Service Manual

LINEAR MOTOR ARM STEREO TURNTABLE

PL-L1000

PIONEER®

MODEL PL-L1000 COMES IN THREE VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
HET	220V and 240V (Switchable)	Europe model (without cartridge)
HBT	220V and 240V (Switchable)	United Kingdom model (without cartridge)
S/G	110V, 120V, 220V, 240V and (Switchable)	U.S. Military model (with cartridge)

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1. SPECIFICATIONS

Motor and Turntable

Drive System . . . . Direct-drive
Motor . . . . Ouartz 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 45rpm
Wow and Flutter . . . . Less than *0.013% (WRMS)
0.025% (WRMS)
0.035% (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 78dB (DIN-B)
(with Pioneer cartridge model PC-600)

Rotational Characteristics

Build-up Time . . . . Within 90° rotation at 33-1/3rpm
Speed Deviation . . . . Less than 0.002%
Speed vs. Load Characteristics . . . . Stable up to 220 grams drag load
Speed Drift . . . . Less than 0.00008%/h at 33-1/3rpm
Less than 0.00003%/degree temp. change at 33-1/3rpm

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

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

Semiconductors

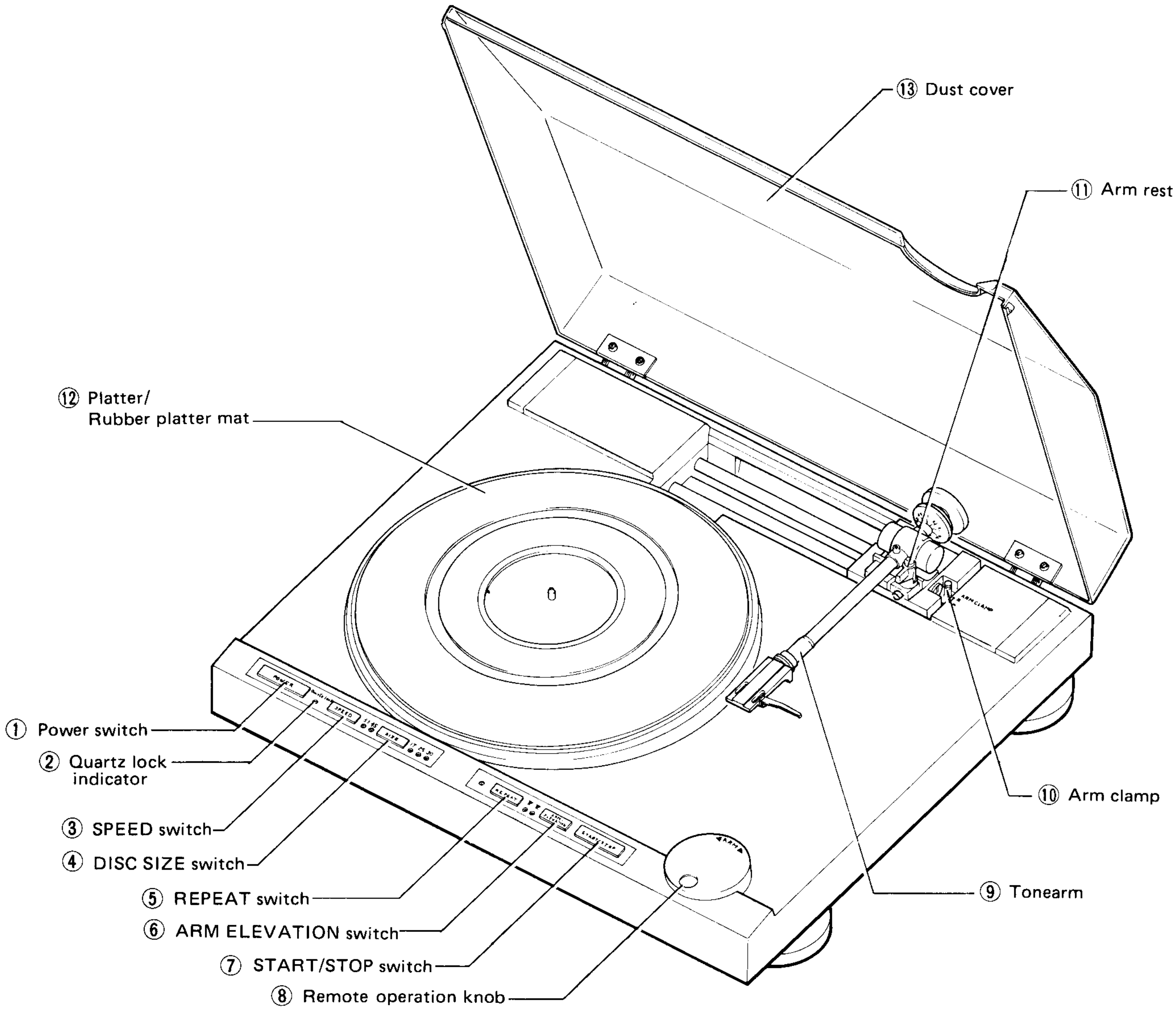
ICs 22
Transistors 17
Diodes 16
Hall Elements 3
LED 14
Photo Transistors 5
CdS 1

Miscellaneous

Power Requirements
HET, HBT models . . . . . AC220/240V ~ (switchable) 50, 60Hz
S/G model . . . . . AC110/120/220/240V ~ (switchable) 50, 60Hz
Power Consumption 35W
Dimensions . . . . 494(W) x 154(H) x 456(D)mm
19-7/16(W) x 6-1/16(H) x 17-15/16(D) in.
Weight 12kg/26lb 8oz
Accessories
EP Adapter 1
Screwdriver 1
Overhang gauge 1
Level 1
Cleaning cloth 1
Cartridge mounting parts (HET, HBT models only)
Cartridge mounting screws 6
Cartridge mounting nuts 2
Cartridge mounting washers 2
Cartridge PC-600 (S/G model only) 1
Operating instructions (French and German furnished on models for HET) 1

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

2. 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 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 12 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 the 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 no auto-return.**

⑦ START/STOP 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 remote 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 and auto-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 stabilizes 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 record play. When fully opened and pulled straight up, this dust cover can be removed from the cabinet.

3. DISASSEMBLY

3.1 PANEL

1. Remove the 4 insulator mounting screws.
2. Remove the top cover.
3. Shift the tonearm across to the center.
4. Lift the panel up, and disconnect the 3 connectors from the printed circuit board below.

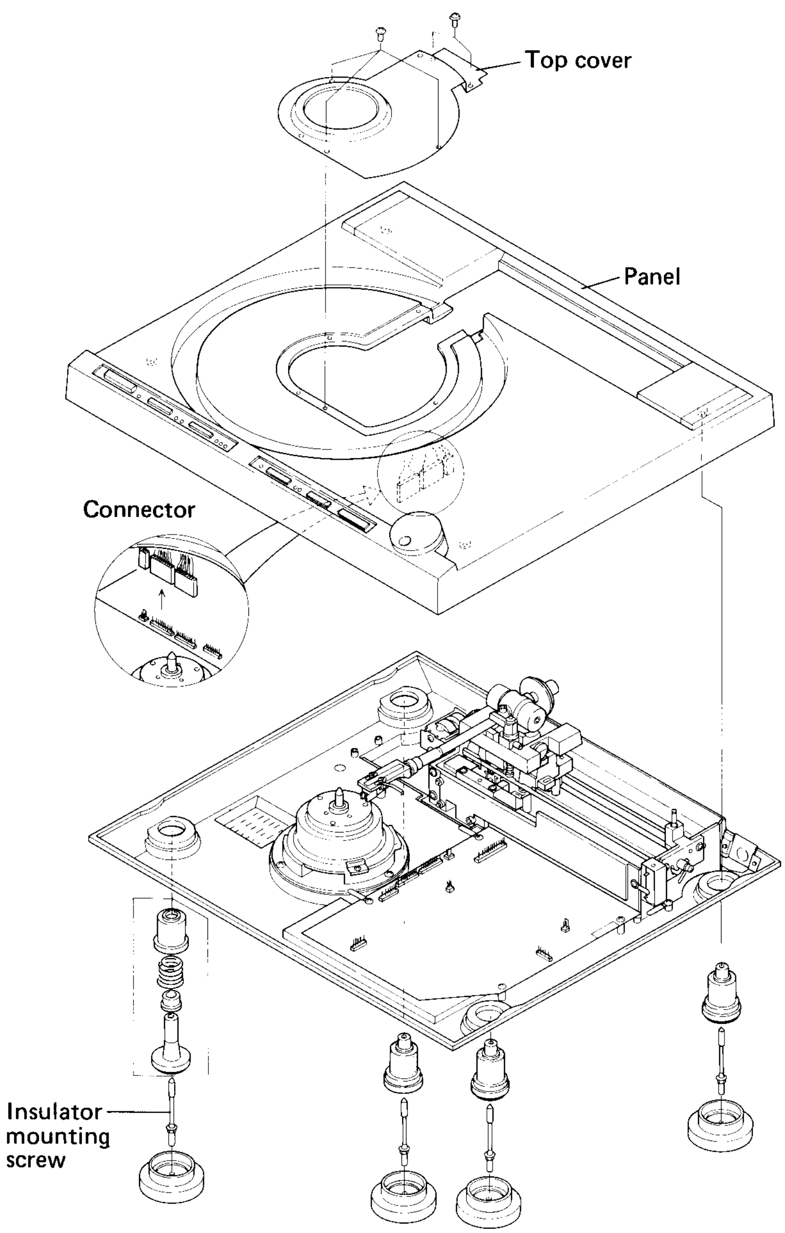


Fig. 3-1

3.2 D.D MOTOR

1. Remove the 3 D.D motor securing screws.
2. Disconnect the D.D motor connector.

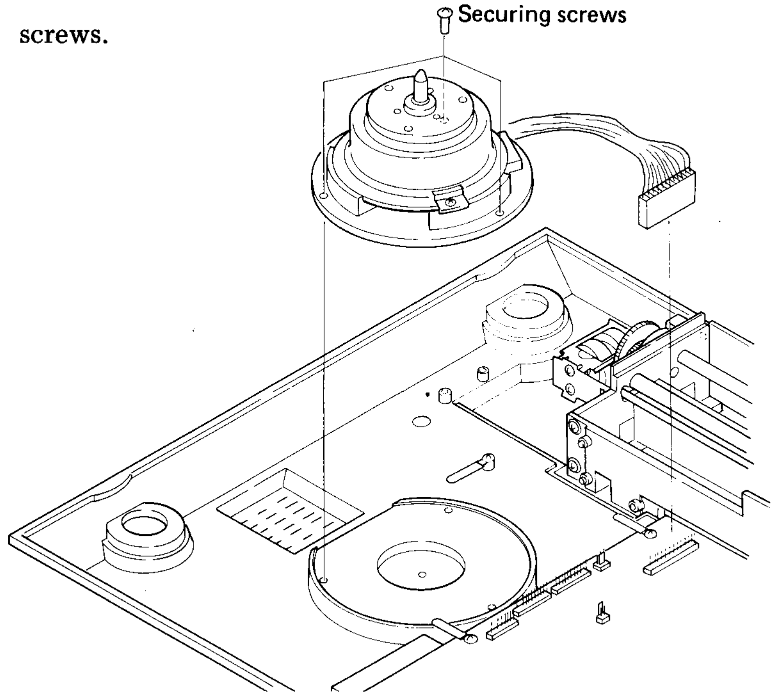


Fig. 3-2

3.3 TONEARM

1. Remove the plate pressing against the tonearm output cable.
2. Remove the coil & rail ass'y.
3. Disconnect the ground lead connected to the front rail from P.C.B.
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 15cm.

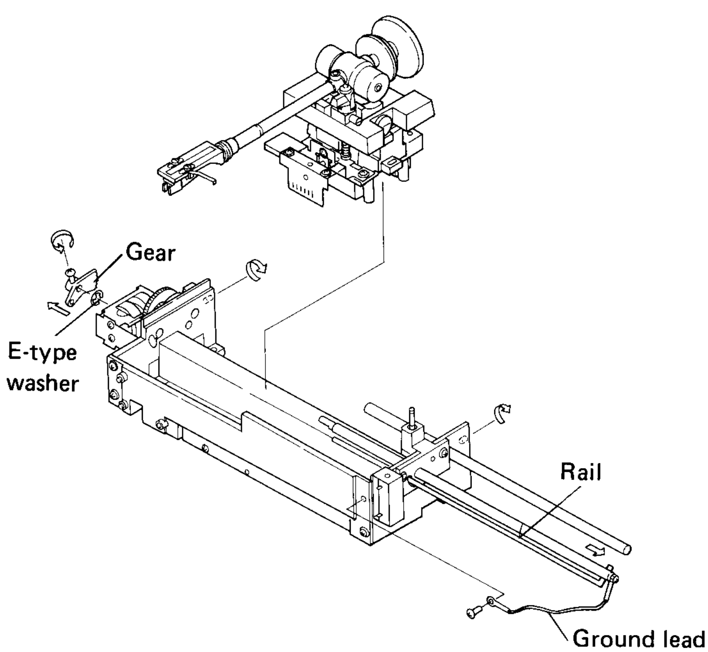


Fig. 3-3

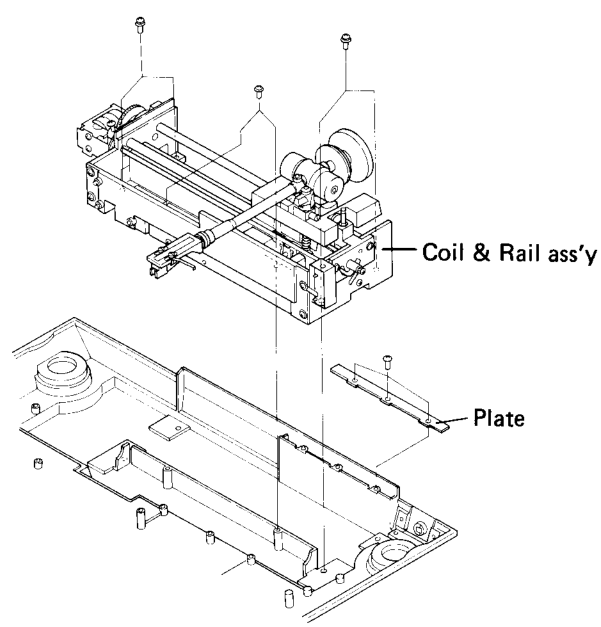


Fig. 3-4

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.

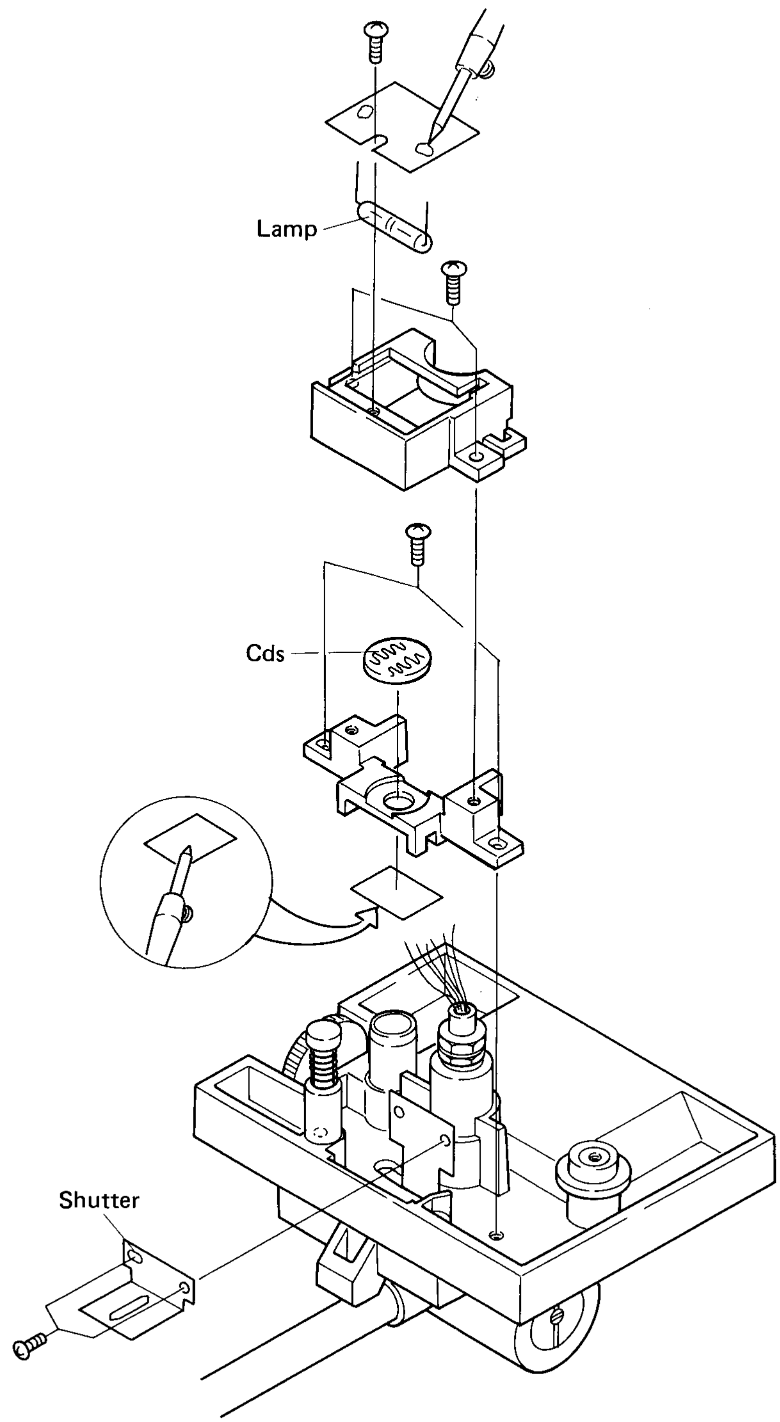


Fig. 3-5

4. 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.*

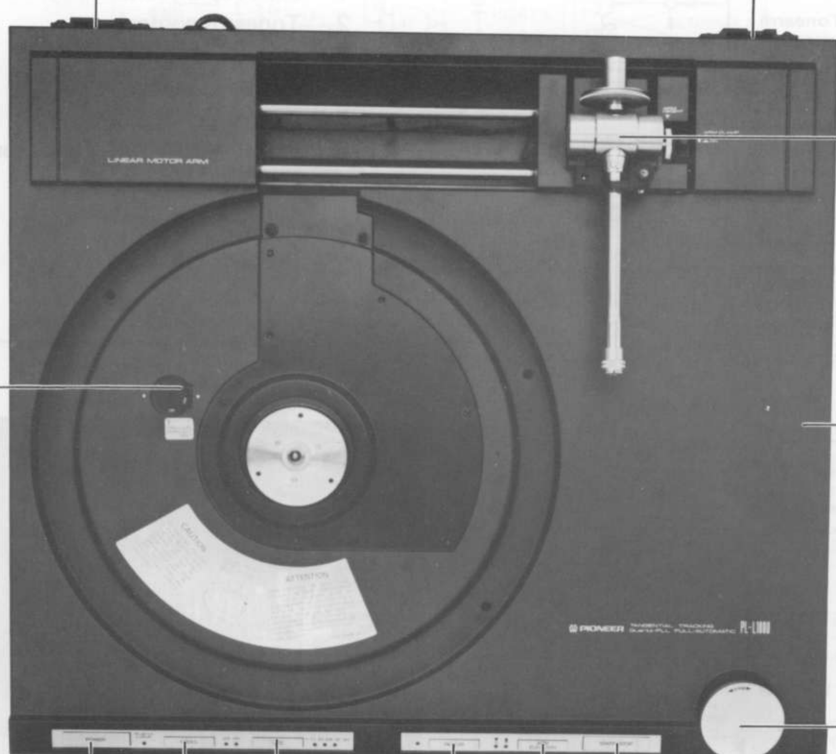


Plate L
PNW-338

Plate R
PNW-339

Tonearm assembly
PPD-601

⚠ Line voltage selector PSB-002 (HET, HBT)
PSB-007 (S/G)

