MODEL 8000 SERIES TWO
LINEAR MOTOR TURNTABLE

Service Manual

Phase Linear®

8000 SERIES TWO

LINEAR MOTOR ARM STEREO TURNTABLE

SERVICE MANUAL

CONTENTS:

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THIS MANUAL IS INTENDED FOR USE ONLY BY QUALIFIED TECHNICAL SERVICE PERSONNEL. HAZARDOUS VOLTAGES MAY BE ENCOUNTERED IN THE TEST AND SERVICING OF THE 8000II. USE EXTREME CAUTION; READ ALL INSTRUCTIONS.

1-0. SPECIFICATIONS

MOTOR AND TURNTABLE:
Drive System:direct drive
Motor: Quartz PLL Hall motor
Turntable Platter: 310mm diam. aluminum alloy die-cast
Inertial Mass: 330kg-cm^2 (including platter mat mass)
Speeds: 33 1/3 and 45 RPM
Wow and Flutter:
less than 0.013% (WRMS)*
0.025% (WRMS)
0.035% (DIN)
(*)indicates wow and flutter for motor and does not include the cartridge or tonearm load.
Signal-to-Noise Ratio:
more than 78dB (DIN-B)

ROTATIONAL CHARACTERISTICS:
Build-up Time: within 90° rotation at 33 1/3 RPM
Speed Deviation:
less than 0.002%
Speed vs. Load Characteristics:
stable up to 220 grams drag load
Speed Drift: less than 0.00008% per hour at 33 1/3 RPM; less than 0.00003% per degree of temperature change at 33 1/3

TONEARM:
Type: linear motor direct-drive; static-balance type; linear-tracking arm
Effective Arm Length: 190mm
Overhang: 0mm
Usable Cartridge Weight:
4g(min.) to 24g(max.)
Arm Height Adjust Range: ±3mm
Headshell Weight: 10.5g

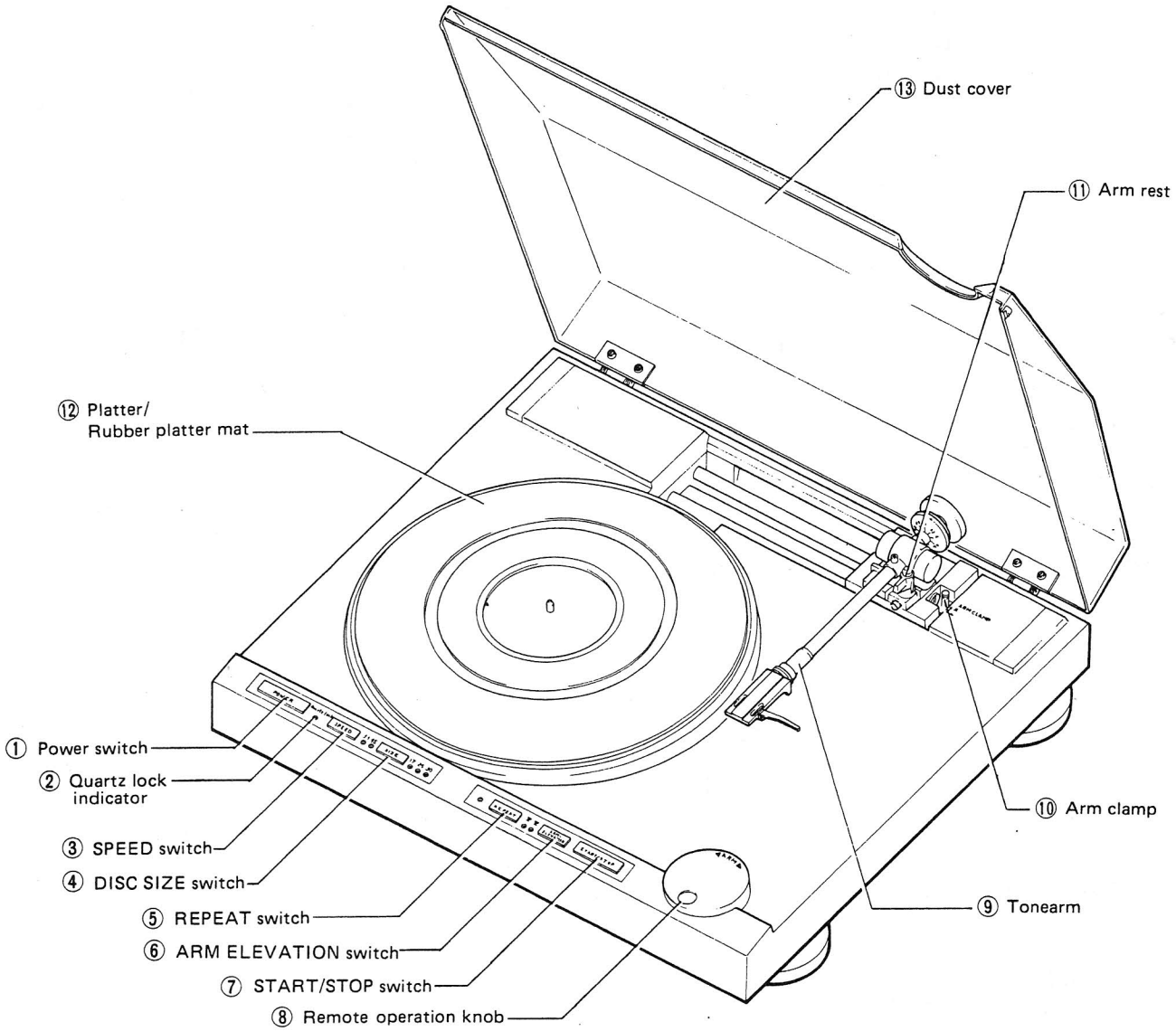
SEMICONDUCTORS:
IC's. 22
Transistors 17
Diodes. 16
Hall Elements 3
LED's 14
Photo Transistors 5
CdS 1

MISCELLANEOUS:
Power Requirements:
110-120vAC/50-60Hz only
Power Consumption: 35 watts
Weight: 26lb 8oz (12kg)
Dimensions:
19 7/16(w) x 6 1/16(h) x 17 15/16(d)in.
494(w) x 154(h) x 456(d)mm

SUBFUNCTIONS:
Auto Lead-In
Auto-Return
Auto Cut
Quick Repeat
Quick Play
Quick Stop
Stylus Pressure Direct Readout Counterweight
Arm Height Adjusting Device
Cueing Device
Free Stop Hinges

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

2-0. PANEL FACILITIES



1. POWER SWITCH

Used to switch on and off the power to the turntable. Power is supplied when the switch is depressed (ON). The SPEED switch indicator (33) comes on. The power is switched off when the POWER switch is released.

NOTES: * The platter does not rotate when the tonearm is positioned at the far right even if the switch is depressed and the power is supplied.

* With each push, this switch alternates between the ON and OFF positions.

* Keep the POWER switch at the OFF position when you are not using the turntable.

2. QUARTZ LOCK INDICATOR

This indicator illuminates when the platter is revolving at the

specified rate of 33 1/3 or 45 RPM.

NOTE: If the platter speed varies, such as when the speed switch is changed from one position to another or when you press momentarily on the platter, the indicator will go off. As the platter revolution returns to the specified speed, the indicator will illuminate again.

3. SPEED SWITCH

33.....Set the switch to this position when playing a 33 1/3 RPM record such as an LP. When it is depressed, the 33 indicator lights up, and the platter rotates at a speed of 33 1/3 RPM.

45.....Set the switch to this position when playing a 45 RPM record like an EP. When it is depressed, the 45 indicator lights up, and the platter rotates at a speed of 45 RPM.

4. DISC SIZE SWITCH

Selects the switch that corresponds to the size of the record you want to hear for auto play operation.

12"30.....for 30cm records
10"25.....for 25cm records
7"17.....for 17cm records

* Used to select the record size when depressed. For instance, when the 30cm indicator lights up, depress the switch for the 25cm position, and depress it again for the 17cm position. Depressing the switch once more sets it to the 30cm position.

* When the power switch is turned ON, the turntable will always be set for records with a diameter of 30cm and the corresponding light will come on.

NOTE: This switch will not work if depressed when the tonearm is moving (auto lead-in, auto-return, auto cut).

5. REPEAT SWITCH

Press this switch for repeat play. When pressed the indicator will light up, and the record will be played again (refer to page 16 for further details on repeat play). Press this switch again to release it. The indicator will go off and the repeat play function will be released.

NOTE: This switch will not work if depressed when the tonearm is moving (auto-return, auto cut).

6. ARM ELEVATION SWITCH

Use this switch to interrupt play temporarily or to perform manual play.
When DOWN position is depressed the tonearm will descend and when the UP position is depressed the tonearm will rise. These two operations will be performed alternately every time the switch is pressed.

NOTES: * When the POWER switch is set to ON, the tonearm

will start in the UP position.

* This switch will not work if depressed when the tonearm is moving (auto lead-in, auto-return, auto cut).
* When the switch is at UP, the auto-return cancelling mechanism is actuated and so there will be be no auto-return.

7. STOP/START SWITCH

Press this switch for auto play. The platter will start to rotate, the tonearm will automatically move over to the edge of the record and play will begin (auto lead-in).
If this switch is pressed during play, the tonearm will automatically return to the arm clamp position, the platter will stop rotating and play will be suspended (auto cut).

NOTE: This switch will not work if depressed when the tonearm is moving (auto lead-in).

8. REMOTE OPERATION KNOB

Used when moving the tonearm by remove control. Rotate counterclockwise to move the tonearm to the left. Rotate clockwise to move the tonearm to the right.

NOTE: When the arm elevation switch is at DOWN or auto lead-in, auto cut, andauto-return, the tonearm does not move even when the remote operation is released and the knob rotated.

9. TONEARM

The tonearm function is to apply the correct tracking force to the cartridge, maintain this value precisely, and allow the stylus to trace the record grooves accurately.
The tonearm can be operated manually with your hand or remotely with the remote operation knob. It is coupled to the motor switch and when it moves across to the record the platter rotates and it stops when the tonearm is returned to the arm clamp position.

NOTE: When the POWER switch is at OFF, the tonearm cannot be moved by either manual or remote operation. If it is forced at the OFF position, this may result in damage so always remember to set the POWER switch to ON when moving it.

10. ARM CLAMP

Used to secure the tonearm.
To secure the tonearm, move it to the right and then push down on the clamp. When you do not intend to use the turntable, secure the tonearm in this way. The tonearm is released when the clamp is raised.

11. ARM REST

This secures the tonearm pipe. When playing a record, rotate the arm rest counterclockwise and release the clamp. When not playing a record, set the arm elevation switch to UP (▼) and then rotate the arm rest clockwise and secure the pipe.

NOTE: When the arm elevation switch is at DOWN (▼), the tonearm pipe cannot be secured. Make sure this switch is set to the UP (▼) position.

12. PLATTER/RUBBER PLATTER MAT

When the tonearm is moved and power is supplied to the turntable, the platter will start rotating at the set rotation speed. The rubber platter mat stabilized the records and also absorbs external vibration.

13. DUST COVER

Keep this closed unless operating the controls or tonearm, or changing records. This serves to keep dust off of the records during play. When fully opened and pulled straight up, this dust cover can be removed from the cabinet.

3-0. DISSASSEMBLY

3.1 Panel

1. Remove the four turntable feet.
2. Remove the four insulating mounting screws(8mm deep socket).
3. Remove the top cover (five phillips screws).
4. Shift the tonearm across to the center (far left).
5. Lift the panel up and disconnect the three connectors from the PC board below.

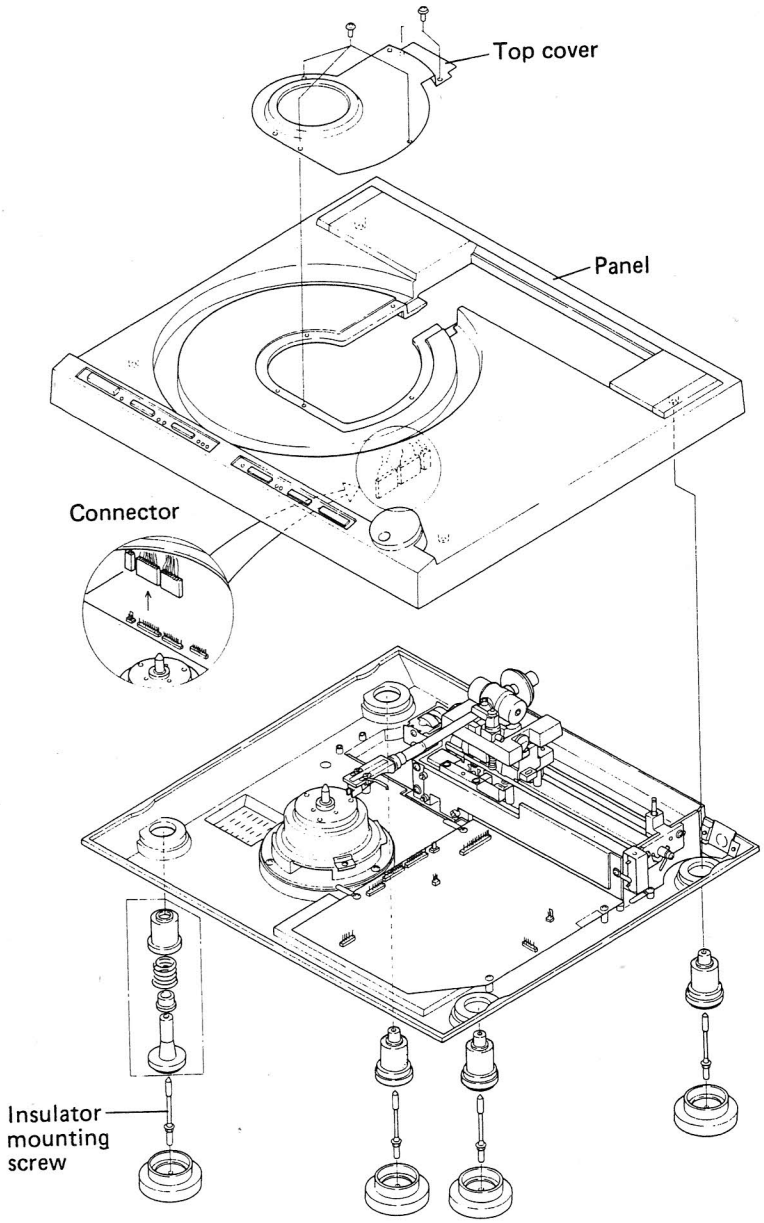


Fig. 3-1

3.2 Direct Drive Motor

1. Remove the three D.D. motor securing screws.
2. Disconnect the D.D. motor PC board connector.

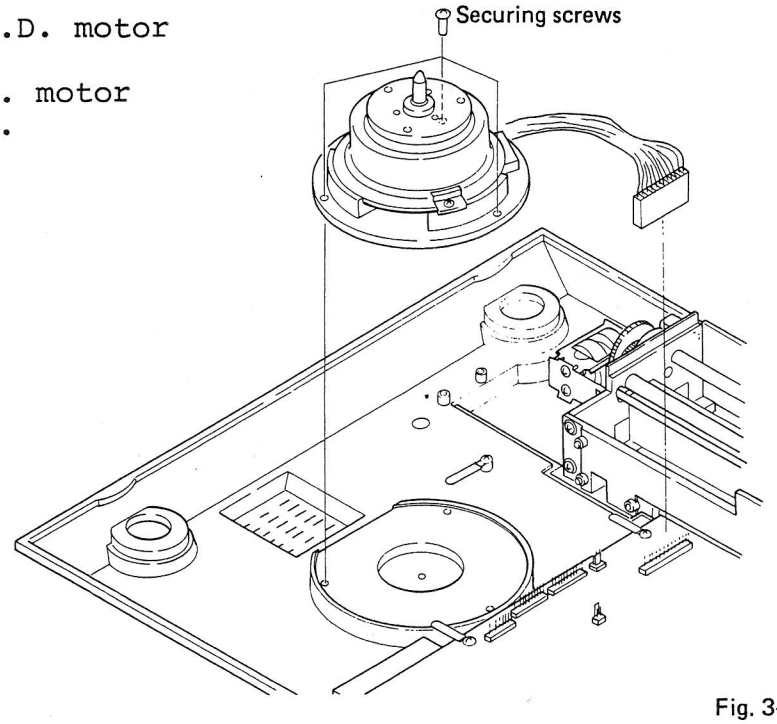


Fig. 3-2

3.3 Tonearm

1. Remove the plate pressing against the tonearm output cable.
2. Remove the coil and rail assembly.
3. Disconnect the ground lead connected to the front rail from PCB.
4. Remove the E-type washers and screw holding the gear and rail of the elevation mechanism. The front rail may then be removed by pulling out towards the right.
5. The other rail may also be removed by pulling out to the right after loosening the securing screw.
6. The tonearm may be removed once both rails have been pulled across to the right by at least 6 inches (15cm).

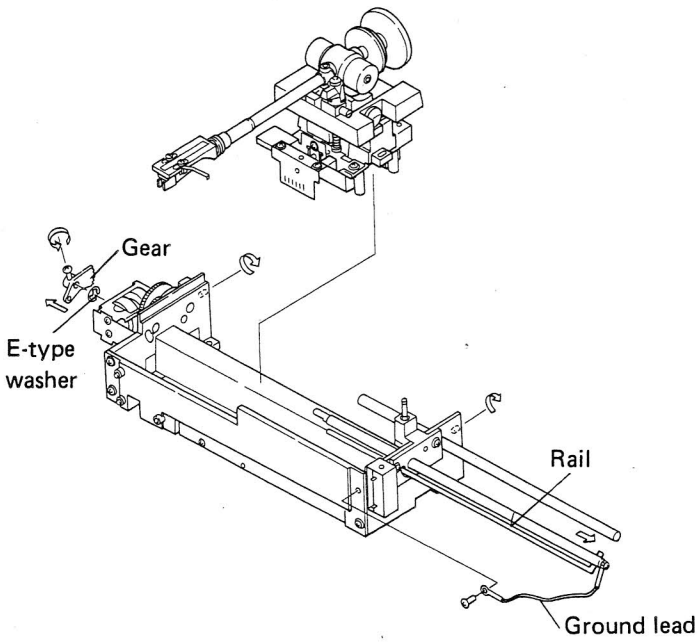


Fig. 3-3

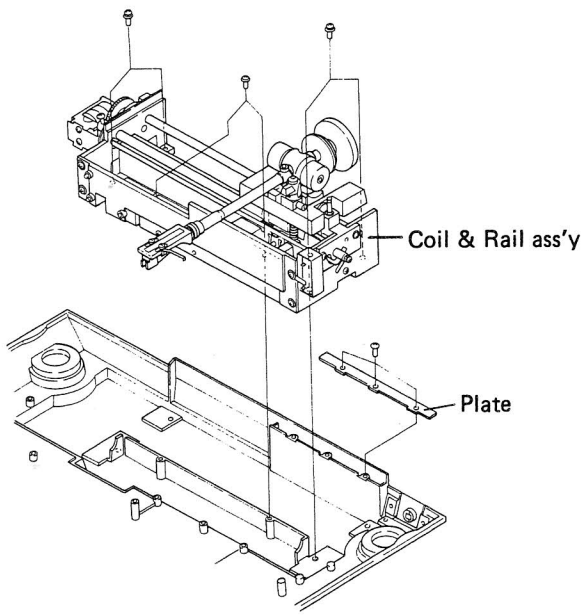
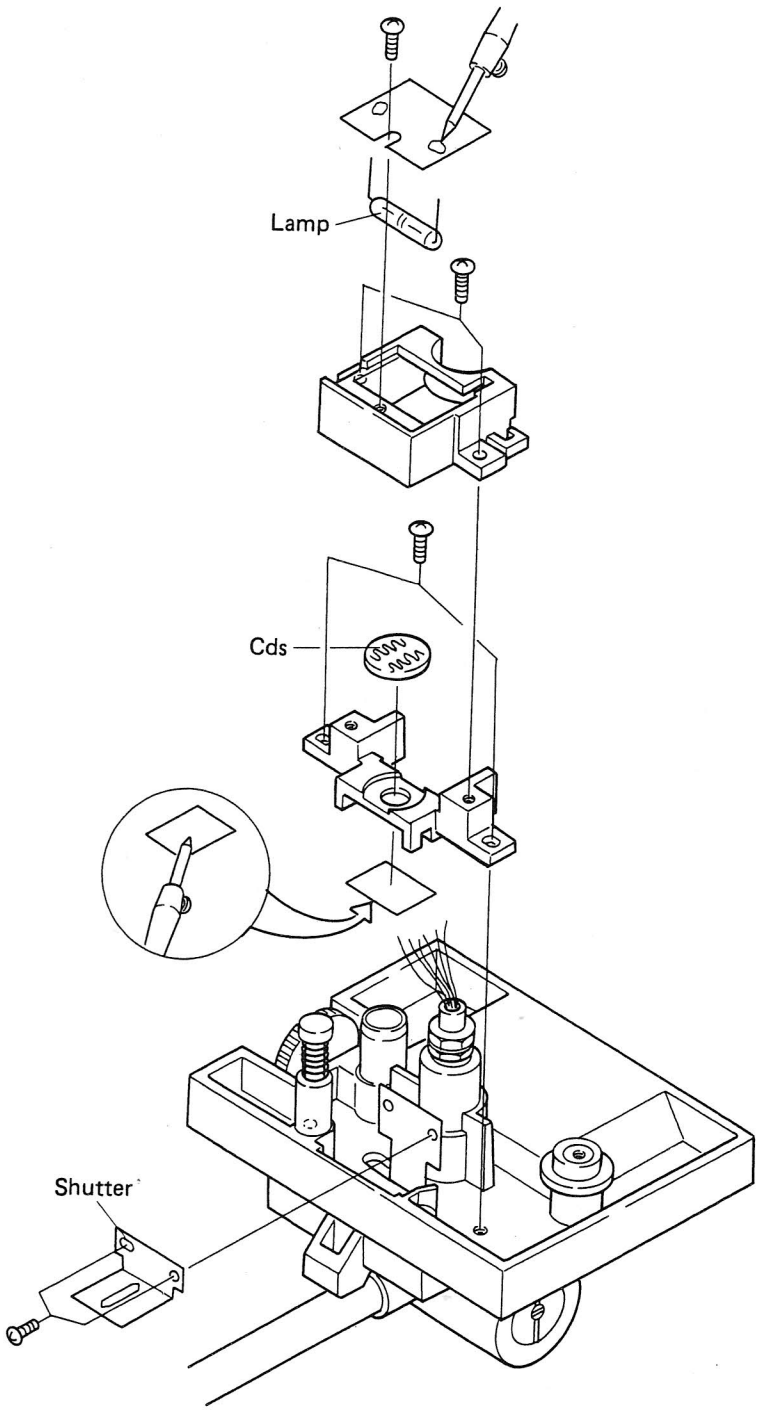


Fig. 3-4

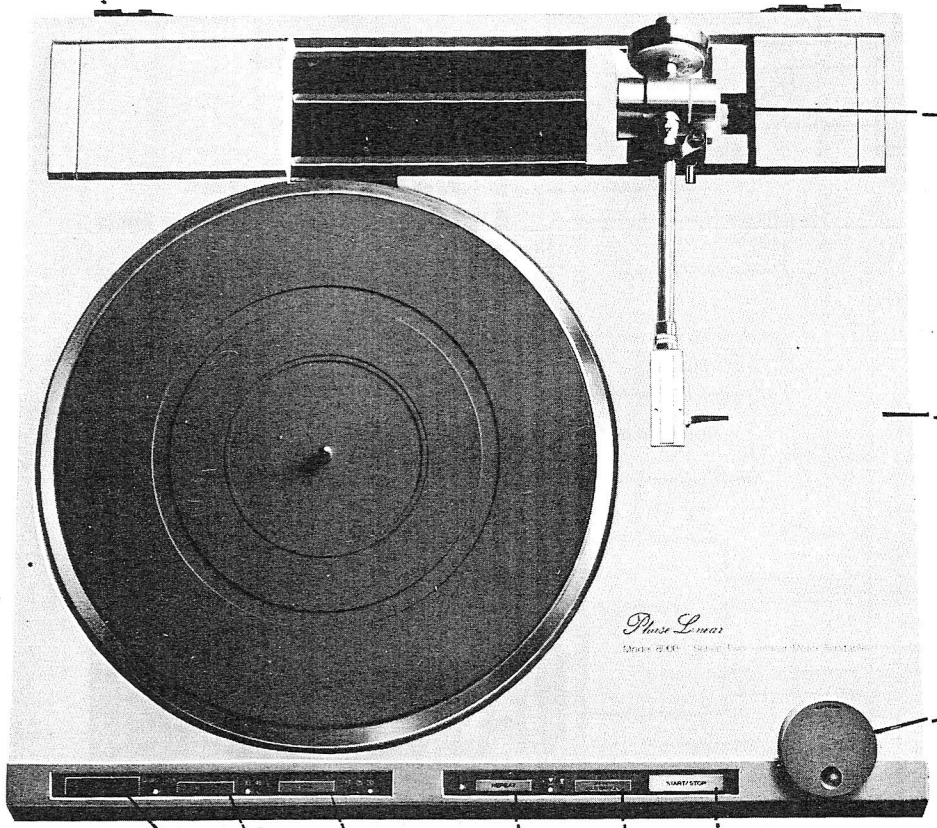
3.4 CdS Detector and Lamp

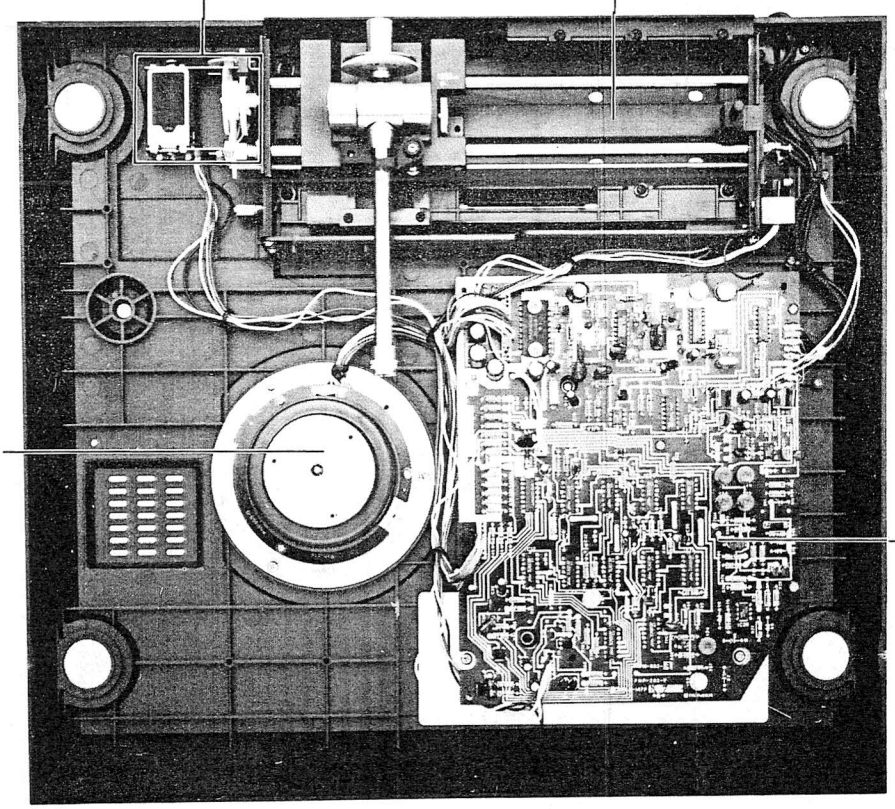
1. After removing the tonearm, remove the CdS detector and lamp in the way indicated in Fig. 3-5.
2. Remove the shutter before removing the spacer securing the CdS detector.



