided into two portions. One, after differentiation in C_{102} and R_{110}, becomes signal E and is applied to the Q_{104} 4/4 NAND gate.
6. The other, after passing through the delay circuit formed by R_{109}, C_{103} and Q_{104} 1/4, triggers the mono-stable multivibrator block A (signal C).
7. Output D from the multivibrator becomes the time reference, with a time base of 900msec.
8. The Q_{104} 4/4 NAND gate compares the time reference with the signal (E) from the differentiation circuit.
9. Because of the long on/off cycle time at the photo transistor, no plus pulse (at E) is obtained during the 900msec time reference (D). The NAND gate output remains unchanged, and the auto-return function is not triggered.
10. The on/off cycle time at the PTr becomes much shorter (as the tonearm rapidly advances towards the platter center).
11. As a positive pulse is now obtained (at E) during the D reference time, NAND output changes from 1 to 0.
12. This change in output F triggers the monostable multivibrator B, and a bias voltage is applied to the base of Q_{102} for approx. 1.5sec, turning Q_{102} on.
13. With Q_{102} in on state, voltage +B causes a current to flow through the relay and Q_{101}, and the relay operates.
14. As the relay contacts close, GM and cam A begin to rotate.
15. Although Q_{101} enters the off state after 1.5sec, GM continues to rotate because of microswitch C, and the auto return function is performed.

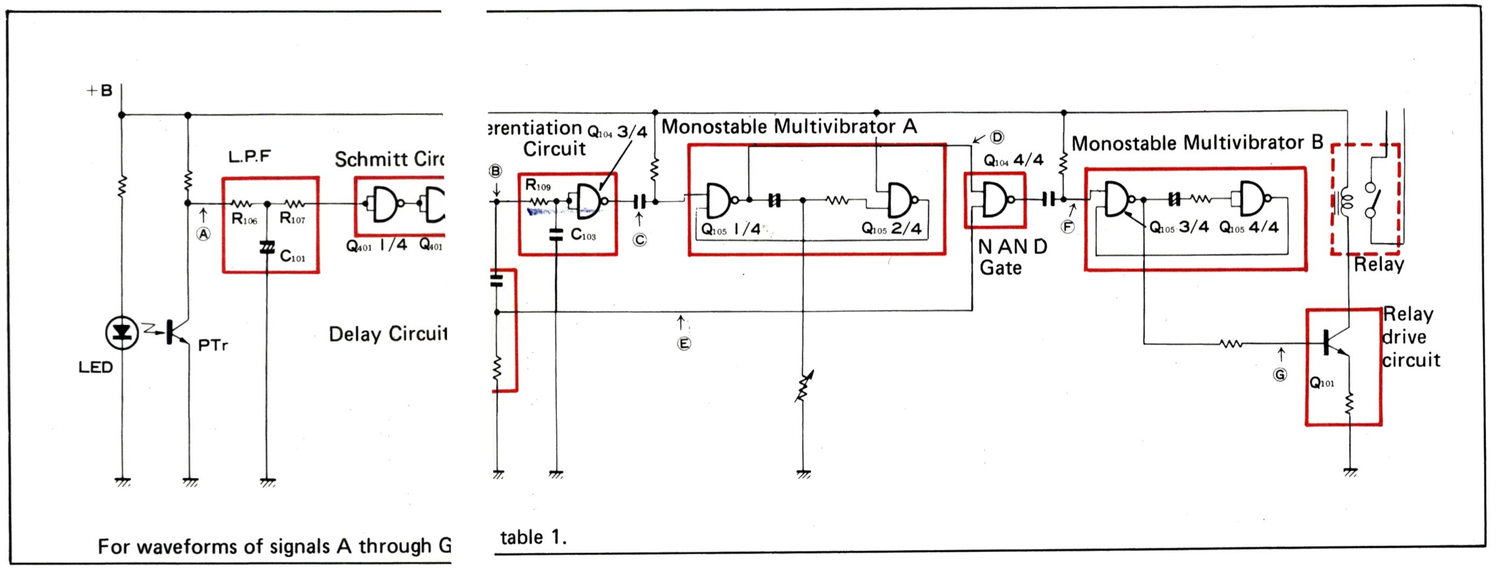


Fig. 29

7.2 ADJUSTMENTS OF AUTO RETURN DETECTION CIRCUIT

7.2.1 Relative Positions of Tonearm Plate and PTr

1. The mounting position of the tonearm plate must be adjusted so that the gap between the plate and the PTr is 0.5—1.0mm.
2. When this gap is larger than 1.0mm, the detection circuit will not function.