Panel
PNR-126

Dial unit
PXT-391

Push button unit A
PAD-058

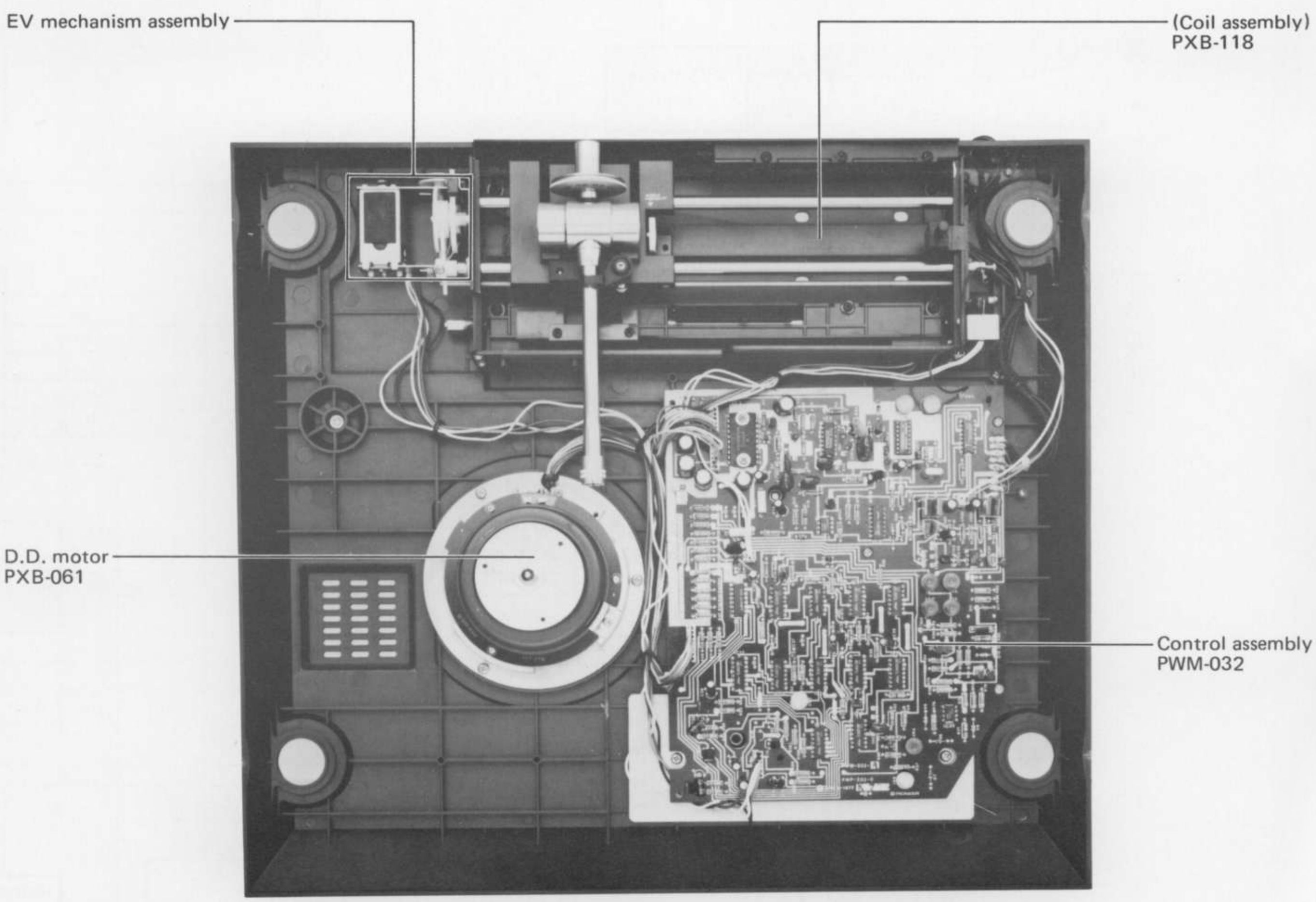
Push button unit B
PAD-061

Push button unit E
PAD-059

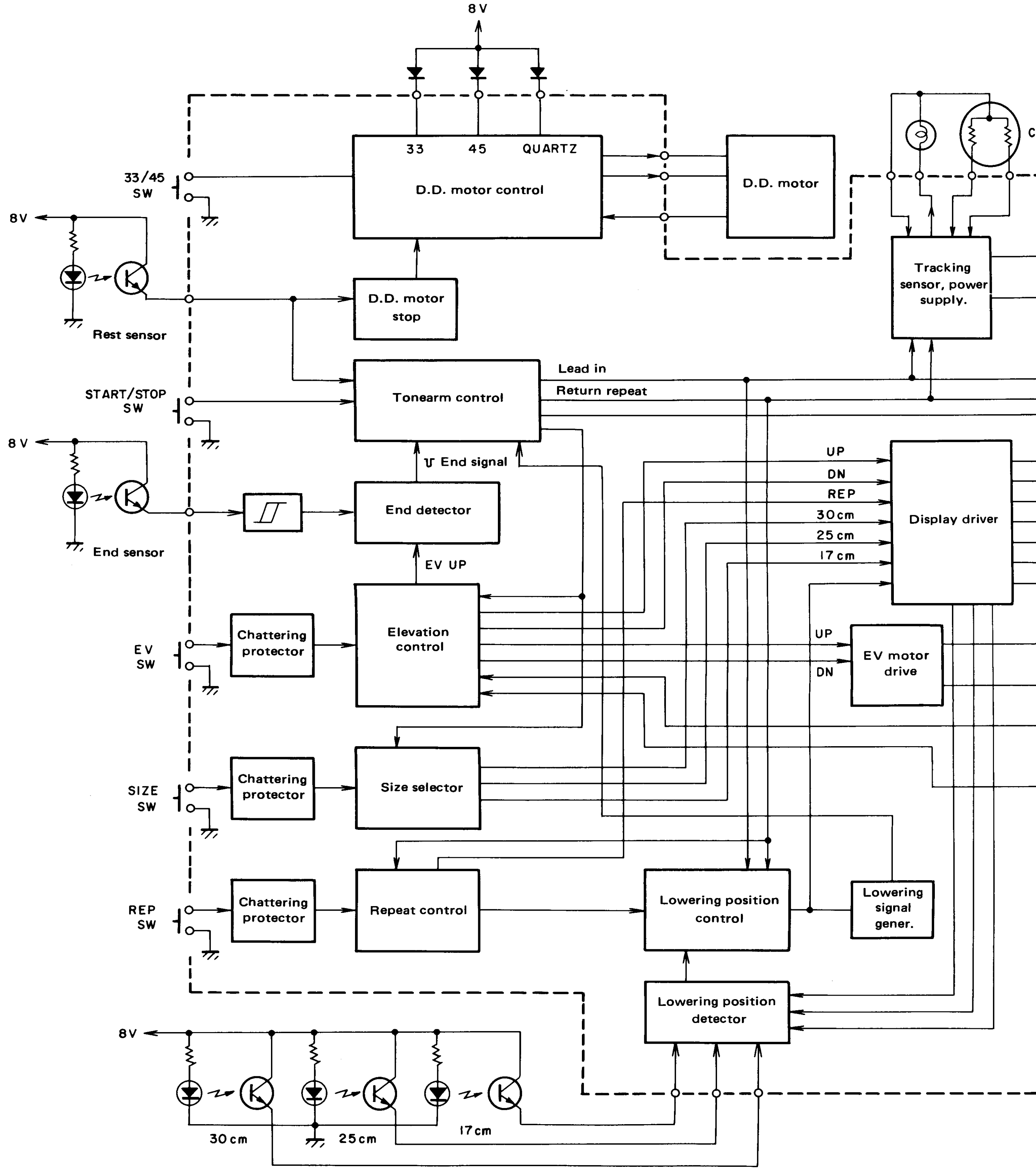
Push button unit F
PAD-063

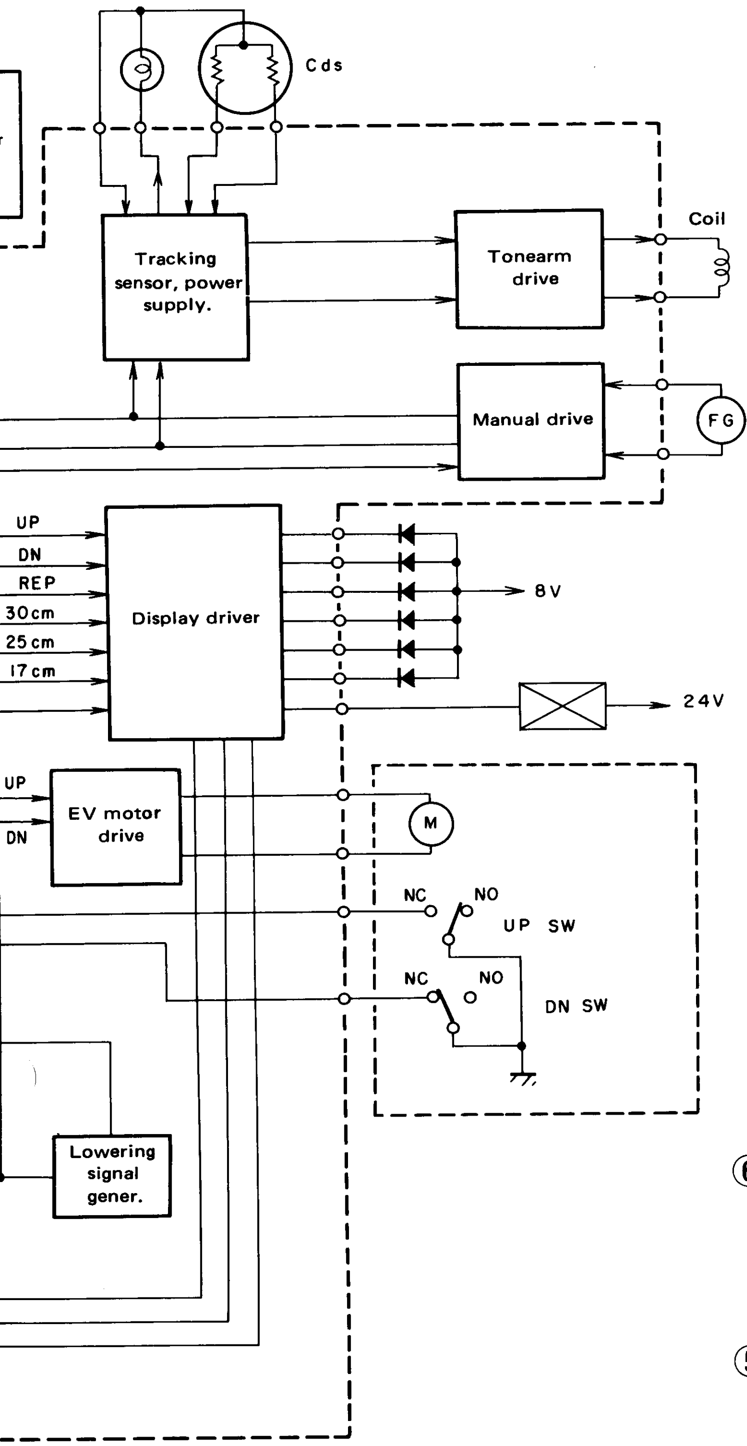
Push button unit C
PAD-060

Push button unit D
PAD-062


EV mechanism assembly
(Coil assembly)
PXB-118
D.D. motor
PXB-061
Control assembly
PWM-032

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

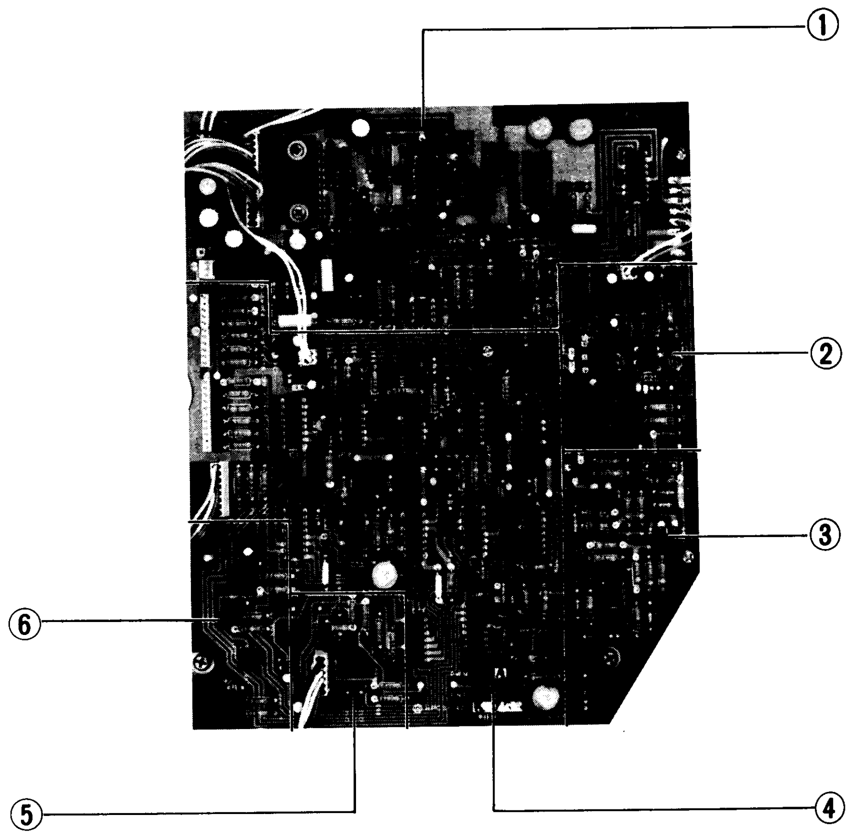


Photo 5-1

BLOCK DIAGRAM OPERATIONS

5.1 TONEARM CONTROL STAGE

a. Lead-in FF and Return FF

Lead-in FF .... This FF is set by pressing the S/S (START/STOP) 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 S/S 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 2 FFs has been set, an "AUTO on" signal is generated (as well as AUTO on), resulting in the arm elevator being set 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 2 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.

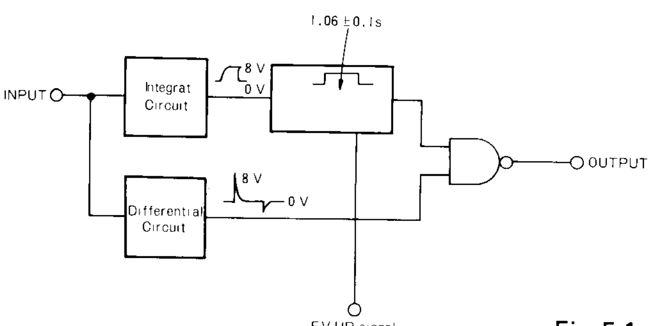


Fig. 5-1

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 descend 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.

The FF output is applied to a logical "and" circuit with the outputs from the elevator UP and DOWN switches, 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 monstable 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 generated. Each of the tonearm control stage FFs 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 the generation of tracking sensor outputs).

5.10 D.D. MOTOR CONTROL STAGE AND D.D. 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 3 specially designed ICs — PA2005, PA2004, and PD1003. These control stages also include the speed selector, speed indicator, and quartz lock indicator circuits.

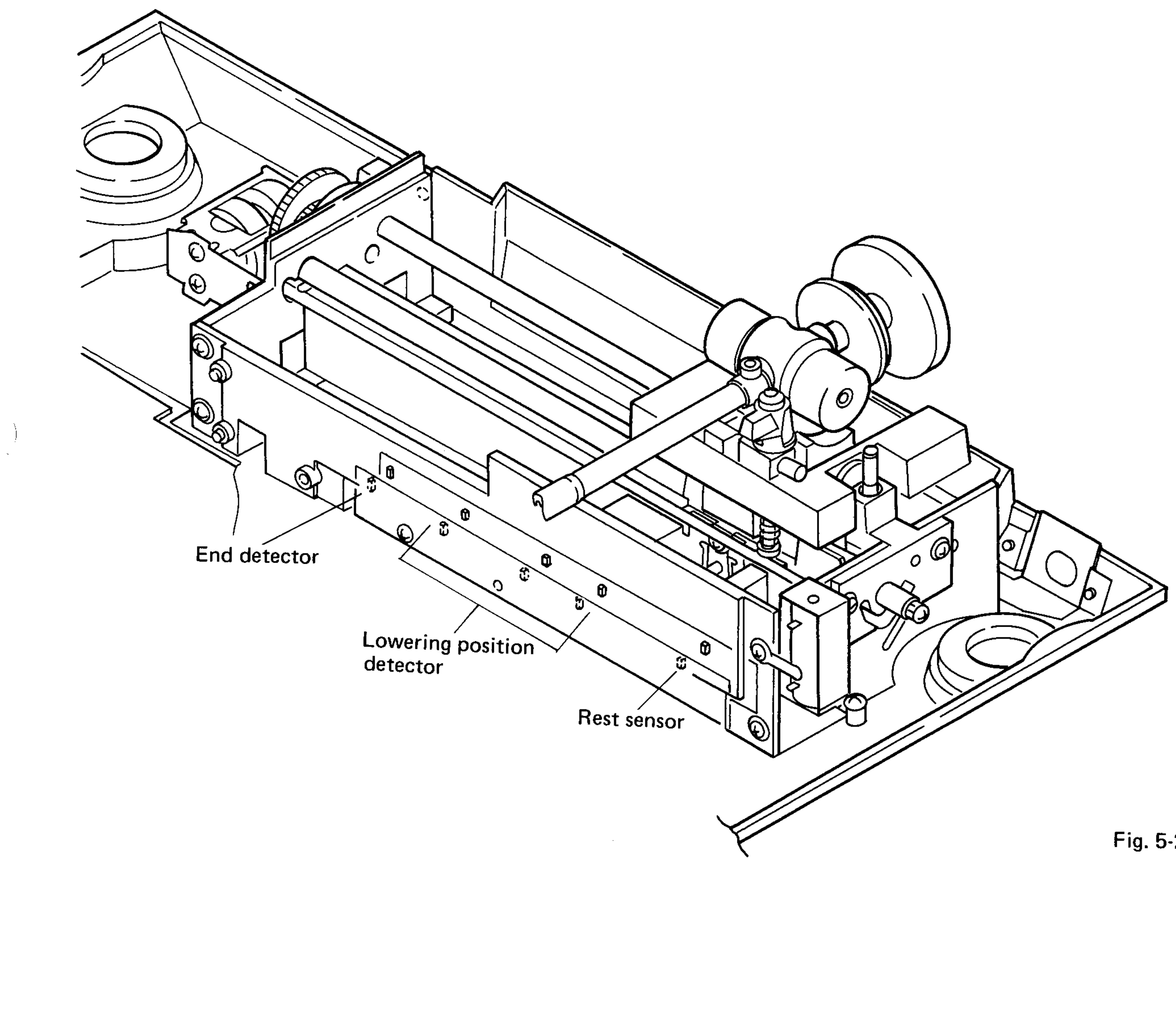
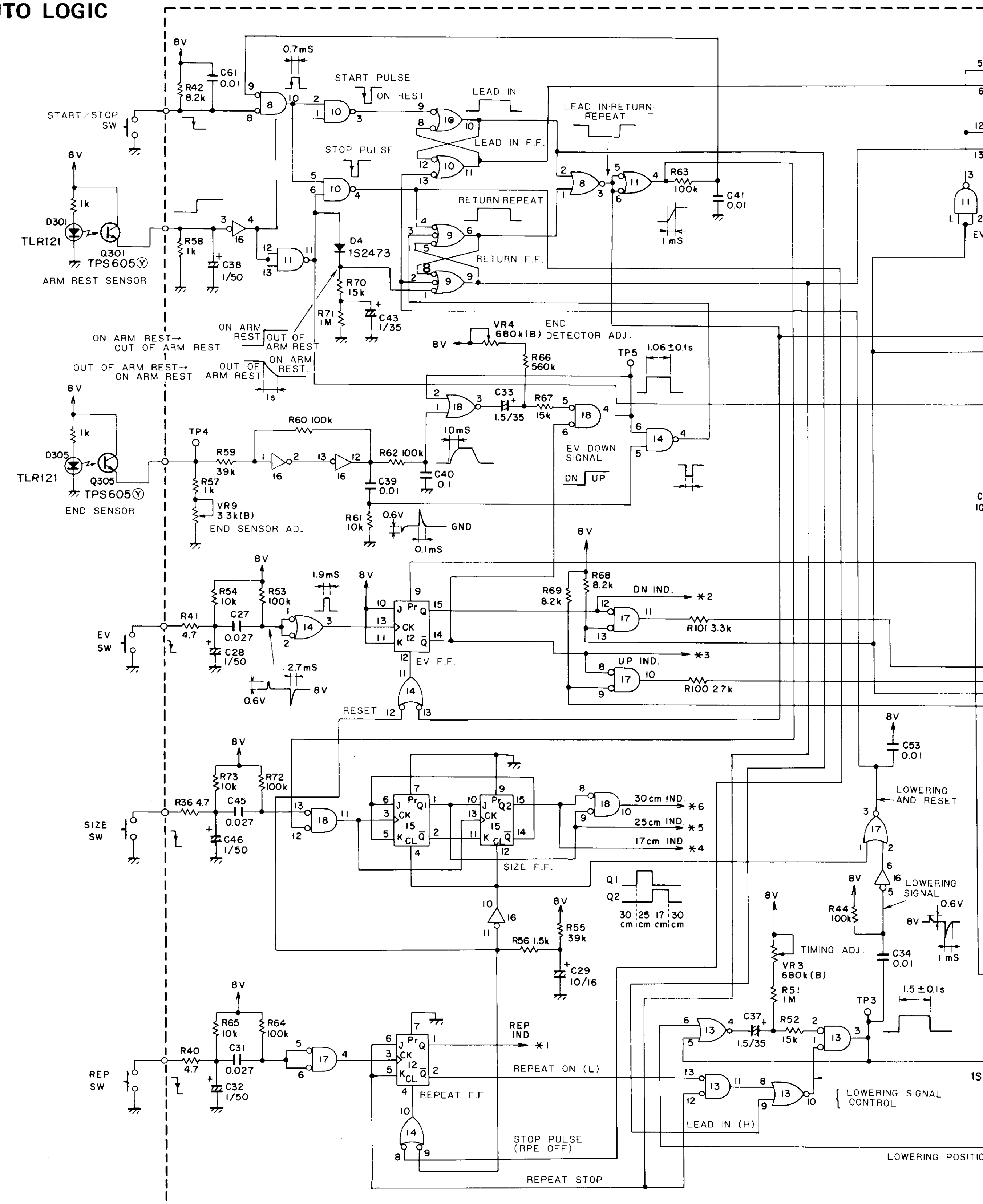
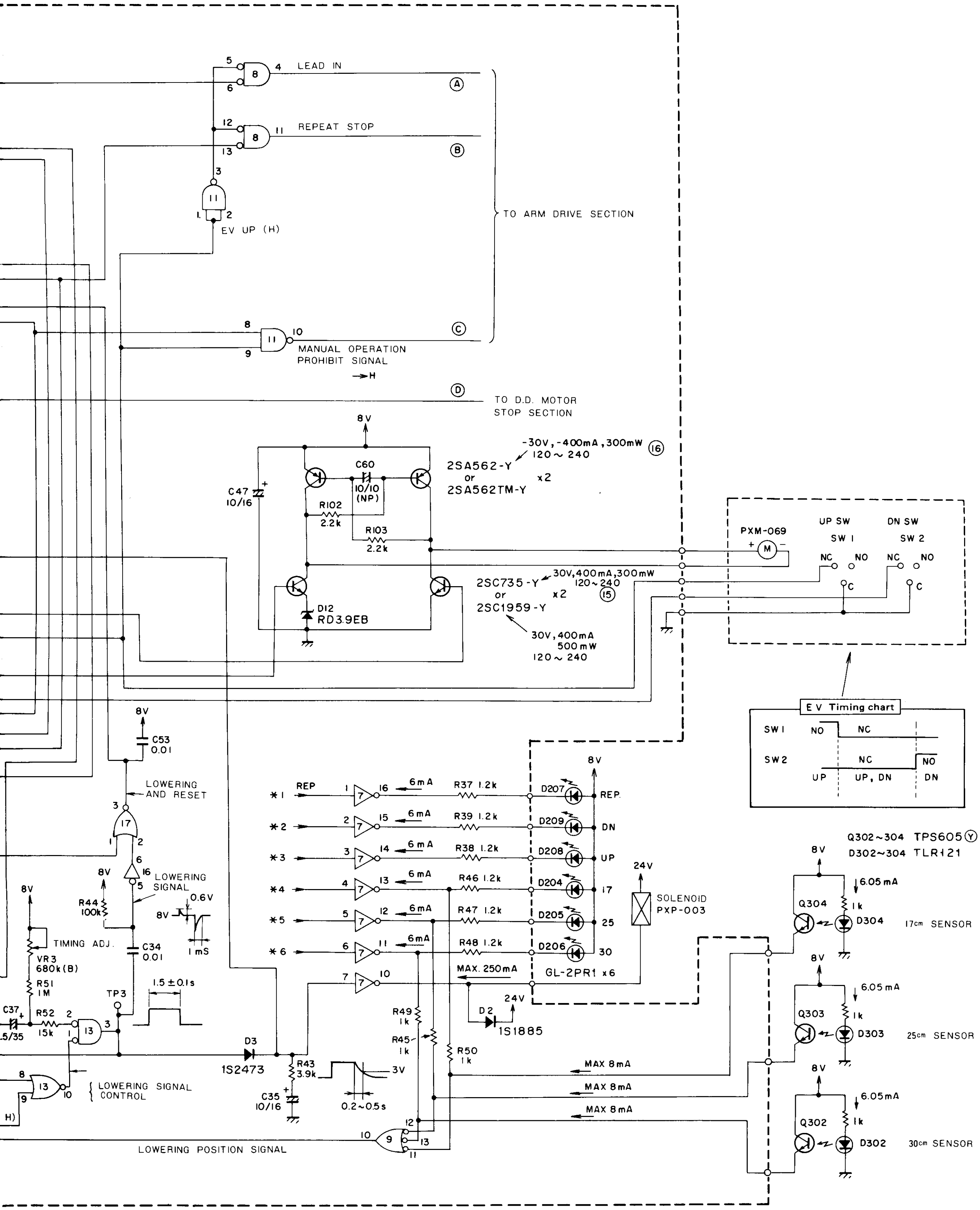


Fig. 5-2

6. CIRCUIT DESCRIPTIONS

6.1 FULL AUTO LOGIC





LEAD IN
REPEAT STOP
EV UP (H)
TO ARM DRIVE SECTION
MANUAL OPERATION PROHIBIT SIGNAL
TO D.D. MOTOR STOP SECTION
2SA562-Y or 2SA562TM-Y x2
-30V, -400mA, 300mW 120~240
2SC735-Y or 2SC1959-Y x2
30V, 400mA, 300mW 120~240
30V, 400mA 500mW 120~240
D12 RD3.9EB
PXM-069
UP SW SW 1
DN SW SW 2
EV Timing chart
LOWERING AND RESET
LOWERING SIGNAL
TIMING ADJ.
LOWERING SIGNAL CONTROL
LOWERING POSITION SIGNAL
SOLENOID PXP-003
GL-2PR1 x6
MAX. 250mA
MAX 8mA
Q302~304 TPS605(Y)
D302~304 TLR121
17cm SENSOR
25cm SENSOR
30cm SENSOR

* Number in parenthesis are the IC pin numbers.
* L denotes L level.
* H denotes H level.
* EV denotes arm elevator, UP denotes that arm elevator is in UP position, while DN that elevator is in the DOWN position.