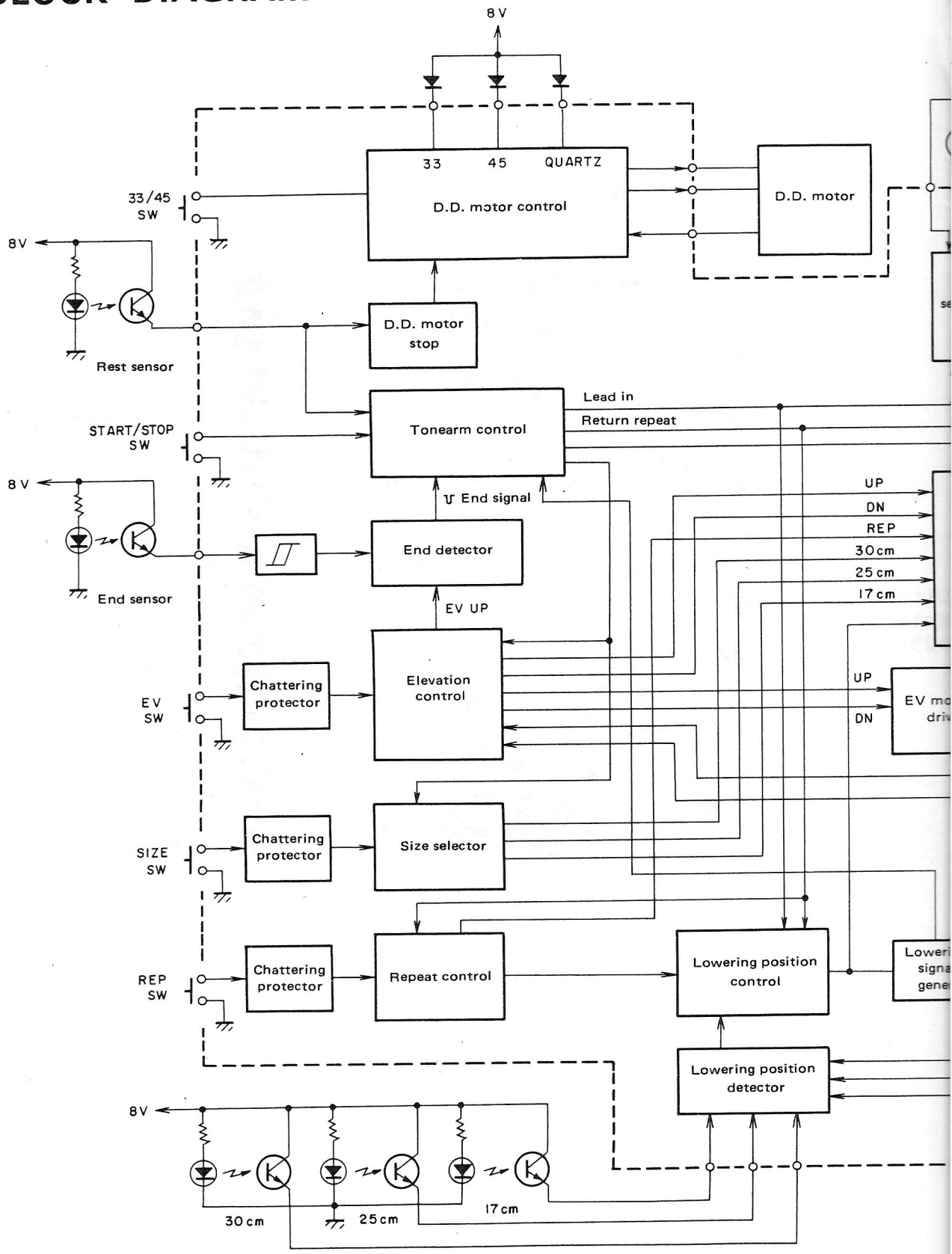
4-0. PARTS LOCATIONS

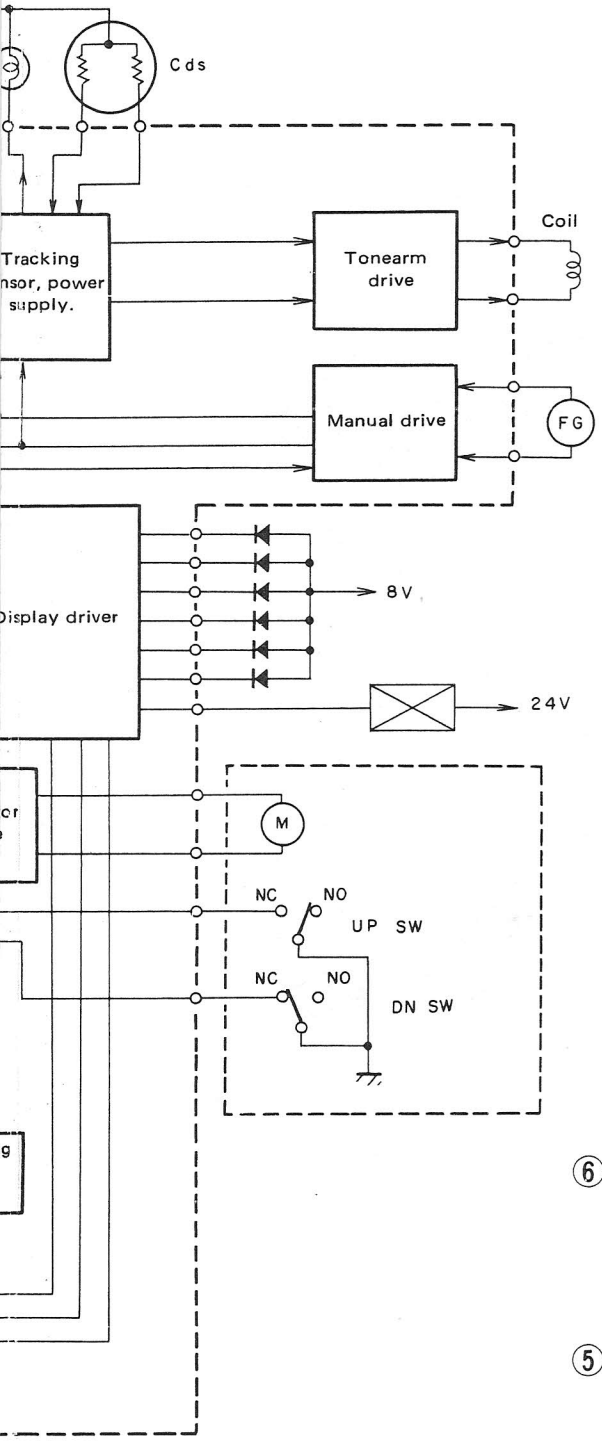
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*




EV Mechanism Assembly
Coil Assembly
925-8030
Direct Drive
Motor
929-8021
Control PC
Board Assembly
901-8012

5. BLOCK DIAGRAM





1 D.D. motor control
2 Tonearm control
3 Arm drive control
4 Full auto logic
5 Arm elevation control
6 EV, REPEAT, SIZE selector input

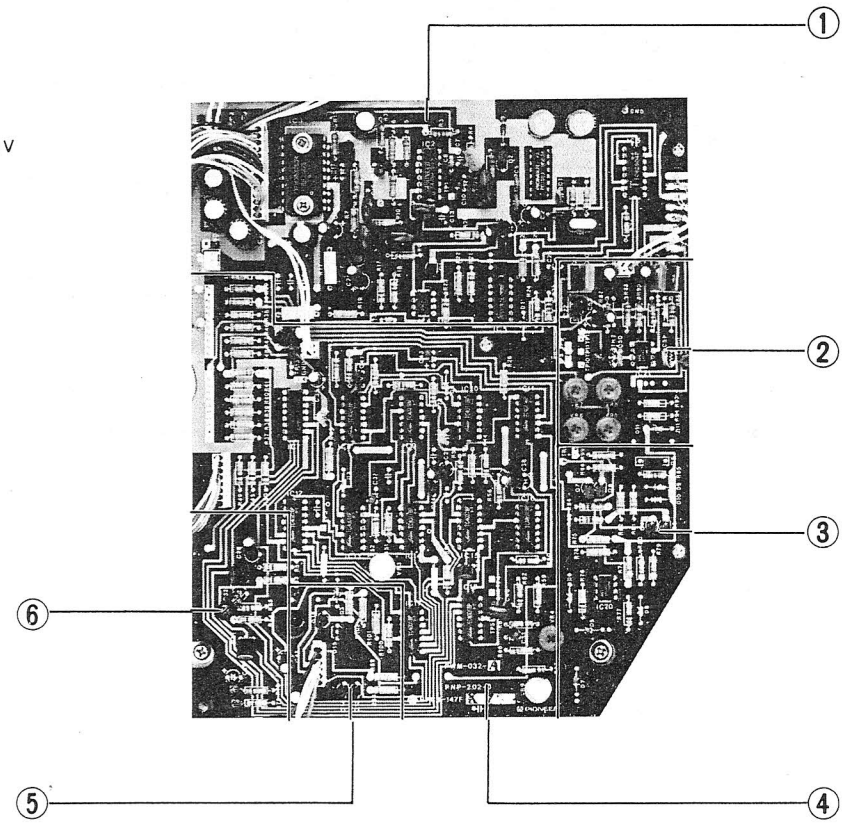


Photo 5-1

BLOCK DIAGRAM OPERATIONS

5.1 Tonearm Control Stage

a. Lead-in FF and Return FF(FlipFlop)

1. Lead-in FF....This FF is set by pressing the STOP/START switch when the tonearm is on the arm rest, and is reset by a descend signal, or when the power switch is turned on.

Return FF.....This FF is set by pressing the STOP/START switch when the tonearm is not on the arm rest, and also by the end detector. It is reset when the power is turned on, or by the descend signal, or when the tonearm returns to the arm rest.

b. When either of the above two FF's has been set, an "AUTO on" signal is generated resulting in the arm elevator being set up to the UP position, and inhibition of manual drive.

5.2 End Detector Stage

The end sensor input signal is rectified and then applied to the detector stage consisting of a differential circuit, integration circuit, and a monostable multivibrator.

When the detector stage detects the arrival of two consecutive input signals within the fixed time constant period, an output signal is generated. This output, however, is inhibited by the EV UP signal when the arm elevator is in the UP position.

5.3 Arm Elevation Control Stage

This stage consists of a J-K-type FF with a reset (clear) input and preset input. The arm elevator is raised (UP position) as a result of the initial resetting, or by the AUTO operation signal from the tonearm control stage. The elevator descends again (DOWN position) when the FF is preset by the descend signal. Furthermore, whenever the EV switch is pressed, Q and $\overline{Q}$ are generated alternately, resulting in the arm elevator being raised and lowered correspondingly.

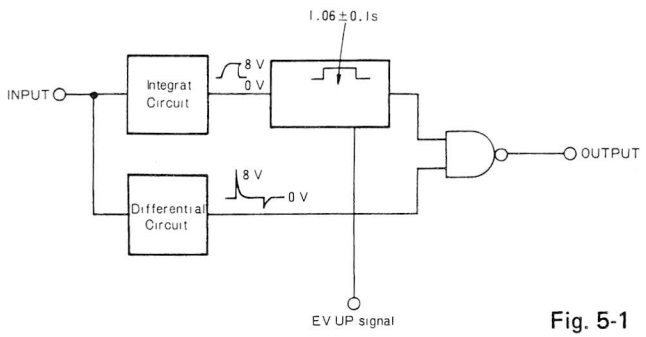


Fig. 5-1

The FF output is applied to a logical "and" circuit with the outputs from the elevator UP and DOWN swtiches, the resultant output being applied to the EV motor drive stage.

5.4 Size Selector Stage

This stage consists of a J-K FF 2-stage ring counter and the Q1/Q2 logical "and"gate. As a result of the initial resetting, Q1=Q2=L for automatic switching of the size selector to the 30cm position. Every time the size selector switch is pressed after that, the selector is switched from the 30 to 25 and 17 positions

in turn, and then back to 30 again. Note, however, that switching is inhibited when AUTO operation signals are received from the tonearm control stage (i.e. during lead-in, return, and repeat operations).

5.5 Repeat Control Stage

Consisting of a T-type FF, Q and $\overline{Q}$ are inverted by REPEAT switch operation. Note that the FF is also turned off by the initial reset, and that there is no inversion while the tonearm control stage return FF remains set (i.e. during return and repeat operations). Furthermore, the FF is also turned off as a result of auto-cut operation during repeat mode.

5.6 Lowering Position Detector, Plunger Control Stage, and Descend Signal Generator

When the tonearm shutter passes between the sensors corresponding to the designated record size (sensors being mounted in positions corresponding to each record size), a lowering position detector output signal is generated. This signal is then applied to the plunger control stage (a monostable multivibrator), resulting in a fixed time constant pulse signal being generated to activate the plunger (during lead-in and repeat modes). The down stroke of the pulse signal is differentiated and a descend position signal is generated. Each of the tonearm control stage FF's is also cleared.

5.7 Display Stage and Plunger Driver

This stage is responsible for the LED display of elevator position, repeat mode, and selected record size, in addition to plunger drive.

5.8 Manual Drive Stage

By amplifying the input to the power generator motor mounted in the locate stage, the tracking sensor stage balance is upset, permitting the tonearm to be moved back and forth. Such operation is inhibited, however, when the elevator is DOWN during auto operation modes (lead-in, return, and repeat).

5.9 Tracking Sensor Stage and Tonearm Driver Stage

The tracking sensor stage (consisting of lamp, CdS element, and shutter) generates + and - voltage differences in response to tonearm movement. These output signals are then applied to the driver stage where they are amplified, and to pass a current through the drive coil to drive the tonearm in such a way as to eliminate tracking error (i.e. to avoid generation of tracking sensor outputs).

5.10 Direct Drive Motor Control Stage and Direct Drive Motor Stop Control

The phono motor stop control stage stops the motor when the rest sensor detects the presence of the tonearm back on the arm

rest. As long as the tonearm remains off the arm rest, the motor will continue to rotate. The phono motor control stage employs three specially designed IC's: PA2005, PA2004, and PD1003. These control stages also include the speed selector, speed indicator, and quartz lock indicator circuits.

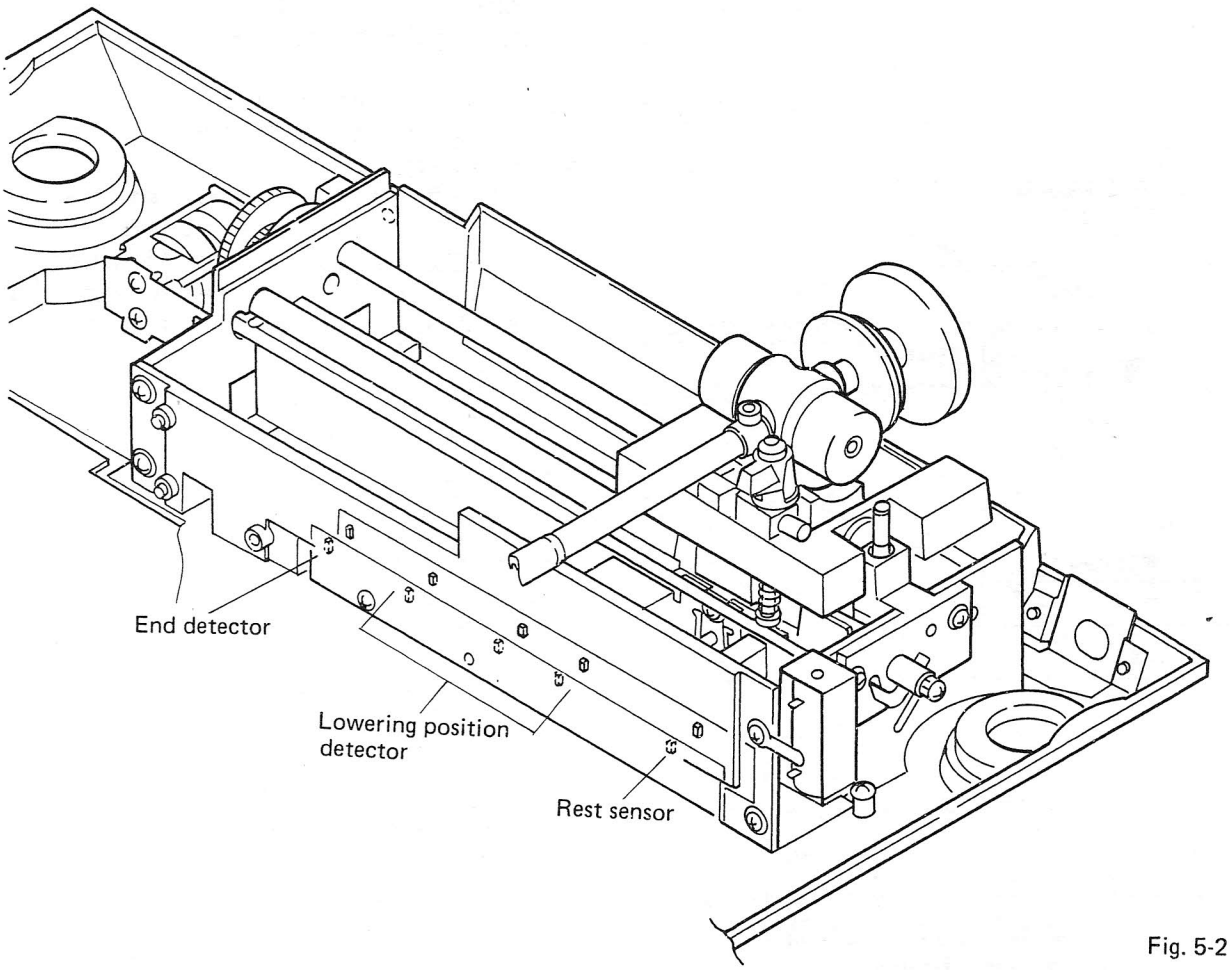


Fig. 5-2

CIRCUIT DESCRIPTIONS

6.1.1 Tonearm Control Stage

1. When the power switch is turned on....
....the lead-in FF and return FF are reset by the initial reset signal (passed from C29/R55 to IC16, to IC17, to IC19 and IC10).

....the phono motor will remain stationary if the tonearm is on the arm rest, but commence to rotate if it has already been moved away.

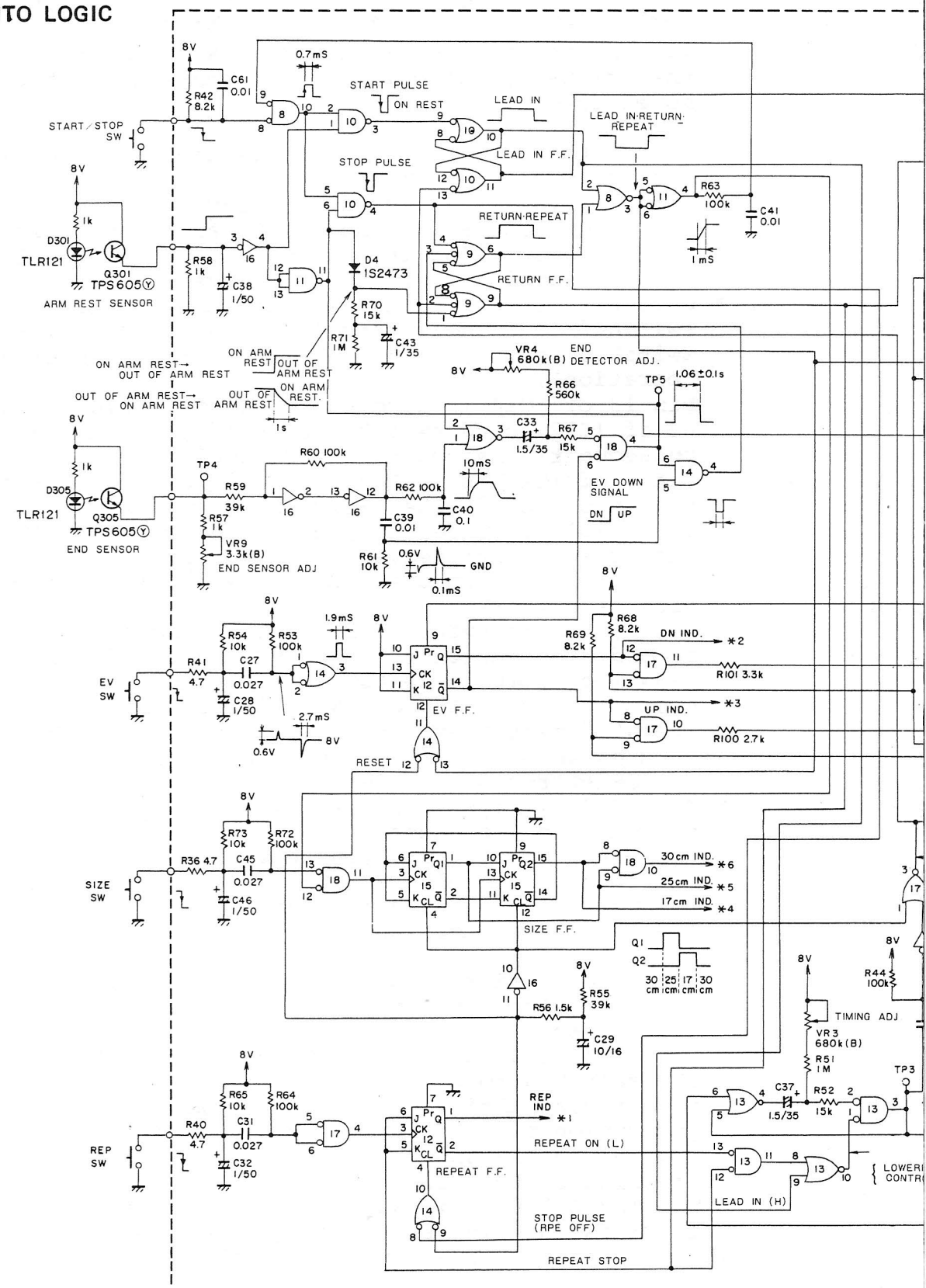
2. When the STOP/START switch is then pressed with the tonearm on the arm rest,

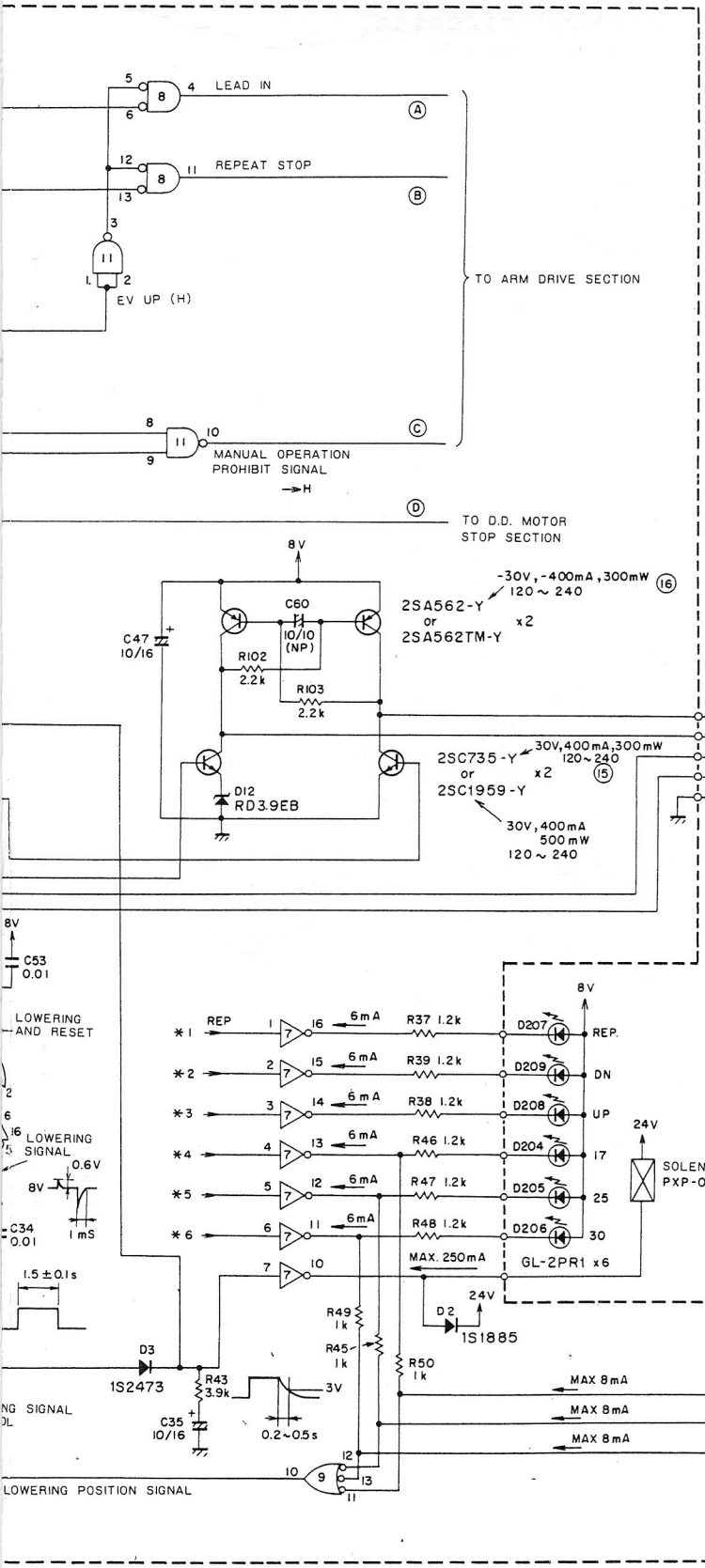
* pin 8 of IC8 is switched to L level.
* Pin 10 of IC8 is switched to H level, and this appears at pin 3 of IC10, resulting in the lead-in FF being set (and pin 10 of IC10 also being switched to H level).
* Once pin 10 of IC10 is switched to H level, pin 3 of IC8 is switched to L level, resulting in pin 8 of IC11 being likewise switched to L level thereby inhibiting manual drive (locate operation).
  Pin 13 of IC14 is also switched to L level, resulting in pin 12 of IC12 being switched to H level, and the elevator being consequently raised to the UP position.
* Pin 4 of IC11 is switched to H level, resulting in the inhibition of any further START/STOP switch inputs after a delay of about 1mS (in order to prevent the return FF from being set when the tonearm leaves the arm rest). At the same time, pin 12 of IC18 is switched to H level to inhibit switching of the size selector.
  Hence, the relevant FF's are set, the arm elevator raised, and record size selector switching inhibited.
* Pin 11 of IC10 is switched to L, and this is transferred to pin 6 of IC8. Once the elevator is properly in the UP position, the UP detector switch is switched to the ON position, resulting in pin 5 of IC8 being switched to L level, and pin 4 of IC8 switched to H level.
* This IC8 pin 4 H level singal then turns Q7 on, resulting in a current being passed from VR8 to VR5 and R99 via R93. If the potential at TP8 drops below the potential at TP10, the difference is amplified and a current passed through the coil to subsequently drive the carrier.
  The carrier is thus shifted across towards the record (assume size selector set to 30cm).
* When the carrier reaches a position about 20mm in front of the 30cm position, the carrier shutter will block the light of the 30cm sensor.
* Pin 13 of IC9 is thereby switched to L level, and pin 10 of IC9 switched to H level. This serves as a trigger for the monostable multivibrator incorporated in IC13, resulting in the generation of an H level signal of t=2.2 seconds. This is applied to TP3 and pin 9 of IC12, presetting the EV FF for lowering of the tonearm.
* The TP3 H level signal is used to drive IC7, and in turn attracts the plunger and raise the index plate.

The carrier continues to move further, coming to a stop when

6. CIRCUIT DESCRIPTIONS

6.1 FULL AUTO LOGIC





NOTES:

* L denotes L level.
* H denotes H level.
* EV denotes arm elevator, UP denotes that arm elevator is in UP position, while DN denotes that elevator is in the DOWN position.

The Full Auto Logic section is made up of the following five main stages:

(1) Tonearm control stage
(2) End detector stage
(3) Elevation control stage
(4) Record size selector stage
(5) Repeat control stage

the swing pin strikes the index plate.

* TP3 is switched back to L level 2.2 seconds later, the signal being differentiated by C34 and R44 to provide the tonearm descend signal which is passed via IC17, IC9, and IC10 to clear the FF's and stop the carrier drive current. The elevator UP, locate inhibition, and size selector switching inhibition are also cancelled at the same time.
* As a further result of TP3 being switched to L level, the charge held by C35 is discharged via R43 and the IC7 base resistance. During this discharge period (0.3 to 0.5 sec.) the plunger is maintained in the attracted position, but is forced back (by a spring) once the discharge has been completed. The elevator is thereby returned to DOWN position for start of play.

3. START/STOP switch pressed when tonearm is not on the arm rest.

* Pin 8 of IC8 is switched to L level.
* The IC8 pin 10 change to H level results in pin 4 of IC10 being changed to L level for the return FF to be set.
* This then results in the elevator being raised, and inhibition of size selector switching, S/S switch input after a delay of 1mS, and locate.
* The L level signal on pin 9 of IC9 is transferred to pins 5 and 6 of IC12, thereby inhibiting inversion of the repeat FF. Furthermore, the IC10 pin 4 L level change is transferred to pin 4 of IC12 via pin 8 of IC14 to clear the repeat FF. The purpose of the 1mS delay circuit referred to above is to permit sufficient time for the generation of the time pulse employed in clearing this FF.
* In a similar fashion to the lead-in operation, the L level signal appearing at pin 9 of IC9 once the elevator has been completely raised, is converted into an H signal at pin 11 of IC8, resulting in Q8 being turned on. In this case, however, the TP10 potential drops below the TP8 potential, resulting in the carrier being returned towards the arm rest.
* When the shutter cuts across the sensor light beam during the return motion, pin 10 of IC9 is switched to H level, but since the repeat mode has been switched off, pin 1 of IC13 will be at H level, thereby preventing operation of the monostable multivibrator.
* Once the carrier reaches the arm rest position, the rest sensor transfers an L level signal to pin 3 of IC16, resulting in pin 11 of IC11 being switched to L level to stop the phono motor.
* When pin 11 of IC11 is switched to L level, the charge stored on C43 is discharged via R71, the return FF being cleared after the potential on pin 1 of IC9 is reduced to $\frac{1}{2}V_{CC}$ (delay circuit). During this period, the carrier remains pressed against the arm rest.

