

Service Manual

COMPACT
disc
DIGITAL AUDIO

DIGITAL

Multi Compact Disc Player

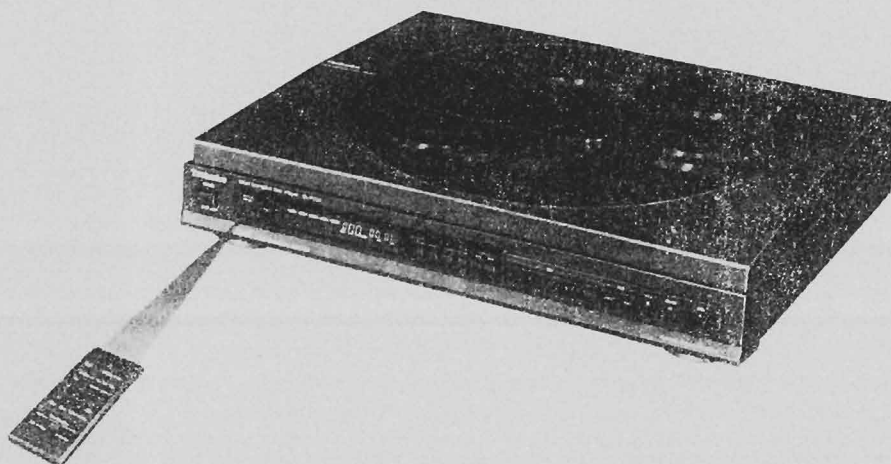
SL-PC20

Color

(K)... Black Type

Area

Country Code	Area	Color
(E, E5)	Continental Europe.	(K)
(EB)	Great Britain.	(K)
(EG)	F.R. Germany and Italy.	(K)



SPECIFICATIONS

Audio

No. of channels	2 (left and right, stereo)
Frequency response	2-20,000 Hz +1 dB
Output voltage	2 V (at 0 dB)
Dynamic range	94 dB
S/N ratio	96 dB
Total harmonic distortion	0.05% (1 kHz, 0 dB)
Wow and flutter	Below measurable limit
Output impedance	1 kΩ
Load impedance	More than 10 kΩ

Signal Format

Sampling frequency	44.1 kHz
D-A conversion	16-bit linear

Pickup

Wavelength	780 nm
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General

Power supply

For Great Britain

AC 50/60 Hz, 240V

For others

AC 50/60 Hz, 220V

Power consumption

13 W

Dimensions (W×H×D)

430 × 95.5 × 362 mm

Weight

3.9 kg

Specifications are subject to change without notice.

Weight and dimensions shown are approximate.

Technics

Matsushita Electric Industrial Co., Ltd.
Central P.O. Box 288, Osaka 530-91, Japan

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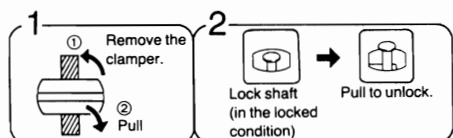
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INSTALLATION

Transport lock

The optical pickup is secured to prevent damage during transport. Be sure to release it before use.



NOTE:
IF THE UNIT IS TRANSPORTED AGAIN, PERFORM THE FOLLOWING STEPS:

1. Turn the power on and remove all discs from the trays.
2. PRESS THE DISC SKIP BUTTON on the top panel and turn the power off.
3. Insert the clasper into the slot on the bottom of the unit and turn it clockwise.
4. Place the unit with the right panel facing downward. Press the lock shaft to the LOCK position (L).

CAUTION:
Do not transport the unit without locking the lock shaft.

SEVERE DAMAGE WILL RESULT.

Placement notes

■ Place on a flat, level surface so that the front-rear inclination does not exceed 5°.

■ Avoid places such as the following:

- Near any equipment or device that generates strong magnetism.
- On any heat-generating equipment or device, or in any place where the temperature is high (40°C or higher).
- Extremely cold places (5°C or below).
- Near a tuner or TV (It may cause noise in the broadcast, or disturbance of the TV picture.)
- For long periods of time in direct sunlight.
- In dusty or smoky locations.
- In locations prone to vibrations.
- In locations where the rear panel is less than 10 cm (about 4") away from the wall or back of an audio rack.
- Within reach of children.

■ When carrying or storing the unit, handle it with care so it is not subjected to any strong bumps. Always remove the disc before storing the unit for any period of time.

■ To avoid problems due to vibration.

- Do not place a book or similar object under this unit.
- Do not route the connection cables (of this or other units) across the operation panel, across the top, or under the unit.

ACCESSORIES

- | | | |
|---|--|-------------------------------------|
| ● AC power supply cord 1
(SJA187 E, E5, EG)
(SJA193 EB) | ● Stereo connection cable 1
(SJP2249-3) | ● Dust cover 1
(RYF0010-K) |
| ● Remote control transmitter 1
(EUR64789B) | ● Batteries 2
(UM-4NE/2S) | |

PRECAUTION OF LASER DIODE

CAUTION: This product utilizes a laser diode with the unit turned "on", invisible laser radiation is emitted from the pick up lens.

Wave length: 780nm

Maximum output radiation power from pick up: 100μW/VDE

Laser radiation from the pick up lens is safety level, but be sure the followings:

1. Do not disassemble the optical pick up unit, since radiation from exposed laser diode is dangerous.
2. Do not adjust the variable resistor on the pickup unit. It was already adjusted.
3. Do not look at the focus lens using optical instruments.
4. Recommend not to look at pick up lens for a long time.

ACHTUNG: Dieses produkt enthält eine laserdiode. Im eingeschalteten zustand wird unsichtbare laserstrahlung von der lasereinheit abgestrahlt.

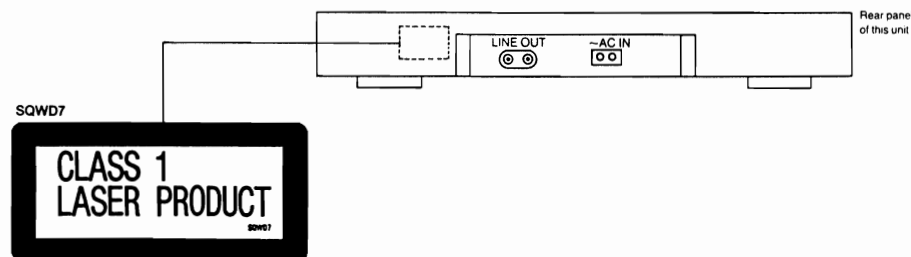
Wellenlänge: 780nm

Maximale strahlungsleistung der lasereinheit: 100μW/VDE

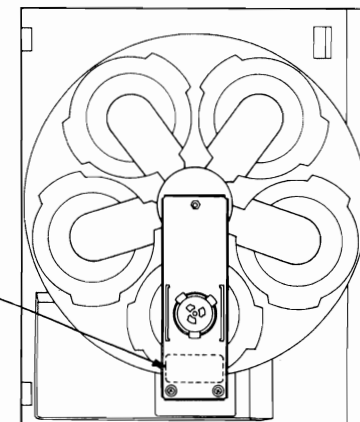
Die strahlung an der lasereinheit ist ungefährlich, wenn folgende punkte beachtet werden:

1. Die lasereinheit nicht zerlegen, da die strahlung an der freigelegten laserdiode gefährlich ist.
2. Den werksseitig justierten einstellregler der lasereinheit nicht verstellen.
3. Nicht mit optischen instrumenten in die fokussierlinse blicken.
4. Nicht über längere zeit in die fokussierlinse blicken.