The Full Auto Logic section is made up of the following 5 main stages.

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

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,→IC17,→IC9, 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 START/STOP 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 FFs 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 NO 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 signal 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 τ = 2.2 sec. 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 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 FFs 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 multivator.
* Once the carrier reaches the arm rest position, the rest sensor transfers and 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 1/2Vcc (delay circuit). During this period, the carrier remains pressed against the arm rest.

4. End detector operation

* When the repeat mode is 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

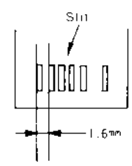


Fig. 6-1-1

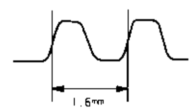


Fig. 6-1-2

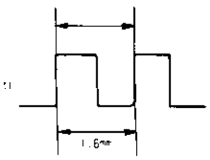


Fig. 6-1-3

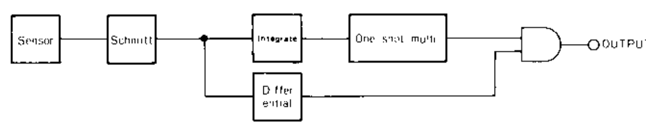


Fig. 6-2

That is, the detector circuit (outlined in the above block diagram) has been designed to detect the presence of 2 rising edges of the Schmitt circuit output within 1.06±0.1 seconds

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 out put is applied to the Schmitt trigger circuit composed of 2 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 2 NOR gates in IC18, resulting in the generation of a 1.06 ± 0.1 sec 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 level 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 is first turned on.
* Since $\overline{Q}$ = H, one of the IC7 transistors will be turned on to light up the UP indicator lamp.
* Until the elevator reaches the UP position the UP detector switch remains in the NC position, resulting in pins (13) and (12) of IC17 being both switched to L level, and Q13 and Q16 of the elevator drive 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 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 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 lamp 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 lamp 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 was 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 lamp is turned off, and the 25cm indicator lamp turned on.
* If the size selector is pressed again, the 17cm indicator lamp is turned on. Every time the selector is pressed, the size is switched in a cyclic order 30 → 25 → 17.

6.1.5 REPEAT CONTROL STAGE

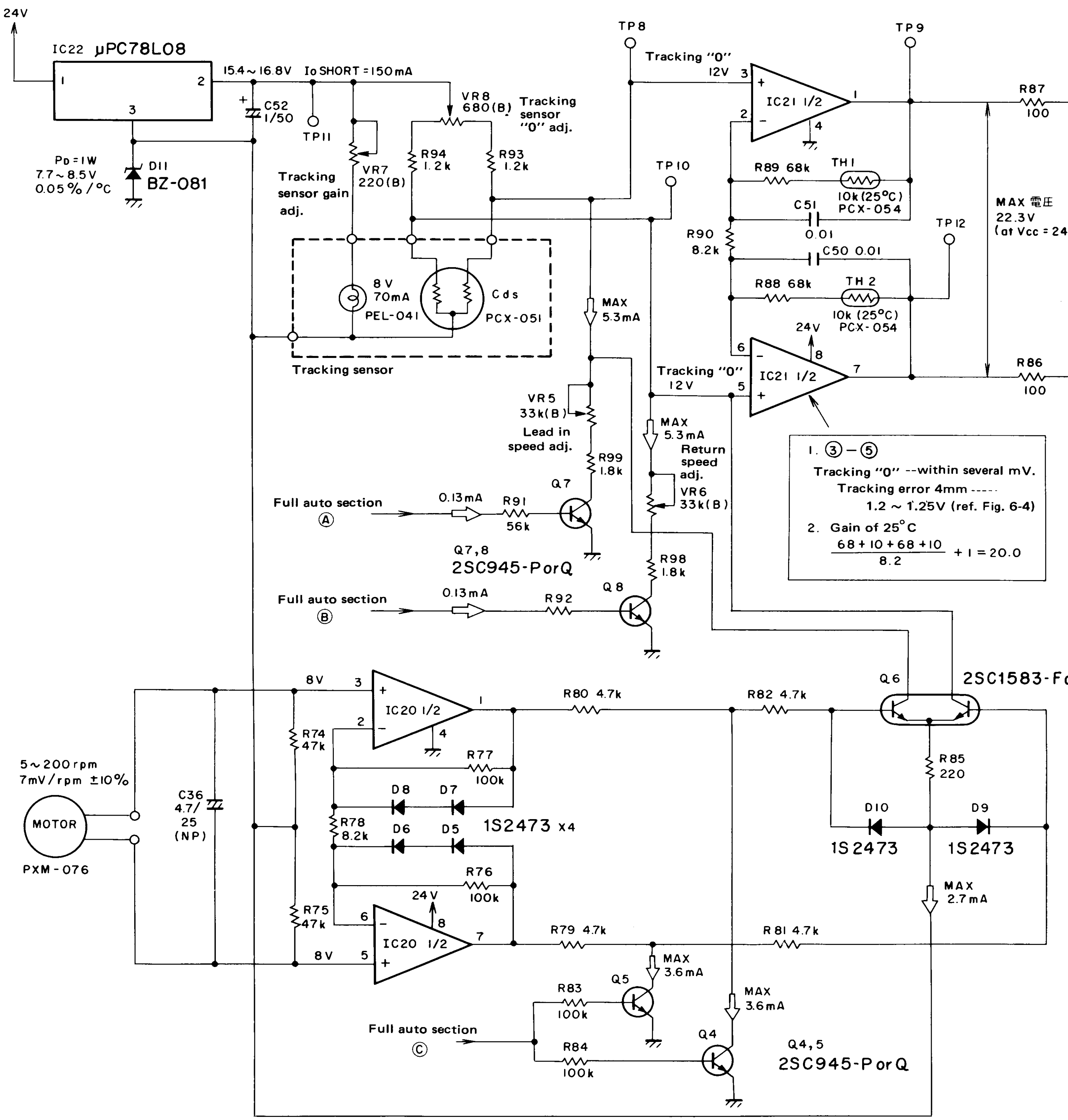
* When the power is turned on, the intial reset signal from R55/C29 is applied to pin (8) of IC14, resulting in pin (10) of this IC being switched to H level, and pin (1) (Q) of IC12 being switched to L level.
* The repeat indicator lamp will thus be turned off (since Q = L).
* If the repeat switch is 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 to be turned on. At the same time, pin (13) of IC13 is switched to L level, thereby enabling the monostable multivibrator consisting of 2 gate circuits in IC13 to operate during repeat.
* If the repeat switch is then pressed again, the J = K = H status will be inverted.

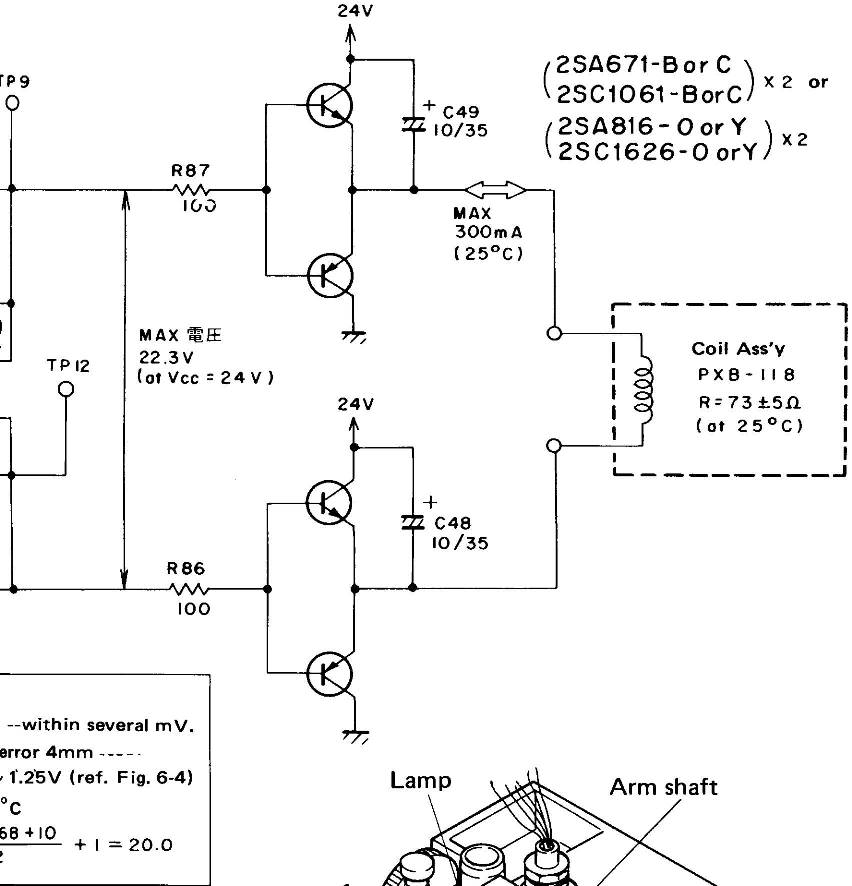
In addition to the above repeat control stage,

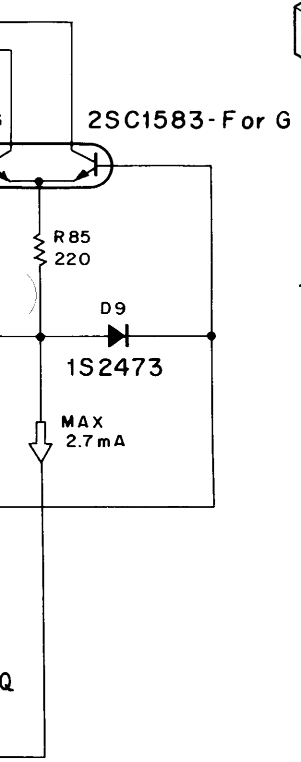
* The START/STOP switch may be pressed to activate return mode. In this case, a falling edge pulse is generated on pin (4) of IC10, and then applied to pin (8) of IC14. Pin (10) of IC14 is thus switched to H level, and the IC12 FF cleared (repeat off), resulting in Q = L and $\overline{Q}$ = H.

* 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







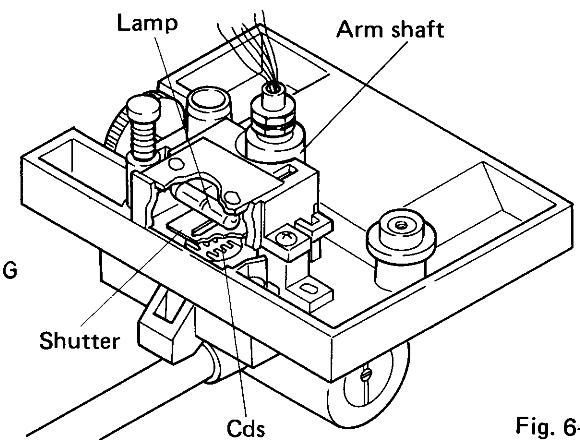


Fig. 6-3

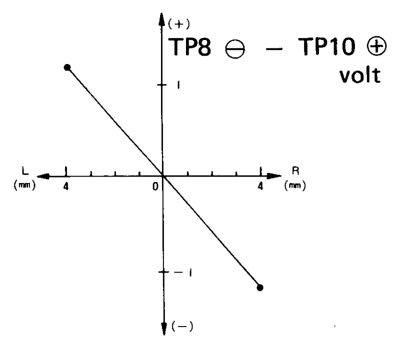


Fig. 6-4

The tonearm drive stage contains the following 3 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 in page 21. 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 2 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 grasp form 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 (sec. 2.2 below), 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.

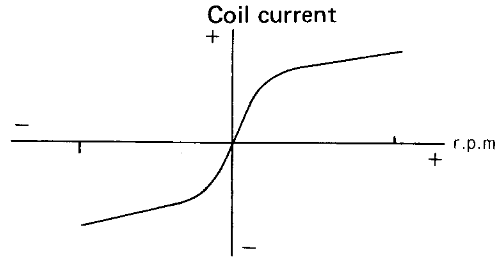


Fig. 6-5

6.2.2 TONEARM DRIVE CIRCUIT

The tonearm drive circuit consists of a current booster formed by a differential amplifier and Q9 ~ Q12.

1. Differential amplifier

Consisting of a pair of op amps.

6.2.3 MANUAL OPERATION CIRCUIT (LOCATE OPERATION CIRCUIT)

* When elevator not completely in UP position (UP detector switch in 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 2 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 emitter. Q6 is this 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 to 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.

7. ADJUSTMENTS

Adjustment position

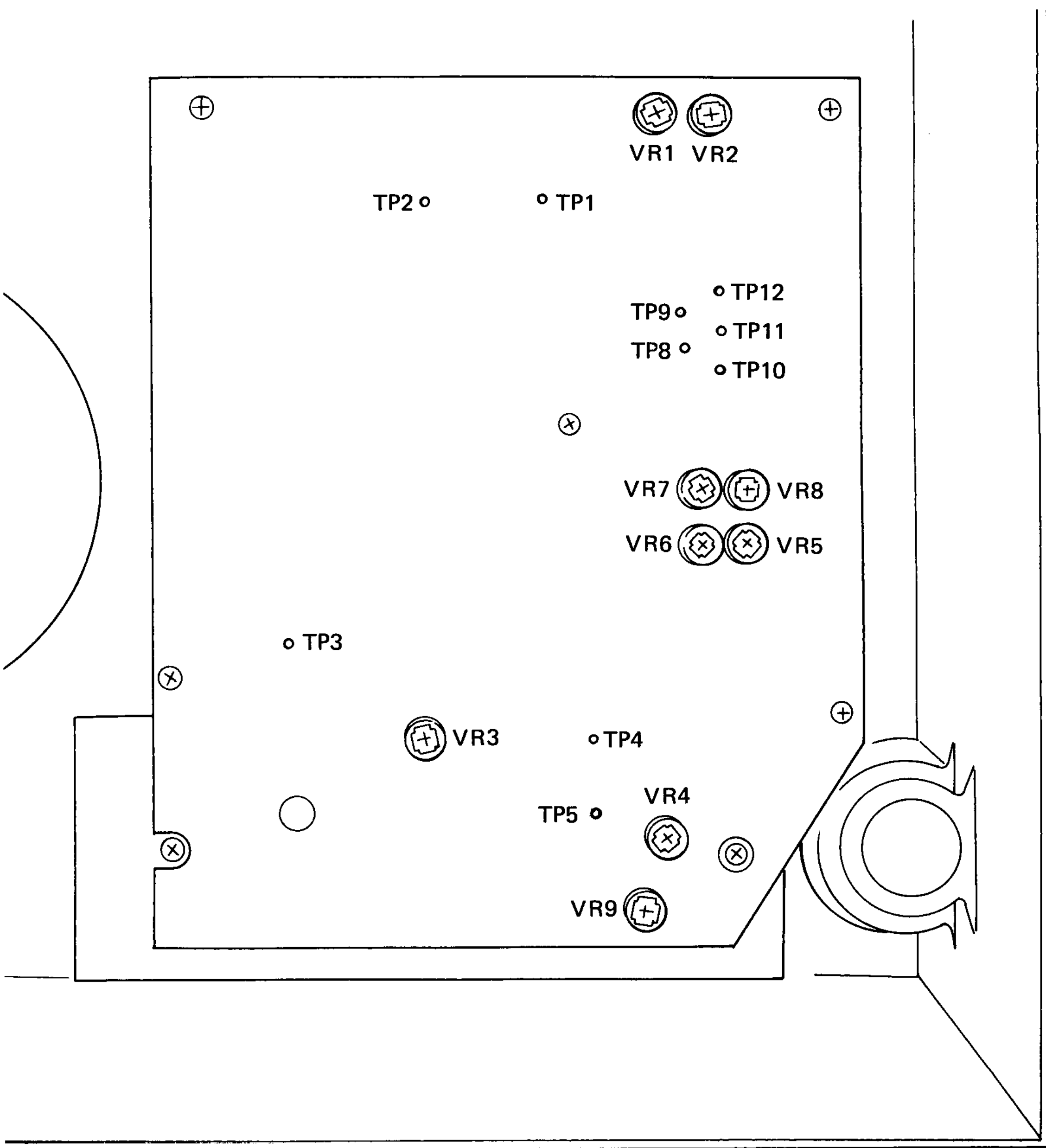


Fig. 7-1

Preparation

1. Disconnect the panel according to the disassembly method outlined earlier.
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 D.D. 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 45rpm speed, while VR2 is the control for 33rpm adjustment.

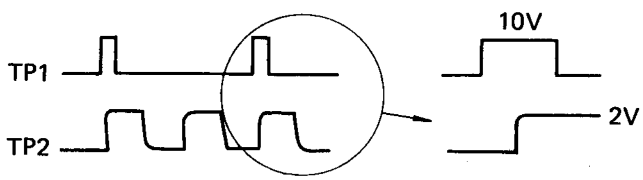


Fig. 7-2

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 sec. for this pulse signal.

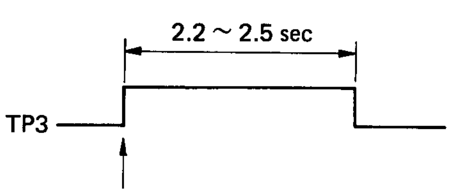


Fig. 7-3

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 10cm/sec.
4. During this operation, adjust VR9 so that the TP4 output saturates at H and L levels at about 50% duty.

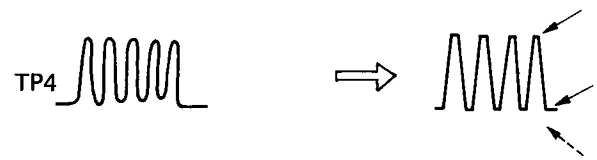
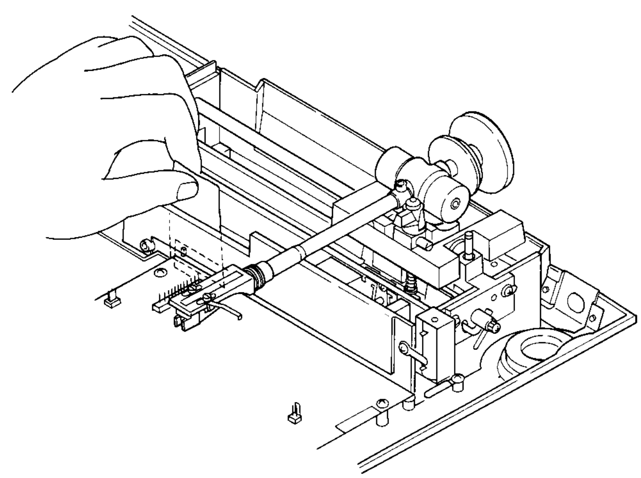


Fig. 7-4

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 end 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 sec by means of VR4.



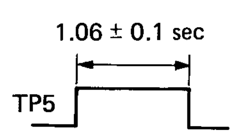


Fig. 7-5

7.5 TRACKING SENSOR ZERO POINT ADJUSTMENT

1. Set the arm elevator to the UP position, and adjust VR8 to obtain of voltage of less than ±0.1V 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 ±0.35V.

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 DD motor rotation.
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 tonearm 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.

*1. 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.

*2. Perform the above tracking sensor adjustment procedures (7.5 and 7.6) at least twice.

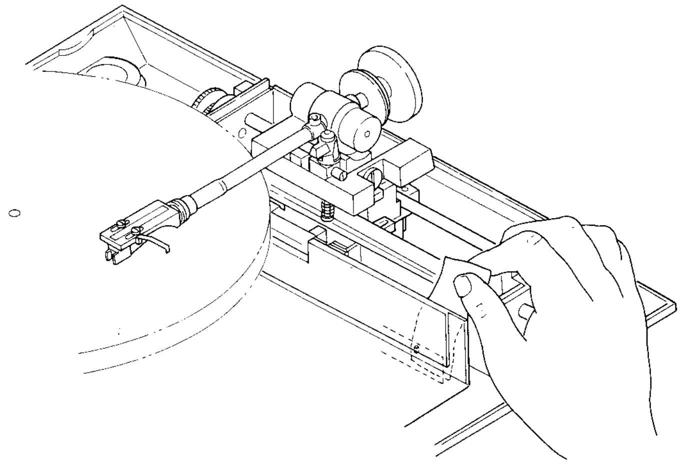


Fig. 7-7

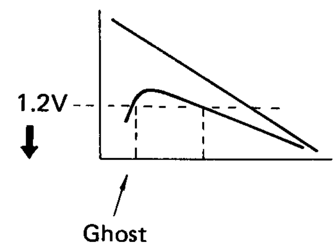


Fig. 7-8

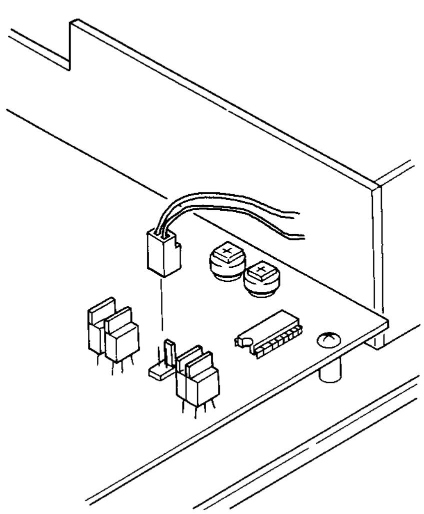


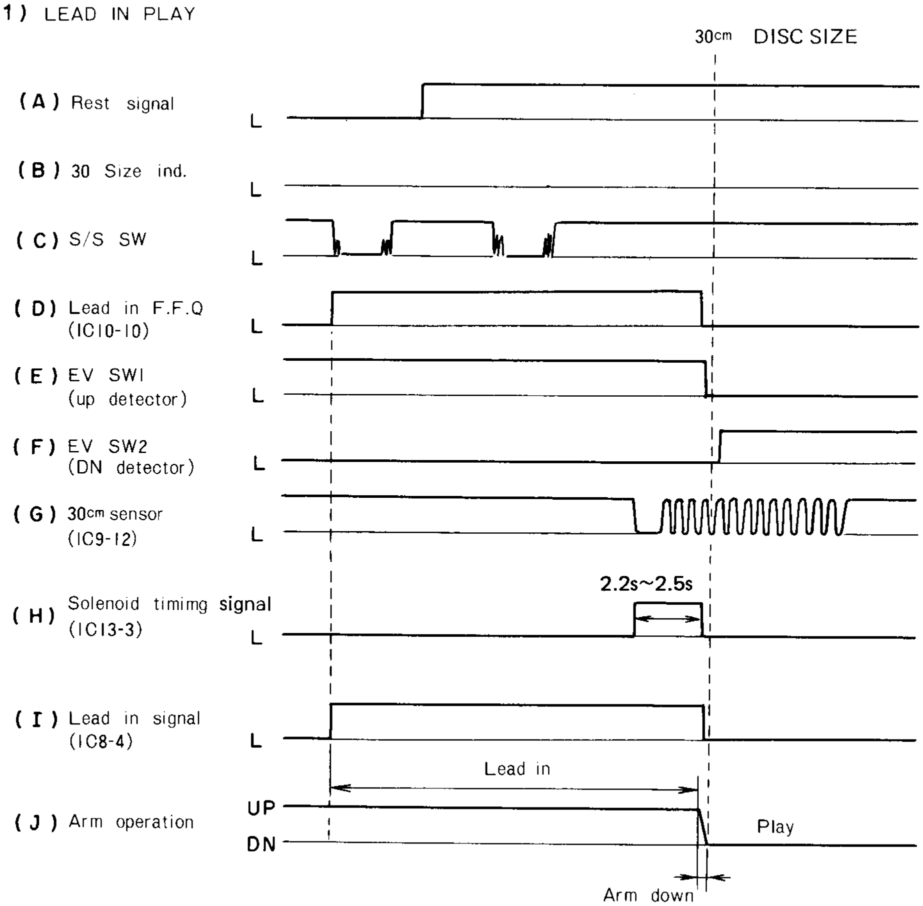
Fig. 7-6

7.7 LEAD-IN AND RETURN SPEED ADJUSTMENT

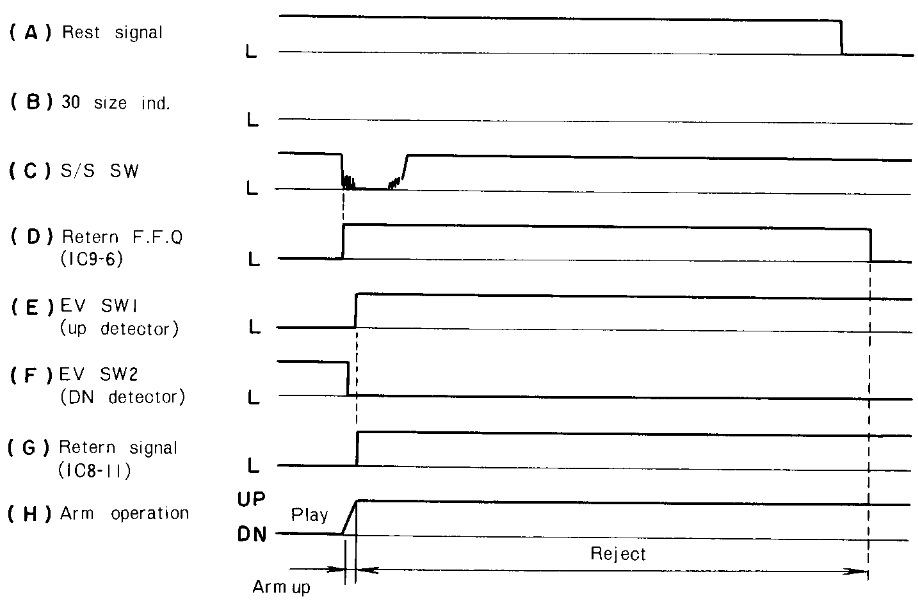
1. Set the record size selector to the 17cm position.
2. Press the START/STOP key to commence the tonearm lead-in operation.
3. Adjust VR5 so that the time required to reach the 17cm position is 5.5 to 6.5 seconds.
4. Then adjust VR6 so that the time required for the tonearm to return to rest from the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