4. End Detector Operation

* When the repeat mode if off, pin 3 of IC9 is switched to L level by the end detector, and the return FF is consequently set. Subsequent steps are the same as during normal return mode.

* When the repeat mode is on, the return FF is again set in the same way for normal return operation. However, when the shutter cuts across the size sensor, the plunger is activated (TP3 switched to H level), followed by the generation of the descend signal in the same way as during lead-in. The elevator is thus lowered for recommencement of play.

6.1.2 End Detector Stage

1. Detector Principle

* Shutter structure:

The detector circuit (outlined in the block diagram) has been designed to detect the presence of two rising edges of the Schmitt circuit output within 1.06, ±0.1 seconds.

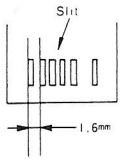


Fig. 6-1-1

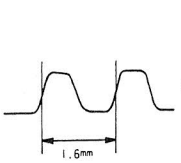


Fig. 6-1-2

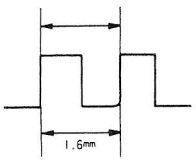


Fig. 6-1-3

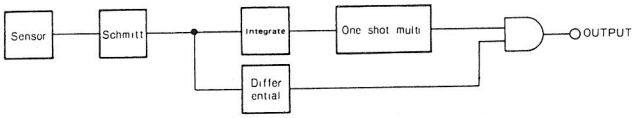


Fig. 6-2

2. Circuit Description

The end sensor is mounted at a position R49mm from the spindle. When the left edge of the shutter slits reaches that position, the stylus tip will be at the R62.5mm position. That is, there is 20mm between the 62.5mm position and the point of entry into the detection range. Once the detection range is entered, the sensor commences to generate output signals with a waveform like that shown in Fig.6-1-2 above. This output is applied to the Schmitt trigger circuit composed of two inverters in IC16 where it is rectified into the square wave as shown in Fig.6-1-3. This output is then differentiated by C39/R61 and applied to pin 5 of IC14, while another portion of the same output is integrated by R62/C40 and applied to the monostable multivibrator composed of two NOR gates in IC18, resulting in the generation of a 1.06, ±1 second H level signal (TP5). Although this signal is applied to pin 6 of IC14, there is no detection by pin 5 because of the delay by the integration circuit. If, however, the next differential pulse is applied to pin 5 of IC14 while the H signal is being generated at TP5, that pulse will be detected. Apart from this case, there is no detection because the differential pulse involves a slight delay before switching TP5 to H level.

Furthermore, when the elevator FF $\overline{Q}$ is connected to pin 6 of IC18 to make $\overline{Q}$=H (i.e. UP position), the monostable multivibrator is inhibited, thereby inhibiting the detector circuit. $\overline{Q}$ =H also when the power switch is turned on, again inhibiting the multivibrator.

6.1.3 Elevation Control Stage

* When the power switch is turned on, an initial reset signal is passed to pin 12 of IC14 from R55/C29, resulting in pin 11 of IC14 and pin 14 of IC12 being switched to H level ($\overline{Q}$ = H). This corresponds to the elevator being in the UP position, or in other words, UP priority is given when the power if first turned on.

* Since $\overline{Q}$ = H, one of the IC7 transistors will be turned on to light up the UP indicator LED.
* Until the elevator reaches the UP position the UP detector switch remains in the normally closed (NC) position, resulting in pins 13 and 12 of IC17 being both switched to L level, and Q13 and Q16 of the elevator deive stage being both turned on to start up the motor.
* Once the elevator is properly in the UP position, the UP detector switch is switched to the normally open (NO) position resulting in pin 13 of IC17 being switched to H level, and pin 11 of IC17 being switched to L level. Q13 and Q16 are both turned off and the motor stopped.
* If the elevator switch is then pressed, a falling edge of differential pulse is generated on pins 1 and 2 of IC14, and a rising edge clock pulse on pin 13 of IC12. This results in Q = H and $\overline{Q}$ = L for lowering of the elevator (DN).
* And since Q = H, the DN indicator LED will be lit up, and the UP indicator turned off.
* The DN detector switch remains in the NC position until the elevator is right down. During this period, pins 9 and 8 of IC17 will be both at L level, while pin 10 of IC17 will be at H level. The elevator drive stage Q14 and Q15 will thus be on and the motor rotating.
* If the elevator switch is pressed during this condition, Q will switch to L and $\overline{Q}$ to H (UP) to reverse the motor.

The above description relates to the operation of the elevator circuit itself. In addition,

* automatic mode UP (as described under the tonearm control stage), and
* DN at the lowering position, may be controlled via the elevator FF preset and clear terminals.

6.1.4 Record Size Selector Stage

* When the power is turned on, the initial reset signal from R55/C29 is passed to IC16 to switch pin 11 to H level, resulting in IC15 being cleared.
* Pin 1 (Q1) and pin 15 (Q2) of IC15 are both switched to L level, this then being transferred to pins 8 and 9 of IC18. Pin 10 of IC18 is thus switched to H level and the 30cm indicator LED is lit up.
* If the size selector is then pressed, the falling edge differential pulse applied to pin 13 of IC18 when pin 12 of this IC was at L level (i.e. when none of the lead-in, return, or repeat modes were operative), is instead applied to pin 11 of IC18 as a rising edge clock pulse, thereby activating the ring counter in IC15. As a result, Q1 = H and Q2 = L. The 30cm indicator LED is turned off, and the 25cm indicator LED turned on.
* If the size selector is pressed again, the 17dm indicator LED is turned on. Every time the selector is pressed, the size is switched in a cyclic order 30 to 25 to 17 to 30...

6.1.5 Repeat Control Stage

* When the power is turned on, the initial reset signal from R55/C29 is applied to pin 8 of IC14, resulting in pin 10 of this IC being switched to H level, and pin 1 (Q) of IC12

being switched to L level.

* The repeat indicator LED will thus be turned off (since Q=L).
* If the repeat switch is then pressed, a falling edge differential pulse will be applied to pins 5 and 6 of IC17, and a rising edge clock pulse generated at pin 4. As long as the repeat or return modes are not operative at this time, pin 5 (K) and 6 (J) of IC12 will both be at H level, resulting in Q = H, and $\overline{Q}$ = L for the repeat indicator LED to be turned on. At the same time, pin 13 of IC13 is switched to L level, thereby enabling the monostable multivibrator consisting of two gate circuits in IC13 to operate during repeat.
* If the repeat switch is then pressed again, the J = K = H status will be inverted.

In addition to the above repeat control stage,

* The START/STOP switch may be pressed to activate return mode. In this case, a falling edge pulse is generated on pin 8 of IC14. Pin 10 of IC14 is thus switched to H level, and the IC12 FF cleared (repeat off), resulting in Q = L and $\overline{Q}$ = H.
* When the return FF is set (during return or repeat mode), pin 9 of IC9 is switched to L level, this being transferred to the J and K terminals of the repeat FF, thereby inhibiting any inversion.

6.2 TONEARM DRIVE

The tonearm drive stage contains the following three major component circuits:

(1) Tracking sensor circuit
(2) Tonearm drive circuit
(3) Manual operation circuit (locate operation circuit)

6.2.1 Tracking Sensor Circuit

An outline of the tracking sensor circuit is shown on page 27. When the stylus is positioned exactly at right angles to the carrier, the lamp beam is directed practically equally onto both CdS elements, which means that the resistance in both elements will also be more or less equal. These two elements form part of a Wheatstone bridge with R93, R94, and VR8, this latter variable control being adjusted so that no potential difference is generated across TP8 and TP10 when the stylus is located at right angles to the carrier. If the stylus should happen to move to either left or right, the amount of light striking the CdS elements will change, resulting in the resistance of one element being increased, and the resistance in the other element being decreased. A potential difference will thus be generated across TP8 and TP10. The relation between stylus movement and the potential difference generated is shown in Fig. 6-4. VR7 is used for adjustment purposes.

* When the stylus is positioned at right angles to the carrier, the bridge is balanced, and the carrier remains stationary.
* If the stylus should tend towards the left of the carrier, a (+) potential will be generated across TP8 and TP10. This signal is amplified in the tonearm drive circuit (see section 6.2.2), resulting in a coil current to move the carrier to the left(during record trace, or when moved to the left by hand).
* If the stylus should happen to tend towards the right, a (-) potential will be generated across TP8 and TP10. After amplification in the tonearm drive circuit, the resultant coil current serves to move the carrier to the right(during record trace, or when moved to the right by hand).
* During lead-in Q7 is turned on, and a current is passed from R93 to R99 via VR5. A (+) potential difference is generated between TP8 and TP10 by the voltage drop across R93, resulting in the carrier being moved to the left. Speed is controlled by adjusting the current passing through VR5.
* During return and repeat modes, Q8 is turned on, resulting in a current being passed from R94 to R98 via VR6. Consequently, a (-) potential difference is generated between TP8 and TP10 by the voltage drop across R94, thereby moving the carrier to the right. In this case, speed is controlled by adjusting the current passing through VR6.

6.2.2 Tonearm Drive Circuit

The tonearm drive circuit consists of a current booster formed by a differential amplifier and Q's 9 through 12. The DC voltage created by the CdS element when the stylus tends toward the left or right is amplified by differential op amp IC21 and current boosters Q9, Q10, Q11, and Q12. This voltage is then passed on

to the linear motor drive coil. The drive voltage is temperature compensated by thermistors TH1 and TH2.

6.2.3 Manual Operation Circuit (locate Operation Circuit)

* When elevator is not completely in the UP position (UP detector switch in the NC position),
* During automatic modes (lead-in, return, repeat).

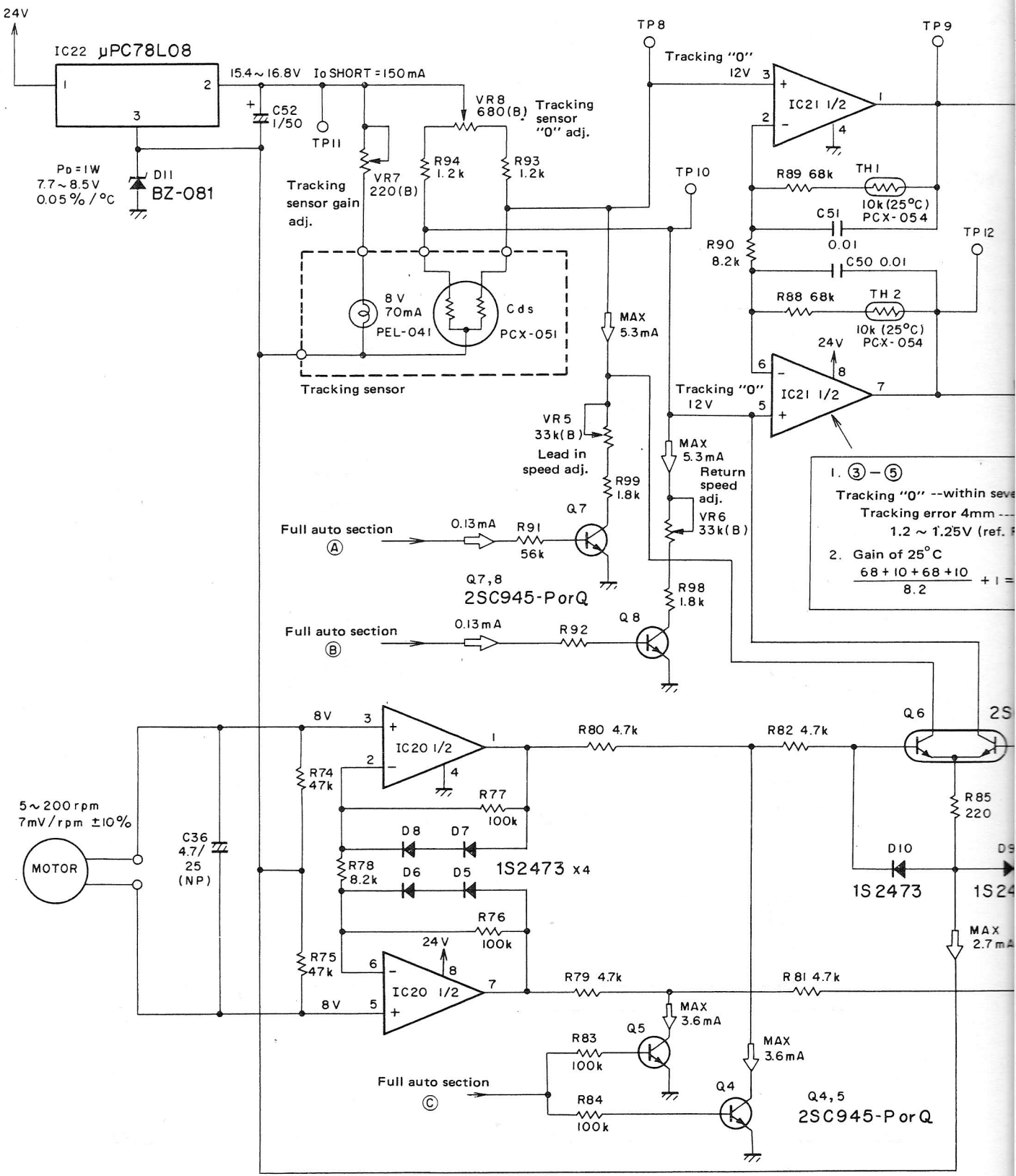
Under the above conditions, pin 10 of IC11 in the full auto logic stage is switched to H level, thereby turning Q4 and Q5 on. The collector voltage of these two transistors will thus be almost zero. Current will also flow through the D10 - R82 - Q4 and D9 - R81 - Q5 routes, resulting in the base of Q6 being biased in the reverse direction due to the voltage drop of V_f of D9 and D10 in respect to the emmitter. Q6 is thus turned off to inhibit locate operation.

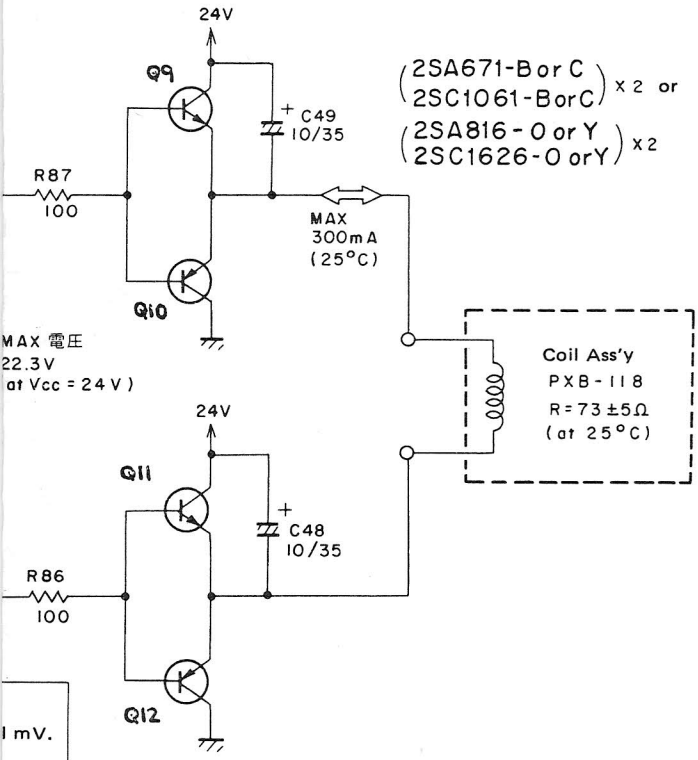
* When locate dial is rotated,
* When the motor generates power,
* When the motor RPM is low (slow rotation of the dial), the amplifier gain is determined by $\frac{R76 + R77}{R78} + 1$,

but once the motor RPM is increased by a certain rate, the gain will be clamped by the voltage determined by D7 and D8, or D5 and D6.

* When the differential amplifier is activated, one side of Q6 is turned on according to the rotational direction of the dial, resulting in a voltage drop across R93 or R94, and the generation of a potential difference between TP8 and TP10. This is subsequently amplified, and results in a current being passed through the coil to move the carrier.

6.2 TONEARM DRIVE




24V
Q9
+ C49
10/35
(2SA671-B or C
2SC1061-B or C) x 2 or
(2SA816-O or Y
2SC1626-O or Y) x 2
R87
100
MAX
300mA
(25°C)
Q10
MAX 電圧
22.3V
at Vcc = 24V)
Coil Ass'y
PXB-118
R=73±5Ω
(at 25°C)
24V
Q11
+
C48
10/35
R86
100
Q12

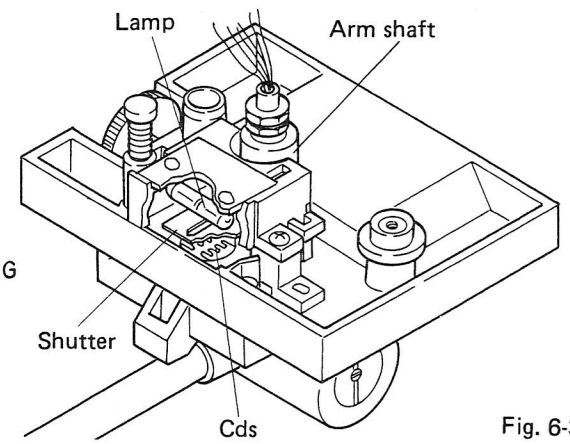

Lamp
Arm shaft
Shutter
Cds

Fig. 6-3

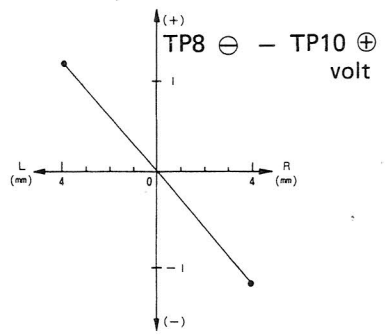

(+)
TP8 ⊖ — TP10 ⊕
volt
L
(mm)
4
0
4
R
(mm)
(−)

Fig. 6-4

7. ADJUSTMENTS

Adjustment position

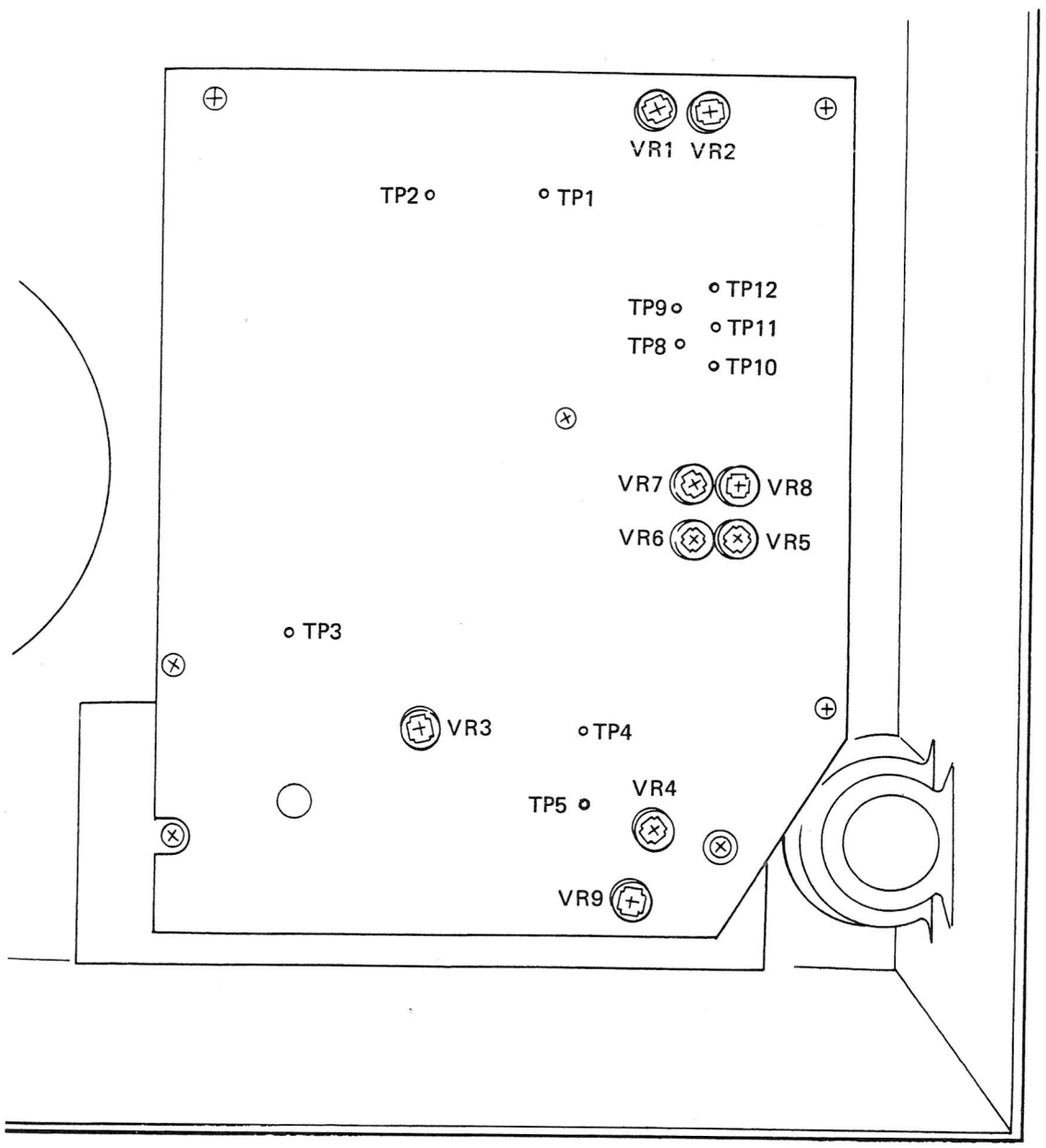


Fig. 7-1

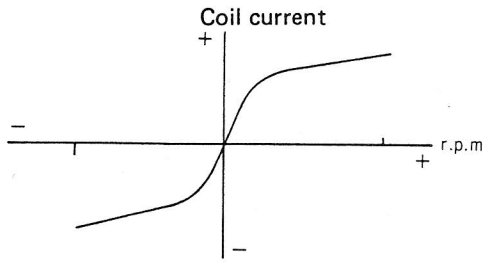


Fig. 6-5

7-0. ADJUSTMENTS

Preparation:
1. Disconnect the panel according to the disassembly method outlined in section 3-0.
2. Use extension leads to connect the panel to the printed circuit board located in the base section.
3. Remount the turntable platter (but without tightening the securing screws).

7.1 Direct Drive Motor Operating Point Adjustment

1. Connect the TP1 and TP2 terminals to the CH1 and CH2 inputs of a dual-trace oscilloscope.

2. Start the turntable platter turning by shifting the tonearm over towards the center of the record from the arm rest position.

3. Observe the waveforms in the oscilloscope, and adjust the corresponding controls so that the rising edge of the TP2 output waveform lies within the TP1 output waveform.

4. VR1 is the control to adjust for 45 RPM speed, while VR2 is the control for 33 1/3 RPM adjustment.

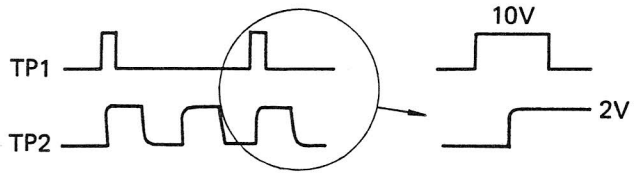


Fig. 7-2

7.2 Auto Lead-In Timing Adjustment

1. Set the record size selector to the 30cm position.
2. Press the START/STOP key to start the tonearm lead-in movement.
3. When the tonearm is about 20mm away from the outer edge of the record, an output pulse signal will appear at TP3 (see fig. 7-3). Adjust VR3 to obtain a time constant of 2.2 - 2.5 seconds for this pulse signal.

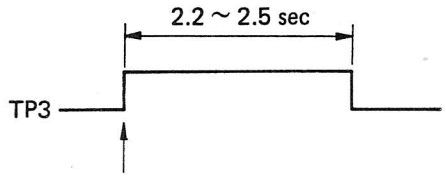


Fig. 7-3

7.3 End Sensor Sensitivity Adjustment

1. Connect the oscilloscope to the TP4 terminal.
2. Set the arm elevator to the UP position, and shift the tonearm across to near the lead-out groove.
3. Hold the tonearm carrier by hand, and move the tonearm back and forth at a rate of 5 to 10 cm/second.

4. During this operation, adjust VR9 so that the TP4 output saturates at H and L levels at about 50% duty.

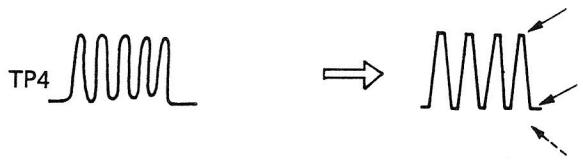
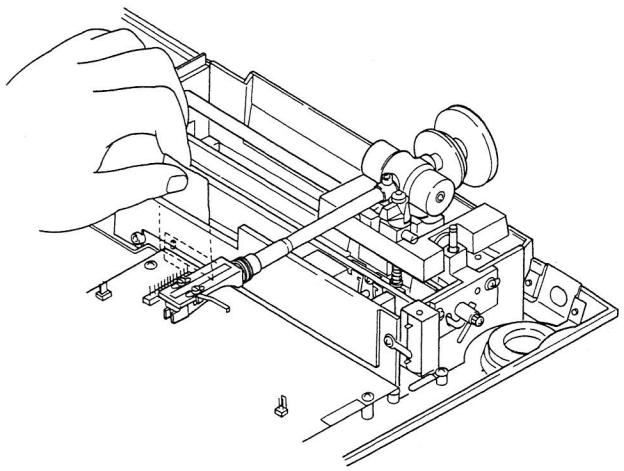


Fig. 7-4

7.4 End Timer Adjustment

1. Connect the oscilloscope to the TP5 terminal.
2. Secure the tonearm to the arm rest, and remove the turntable platter.
3. Insert a piece of paper (or any other light shield) into the and sensor stage.
4. As soon as the piece of paper (or light shield) is removed, an output signal appears at TP5. Adjust the time constant of this output to 1.06 ±0.1 second by means of VR4.



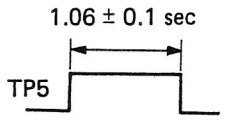


Fig. 7-5

7.5 Tracking Sensor Zero Point Adjustment

1. Set the arm elevator to the UP position, and adjust VR8 to obtain a voltage of less than ±0.1 volt between TP9 (-) and TP12 (+).
2. Set the arm elevator to the UP and DOWN positions repeatedly, and also perform each of the automatic mode operations. Finally set the arm elevator back to the UP position, and check that the voltage across the TP9 and TP12 terminals remains below ±0.35 V.

7.6 Tracking Sensor Gain Adjustment

1. Disconnect the drive coil connector, and insert a piece of paper (or any other light shield) into the rest sensor stage and stop the direct drive motor rotation.

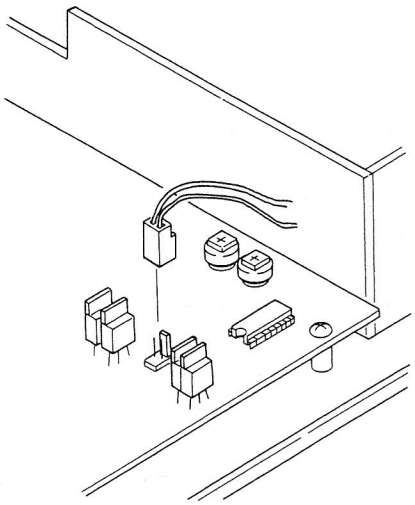


Fig. 7-6

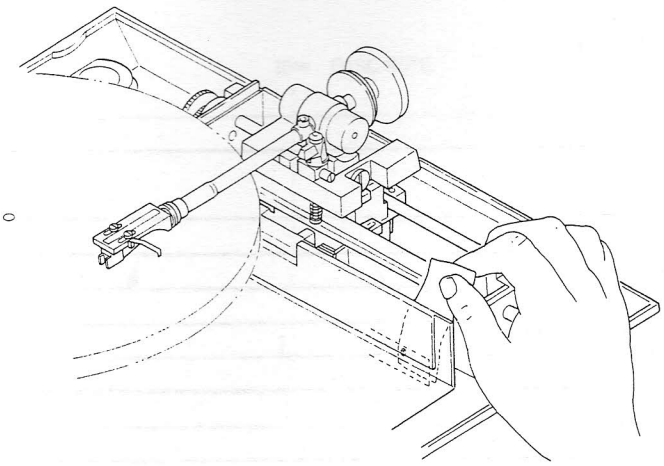


Fig. 7-7

2. Shift the tonearm across to any desired position above the turntable platter, and then fix the rail and roller to secure the carrier.
3. With the arm elevator in the DOWN position, shift the tonearm across to a position 4mm to the left of the tonearm center position.
4. Then adjust VR7 so as to obtain a voltage of 1.2 to 1.25V across the TP8 and TP10 terminals.
5. Next shift the tomearm to a position 4mm to the right of the tonearm center, and check that the voltage across TP8 and TP10 varies by no more than ±0.15V from the value measured in step 4 above.