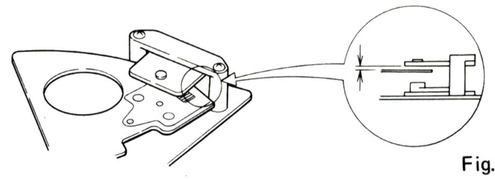


Fig. 30

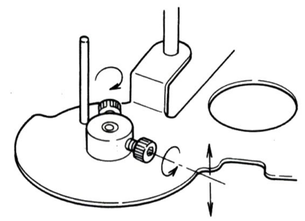


Fig. 31

7.2.2 Adjustment of Reference Time

1. Connect oscilloscope to CP pin of detection circuit ass'y PWX-011. Set 'scope sweep time at 0.2cm/sec.
2. Briefly short-circuit pins BR and BL on detection circuit ass'y.
3. Oscilloscope should show a trace of 4.5cm (900msec ±50).

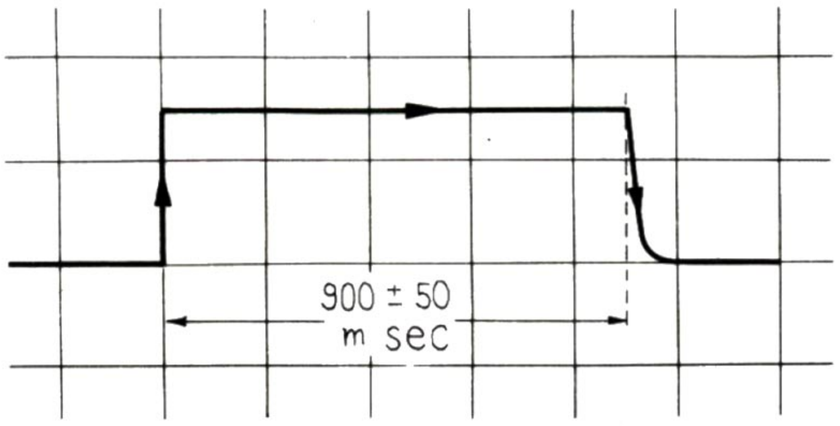


Fig. 32

4. If trace is longer or shorter, adjust VR_{102} on detection circuit ass'y PWX-011.

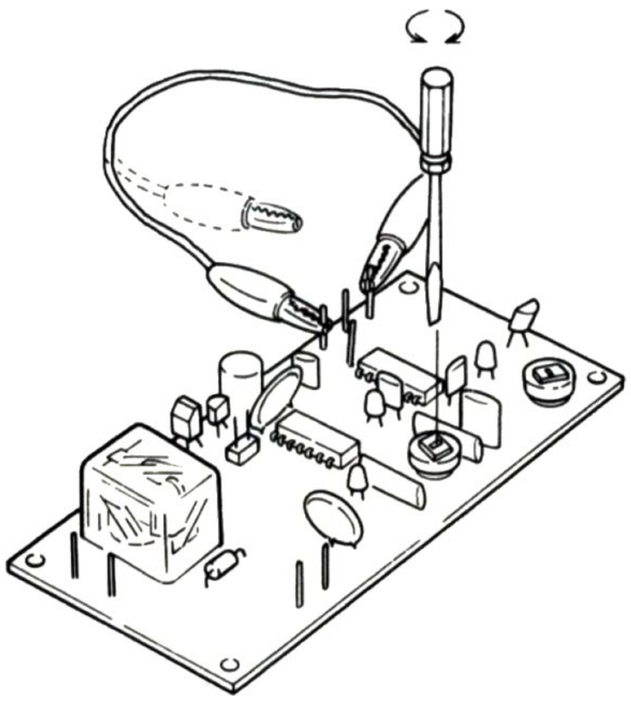


Fig. 33

7.2.3 Adjustment of PTr Output and Auto Return Start Position.

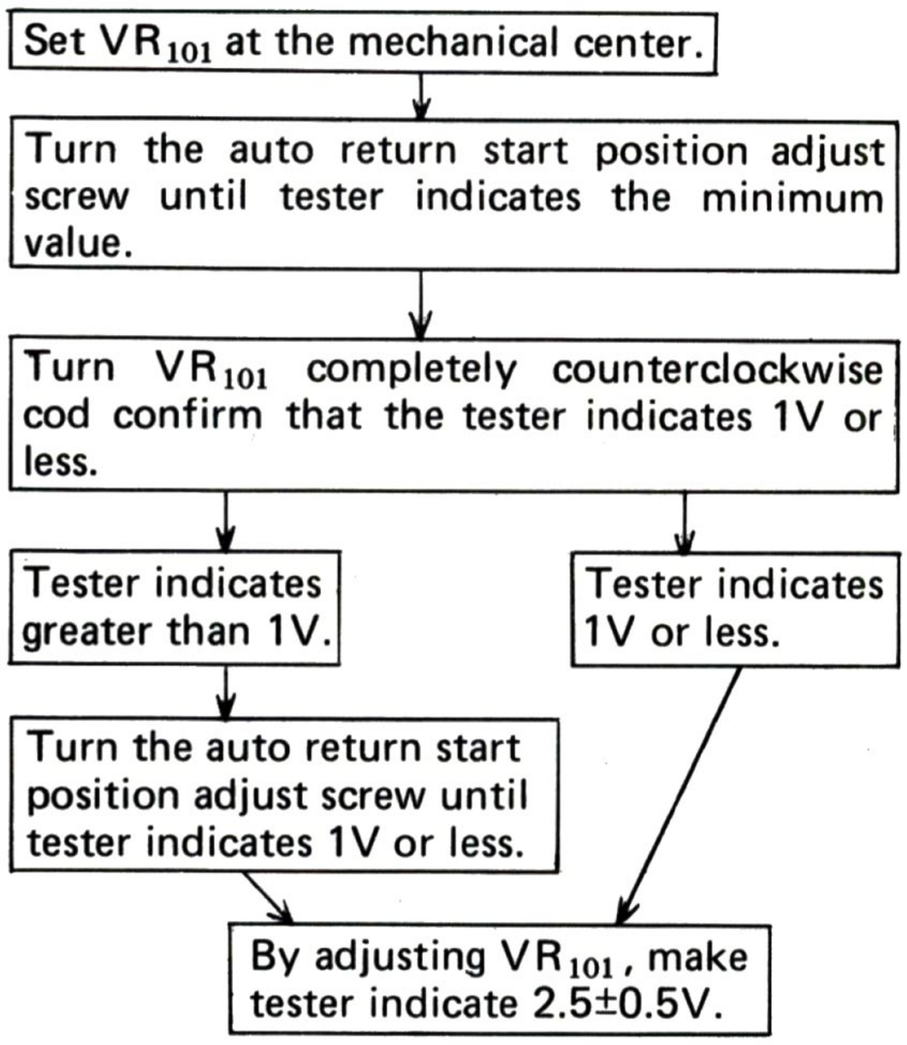
Points to note in adjustment:

- The tester used should have an input impedance of 10kOhm or greater.
- Voltage setting (2.5±0.5V) by means of the VR_{101} must be done accurately. After setting voltage, recheck after two or three minutes.

1. As shown in Fig. 34, short-out connector A of detection circuit ass'y PWX-011.
2. Remove the connector between detection circuit ass'y PWX-011 and motor PXM-049, causing the turntable to stop.
3. Connect (+) tester lead to the GR terminal of detection circuit ass'y PWX-011. Connect (−) lead to the BL terminal. (Tester should be set in 5V or 3V range.)
4. Adjustment tool GGK-057 on center shaft as shown in Fig. 35.
5. Secure headshell at angle set by adjusting tool GGK-057 using rubber band (Fig. 35).

Preparations for adjustment are now completed. Adjustment should be performed according to the following chart. Adjust ments are made at VR_{101} of PWX-011 (Fig. 34) and auto return start position adjust screw (Fig. 36).