8. TIMING CHART

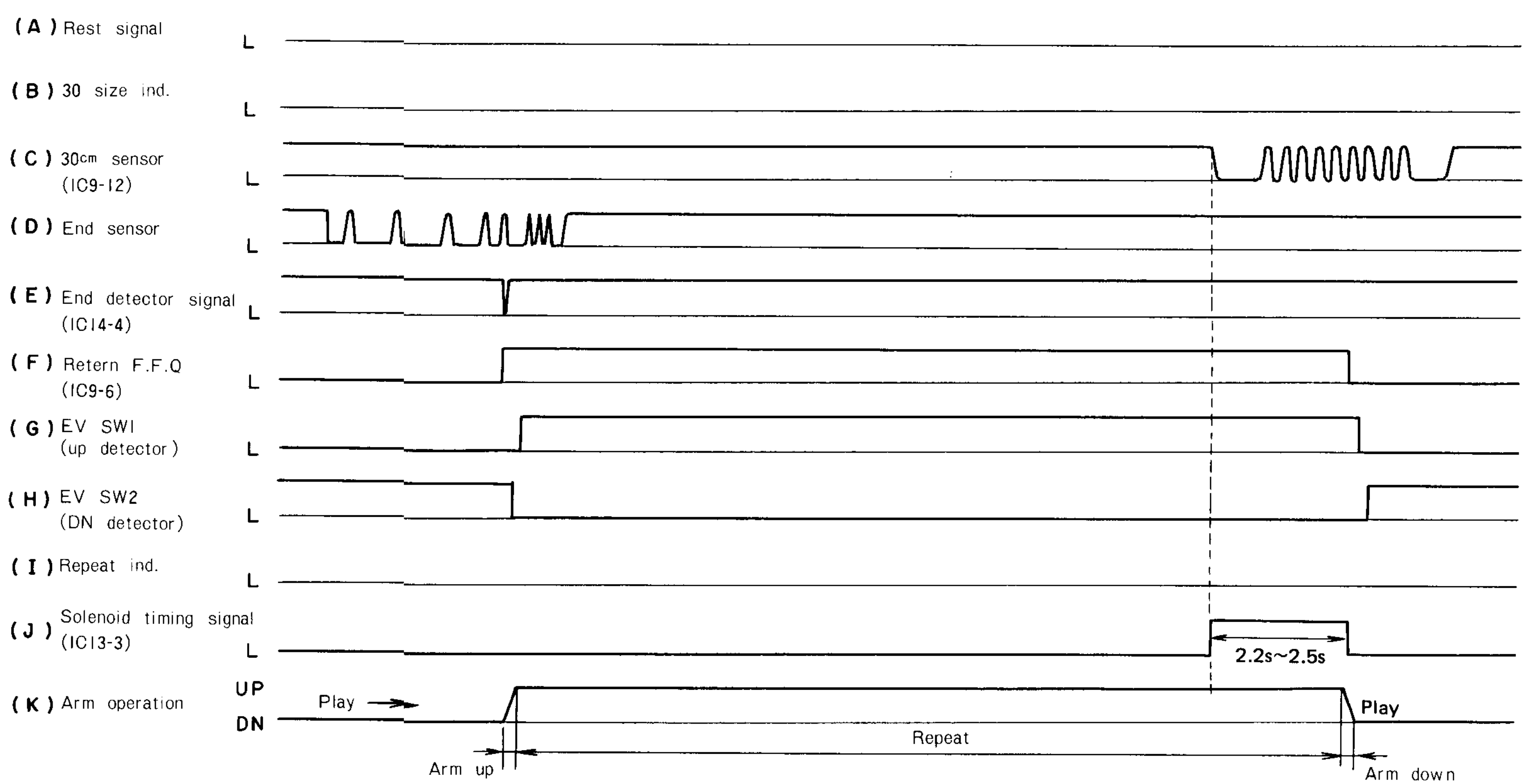
(1) LEAD IN PLAY



(2) REJECT



(3) REPEAT

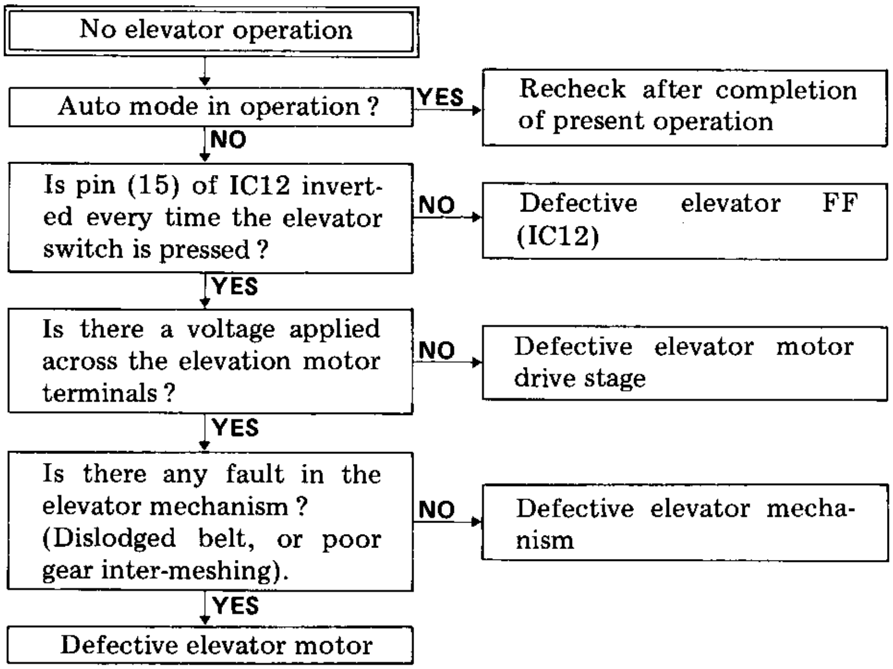


NOTES : UP — Arm elevation UP
DN — Arm elevation DOWN
S/S— START·STOP Switch
F.F — FLip Flop
EV — Elevation (Tonearm)

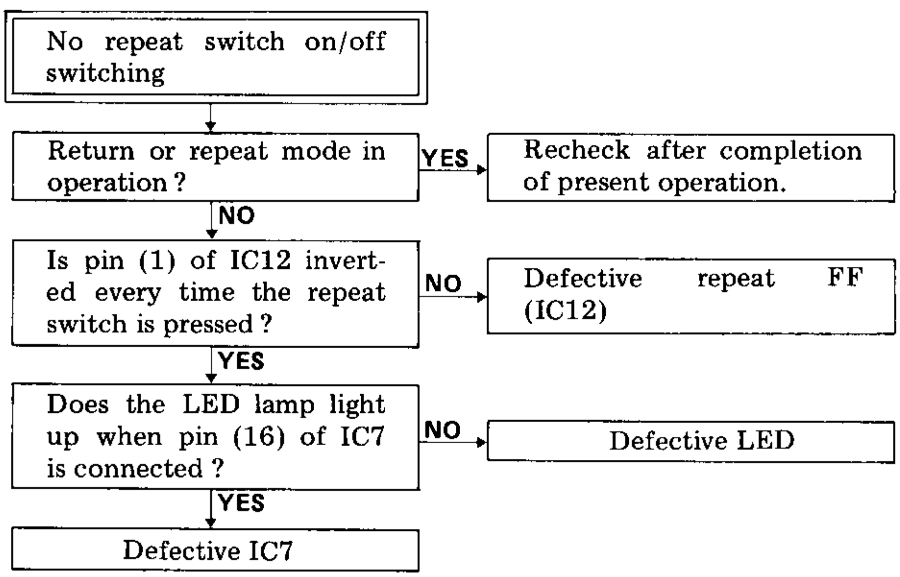
9. TROUBLE SHOOTING

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?
  - **NO** → Defective tracking sensor stage (defective lamp or CdS element, or disconnected lead wire).
  - **YES** → Is there a voltage difference between TP9 and TP12 (around 10 to 15V)?
    - **NO** → Defective IC21
    - **YES** → Defective drive coil / Defective drive transistor / Incorrect magnetic polarity

9.1.11

Abnormal tonearm movement

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

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

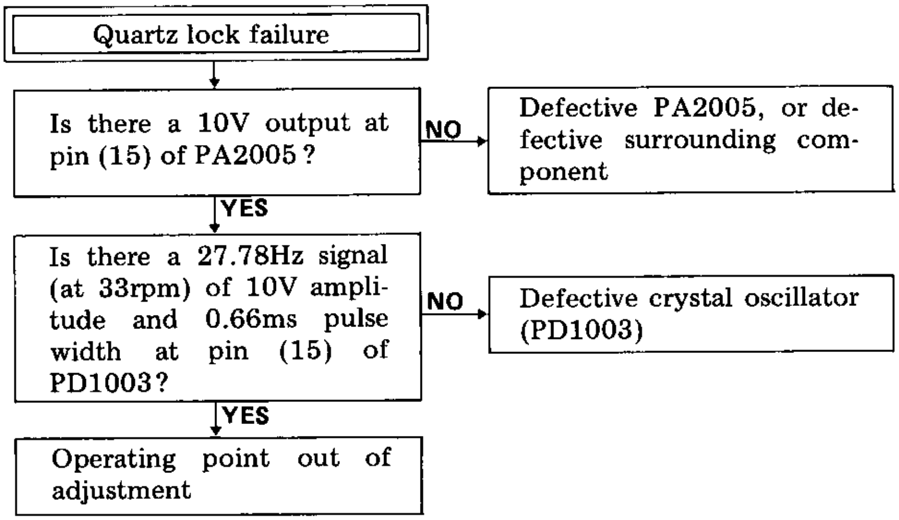
YES ↓

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

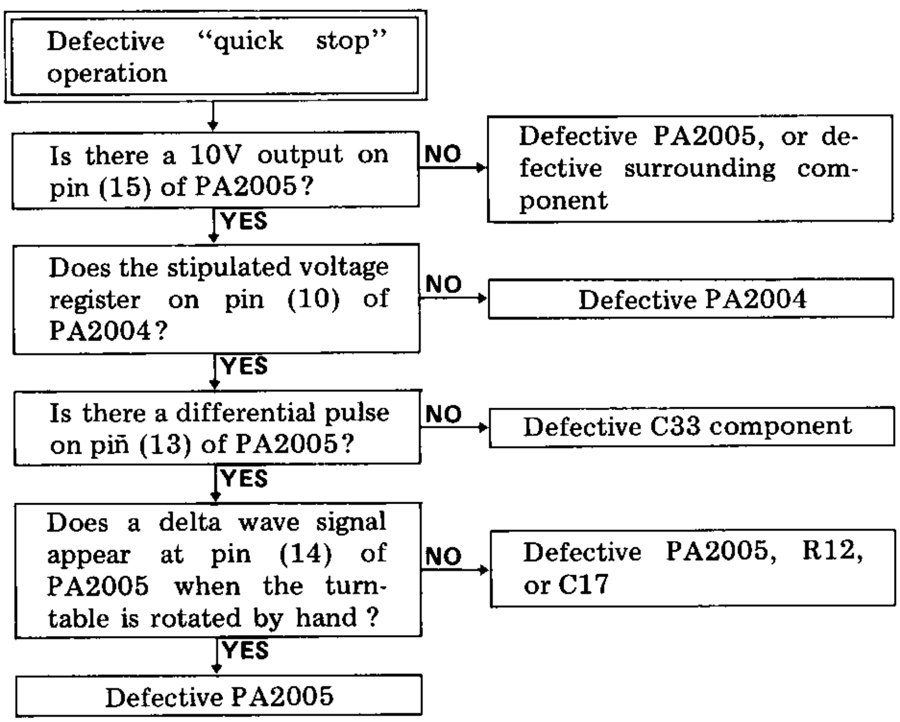
YES ↓

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

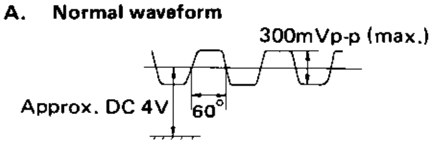
9.1.15

Motor runaway

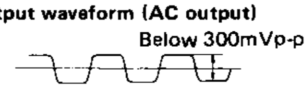
- Is there a 10V output on pin (15) of PA2005?
  - NO → Defective PA2005 or surrounding component
  - YES ↓
- Is there a 55.5Hz square wave signal on pin (5) of PA2004 when the motor speed is held to 33-1/3rpm by hand?
  - NO → Is there an input from the FG circuit board?
    - NO → Defective wiring, or defective speed detector circuit board
    - YES → Defective PA2004 or defective R3, R4 C6~C8 component
  - YES ↓
- Is there a 55.5Hz square wave signal on pin (10) of PA2004 when the motor is held to the same speed (33-1/3rpm) in the same way again?
  - NO → Defective PA2004
  - YES ↓
- While measuring the voltage between pins (12) (−) and (14) (+) of PA2004 with the motor stopped by hand, let the motor speed (rpm) increase gradually. Does the voltage vary gradually from −0.5 to +2V?
  - NO → Is there a 27.78Hz signal (at 33−1/3rpm) on pin (15) of PD1003?
    - NO → Defective PD1003
    - YES → Defective PA2004 or related component
  - YES ↓
- Is there any abnormality in the waveforms observed in the oscilloscope (see accompanying diagrams) when measuring the waveforms at each of the Hall element output terminals while keeping the motor speed steady at 33−1/3rpm?
  - NO → Defective Hall element or Hall element resistance
  - YES → Defective PA2005

[Hall element output waveforms]

A. Normal waveform

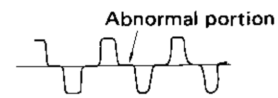


B. Low output waveform (AC output)

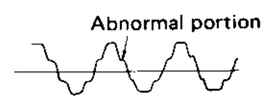


C. Examples of distorted waveform (but normal output level)

Ex. 1

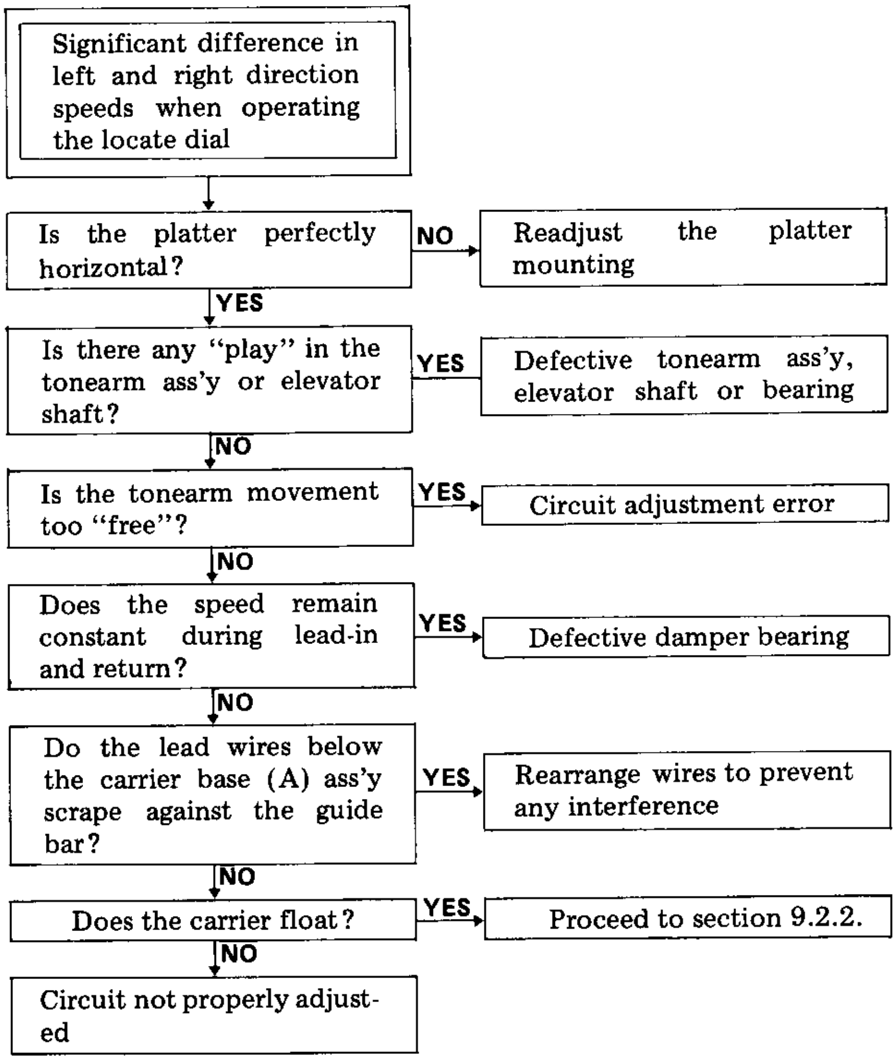


EX. 2

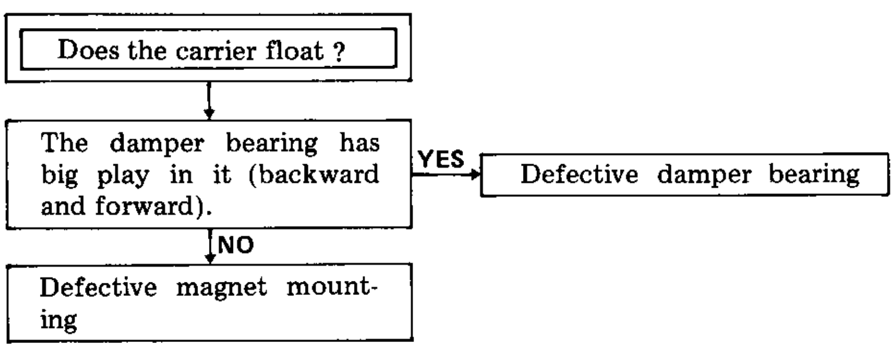


9.2 MECHANISM BLOCK

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

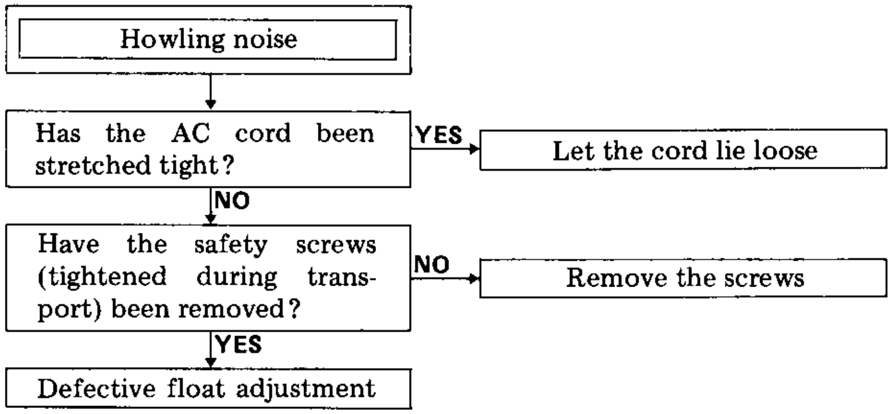
- Is the platter perfectly horizontal?
  - NO → Readjust the platter mounting
  - YES ↓
- Is there any "play" in the tonearm ass'y or elevator shaft?
  - YES → Defective tonearm ass'y, elevator shaft or bearing
  - NO ↓
- Is there a gap between the elevator sheet and tonearm rubber tip?
  - NO → Readjust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

9.2.6

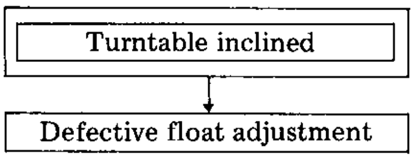
When tonearm shifts across and traces record groove

- 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.