NOTES: * Because of the "ghost" tendency caused by light from the tracking sensor lamp (as shown in fig. 7-8), this adjustment must be performed with care.
* Perform the above tracking sensor adjustment procedures (7.5 and 7.6) at least twice.

7.7 Lead-In and Return Speed Adjustment

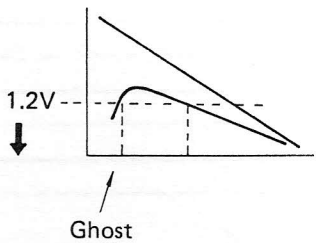
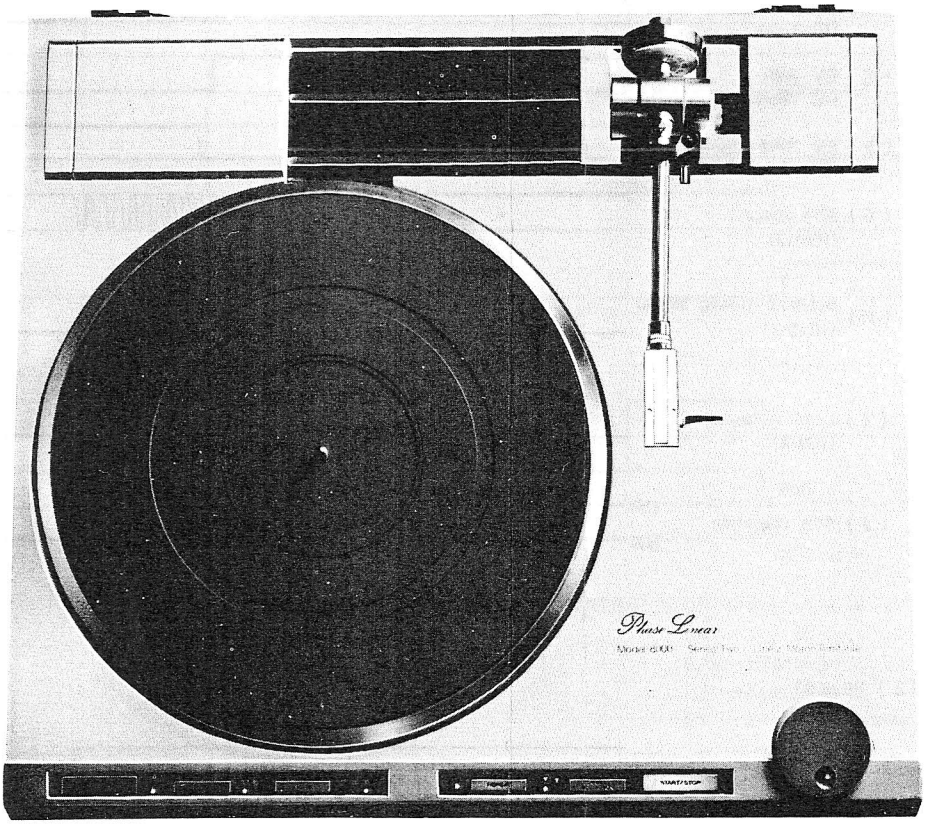


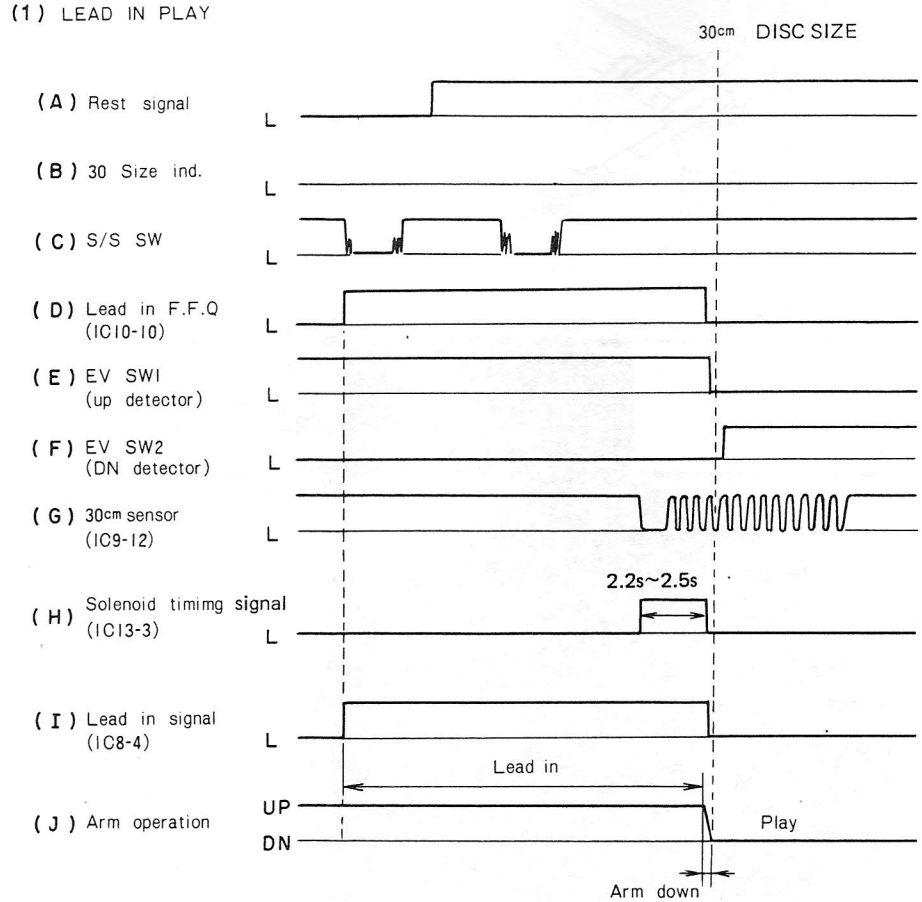
Fig. 7-8

1. Set the record size selector to the 17cm position.
2. Press the START/STOP key to commence the tonearm lead-in operation.
3. Adjust VR5 so that the time required to reach the 17cm position is 5.5 to 6.5 seconds.
4. Then adjust VR6 so that the time required for the tonearm to return to rest from the 17cm position is also 5.5 to 6.5 seconds.

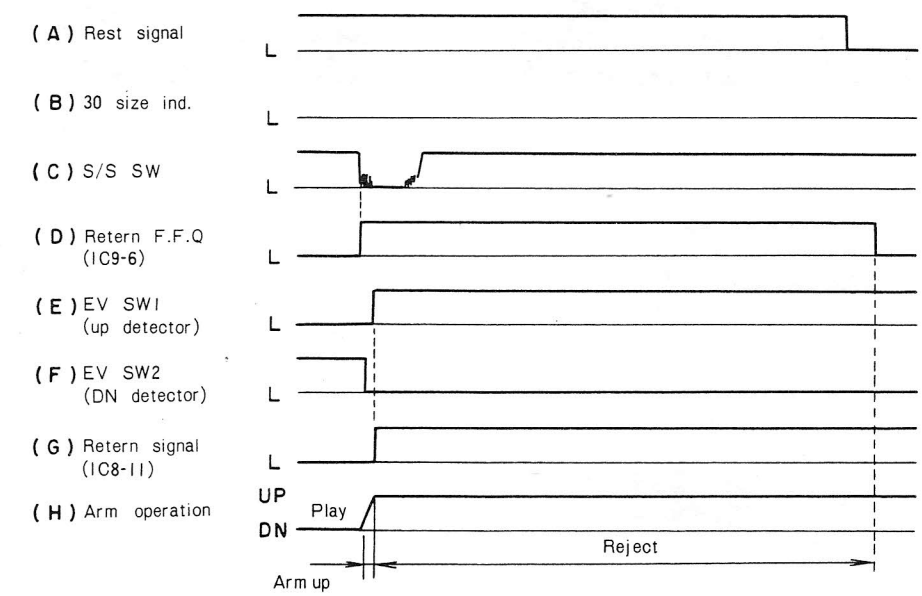

Phase Linear

8. TIMING CHART

(1) LEAD IN PLAY

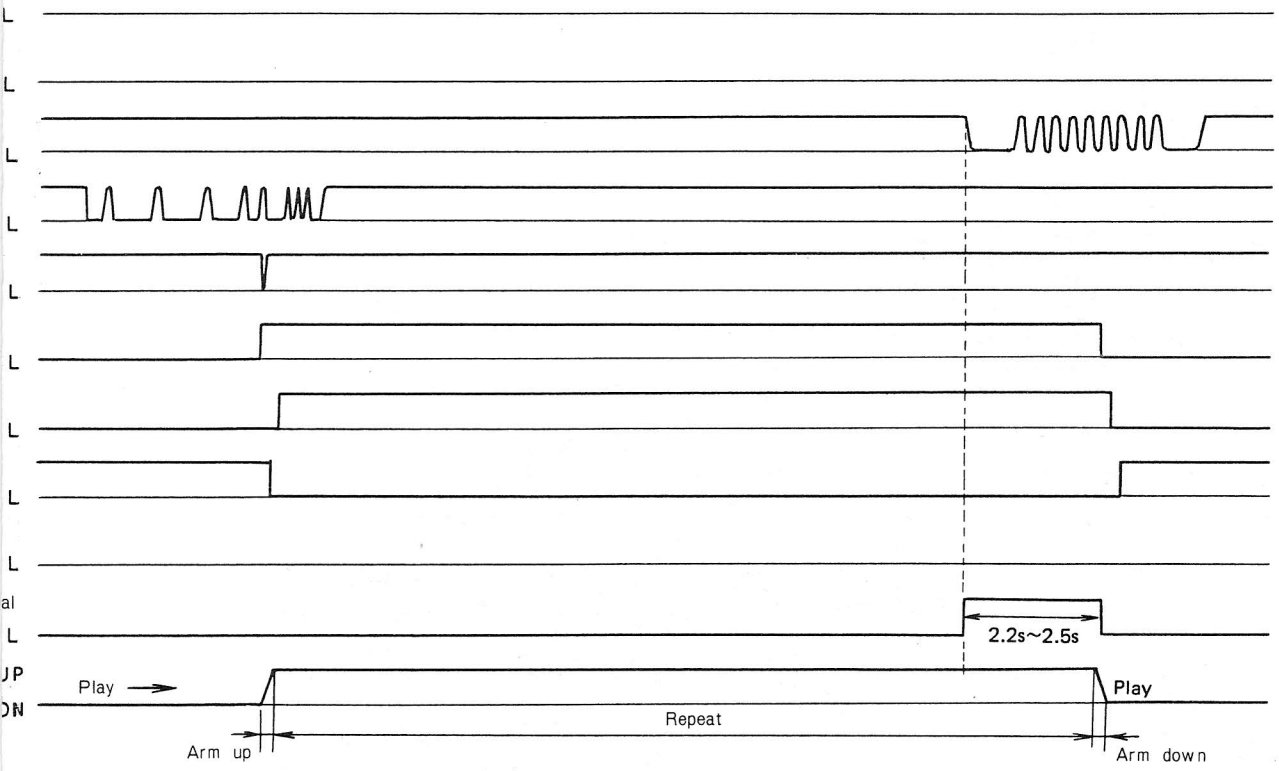


(2) REJECT



(3) REPEAT

(A) Rest signal
(B) 30 size ind.
(C) 30cm sensor (IC9-12)
(D) End sensor
(E) End detector signal (IC14-4)
(F) Retern F.F.Q (IC9-6)
(G) EV SW1 (up detector)
(H) EV SW2 (DN detector)
(I) Repeat ind.
(J) Solenoid timing sig (IC13-3)
(K) Arm operation

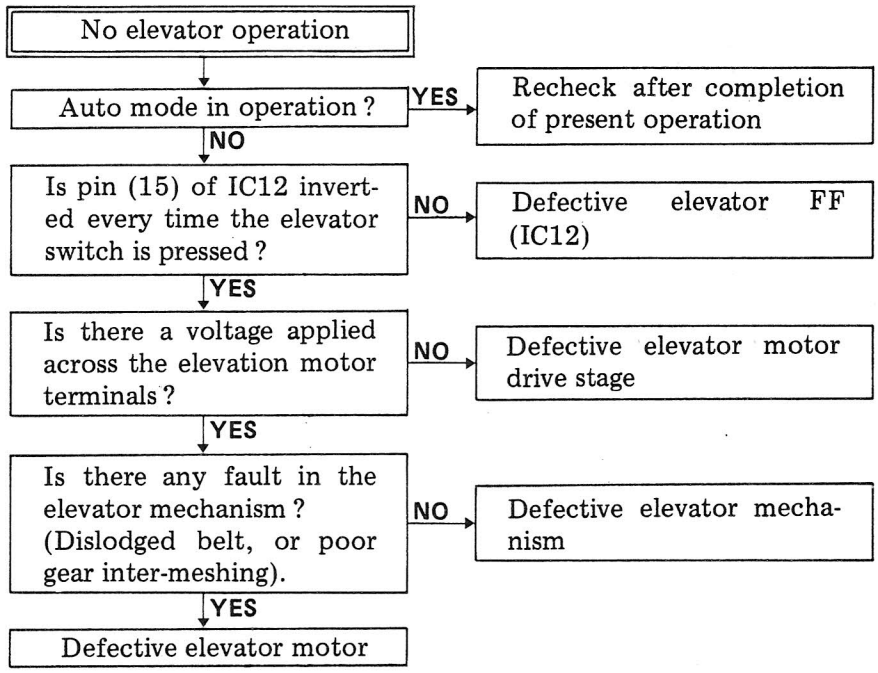


NOTES : UP — Arm elevation UP
DN — Arm elevation DOWN
S/S— START·STOP Switch
F.F — FLip Flop
EV — Elevation (Tonearm)

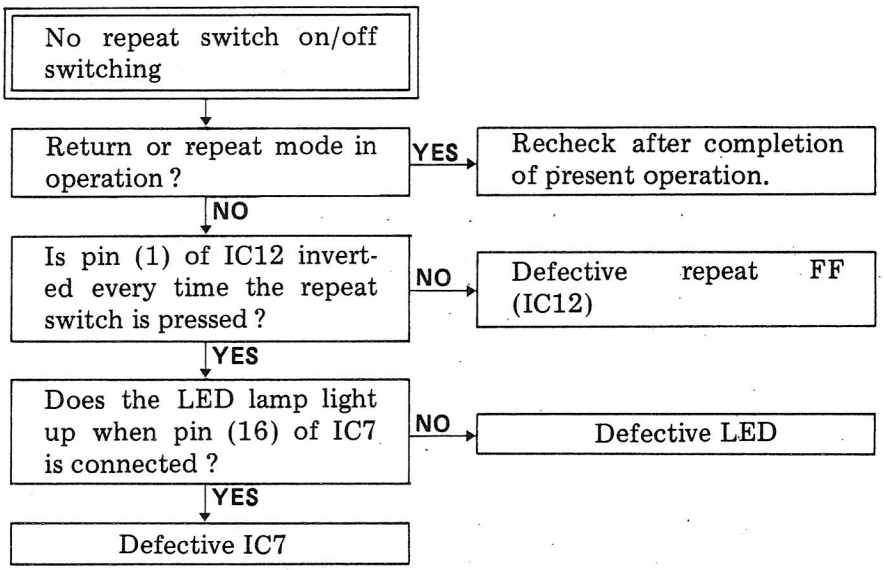
9. TROUBLE SHOOTING

9.1 CIRCUIT BLOCK

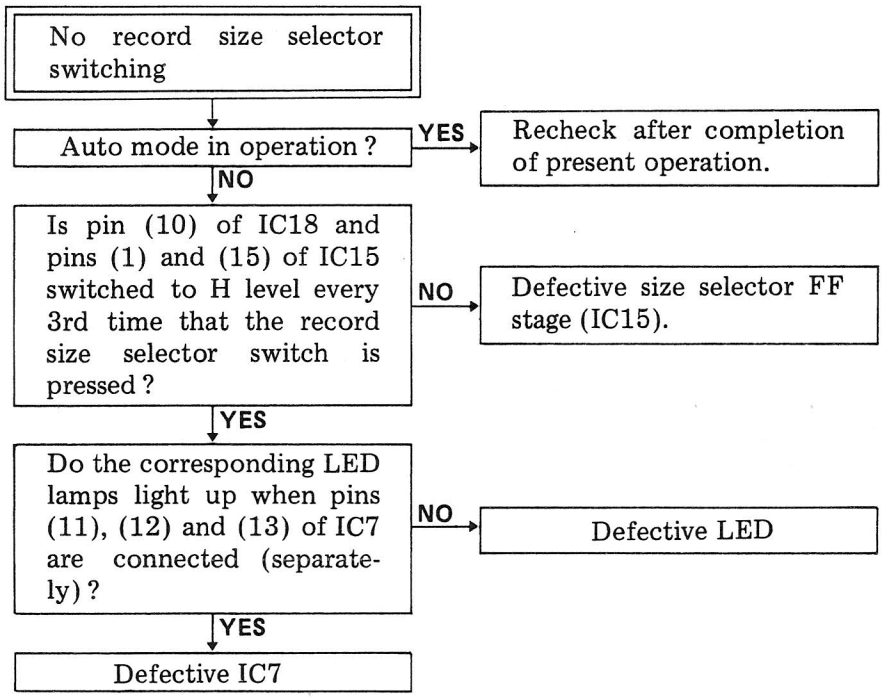
9.1.1



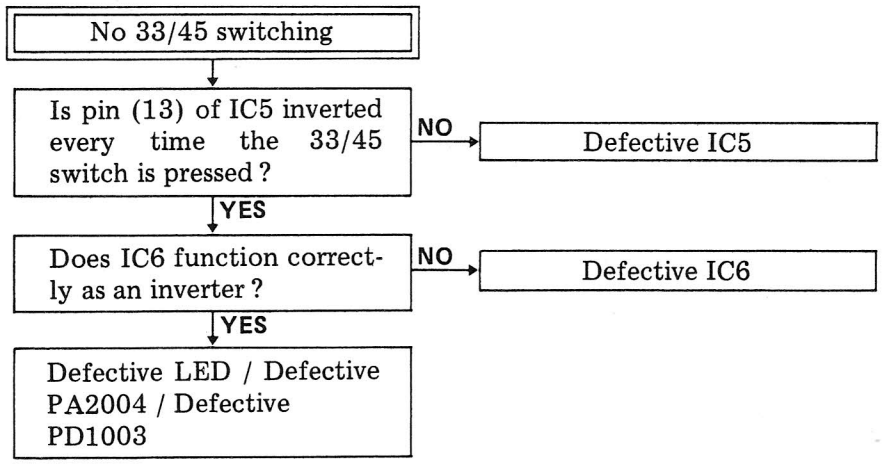
9.1.2



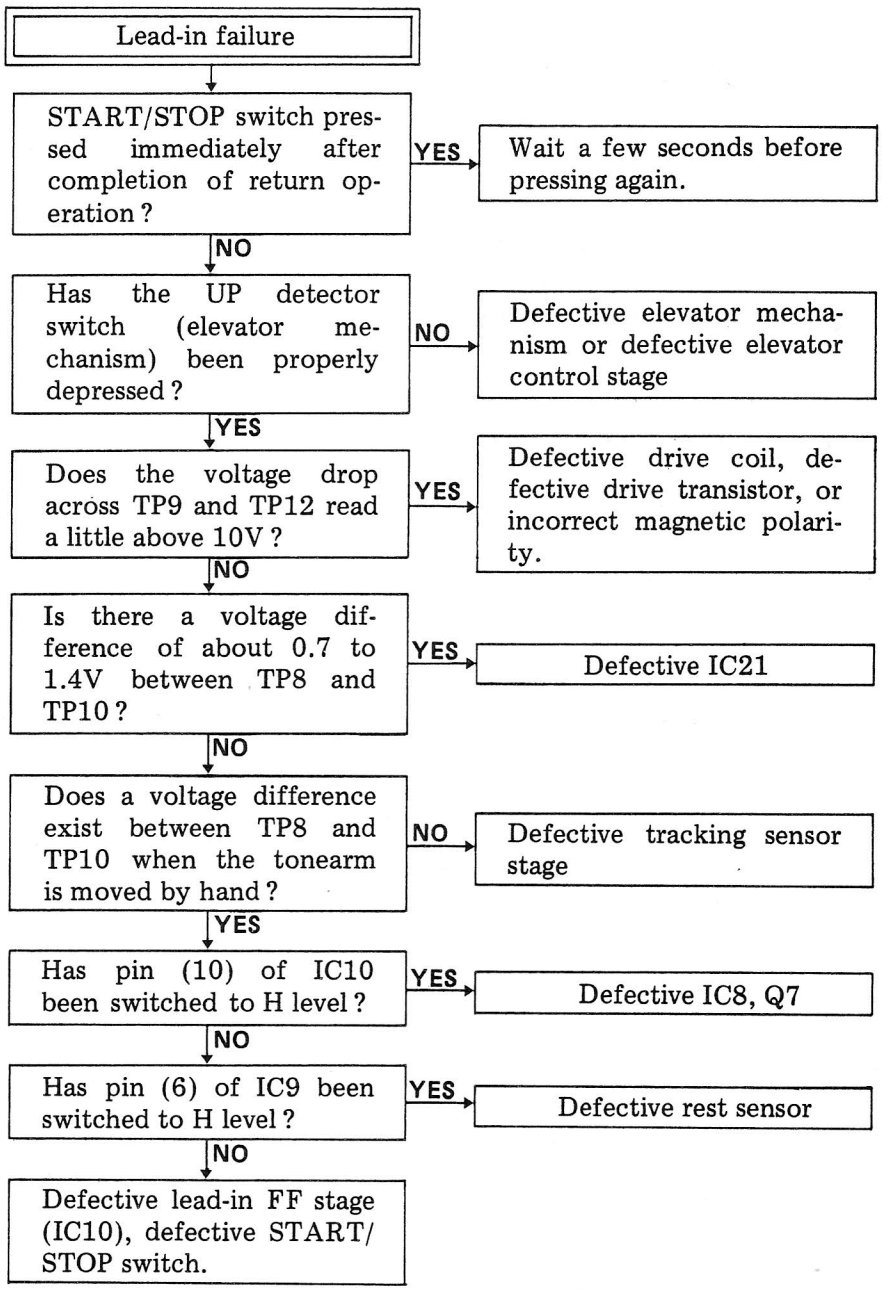
9.1.3


No record size selector switching
Auto mode in operation ?
YES
Recheck after completion of present operation.
NO
Is pin (10) of IC18 and pins (1) and (15) of IC15 switched to H level every 3rd time that the record size selector switch is pressed ?
NO
Defective size selector FF stage (IC15).
YES
Do the corresponding LED lamps light up when pins (11), (12) and (13) of IC7 are connected (separately) ?
NO
Defective LED
YES
Defective IC7

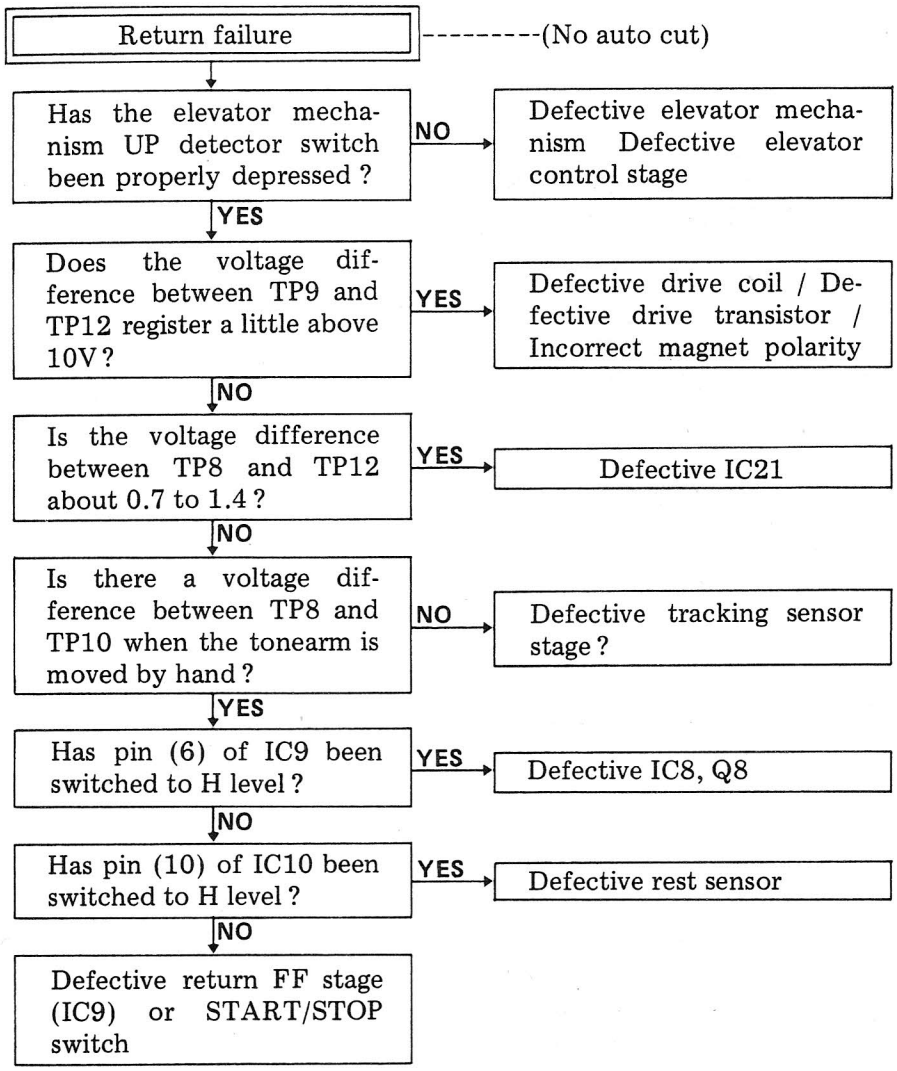
9.1.4


No 33/45 switching
Is pin (13) of IC5 inverted every time the 33/45 switch is pressed ?
NO
Defective IC5
YES
Does IC6 function correctly as an inverter ?
NO
Defective IC6
YES
Defective LED / Defective PA2004 / Defective PD1003

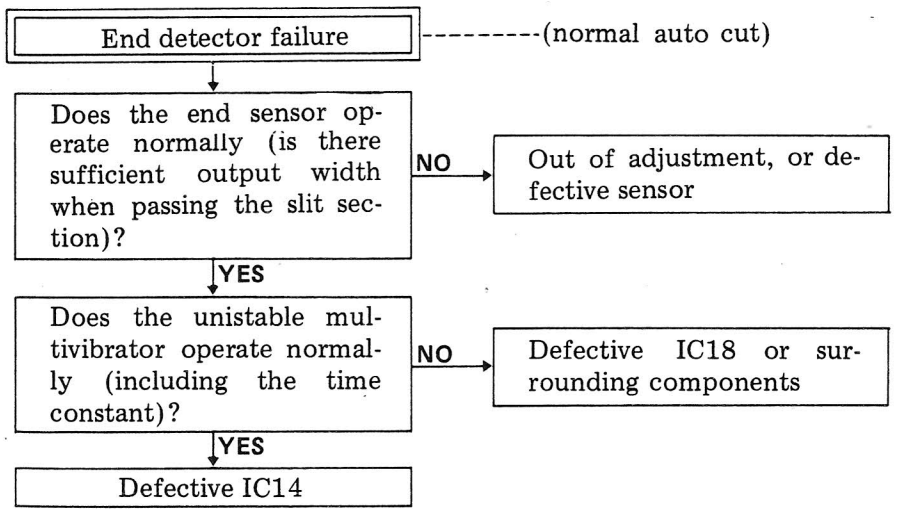
9.1.5


Lead-in failure
START/STOP switch pressed immediately after completion of return operation ?
YES
Wait a few seconds before pressing again.
NO
Has the UP detector switch (elevator mechanism) been properly depressed ?
NO
Defective elevator mechanism or defective elevator control stage
YES
Does the voltage drop across TP9 and TP12 read a little above 10V ?
YES
Defective drive coil, defective drive transistor, or incorrect magnetic polarity.
NO
Is there a voltage difference of about 0.7 to 1.4V between TP8 and TP10 ?
YES
Defective IC21
NO
Does a voltage difference exist between TP8 and TP10 when the tonearm is moved by hand ?
NO
Defective tracking sensor stage
YES
Has pin (10) of IC10 been switched to H level ?
YES
Defective IC8, Q7
NO
Has pin (6) of IC9 been switched to H level ?
YES
Defective rest sensor
NO
Defective lead-in FF stage (IC10), defective START/STOP switch.

