

PIONEER

Service Manual

**CIRCUIT & MECHANISM
DESCRIPTIONS
REPAIR & ADJUSTMENTS**



**ORDER NO.
ARP-256-0**

STEREO TURNTABLE

PL-707

MODEL PL-707 COMES IN FOUR VERSIONS DISTINGUISHED AS FOLLOWS:

| Type | Voltage | Remark |
|------|---------------------------------------|------------------------------------|
| KUT | AC120V only | U. S. A. model (Without cartridge) |
| HE | AC220V, 240V (switchable) | European continent model |
| HB | AC220V, 240V (switchable) | United Kingdom model |
| S | AC110V, 120V, 220V, 240V (switchable) | General export model |

- This service manual is applicable to the KUT type. For servicing of the other types, please refer to page 56.
- Ce manuel d'instruction se réfère au mode de réglage, en français.
- Este manual de servicio trata del método de ajuste escrito en español.

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1. SPECIFICATIONS

Motor and Turntable

Drive System Direct-drive
Motor Quartz PLL Hall motor
Turntable Platter 310 mm diam. aluminum alloy die-cast
Speeds 33-1/3 and 45 rpm
Wow and Flutter Less than *0.012% (WRMS)
0.025% (WRMS)
± 0.035% WTD Peak (DIN)

Values marked with an "*" designate the wow and flutter for motor, and do not include the cartridge or tonearm load.

Signal-to-Noise-Ratio More than 80 dB (DIN-B)
(with Pioneer cartridge model PC-6MC)

Tonearm

Type Static-balance type, Straight pipe arm
Effective Arm Length 235 mm
Overhang 15 mm
Usable Cartridge Weight 3 g (min.) to 8 g (max.)

PC-6MC Specifications

Type Moving coil type
Stylus 0.3 x 0.7 mil diamond (PN-6 MC)
Output Voltage 2.2 mV
(1 kHz, 5 cm/s LAT. Peak)
Tracking Force 1.7 g to 2.3 g (proper 2 g)
Frequency Response 10 to 35,000 Hz
Recommended Load 50 kΩ
Weight 3.3 g

Subfunctions

Auto lead in, Auto return, Auto cut, Repeat, Quick play, Quick stop, Anti-skating, Arm elevation, Tracking-force direct-read-out, Tonearm height adjusting device (± 3 mm), Insulator height adjusting device, Free stop hinges.

Miscellaneous

Power Requirements
HE, HB, HP models AC 220 V/240 V
(switchable), 50, 60 Hz
KUT, KCT models AC 120 V, 60 Hz
S, S/G models AC 110 V/120 V/220 V/240 V
(switchable), 50, 60 Hz

Power Consumption
HE, HB, HP models 9W
KUT, KCT models 10W
S, S/G models 7W
Dimensions 460 (W) x 164 (H) x 409 (D) mm
18-1/8 (W) x 6-1/2 (H) x 16-1/8 (D) in.
Weight 8.1 kg/17 lb 14 oz

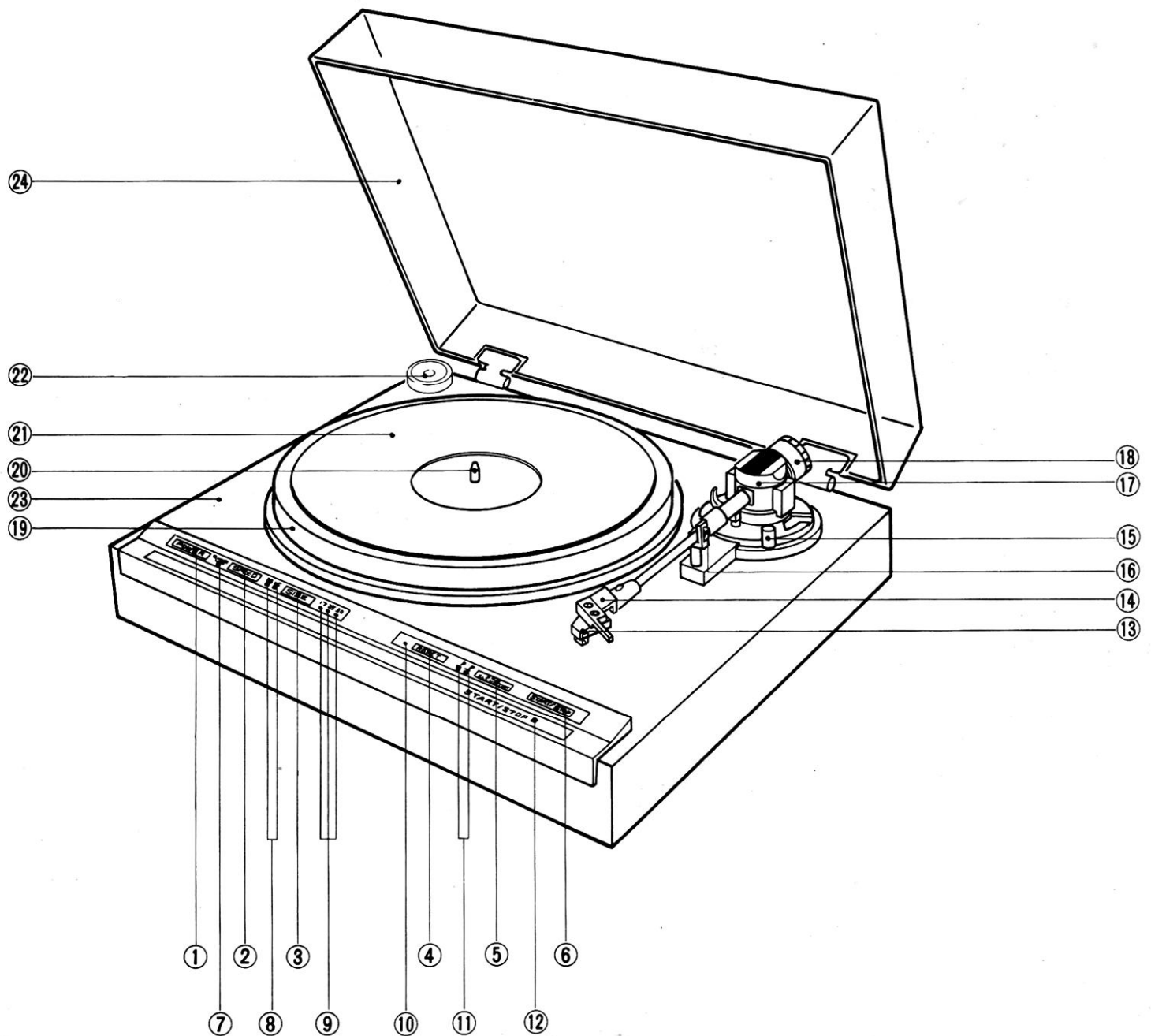
Accessories

EP Adapter 1
Operating Instructions 1
Cartridge mounting parts (For KUT and KCT models)
Screws (L) 2
Screws (M) 2
Screws (S) 2
Washers 2
Nuts 2

NOTE:

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

2. FRONT PANEL FACILITIES



① POWER SWITCH

- Press this switch to turn the power on and off.
 [ON] (depressed position) : Power is switched ON.
 [OFF] (released position) : Power is switched OFF.
 When the POWER switch is set to ON, the following switches are set automatically.
- SPEED switch — [33]
 - RECORD SIZE switch — [30]
 - REPEAT switch — [OFF]

② SPEED SWITCH

- Set this switch in accordance with the speed of the record which is to be played.
- [33] indicator lights:
 For playing 33-1/3 rpm records.
- [45] indicator lights:
 For playing 45 rpm records.

③ RECORD SIZE SWITCH

Set this switch in accordance with the size of the record which is to be played.

[12"30] indicator lights:

For playing 30 cm (12") records.

[10"25] indicator lights:

For playing 25 cm (10") records.

[7"17] indicator lights:

For playing 17 cm (7") records.

④ REPEAT SWITCH

Press this switch so that the indicator lights for repeat play.

⑤ ARM ELEVATION SWITCH

- Use the switch to manual play.
- Use the switch to suspend record play temporarily.
- Use the switch when changing the tracks during manual play.

[▼] indicator lights:

The tonearm rises (the stylus moves away from the record).

[▼] indicator lights:

The tonearm descends (the stylus is lowered onto the record).

⑥ START/STOP SWITCH

Press this switch when starting auto play or when stopping play

⑦ QUARTZ LOCK INDICATOR

This lights when the platter is rotating at exactly 33-1/3 or 45 revolutions per minute.

⑧ SPEED INDICATORS (33, 45)

These indicate the platter speed.

[33] lights:

Platter is rotating at 33-1/3 rpm.

[45] lights:

Platter is rotating at 45 rpm.

⑨ SIZE INDICATORS (30, 25, 17)

These indicate the record size.

[12"30] lights – 30 cm (12")

[10"25] lights – 25 cm (10")

[7"17] lights – 17 cm (7")

⑩ REPEAT INDICATOR (REPEAT)

This indicator lights up when the repeat play function is utilized.

⑪ ARM ELEVATION INDICATOR (▼ · ▼)

These indicators indicate whether the tonearm is the raised (up) or lowered (down) position.

[▼] lights:

The tonearm rises (the stylus moves away from the record).

[▼] lights:

The tonearm descends (the stylus is lowered onto the record).

⑫ START/STOP INDICATOR

- This lights when the START/STOP switch has been pressed and auto play has been started.
- This lights when the START/STOP switch is pressed to suspend play.

⑬ CARTRIDGE (PC-6MC)

NOTE:

A cartridge is not provided with the KUT and KCT models and so your own cartridge should be mounted, following the instructions laid down in CARTRIDGE MOUNTING.

⑭ HEADSHELL

⑮ ANTI-SKATE CONTROL

This is rotated when performing the anti-skating adjustment.

⑯ ARM REST

This serves to hold and clamp the tonearm. When moving the tonearm, release the clamp.

⑰ TONEARM

⑱ TRACKING FORCE ADJUSTMENT WEIGHT

This is used when adjusting the tracking force.

⑲ PLATTER

⑳ PLATTER SHAFT

㉑ RUBBER MAT

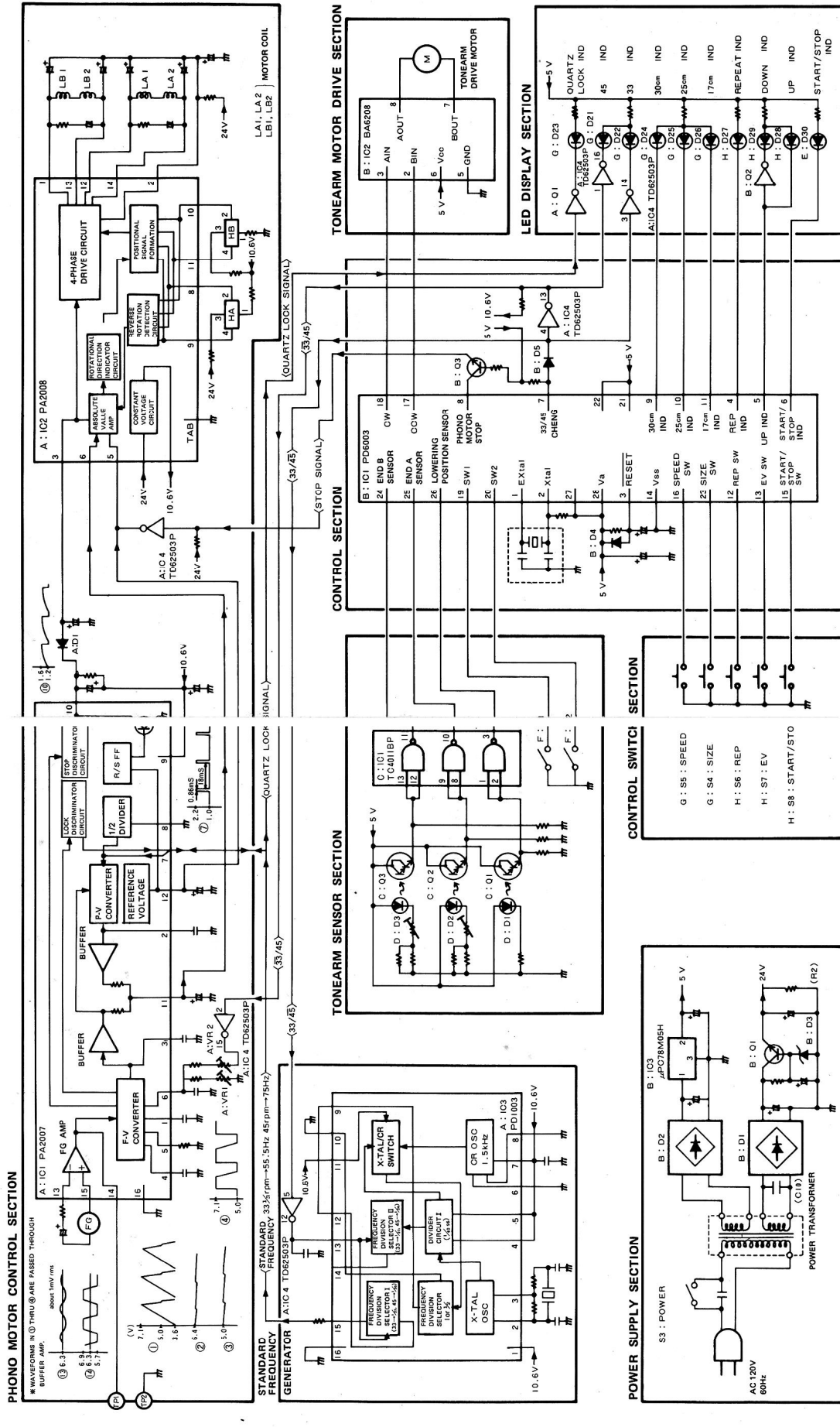
㉒ EP ADAPTER

This is used when playing records without a "middle."

㉓ CABINET

㉔ DUST COVER

3. BLOCK DIAGRAM



4. MECHANISM DESCRIPTION

To facilitate understanding the operation of the PL-9, the total unit may be broken down into blocks consisting of the tonearm drive mechanism, the sensing mechanism serving to sense lead in and lead out positions of the tonearm, the control section consisting of the full-auto control IC PD6003, and the motor section functioning to drive the turntable platter. →

↙ The operational and functional relationship between each block is quite complex, so in order to understand total system operation, it is first necessary to thoroughly understand the operation and function of each block, then carefully study their interrelationships.

This manual covers the subject in that order. First, the operation and function of each block will be described, then a timing chart is presented to clarify block relationships.

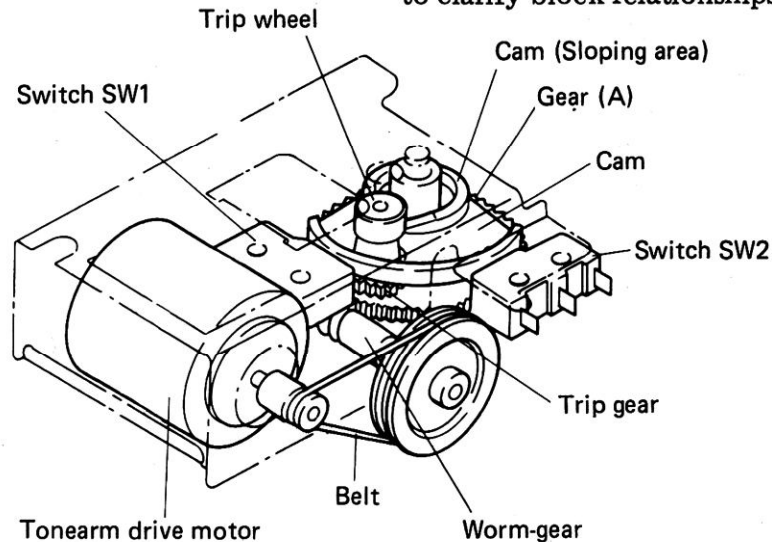


Fig. 4-1 Tonearm drive mechanism

4.1 TONEARM DRIVE MECHANISM

1. The tonearm drive mechanism consists of the tonearm drive motor, worm-gear, gear (A), gear (B), trip gear, trip wheel, cam, switch SW1, and switch SW2. (Fig. 4-1)
2. The gear cluster is shown in Fig. 4-2. When the cam is held immovable and gear (A) is rotated in a counterclockwise direction, a small amount of friction is felt, but gear (B) and trip gear also rotate. Note that rotation of the trip gear also rotates the trip wheel. (Fig. 4-3) Also note that when the cam is free to rotate, friction will cause it to rotate in the same direction as gear (A) and (B).
3. Refer to Fig. 4-4. The elevation shaft contacts the sloping area located around the center shaft of the cam. Also note the position of the cam at this time. This is the position the mechanism will be in prior to starting up the unit. The tonearm will be on the arm rest, and arm-elevation will be in the DOWN position.

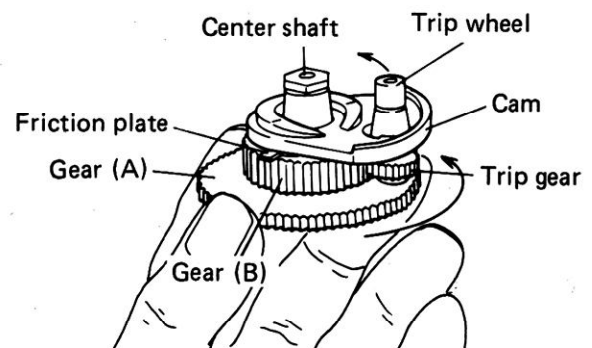


Fig. 4-2 Gear cluster

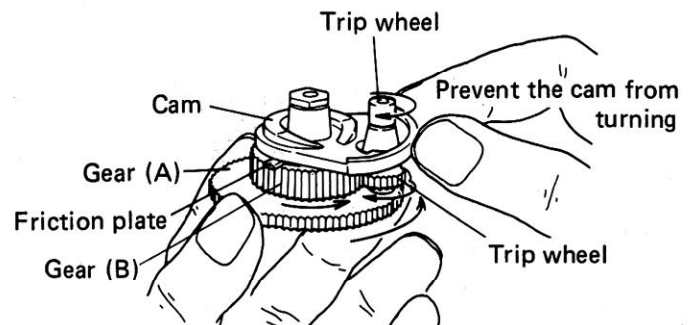


Fig. 4-3 Gear cluster operation

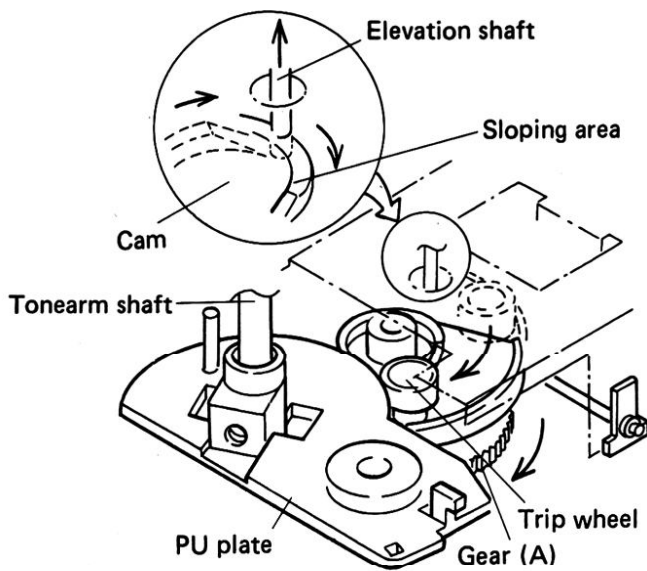


Fig. 4-4 Lead in operation

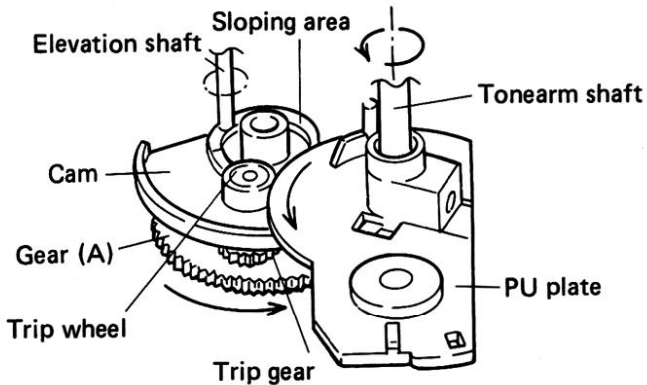


Fig. 4-5 Return operation

4. Turn the worm gear by hand imitating what would occur if the START/STOP button were depressed causing the motor to rotate the gear. Worm gear rotation causes gear (A) to rotate, and the gears shown in Fig. 4-2 and 4-3 of item 2 above all turn in a clockwise direction.
5. The elevation shaft raises as the gear/cam assembly rotates, and this in turn causes the tonearm to raise. The two switches, SW2 and SW1 are also turned OFF.
6. As the assembly rotates further, the trip wheel and PU plate attached to the tonearm shaft come into contact, creating the same condition as occurred in item 2 where the cam was held in an immovable position. Continued rotation of the trip wheel causes the PU plate attached to the tonearm shaft to turn.
7. Rotation of the PU plate moves the tonearm to the point specified by the sensing and control mechanisms (covered in the following paragraphs). When the tonearm reaches that

specified point, the motor reverses itself, and the cam switches SW1 and SW2 ON in sequence. Arm-elevation goes to the DOWN position and playback starts.