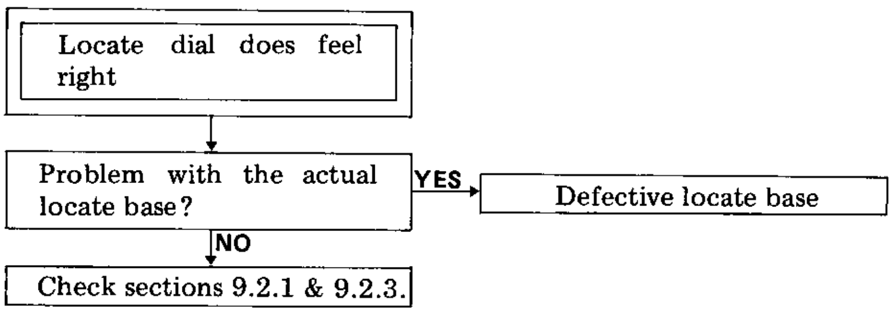
9.2.7



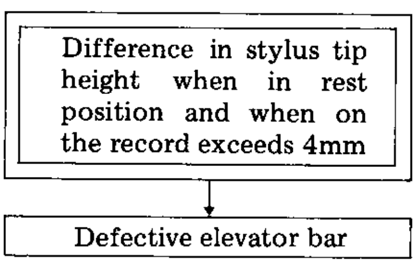
9.2.8



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
  - 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

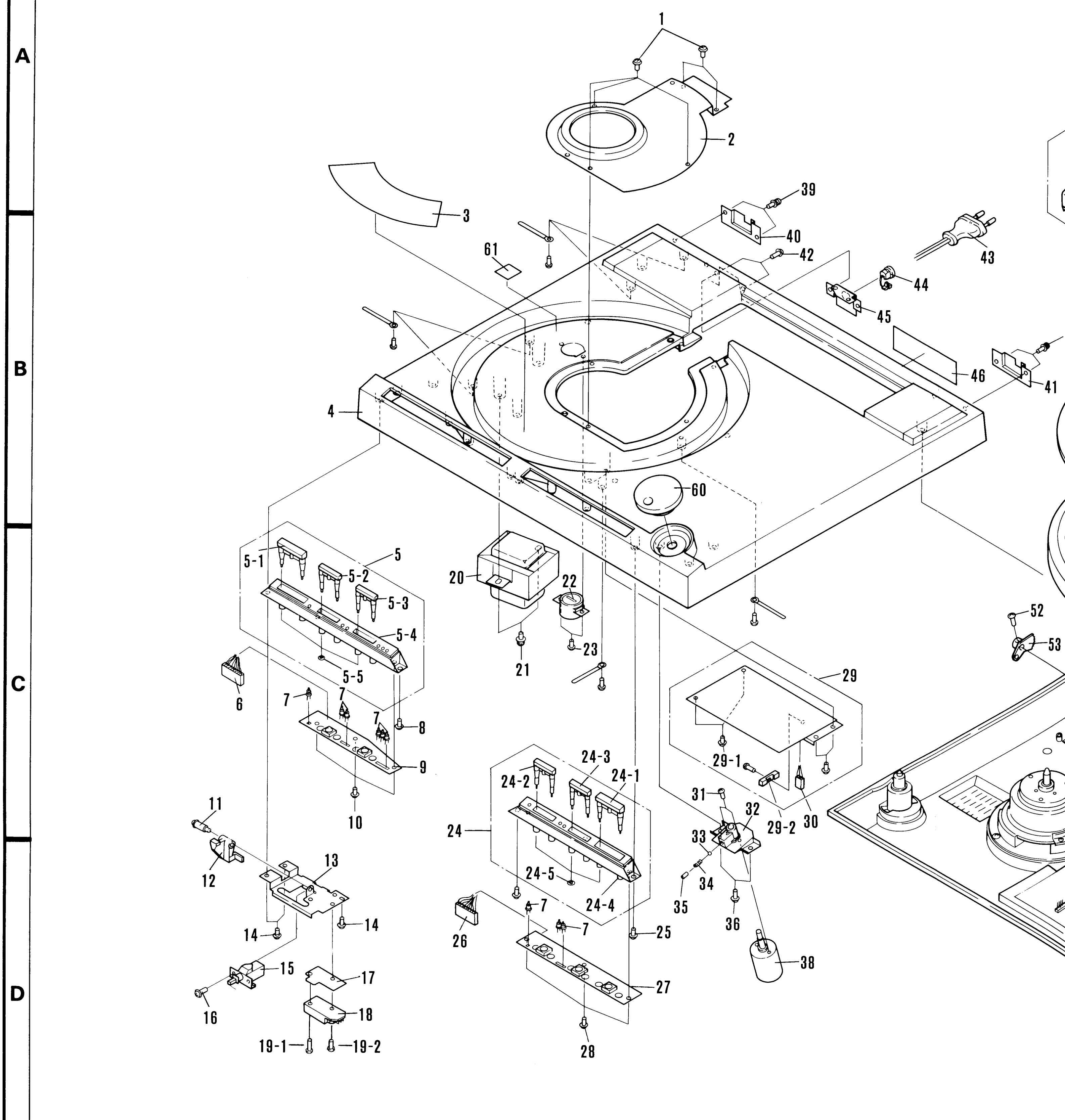
Return failure

- 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

1	2	3

10. EXPLODED VIEWS

10.1 EXTERIOR



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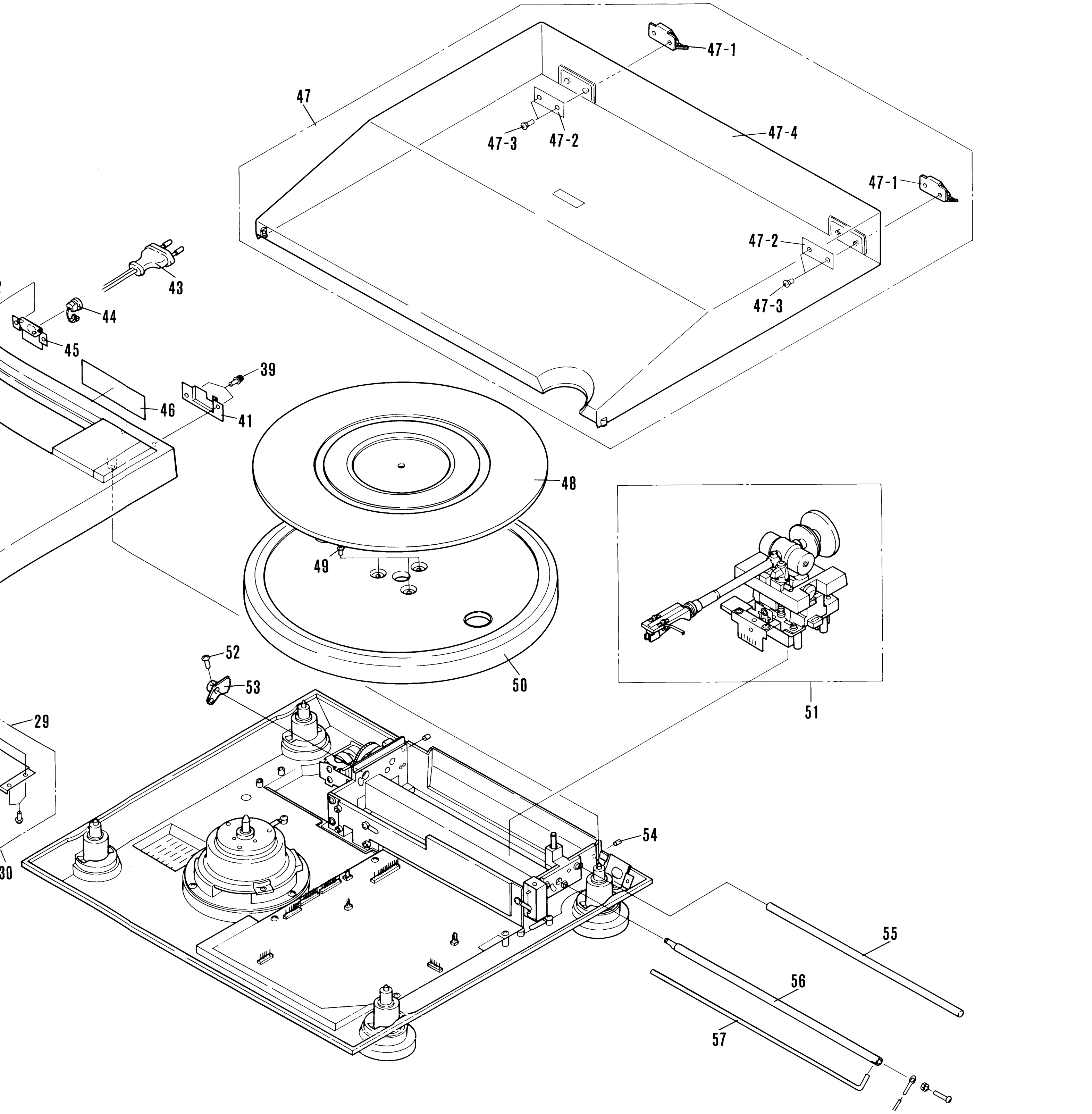
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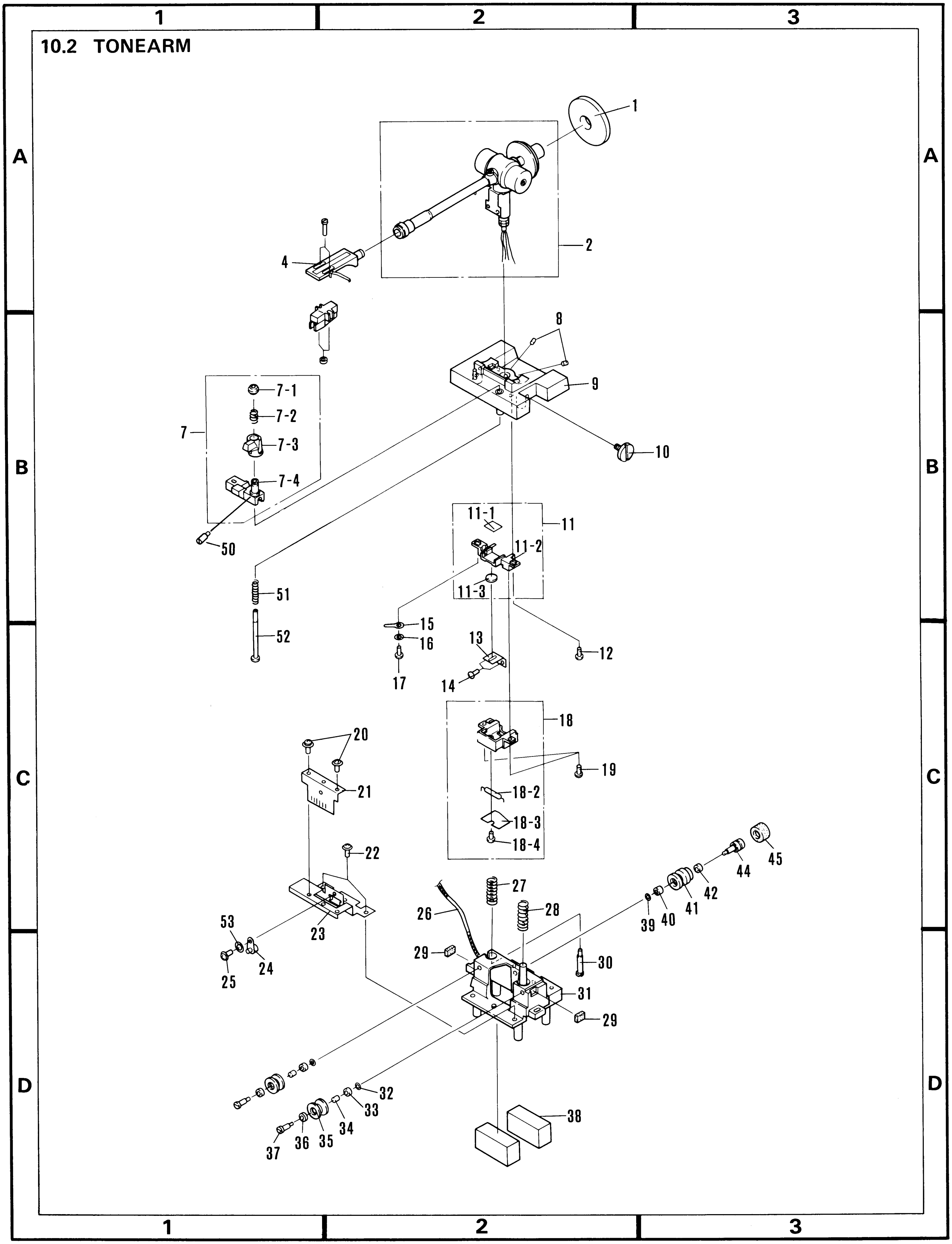
Parts List of Exterior

- *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 number cannot be supplied.*

Key No.	Part No.	Description
1.		Washer faced alutite screw 3 x 8
2.		Cover
3.	PRW-068	Caution label
4.	PNR-126	Panel
5.		Control case assembly
5-1	PAD-058	Push button unit A
5-2	PAD-059	Push button unit E
5-3	PAD-060	Push button unit C
5-4	PNX-135	Control case A
5-5		CS type washer 2ϕ
6.	PDE-065	Connector assembly
7.	GL-2PR1	LED
8.		Washer faced alutite screw 3 x8
9.		P.C. Board
10.		PT 3 x 8
11.	PBA-104	Screw
12.	PNX-092	Lever
13.		Switch base
14.		Washer faced alutite screw 3 x 8
15.	PSG-017	Push switch
16.		Washer feed alutite screw 3 x 6
⚠ 17.	PEC-052 (HET, HBT)	Insulator
⚠ 18.	PSF-012 (HET, HBT)	Microswitch
	PSF-008 (S/G)	"
19-1		PSA 3 x 15
19-2	(HET, HBT)	Plastic screw 3 x 15
	(S/G)	PSA 3 x 15
⚠ 20.	PTT-097 (HET, HBT)	Power transformer
	PTT-100 (S/G)	
21.		PSB 4 x 8
⚠ 22.	PSB-002 (HET, HBT)	Line voltage selector
	PSB-007 (S/G)	
23.		Washer faced alutite screw 3 x 8
24.		Control case B assembly
24-1	PAD-061	Push button unit B
24-2	PAD-062	Push button unit D
24-3	PAD-063	Push button unit F
24-4	PNX-130	Control case B
24-5		CS type washer 2ϕ
25.		Washer faced alutite screw 3 x 8
26.	PDE-071	Connector assembly
27.		P.C. Board
28.		PT3 x 8
⚠ 29.	PWR-057 (HET, HBT)	Power supply assembly
	PWR-058 (S/G)	
30.	PDE-067	Connector assembly
31.		PSA 2.6 x 6
32.	PNX-094	Base
33.	PEC-063	Nylon ball 3ϕ
34.	PBH-257	Spring
35.		SF 4 x 5
36.		Washer faced alutite screw 3 x 8

Key No.	Part No.	Description
37.		
38.	PXT-403	Motor
39.		Washer faced alutite screw 3 x 8
40.	PNW-338	Plate L
41.	PNW-339	Plate R
42.		PSB 3 x 8
⚠ 43.	PDG-021 (HET, HBT)	AC power cord
	PDG-004 (S/G)	
44.	PEC-051 (HET, HBT)	Strain relief
	E32-056 (S/G)	
45.		Angle
46.		Label
47.		Dust cover assembly
47-1	PXA-463	Hinge assembly
47-2	PNB-105	Plate
47-3		DCM 4 x 8
47-4	PNV-035	Dust cover
48.	PEA-036	Rubber mat assembly
49.	PXB-134	Screw
50.	PNR-121	Turntable platter assembly
51.		
52.		PM 3 x 5
53.	PNX-108	EV gear
54.		
55.	PLB-051	Guide bar B
56.	PLB-050	Guide bar A
57.	PLB-067	EV bar
58.		
59.		
60.	PXT-391	Dial unit
61.	PRW-046	Label

10.2 TONEARM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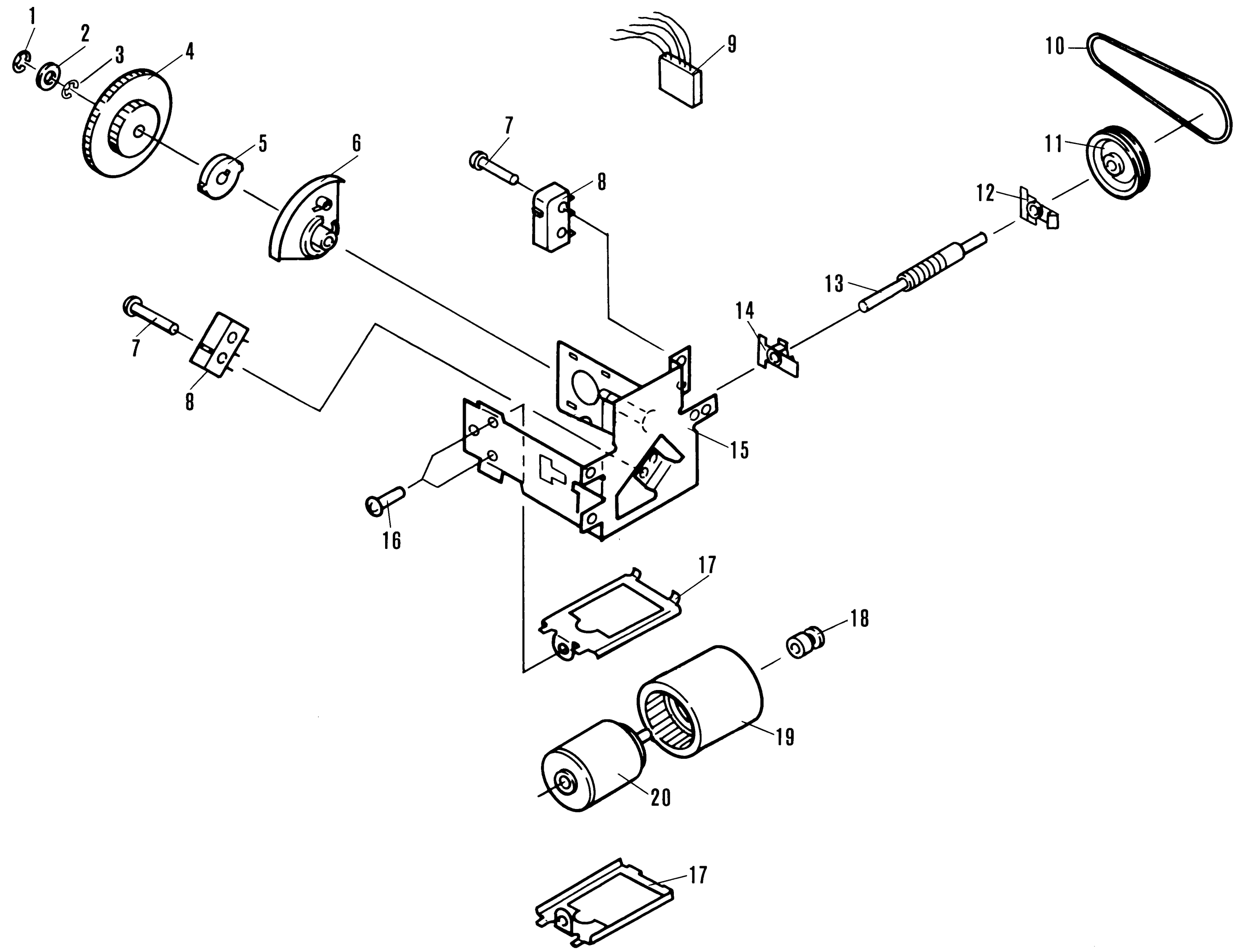
Parts List of Tonearm

• *Parts without part number cannot be supplied.*

Key No.	Part No.	Description
1	PXA-804	Weight assembly
2	PPD-601	Tone arm assembly
3		
4	Head shell assembly	
5		
6.		
7.	PXB-116	EV sheet assembly
7-1		Stopper
7-2		Spring
7-3		Cramper
7-4		EV sheet unit
8.		HS 3x5
9.	PNR-127	Base A
10.	PXT-414	Screw
11.		
11-1		Sensor board
11-2	PNX-103	Spacer
11-3	PCX-051	Cds
12.		PM 2.6 x 6
13.		Tracking shater
14.		PM 2.6 x 5
15.		Terminal
16.		FW 2.6 x 5 x 0.5t
17.		PM 2.6 x 6
18.		
18-1.	PNX-102	Cupler base
18-2.	PEL-041	Lamp
18-3		Sensor board
18-4		PT 2.6 x 8
19.		PT 2.6 x 8
20.		PSA 3x5
21.		Shutter
22.		Washer faced alutite screw 3 x 6
23.		Plate
24.		Pin unit
25.	PBA-094	Screw
26.	PDA-013	Shield tube
27.	PBH-254	Spring
28.	PBH-254	Spring
29.	PEB-171	Rubber pad
30.	PLB-060	Screw
31.		Base B
32.	PBE-017	Washer
33.	PXB-121	Bearing
34.	PNC-145	Spacer
35.	PLB-046	Roller
36.	PXB-120	Bearing
37.	PLB-047	Shaft
38.		Magnet
39.	PBE-017	Washer
40.	PXB-120	Bearing
41.	PLB-059	Shaft holder A
42.	PXB-121	Bearing
43.		
44.	PXT-394	Shaft holder B unit
45.	PEB-158	Rubber cap
46.		
47.		
48.		
49.		
50.	PAD-064	EV adjust screw
51.	PBH-255	EV spring
52.		EV shaft
53.		Plastic washer 4ϕ x 0.13t

10.3 EV MECHANISM



Parts List

• *Parts without part number cannot be supplied.*

Key No.	Part No.	Description
1.		EW3
2.	PBE-018	Washer
3.	PBE-014	Washer
4.	PNW-418	Gear F
5.		Plate
6.	PNW-390	Cam
7.		PT 2x10
8	PSF-005	Microswitch
9	PDE-068	Connector assembly
10	PEB-097	Belt

Key No.	Part No.	Description
11	PNW-393	Pulley
12	PNW-391	Collar
13	PNW-485	Worm gear
14	PNW-391	Collar
15		Chassis
16.		PSA 2.6x5
17		Frame
18	PNW-392	Motor pulley
19	PEB-167	Tube
20	PXM-073	Motor

1	2	3

10.4 BOTTOM PLATE

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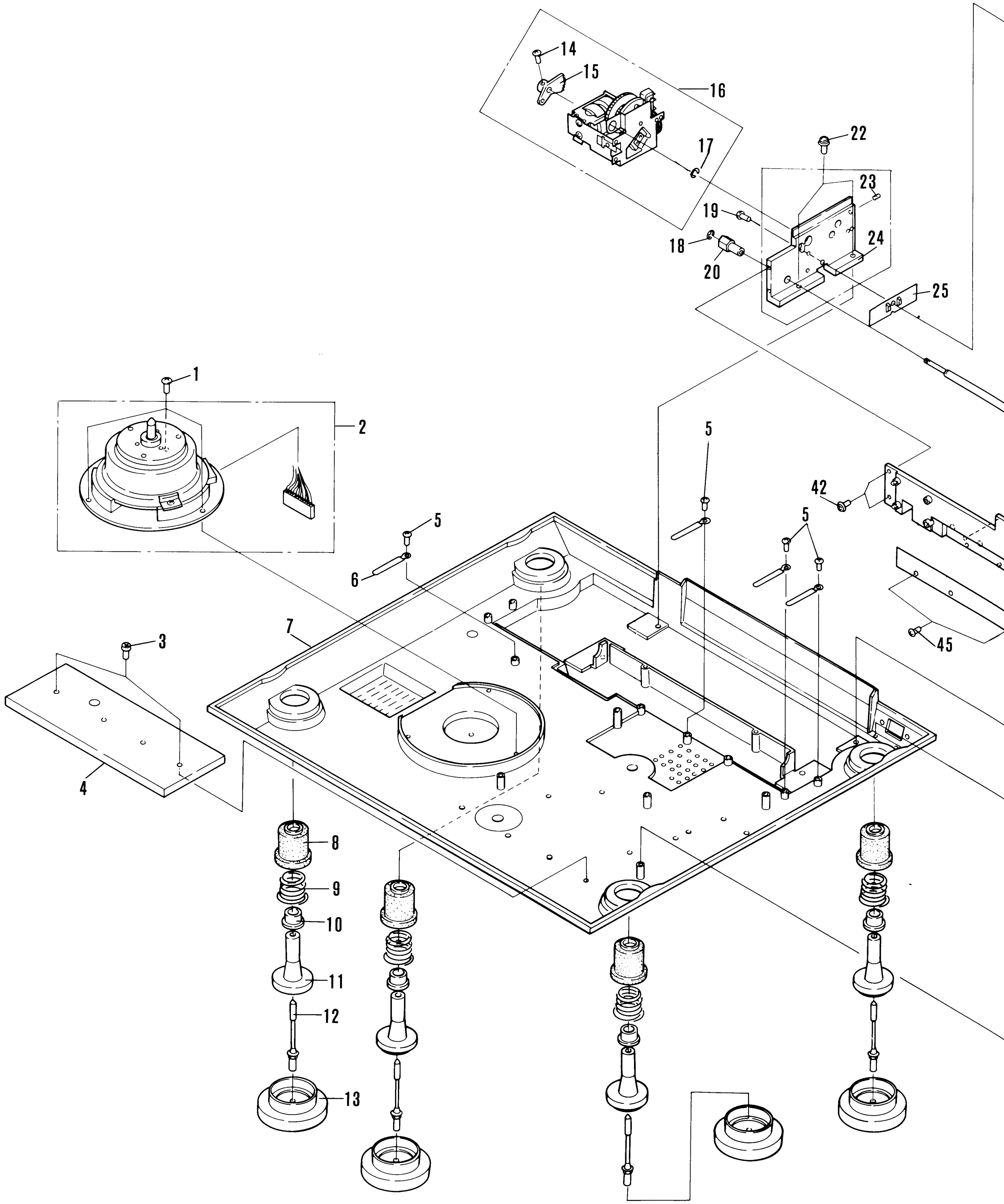
B
C
D