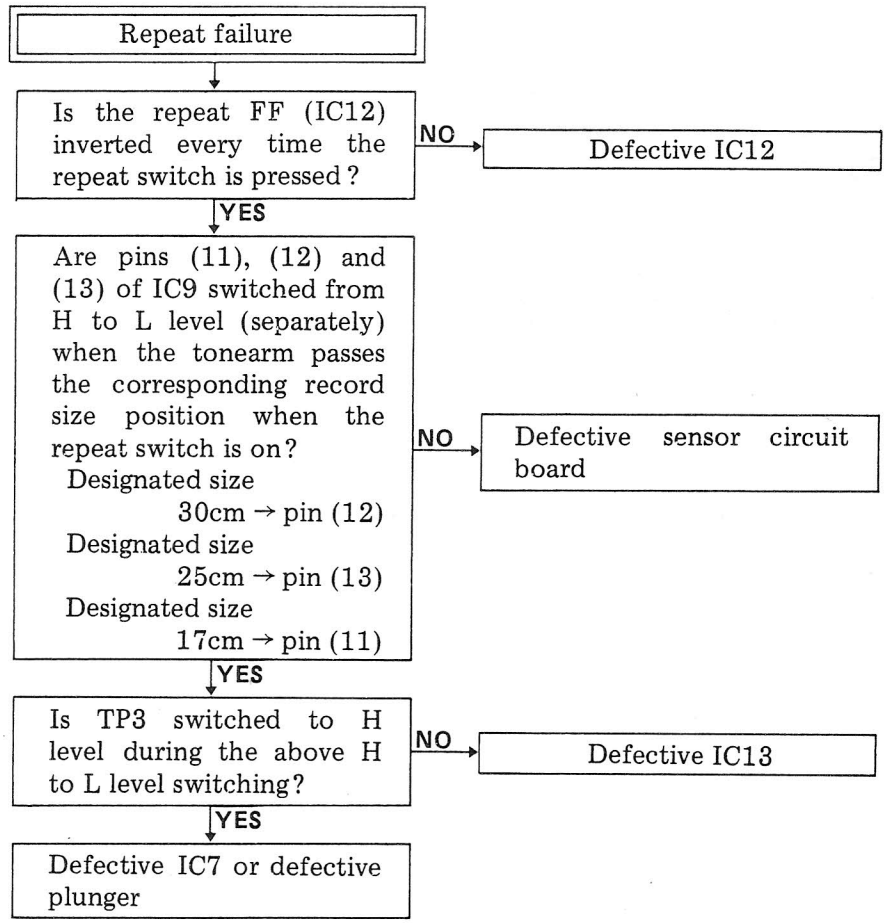
9.1.6


Return failure
(No auto cut)
Has the elevator mechanism UP detector switch been properly depressed ?
NO
Defective elevator mechanism Defective elevator control stage
YES
Does the voltage difference between TP9 and TP12 register a little above 10V ?
YES
Defective drive coil / Defective drive transistor / Incorrect magnet polarity
NO
Is the voltage difference between TP8 and TP12 about 0.7 to 1.4 ?
YES
Defective IC21
NO
Is there a voltage difference between TP8 and TP10 when the tonearm is moved by hand ?
NO
Defective tracking sensor stage ?
YES
Has pin (6) of IC9 been switched to H level ?
YES
Defective IC8, Q8
NO
Has pin (10) of IC10 been switched to H level ?
YES
Defective rest sensor
NO
Defective return FF stage (IC9) or START/STOP switch

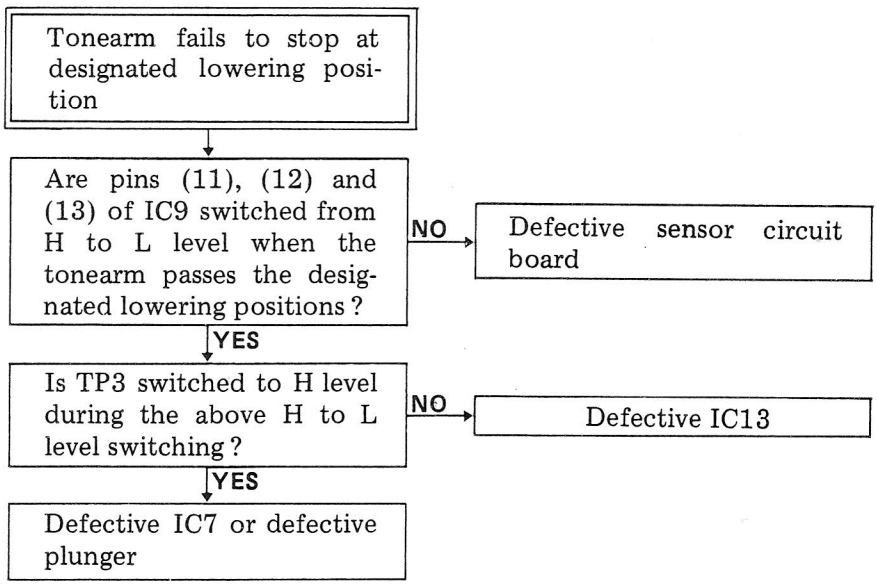
9.1.7


End detector failure
(normal auto cut)
Does the end sensor operate normally (is there sufficient output width when passing the slit section)?
NO
Out of adjustment, or defective sensor
YES
Does the unistable multivibrator operate normally (including the time constant)?
NO
Defective IC18 or surrounding components
YES
Defective IC14

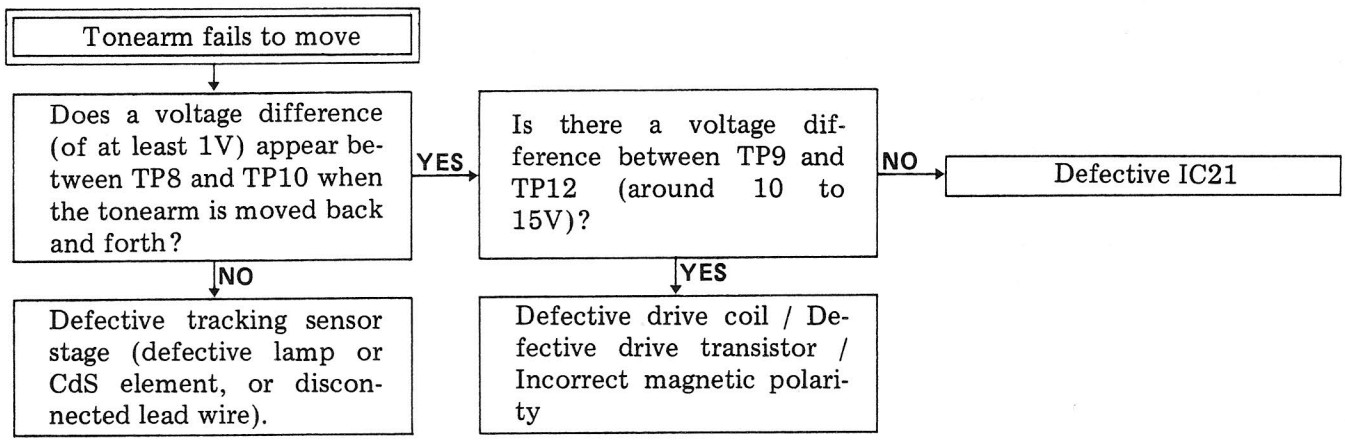
9.1.8


Repeat failure
Is the repeat FF (IC12) inverted every time the repeat switch is pressed ?
NO
Defective IC12
YES
Are pins (11), (12) and (13) of IC9 switched from H to L level (separately) when the tonearm passes the corresponding record size position when the repeat switch is on?
Designated size
30cm → pin (12)
Designated size
25cm → pin (13)
Designated size
17cm → pin (11)
NO
Defective sensor circuit board
YES
Is TP3 switched to H level during the above H to L level switching?
NO
Defective IC13
YES
Defective IC7 or defective plunger

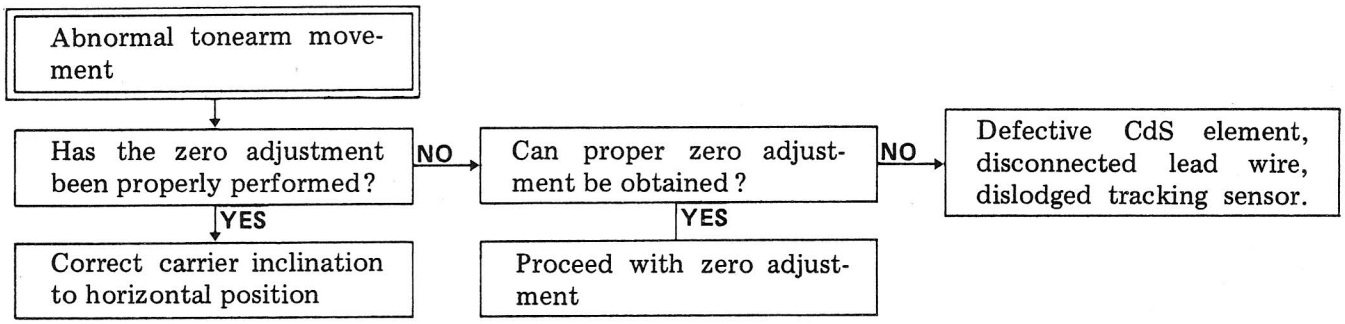
9.1.9


Tonearm fails to stop at designated lowering position
Are pins (11), (12) and (13) of IC9 switched from H to L level when the tonearm passes the designated lowering positions ?
NO
Defective sensor circuit board
YES
Is TP3 switched to H level during the above H to L level switching ?
NO
Defective IC13
YES
Defective IC7 or defective plunger

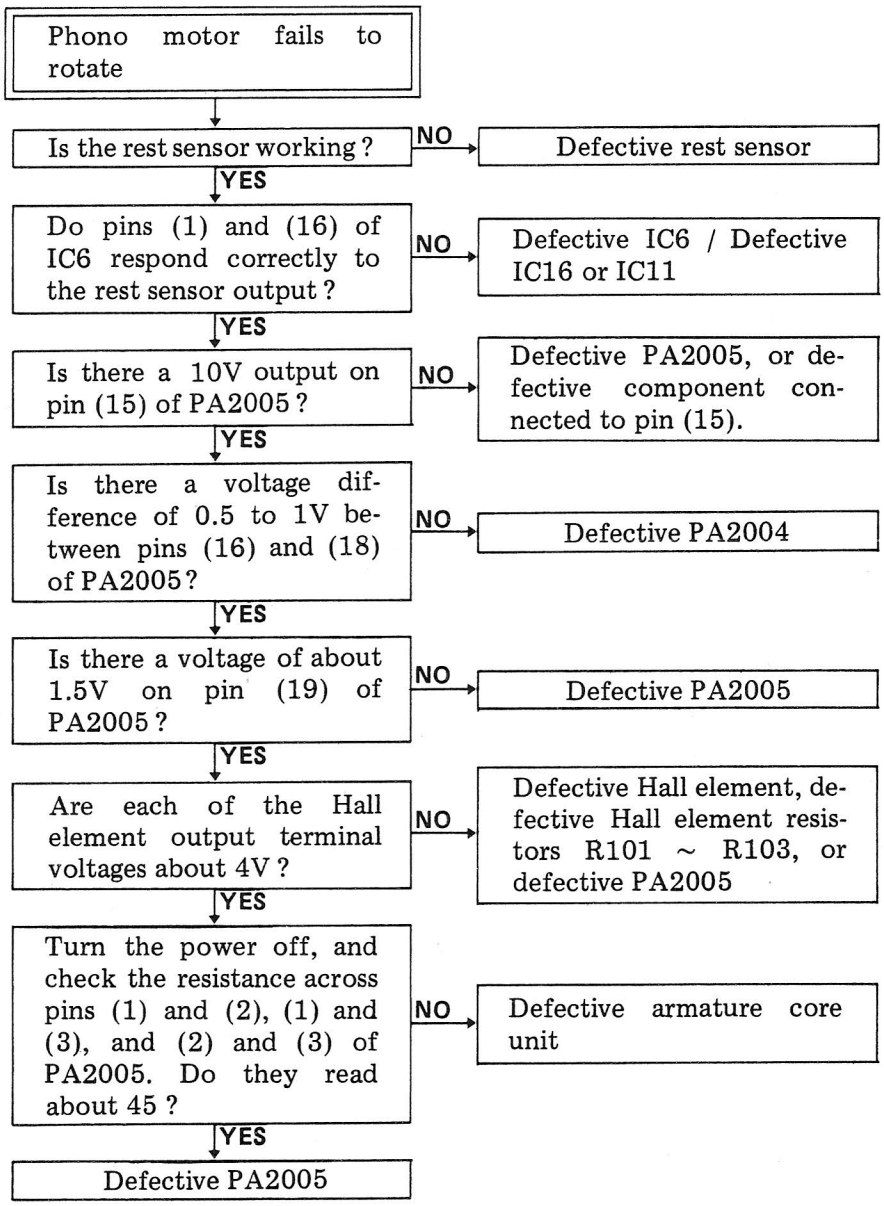
9.1.10


Tonearm fails to move
Does a voltage difference (of at least 1V) appear between TP8 and TP10 when the tonearm is moved back and forth?
YES
Is there a voltage difference between TP9 and TP12 (around 10 to 15V)?
NO
Defective IC21
NO
Defective tracking sensor stage (defective lamp or CdS element, or disconnected lead wire).
YES
Defective drive coil / Defective drive transistor / Incorrect magnetic polarity

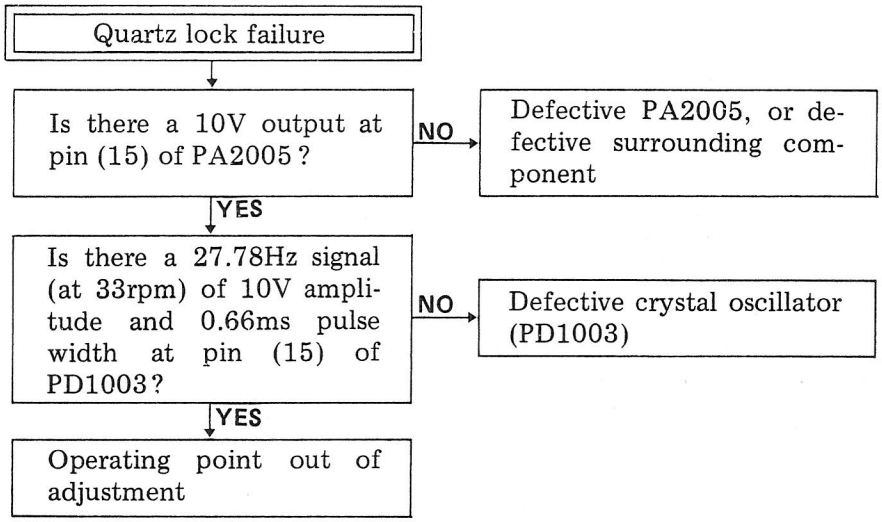
9.1.11


Abnormal tonearm movement
Has the zero adjustment been properly performed?
NO
Can proper zero adjustment be obtained?
NO
Defective CdS element, disconnected lead wire, dislodged tracking sensor.
YES
Correct carrier inclination to horizontal position
YES
Proceed with zero adjustment

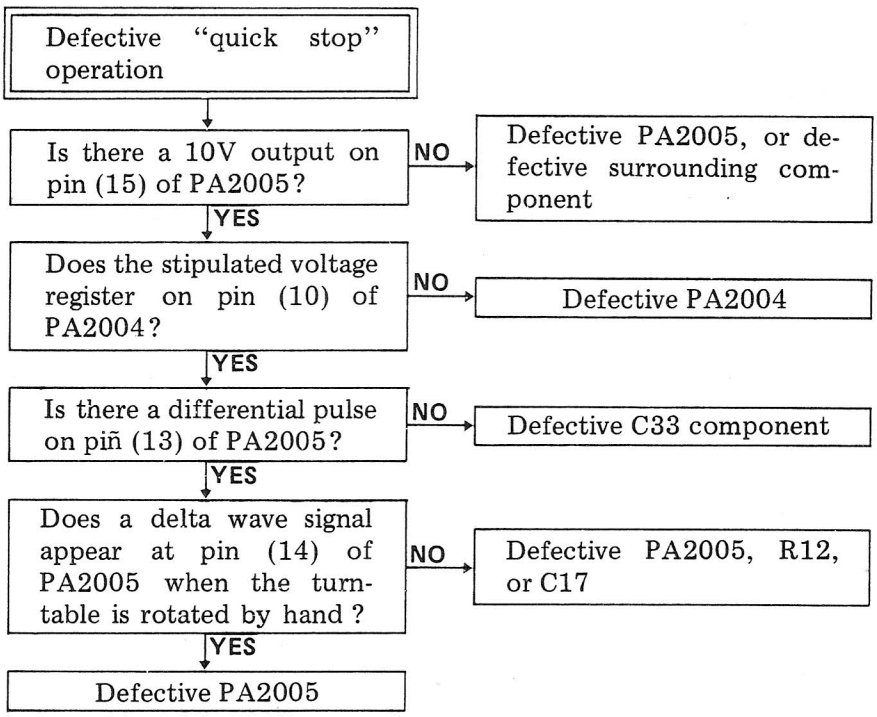
9.1.12


Phono motor fails to rotate
Is the rest sensor working ?
NO
Defective rest sensor
YES
Do pins (1) and (16) of IC6 respond correctly to the rest sensor output ?
NO
Defective IC6 / Defective IC16 or IC11
YES
Is there a 10V output on pin (15) of PA2005 ?
NO
Defective PA2005, or defective component connected to pin (15).
YES
Is there a voltage difference of 0.5 to 1V between pins (16) and (18) of PA2005 ?
NO
Defective PA2004
YES
Is there a voltage of about 1.5V on pin (19) of PA2005 ?
NO
Defective PA2005
YES
Are each of the Hall element output terminal voltages about 4V ?
NO
Defective Hall element, defective Hall element resistors R101 ~ R103, or defective PA2005
YES
Turn the power off, and check the resistance across pins (1) and (2), (1) and (3), and (2) and (3) of PA2005. Do they read about 45 ?
NO
Defective armature core unit
YES
Defective PA2005

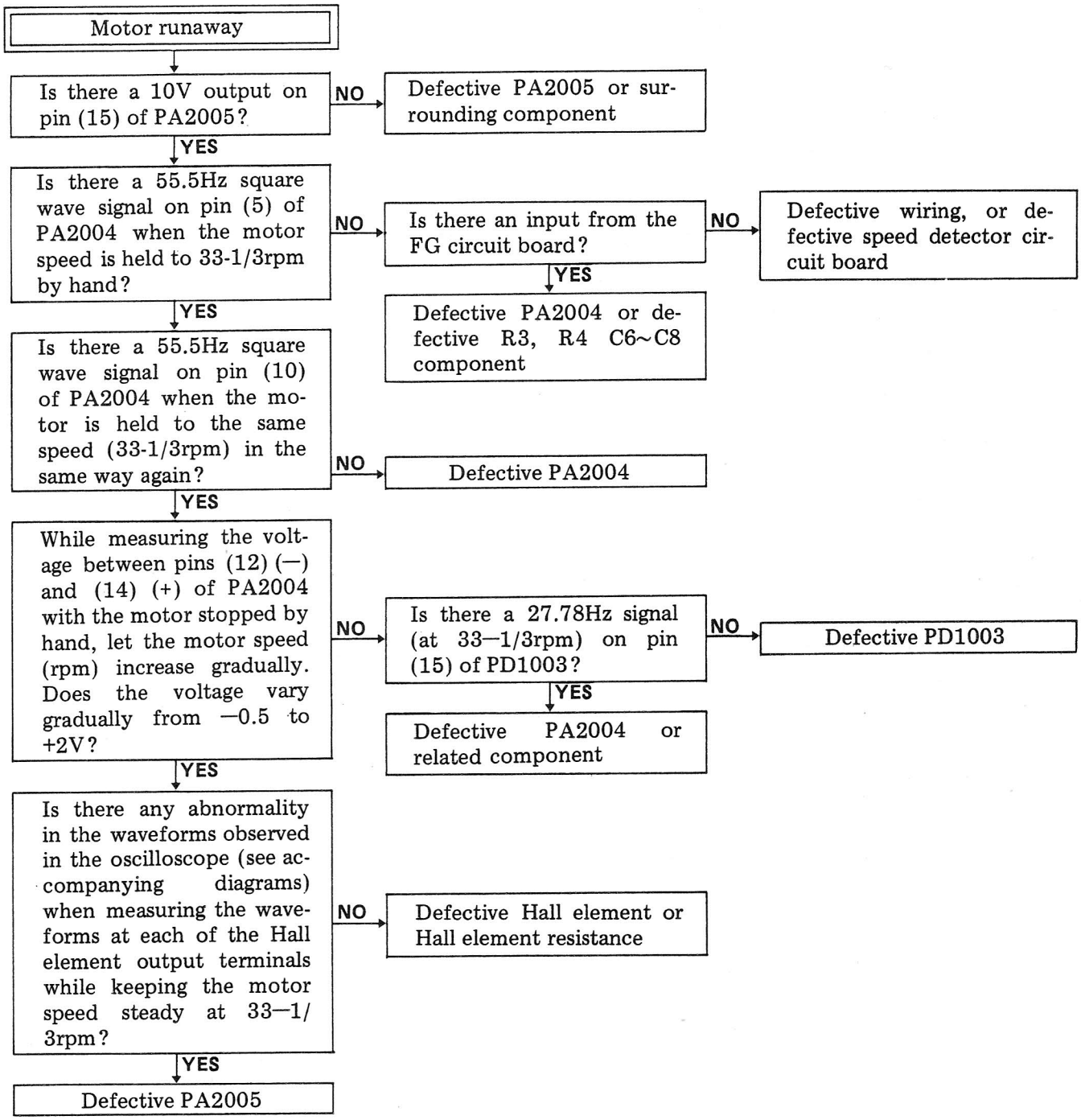
9.1.13


Quartz lock failure
Is there a 10V output at pin (15) of PA2005 ?
NO
Defective PA2005, or defective surrounding component
YES
Is there a 27.78Hz signal (at 33rpm) of 10V amplitude and 0.66ms pulse width at pin (15) of PD1003?
NO
Defective crystal oscillator (PD1003)
YES
Operating point out of adjustment

9.1.14

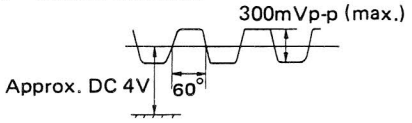

Defective "quick stop" operation
Is there a 10V output on pin (15) of PA2005?
NO
Defective PA2005, or defective surrounding component
YES
Does the stipulated voltage register on pin (10) of PA2004?
NO
Defective PA2004
YES
Is there a differential pulse on piñ (13) of PA2005?
NO
Defective C33 component
YES
Does a delta wave signal appear at pin (14) of PA2005 when the turntable is rotated by hand ?
NO
Defective PA2005, R12, or C17
YES
Defective PA2005

9.1.15

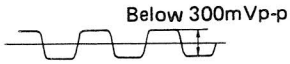


[Hall element output waveforms]