8. In practice, each of the above operational steps are controlled either directly or indirectly from the control section or by the forward or reverse rotation of the motor. The control section picks up its operational cues by detecting the ON or OFF status of switch SW1 and SW2, and these switches are controlled by the movement of the mechanism positioning the cam.

4.2 SENSING MECHANISM

As shown in Fig. 4-6, the shutter fixed to the tonearm is positioned to travel in the space between the phototransistors and LEDs mounted on

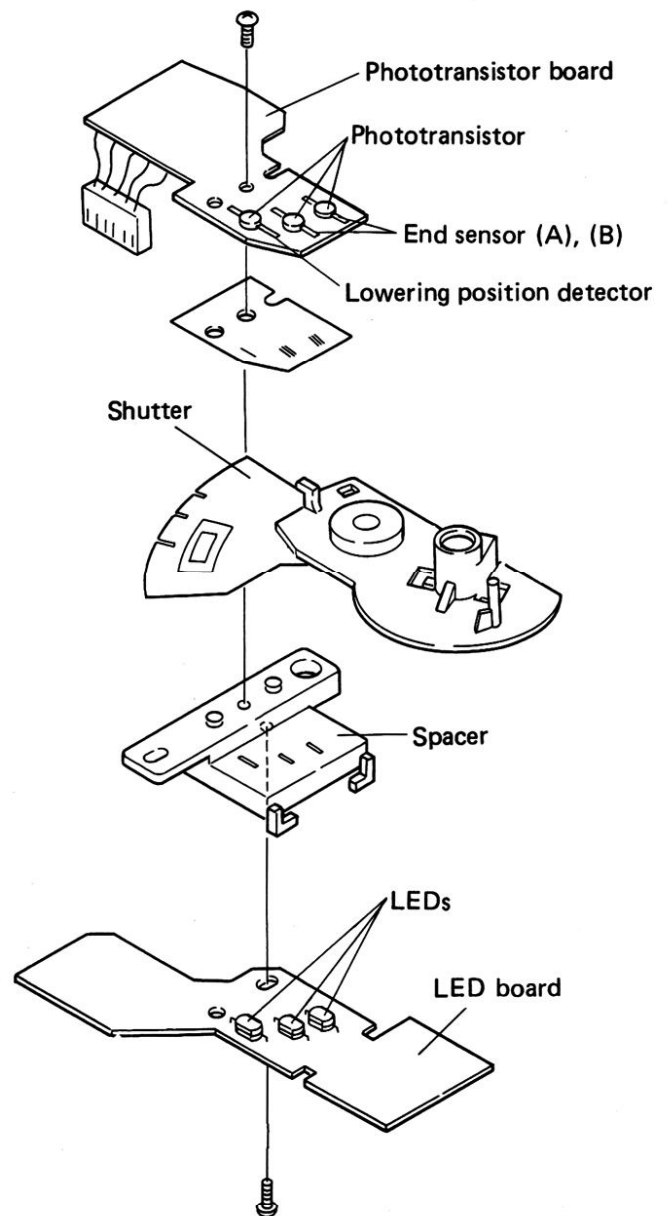


Fig. 4-6 Sensing mechanism

their respective boards. The shutter has three 0.7mm slits cut out of its outer circumference at the position the outer edge of a 30cm, 25cm, or 17cm record disc would be located. The slit, or opening located inside of those three slits is the end sensor slit (Fig. 4-7).

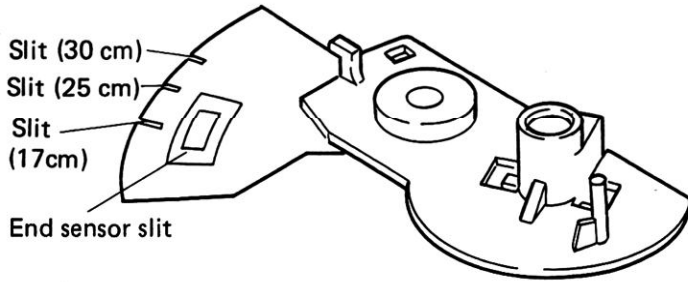


Fig 4-7 Shutter

■ Lowering Position Detector

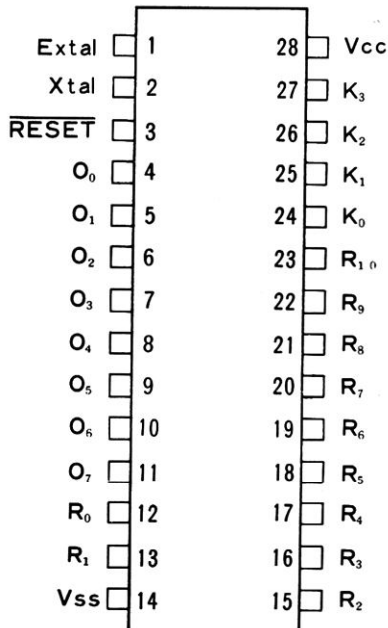
1. This unit is mechanically designed to allow the shutter to pass between two boards mounting the sensing elements or photocoupler. The photocoupler consists of an LED and phototransistor.
2. The shutter moves with the tonearm, and a signal is transmitted to the control section by the light emitted from the LED (normally interrupted by the opaque portion of the shutter) being passed through the 30cm, 25cm, or 17cm slit and triggering the phototransistor ON.

■ End Sensor

1. As the tonearm travels toward the inside of the record disc and reaches the end sensor zone (end sensor slit), the light transmitted by the LED is passed through the end sensor slit and turns the phototransistor ON, then OFF. This causes the pulse signal transmitted by end sensor A and B to go 90° out of phase.
2. The pulse frequency is compared with the rotational speed (movement) of the tonearm, and then sent to the control section as the record disc lead-out groove sensor signal.

■ Arm Rest Position Sensor

1. When the three sensors consisting of the lowering position sensor and end sensor (A) and (B) are all simultaneously picking up transmitted light, control determines that the tonearm is at the arm rest position.
2. This status is used to control starting and stopping of the turntable motor during manual operations, or, in the auto-return mode, simply perceives that the tonearm has returned to the arm rest.



IC PD6003 pins

| Pin | Function | Timing | Pin | Function | Timing |
|----------------|-----------------------------|--------|-----------------|--------------------------------|--------|
| O ₀ | Repeat display output | | R ₅ | CW rotation output | |
| O ₁ | EV-UP display output | | R ₆ | SW1 input | — |
| O ₂ | START-STOP display output | | R ₇ | SW2 input | — |
| O ₃ | Speed selector output | | R ₈ | | |
| O ₄ | Turntable motor stop output | | R ₉ | | |
| O ₅ | 30cm display output | | R ₁₀ | Size selector switch input | |
| O ₆ | 25cm display output | | | | |
| O ₇ | 17cm display output | | K ₀ | End sensor B input | — |
| | | | K ₁ | End sensor A input | — |
| R ₀ | Repeat switch input | | K ₂ | Lowering position sensor input | |
| R ₁ | EV switch input | | K ₃ | | |
| R ₂ | START-STOP switch input | | | | |
| R ₃ | Speed selector switch input | | | | |
| R ₄ | CCW rotation output | | | | |

PD6003 Pin Function Table

Fig. 4-8 PD6003

4.3 CONTROL SECTION

The functions of the full-auto control IC PD6003 are described in this section. The table shown in Fig. 4-8 lists the function performed by each pin of PD6003. Please refer to this table as the detailed explanation progresses.

1. When the tonearm is at the arm rest position, pressing the START/STOP button causes the turntable motor to start rotating and illuminates the LED built into the START/STOP button and the EV UP display LED. At the same time the tonearm drive motor moves the tonearm toward the lead in groove of the record.
2. The tonearm drive motor continues rotating until it reaches the point where the signal from the lowering position sensor is picked up. When that point is reached, the drive motor is reversed, lowering the tonearm.
3. End sensor A and B is used to detect the end of playback, but if the START/STOP button is depressed during playback, the tonearm drive motor starts rotating in the return direction and tonearm return operation is started. When the tonearm reaches the point directly above the arm rest, the tonearm drive motor starts rotating in the reverse direction and lowers the tonearm on the arm rest.
4. If the operation in the above step is carried out with the repeat switch ON, the tonearm again will return to the lead in groove. If the repeat switch is OFF, the turntable motor will stop at this point.

4.4 ACTUAL OPERATION (PLAYBACK OF A 33 rpm, 17cm RECORD DISC)

■ Automatic Lead in

1. Depress the button and turn the power switch ON. Set the speed for the record to be played (33 rpm). When the 33 rpm button is depressed, an instruction signal from the motor assembly will illuminate the 33 rpm display LED, D22. Next, set the proper size for the record to be played (17cm in this case). When the size selector switch is depressed twice, the 11 pin of PD6003 will go to a low level, and the 17cm display LED, D26 will be illuminated.
2. With the turntable thus set up, depressing the START/STOP button causes the 15 pin of PD6003 to go to a low level. Also 6 pin goes to a low level, illuminating the START/STOP display LED, D30. At the same time, pin 17 goes to a low level and pin 18 goes high,

starting rotation of the tonearm drive motor in the mechanism section.

3. The worm gear is coupled to the rotating motor by belt, and the worm gear turns gear (A) (and cam) in a clockwise direction. The tonearm is lifted by the arm-elevation mechanism, and switch SW2 and SW1 go OFF.
4. Gear (A) (and the cam) continue rotating until finally, the cam makes contact with the PU plate fixed to the tonearm shaft. When the cam contacts the PU plate, it stops rotating. However, the trip wheel continues rotation along with gear (B).

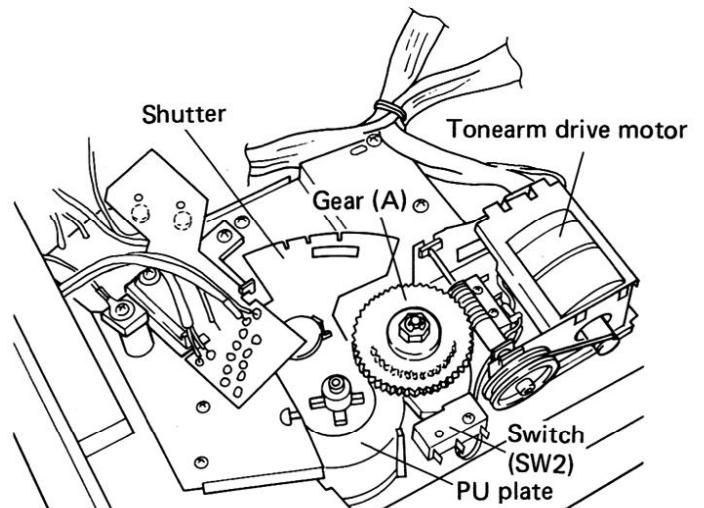


Fig. 4-9 Mechanism section

5. The trip wheel is making contact with the arm rotation stopper, and the rotating trip wheel causes the PU plate to turn. The turning PU plate moves the tonearm toward the center of the platter.
6. As the tonearm moves, so does the shutter attached to the tonearm shaft. The tonearm (and shutter) go past the 30cm and 25cm lowering position until it reaches the 17cm record disc lead-in groove where the third pulse signal from the lowering position sensor (light from LED passes through the slit in the shutter fixed to tonearm shaft turning phototransistor ON) causes the 26 pin of PD6003 to go to a low level. (Pulse signals are also produced at 30cm and 25cm positions.)

7. This causes the PD6003 17 pin to go low, and the 18 pin to go to a high level, and after the tonearm drive motor stops, it commences reverse rotation. As it rotates, the arm-elevation shaft riding on the sloping area of the cam moves down off the slope and playback starts.
8. When the tonearm drive motor rotating in reverse (switch SW1 ON) turns switch SW2 ON, the PD6003 6 pin goes to a high level, extinguishing the START/STOP display LED, D30. The turntable will not go into the auto-stop until the START/STOP display LED is extinguished even though the START/STOP button is depressed. Also, when both the tonearm drive motor and switch SW2 are ON, PD6003 17 and 18 pin both go high, stopping the drive motor.
9. If the tonearm does not move off the arm rest within 8 seconds after the START/STOP button is depressed (tonearm clamped in arm rest), the START/STOP display indicator starts flashing. If this status (flashing) continues for another 11 seconds, the start instruction is cancelled and the tonearm lowers in the arm rest.
10. The elevation -up display LED, D28 illuminates when the START/STOP button is depressed, and when the tonearm moves to the record disc and lowers down, D14 is extinguished. PD6003 senses the first pulse as the 30cm position, the second as the 25cm, and the third as the 17cm record size position. When it determines that the tonearm has reached the proper lowering position, pin 5 goes to a high level, extinguishing the display.

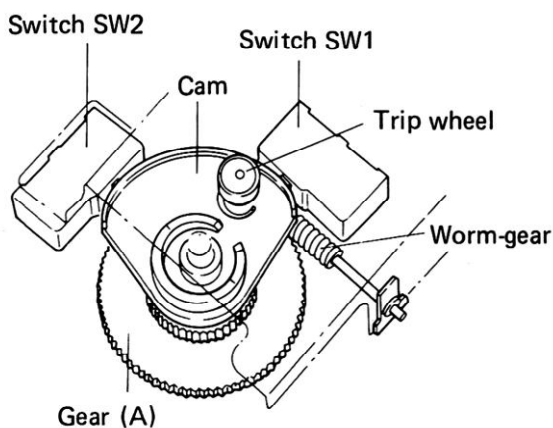


Fig. 4-10 Switch SW1, 2 position

■ Arm-elevation UP and DOWN

1. When the arm-elevation switch is depressed during record playback, arm-elevation goes UP and playback is temporarily stopped.
2. When the arm-elevation switch is depressed, the 13 pin of PD6003 goes to a low level. Pin 5 also goes low, and illuminating the elevation display LED, D28.
3. At the same time, pin 17 goes to a low level and pin 18 goes high, starting tonearm drive motor rotation. This causes the cam to turn, and the elevation shaft to ride up on the sloping section of the cam. This action causes the arm-elevation to go to the UP position, stopping record playback.
4. The tonearm drive motor continues to move the cam until the position is reached where SW1 is turned OFF (tonearm still in UP position).
5. To restart playback, the arm-elevation switch is depressed again. This causes the 13 pin of PD6003 to go to a low level. The 5 pin goes high, extinguishing the elevation display LED, D14.
6. At the same time, pin 17 goes high and pin 18 goes low, causing the tonearm drive motor to rotate in an opposite direction of that in the UP position. As the cam turns, the elevation shaft drops down off the slope, lowering the tonearm and starting playback again.
7. The tonearm drive motor continues to move the cam until the position is reached where SW2 is turned ON (tonearm still in DOWN position).

For manual playback operation, depress the arm-elevation switch to raise the tonearm up off the arm rest (UP), then move it to the desired point over the record by hand. Depressing the arm-elevation switch again will then lower (DOWN) the tonearm onto the record. Operationally, this follows the sequence listed in items 2 through 7 above.

Also during manual play, when the tonearm is manually moved toward the center of the record (off the arm rest), the platter commences rotation. When the tonearm is moved off the arm rest, PD6003 26 pin (signal pin from lowering position sensor) goes to a high level, and the 8 pin goes to a low level, starting the motor rotation.

■ Auto-return

1. When record playback is over, the tonearm stylus goes from the band of audio grooves into the lead out groove, and the pulse width of the signal output from end sensor A and B become more narrow. This informs PD6003 that record playback has ended.

The phase of the pulse from end sensor A and B is set so that B leads A by 90°, however this phase offset is not used for detection of the end of playback, but to prevent any unintentional operations from sources such as record disc eccentricity.

2. When playback completion is detected, PD6003 pin 17 goes to a high level and pin 18 goes low, starting the tonearm drive motor rotating. As rotation moves the cam, the slope causes the arm-elevation to go UP, raising the tonearm.
3. As the cam continues rotating, it strikes the PU plate. This stops cam movement, but the trip wheel continues rotating and turns the PU plate. This results in the tonearm being returned to a position above the arm rest.
4. At this position, light strikes the lowering position detector and end sensor A and B (all three at once), and pin 24, 25, and 26 of PD6003 go to a low level.
5. One to two seconds later, PD6003 pin 17 goes low and pin 18 goes high, and after the tonearm drive motor stops, it reverses rotation and sends the arm-elevation back down the cam slope. This lowers the tonearm on the arm rest ending playback.
6. At the same time, the cam turns switch SW1 ON (switch SW2 is already ON). When both switches come ON, both pin 17 and 18 (PD6003) go to a high level, stopping the tonearm drive motor. Also, when the tonearm reaches the arm rest position, pin 8 goes high, lowering the tonearm and causing pin 5 to go high. This causes the platter to stop rotating and extinguishes the elevation-up display LED, D28.

■ Auto-stop

1. When it is desired to stop record playback in the middle of the record, depress the START/STOP button. As the START/STOP button is depressed, PD6003 pin 15 goes to a low level. Pin 17 goes high and pin 18 goes low, starting rotation of the tonearm drive motor. Rotation causes the arm-elevation to ride up on the slope of the turning cam raising the tonearm.
2. Also pin 6 goes to a low level, thereby illuminating the START/STOP display LED, D30. From here the operation is the same as that for auto-return (above), items 3 through 6.
3. The START/STOP display LED, D30 are extinguished by the tonearm drive motor reversing rotation and turning switch SW1 ON and sending PD6003 pin 6 to a high level.

■ Auto-repeat

1. To repeat playback of the same record, depress the repeat button. This causes PD6003 pin 12 to go to a low level. At the same time, pin 4 also goes low, illuminating the repeat display LED, D27.
2. When the repeat button has been depressed, after autoreturn operations have returned and lowered the tonearm on the arm rest, the unit again goes into autolead in operations and continues playback. (The platter motor continues to rotate.)

5. CIRCUIT DESCRIPTIONS

5.1 SIMPLE SIGNAL PATH

The PL-707 motor drive circuit consists of the control IC PA2007, reference phase generator IC PD1003, motor drive IC PA2008, and IC TD62504P functioning to produce the various operational switch signals.

The signal picked up from the speed sensor section is amplified by the FG amp, then converted to the speed sensor signal voltage (DC) by the F/V converter.

Reference phase voltage is obtained by extracting the reference phase from PD1003 pin 15, passing it through the 1/2 divider, then sending it through the P/V converter to be used as reference phase voltage (DC).

The speed sensor signal voltage and reference phase voltage are each passed through a buffer amp and resistance and combined (compared). The resulting voltage is taken from the IC PA2008 pin 6 and input into the absolute value amp, and is used to control the 4-phase drive circuit motor rotation voltage, maintaining the motor at a fixed speed.

5.2 SPEED SENSOR SECTION

1. The speed sensor board consists of a single printed circuit.
2. Above this, rotates a rotor with 400 magnetized poles on its lower face. Output varies in accordance with the rotational speed of the rotor.
3. The output (frequency) from the speed sensor board is 111Hz for 33 1/3 rpm and 150Hz for 45 rpm.
4. The output signal is sent to PA2007 as a balanced input.

5.3 FG AMP

In order to square the waveform of the signal obtained from the speed sensor section (output: 0.5 – 2.0 mV rms) prior to inputting it into the F/V converter, it is amplified 69dB across a bandwidth of 20 to 160Hz.

5.4 F/V CONVERTER

1. Since the rotational speed is detected at a fixed frequency, the frequency must be converted to a voltage (DC). This function is performed by the F/V converter.
2. Previously (in PA2004) this was done by a 2-frequency F/V converter, however, increasing control gain of PA2007 allows a signal-frequency F/V to be used.

3. F/V converter gain does not change even with rpm changes.
4. Switching reference frequency is shown in Fig. 5-1.

When the switch is OFF, speed is set to 33 1/3 rpm, and when the switch is ON, the variable resistor used by 33 1/3 rpm is connected parallel to the 45 rpm variable resistor. The resulting total impedance establishes rotational speed. Thus, each time 33 1/3 rpm is adjusted, 45 rpm must also be adjusted. This arrangement prevents any rotational instability that might result from both switches being temporarily OFF when speed changes are made by switching from 33 1/3 – 45 rpm.

5. Co, Ct, Rt, and Rfv are each connected to ground, but the grounding point is very close to that of PA2007. Also, Rt is a 0.01 μ F ceramic capacitor for noise and oscillation removal, and it is grounded in close proximity to PA2007 too.