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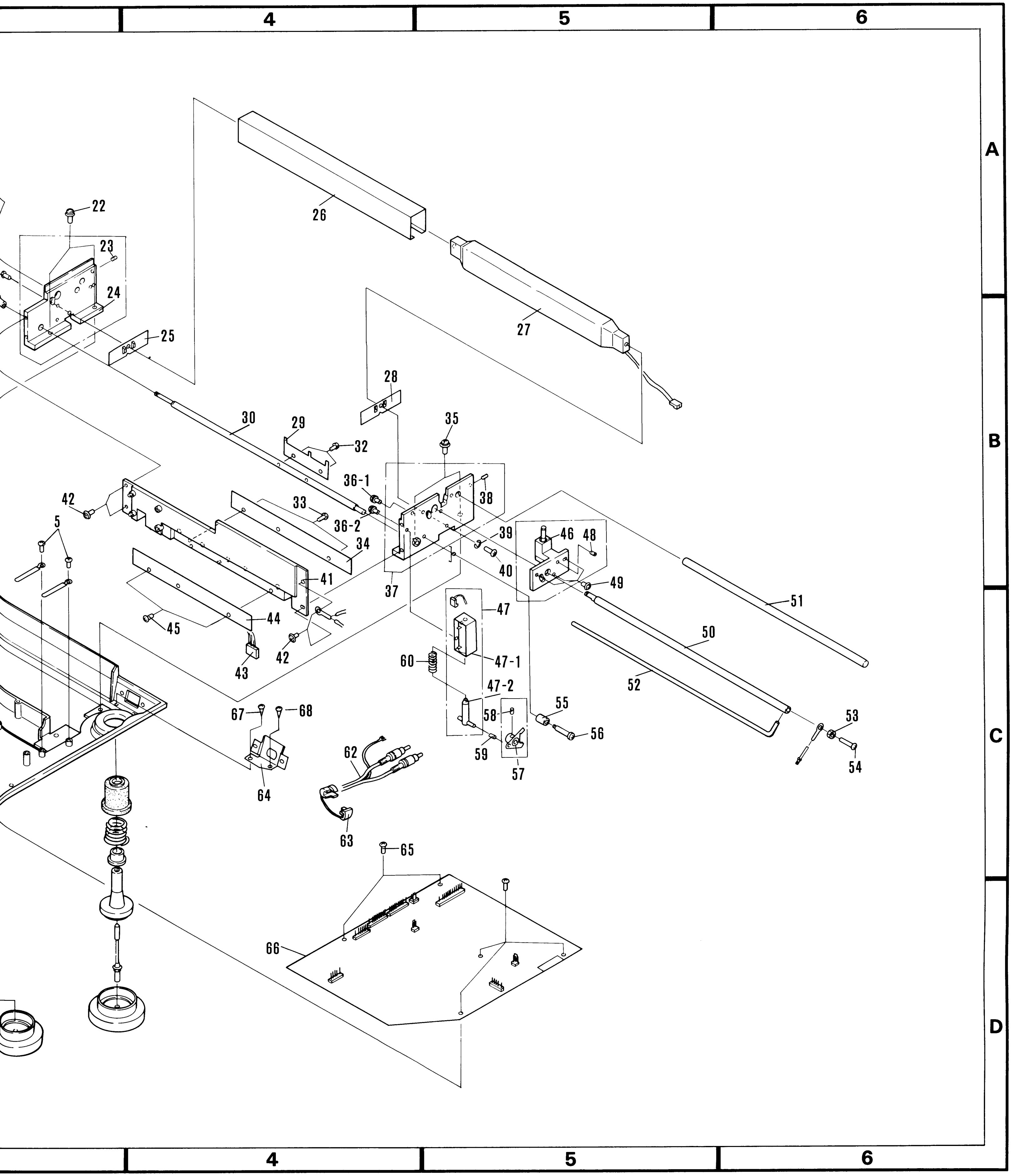

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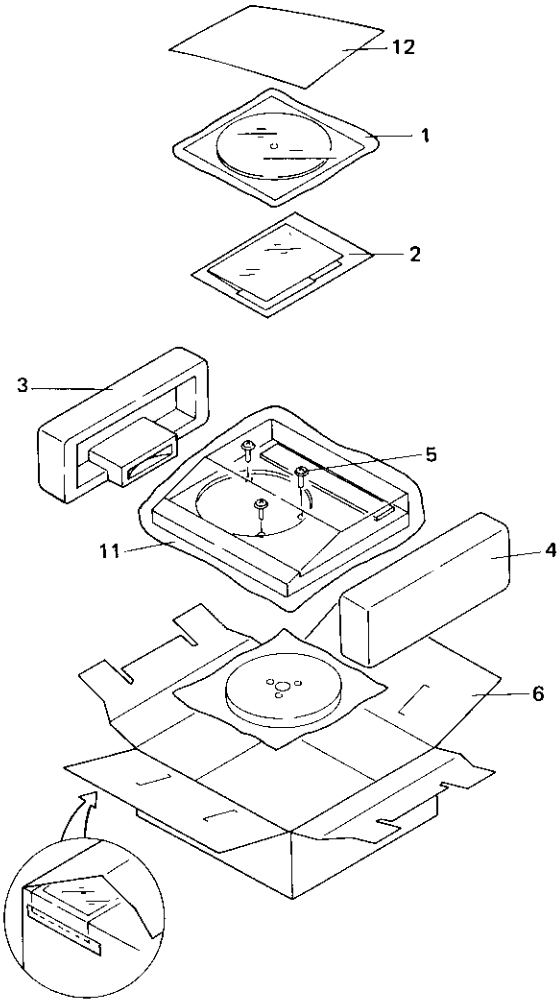
Parts List of Bottom Plate

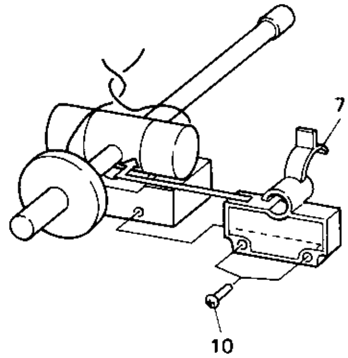
● *Parts without part number cannot be supplied.*

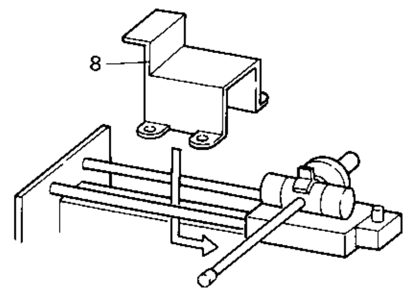
Key No.	Part No.	Description
1.		PSA 4 x 16
2.	PXB-061	Motor assembly
3.		PSB 4 x 16
4.		Balance weight
5.		PT 3 x 12
6.		Cord clamper
7.		Under base
8.	PEB-102	Rubber cushion A
9.	PBH-169	Spring C
10.	PNW-375	Spring holder
11.	PNW-483	Case C
12.	PBA-105	Screw
13.	PXT-392	Case unit
14.		PM3x5
15.	PNX-108	EV gear
16.		EV mechanism assembly
17.		Ew 6
18.		Ew 3
19.		PSB 4 x 16
20.		Adjust shaft holder
21.		
22.		PSB 4 x 12
23.		SF 3 x 5
24.		Base B
25.		Plate
26.		Coil cover
27.	PXB-118	Coil assembly
28.		Plate
29.		Plate
30.		Bar
31.		
32		PSF 3 x 6
33.		PT 3 x 8
34.		Sensor board
35.		PSB 4 x 12
36-1		PM 2.6 x 6
36-2		PM 2.6 x 8
37.		Base A
38.		SF 3 x 5
39.		
40.		PSB 4 x 16

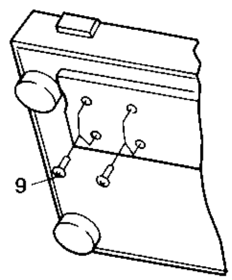
Key No.	Part No.	Description
41.		Case
42.		Washer faced alutite screw 3 x 8
43.	PDE-066	Connector assembly
44.		Sensor board
45.		PT 3 x 8
46.	PXB-119	Cramper assembly
47.	PXP-003	Solenoid assembly
48.		SF 3 x 5
49.		Washer faced alutite screw 3 x 6
50.	PLB-050	Guide bar A
51.	PLB-051	Guide bar B
52.	PLB-067	EV bar
53.		N 3
54.		PM 3 x 12
55.	PEB-155	Stopper cushion
56.	PBA-107	Screw
57.		Stopper unit
58.		HF 3 x 3
59.	PEB-170	Tube
60.	PBH-252	Spring
61.		
62.	PDE-074	Output cord
63.	PEC-051	Strain relief
64.		Angle
65.		PT 3 x 12
66.	PWM-032	Control assembly
67.		PT 3 x 12
68		PT 3 x 8
69.		
70.		

11. PACKING









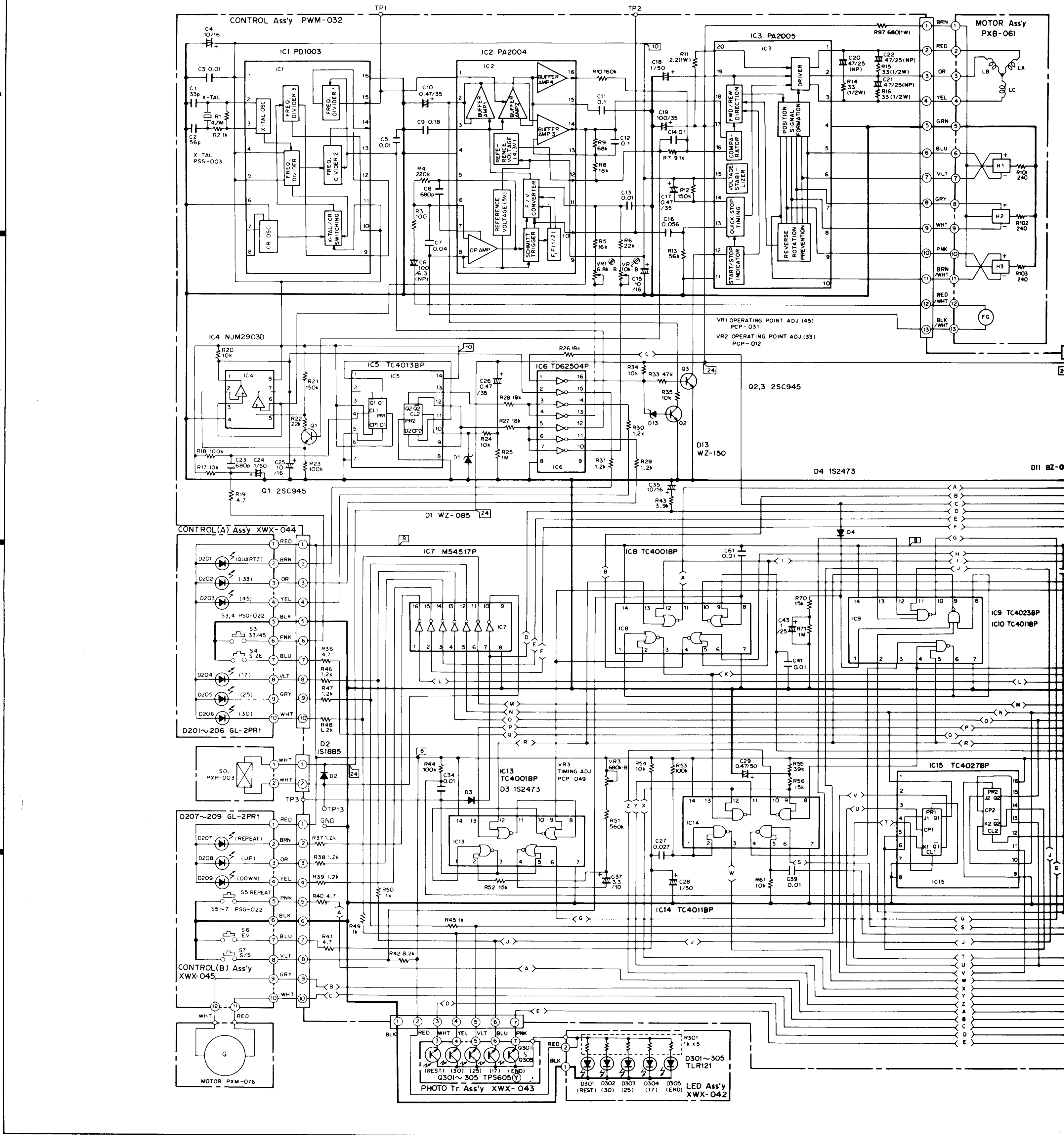
Parts List

Key No.	Part No.	Symbol & Description
1	PEA-036	Rubber mat assembly
2	PRB-156	Operating instructions (English)
	PRD-051(HET, HBT)	Operating instructions (German/French)
3	PHA-109	Protector L
4	PHA-110	Protector R
5	PBA-079	Screw
	B22-026	Washer
6	PHG-408 (HET)	Packing case
	PHG-382 (S/G)	Packing case
7	PNX-098	Arm holder
8	PNX-097	Spacer
9		Screw PSB4x12
10		Screw PSB3x15
11	PHL-006	Cover
12	PHC-049	Upper protector
	PHN-008 (HET)	Headshell case
	PHN-009 (HET)	Headshell case cover

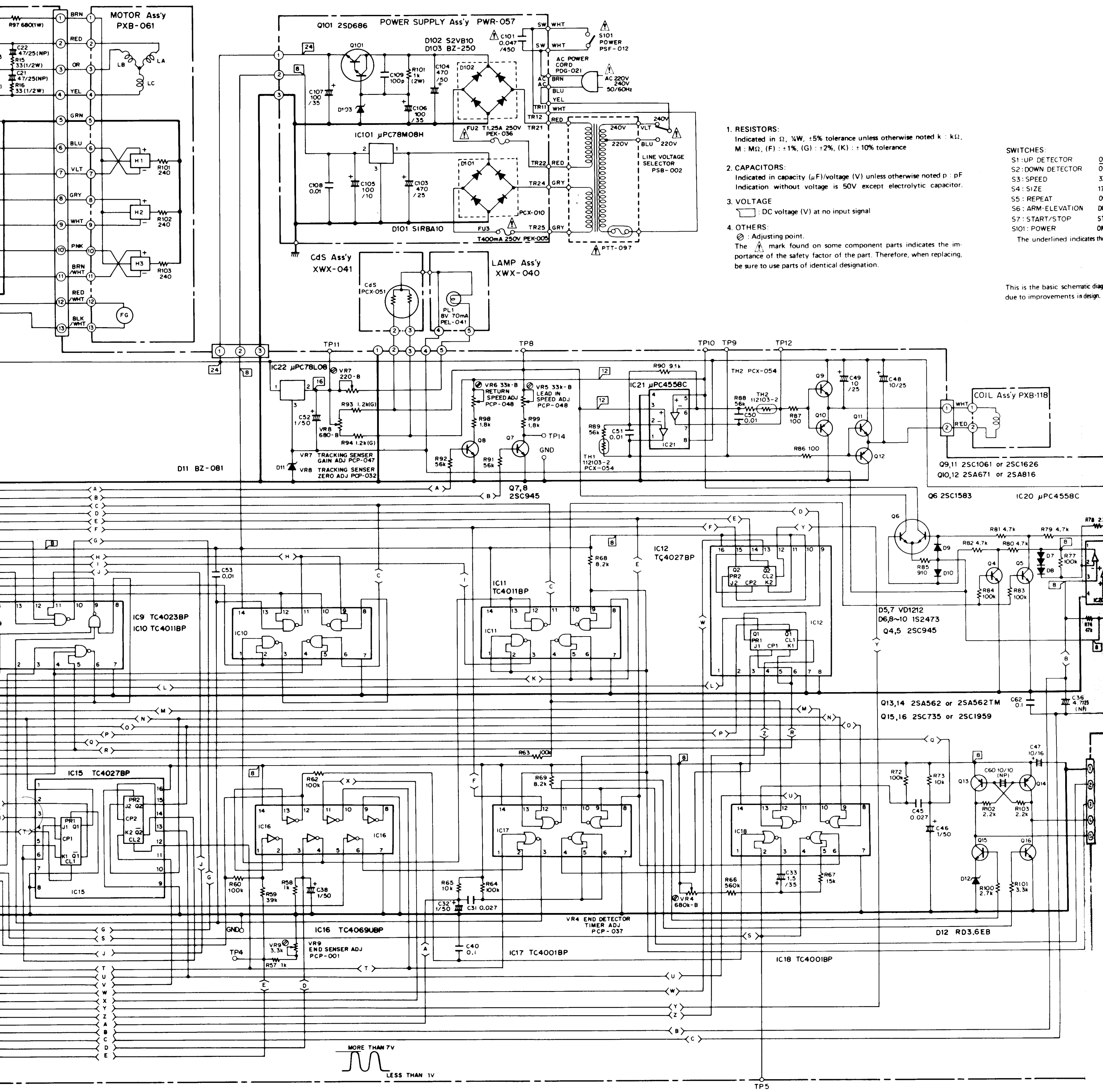
Accessories

Key No.	Part No.	Symbol & Description
	PXA-804	Weight assembly
	KEX-002	Screwdriver
	N93-603	EP Adapter
	PXB-125	Cartridge mounting part assembly
	PEC-012	Overhang gauge
	PAW-007	Level
	PED-016	Cleaning cloth

12. SCHEMATIC DIAGRAM (HET,HBT MODEL)



4	5	6



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 0
- S2 : DOWN DETECTOR 0
- S3 : SPEED 3
- S4 : SIZE 17
- S5 : REPEAT 0
- S6 : ARM-ELEVATION D
- S7 : START/STOP S
- S101 : POWER O

The underlined indicates th

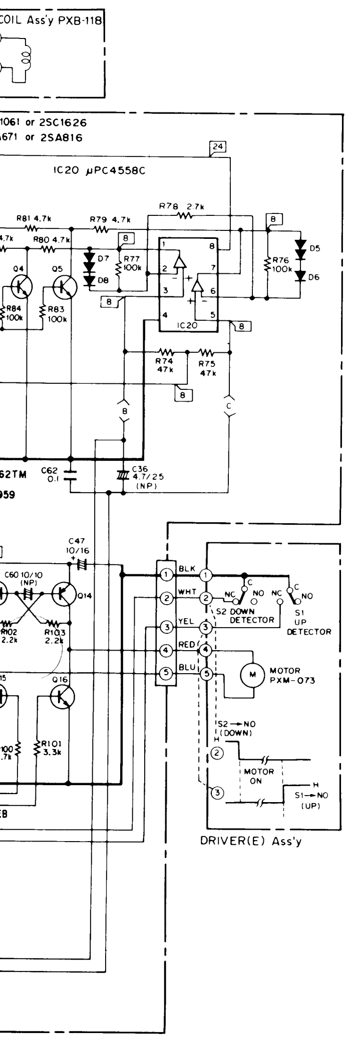
This is the basic schematic diag
due to improvements in design.

4	5	6

7 | 8 | 9

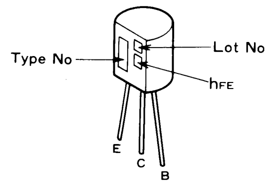
SWITCHES:
S1 : UP DETECTOR ON — OFF
S2 : DOWN DETECTOR ON — OFF
S3 : SPEED 33 rpm — 45 rpm
S4 : SIZE 17 — 25 — 30
S5 : REPEAT ON — OFF
S6 : ARM-ELEVATION DOWN — UP
S7 : START/STOP START — STOP
S101 : POWER ON — OFF
The underlined indicates the switch position.