A. Normal waveform

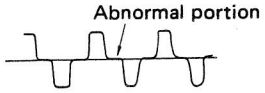


B. Low output waveform (AC output)

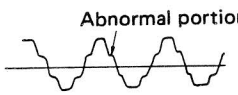


C. Examples of distorted waveform (but normal output level)

Ex. 1

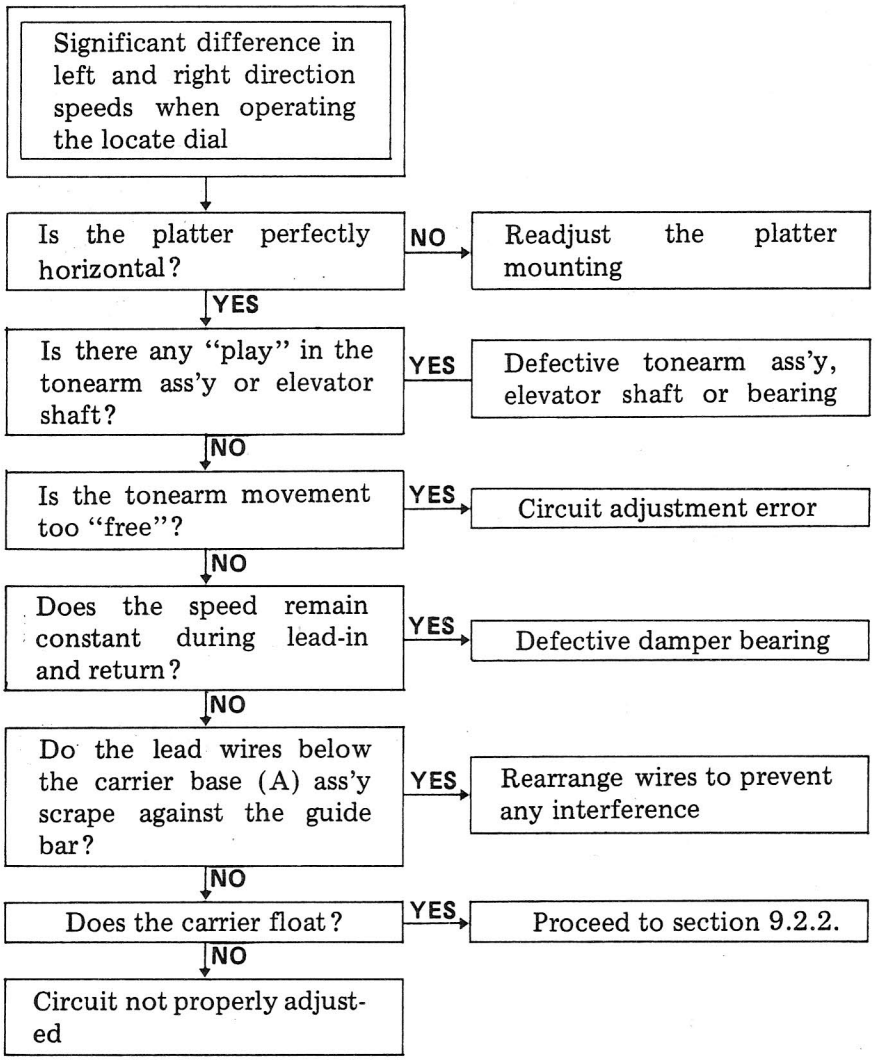


EX. 2

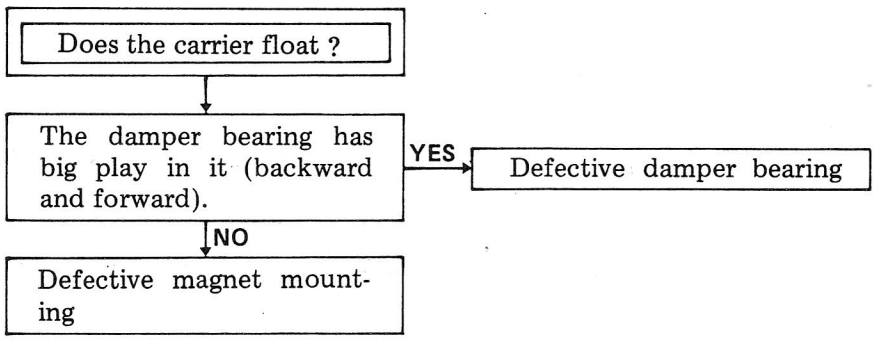


9.2 MECHANISM BLOCK

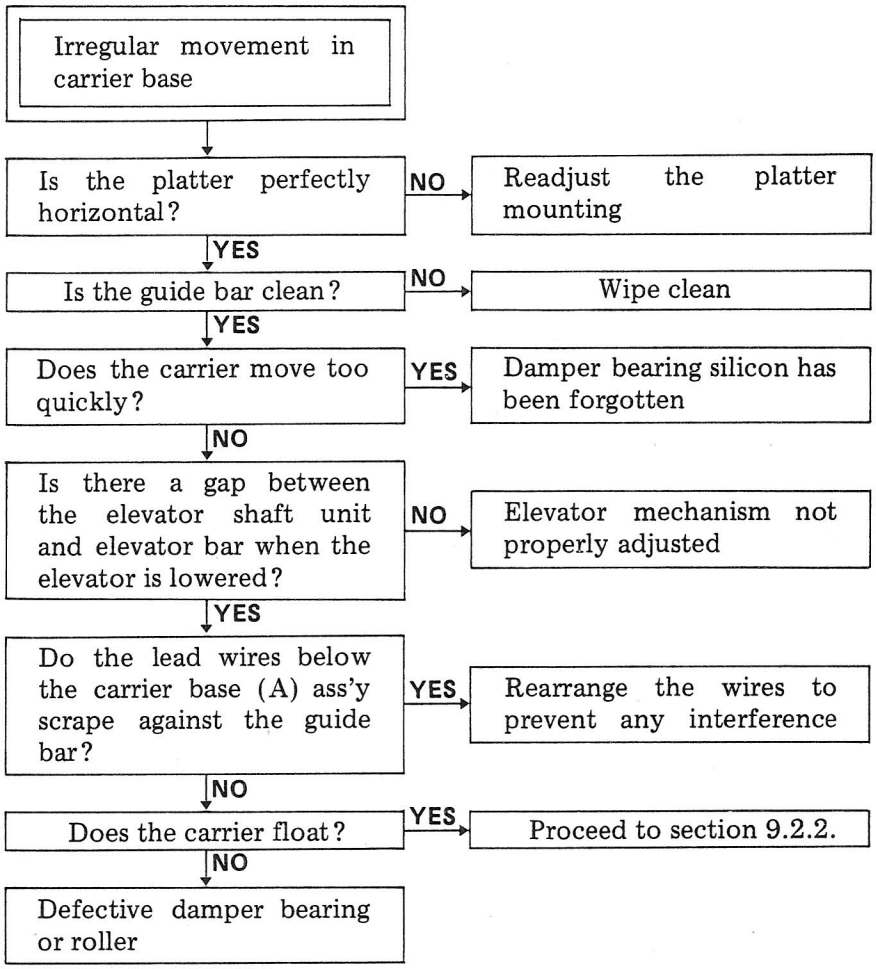
9.2.1



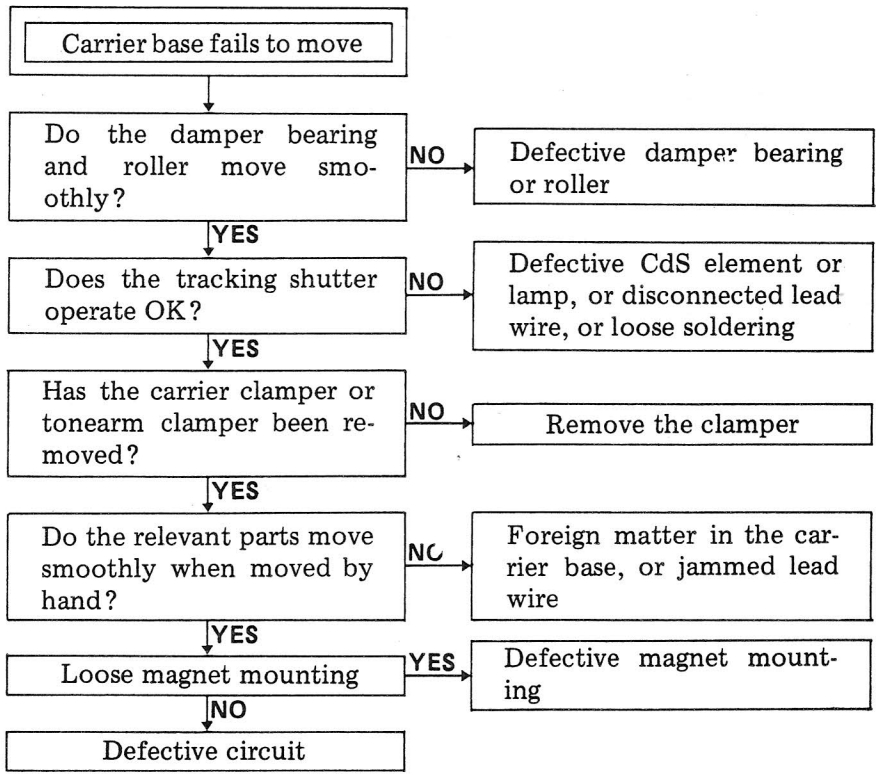
9.2.2



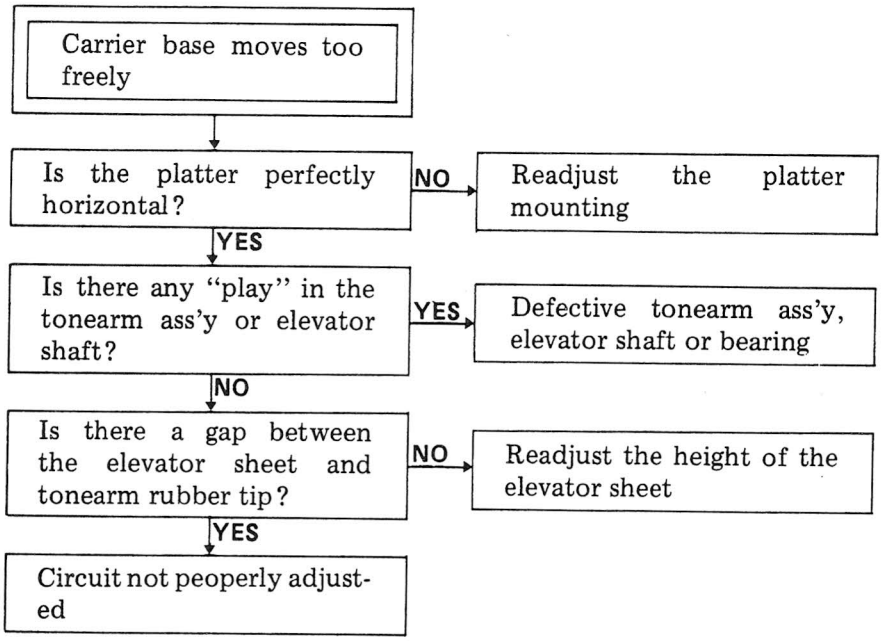
9.2.3


Irregular movement in carrier base
Is the platter perfectly horizontal?
NO
Readjust the platter mounting
YES
Is the guide bar clean?
NO
Wipe clean
YES
Does the carrier move too quickly?
YES
Damper bearing silicon has been forgotten
NO
Is there a gap between the elevator shaft unit and elevator bar when the elevator is lowered?
NO
Elevator mechanism not properly adjusted
YES
Do the lead wires below the carrier base (A) ass'y scrape against the guide bar?
YES
Rearrange the wires to prevent any interference
NO
Does the carrier float?
YES
Proceed to section 9.2.2.
NO
Defective damper bearing or roller

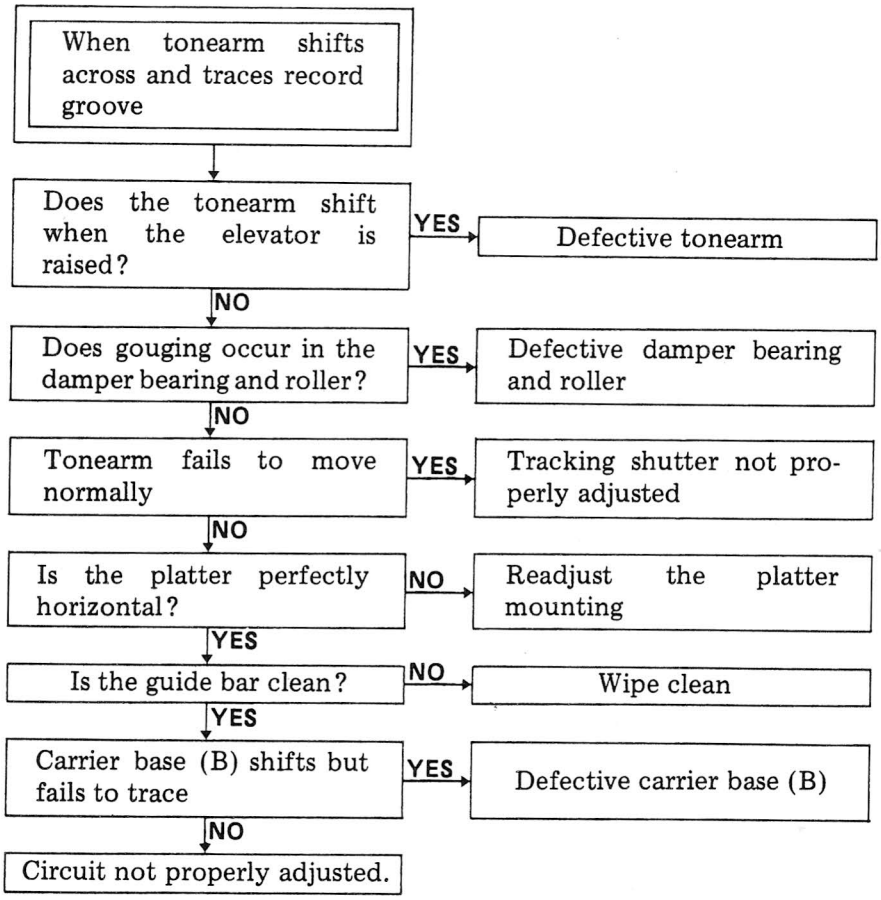
9.2.4


Carrier base fails to move
Do the damper bearing and roller move smoothly?
NO
Defective damper bearing or roller
YES
Does the tracking shutter operate OK?
NO
Defective CdS element or lamp, or disconnected lead wire, or loose soldering
YES
Has the carrier clamper or tonearm clamper been removed?
NO
Remove the clamper
YES
Do the relevant parts move smoothly when moved by hand?
NO
Foreign matter in the carrier base, or jammed lead wire
YES
Loose magnet mounting
YES
Defective magnet mounting
NO
Defective circuit

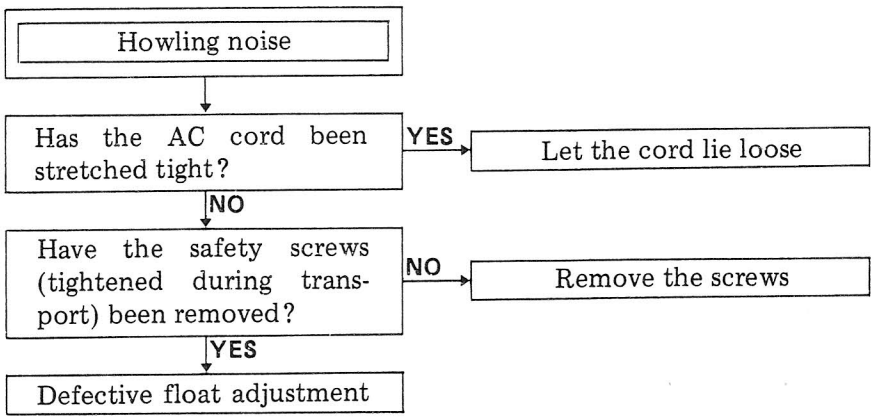
9.2.5


Carrier base moves too freely
Is the platter perfectly horizontal?
NO
Readjust the platter mounting
YES
Is there any "play" in the tonearm ass'y or elevator shaft?
YES
Defective tonearm ass'y, elevator shaft or bearing
NO
Is there a gap between the elevator sheet and tonearm rubber tip?
NO
Readjust the height of the elevator sheet
YES
Circuit not peoperly adjusted

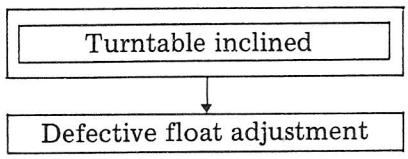
9.2.6


When tonearm shifts across and traces record groove
Does the tonearm shift when the elevator is raised?
YES
Defective tonearm
NO
Does gouging occur in the damper bearing and roller?
YES
Defective damper bearing and roller
NO
Tonearm fails to move normally
YES
Tracking shutter not properly adjusted
NO
Is the platter perfectly horizontal?
NO
Readjust the platter mounting
YES
Is the guide bar clean?
NO
Wipe clean
YES
Carrier base (B) shifts but fails to trace
YES
Defective carrier base (B)
NO
Circuit not properly adjusted.

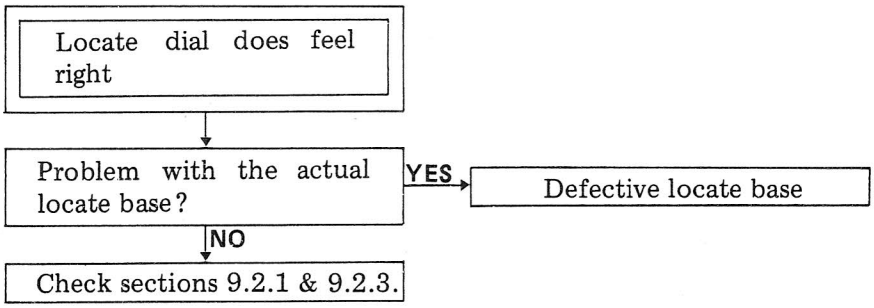
9.2.7



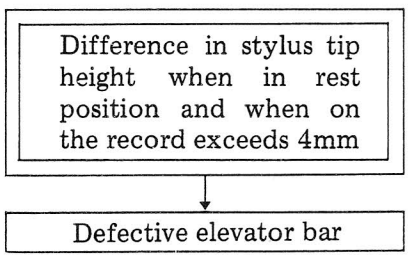
9.2.8



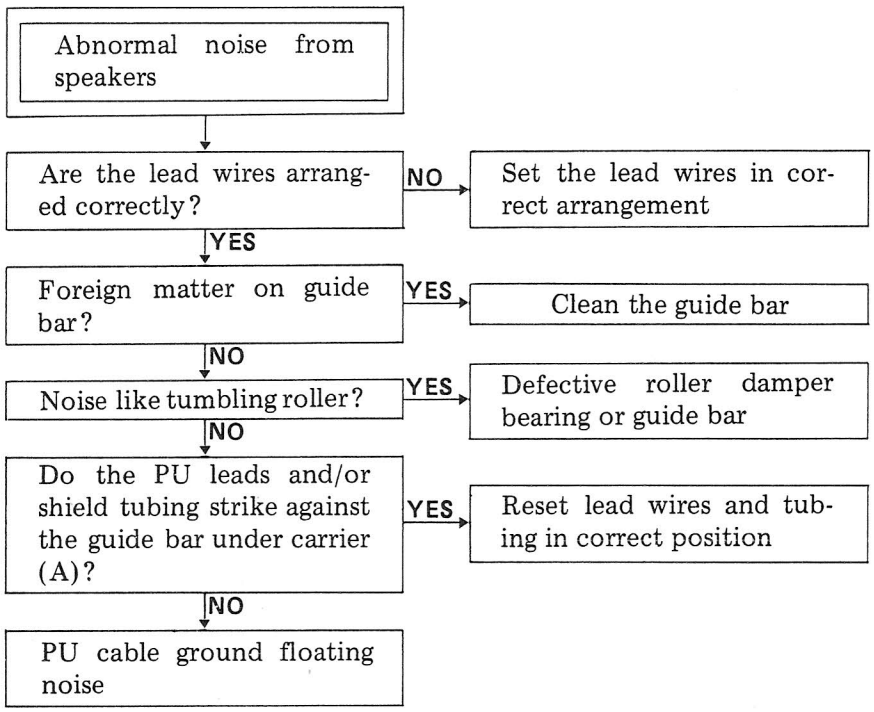
9.2.9



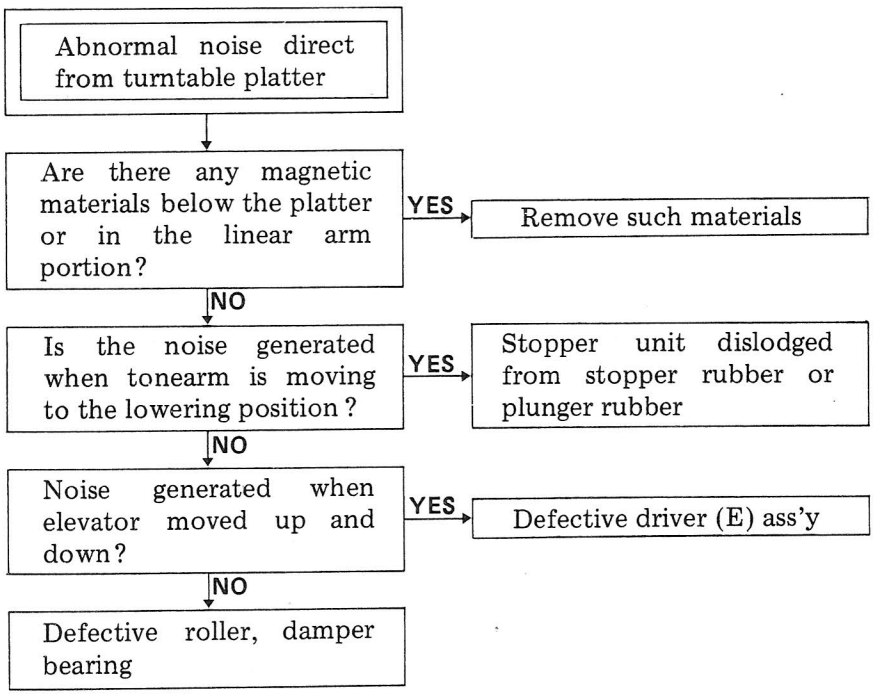
9.2.10



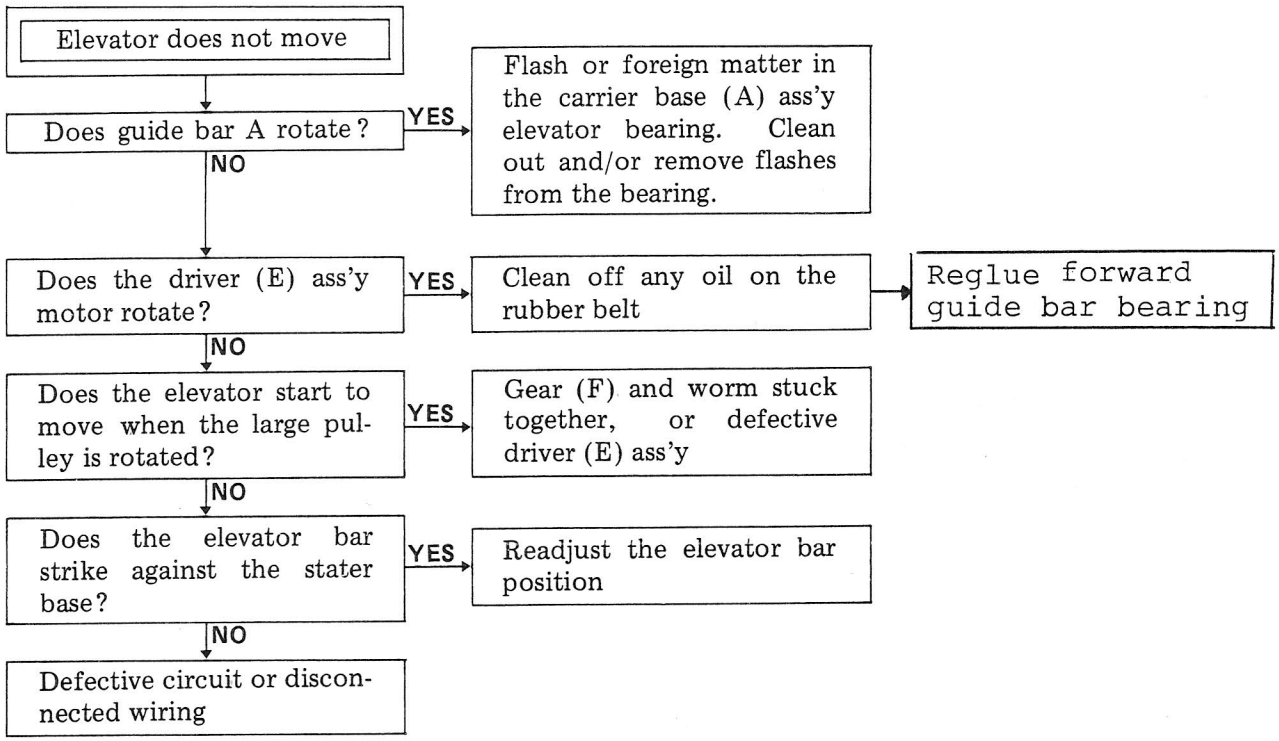
9.2.11


Abnormal noise from speakers
Are the lead wires arranged correctly?
NO
Set the lead wires in correct arrangement
YES
Foreign matter on guide bar?
YES
Clean the guide bar
NO
Noise like tumbling roller?
YES
Defective roller damper bearing or guide bar
NO
Do the PU leads and/or shield tubing strike against the guide bar under carrier (A)?
YES
Reset lead wires and tubing in correct position
NO
PU cable ground floating noise

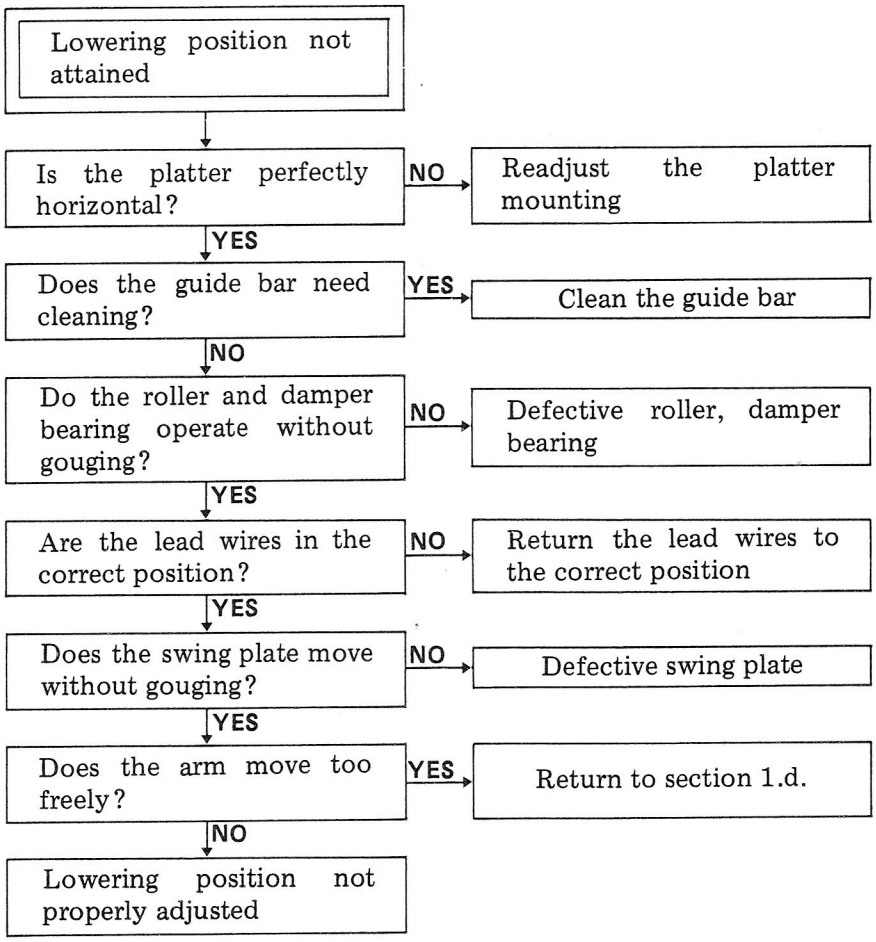
9.2.12


Abnormal noise direct from turntable platter
Are there any magnetic materials below the platter or in the linear arm portion?
YES
Remove such materials
NO
Is the noise generated when tonearm is moving to the lowering position?
YES
Stopper unit dislodged from stopper rubber or plunger rubber
NO
Noise generated when elevator moved up and down?
YES
Defective driver (E) ass'y
NO
Defective roller, damper bearing

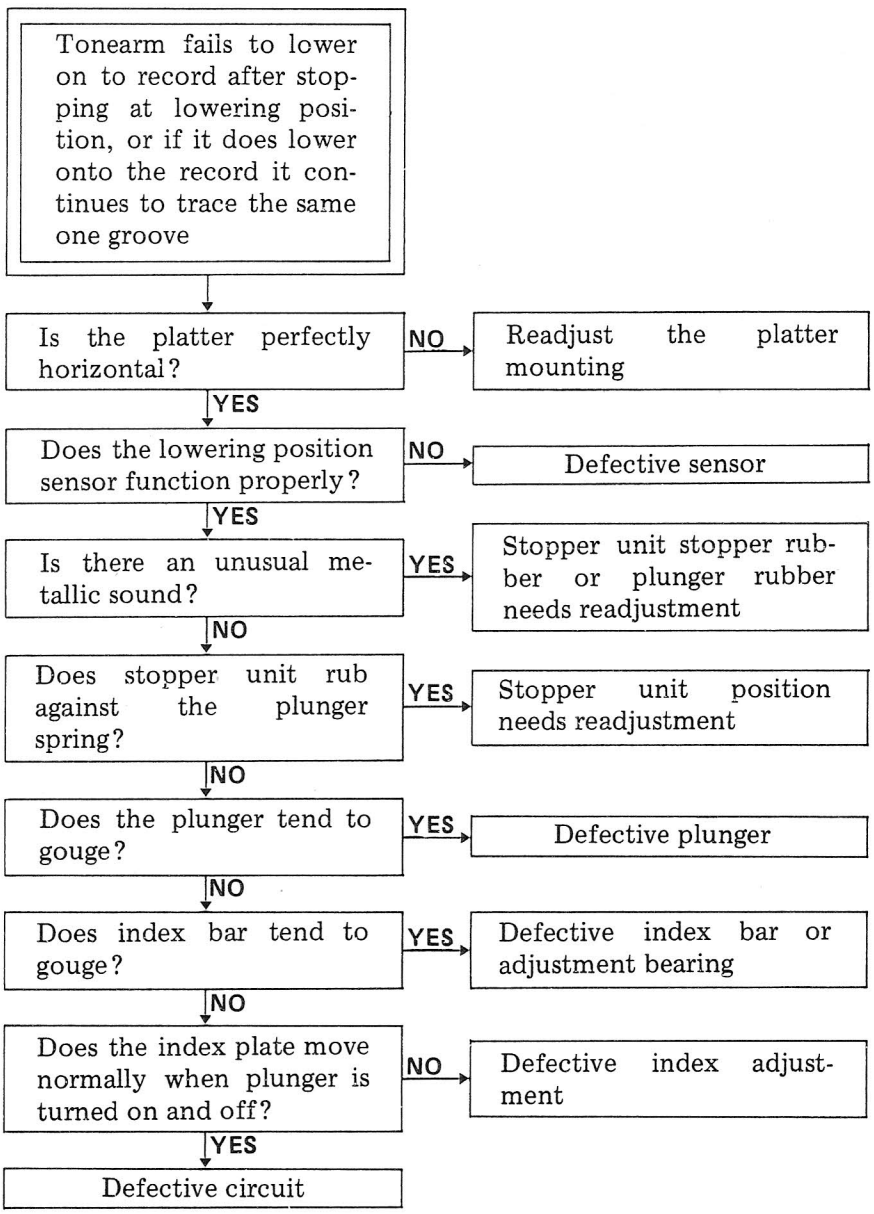
9.2.13


Elevator does not move
Does guide bar A rotate?
YES
Flash or foreign matter in the carrier base (A) ass'y elevator bearing. Clean out and/or remove flashes from the bearing.
NO
Does the driver (E) ass'y motor rotate?
YES
Clean off any oil on the rubber belt
Reglue forward guide bar bearing
NO
Does the elevator start to move when the large pulley is rotated?
YES
Gear (F) and worm stuck together, or defective driver (E) ass'y
NO
Does the elevator bar strike against the stater base?
YES
Readjust the elevator bar position
NO
Defective circuit or disconnected wiring

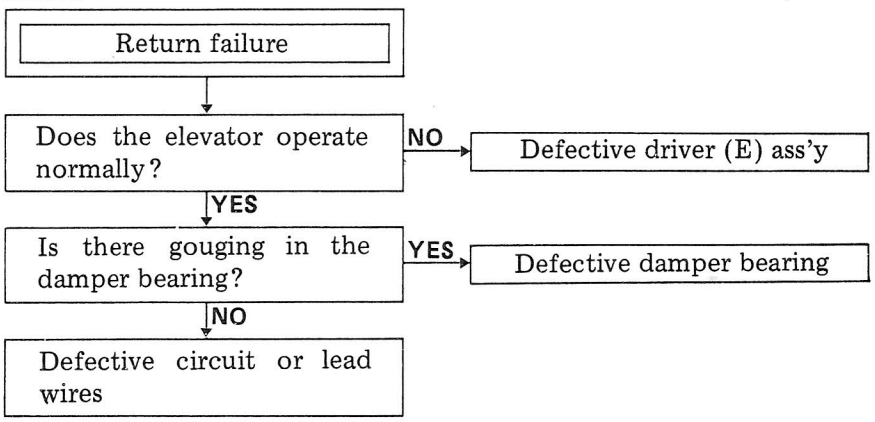
9.2.14


Lowering position not attained
Is the platter perfectly horizontal?
NO
Readjust the platter mounting
YES
Does the guide bar need cleaning?
YES
Clean the guide bar
NO
Do the roller and damper bearing operate without gouging?
NO
Defective roller, damper bearing
YES
Are the lead wires in the correct position?
NO
Return the lead wires to the correct position
YES
Does the swing plate move without gouging?
NO
Defective swing plate
YES
Does the arm move too freely?
YES
Return to section 1.d.
NO
Lowering position not properly adjusted