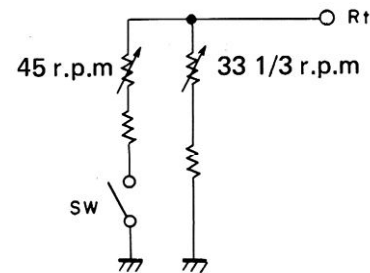


Fig. 5-1 Switching reference frequency

5.5 REFERENCE PHASE GENERATOR IC PD1003

1. When power is turned ON, the X'tal oscillator block generates a 6.144 MHz signal by using the externally connected crystal oscillator.
2. This is reduced to 6kHz by divider circuit 1 (1/1024), then this divided signal is input to divider circuit 2.
3. The 6kHz signal input to divider circuit 2 is further divided 1/27 for 33 1/3 rpm operation, and 1/20 for 45 rpm, then transmitted from pin 15 to PA2007 pin 8.
33 1/3 rpm: 222.2Hz
45 rpm: 300Hz

5.6 1/2 DIVIDER AND P/V CONVERTER

The signal received at the 8 pin (item above) is further divided by 1/2 by the 1/2 divider, then input to the P/V converter. The P/V converter serves to convert the reference phase taken from the 1/2 divider to DC voltage.

The reference phase converted into DC voltage is combined (by the buffer amp and resistor) with the DC voltage from the F/V converter (and used for rotation speed) and transmitted from pin 11 as a motor rotation speed control signal to IC PA2008 pin 6, then finally to the absolute value amp (Fig. 5-2).

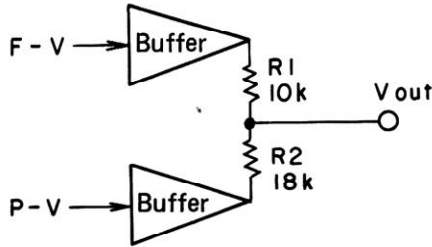


Fig. 5-2 (F-V) + (P-V) circuit

5.7 PHASE-LOCK DISCRIMINATOR CIRCUIT

When phase control is in effect, the output characteristics of the F/V converter appear as in Fig. 5-3. The portion that shows no change in speed when load torque is varied up and down can be considered as the phase-locked area, and the portion where large rotational speed changes occur (as in Fig. 5-4) is outside the phase-locked area. Thus, F/V converter output can be input into an absolute value comparator having an upper and lower threshold. A theoretical diagram of such a circuit is shown in Fig. 5-5.

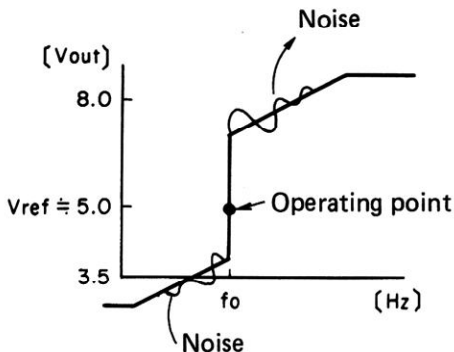


Fig. 5-3 Input/output characteristics

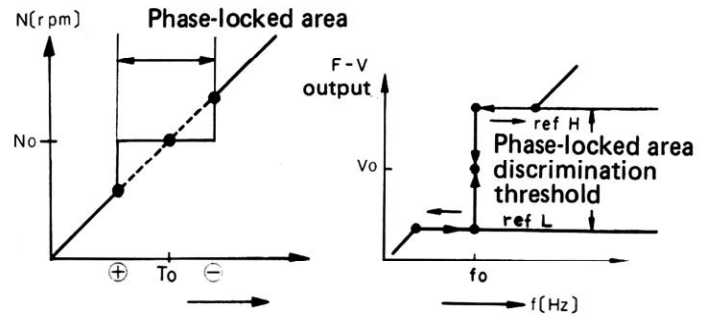


Fig. 5-4 F/V converter output

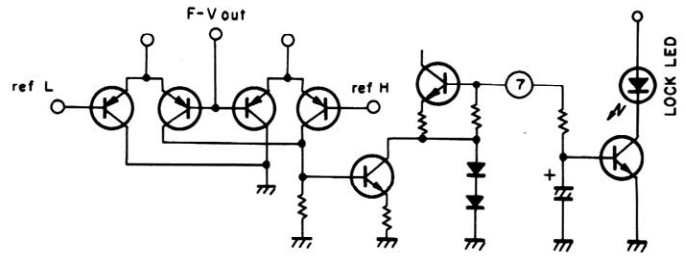


Fig. 5-5 Phase-locked discrimination theoretical circuit

5.8 STOP DISCRIMINATOR CIRCUIT

1. Depressing the START/STOP button of the PL-707 transmits a stop signal generating a reverse torque and applying a brake to the motor. Motor rotation stops almost immediately.
2. The stop discriminator circuit functions to detect low or high rotation speed through the charge/discharge status of capacitors and resistors connected to IC PA2007 pin 10 (To/STOP), and when rotation drops below a certain speed, motor torque is dropped to zero. A theoretical circuit diagram is shown in Fig. 5-6.
3. After that, the platter turns a small amount due to inertia, then stops.

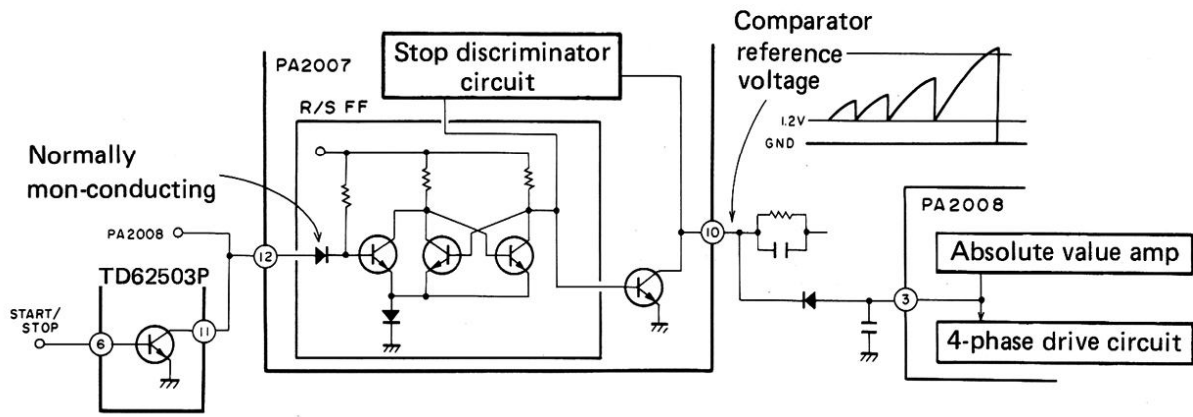


Fig. 5-6 Stop discriminator theoretical circuit

5.9 ABSOLUTE VALUE AMP AND ROTATION DIRECTION INDICATOR CIRCUIT

1. The signal at the 6 pin (control input) is compared with the signal at the 5 pin (reference voltage) and the difference in voltage is used to generate current in the motor winding. The input/output characteristics are shown in Fig. 5-7.
2. The control input is higher than the reference voltage ($V_{ref} 5V$) when the rotation of the platter is higher than specified speed. When this occurs, the absolute value amp sends an indication (instruction) to the rotation direction indicator circuit to generate reverse torque in order to drop the speed of the motor.
3. The control input is lower than the reference voltage ($V_{ref} 5V$) when the rotation of the platter is lower than specified speed. When this occurs, the absolute value amp sends an indication (instruction) to the rotation direction indicator circuit to generate forward torque in order to increase the speed of the motor.

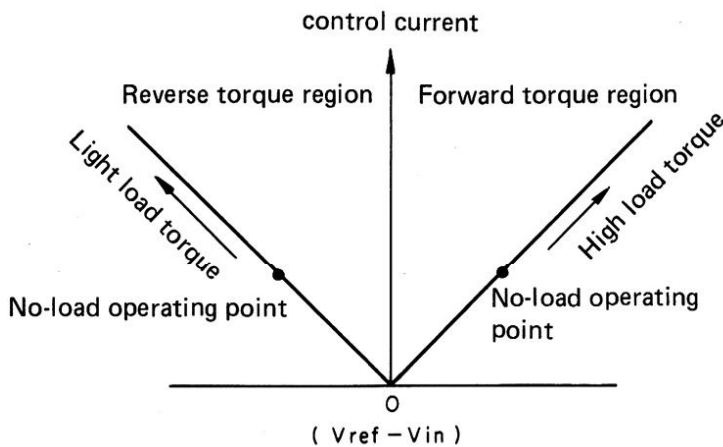


Fig. 5-7 Input/output characteristics

5.10 DRIVE CIRCUIT

1. The HA and HB Hall elements (6 magnetized pole pieces fixed to the circumference of the motor) are attached electrically 90° out of phase with each other. These elements are used to sense the rotational position of the motor.
2. The position sensing signal produced by the Hall elements are each output to the block diagram position signal synthesizing circuit, and their waveforms are shaped as shown in Fig. 5-8.
3. The staircase waves are each input into the block diagram 4-phase drive circuit, and as shown in Fig. 5-8, LA and LB alternate back and forth in a 90° duty cycle (voltage) to turn the motor.
4. LA and LB amplitude is in proportion to the output of the absolute value amp.

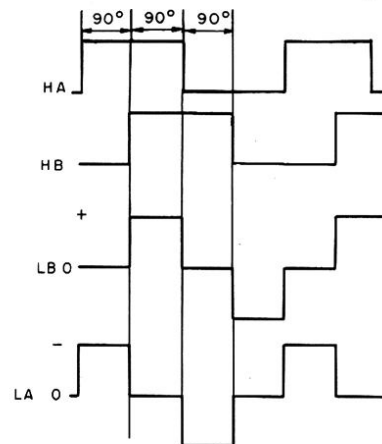


Fig. 5-8 Drive circuit waveforms

5.11 REVERSE ROTATION SENSING CIRCUIT

1. The motor used in the PL-9 is the dual-direction drive circuit type, and if manually forced in the reverse direction, it will continue to apply a forward torque in an attempt to restore forward rotation as long as it does not exceed specified rotation speed.
2. However, when reverse rotation exceeds 45 or 33 1/3 rpm, the rotation direction indicator circuit detects this as an overrun in the forward direction and applies reverse torque in an attempt to bring it to specified rotation speed.
3. Reverse torque applied to the platter already rotating in reverse will further increase the speed and the turntable will run out of control.
4. The reverse rotation guard circuit prevents the platter from running out of control.
5. The equivalent circuit of the reverse rotation sensing circuit consists of a D type flip-flop (D input output at Q by CK triggering).

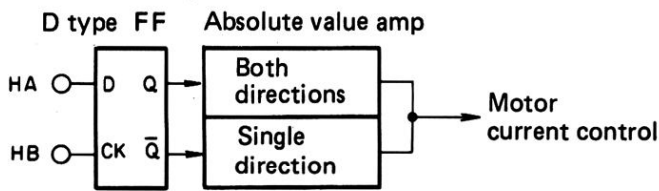


Fig. 5-9 Reverse rotation sensor equivalent circuit

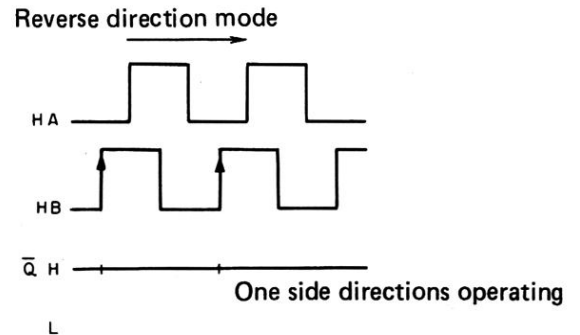
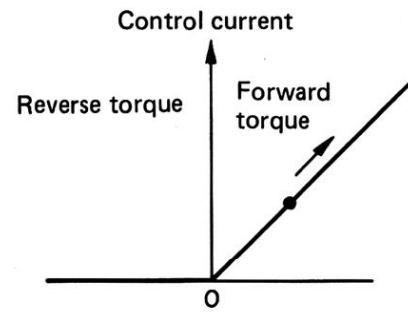


Fig. 5-11 Reverse direction mode

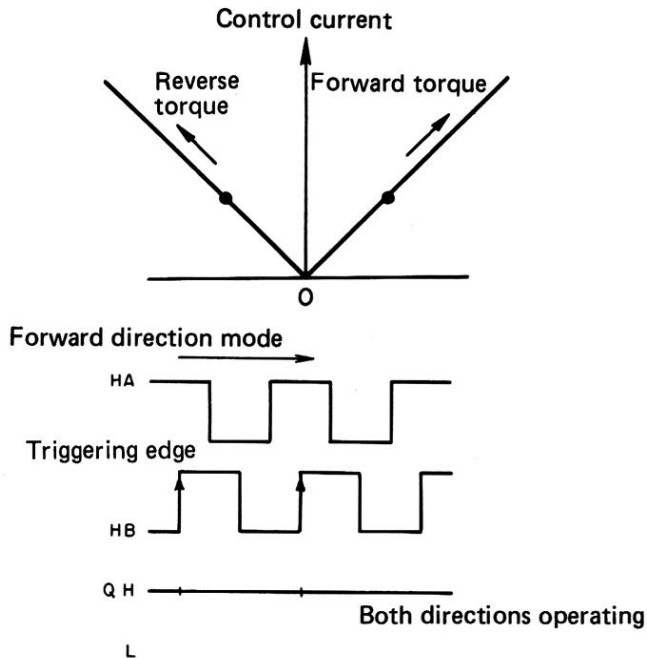
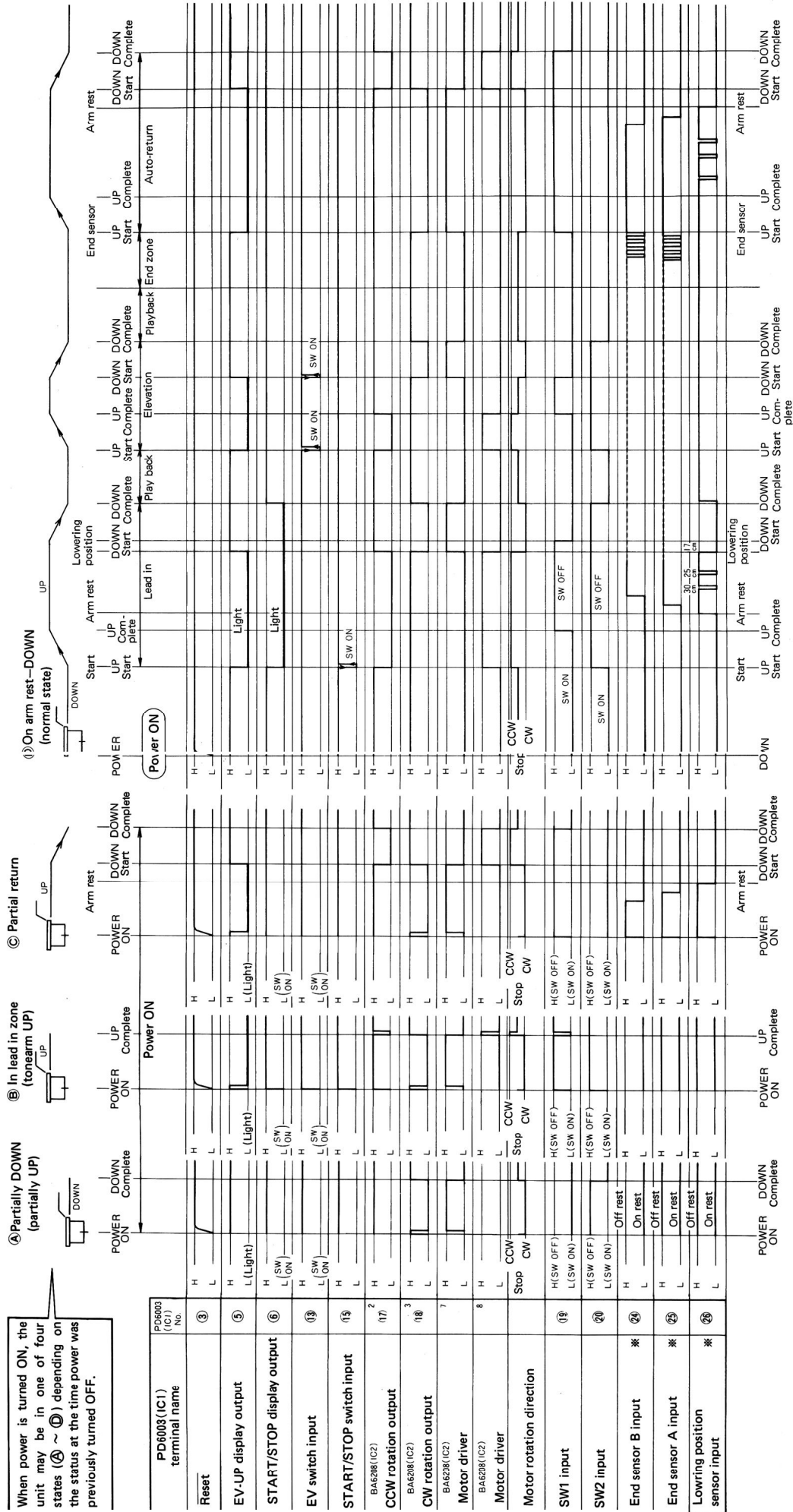


Fig. 5-10 Forward direction mode

TIMING CHART 1

Operational sequence for a single cycle between power ON and automatic stop (full-automatic operation, 17cm record disc).

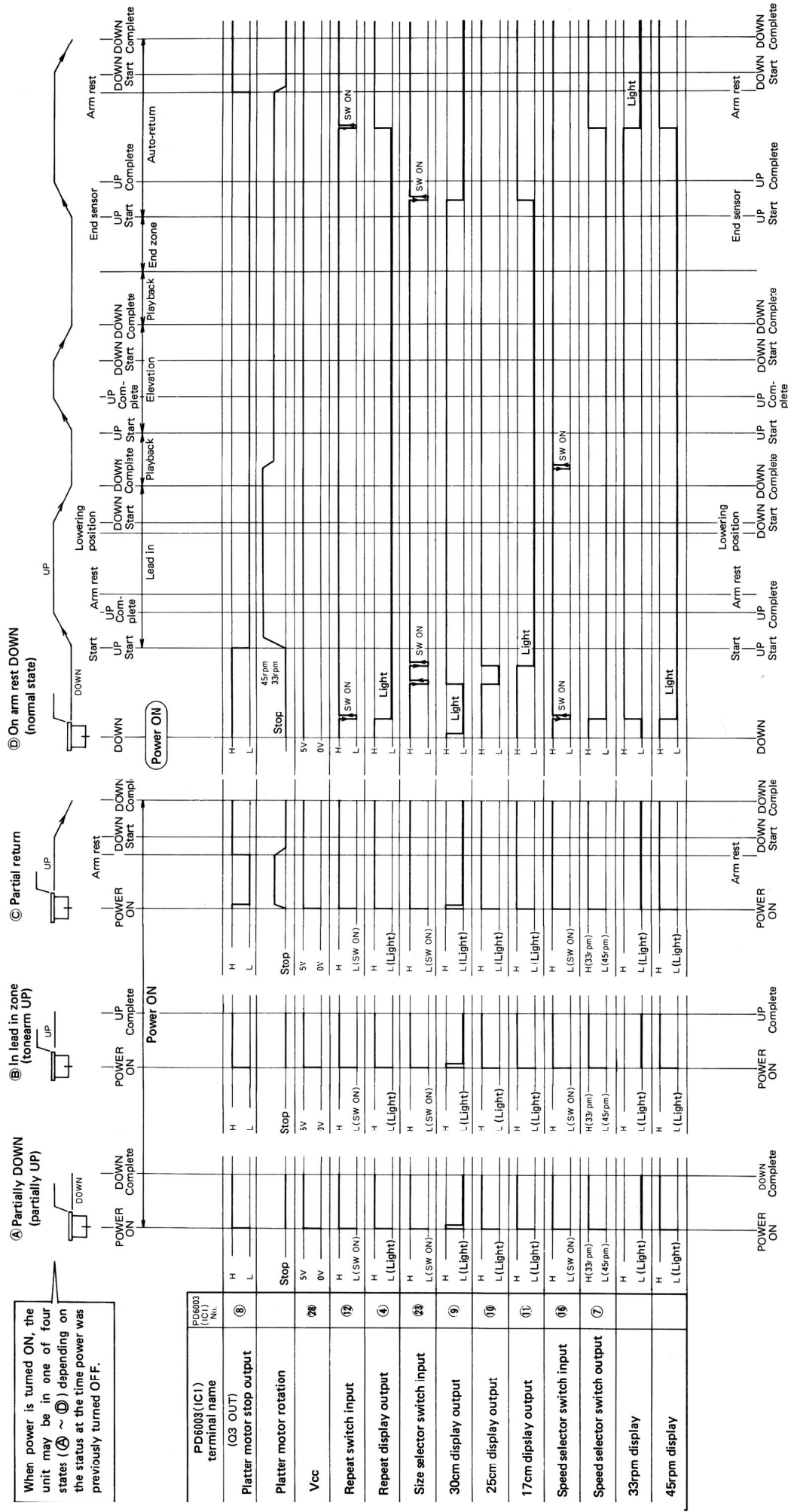
When power is turned ON, the unit may be in one of four states (A ~ D) depending on the status at the time power was previously turned OFF.