ADVASEL: I dette a apparat anvendes laser.



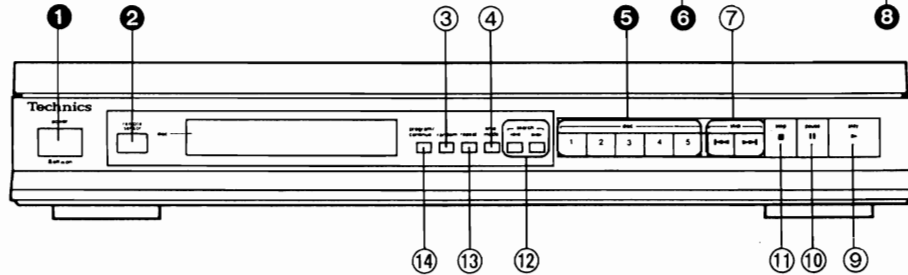
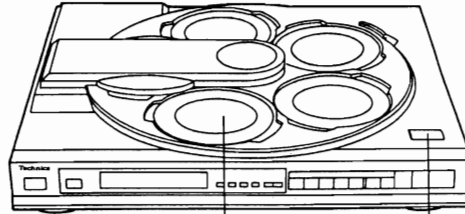
Obs:
Apparaten innehåller laser
Komponent av höger laserklass
än klass 1.



FRONT PANEL CONTROLS AND FUNCTIONS

Control section

The functions indicated by the black numbers (③ etc.) can also be activated using the remote control transmitter.



① Power switch (power)

Press (I) to switch the power on.
Press again (I) to switch the power off.

② Remote control signal sensor (remote sensor)

③ Random button (random)

Press this button to let the microcomputer make a random selection of the sequence in which discs and tracks are played during continuous play or program play.
Press the button again to cancel the random play mode.

④ Time mode select button (time mode)

Use this button to select the desired time mode. The display information will change as follows each time the button is pressed.

- ① Track number and the elapsed play time.
- ② Track number and remaining time of track now playing.
- ③ Total track numbers and playing time of the current disc.
- ④ Total elapsed play time of the current disc.

⑤ Disc select buttons (disc, 1~5)

These buttons are used to select the desired disc for continuous or program play.

⑥ Disc trays (1~5)

One disc per tray can be located.

⑦ Skip buttons (◀◀ skip ▶▶)

Press one of these buttons briefly to move the pickup (backward and forward) to the beginning of a specific track.

Pickup:

The pickup is a laser device that reads the information on the disc surface. The pickup moves across the disc as the disc is played, but it is not visible from outside the cabinet.

⑧ Disc skip button (disc skip)

Each time this button is pressed, the carousel will rotate to the next tray position in a clockwise direction. This allows for loading or unloading of the fifth disc.
This button is also used to select the next disc, in the continuous or random mode.

⑨ Play button (▶ play)

⑩ Pause button (|| pause)

⑪ Stop button (■ stop)

⑫ Search buttons (◀◀ search ▶▶)

Use these buttons to move the pickup forward and backward.

⑬ Repeat button (repeat)

Press this button to activate the repeat mode. The repeat indicator illuminates.
Press again to cancel the repeat mode. The repeat indicator will no longer illuminate.

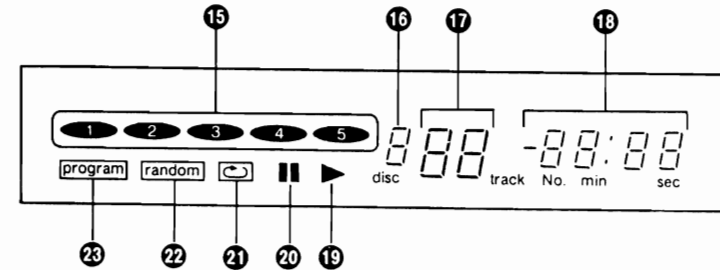
⑭ Program/continue button (program/continue)

This button is used to select either continuous play or program play.
The selection changes each time the button is pressed.

Note:

Continuous play is automatically selected when the power is switched on.

Display section



⑮ Disc indicators (1 ~ 5)

The indicator corresponding to the disc being played flashes during play.
When the unit is in the program mode, these indicators show the programmed discs.

⑯ Disc number display (disc)

Disc numbers (1~5) are shown here.

⑰ Track number display (track)

Track numbers (up to 99) are shown here.

⑱ Time/programmed number display (No., min, sec)

This display shows the elapsed playing time of the track being played. When the unit is in the program mode, this display shows the program sequence.

⑲ Play indicator (▶)

Illuminates when the play mode is activated.

⑳ Pause indicator (||)

Illuminates when the pause mode is activated.

㉑ Repeat indicator (◀◀)

Illuminates when the repeat mode is activated.

㉒ Random indicator (random)

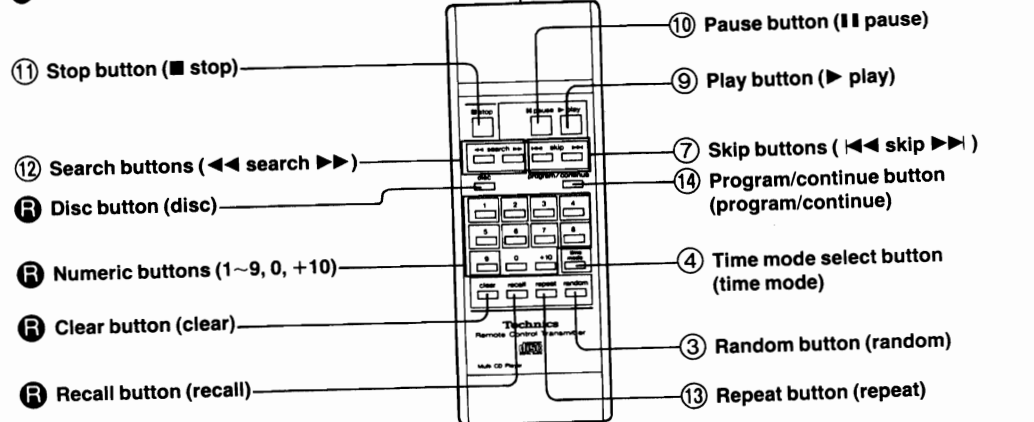
Illuminates when random play is activated.

㉓ Program play indicator (program)

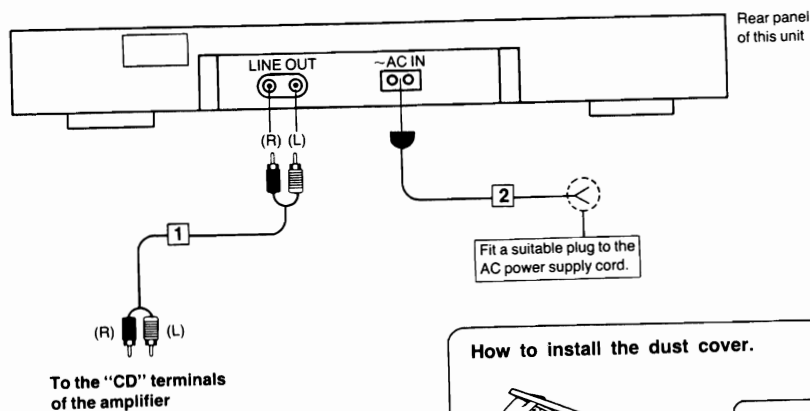
Illuminates when the unit is in the programming or program play mode.