9.2.15


Tonearm fails to lower on to record after stopping at lowering position, or if it does lower onto the record it continues to trace the same one groove
Is the platter perfectly horizontal?
NO
Readjust the platter mounting
YES
Does the lowering position sensor function properly?
NO
Defective sensor
YES
Is there an unusual metallic sound?
YES
Stopper unit stopper rubber or plunger rubber needs readjustment
NO
Does stopper unit rub against the plunger spring?
YES
Stopper unit position needs readjustment
NO
Does the plunger tend to gouge?
YES
Defective plunger
NO
Does index bar tend to gouge?
YES
Defective index bar or adjustment bearing
NO
Does the index plate move normally when plunger is turned on and off?
NO
Defective index adjustment
YES
Defective circuit

9.2.16

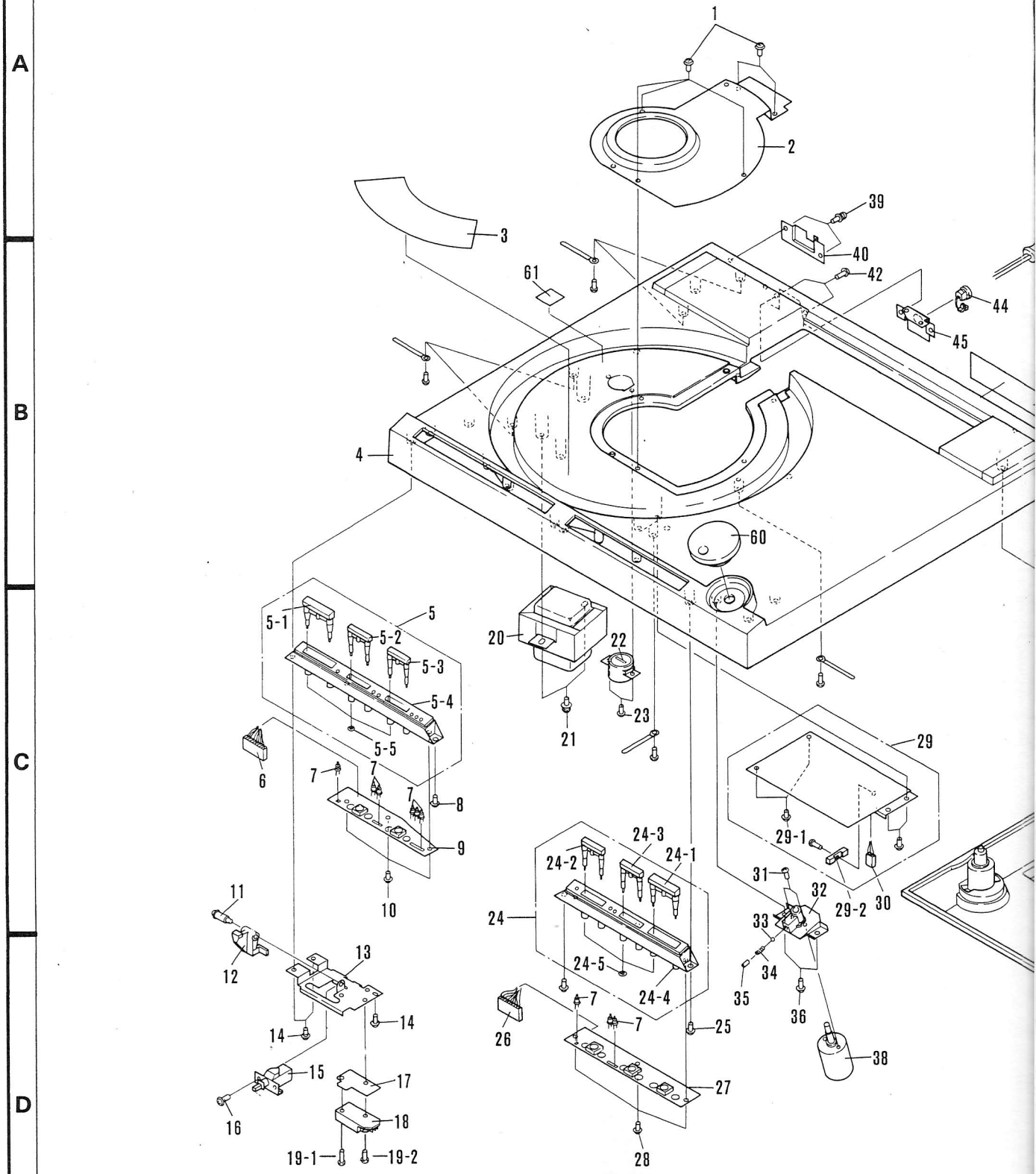

Return failure
Does the elevator operate normally?
NO
Defective driver (E) ass'y
YES
Is there gouging in the damper bearing?
YES
Defective damper bearing
NO
Defective circuit or lead wires

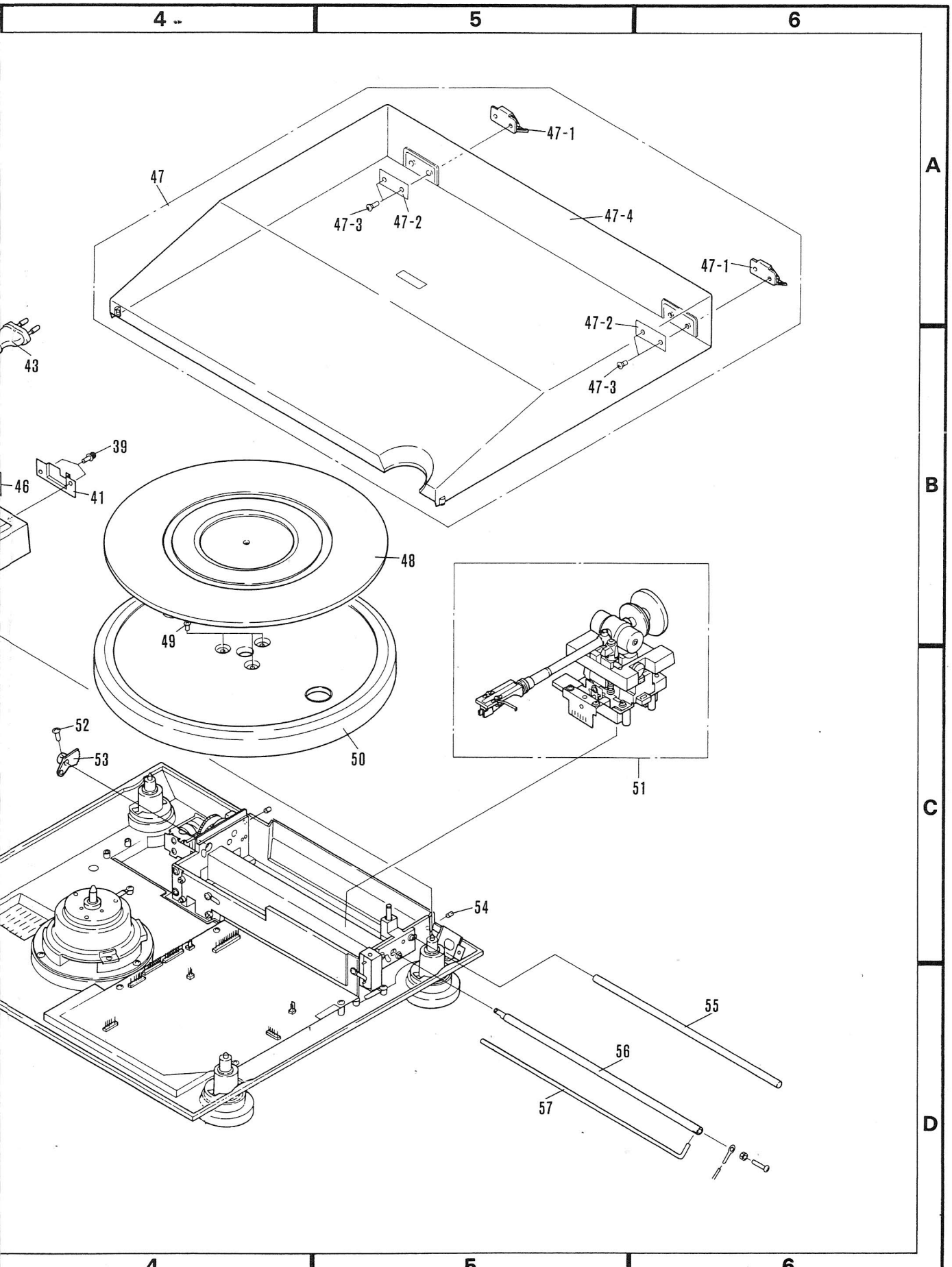
10. EXPLODED VIEWS

NOTES

10. EXPLODED VIEWS

10.1 EXTERIOR




4
5
6
A
B
C
D
47
47-1
47-2
47-3
47-4
43
39
41
46
48
49
50
51
52
53
54
55
56
57

Parts List of Exterior

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.

* Parts without part numbers CANNOT be supplied.

Key No.	Part No.	Description
1.	922-8054	Washer faced alutite screw:3 x 8
2.		Cover
3.		Caution label
4.	942-8087	Panel
5.	930-8028	Control case assy.
5-1.	942-8075	Pushbutton unit A
5-2.	942-8076	Pushbutton unit E
5-3.	942-8077	Pushbutton unit C
5-4.	942-8081	Control case A
5-5.	922-8055	CS type washer:2ø
6.	924-8020	Connector harnass
7.	926-8101	LED:GL-2PR1
8.	922-8054	Washer faced alutite screw:3 x 8
9.		PC board
10.	922-8056	Screw:PT3 x 8
11.	922-8035	Screw
12.	942-8042	Lever
13.		Switch base
14.	922-8054	Washer faced alutite screw:3 x 8
15.	929-8016	Push switch
16.	922-8059	Washer faced alutite screw:3 x 6
⚠ 17.	941-8014	Insulator
⚠ 18.	929-8023	Microswitch
19-1.	922-8057	Screw:PSA3 x 15
19-2.	922-8058	Plastic screw:3 x 15
⚠ 20.	925-8029	Power transformer
21.	922-8041	Screw:PSB4 x 8
22.		
23.	922-8054	Washer faced alutite screw:3 x 8
24-1.	942-8078	Pushbutton unit B
24-2.	942-8079	Pushbutton unit D
24-3.	942-8080	Pushbutton unit F
24-4.	942-8082	Control case B
24-5.	922-8055	CS type washer 2ø
25.	922-8054	Washer faced alutite screw:3 x 8
26.	924-8019	Connector harnass
27.		PC board
28.	922-8056	Screw:PT3 x 8
⚠ 29.	901-8002	Power supply PCB

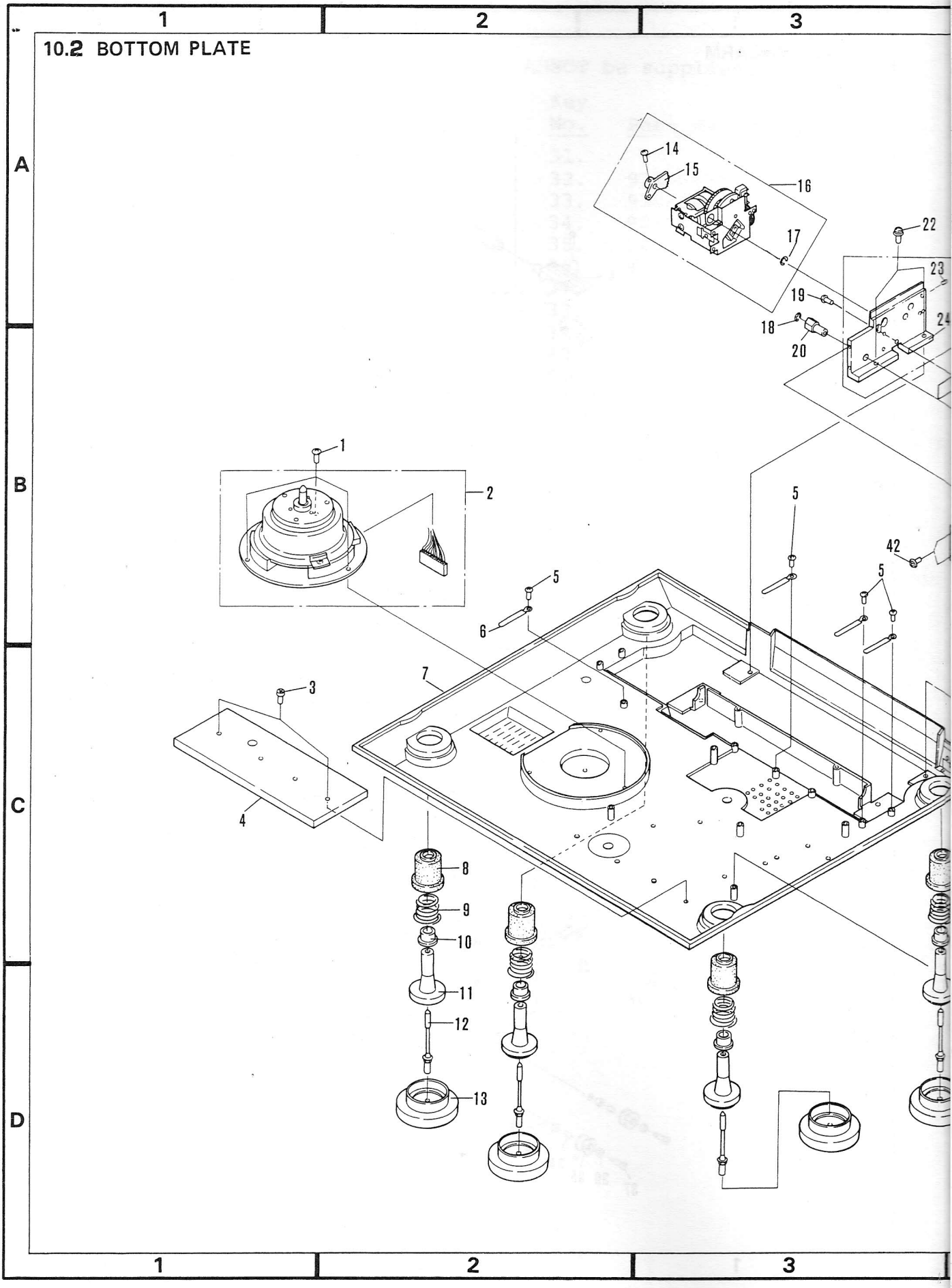
Key No.	Part No.	Description
30.	924-8023	Connector harnass
31.	922-8061	Screw:PSA2.6 x 6
32.	942-8035	Base
33.	942-8060	Nylon ball 3 ø
34.	921-8027	Spring
35.	922-8060	Setscrew:SF4 x 5
36.	922-8054	Washer faced alutite screw:3 x 8
37.		
38.	929-8018	Motor
39.	922-8054	Washer faced alutite screw:3 x 8
40.	942-8066	Plate:L
41.	942-8068	Plate:R
42.	922-8062	Screw:PSB3 x 8
⚠ 43.	921-8017	Line cord
44.	921-8056	Strain relief
45.		Angle
46.		Label
47-1.	930-8030	Hinge assy.
47-2.	941-8001	Plate
47-3.	922-8063	Screw
47-4.	942-8059	Dust cover
48.	942-8073	Rubber mat
49.	922-8046	Screw
50.	943-8012	Turntable platter
51.		
52.	922-8064	Screw:PM3 x 8
53.	942-8046	EV gear
54.		
55.	943-8008	Guide bar:B
56.	943-8007	Guide bar:A
57.	921-8014	EV bar
58.		
59.		
60.	942-8055	Dial knob
61.		Label

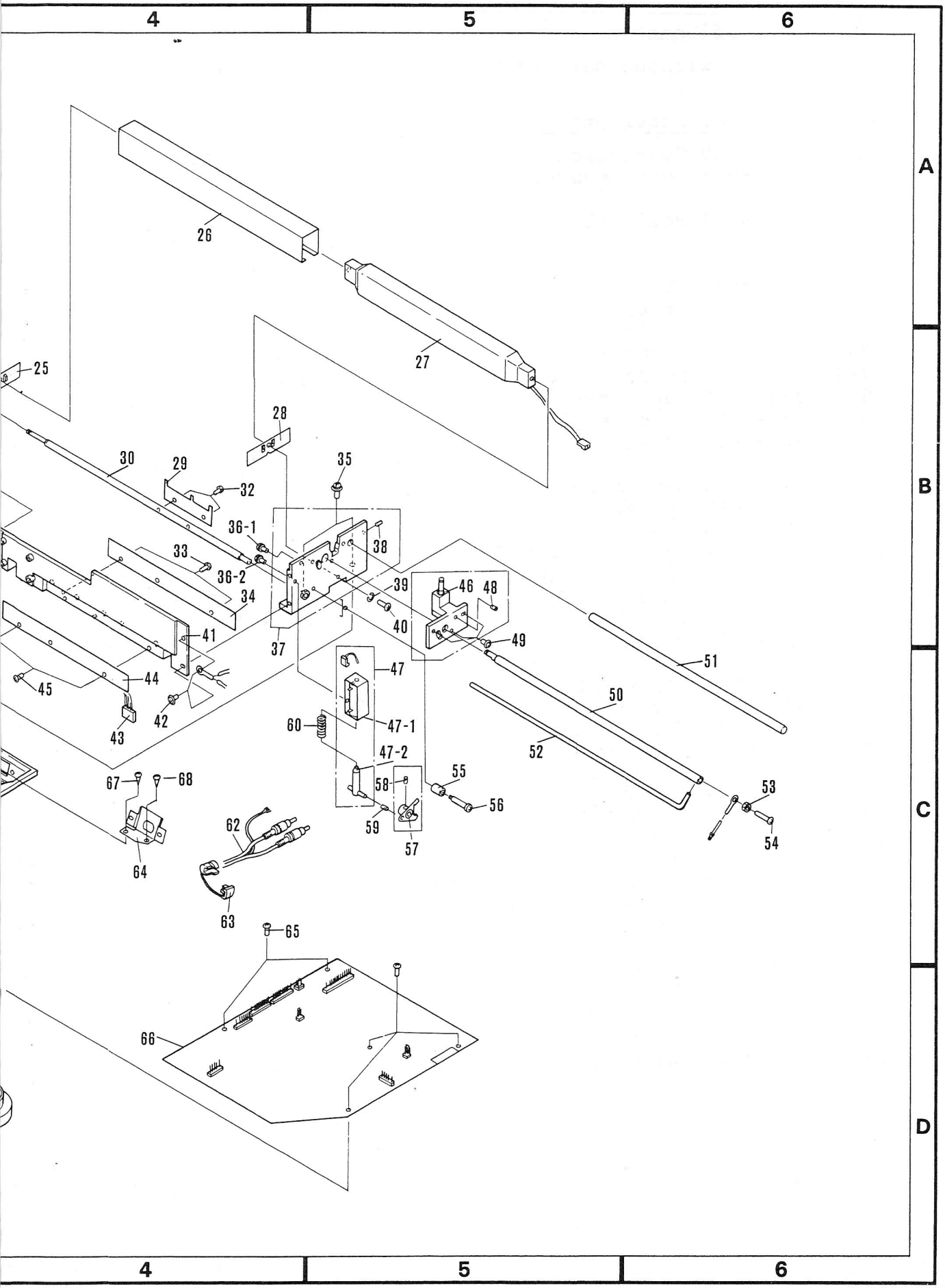
Parts List of Bottom Plate

NOTE: *Parts without part numbers CANNOT be supplied.

Key No.	Part No.	Description
1.	922-8083	Screw:PSA4 x 16
2.	929-8021	Motor assy.
3.	922-8072	Screw:PSB4 x 16
4.		Ballast weight
5.	922-8071	Screw:PT3 x 12
6.	941-8023	Cord clamper
7.	942-8093	Chassis base
8.	942-8040	Rubber cushion A
9.	921-8040	Spring C
10.	942-8063	Spring holder
11.	942-8064	Case C
12.	922-8026	Screw
13.	942-8072	Case unit (foot)
14.	922-8070	Screw:PM3 x 5
15.	942-8046	EV gear
16.		EV mechanism assy.
17.	922-8069	Circlip:EW6
18.	922-8049	Circlip:EW3
19.	922-8072	Screw:PSB4 x 16
20.	922-8073	Index shaft adjuster
21.		
22.	922-8074	Screw:PSB4 x 12
23.	922-8075	Setscrew:SF3 x 5
24.		Base B
25.		Plate
26.	942-8094	Coil cover
27.	925-8030	Coil assy.
28.		Plate
29.		Plate
30.		Bar
31.		
32.	922-8003	Screw:PSF3 x 6
33.	922-8056	Screw:PT3 x 8
34.	901-8017	PCB:phototransistor
35.	922-8074	Screw:PSB4 x 12
36-1.	922-8012	Screw:PM2.6 x 6
36-2.	922-8078	Screw:PM2.6 x 8
37.		Base A
38.	922-8075	Setscrew:SF3 x 5
39.		
40.	922-8072	Screw:PSB4 x 16
41.		Case
42.	922-8054	Washer faced alutite screw:3 x 8
43.	924-8022	Connector harnass
44.	901-8003	PCB:LED sensor
45.	922-8056	Screw:PT3 x 8
46.	930-8027	Base clamp assy.
47.	929-8012	Solenoid assy.
48.	922-8075	Setscrew:SF3 x 5
49.	922-8067	Washer faced alutite screw:3 x 6
50.	943-8007	Guide bar:A
51.	943-8008	Guide bar:B
52.	921-8014	EV bar
53.	922-8076	Hex nut:3mm
54.	922-8084	Screw:PM3 x 12
55.	942-8041	Stopper cushion
56.	922-8027	Screw
57.	930-8033	Stopper unit
58.	922-8077	Setscrew:HF3 x 3
59.	921-8060	Tube
60.	921-8031	Spring
61.		
62.	921-8053	Output cord
63.	921-8005	Strain relief
64.	941-8024	Bracket:str.relief
65.	922-8071	Screw:PT3 x 12
66.	901-8012	PCB:control
67.	922-8071	Screw:PT3 x 12
68.	922-8056	Screw:PT3 x 8
69.		
70.		

10.2 BOTTOM PLATE

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A
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C
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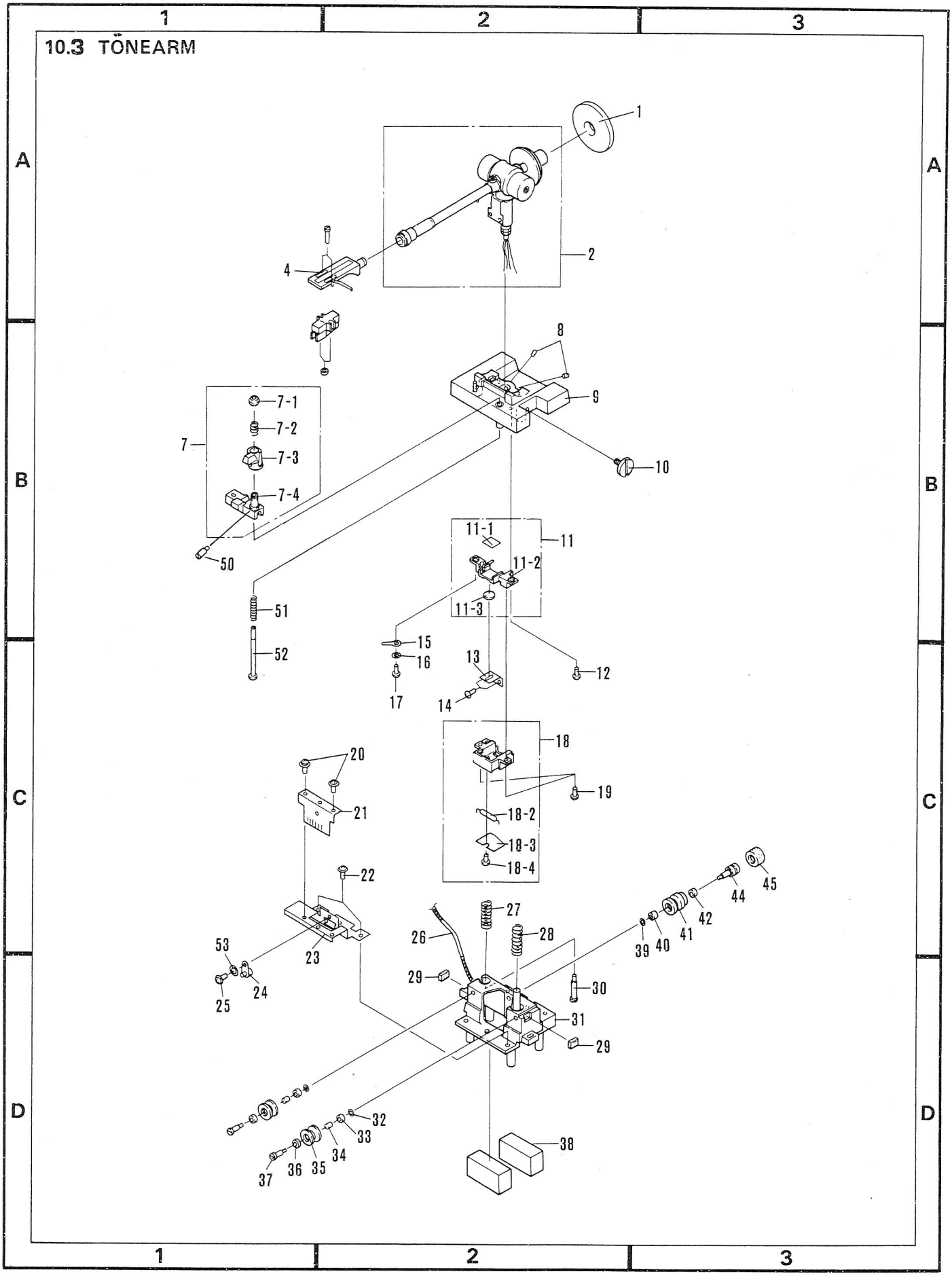
Parts List of Tonearm

NOTE: *Parts without part number CANNOT be supplied.

Key No.	Part No.	Description
1.	943-8009	Counterweight
2.	930-8023	Tonearm assy.
3.		
4.	930-8019	Headshell
5.		
6.		
7.	930-8029	EV sheet assy.
7-1.		Stopper
7-2.		Spring
7-3.		Clamper
7-4.		EV sheet unit
8.	922-8065	Setscrew:HS3 x 5
9.	930-8020	Base assy.
10.	922-8047	Screw
11.		
11-1.	941-8012	Sensor board
11-2.	942-8061	Spacer
11-3.	928-8005	CdS
12.	922-8012	Screw:PM2.6 x 6
13.		Tracking shutter
14.	922-8066	Screw:PM2.6 x 5
15.		Terminal
16.	922-8025	Washer: FW2.6 x 5 x 0.5t
17.	922-8012	Screw:PM2.6 x 6
18.	901-8004	Lamp PCB assy.
18-1.	942-8037	Coupler base
18-2.	921-8015	Lamp
18-3.		Sensor board
18-4.	922-8079	Screw:PT2.6 x 8
19.	922-8079	Screw:PT2.6 x 8
20.	922-8048	Screw:PSA3 x 5
21.		Shutter
22.	922-8067	Washer faced alutite screw:3 x 6
23.		Plate
24.	930-8032	Pin unit
25.	922-8033	Screw
26.		Shield tube
27.	921-8036	Spring
28.	921-8036	Spring
29.	941-8022	Rubber pad
30.	922-8028	Screw

Key No.	Part No.	Description
31.		Base B
32.	922-8025	Washer
33.	930-8025	Bearing
34.	921-8059	Spacer
35.	943-8010	Roller
36.	930-8026	Bearing
37.	922-8034	Shaft
38.		Magnet
39.	922-8025	Washer
40.	930-8026	Bearing
41.	943-8011	Shaft holder A
42.	930-8025	Bearing
43.		
44.	930-8024	Shafter holder B
45.	942-8039	Rubber cap
46.		
47.		
48.		
49.		
50.	922-8039	EV adjust screw
51.	921-8055	EV spring
52.	930-8034	EV shaft
53.		Plastic washer

10.3 TONEARM


1
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18-3
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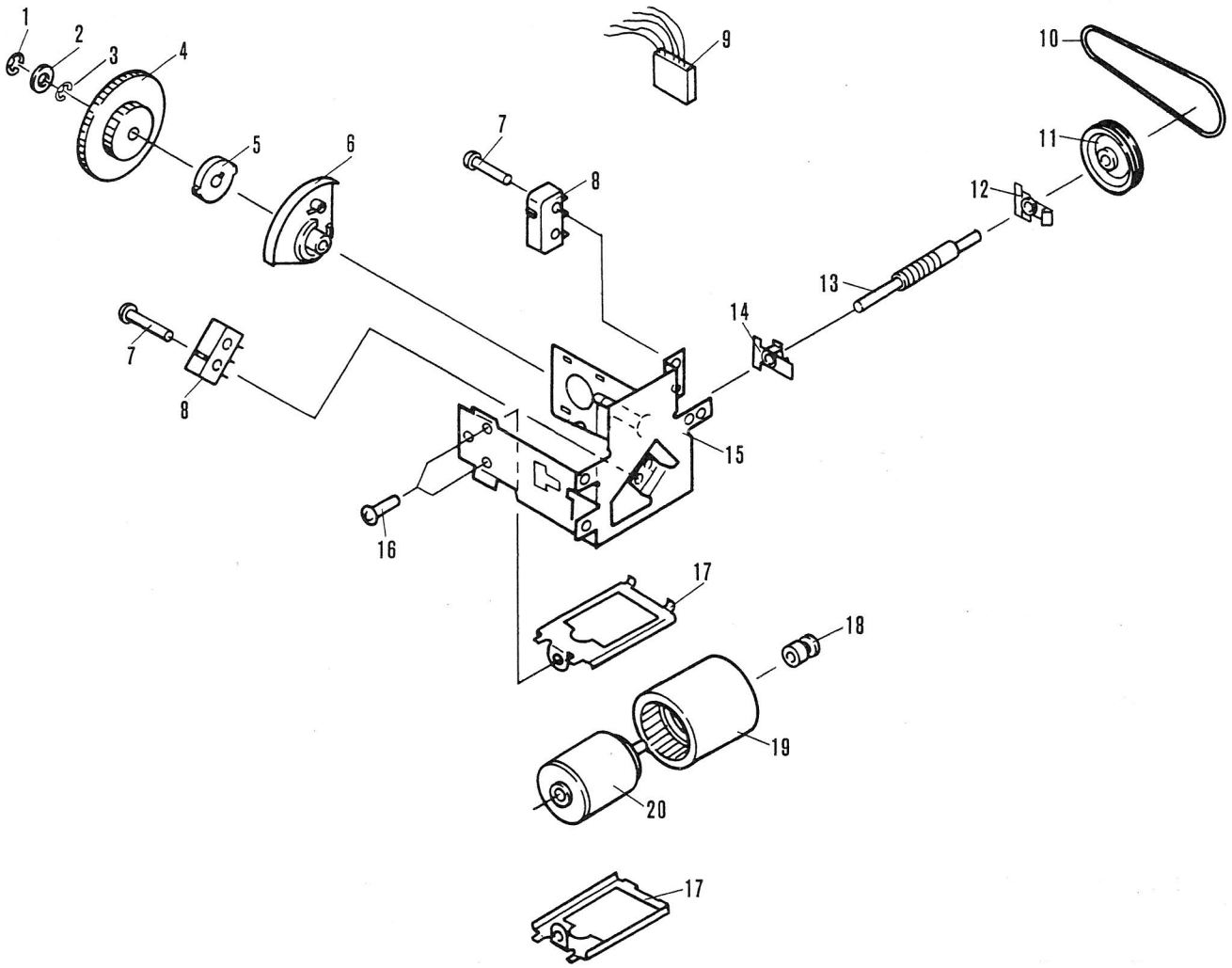
10.4 EV MECHANISM

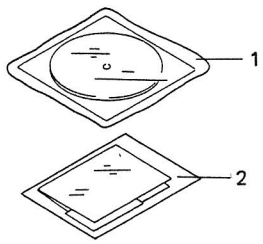
NOTE: *Parts without parts numbers CANNOT be supplied.