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

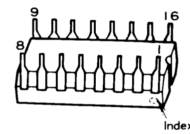


External Appearance of Transistors and ICs

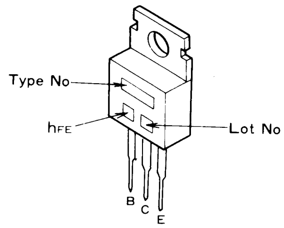
2SA562TM
2SC945
2SC1815
2SC1959



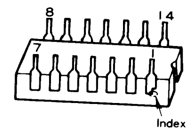
PA2004
PD1003
TD62504P
TC4027BP
M54517P



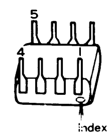
2SA816
2SC1626



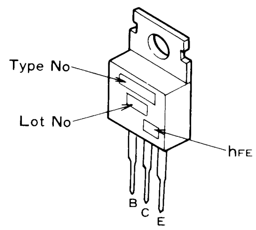
TC4001BP
TC4011BP
TC4013BP
TC4023BP
TC4069UBP



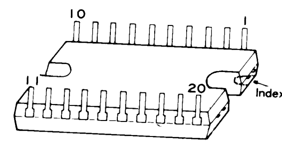
NJM2903
µPC4558



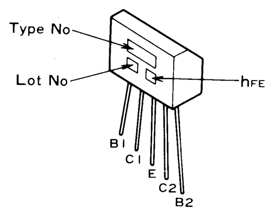
2SA671
2SC106



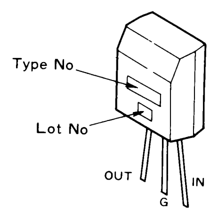
PA2005



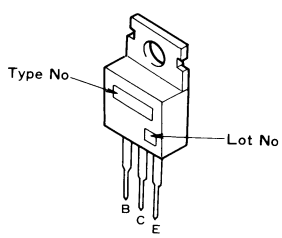
2SC1583



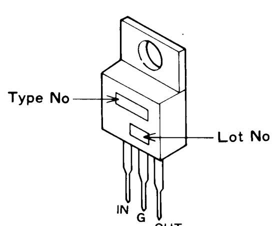
µPC78M08H



2SD686



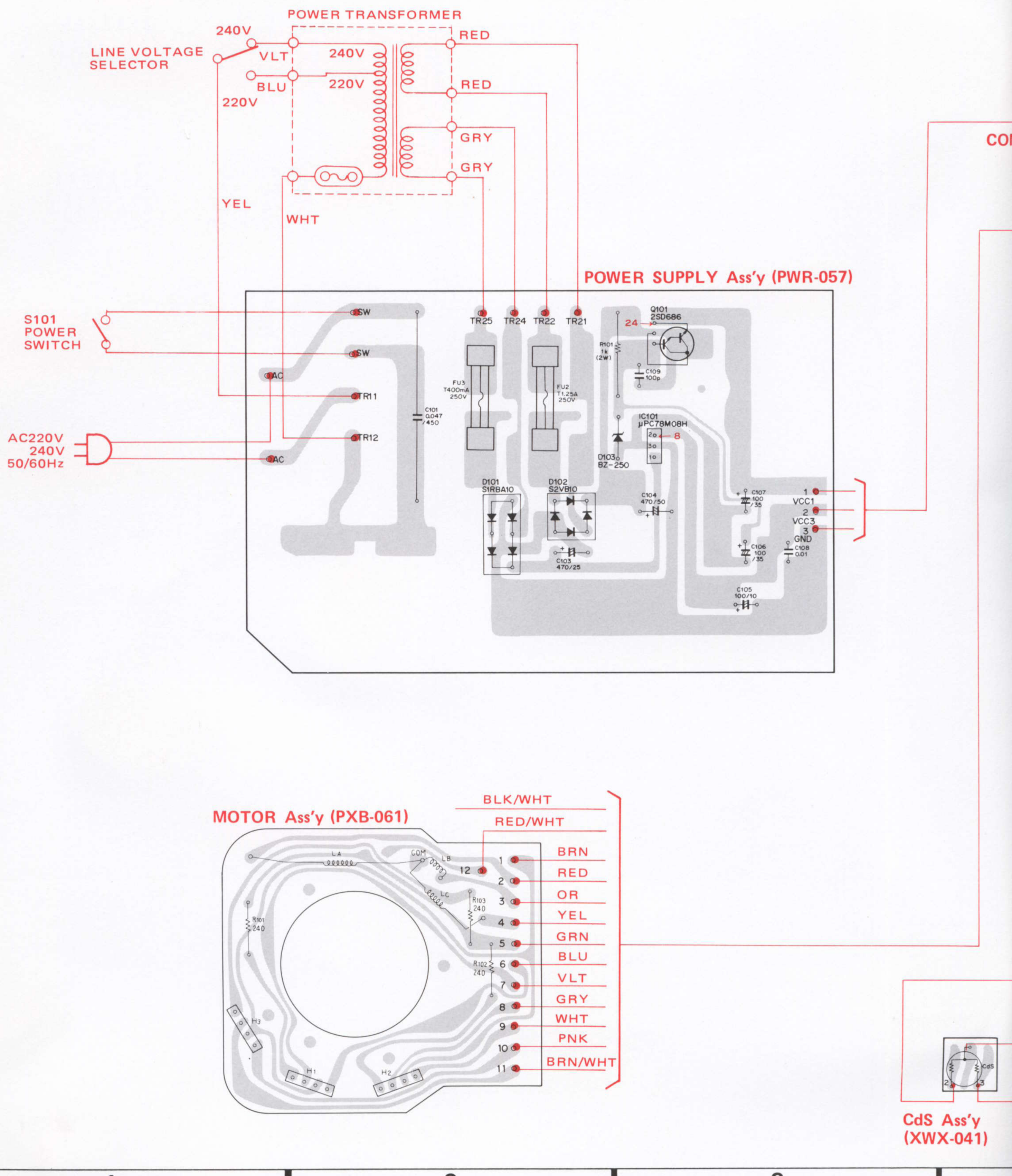
µPC78L08

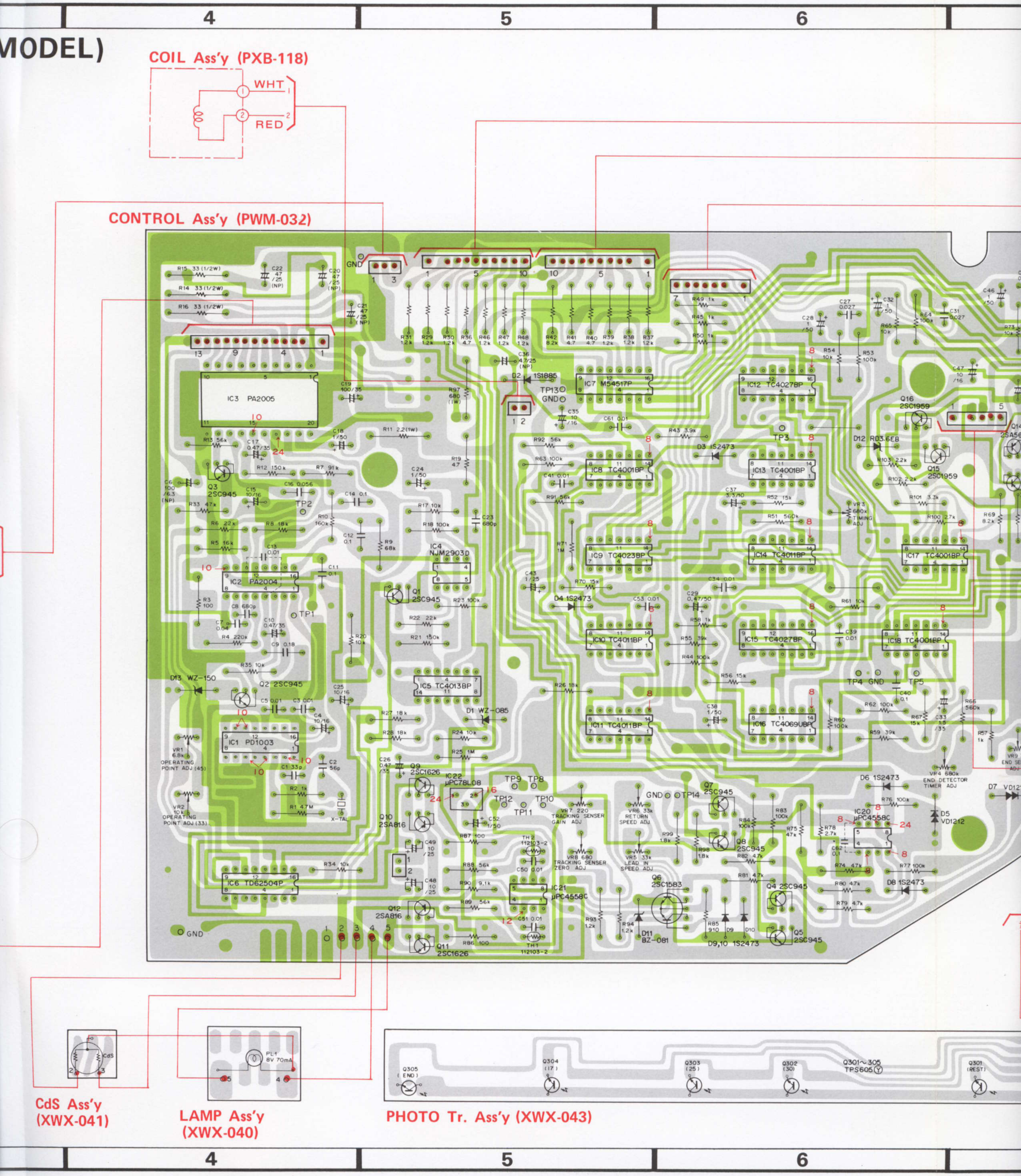


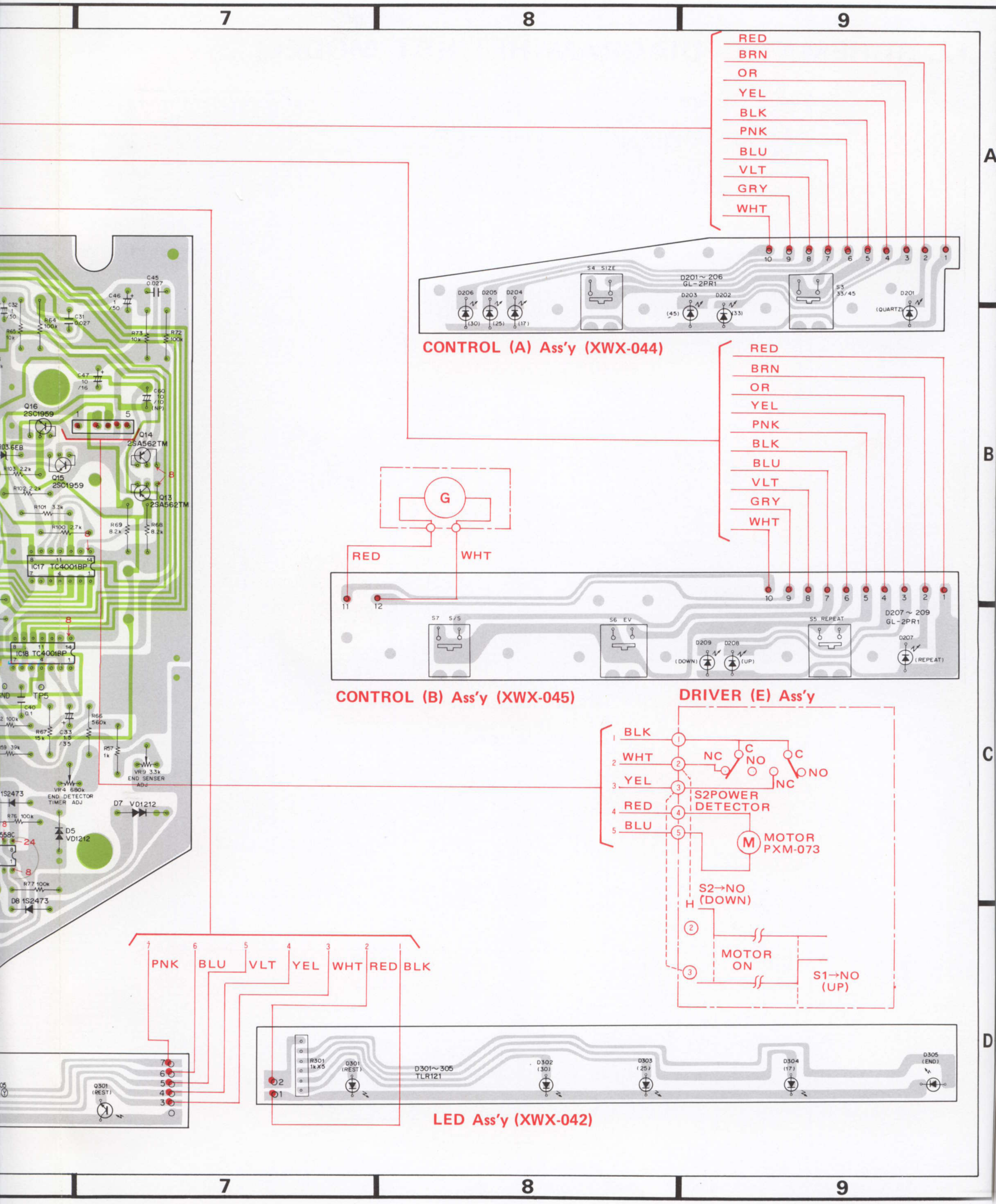
A
B
C
D

7 | 8 | 9

13. P.C.BOARD CONNECTION DIAGRAM (HET,HBT MODEL)




4
5
6
MODEL)
COIL Ass'y (PXB-118)
WHT
RED
CONTROL Ass'y (PWM-032)
GND
IC3 PA2005
IC2 PA2004
IC1 PD1003
IC4 NJM2903D
IC5 TC4013BP
IC6 TD62504P
IC7 M54517P
IC8 TC4001BP
IC9 TC4023BP
IC10 TC4011BP
IC11 TC4011BP
IC12 TC4027BP
IC13 TC4001BP
IC14 TC4001BP
IC15 TC4027BP
IC16 TC4069UBP
IC17 TC4001BP
IC18 TC4001BP
IC20 μPC4558C
IC21 μPC4558C
IC22 μPC78L08
Q1 2SC945
Q2 2SC945
Q3 2SC945
Q4 2SC945
Q5 2SC945
Q6 2SC1583
Q7 2SC945
Q8 2SC945
Q9 2SC1626
Q10 2SA816
Q11 2SC1626
Q12 2SA816
Q15 2SC1959
Q16 2SC1959
D1 WZ-085
D2 1S1885
D3 1S2473
D4 1S2473
D5 VD1212
D6 1S2473
D8 1S2473
D9,10 1S2473
D11 BZ-081
D12 RD3.6EB
D13 WZ-150
VR1 6.8k OPERATING POINT ADJ (45)
VR2 10k OPERATING POINT ADJ (33)
VR3 680k TIMING ADJ
VR4 680k END DETECTOR TIMER ADJ
VR5 33k LEAD IN SPEED ADJ
VR6 33k RETURN SPEED ADJ
VR7 220 TRACKING SENSER GAIN ADJ
VR8 680 TRACKING SENSER ZERO ADJ
X-TAL
TH1 112103-2
TH2 112103-2
CdS Ass'y (XWX-041)
LAMP Ass'y (XWX-040)
PL1 8V 70mA
PHOTO Tr. Ass'y (XWX-043)
Q305 (END)
Q304 (17)
Q303 (25)
Q302 (30)
Q301~305 TPS605(Y)
Q301 (REST)



CONTROL (A) Ass'y (XWX-044)
RED
BRN
OR
YEL
BLK
PNK
BLU
VLT
GRY
WHT
S4 SIZE
D201~206
GL-2PR1
S3
33/45
D201
(QUARTZ)
CONTROL (B) Ass'y (XWX-045)
RED
WHT
G
S7 S/S
S6 EV
S5 REPEAT
D207~209
GL-2PR1
(DOWN)
(UP)
(REPEAT)
DRIVER (E) Ass'y
BLK
WHT
YEL
RED
BLU
NC
C
NO
S2POWER
DETECTOR
MOTOR
PXM-073
S2→NO
(DOWN)
MOTOR
ON
S1→NO
(UP)
PNK
BLU
VLT
YEL
WHT
RED
BLK
R301
1k X5
D301~305
TLR121
D301
(REST)
D302
(30)
D303
(25)
D304
(17)
D305
(END)
Q301
(REST)
LED Ass'y (XWX-042)
Q16
2SC1959
Q14
2SA562TM
Q15
2SC1959
Q13
2SA562TM
IC17 TC4001BP
IC18 TC4001BP
VR9 33k
END SENSER
ADJ
VR4 680k
END DETECTOR
TIMER ADJ
D7 VD1212
D5
VD1212
D8 1S2473

14. PARTS LIST OF P.C.BOARD ASSEMBLY (HET,HBT MODEL)

NOTE:

- *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 × 10¹ —— 561 .... RD¼PS $\boxed{5}\boxed{6}\boxed{1}$ J
47kΩ —— 47 × 10³ —— 473 .... RD¼PS $\boxed{4}\boxed{7}\boxed{3}$ J
0.5Ω —— 0R5 .... RN2H $\boxed{0}\boxed{R}\boxed{5}$ K
1Ω —— 010 .... RS1P $\boxed{0}\boxed{1}\boxed{0}$ K

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

5.62kΩ 562 × 10¹ 5621 .... RN¼SR $\boxed{5}\boxed{6}\boxed{2}\boxed{1}$ F

- *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 List of Control Assembly (PWM-032)

SEMICONDUCTORS

Part No.	Symbol & Description
PD1003	IC1
PA2004	IC2
PA2005	IC3
NJM2903D	IC4
JC4013BP	IC5
TD62504P	IC6
M54517P	IC7
TC4001BP	IC8, IC13, IC17, IC18
TC4023BP	IC9
TC4011BP	IC10, IC11, IC14
TC4027BP	IC12, IC15
TC4069UBP	IC16
μPC4558C	IC20, IC21
μPC78L08	IC22
2SC945 (2SC1815)	Q1–Q5, Q7, Q8
2SC1583	Q6
2SC1626	Q9, Q11
2SA816	Q10, Q12
2SA562TM-Y	Q13, Q14
2SC1959-Y	Q15, Q16
WZ-085	D1
IS1885	D2
IS2473	D3, D4, D6, D8–D10, D14, D15
VD1212	D5, D7
RD2.4EB	D12
WZ-150	D13

RESISTORS

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

Part No.	Symbol & Description	
RD¼PS □□□ J	R1–R10, R12–R31, R33–R53, R55–R92, R98–R104, R110	
RN1P2R2J	R11	
RN¼PS 1301 G	R93, R94	
RS1PF 681J	R97	
PCP-031	VR1	6.8K-B
PCP-012	VR2	10K-B
PCP-049	VR3	680K-B
PCP-037	VR4	680K-B
PCP-048	VR5, VR6	33K-B
PCP-047	VR7	220-B
PCP-038	VR8	330-B
PCP-001	VR9	3.3K-B

CAPACITORS

Part No.	Symbol & Description
CCDCH 330J 50	C1
CCDCH 560J 50	C2
CKDYF 103Z 50	C3, C5, C13, C50, C51, C53, C61
CEA 100P 16	C4, C25, C35, C47
CEA 101M 6.3NP	C6
CKDYF 403Z 50	C7
CKDYB 681K 50	C8, C23
CQMA 184J 50	C9
CSZA R47M 35	C10, C17, C26
CQMA 104K 50	C11, C12, C14, C40

Part No.	Symbol & Description
CSZA 100M 16	C15
CQMA 563K 50	C16
CEA 010P 50	C18, C24, C28, C32, C38, C46, C52
CEA 101M 35L	C19
CEA 470M 25NP	C20–C22
CQMA 273K 50	C27, C31, C45
CEA R47P 50	C29
CSZA 1R5K 50	C33
CQMA 103K 50	C34, C39, C41
CEA 4R7M 25NP	C36
CSZA 3R3K 10	C37
CSZA 010K 25	C43
CEA 100P 25	C48, C49
CEA 100M 10NP	C60
CKDYF 104Z 50	C62

OTHERS

Part No.	Symbol & Description
PSS-003	X'tal
112103-2	TH1, TH2

Parts List of Power Supply Assembly (PWR-057)

Part No.	Symbol & Description	
μPC78MD8H	IC101	
2SD686	Q101	
PCX-010	D101	
S2VB10	D102	
BZ-250	D103	
RS2PF102J	R101	
⚠ PCL-024	C101	0.047/450
CEA 471M 25L	C103	
CEA 471M 50L	C104	
CEA 101P 10	C105	
CEA 101M 35L	C106, C107	
CKDYF 103Z 50	C108	
CCDSL 101K 50	C109	
PNM-013	Spacer	
PNX-015	Spacer	
PBA-089	Screw	
⚠ PEA-005	Fuse	400mA
⚠ PEK-036	Fuse	1.25A

Parts List of Lamp Assembly (XWX-040)

Part No.	Symbol & Description	
PEL-041	PL1	8V 70mA

Parts List of LED Assembly (XWX-042)

Part No.	Symbol & Description
TLR-121	D301–D305
RD¼PS 103J	R301

Parts List of Cds Assembly (XWX-041)

Part No.	Symbol & Description
PCX-051	Cds

Parts List of Photo Tr Assembly (XWX-043)

Part No.	Symbol & Description
TPS605	Q301–Q305

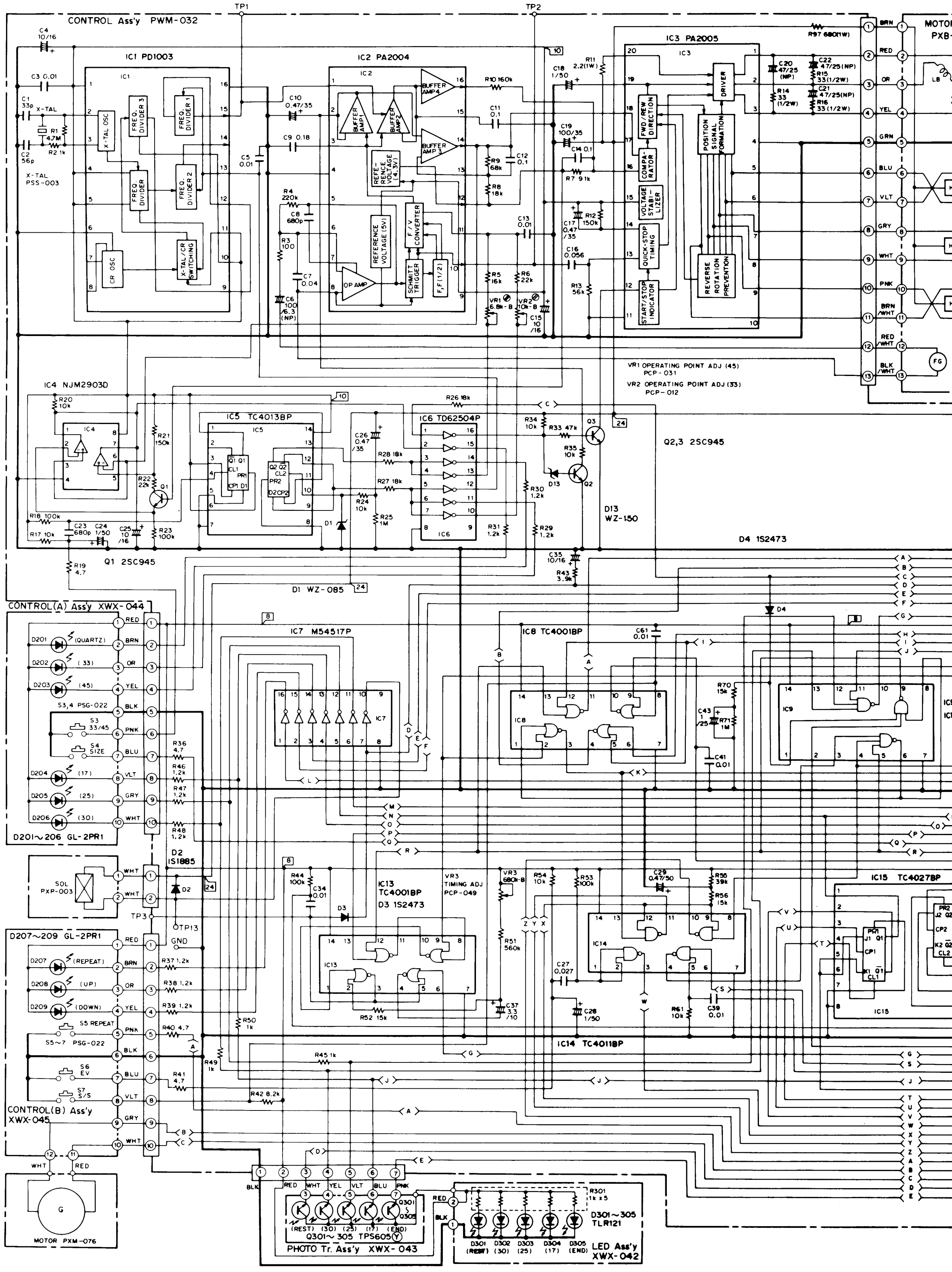
Parts List of Control A Assembly (XWX-044)