Remote functions

R On the remote control transmitter only.

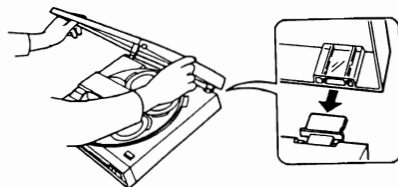


CONNECTIONS



- 1 Stereo connection cable (included)
- 2 AC power supply cord (included)

How to install the dust cover.

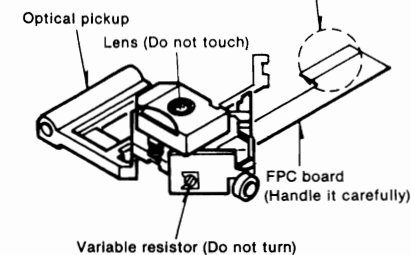
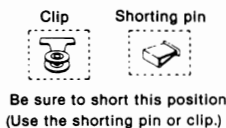


HANDLING PRECAUTIONS FOR OPTICAL PICKUP

The laser diode in the optical pickup may break down due to potential difference caused by static electricity of clothes or human body. So, be careful of electrostatic breakdown during repair of the optical pickup.

• Handling of optical pickup

1. Do not subject the optical pickup to static electricity as it is extremely sensitive to electrical shock.
2. To prevent the breakdown of the laser diode, an anti-static shorting pin is inserted into the flexible board. (FPC board)
When removing or connecting the short pin, finish the job in as short time as possible.
3. Take care not to apply excessive stress to the flexible board. (FPC board)
4. Do not turn the variable resistor (laser power adjustment). It has already been adjusted.

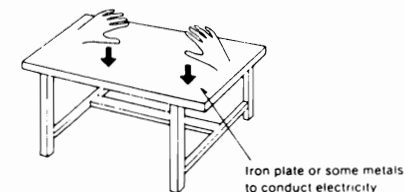
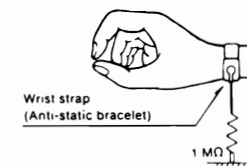


• Grounding for electrostatic breakdown prevention

1. Human body grounding
Use the anti-static wrist strap to discharge the static electricity from your body.
2. Work table grounding
Put a conductive material (sheet) or steel sheet on the area where the optical pickup is placed, and ground the sheet.

Caution:

The static electricity of your clothes will not be grounded through the wrist strap. So, take care not to let your clothes touch the optical pickup.

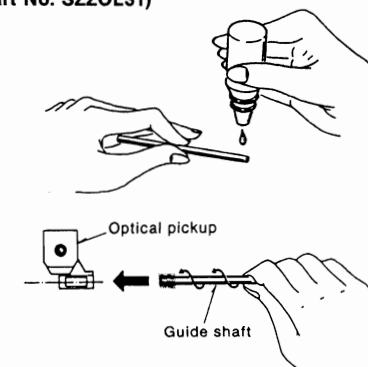


INSTRUCTIONS FOR TRAVERSE OIL (Part No. SZZOL31)

The container contains 6g (approx. 3ml) of oil.
One application (one shaft) uses 0.05ml of oil.

How to Use

- (1) Remove the guide shaft in the traverse deck from the optical pickup and clean off any dust from the guide shaft.
- (2) Apply one drop of the SZZOL31 to the tip of the guide shaft.
- (3) Hold the guide shaft so that its oiled end touches the optical pickup and insert it into the bearing while rotating it slowly.
- (4) After securing the guide shaft, move the optical pickup by hand several times to the left and right to distribute the oil on the guide shaft.

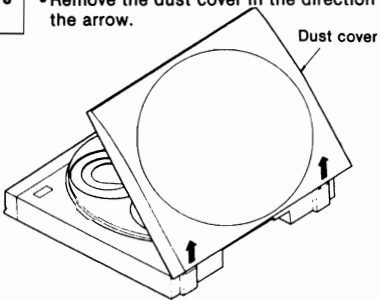
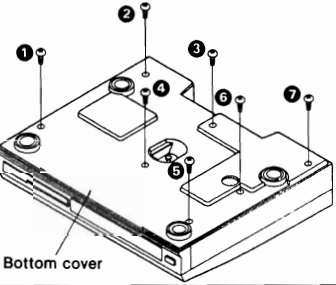
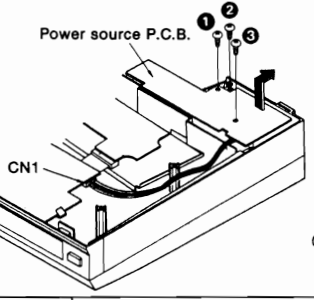
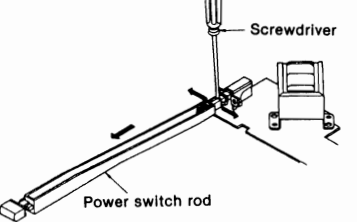
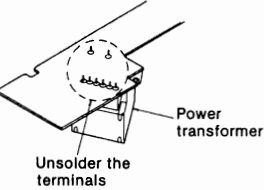
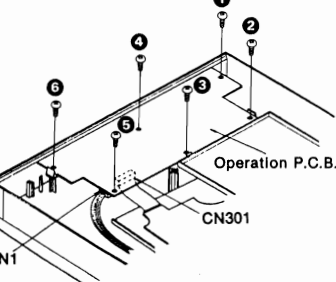


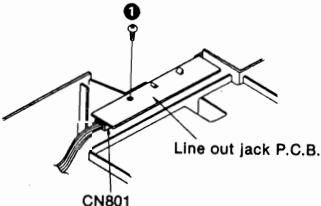
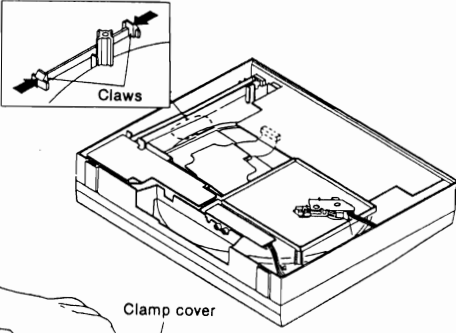
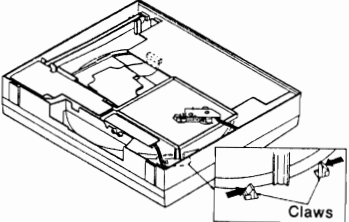
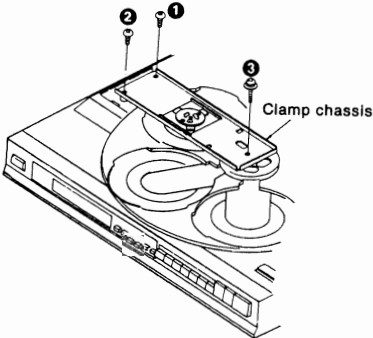
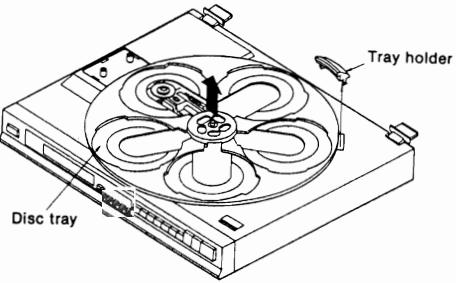
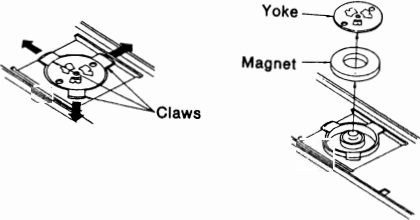
DISASSEMBLY INSTRUCTIONS