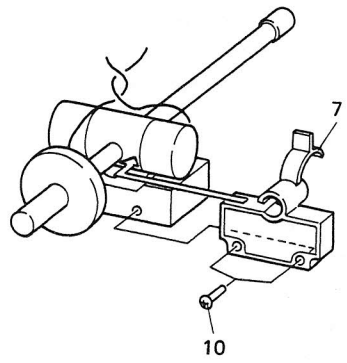


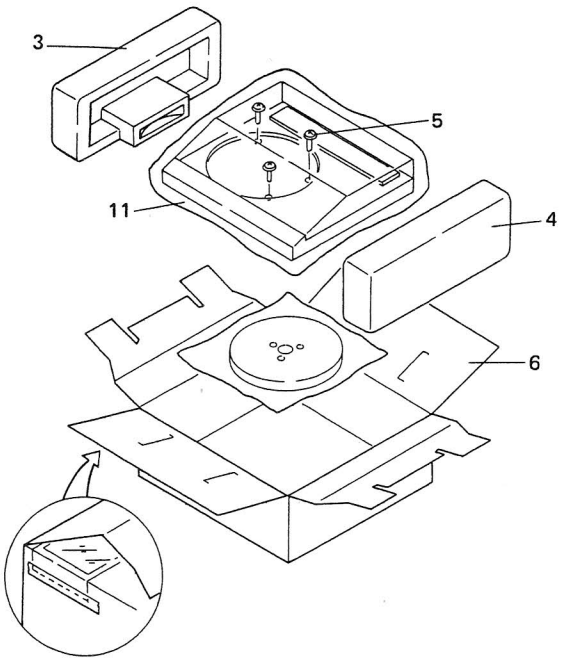
Parts List

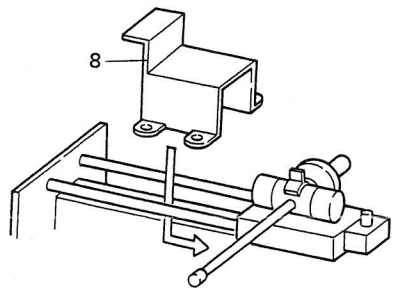
Key No.	Part No.	Description	Key No.	Part No.	Description
1.	922-8048	Circlip:EW3	11.	942-8044	Pulley
2.	922-8029	Washer	12.	942-8045	Collar
3.	922-8024	Washer	13.	930-8018	Worm gear
4.	942-8049	Gear F	14.	942-8045	Collar
5.		Plate	15.		Chassis
6.	942-8043	Cam	16.	922-8017	Screw:PSA2.6 x 5
7.	922-8068	Screw:PT2 x 10	17.		Frame
8.	929-8022	Microswitch	18.	942-8071	Motor pulley
9.	924-8021	Connector harnass	19.	942-8038	Tube
10.	942-8067	Belt	20.	929-8050	Motor

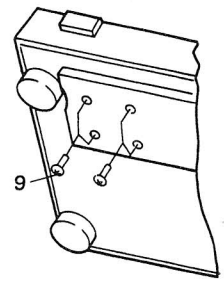
11. PACKING











Parts List:

Key No.	Part No.	Description
1.	942-8073	Rubber mat assy.
2.		Owner's manual
3.	952-8004	Protector:L
4.	952-8005	Protector:R
5.	922-8032	Screw
	922-8080	Fiber washer
6.	952-8007	Shipping box
7.	942-8057	Arm holder
8.	942-8056	Spacer
9.	922-8081	Screw:PSB4 x 12
10.	922-8082	Screw:PSB3 x 15
11.	952-8006	Plastic cover

Accessories:

Key No.	Part No.	Description
	943-8009	Counterweight
	930-8035	Screwdriver
	942-8070	EP(45RPM)adaptor
	922-8036	Cartridge mount kit
	942-8036	Overhang gauge
		Cleaning cloth
	930-8022	Bubble level

NOTE: * With the exception of the owner's manual, parts without part number CANNOT be supplied.

12. PARTS LISTS OF PC BOARD ASSEMBLIES

NOTE: *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 description.

Parts List of Control PCB Assembly (901-8012)

SEMICONDUCTORS:

Part No.	Description	Symbol
926-8023	PD1003	IC1
926-8028	PA2004	IC2
926-8031	PA2005	IC3
926-8049	NJM2903D	IC4
926-8114	JC4013BP	IC5
926-8046	TD62504P	IC6
926-8052	M54517P	IC7
926-8056	TC4001BP	IC8, IC13, IC17, IC18
926-8050	TC4023BP	IC9
926-8118	TC4011BP	IC10, IC11, IC14
926-8044	TC4027BP	IC12, IC15
926-8113	TC4069UPB	IC16
926-8115	uPC4558C	IC20, IC21
926-8048	uPC78L08	IC22
926-8002	2SC945	Q1-Q5, Q7, Q8
926-8030	(2SC1815)	
926-8003	2SC1583	Q6
926-8005	2SC1626	Q9, Q11
926-8020	2SA816	Q10, Q12
926-8107	2SA562TM-Y	Q13, Q14
926-8051	2SC1959-Y	Q15, Q16
926-8041	WZ-085	D1
926-8035	IS1885	D2
926-8037	IS2473	D3, D4, D6, D8-D10, D14, D15
926-8116	VD1212	D5, D7
926-8108	RD2.4EB	D12
926-8089	WZ-150	D13

VARIABLE RESISTORS:

Part No.	Description	Symbol
929-8025	6.8K-B	VR1
929-8017	10K-B	VR2
929-8056	680K-B	VR3
929-8053	680K-B	VR4
929-8055	33K-B	VR5, VR6
929-8054	220-B	VR7
929-8057	330-B	VR8
929-8001	3.3K-B	VR9

MISCELLANEOUS:

926-8103	Crystal	X-tal
928-8006	Thermistor	TH1, TH2

* * * * * * * * * * * * * * * *

Parts List of Power Supply PCB Assembly (901-8002)

SEMICONDUCTORS:

Part No.	Description	Symbol
926-8047	uPC78MD8H	IC101
926-8109	2SD686	Q101
926-8036	S1RBA10	D101
926-8053	S2VB10	D102
926-8097	BZ-250	D103

CAPACITORS:

Part No.	Description	Symbol
⚠ 927-8008	.047/450:myl	C101

RESISTORS:

928-8007	2W:1K	R101

HARDWARE:

921-8057	Spacer
921-8058	Spacer
922-8031	Screw

Parts List of Lamp PCB Assembly (901-8004)

Part No.	Description	Symbol
921-8015	8V 70mA lamp	PL1

* * * * * * * * * * * * * * *

Parts List of LED Sensor PCB Assembly (901-8003)

Part No.	Description	Symbol
926-8042	LED	D301-D305

* * * * * * * * * * * * * * *

Parts List of CdS PCB Assembly (901-8016)

Part No.	Description	Symbol
928-8005	CdS	CdS

* * * * * * * * * * * * * * *

Parts List of Phototransistor PCB Assembly (901-8017)

Part No.	Description	Symbol
926-8043	TPS605-Y	Q301-Q305

* * * * * * * * * * * * * * *

Parts List of Control A PCB Assembly (901-8018)

Part No.	Description	Symbol
926-8101	GL-2PR1	D201-D206
929-8015	Switch	S3, S4

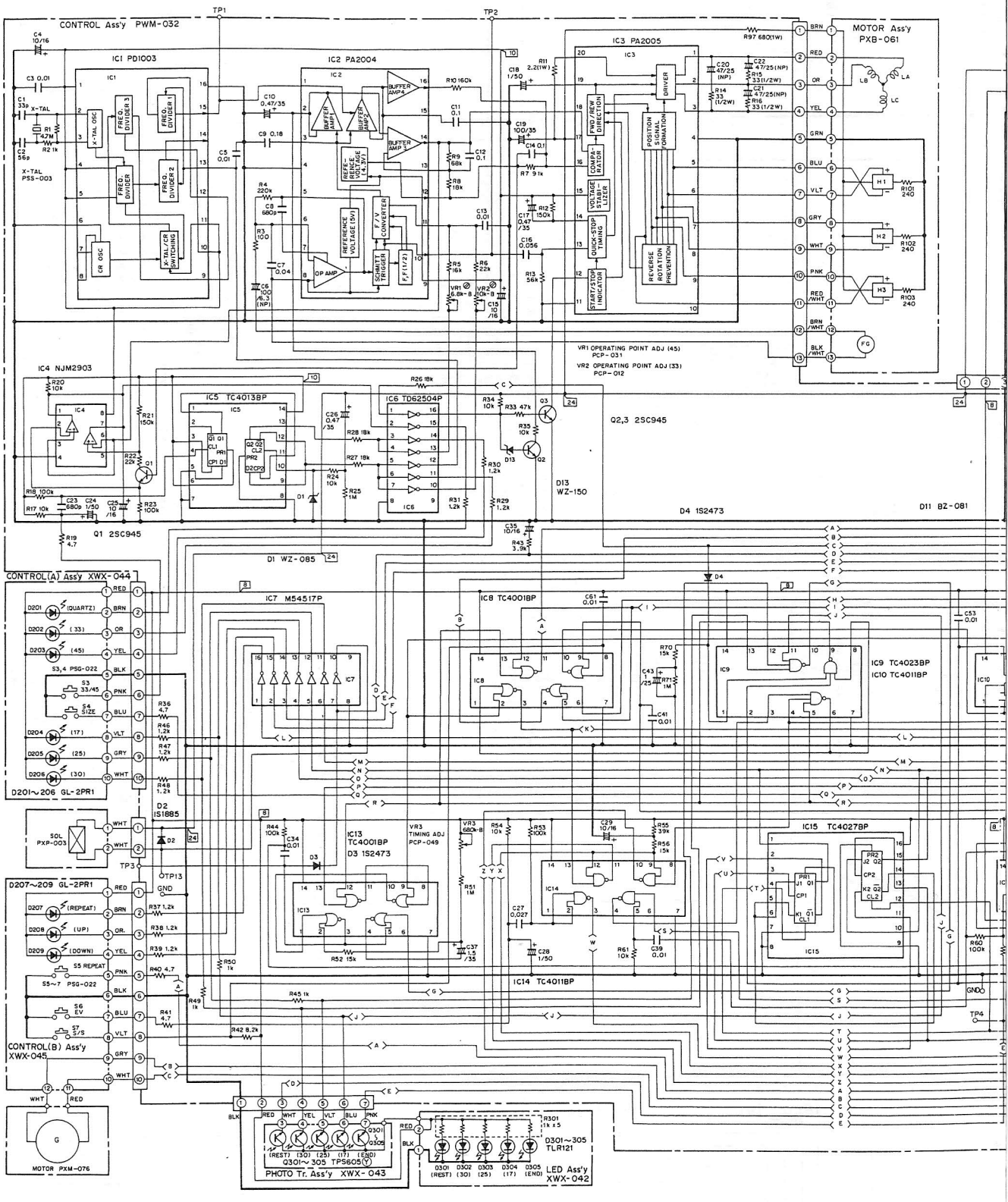
* * * * * * * * * * * * * * *

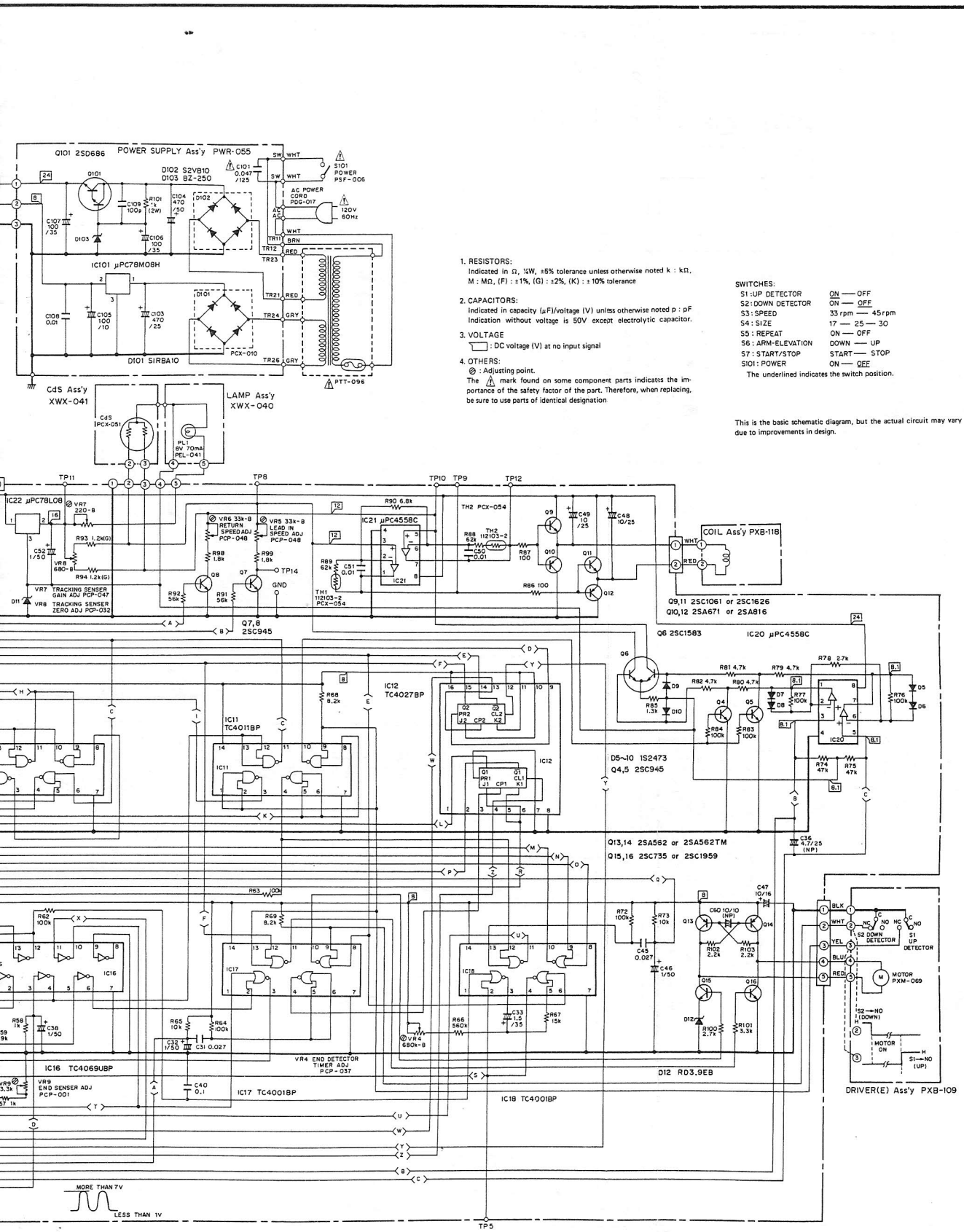
Parts List of Control B PCB Assembly (901-8019)

Part No.	Description	Symbol
926-8101	GL-2PR1	D207-D209
929-8015	Switch	S5-S7

MODEL 8000 SERIES TWO

SCHEMATIC DIAGRAM





1. RESISTORS:
Indicated in Ω, ¼W, ±5% tolerance unless otherwise noted k : kΩ, M : MΩ, (F) : ±1%, (G) : ±2%, (K) : ± 10% tolerance

2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise noted p : pF
Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE
: DC voltage (V) at no input signal

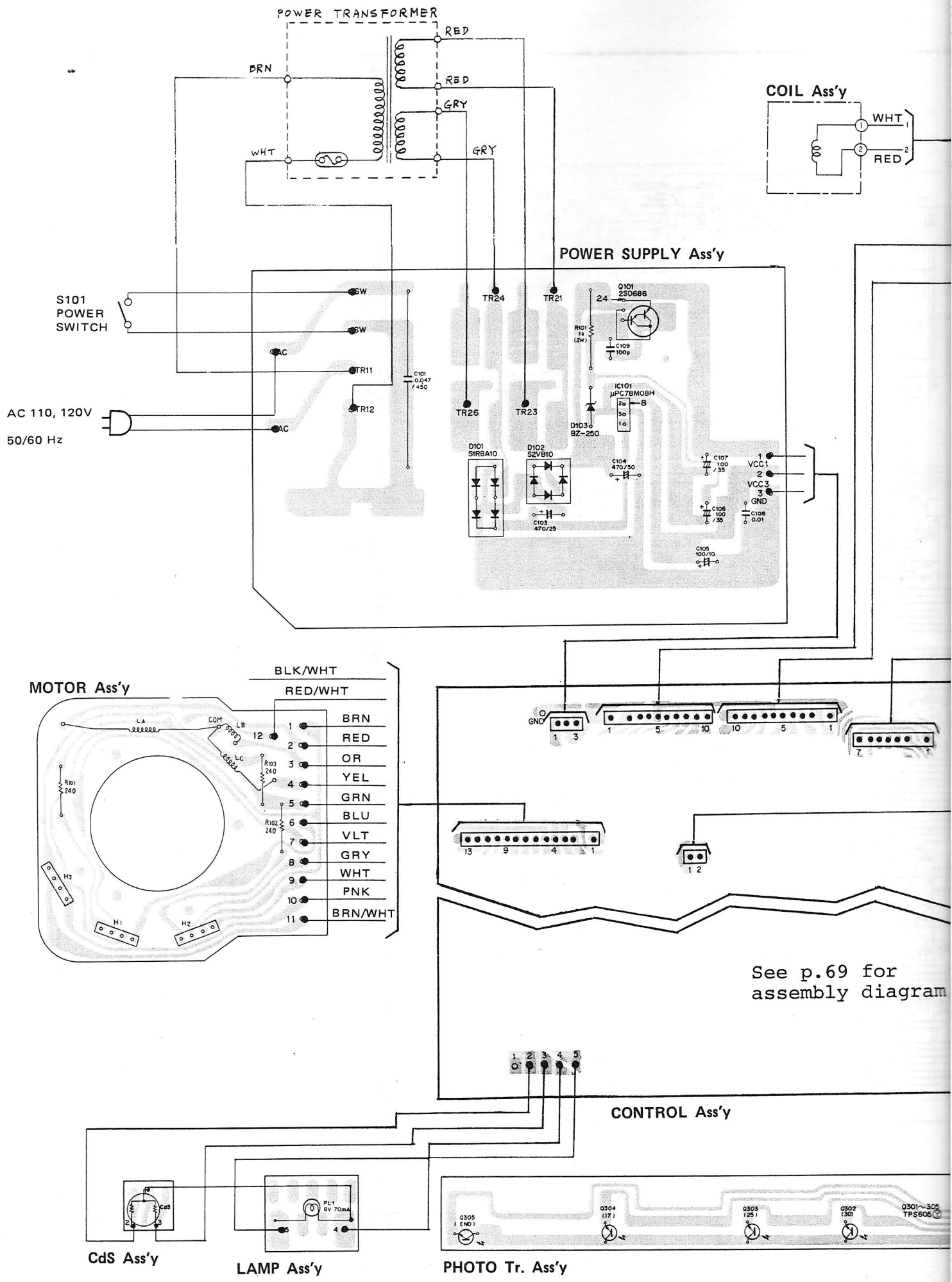
4. OTHERS:
⊘ : Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

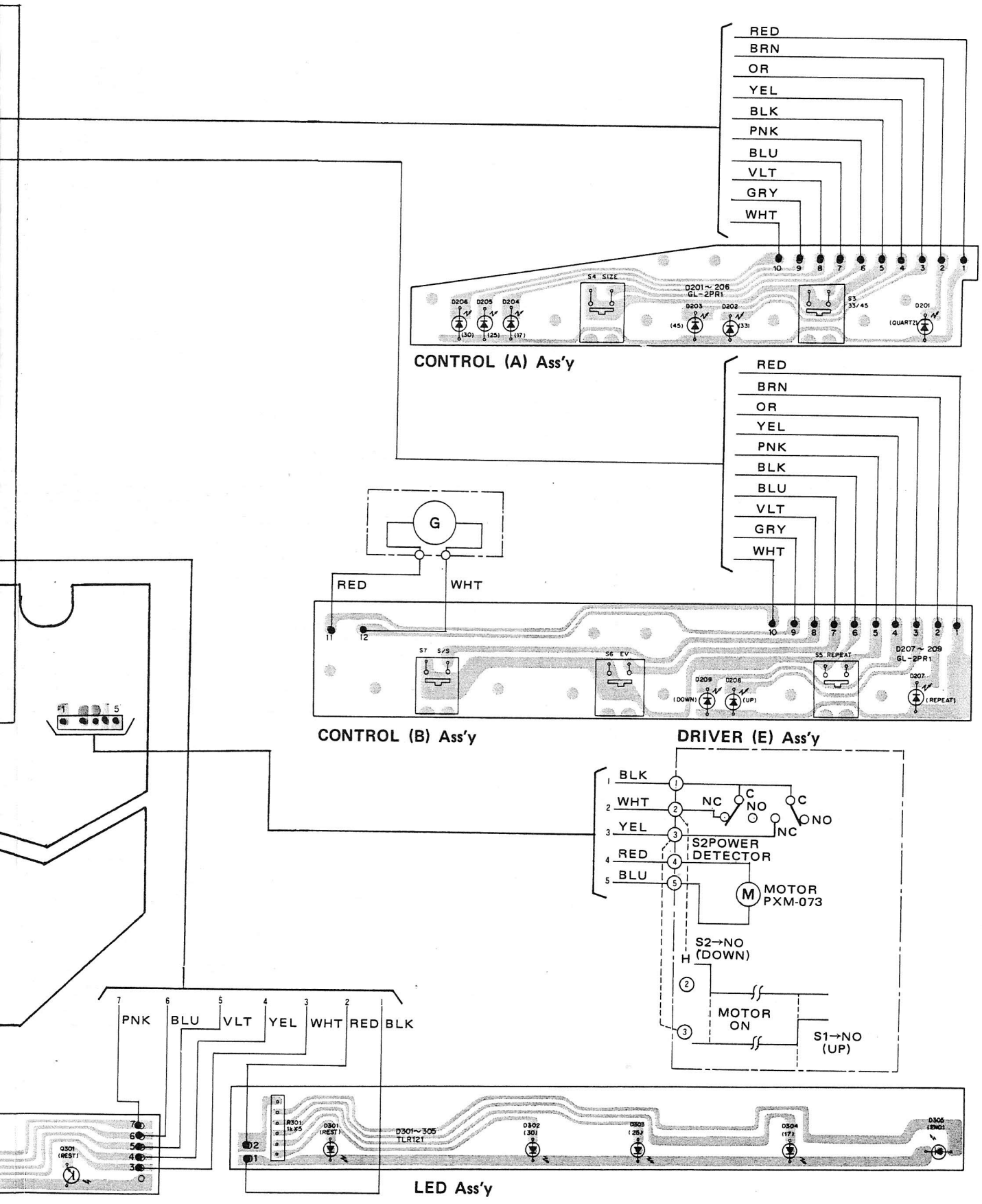
SWITCHES:

S1 : UP DETECTOR	ON — OFF
S2 : DOWN DETECTOR	ON — OFF
S3 : SPEED	33 rpm — 45 rpm
S4 : SIZE	17 — 25 — 30
S5 : REPEAT	ON — OFF
S6 : ARM-ELEVATION	DOWN — UP
S7 : START/STOP	START — STOP
S101 : POWER	ON — OFF

The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.


POWER TRANSFORMER
RED
BRN
RED
GRY
WHT
GRY
COIL Ass'y
WHT
RED
POWER SUPPLY Ass'y
S101
POWER
SWITCH
SW
SW
AC
TR11
TR12
AC
AC 110, 120V
50/60 Hz
C101
0.047
/450
TR24
TR21
TR26
TR23
Q101
2SD686
R101
1k
(2W)
C109
100p
IC101
μPC78M08H
D103
BZ-250
D101
S1RBA10
D102
S2VB10
C104
470/50
C103
470/25
C107
100
/35
C106
100
/35
C108
0.01
C105
100/10
1
VCC1
2
VCC3
3
GND
MOTOR Ass'y
BLK/WHT
RED/WHT
LA
COM
LB
LC
R101
240
R103
240
R102
240
H3
H1
H2
12
1 BRN
2 RED
3 OR
4 YEL
5 GRN
6 BLU
7 VLT
8 GRY
9 WHT
10 PNK
11 BRN/WHT
GND
1 3
1 5 10
10 5 1
7 1
13 9 4 1
1 2
See p.69 for
assembly diagram
1 2 3 4 5
CONTROL Ass'y
CdS
2 3
PL1
8V 70mA
6 4
Q305
(END)
Q304
(17)
Q303
(25)
Q302
(30)
Q301~305
TPS605
CdS Ass'y
LAMP Ass'y
PHOTO Tr. Ass'y


RED
BRN
OR
YEL
BLK
PNK
BLU
VLT
GRY
WHT
10 9 8 7 6 5 4 3 2 1
S4 SIZE
D201~206 GL-2PR1
D206 D205 D204
(30) (25) (17)
D203 D202
(45) (33)
S3 33/45
D201
(QUARTZ)
CONTROL (A) Ass'y
RED
BRN
OR
YEL
PNK
BLK
BLU
VLT
GRY
WHT
10 9 8 7 6 5 4 3 2 1
G
RED
WHT
T1 T2
S7 S/S
S6 EV
S5 REPEAT
D207~209 GL-2PR1
D209 D208
(DOWN) (UP)
D207
(REPEAT)
CONTROL (B) Ass'y
DRIVER (E) Ass'y
P1 1 5
BLK
WHT
YEL
RED
BLU
NC C NO
C NO
NC
S2POWER DETECTOR
M MOTOR PXM-073
S2→NO (DOWN)
H
MOTOR ON
S1→NO (UP)
7 6 5 4 3 2
PNK BLU VLT YEL WHT RED BLK
Q301 (REST)
R301 1kX5
D301 (REST)
D301~305 TLR121
D302 (30)
D303 (25)
D304 (17)
D305 (END)
LED Ass'y

12.1 CONTROL PCB ASSEMBLY (901-8012)

NOTE: * See pp. 67 and 68 for interconnect diagrams.