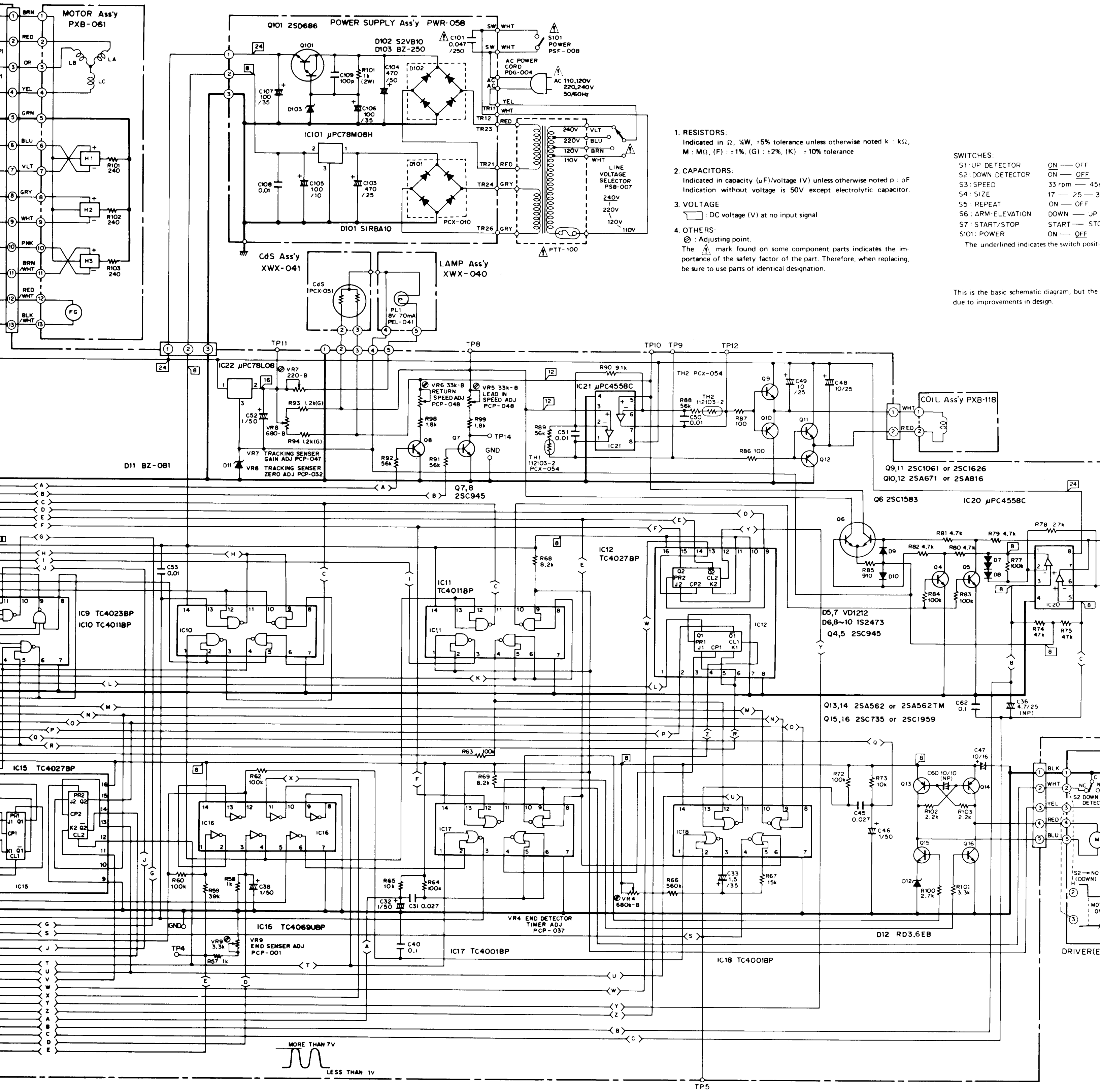
Part No.	Symbol & Description
GL-2PR1	D201–D206
PSG-022	S3, S4

Parts List of Control B Assembly (XWX-045)

Part No.	Symbol & Description
GL-2PR1	D207–D209
PSG-022	S5–S7

15. SCHEMATIC DIAGRAM(S/G MODEL)





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:

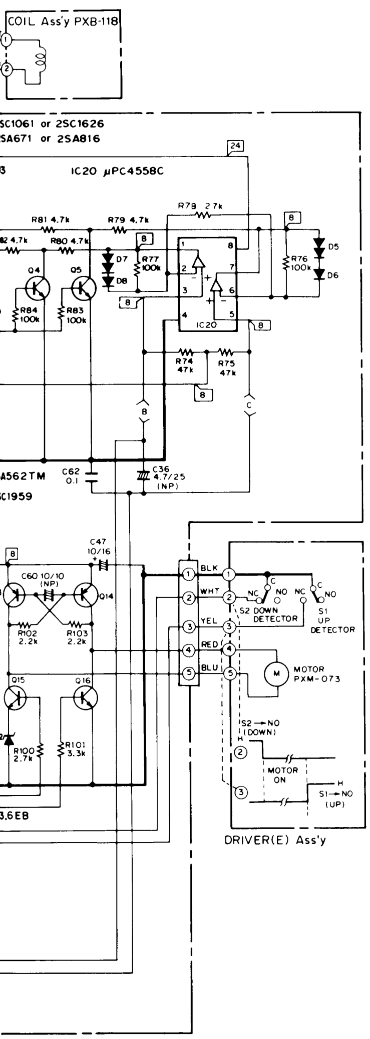
S1 : UP DETECTOR	ON — OFF
S2 : DOWN DETECTOR	ON — OFF
S3 : SPEED	33 rpm — 45
S4 : SIZE	17 — 25 — 3
S5 : REPEAT	ON — OFF
S6 : ARM-ELEVATION	DOWN — UP
S7 : START/STOP	START — STO
S101 : POWER	ON — OFF

The underlined indicates the switch positi

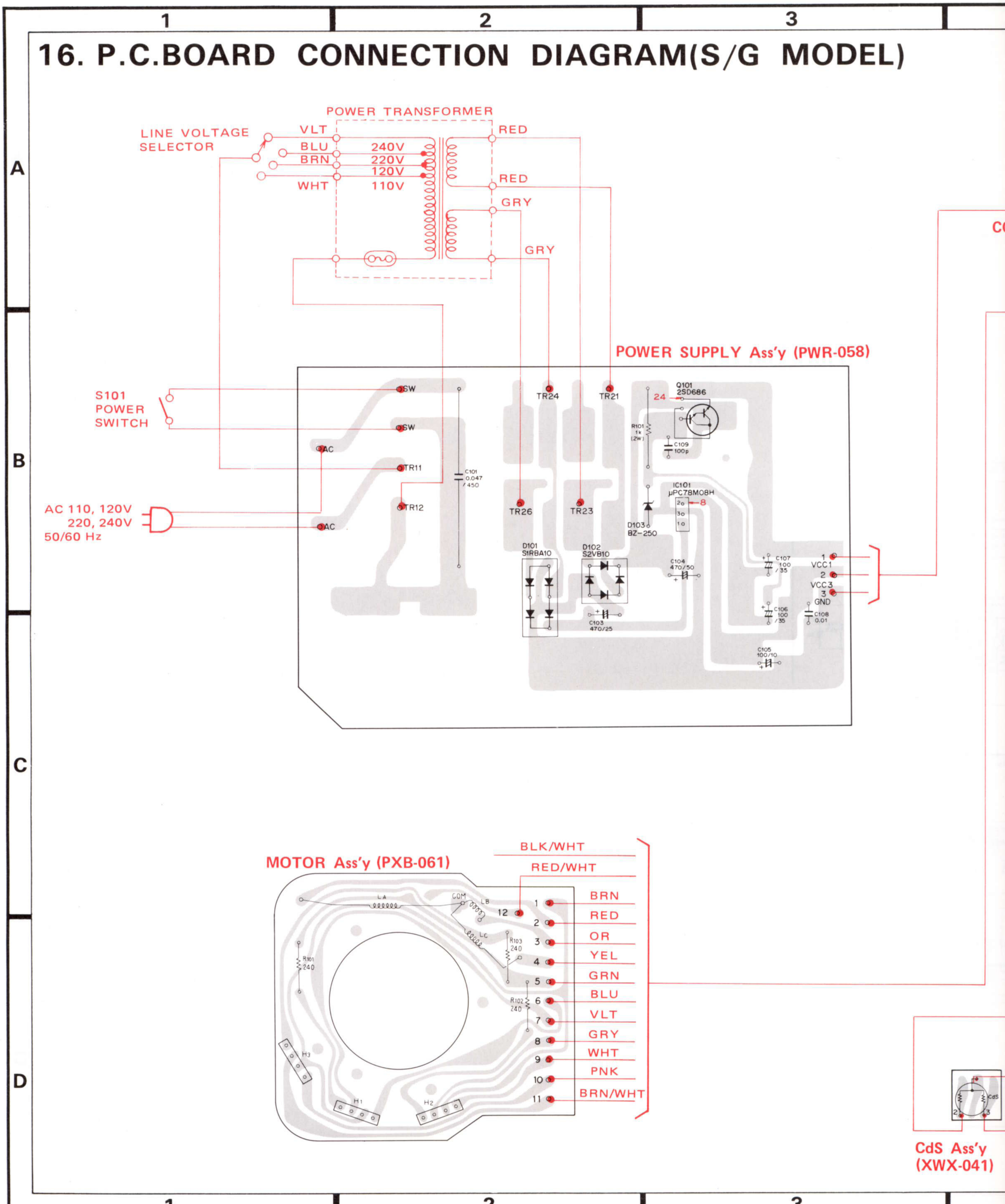
This is the basic schematic diagram, but the due to improvements in design.

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.

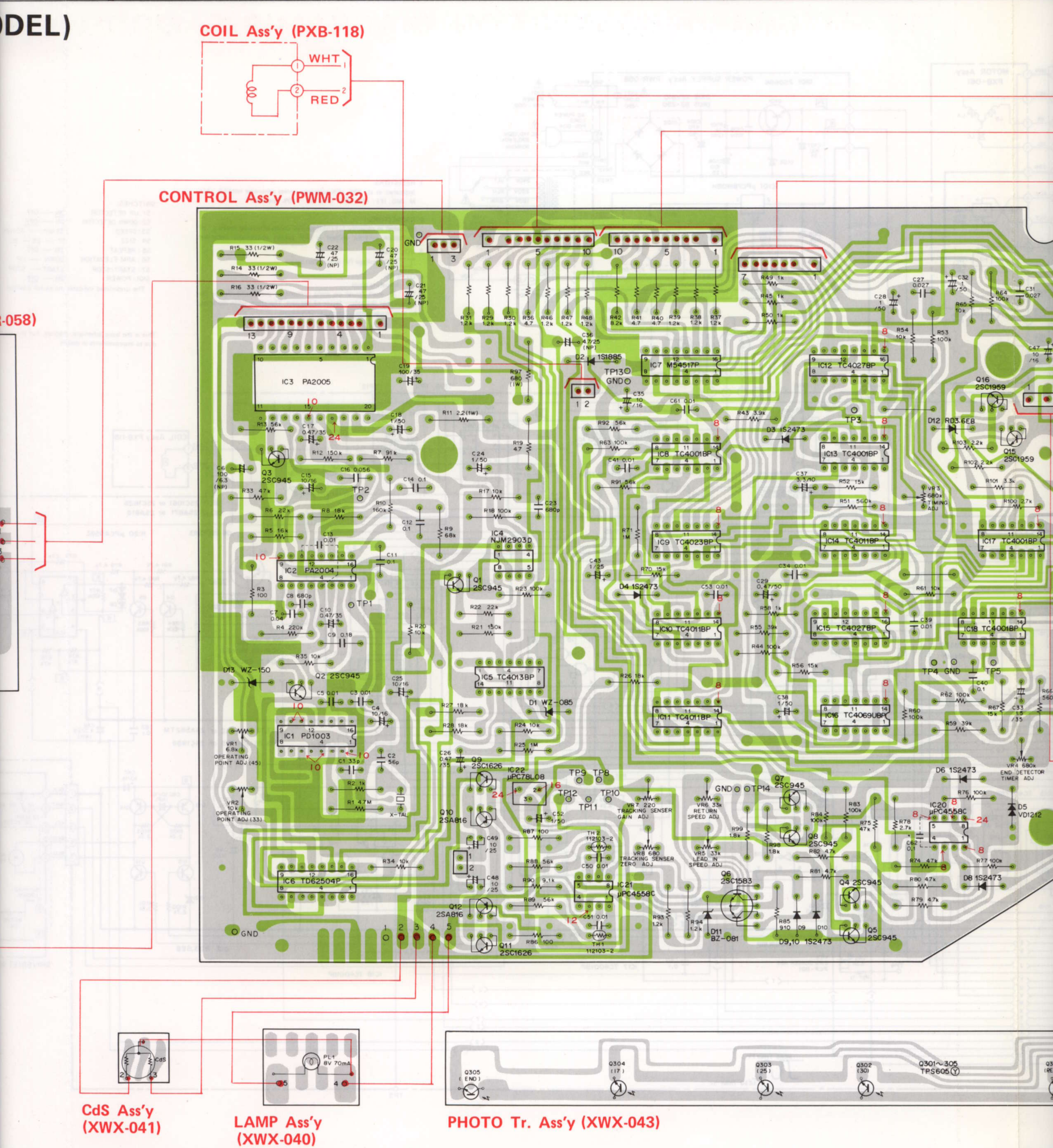
This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.



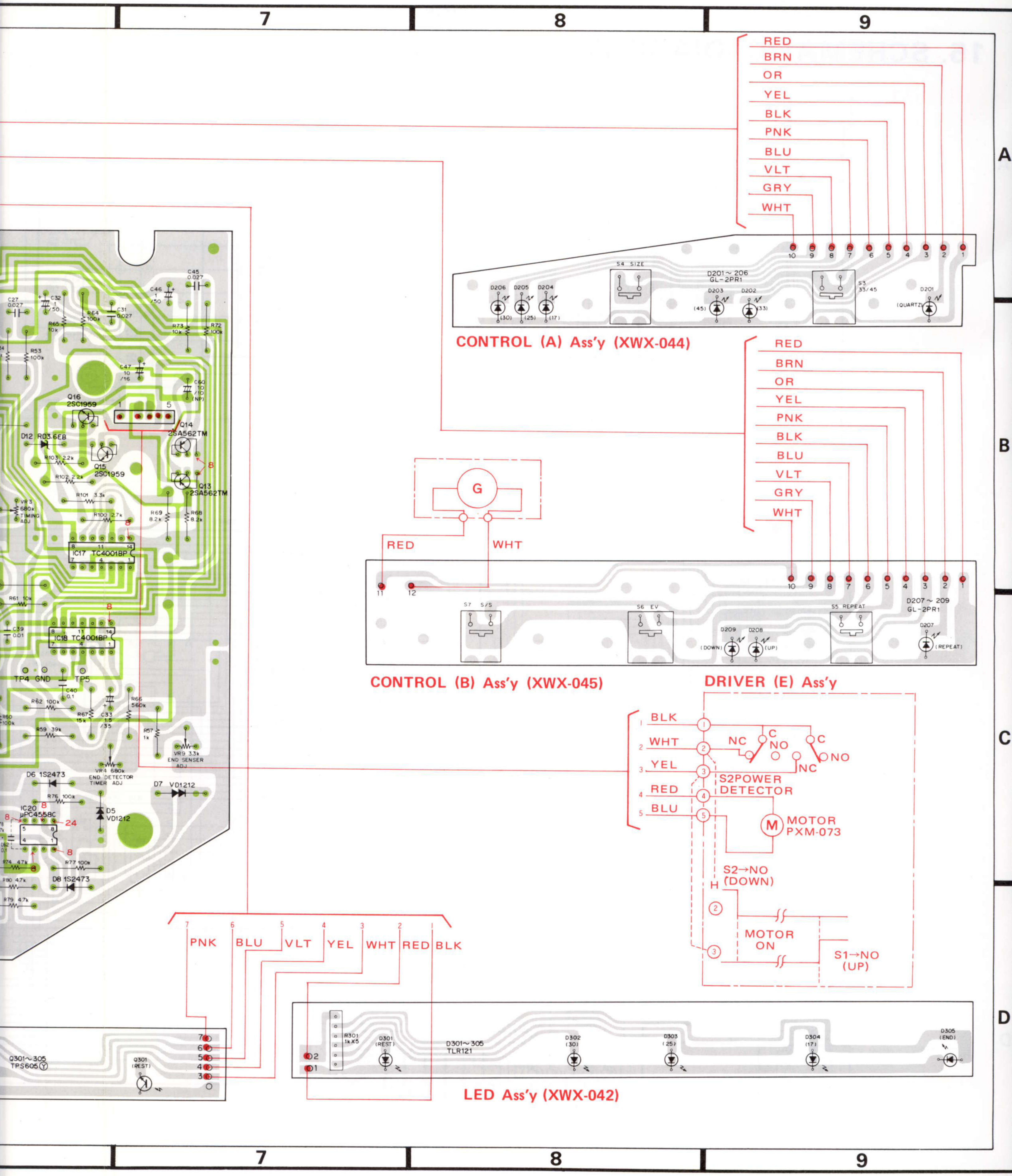
16. P.C.BOARD CONNECTION DIAGRAM(S/G MODEL)



4	5	6


DEL)
COIL Ass'y (PXB-118)
WHT
RED
CONTROL Ass'y (PWM-032)
-058)
IC3 PA2005
IC2 PA2004
IC1 PD1003
IC6 TD62504P
IC4 NJM2903D
IC5 TC4013BP
IC7 M54517P
IC8 TC4001BP
IC9 TC4023BP
IC10 TC4001BP
IC11 TC4011BP
IC12 TC40278P
IC13 TC4001BP
IC14 TC4011BP
IC15 TC40278P
IC16 TC4069UBP
IC17 TC4001BP
IC18 TC4001BP
IC20 µPC4558C
IC21 µPC4558C
IC22 µPC78L08
VR1 6.8k OPERATING POINT ADJ (45)
VR2 10k OPERATING POINT ADJ (33)
VR3 680k TIMING ADJ
VR4 680k END DETECTOR TIMER ADJ
VR5 33k LEAD IN SPEED ADJ
VR6 33k RETURN SPEED ADJ
VR7 220 TRACKING SENSER GAIN ADJ
VR8 680 TRACKING SENSER ZERO ADJ
CdS Ass'y (XWX-041)
LAMP Ass'y (XWX-040)
PL1 8V 70mA
PHOTO Tr. Ass'y (XWX-043)
Q301~305 TPS605(Y)

4	5	6


7
8
9
A
B
C
D
RED
BRN
OR
YEL
BLK
PNK
BLU
VLT
GRY
WHT
S4 SIZE
D201～206
GL-2PR1
S3
33/45
CONTROL (A) Ass'y (XWX-044)
G
RED
WHT
S7 S/S
S6 EV
S5 REPEAT
D207～209
GL-2PR1
CONTROL (B) Ass'y (XWX-045)
DRIVER (E) Ass'y
NC
C
NO
S2POWER
DETECTOR
MOTOR
PXM-073
S2→NO
(DOWN)
MOTOR
ON
S1→NO
(UP)
IC17 TC4001BP
IC18 TC4001BP
IC20
μPC4558C
Q16
2SC1959
Q15
2SC1959
Q14
2SA562TM
Q13
2SA562TM
VR3
680k
TIMING
ADJ
VR4 680k
END DETECTOR
TIMER ADJ
VR9 3.3k
END SENSER
ADJ
D6 1S2473
D7 VD1212
D5
VD1212
D8 1S2473
TP4 GND
TP5
Q301～305
TPS605
Q301
(REST)
D301～305
TLR121
R301
1k×5
LED Ass'y (XWX-042)

17. PARTS LIST OF P.C.BOARD ASSEMBLY (S/G MODEL)

NOTE:

- *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 ×10¹——561 .... RD¼PS $\boxed{5}\boxed{6}\boxed{1}$ J
47kΩ——47 ×10³——473 .... RD¼PS $\boxed{4}\boxed{7}\boxed{3}$ J
0.5Ω——0R5 .... RN2H $\boxed{0}\boxed{R}\boxed{5}$ K
1Ω——010 .... RS1P $\boxed{0}\boxed{1}\boxed{0}$ K

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

5.62kΩ 562 × 10¹ 5621 .... RN¼SR $\boxed{5}\boxed{6}\boxed{2}\boxed{1}$ F

- *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 List of Control Assembly (PWM-032)

SEMICONDUCTORS

Part No.	Symbol & Description
PD1003	IC1
PA2004	IC2
PA2005	IC3
NJM2903D	IC4
JC4013BP	IC5
TD62504P	IC6
M54517P	IC7
TC4001BP	IC8, IC13, IC17, IC18
TC4023BP	IC9
TC4011BP	IC10, IC11, IC14
TC4027BP	IC12, IC15
TC4069UBP	IC16
μPC4558C	IC20, IC21
μPC78L08	IC22
2SC945 (2SC1815)	Q1–Q5, Q7, Q8
2SC1583	Q6
2SC1626	Q9, Q11
2SA816	Q10, Q12
2SA562TM-Y	Q13, Q14
2SC1959-Y	Q15, Q16
WZ-085	D1
IS1885	D2
IS2473	D3, D4, D6, D8–D10, D14, D15
VD1212	D5, D7
RD2.4EB	D12
WZ-150	D13

RESISTORS

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

Part No.	Symbol & Description	
RD¼PS ☐☐☐ J	R1–R10, R12–R31, R33–R53, R55–R92, R98–R104, R110	
RN1P2R2J	R11	
RN¼PS 1301 G	R93, R94	
RS1PF 681J	R97	
PCP-031	VR1	6.8K-B
PCP-012	VR2	10K-B
PCP-049	VR3	680K-B
PCP-037	VR4	680K-B
PCP-048	VR5, VR6	33K-B
PCP-047	VR7	220-B
PCP-038	VR8	330-B
PCP-001	VR9	3.3K-B

CAPACITORS

Part No.	Symbol & Description
CCDCH 330J 50	C1
CCDCH 560J 50	C2
CKDYF 103Z 50	C3, C5, C13, C50, C51, C53, C61
CEA 100P 16	C4, C25, C35, C47
CEA 101M 6.3NP	C6
CKDYF 403Z 50	C7
CKDYB 681K 50	C8, C23
CQMA 184J 50	C9
CSZA R47M 35	C10, C17, C26
CQMA 104K 50	C11, C12, C14, C40

Part No.	Symbol & Description
CSZA 100M 16	C15
CQMA 563K 50	C16
CEA 010P 50	C18, C24, C28, C32, C38, C46, C52
CEA 101M 35L	C19
CEA 470M 25NP	C20–C22
CQMA 273K 50	C27, C31, C45
CEA R47P 50	C29
CSZA 1R5K 50	C33
CQMA 103K 50	C34, C39, C41
CEA 4R7M 25NP	C36
CSZA 3R3K 10	C37
CSZA 010K 25	C43
CEA 100P 25	C48, C49
CEA 100M 10NP	C60
CKDYF 104Z 50	C62

OTHERS

Part No.	Symbol & Description
PSS-003	X'tal
112103-2	TH1, TH2

Parts List of Power Supply Assembly (PWR-058)

Part No.	Symbol & Description	
μPC78MD8H	IC101	
2SD686	Q101	
PCX-010	D101	
S2VB10	D102	
BZ-250	D103	
RS2PF102J	R101	
⚠ PCL-005	C101	0.047/450
CEA 471M 25L	C103	
CEA 471M 50L	C104	
CEA 101P 10	C105	
CEA101M 35L	C106, C107	
CKDYF 103Z 50	C108	
CCDSL 101K 50	C109	
PNM-013	Spacer	
PNX-015	Spacer	
PBA-089	Screw	

Parts List of Lamp Assembly (XWX-040)

Part No.	Symbol & Description	
PEL-041	PL1	8V 70mA

Parts List of LED Assembly (XWX-042)

Part No.	Symbol & Description
TLR-121	D301–D305
RD¼PS 103J	R301

Parts List of Cds Assembly (XWX-041)

Part No.	Symbol & Description
PCX-051	Cds

Parts List of Photo Tr Assembly (XWX-043)

Part No.	Symbol & Description
TPS605	Q301–Q305

Parts List of Control A Assembly (XWX-044)

Part No.	Symbol & Description
GL-2PR1	D201–D206
PSG-022	S3, S4

Parts List of Control B Assembly (XWX-045)

Part No.	Symbol & Description
GL-2PR1	D207–D209
PSG-022	S5–S7

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