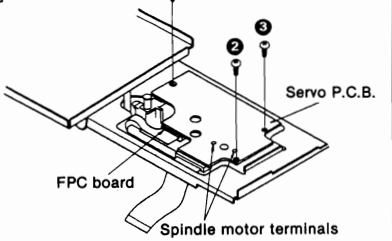
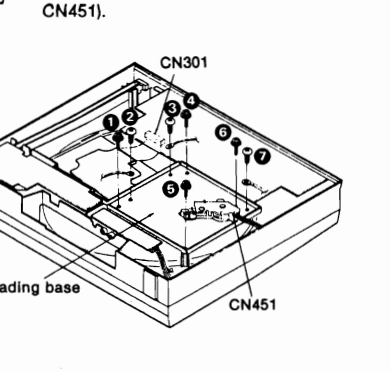
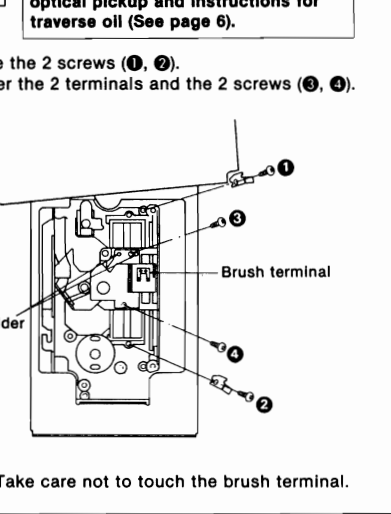
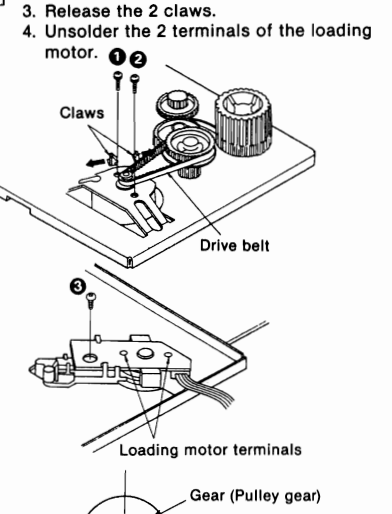
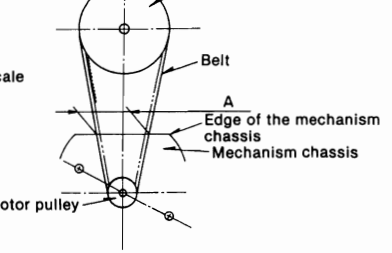
Warning: This product uses a laser diodes. Refer to caution statements on page 2.

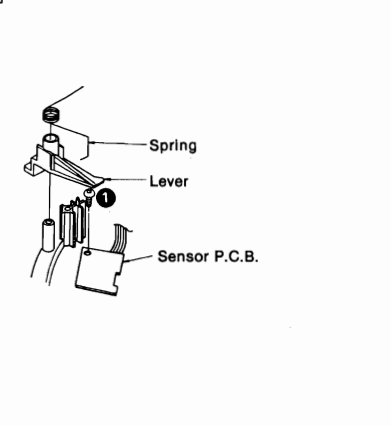
ACHTUNG: • Die Lasereinheit nicht zerlegen.
• Die Lasereinheit darf nur gegen eine vom hersteller spezifizierte einheit ausgetauscht werden.

* This CD player is equipped with FPC boards, so handle them with care during disassembly and reassembly.

Ref. No. 1	Removal of the dust cover	Ref. No. 2	Removal of the bottom cover
Procedure 1	• Remove the dust cover in the direction of the arrow. 	Procedure 2	• Remove the 7 screws (①~⑦). 
Ref. No. 3	Removal of the power source P.C.B., power transformer and power switch rod		
Procedure 2→3	1. Remove the 3 screws (①~③). 2. Remove the 1 connector (CN1). 3. Remove the power source P.C.B. in the direction of the arrow.   		
Ref. No. 4	Removal of the operation P.C.B.		
Procedure 2→4	■ Removal of the operation P.C.B. 1. Remove the 6 screws (①~⑥). 2. Remove the 2 connectors (CN1, CN301). 		

Ref. No. 5	Removal of the line out jack P.C.B.	Ref. No. 6	Removal of the clamp cover
Procedure 2→5	1. Remove the 1 screw (1). 2. Remove the 1 connector (CN801). 	Procedure 1→2→6 1. Release the 2 claws. 2. Remove the clamp cover in the direction of the arrow. 	
Ref. No. 7	Removal of the clamp chassis	Ref. No. 8 Removal of the disc tray Procedure 1→2→6 →7→8 1. Release the 2 claws of the tray holder. 	
Procedure 1→2→6→7	1. Remove the 3 screws (1~3). 		
Ref. No. 9	Removal of the magnet	2. Remove the disc tray in the direction of the arrow. 	
Procedure 1→2→6 →7→9	• Release the 3 claws. 		

Ref. No. 10	Removal of the loading chassis	Ref. No. 11	Removal of the servo P.C.B.
Procedure 8→10	1. Remove the 7 screws (①~⑦). 2. Remove the 2 connectors (CN301, CN451).	Procedure 8→10→11	
			1. Remove the 3 screws (①~③). 2. Unsolder the 2 terminals of spindle motor. 3. Remove the FPC board from the optical pickup. Caution: To prevent the breakdown of the laser diode, antistatic shorting pin is inserted into the FPC board.
Ref. No. 12	Removal of the optical pickup	Ref. No. 13	Removal of the loading motor
Procedure 8→10→12	Refer to the handling precautions for optical pickup and instructions for traverse oil (See page 6).	Procedure 8→10→13	1. Remove the drive belt. 2. Remove the 3 screws (①~③). 3. Release the 2 claws. 4. Unsolder the 2 terminals of the loading motor.
	1. Remove the 2 screws (①, ②). 2. Unsolder the 2 terminals and the 2 screws (③, ④). 		
	Caution: Take care not to touch the brush terminal. Belt tension adjustment procedure 1. Attach the belt to the pulley gear and the motor pulley, and temporarily secure the motor. 2. Secure the motor firmly so that, while there is no force being applied to the belt, dimension A of the edge of the mechanism chassis is within the standard value. Standard value: A = 16 ± 0.5 mm		

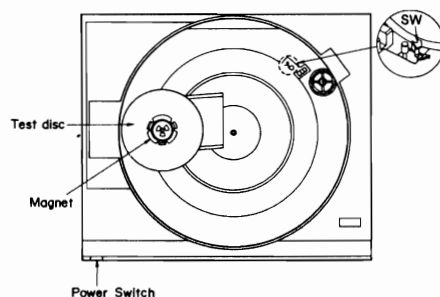
Ref. No. 14	Removal of the sensor P.C.B.	Ref. No. 15	Removal of the sub button and main button
Procedure 2→5→14	1. Remove the spring and lever. 2. Remove the 1 screw (①).	Procedure 2→4→15	1. Remove the 2 screws (①, ②). 2. Remove the sub button in the direction of the arrow ④. 3. Remove the 3 screws (③~⑤). 4. Remove the main button in the direction of the arrow ⑥.
			