■ **TIMING CHART 2**

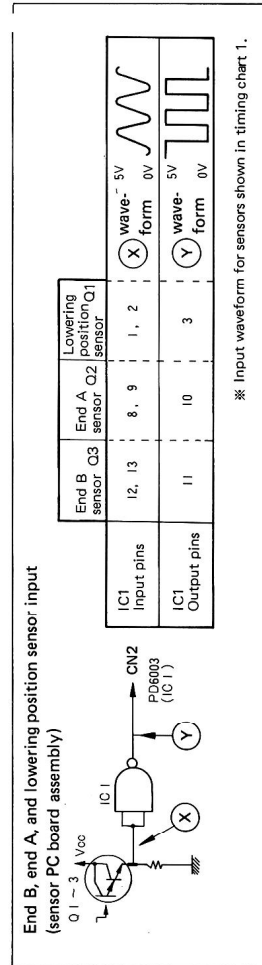
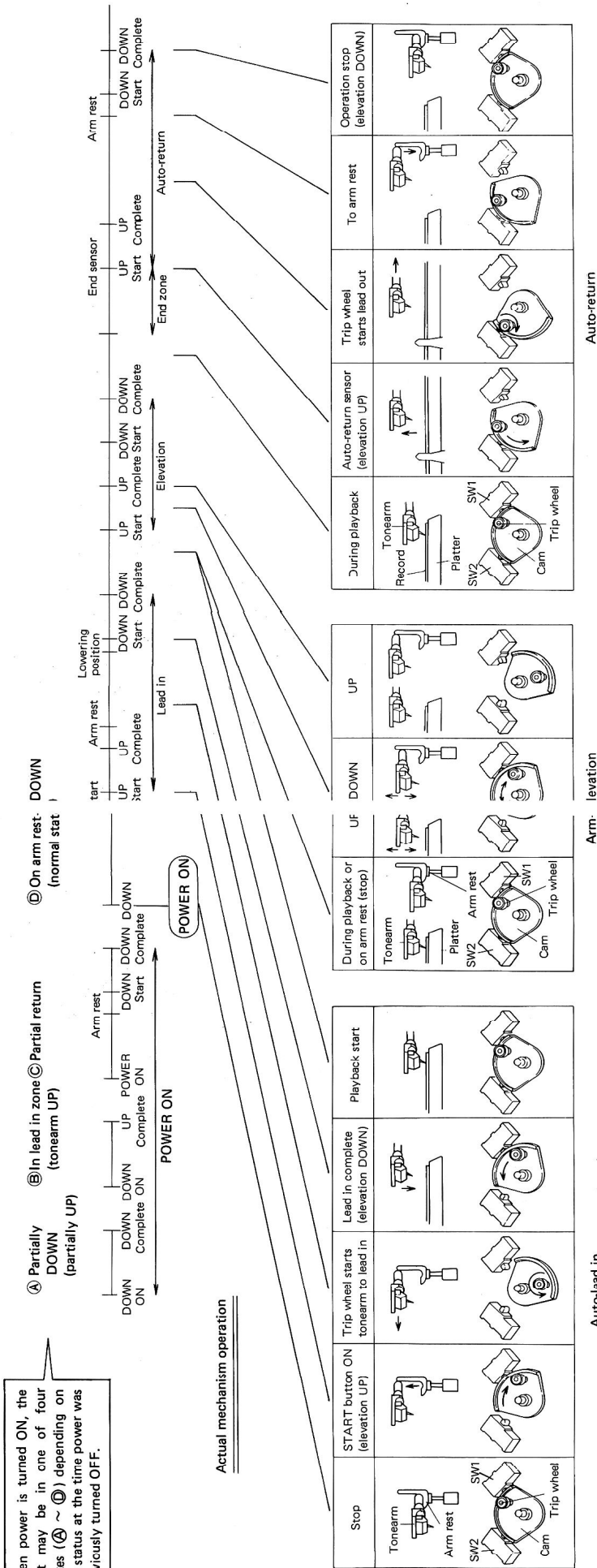
Operational sequence for a single cycle between power ON and automatic stop (full-automatic operation, 17cm record disc).

When power is turned ON, the unit may be in one of four states (A ~ D) depending on the status at the time power was previously turned OFF.



TIMING CHART 3

Operational sequence for a single cycle between power ON and automatic stop (full-automatic operation, 17cm record disc).



6. DISASSEMBLY

NOTE: A cartridge is not supplied with the KUT type.

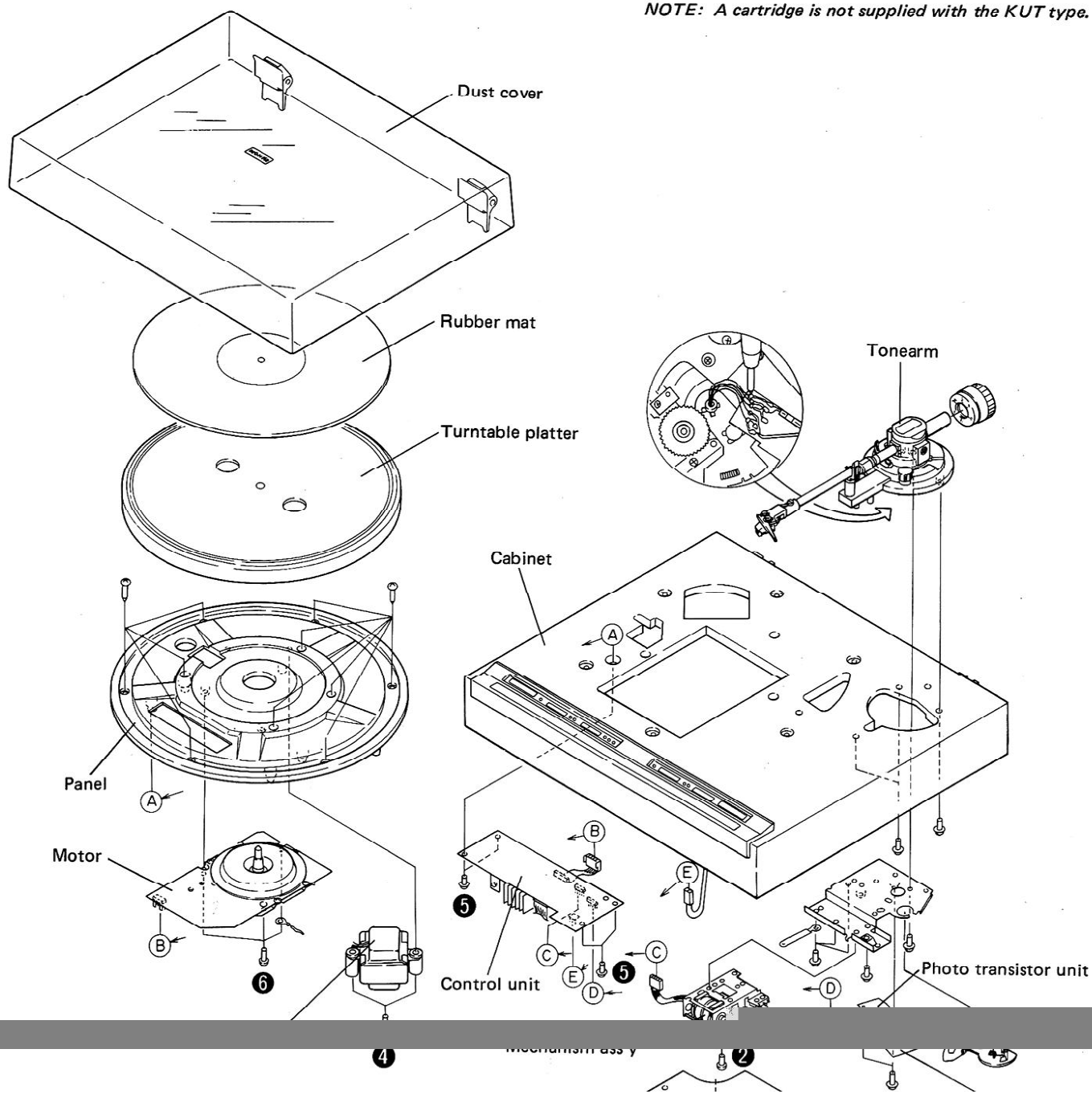
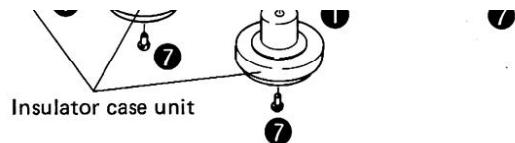


Fig. 6-1 Disassembly



- **Disassembly**

1. Remove the dust cover by pulling upwards.
2. Remove the rubber mat, and then the turntable platter by pulling upwards.
3. After undoing screw ⑦ and screwing off the insulator case units, remove the bottom plate by undoing screws ① .
4. Disconnect connector C, and undo screw ② to remove the mechanism ass'y.

5. Disconnect connector D , and undo screw ③ to remove the photo transistor and LED units.
6. Undo screw ④ to remove the power transformer.
7. Disconnect connectors B and E , and undo screws ⑤ to remove the control unit.
8. Undo screw ⑥ to remove the motor.

- **Tonearm Ass'y Removal**

1. Remove the tonearm lead wire soldering, and undo screw ① to remove the sensor ass'y.
2. Undo screw ② to remove the ass'y drive mechanism.

3. Loosen screw ③ to enable the removal of the PU plate and shutter.
4. Undo screw ④ to remove the tonearm ass'y.

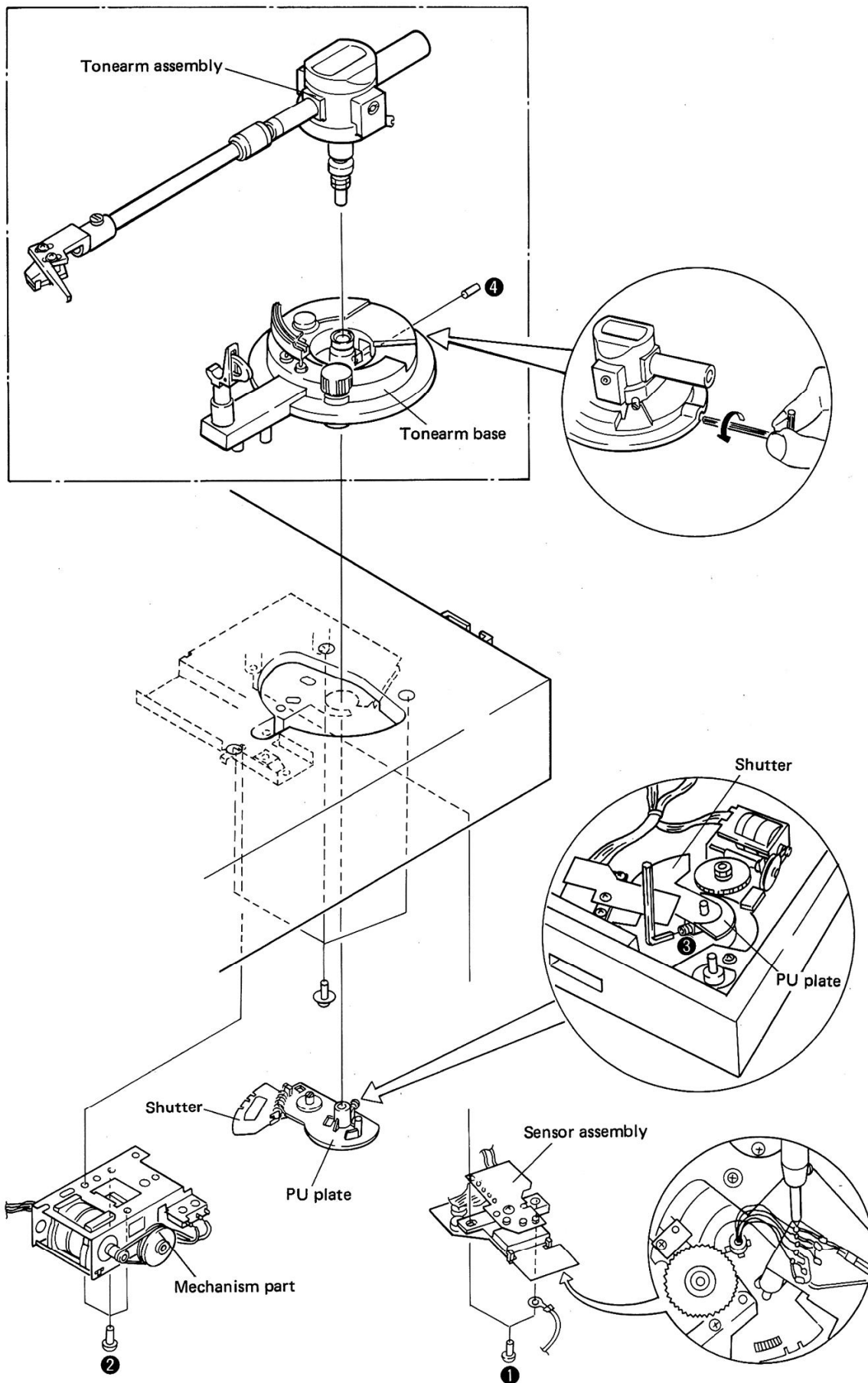


Fig. 6-2 Tonearm part remove.

● **Mounting the PU plate and Shutter**

1. Mount the PU plate aligned with the edge of the shutter.
2. Align point A of the shutter with the triangular mark on the mechanism base unit.

3. Adjust the separation between the PU plate and shutter to 13.8mm. Using a hexagonal wrench, tighten the PU plate in the reverse order to the disassembly procedure.

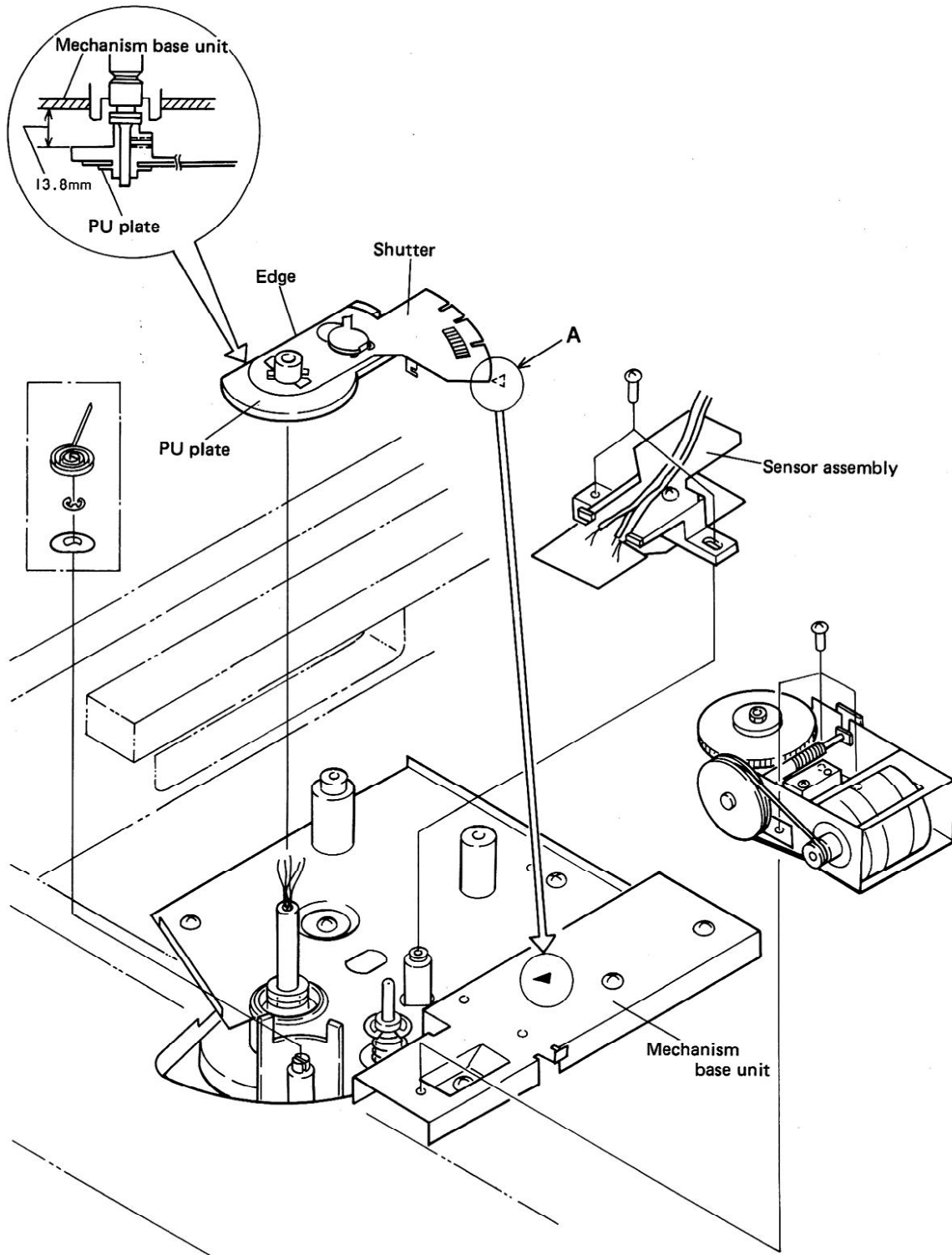



Fig. 6-3 PU plate attachment

7. PARTS LOCATION

NOTES:

- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.

★★ GENERALLY MOVES FASTER THAN ★

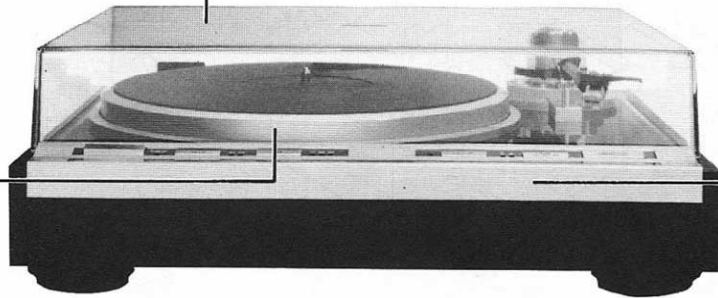
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

A cartridge is not supplied with the KUT type.