Adjustment Procedure



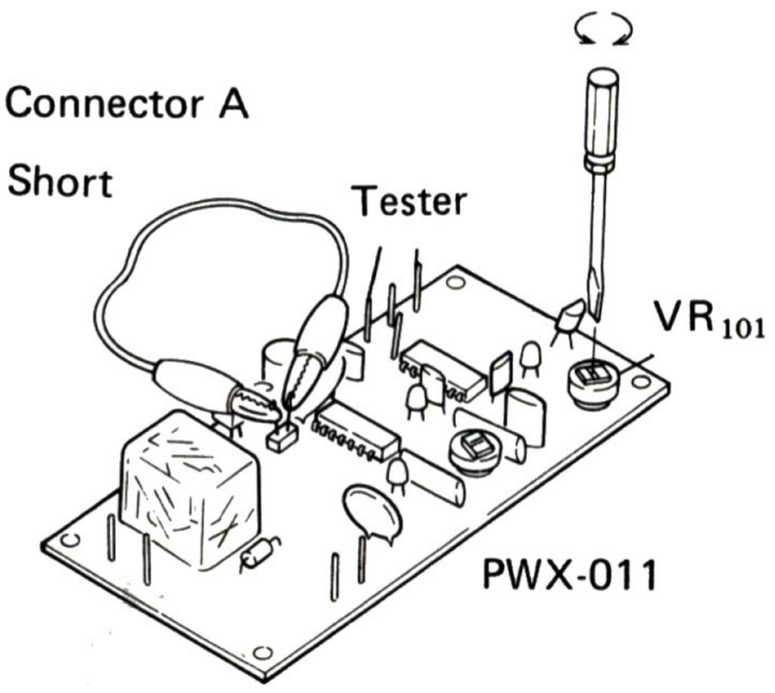


Fig. 34

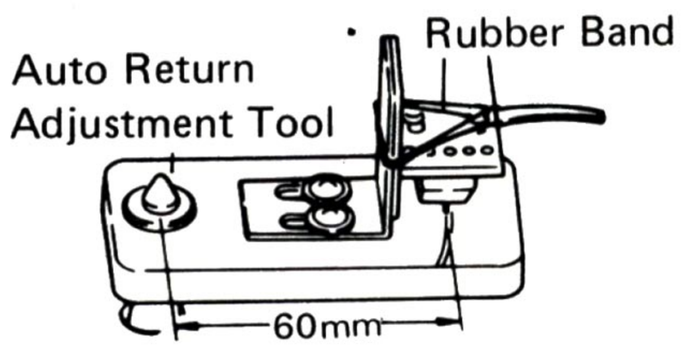
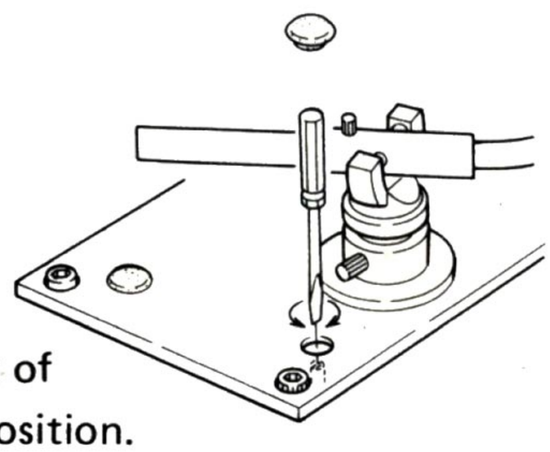


Fig. 35



Adjustment of starting position.

Fig. 36

7.3 TROUBLE SHOOTING OF AUTO RETURN DETECTION CIRCUIT

No auto return performed

DOWN . . . . . YES
ACROSS . . . . . NO

↓

Is relay in auto return circuit ass'y (PWX-011) functioning? → Defect in mechanism and/or GM.

↓

Defect in PWX-011)or tonearm plate.

↓

Check supply voltage +B (20V) on PWX-011. → Defect in voltage regulator in power supply ass'y (PWR-828 and PWR-830).

↓

Check if emitter voltage at R_{108} is stable at 15V DC. → Defect in voltage regulator block in detection circuit ass'y (PWX-011).

↓

Check if PTr produces specified output if tonearm is moved to within 60 mm from center of platter. → Incorrect gap between tonearm plate and PTr. Also check PTr and LED for proper operation, as well as PTr output.

↓

Short-circuit terminals GR and BL briefly, then open again. Check if proper waveform appears at pin 10 of Q_{104}. → Defective Schmitt circuit. Replace Q_{104}.

↓

Short-circuit terminals GR and BL briefly, then open again. Check if delayed signal appears at pin 4 of Q_{104}. → Defective delay circuit. Replace Q_{104}.

↓

Short-circuit terminals GR and BL briefly, then open again. Check if output of 900msec ±50 duration appears at CP terminal. → Defective monostable multivibrator A. Replace Q_{105}.

↓

Check that, when pin 1 of Q_{105} is grounded briefly, V_{CC} appears at pin 3 of Q_{105} (for about 2sec). → Defective monostable multivibrator B. Replace Q_{105}.

↓

Check if relay is switched on when V_{CC} is applied to Q_{101} base through a 15kΩ resistance.

↓

Relay or relay drive circuit defective.

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