MEASUREMENTS AND ADJUSTMENTS

Warning: This product uses a laser diode. Refer to caution statements on page 2.

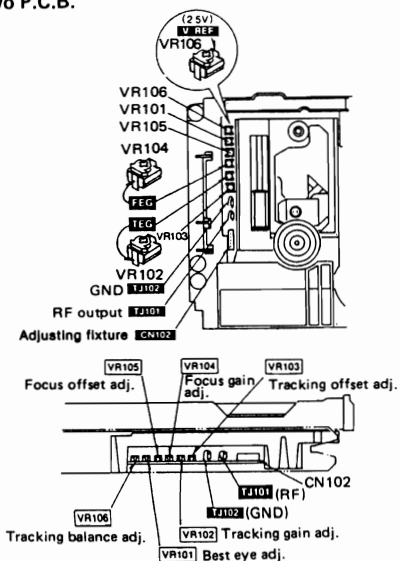
PREPARATION

1. Remove the dust cover (refer to disassembly instruction Ref. No. 1).
2. Remove the bottom cover (refer to disassembly instruction Ref. No. 2).
3. Remove the clamp cover (refer to disassembly instruction Ref. No. 6).
4. Remove the clamp chassis (refer to disassembly instruction Ref. No. 7).
Set the power switch to ON.
5. (1) The carousel rotates clockwise and stops at the fifth tray.
(2) Set the power switch to OFF and then to ON again, when the optical deck reaches its height position, set the power switch to OFF.
6. Remove the disc tray (refer to disassembly instruction Ref. No. 8).
7. Place the test disc and secure it by using the magnet (refer to disassembly instruction Ref. No. 9).
8. Set the unit in the test mode as follows:
(hold the play, stop and disc 1 keys (3 keys) on and set the power switch to ON.
9. Follow the adjustment procedure.

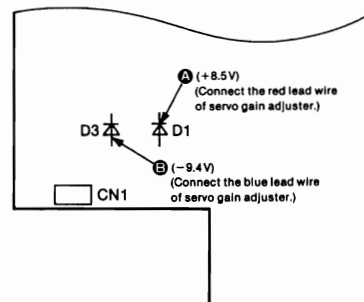


ADJUSTMENT POINTS

• Servo P.C.B.



• Main P.C.B.



• Temporary setting of each VR



Temporary VR setting if any of the trimmer VRs are replaced or require readjustment, temporarily set them to the following positions:

Measuring Instruments and Special Tools

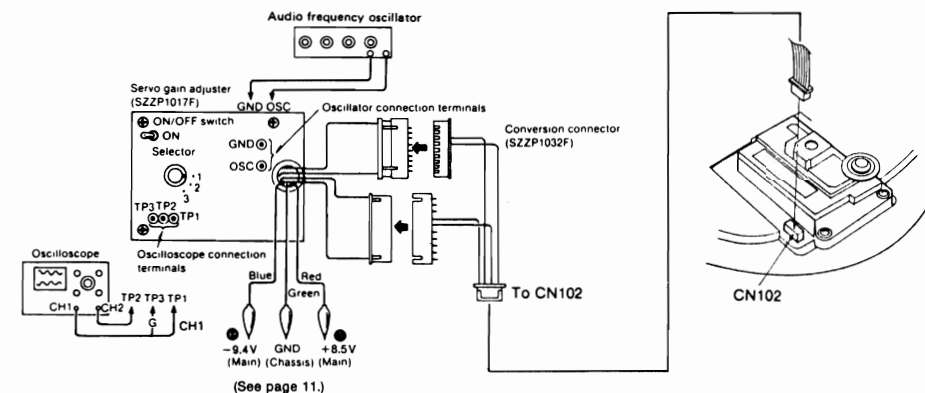
- * Servo gain adjuster (SZZP1017F)
- * Test discs
 1. Playability test disc (SZZP1054C or SZZP1014F)
 2. Uneven test disc (SZZP1056C)
 3. Black band test disc (SZZP1057C)
- * Normal disc
- * Dual-beam oscilloscope with bandwidth of 30 MHz or better (with EXT trigger and 1 : 1 probe).
- * Audio frequency (AF) oscillator
- * Conversion connector (SZZP1032F)

- * Allen wrench (M2.0) (SZZP1101C)
- * Allen wrench (M1.27)
- * 0.9mm clearance gauge (RZZ0297)

Perform adjustments depend on the part to be replaced according to followings:

- (1) Spindle motorItems 1, 3 to 8
- (2) TurntableItems 1, 3 to 8
- (3) Optical pickupItems 2 to 8

Connection of servo gain adjuster



Adjusting Procedure

- * If you have replaced the optical pickup, spindle motor, or turntable, do the following adjustment:

(1) TURNTABLE HEIGHT ADJUSTMENT

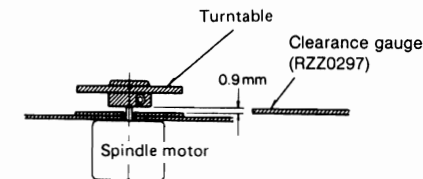
1. Insert the 0.9 mm clearance gauge (RZZ0297) between the turntable and the loading base (see the figure at right).
2. Tighten the turntable retention screw with the 1.27 mm allen wrench.
3. Connect the oscilloscope's CH. 1 probe across VR104's FEG (+) and VR106's V. REF (-) terminals.
(Note: A voltage of 2.5V appears at the V. REF terminal. Take care not to short the player's chassis to the oscilloscope ground.)

Oscilloscope setting: VOLT 50 mV
SWEEP 1 ms.
Input coupling ... DC

4. Adjust oscilloscope's DC zero balance.
5. Switch the player power ON, and play the test disc (SZZP1014F or SZZP1054C).
6. Measure the voltage amplitude of the signal on the oscilloscope.

Note 1. If the measured amplitude is within a range of ± 15 mV, the turntable height is correct. If it is outside this range, adjust the turntable height by using the clearance gauge as a pry.

If the amplitude exceeds +15 mV, lower turntable.
If the amplitude is below -15 mV, elevate the turntable.