Front Panel View

Dust cover
PNV-047

Turntable platter
PNR-198



Front panel assembly
PXB-331

Top View

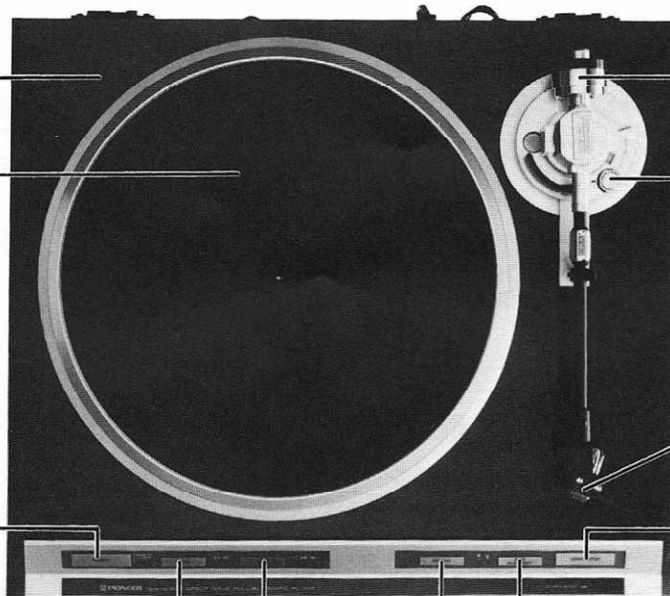
Cabinet
PMM-197

Rubber mat

Push button unit (A)
PAD-079

Push button unit (E)
PAD-080

Push button unit (C)
PAD-081



Weight assembly
PXB-566

AS knob unit
PAD-128

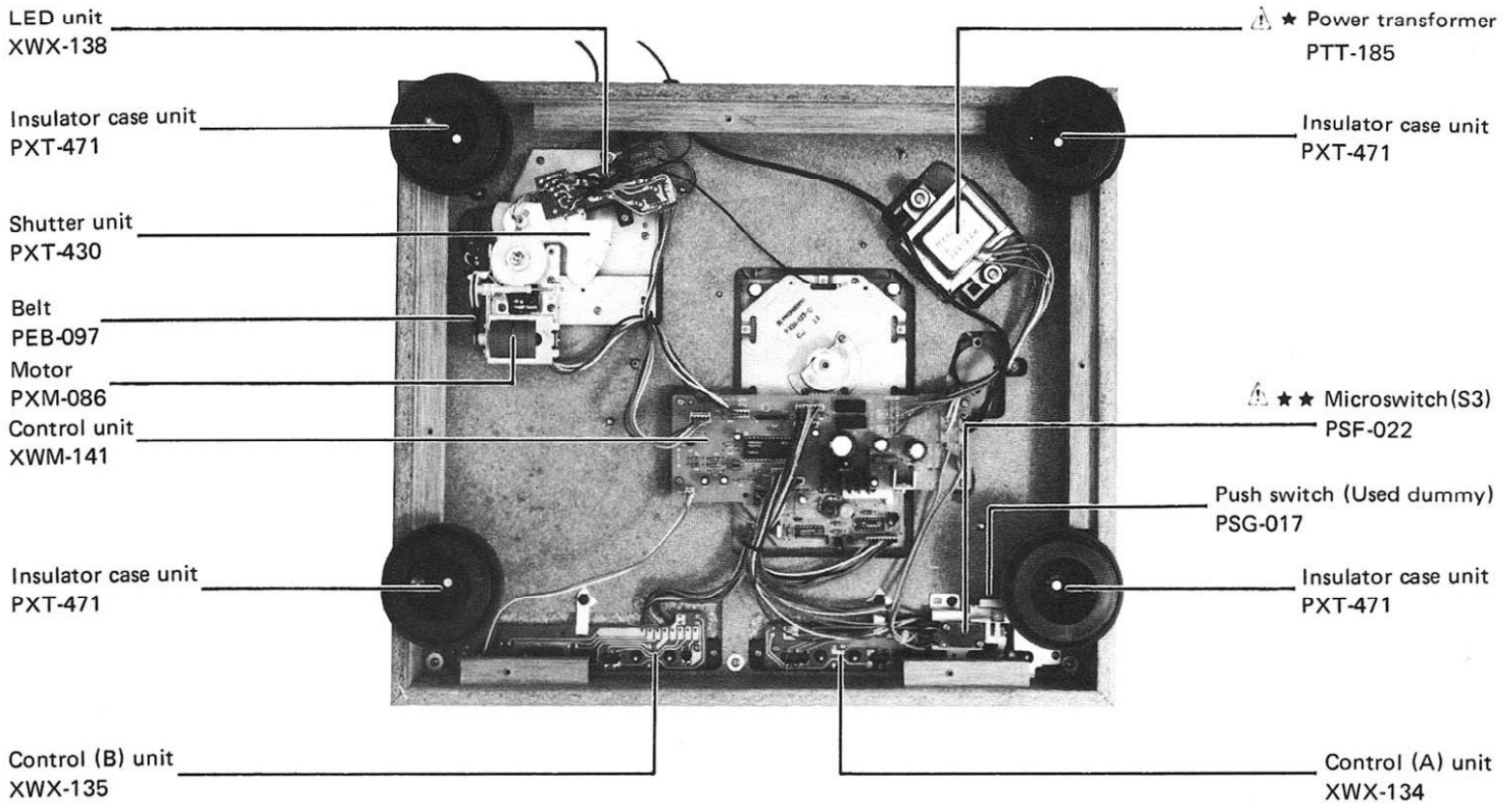
Head shell assembly
PXB-564

Push button unit (B)
PAD-082

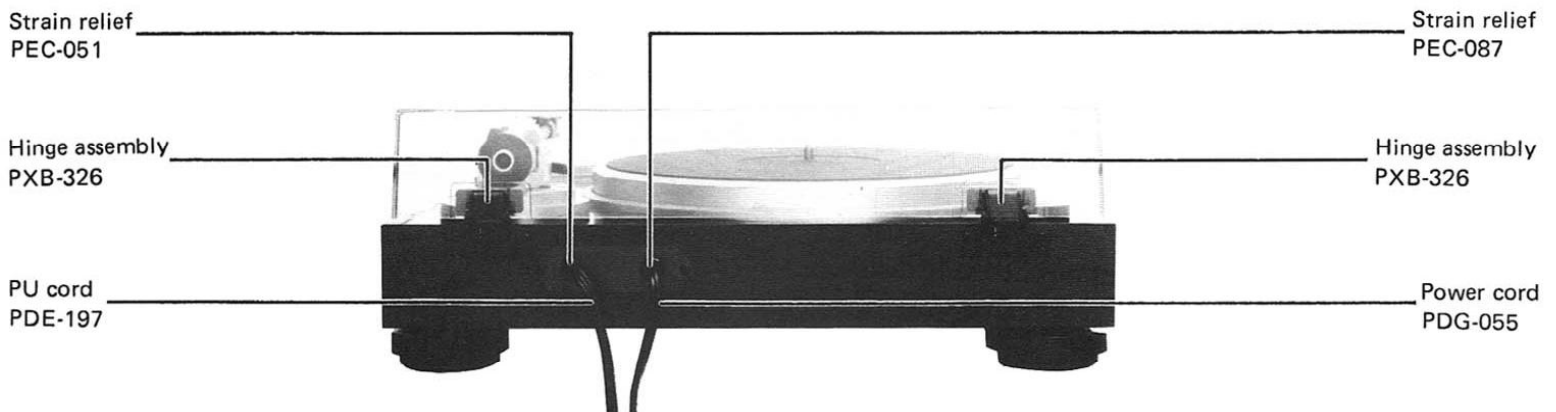
Push button unit (F)
PAD-084

Push button unit (D)
PAD-083

Bottom View



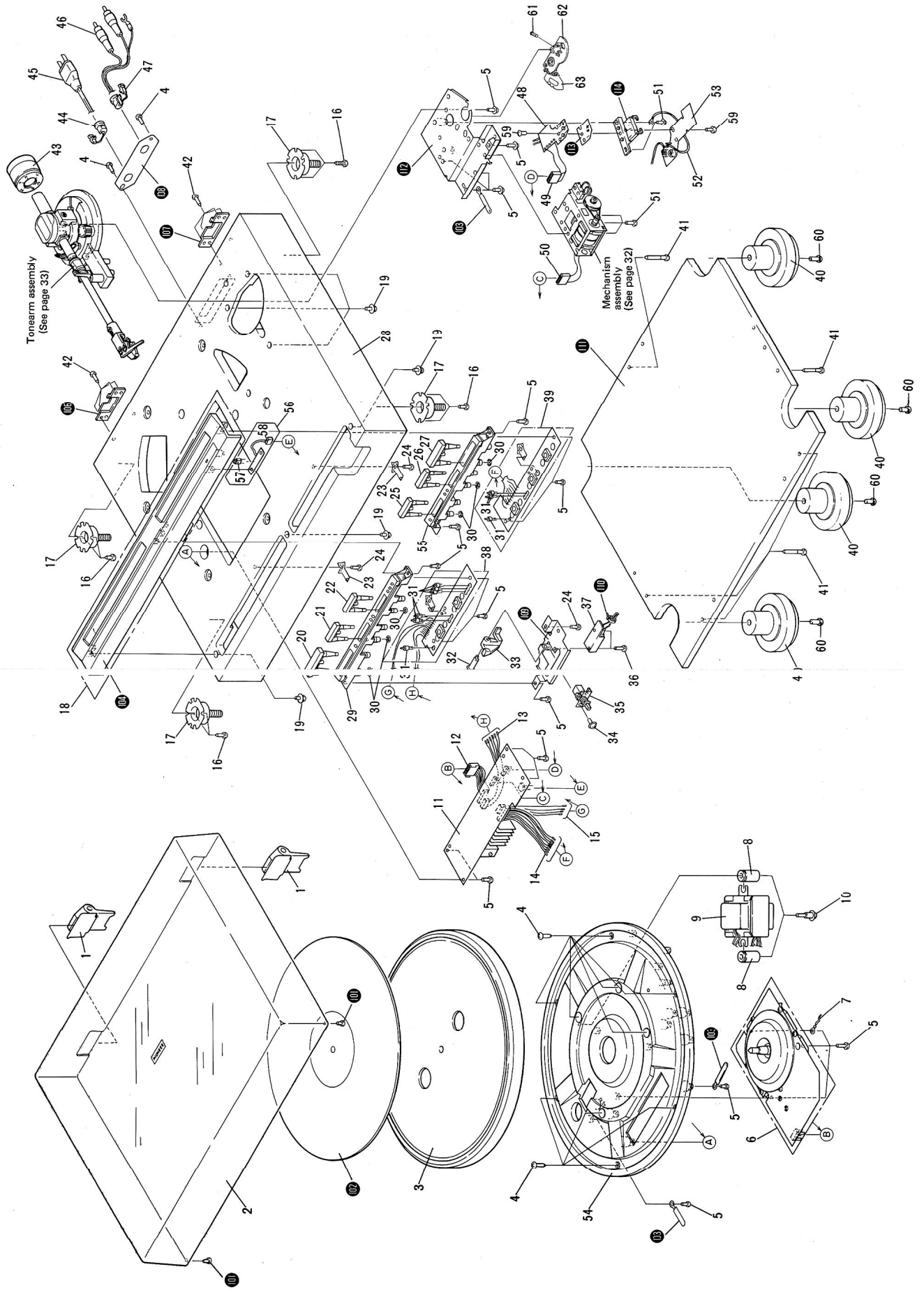
Rear Panel View



3. EXPLODED VIEW AND PARTS LIST

1.1 EXTERIOR

NOTE: A cartridge is not supplied with the KUT type.



NOTES:

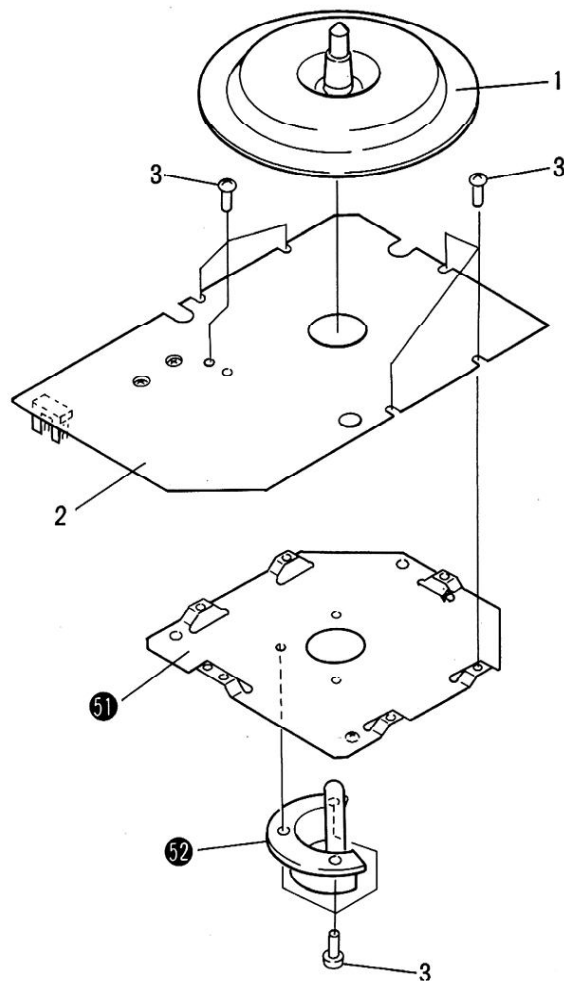
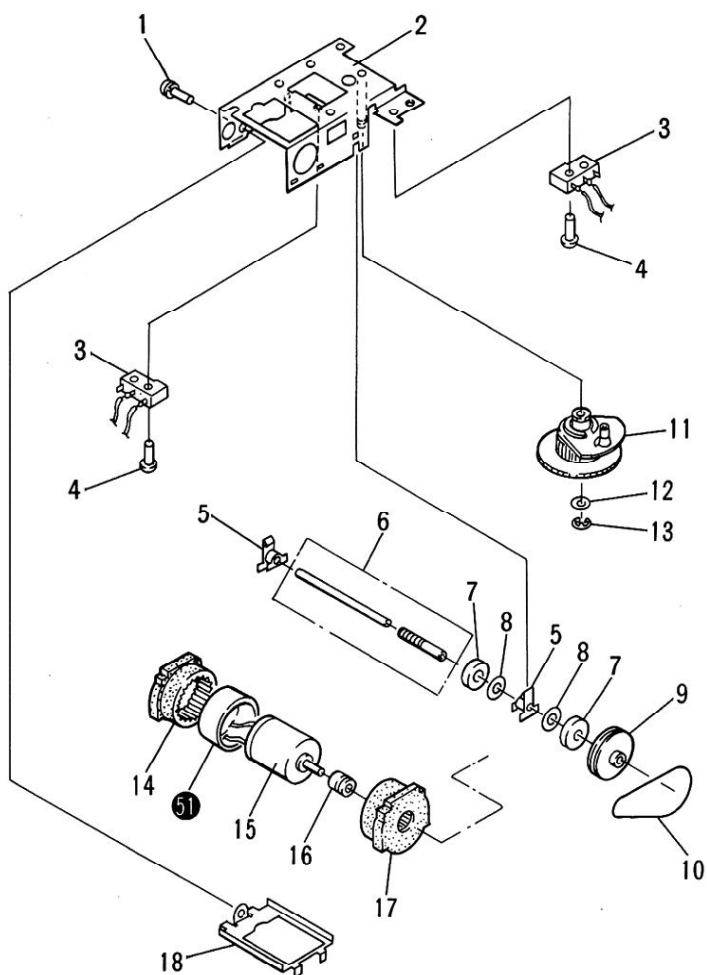
- *Parts without part number cannot be supplied.*
 - *The \triangle mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
 - *For your Parts Stock Control, the fast moving items are indicated with the marks $\star\star$ and \star .*
- $\star\star$ GENERALLY MOVES FASTER THAN \star**
- This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.*

Parts List of Exterior

| Mark | No. | Part No. | Description | Mark | No. | Part No. | Description |
|--------------|------------------|--------------|-------------------------|-------------|------|--------------|-------------------------|
| | 1. | PXB-326 | Hinge assembly | | 41. | PBA-168 | Screw |
| | 2. | PNV-047 | Dust cover | | 42. | PYC30P120FZK | Screw |
| | 3. | PNR-185 | Turntable platter | | 43. | PXB-566 | Weight assembly |
| | 4. | PBA-165 | Screw | | 44. | PEC-087 | Strain relief |
| | 5. | PPZ30P100FMC | Screw | \triangle | 45. | PDG-055 | Power cord |
| | 6. | PXM-125 | Motor | | 46. | PDE-197 | PU cord |
| | 7. | PDF-192 | Earth lead unit | | 47. | PEC-051 | Strain relief |
| | 8. | PEB-250 | Base rubber | | 48. | XWX-137 | Photo transistor unit |
| \triangle | \star 9. | PTT-185 | Power transformer | | 49. | PDE-223 | Connector assembly (5P) |
| | 10. | PBA-144 | Screw | | 50. | PDE-090 | Connector assembly (5P) |
| \triangle | \star 11. | XWM-141 | Control unit | | 51. | PDZ30P080FMC | Screw |
| | 12. | PDE-240 | Connector assembly (7P) | | 52. | PDF-200 | Earth lead wire unit |
| | 13. | PDF-194 | Lead wire unit (6P) | | 53. | XWX-138 | LED unit |
| | 14. | PDF-195 | Lead wire unit (8P) | | 54. | PNY-049 | Panel |
| | 15. | PDF-193 | Lead wire unit (4P) | | 55. | PNY-066 | Control case (B) |
| | 16. | PYC40P120FMC | Screw | | 56. | XWX-136 | Start unit |
| | 17. | PXV-048 | Insulator unit (E) | | 57. | GL9PR12 | LED |
| | 18. | PXB-331 | Front panel assembly | | 58. | PDE-225 | Connector assembly (2P) |
| | 19. | PBA-159 | Screw | | 59. | PPZ30P080FMC | Screw |
| | 20. | PAD-079 | Push button unit (A) | | 60. | BMZ40P080FMC | Screw |
| | 21. | PAD-080 | Push button unit (E) | | 61. | ZMD40H140FZK | Screw |
| | 22. | PAD-081 | Push button unit (C) | | 62. | PNY-127 | PU plate |
| | 23. | PBK-071 | Spring | | 63. | PXT-430 | Shutter unit |
| | 24. | PYC40P080FMC | Screw | | 101. | | Rubber foot |
| | 25. | PAD-083 | Push button unit (D) | | 102. | | Rubber mat |
| | 26. | PAD-084 | Push button unit (F) | | 103. | | Cord clamper |
| | 27. | PAD-082 | Push button unit (B) | | 104. | | Front panel |
| | 28. | PMM-197 | Cabinet | | 106. | | Plate (L) |
| | 29. | PNY-114 | Control case (A) | | 107. | | Plate (R) |
| | 30. | YS20FBT | Washer | | 108. | | Cord holder |
| | 31. | GL-2PR1 | LED | | 109. | | Switch base |
| | 32. | PBA-104 | Screw | | 110. | | Cord fixer |
| | 33. | PNX-092 | Lever | | 111. | | Bottom plate |
| | 34. | iAZ30P060FMC | Screw | | 112. | | Mechanism base unit |
| $\star\star$ | 35. | PSG-017 | Push switch | | 113. | | Slit plate |
| | 36. | PMA30P150FMC | Screw | | 114. | | Spacer |
| \triangle | $\star\star$ 37. | PSF-022 | Microswitch S3 | | | | |
| | 38. | XWX-134 | Control (A) unit | | | | |
| | 39. | XWX-135 | Control (B) unit | | | | |
| | 40. | PXT-471 | Insulator case unit | | | | |

8.2 MECHANISM ASSEMBLY

8.3 MOTOR ASSEMBLY



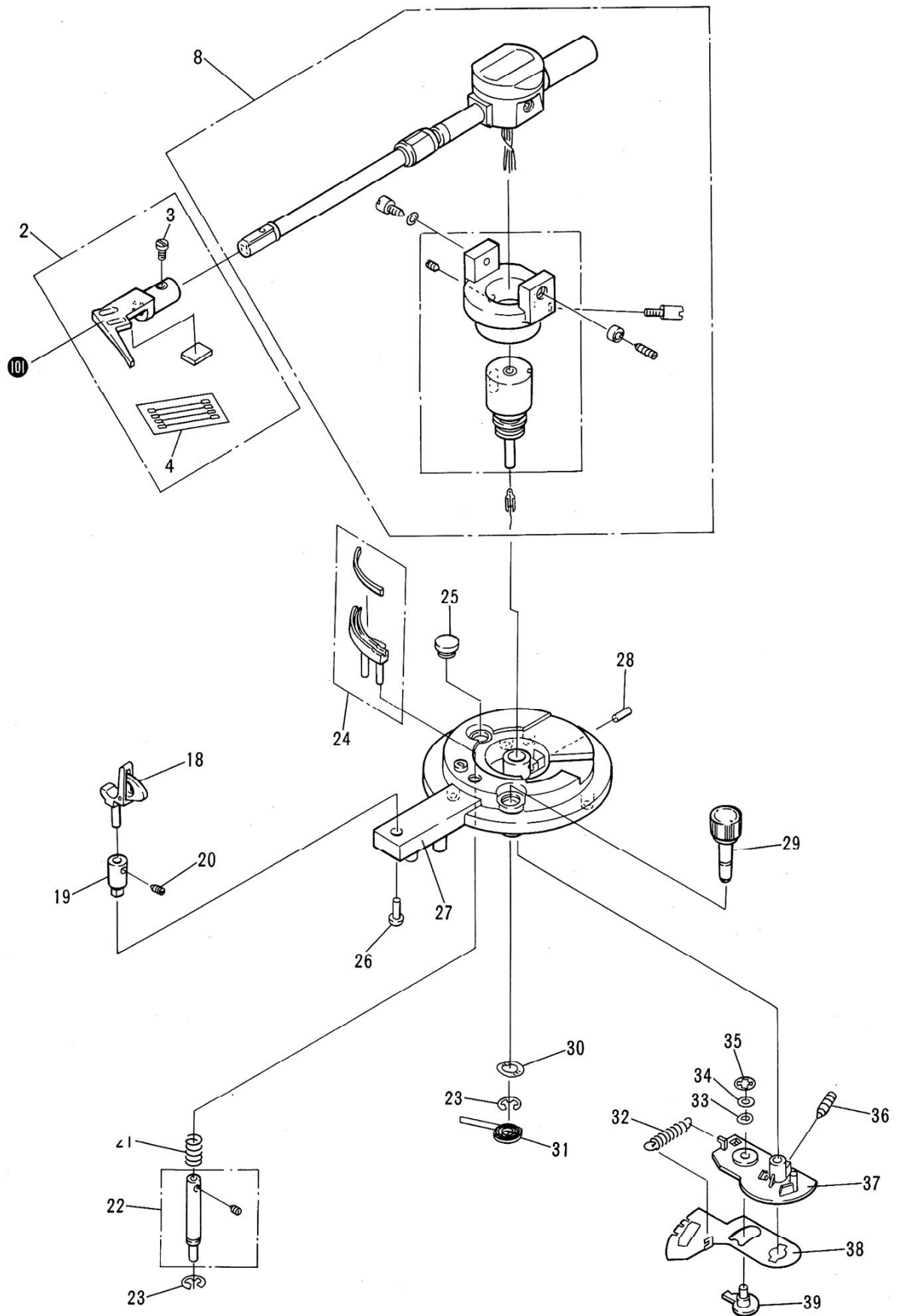
Parts List of Mechanism

| Mark | No. | Part No. | Description |
|------|-----|--------------|-------------------|
| | 1. | PMA26P050FMC | Screw |
| | 2. | PXT-322 | Chassis unit (F) |
| ★ ★ | 3. | PSF-016 | Microswitch |
| | 4. | PMZ20G100FMC | Screw |
| | 5. | PNW-391 | Collar |
| | 6. | PNW-485 | Worm unit |
| | 7. | PED-010 | Felt washer |
| | 8. | PBF-009 | Nylon washer |
| | 9. | PNW-393 | Pulley |
| | 10. | PEB-097 | Belt |
| | 11. | PYY-117 | Gear (F) assembly |
| | 12. | WA31D054D050 | Washer |
| | 13. | YE25S | Washer |
| | 14. | PEB-249 | Damper rubber (B) |
| | 15. | PXM-086 | Motor |
| | 16. | PLM-008 | Motor pulley |
| | 17. | PEB-248 | Damper rubber (A) |
| | 18. | PNC-300 | Frame |
| | 51. | | Shield plate |