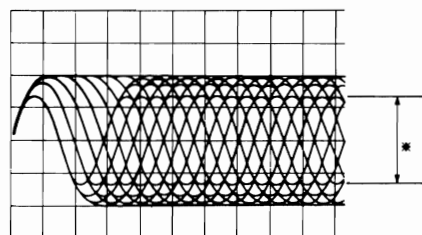
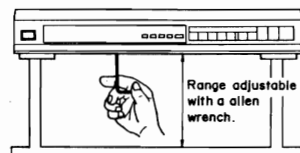
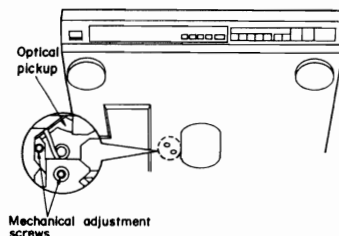
Note 2. If the measured amplitude greatly surpasses or falls short of the range above, set VR105 at or around the center, then try to adjust the height again. (Then be sure to adjust the focus offset as well.)

(2) MECHANICAL ADJUSTMENT

1. Connect the oscilloscope's CH. 1 probe across **TJ101** (+) and **TJ102** (-) on the Servo P.C.B.

Oscilloscope setting: VOLT 100 mV
SWEEP 0.5 μ s.
Input coupling ... AC

2. Switch the player power ON, and play track 9 on the test disc (SZZP1056C). (Playing any other track may yield a false adjustment.)
3. Leave the player in Play mode, and place it as shown in the figure on the right.
4. Alternately adjust the two mechanical adjusting screws with the 2.0mm allen wrench (SZZP1101C) until the vertical fluctuation of RF signal is minimized and the eye pattern is most stretched.
5. After completing the adjustment, lock the mechanical adjustments with lock paint (RZZOL01).



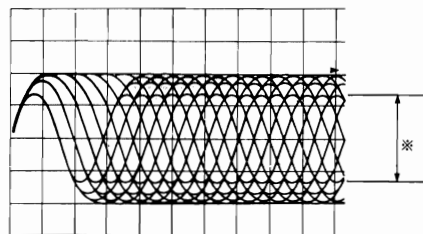
* Most stretched eye pattern.

(3) BEST EYE (PD BALANCE) ADJUSTMENT

1. Connect the oscilloscope's CH. 1 probe across **TJ101** (+) and **TJ102** (-) on the Servo P.C.B.

Oscilloscope setting: VOLT 100 mV
SWEEP 0.5 μ s
Input coupling ... AC

2. Switch the player power ON, and play the 0.5 mm black dot on the test disc (SZZP1014F or SZZP1054C).
3. Adjust **VR101** until the vertical fluctuation of RF signal is minimized and the eye pattern is most stretched.



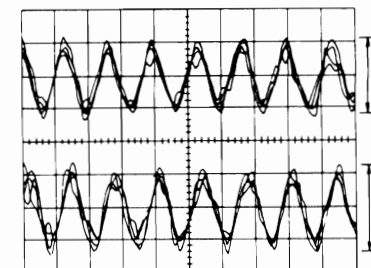
* Most stretched eye pattern.

(4) FOCUS GAIN ADJUSTMENT

1. Connect the servo gain adjuster to the player (see page 15).
2. Set the servo gain adjuster's gain switch to position "2" and the ON/OFF switch to ON.
3. Set up the AF oscillator output for 825Hz, 150 mVp-p, and connect it across the OSC and GND terminals on the servo gain adjuster.
4. Connect oscilloscope's CH. 1 and CH. 2 probes to the servo gain adjuster's TP1 and TP2 terminals, respectively (TP3 is GND).

Oscilloscope setting: VOLT 100 mV
(both channels)
SWEEP 0.2 ms.
Input coupling ... AC

5. Play the test disc (SZZP1014F or SZZP1054C).
6. Set the servo gain adjuster's gain switch to position "3", and you will see a 825 Hz signal on the oscilloscope. Adjust **VR104** until the signal amplitudes on both channels become identical to each other.
7. Set the gain switch back to position "2".



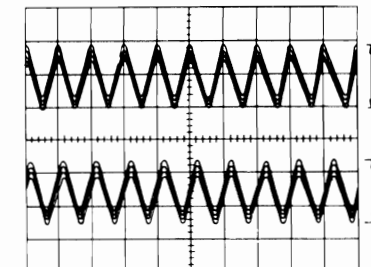
* Adjust **VR104** until a equals b.

(5) TRACKING GAIN ADJUSTMENT

1. Set up the AF oscillator output for 1.1 kHz, 150 mVp-p, and connect it across the OSC and GND terminals on the servo gain adjuster.
2. Connect oscilloscope's CH. 1 and CH. 2 probes to the servo gain adjuster's TP1 and TP2 terminals, respectively (TP3 is GND).

Oscilloscope setting: VOLT 100 mV
(both channels)
SWEEP 0.2 ms.
Input coupling ... AC

3. Switch the player power ON, and play the test disc (SZZP1014F or SZZP1054C).
4. Set the servo gain adjuster's gain switch to position "1", and you will see a 1.1 kHz signal on the oscilloscope. Adjust **VR102** until the signal amplitudes on both channels become identical to each other.
5. Set the gain switch back to position "2".



* Adjust **VR102** until a equals b.

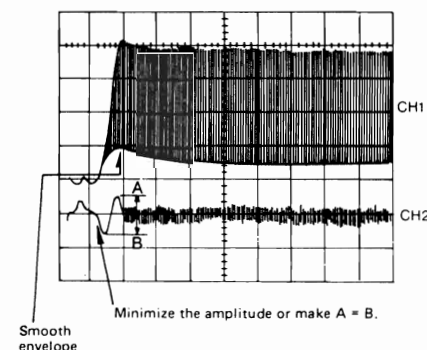
(6) FOCUS OFFSET ADJUSTMENT

Note: Make sure that the servo gain adjuster's gain switch is set to position "2".

1. Connect the oscilloscope's CH. 1 probe across **TJ101** (+) and **TJ102** (-) on the Servo P.C.B. and its CH. 2 probe (+) to **VR104's FEG** terminal.

Oscilloscope setting: VOLT 100 mV (CH. 1)
100 mV (CH. 2)
SWEEP 0.2 ms.
Input coupling ... AC (both CH. 1 and 2)
Trigger mode ... NORM (trigger CH. 1.)

2. Switch the player power ON, and play track 9 on the test disc (SZZP1057C).
3. Trigger the oscilloscope's CH. 1 so that the following waveforms are observed. Adjust **VR105** until the dip in the RF signal envelope on CH. 1 is smooth and the signal amplitude on CH. 2 is minimized, i.e. when amplitude A equals amplitude B.



(7) TRACKING OFFSET ADJUSTMENT

Note: Make sure that the servo gain adjuster's gain switch is set to position "2".

1. Connect the oscilloscope's CH. 1 probe across **TJ101** (+) and **TJ102** (-) on the Servo P.C.B., and its CH. 2 probe (+) to VR102's **TEG** terminal.

Oscilloscope setting: VOLT. 100 mV (CH. 1)
100 mV (CH. 2)

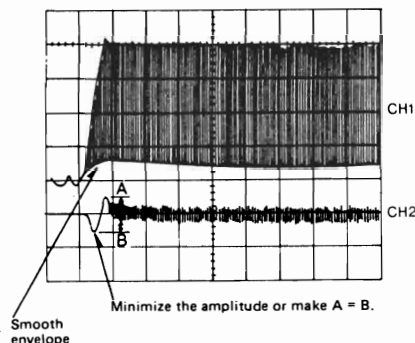
SWEEP. 0.2 ms.

Input coupling. . AC (both CH. 1 and 2)

Trigger mode. . . NORM (trigger CH. 1.)

2. Switch the player power **ON**, and play track 9 on the test disc (SZZP1057C).

3. Trigger the oscilloscope's CH. 1 so that the following waveforms are observed. Adjust **VR103** until the dip in the RF signal envelope on CH. 1 is smooth and the signal amplitude on CH. 2 is minimized, i.e. when amplitude A equals amplitude B.



(8) TRACKING BALANCE ADJUSTMENT

1. Make sure that the servo gain adjuster's gain switch is set to position "2".

2. Set up the AF oscillator output for 1.1 kHz, 600 mVp-p, and connect it across the OSC and GND terminals on the servo gain adjuster.

3. Connect the oscilloscope's CH. 1 probe across **TJ101** (+) and **TJ102** (-) on the Servo P.C.B. and CH. 2 probe (+) to the OSC terminal on the servo gain adjuster.

Oscilloscope setting: VOLT. 100 mV (CH. 1)
200 mV (CH. 2)

SWEEP. 0.1 ms.

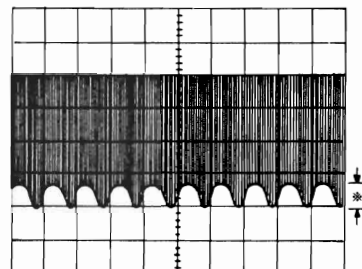
Input coupling. . AC (both CH. 1 and 2)

Trigger mode. . . NORM (trigger CH. 2)

4. Switch the player power **ON**, and play the test disc (SZZP1014F or SZZP1054C).

5. Set the servo gain adjuster's gain switch to position "1", and adjust **VR106** so that the section of the output of the waveform marked with * is balanced.

6. Disconnect the servo gain adjuster's leads from the player.



* This section of the waveform must be balanced.

(9) CHECK OF PLAY OPERATION AFTER ADJUSTMENT

* Checking Skip Search

1. Play an ordinary musical program disc.
2. Press the skip button to check for normal skip search operation (in both the forward and reverse directions).

* Checking Manual Search

1. Play an ordinary musical program disc.
2. Press the manual search button to check for smooth manual search operations at either low or high speed (in both the forward and reverse directions).

* Checking Using Defect Disc

1. Play the 0.7 mm black dot and the 0.7 mm wedge on the defect test disc (SZZP1054C) and verify that no sound skip or noise occurs.
2. Play the middle tracks of the uneven test disc and verify that no sound skip or noise occurs.

■ TERMINAL FUNCTION OF IC'S

• IC101 (AN8373S): Servo amp.

Pin No.	Mark	I/O Division	Function
1	AMP1	I	RF signal input (X30 amp.)
2	PDAD	I	Photo detector current input (A2)
3	PDA	I	Photo detector current input (A1)
4	PDBD	I	Photo detector current input (A4)
5	PDB	I	Photo detector current input (A3)
6	LPD	I	Non-inverting laser power input
7	LD	O	Laser power auto control output
8	FBL1	I	PD balance adjustment
9	FBL2	I	
10	TBL1	I	Tracking balance adjustment
11	TBL2	I	
12	FOOFS	I	Focus offset adjustment
13	IVA	O	Current/voltage conversion output (A)
14	IVB	O	Current/voltage conversion output (B)
15	FE	O	Focus gain adjustment output
16	FPI	I	Focus error signal input
17	TPI	I	Tracking error signal input
18	C. TPL	I	Tracking error filter capacitor input
19	C. TPH		
20	C. FPL		
21	C. FPH	I	Focus error filter capacitor input

Pin No.	Mark	I/O Division	Function
22	TPO	O	Tracking error signal output
23	FPO	O	Focus error signal output
24	FGC	I	Focus gain up signal input (Not used, connected to GND)
25	TGC	I	Tracking gain up signal input (Not used, connected to GND)
26	GD	I	Focus/Tracking down signal input (Not used, connected to GND)
27	PTO	O	Position detecting amp. output
28	PTI	I	Position detecting amp. input
29	PBO	O	Position detecting buffer output
30	POT	I	Position detecting buffer input
31	BDO	O	Dropout detection output
32	RFDET	O	RF detection signal output
33	SDO	O	Dropout detection pulse output
34	C. SBDO	I	Dropout detecting capacitor input
35	ARF	O	RF signal output
36	C. AGC	I	AGC detecting capacitor input
37	VCC	I	Power supply (+5 V input)
38	LDON	I	Laser power control input
39	RF IN	I	RF signal input
40	AMPO	O	RF signal output
41	VREF	O	Reference voltage output
42	GND	I	Ground terminal

• IC102 (AN8374S): Servo processor

Pin No.	Mark	I/O Division	Function	Pin No.	Mark	I/O Division	Function
1	LSA	I	Phase difference input (A)	22	VDD	I	Power supply (+5 V input)
2	LSB	I	Phase difference input (B)	23	SPCNT	O	Track crossing speed control output (Not used, open)
3	TEOFS	O	Tracking offset adjustment	24	SENSE	O	Selector output (track crossing state)
4	TE	O	Tracking gain adjustment	25	TRV	O	Traverse servo control output
5	TEG	I		26	FLOCK	O	Focus lock signal output
6	TE OUT	O	Tracking error signal output	27	KICK	O	Track kick signal output
7	TE BPF	I	Tracking error gain detecting filter (Not used, open)	28	LDON	O	Laser power control output
8	FEG	I	Focus gain adjustment	29	VDET	O	Focus/tracking gain up output (Not used, open)
9	FE OUT	O	Focus error signal output	30	CNT1	I	Control input (FOON: Focus Servo On signal)
10	CLW	O	Triangular wave oscillator capacitor output	31	CNT2	I	Control input (TRON: Tracking Servo On signal)
11	VREF	I	Reference voltage input	32	CNT3	I	Control input (KICKF: Kick Direction (Forward) command)
12	ARF	I	RF signal input	33	CNT4	I	Control input (KICKR: Kick Direction (Backward) command)
13	CDSL	I	Data slice filter capacitor input	34	TRVF	I	Traverse forward command signal
14	FPC	I	Frequency difference signal input	35	TRVR	I	Traverse backward command signal
15	GND	I	Ground terminal	36	RFDET	I	RF detection signal input
16	C. PLL	I	PLL loop filter constant	37	BDO	I	Dropout detection input
17	VSS	I	Ground terminal	38	VCC	I	Power supply (+5 V input)
18	CLK	I	Frequency pull-in clock signal (88.2 kHz) input	39	TVPO	O	Traverse position detecting resistor/capacitor inputs
19	SRF	O	Sliced and digitized RF signal output	40	TVPI	I	
20	PCK	O	Clock output extracted from SRF	41	BROUT	O	Tracking drive control output
21	EFM	O	EFM signal output synchronous with PCK	42	BRIN	I	Tracking error signal input

• IC103 (AN8377N): BTL drive

Pin No.	Mark	I/O Division	Function	Pin No.	Mark	I/O Division	Function
1	PVCC	I	Driver power supply (+7.7 V input)	9	TD-	O	Inverting output of tracking driver
2	VCC	I	Power supply (+7.7 V input)	10	TD+	O	Non-inverting output of tracking driver
3	TB	O	External transistor base driving output	11	FD-	O	Inverting output of focus driver
4	VMON	O	Voltage (+4.9 V) output	12	FD+	O	Non-inverting output of focus driver
5	TVDI	I	Traverse error signal input	13	TVD-	O	Inverting output of traverse driver
6	FDI	I	Focus error signal input	14	TVD+	O	Non-inverting output of traverse driver
7	TDI	I	Tracking error signal input	15	RESET	O	Reset signal output
8	VREF	I	Reference voltage input	16	PC	I	PC input (connect to GND.)