Parts List of Motor

| Mark | No. | Part No. | Description |
|------|-----|--------------|-------------------|
| | 1. | PXV-029 | Rotor unit |
| | 2. | PWM-138 | Circuit unit |
| | 3. | PSZ30P050FMC | Screw |
| | 51. | | Base |
| | 52. | | Spindle base unit |

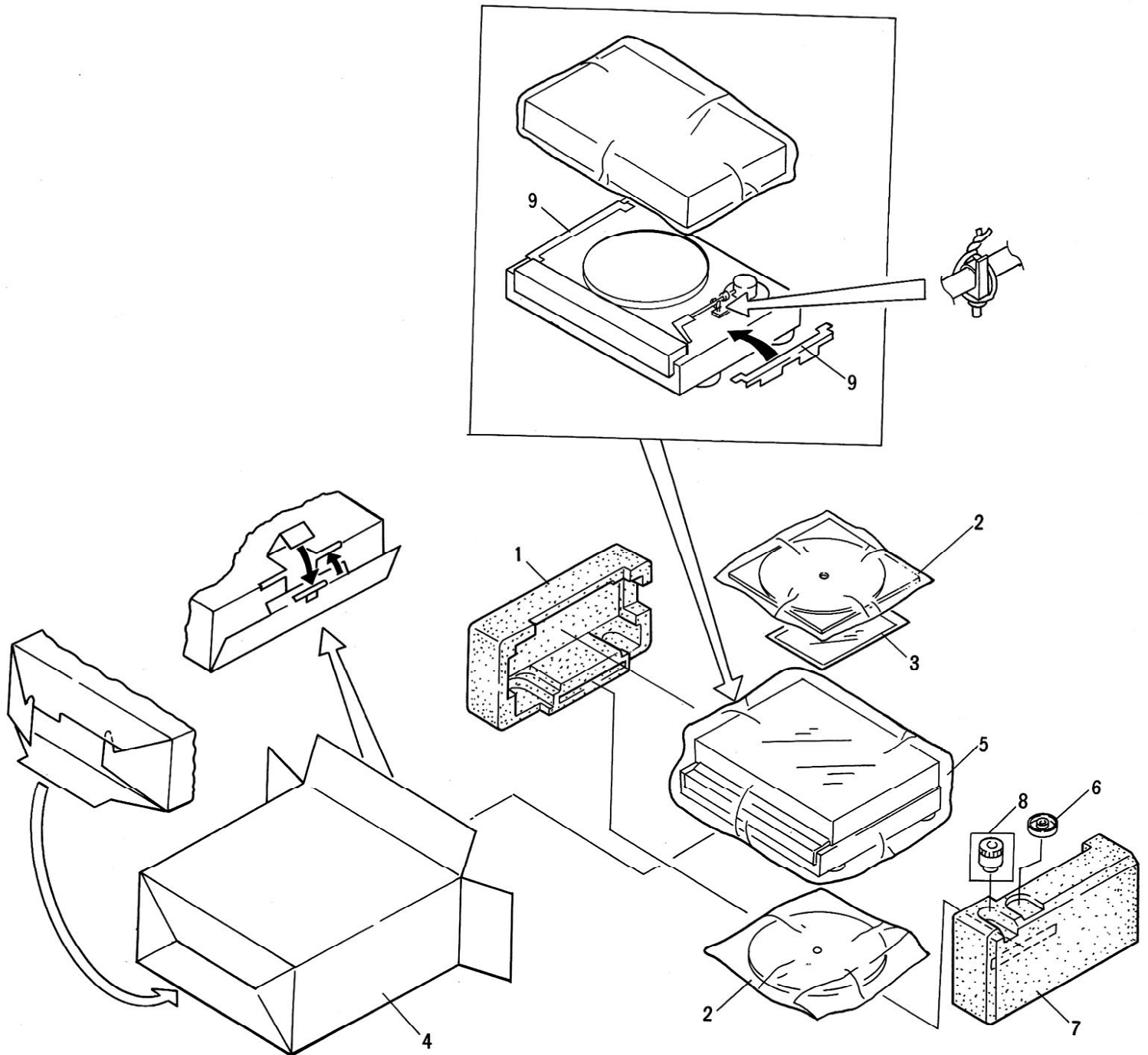
8.4 TONEARM ASSEMBLY



Parts List of Tonearm

| Mark | No. | Part No. | Description | Mark | No. | Part No. | Description |
|------|-----|--------------|--------------------|------|------|--------------|------------------|
| | 1. | | | | 26. | PMZ30P060FMC | Screw |
| | 2. | PXB-564 | Headshell assembly | | 27. | PNY-047 | Tonearm base |
| | 3. | PBA-533 | Screw | | 28. | ZMK40M080FZK | Screw |
| | 4. | PDF-544 | Terminal chip unit | | 29. | PAD-128 | AS knob unit |
| | 5. | | | | 30. | PBE-012 | AS spring washer |
| | 6. | | | | 31. | PBH-268 | AS spring |
| | 7. | | | | 32. | PBH-364 | PU plate spring |
| | 8. | PPD-640 | Tonearm assembly | | 33. | PBE-019 | PU spring washer |
| | 9. | | | | 34. | WC40FMC | Washer |
| | 10. | | | | 35. | YS40S | Washer |
| | 11. | | | | 36. | ZMD40H140FZK | Screw |
| | 12. | | | | 37. | PNY-127 | PU plate |
| | 13. | | | | 38. | PXT-430 | Shutter unit |
| | 14. | | | | 39. | PNW-592 | Adjustment cam |
| | 15. | | | | | | |
| | 16. | | | | 101. | | Head shell |
| | 17. | | | | 102. | | Stylus |
| | 18. | PXB-325 | Arm rest assembly | | | | |
| | 19. | PLB-208 | Rest shaft holder | | | | |
| | 20. | ZMK30M030FNi | Screw | | | | |
| | 21. | PBH-166 | EV spring | | | | |
| | 22. | PLB-207 | EV shaft | | | | |
| | 23. | YE50S | Washer | | | | |
| | 24. | PXB-210 | EV sheet assembly | | | | |
| | 25. | PEB-255 | Rubber bush | | | | |

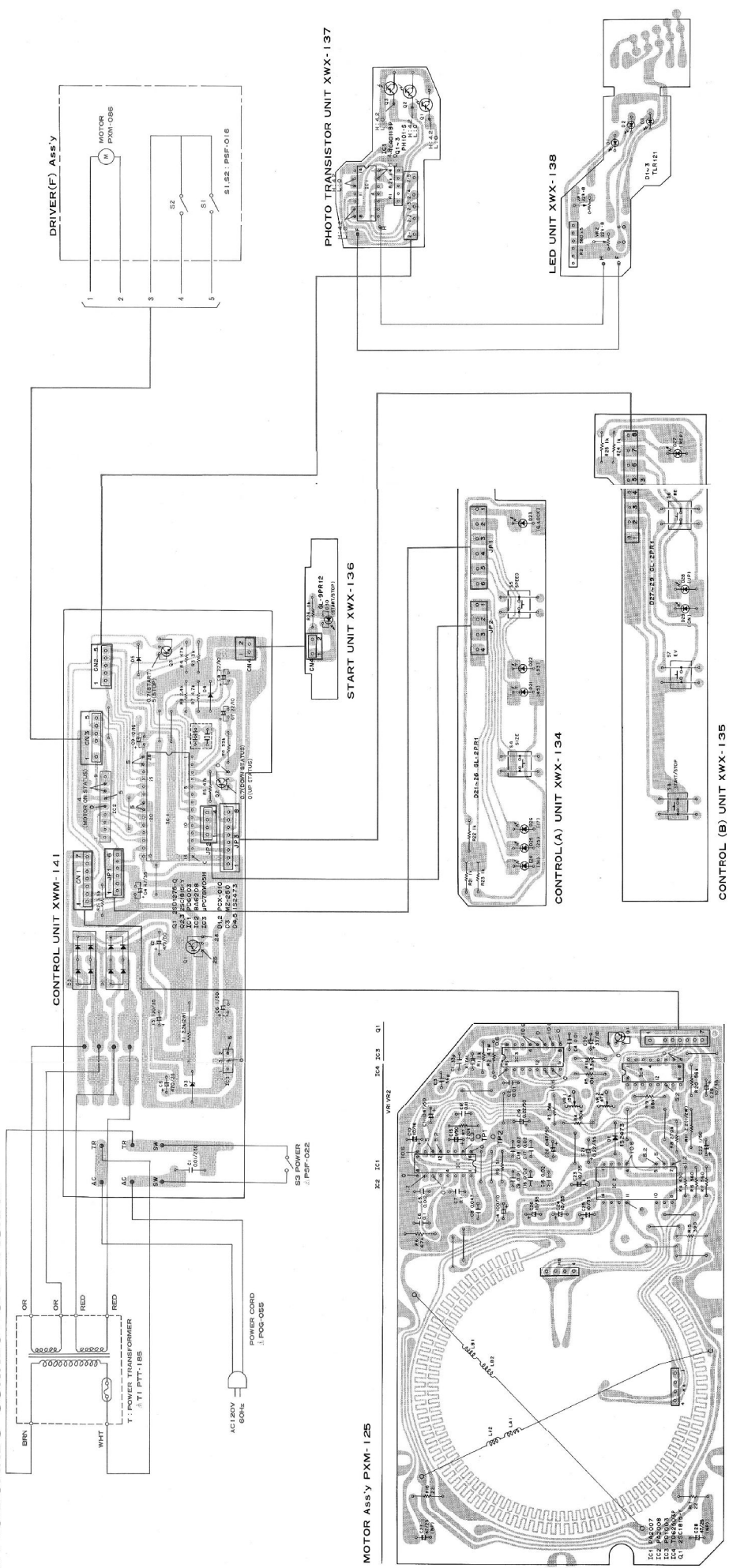
9. PACKING



PACKING

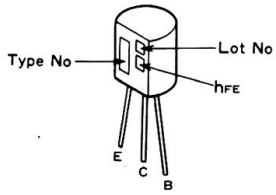
| Mark | No. | Part No. | Description | Mark | No. | Part No. | Description |
|------|-----|----------|------------------------|------|-----|----------|-----------------|
| | 1. | PHA-154 | Protector (L) | | 6. | N93-603 | EP adaptor |
| | 2. | PEA-065 | Rubber mat assembly | | 7. | PHA-155 | Protector (R) |
| | 3. | PRB-231 | Operating instructions | | 8. | PXB-566 | Weight assembly |
| | 4. | PHH-048 | Packing case | | 9. | PHC-096 | Spacer |
| | 5. | PHL-026 | Sheet | | | | |

10. P.C. BOARDS CONNECTION DIAGRAM

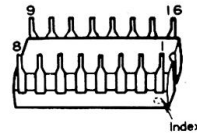


External Appearance of Transistors and ICs

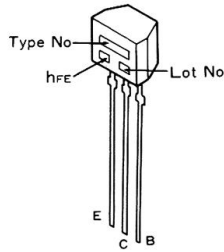
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2SC1815



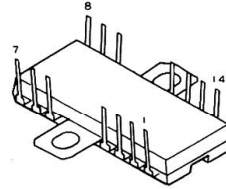
PA2007
PD1003
TD62503P



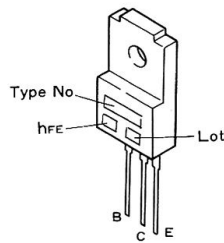
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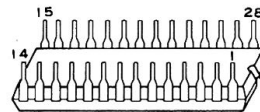
PA2008



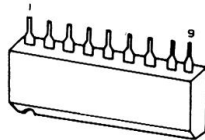
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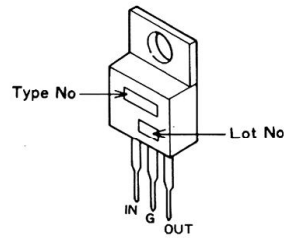
PD6003



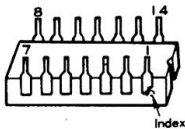
BA6208



μ PC78M05H



MB84011B
TC4011BP



PH101



12. ELECTRICAL PARTS LIST

NOTES:

- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

| | | | | |
|------|----------------------|---------------|-------|-------|
| 560Ω | 56 × 10 ¹ | 561 | RD½PS | 561 J |
| 47kΩ | 47 × 10 ³ | 473 | RD½PS | 473 J |
| 0.5Ω | 0R5 | | RN2H | 0R5 K |
| 1Ω | 010 | | RS1P | 010 K |

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

| | | | | |
|--------|-----------------------|----------------|-------|--------|
| 5.62kΩ | 562 × 10 ¹ | 5621 | RN½SR | 5621 F |
|--------|-----------------------|----------------|-------|--------|

- The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.
★★ GENERALLY MOVES FASTER THAN ★
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

ASSEMBLY AND OTHERS

| Mark | Part No. | Symbol & Description |
|-------------|----------|-----------------------|
| Δ | XWM-141 | Control unit |
| | XWX-134 | Control (A) unit |
| | XWX-135 | Control (B) unit |
| | XWX-136 | Start unit |
| | XWX-137 | Photo transistor unit |
| | XWX-138 | LED unit |
| | PWM-138 | Circuit unit |
| Δ ★ | PTT-185 | Power transformer |
| ★★ | PSF-016 | S1, S2 Microswitch |
| ★★ | | Push switch |
| Δ ★★ | PSF-022 | S3 Microswitch |
| | PXM-125 | Motor |
| | PXM-086 | Motor |

CONTROL UNIT (XWM-141)

SEMICONDUCTORS

| Mark | Part No. | Symbol & Description |
|------|--------------------|----------------------|
| ★★ | PD6003 | IC1 |
| ★★ | BA6208 | IC2 |
| ★★ | μPC78M05H | IC3 |
| ★ | 2SC1815 | Q2, Q3 |
| ★ | 2SD1275 | Q1 |
| ★ | 1S2473 (1S1555) | D4, D5 |
| ★ | PCX-010 | D1, D2 |
| ★ | MZ-250 (WZ-250) | D3 |

CAPACITORS

| Mark | Part No. | Symbol & Description |
|----------|--------------|----------------------|
| Δ | PCL-040 | C1 |
| | CEA 1R0M 50L | C6 |
| | CEA 100M 16L | C9 |
| | CEA 101M 35L | C3 |
| | CEA 220M 10L | C7, C8 |
| | CEA 4R7M 35L | C4 |
| | CEA 471M 25L | C5 |
| | PCL-043 | C2 |
| | CKDYF 103Z50 | C10 |

RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

| Mark | Part No. | Symbol & Description |
|------|--------------|----------------------|
| | RS2PF222J | R1 RS2PF222J |
| | RD1/4PM □□□J | R2 - R8 |

OTHERS

| Mark | Part No. | Symbol & Description |
|------|--------------|-----------------------------|
| | PKC-016 | T1, T2 |
| | PKC-010 | T3 |
| | PDE-240 | CN1 Connector assembly (7P) |
| | PDF-194 | JP1 Lead wier unit (6P) |
| | PDF-193 | JP2 Lead wier unit (4P) |
| | PDF-195 | JP3 Lead wier unit (8P) |
| | KMFC1033S | |
| | VZB30P060FMC | Screw |
| | PMZ30P060FMC | Screw |

CONTROL (A) UNIT (XWX-134)

| Mark | Part No. | Symbol & Description |
|------|-------------|----------------------|
| ★★ | PSG-025 | S4, S5 Switch |
| | RD1/4PM102J | R21 - R23 Resistor |

CONTROL (B) UNIT (XWX-135)

| Mark | Part No. | Symbol & Description |
|------|-------------|----------------------|
| | PSG-025 | S6 – S8 Switch |
| | RD1/4PM102J | R24, R25 Resistor |

START UNIT (XWX-136)

| Mark | Part No. | Symbol & Description |
|------|-------------|-----------------------------|
| ★ | GL9PR12 | D30 LED |
| | RD1/4PM102J | R26 Resistor |
| | PDE-225 | CN4 Connector assembly (2P) |

PHOTO TRANSISTOR UNIT (XWX-137)

| Mark | Part No. | Symbol & Description |
|------|------------------------|-------------------------|
| ★★ | PH101-S | Q1 – Q3 |
| ★★ | TC4011BP (MB84011B) | IC1 |
| | RGSD4X822J | R1 |
| | PDE-223 | Connector assembly (5P) |

LED UNIT (XWX-138)

| Mark | Part No. | Symbol & Description |
|------|--------------|-----------------------------|
| ★ | TLR121 | D1 – D3 |
| | PCP-013 | VR1, VR2 Semi-fixed (22k-B) |
| | RGSD5X561J | R2 |
| | PDF-192 | Earth lead wire unit |
| | PDF-200 | Earth lead wire unit |
| | PPZ30P080FMC | Screw |

CIRCUIT UNIT (PWM-138)**SEMICONDUCTORS**

| Mark | Part No. | Symbol & Description |
|------|----------------------------------|------------------------------|
| ★★ | PA2007 | IC1 |
| ★★ | PA2008 | IC2 |
| ★★ | PD1003 | IC3 |
| ★★ | TD62503P | IC4 |
| ★★ | 2SC1815 (2SC945) (2SC2458) | Q1 |
| ★ | PCX-057 PSS-003 | HA, HB Hall element X'tal |
| ★ | 1S2473 | D1 |

CAPACITORS

| Mark | Part No. | Symbol & Description |
|------|---------------|----------------------|
| | CQMA 123K 50 | C5 |
| | CQPA 473J 50 | C8 |
| | CKDYF 103Z 50 | C2, C4, C9, C12 |
| | CKDYF 223Z 50 | C15 – C18 |
| | CCDCH 330J 50 | C1 |
| | CCDCH 560J 50 | C3 |
| | PCL-046 | C6, C7 |
| | CEANL R22M 50 | C19 |
| | CEA R47M 50 | C11, C20 |
| | CEA 010M 50 | C13, C22 |
| | CEA 100M 16 | C10 |
| | CEA 100M 35 | C23 – C26, C29 |
| | CEA 330M 10 | C30 |
| | CEA 101M 10 | C14 |
| | CSZA R22M 35 | C21 |
| | CEANP 470M 25 | C27, C28 |

RESISTORS

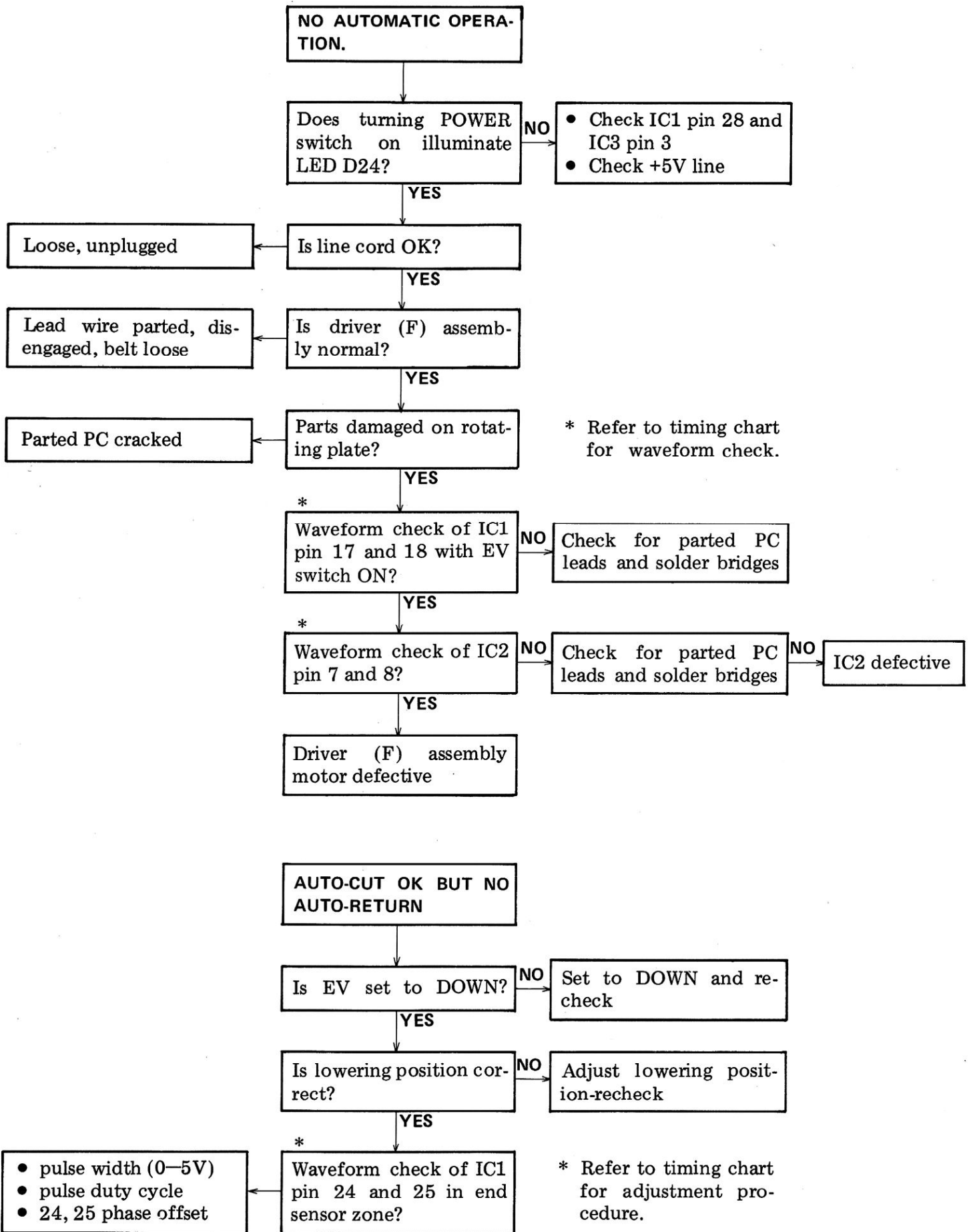
NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

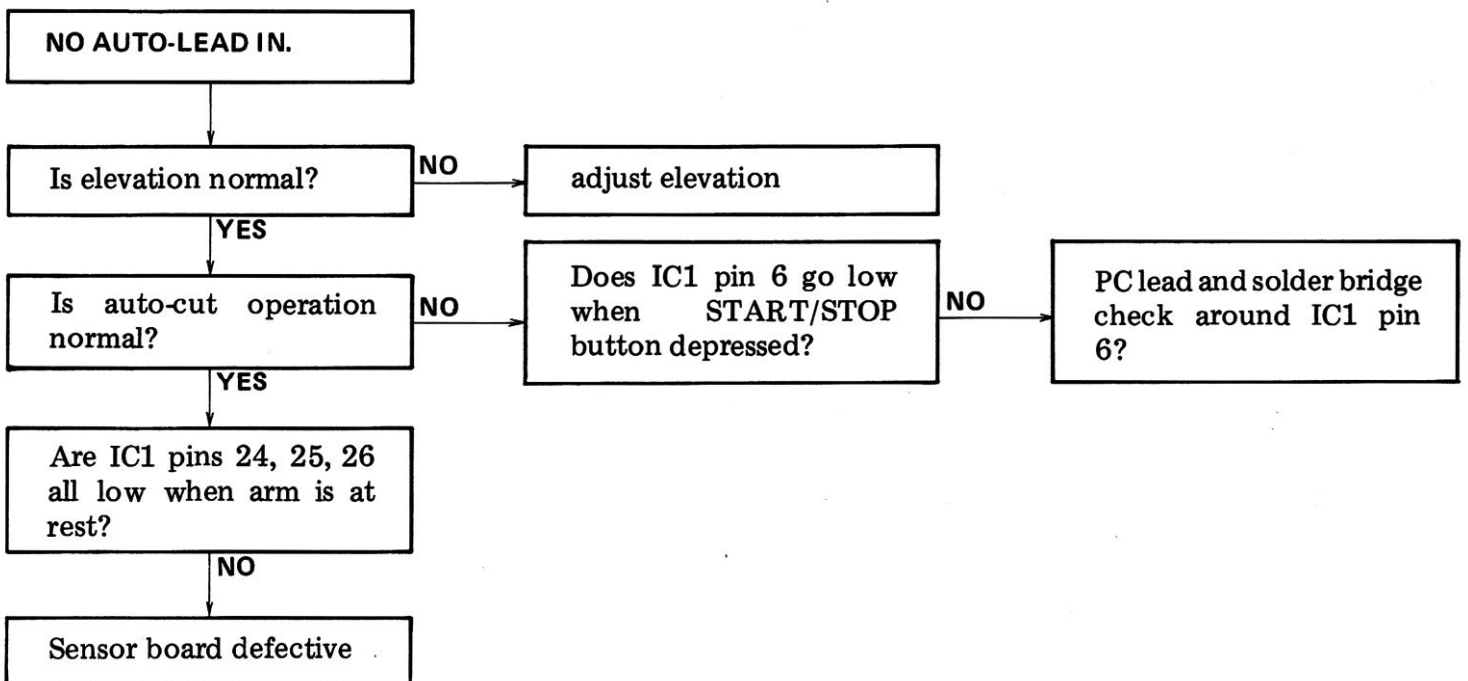
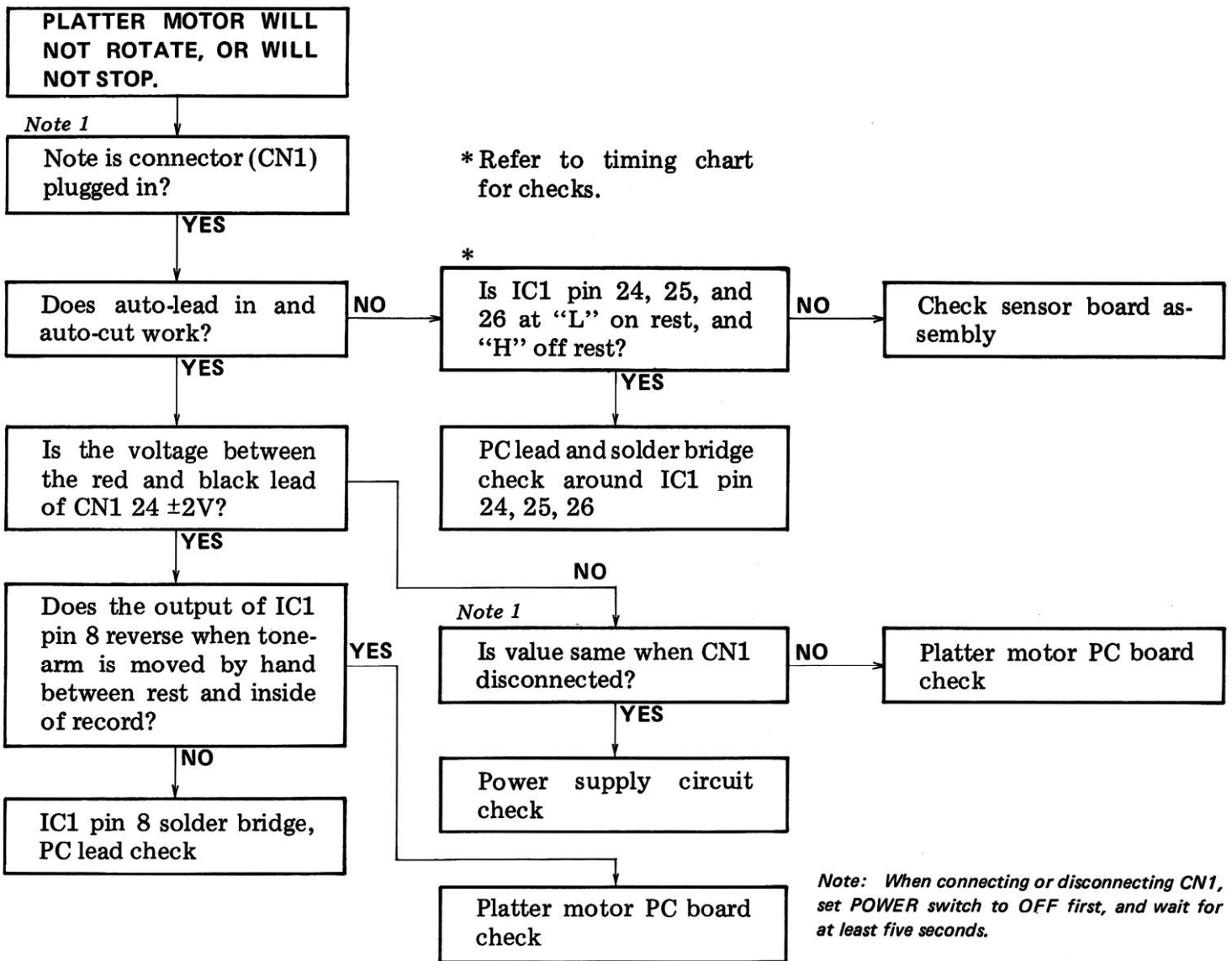
| Mark | Part No. | Symbol & Description |
|------|--------------|------------------------|
| | PCP-006 | VR1 Semi-fixed (15k-B) |
| | PCP-072 | VR2 Semi-fixed (47k-B) |
| | RN1/4PR563G | R3 |
| | RN1/4PR154G | R4 |
| | RD1/2PS2R2J | R11 |
| | RD1/4PM □□□J | Others |

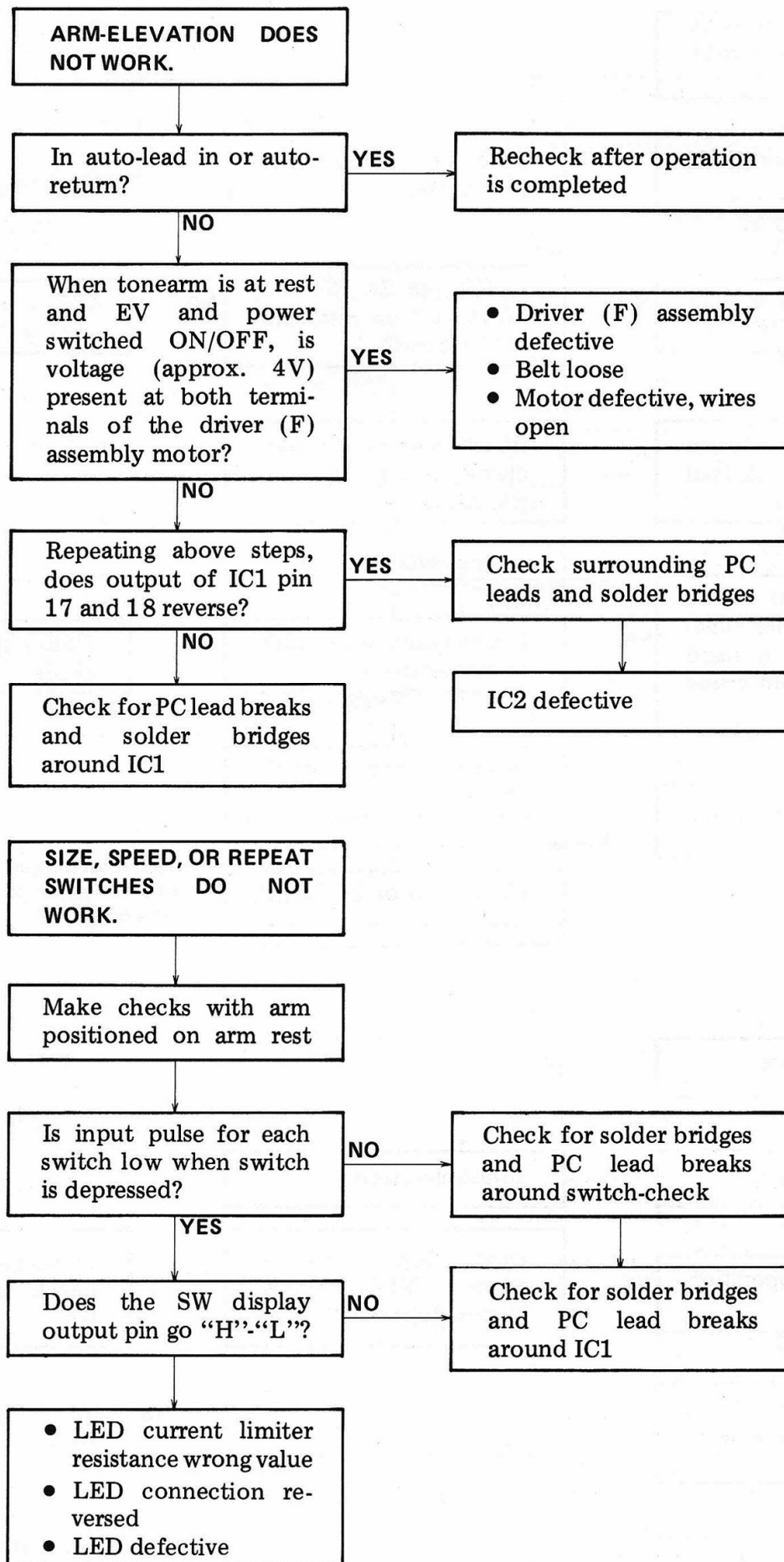
OTHERS

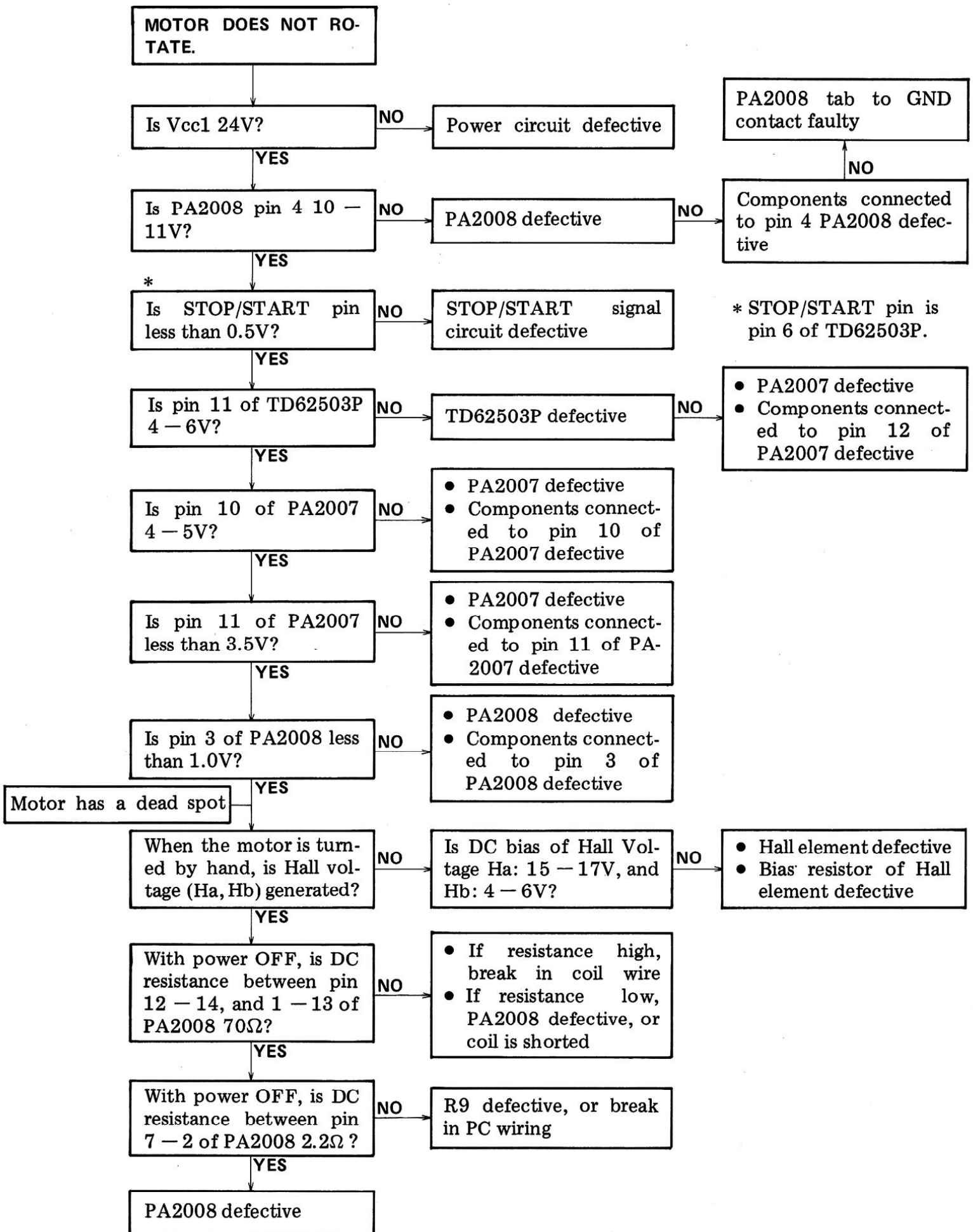
| Mark | Part No. | Symbol & Description |
|------|--------------|----------------------|
| | RNH-199 | Earth terminal |
| | SD-5048-07A | Screw |
| | PSZ30P050FMC | Screw |

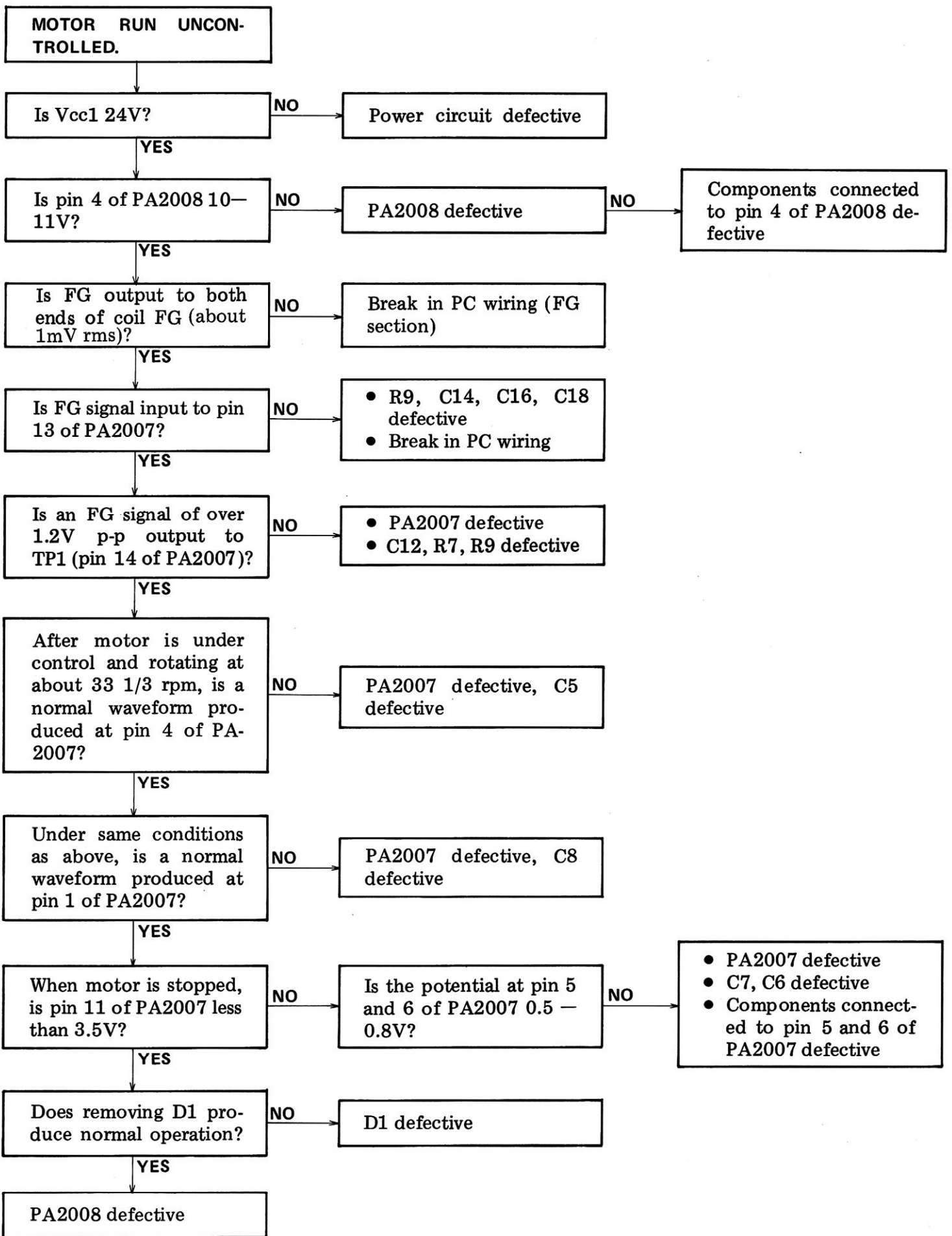
13. TROUBLESHOOTING

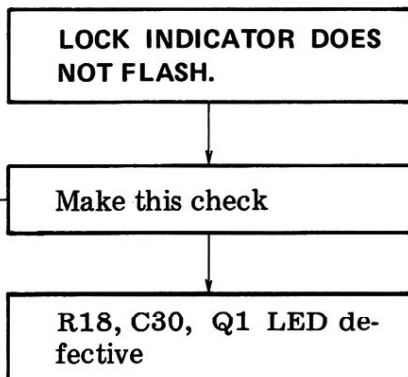
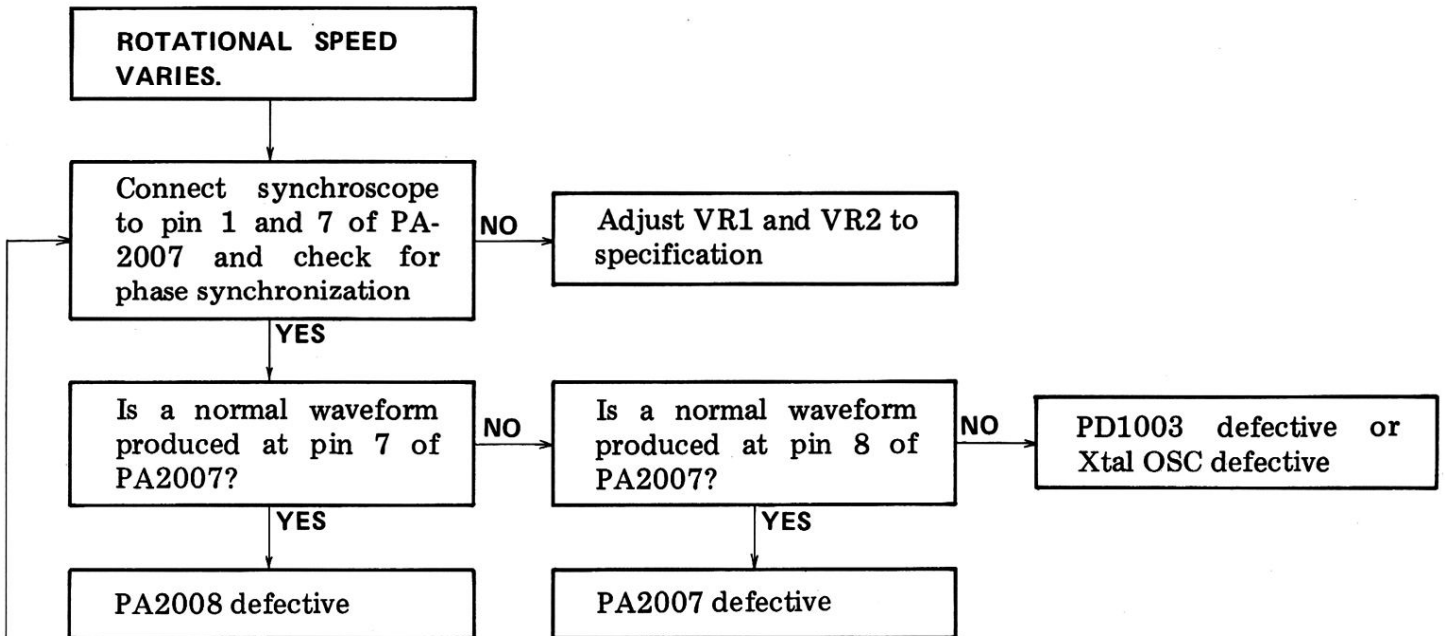
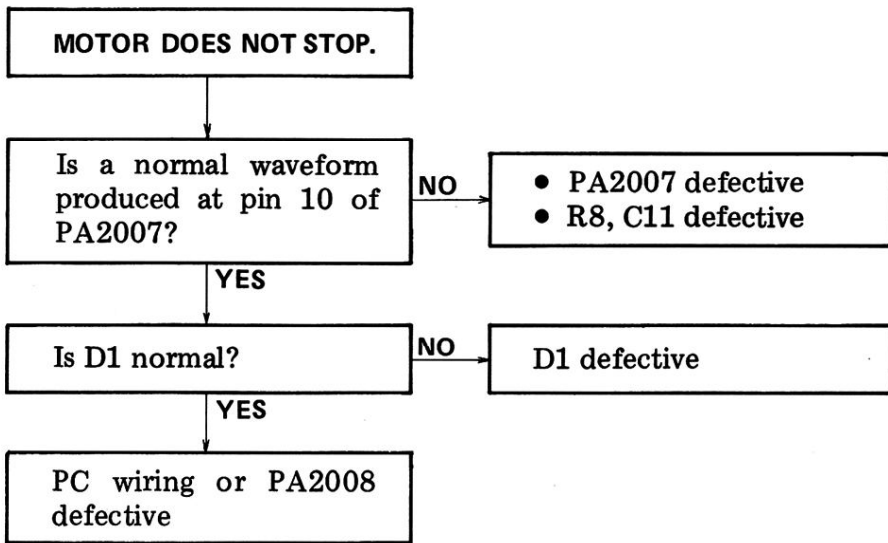












14. ADJUSTMENTS

14.1 STYLUS LOWERING POSITION

1. Remove the rubber plug (Fig. 14-1).
2. If the tonearm lowers too far to the outside of the record, turn the adjusting screw clockwise.
3. If the tonearm lowers too far to the inside of the record, turn the adjusting screw counter-clockwise.

Specifications for test record use.

30cm lowering position . . . adjust to lower between count 305 and 316.

17cm lowering position . . . adjust to lower between count 174 and 185.

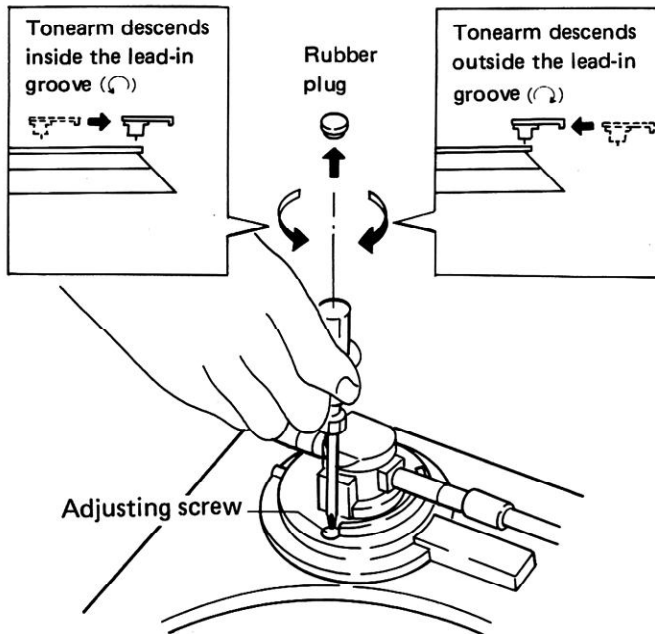


Fig. 14-1 Stylus lowering position

14.2 END SENSOR SENSITIVITY ADJUSTMENT

1. Remove the platter and top cover unit.
2. Make certain the shutter will pass between the sensor board assembly positioned slightly above center (Fig. 14-2).

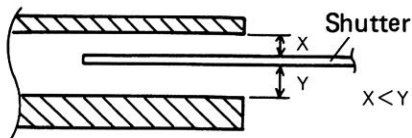
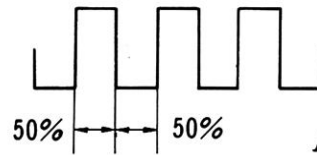


Fig. 14-2 Shutter position

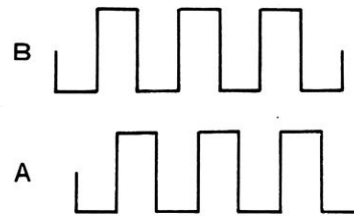
3. Connect an oscilloscope to PD6003 pin 25 (end sensor A) (CN2 3 pin), and PD6003 pin 24 (end sensor B) (CN2 2 pin).
4. Turn the power ON and set the arm-elevation to UP.
Position the tonearm over the lead out groove zone of the record as if playback were in progress.

5. While making certain outside light is not directly striking the sensor section, adjust VR1 and VR2 so that the output waveform (pulse) for sensors A and B are both at approximately 50% duty cycle (Fig. 14-3, 14-5).



Adjust pulse width of end sensor A and B to 50% duty cycle.

Fig. 14-3 Output waveform 1



The phase of end sensor B leads end sensor A 90°.

Fig. 14-4 Output waveform 2

6. Next, move the tonearm toward the inside of the record at about the speed the tonearm would normally trace the lead out groove.
7. Make certain the phase of end sensor B is 90° advanced over end sensor A (Fig. 14-4).

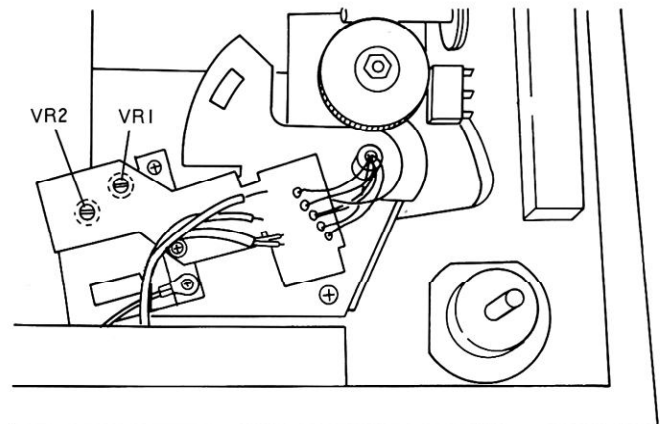


Fig. 14-5 VR1, VR2 position

14.3 MOTOR OPERATING POINT ADJUSTMENT

1. Set the speed to 33 1/3 rpm and depress the START/STOP button to put the unit into the operational mode.
2. Connect a buffer amp to pin 1 of IC PA2007, and connect the output to a oscilloscope (Fig. 14-6).
3. When a waveform like that shown in Fig. 14-7 is obtained, vary oscilloscope gain until a sawtooth wave with 5 div peak-to-peak is obtained. Then, referring to Fig. 14-7, adjust VR1 until a to b equals 2.8 to 2.2 (Make sure noise does not affect adjustment.)
4. When the 33 1/3 rpm adjustment is completed, adjust VR2 using the same procedure (item 2 and 3 above) for 45 rpm. Always adjust 33 1/3 first, and always adjust 33 1/3 if 45 rpm is to be adjusted even though it might be accurate.
5. Connect pin 7 of PA2007 to a oscilloscope and make certain the frequency for 33 1/3 rpm is 55.5Hz, and that for 45 rpm is 75Hz.

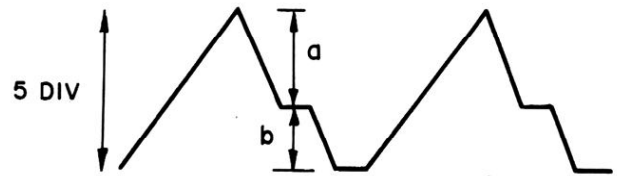


Fig. 14-7 Waveform

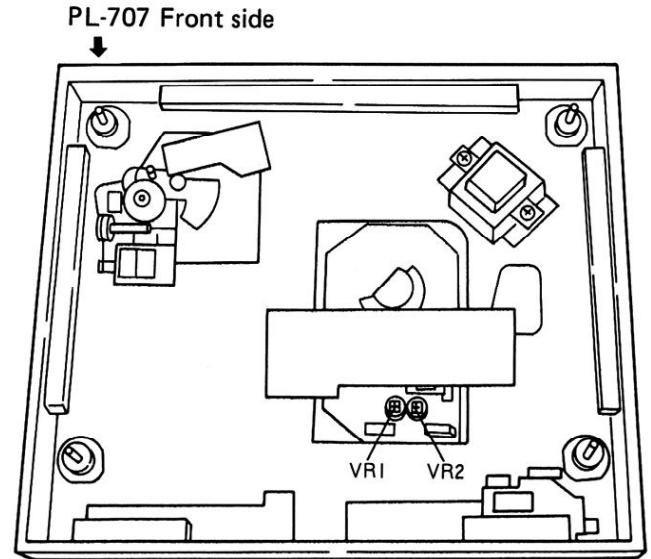


Fig. 14-8 VR1, VR2 position

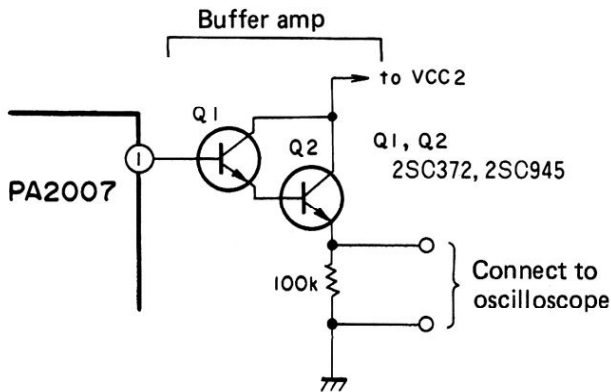


Fig. 14-6 Connect buffer amp

14. RÉGLAGE

14.1 POSITION DE DESCENTE DE LA POINTE DE LECTURE

1. Retirer l'obturateur en caoutchouc (Fig. 14-1).
2. Si le bras acoustique descend trop loin à l'extérieur du disque, tourner la vis de réglage dans le sens des aiguilles d'une montre.
3. Si le bras acoustique descend trop loin sur le disque, tourner la vis de réglage dans le sens inverse des aiguilles d'une montre.

Caractéristiques de descente sur disque:

Position de descente sur disque 30 cm régler pour une descente entre 305 et 316.

Position de descente sur disque 17 cm régler pour une descente entre 174 et 185.

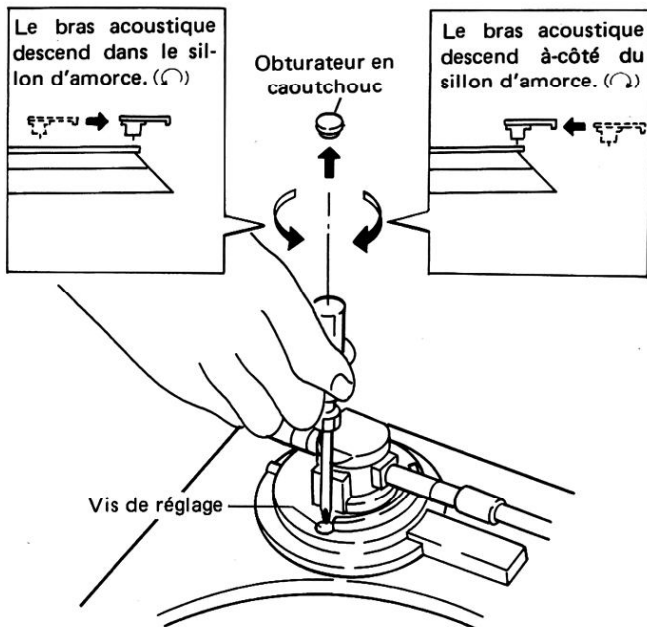


Fig. 14-1 Position de descente de la pointe de lecture

14.2 REGLAGE DE SENSIBILITE DE CAPTEUR DE FIN DE DISQUE

1. Déposer le plateau ainsi que le capot anti-poussière.
2. Veiller à ce que le volet passe entre l'ensemble de plateau de capteur positionné légèrement au-dessus du centre (Fig. 14-2).

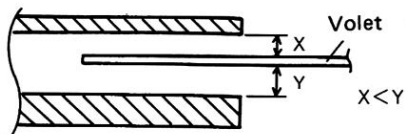


Fig. 12-2 Position du volet

3. Connecter un oscilloscope à la broche 25 de PD6003 (capteur A de fin de disque) (CN2 à 3 broches) et la broche 24 de PD6003 (capteur B de fin de disque) (CN2 à 2 broches).
4. Mettre sous tension et amener le lève-bras sur Up. Positionner le bras acoustique au-dessus du sillon de sortie du disque, comme à la fin de sa reproduction normale.
5. Tout en veillant à ce qu'aucune lumière extérieure n'atteigne le capteur, régler VR1 et VR2 de manière à ce que la forme d'onde de sortie (impulsion) pour les capteurs A et B soit d'environ 50 % du cycle efficace (Fig. 14-3, 14-5).

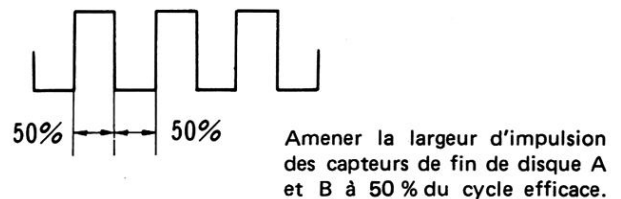


Fig. 14-3 Forme d'onde de sortie 1

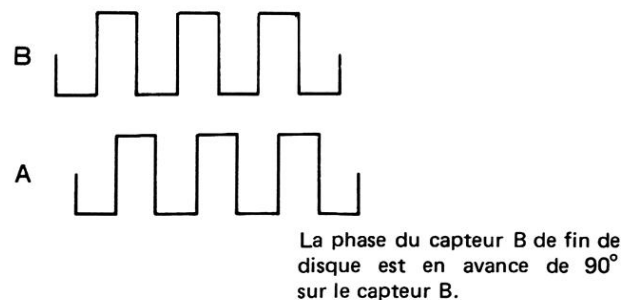


Fig. 14-4 Forme d'onde de sortie 2

6. Amener le bras acoustique vers l'intérieur du disque à environ la vitesse à laquelle il avancerait sur le sillon de sortie.
7. Veiller à ce que la phase du capteur B de fin de disque soit en avance de 90° sur celle du capteur A (Fig. 14-4).

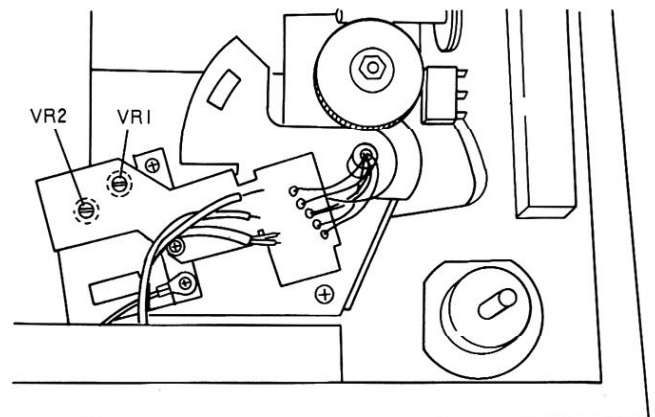
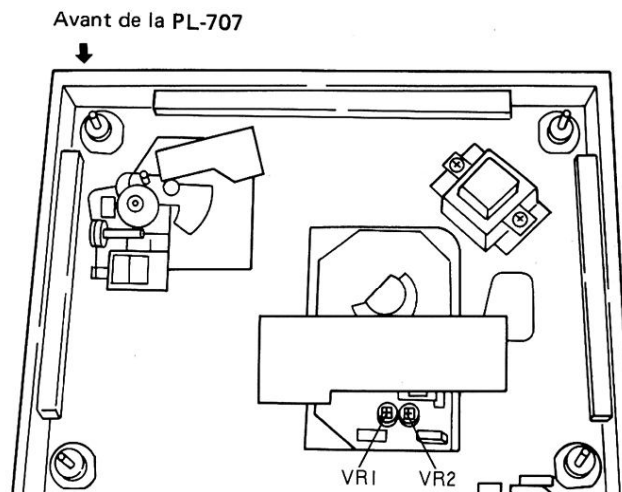


Fig. 14-5 Position de VR1 et VR2

14.3 REGLAGE DE POINT D'ACTIONNEMENT DU MOTEUR

1. Passer sur $33 \frac{1}{3}$ tr/mn et appuyer sur la touche START/STOP afin de mettre la table de lecture en marche.
2. Brancher un amplificateur intermédiaire sur la broche 1 du CI PA2007 et connecter la sortie à un oscilloscope (Fig. 14-6).
3. Si la forme d'onde est semblable à celle de la Fig. 14-7, faire varier le gain de l'oscilloscope jusqu'à ce qu'elle soit en dents de scie avec 5 divisions crête à crête puis, en se reportant à la Fig. 14-7, régler VR1 jusqu'à ce que a à b soit égal à 2.8 à 2.2 (veiller à ce qu'aucun bruit ne gêne le réglage).
4. Lorsque le réglage de $33\frac{1}{3}$ tr/mn est terminé,



14.3 AJUSTAR DEL PUNTO DE FUNCIONA-