• IC301 (MN6625): Digital signal processing

Pin No.	Mark	I/O Division	Function	Pin No.	Mark	I/O Division	Function
1	BYTCK	O	Serial data byte clock (Not used, open)	25	MCLK	I	Command clock signal input
2	FCLK	O	Crystal frame clock (Not used, open)	26	MDATA	I	Command data input
3	DEMPH	O	De-emphasis ON signal (de-emphasis ON at "H")	27	DMUTE	I	Muting control
4	SRDATA	O	Serial data output (MSB first)	28	TRON	I	Tracking servo ON signal (tracking servo ON at "L")
5	SCK	O	Serial bit clock output	29	STAT	O	Processing condition (CRC, CUE, CLVS, TT STOP, FCLV)
6	LRCK	O	LR discrimination signal output	30	SUBC	O	Sub-code serial output data (Not used, open)
7	WDCK	O	Serial data output word clock	31	SBCK	I	Clock for sub-code serial output (Not used, open)
8	LDG	O	L channel deglitch signal (Not used, open)	32	SMCK	O	Clock output (4.2336 MHz)
9	RDG	O	R channel deglitch signal (Not used, open)	33	VDD	I	Power supply (connected to +5V)
10	IPFLAG	O	Interpolation flag (Interpolation at "H")	34	MEMP	I	Emphasis signal input (Not used, open)
11	FLAG	O	Error flag terminal	35	FG	I	Spindle motor FG signal input (Not used, open)
12	XCK	O	Clock (16.9344 MHz) output	36	PC	O	Spindle motor ON signal (ON at "L")
13	TEST	I	Test mode selection (Not used, connected to +5V)	37	EC	O	Spindle motor drive signal
14	TX	O	Digital signal output (Not used, open)	38	RESY	O	Resynchronizing signal (Not used, open)
15	SLEEP	I	Mode selector ("L": normal, "H": SLEEP mode)	39	DO	I	Drop-out signal (Drop-out at "H")
16	CSEL	I	Test terminal ("L": normal)	40	SRF	I	EFM signal input (DSL)
17	X1	I	Clock input (16.9344 MHz)	41	EFM	I	EFM signal input (PLL)
18	X2	O	Clock output (16.9344 MHz)	42	PCK	I	PLL extract clock input (4.3218 MHz)
19	VSS	I	GND terminal	43	FPC	O	PLL frequency comparison signal
20	BLKCK	O	Sub-code block (Q data) clock (75 Hz)	44 } 51 } 51	D7 } D0 } D0	I/O	16K RAM data input/output
21	CLDCK	O	Sub-code frame (Q data) clock (7.35 kHz)	52	RAM/OE	O	16K RAM OE signal
22	SUBC	O	Sub-code (Q data) output	53	RAM/WE	O	16K RAM WE signal
23	RST	I	Reset signal input (reset at "L")	54 } 64 } 64	RAM/A0 } RAM/A10 } RAM/A10	O	16K RAM address signal (RAMA0: LSB, RAMA10: MSB)
24	MLD	I	Command load signal input				

• IC401 (MN15283PJL): System control

Pin No.	Mark	I/O	Function
1	GND	I	GND terminal
2	XO	O	Not used, open
3	X1	I	Optical servo condition input
4	M-RLY	I	Muting control
5	MDATA	O	Command data output
6	MCLK	O	Command clock output
7	MLD	O	Command load output
8	SLOW	O	Motor drive control
9	FOW/REV	O	Motor drive control
10	LOADING	O	Motor drive control
11	HIGHT	O	Motor drive control
12	SYNC	I	Not used, open
13	RST	I	Reset signal input (reset at "L")
14	BLKCK	I	Sub-code block (Q-data) clock (75kHz) input
15 P50 P53		I	Key scan input
19	CLDCK	I	Sub-code frame clock (7.35kHz)
20	SUBQ	I	Sub-code "Q" data input
21	NC	—	Not used, open
22	NC	—	Not used, open
23	TRV-R	O	Traverse reverse command signal
24	TRV-F	O	Traverse forward command signal
25	CONT4	O	Optical servo IC control signal (KICKR: Kick direction [Reverse] command)

• IC403 (MN1550PEB): Remote control signal processing

Pin No.	Mark	Signal	I/O Division	Function
1	VDD	—	I	Power supply (connected to +5V)
2	OSC1	SMCK	I	Clock input
3	OSC2	—	—	Not used, open
4	P22	—	—	Not used, open
5	RST	RESET	I	Reset signal input
6	P21	—	—	Not used, open
7	P20	—	I	Remote control signal input
8	IRQ	—	I	Program enable/de-enable control

Pin No.	Mark	I/O	Function
26	CONT3	O	Optical servo IC control signal (KICKF: Kick direction [Forward] command)
27	CONT2	O	Optical servo IC control signal (TRON: Tracking servo)
28	CONT1	O	Optical servo IC control signal (FOON: Focus servo)
29	STAT	I	Key input strobe and processing status input from signal processing LSI travers position detector
30	HIGHT	I	Elevator height signal input (Not used, open)
31	FLOCK	I	Optical servo condition (Focus) input
32	SENSE	I	Optical servo condition (Track cross) input
33	PAUSE	O	Not used, open
34	PLAY	O	Not used, open
35	DAC	O	Not used, open
36	VPP	I	FL drive power supply (connected to -28V)
37 DO DF		O	FL glide signal and key scan signal
53 S8 S0		O	FL anode signal
62	VDD	I	Power supply (connected to +5V)
63	OSC2	I	Clock terminal (Not used, open)
64	OSC1	I	Clock input

• IC801 (SM5807ES): Digital filter

Pin No.	Mark	I/O Division	Function
1	XT	I	Clock signal input (16.9344MHz)
2	XT	I	Clock signal input (Not used, open)
3	CKSL	I	External input terminal (Not used, open)
4	CKO	O	Clock signal output (Not used, open)
5	LRCI	I	Synchronizing clock signal input of 44.1kHz
6	DIN	I	Serial data input
7	BCKI	I	Serial bit clock input
8	V _{ss}	I	GND terminal
9	SCSL	I	SCSL=H: System clock=192fs SCSL=L: System clock=196fs (fs=Sampling frequency) (Not used, open)

Pin No.	Mark	I/O Division	Function
10	DGR	O	Rch deglitch signal output (176.4kHz) (Not used, open)
11	DGL	O	Lch deglitch signal output (176.4kHz) (Not used, open)
12	DOUT	O	Serial data output
13	WDCO	O	Output control clock signal (352.8kHz)
14	LRCO	O	Output control clock signal (176.4kHz)
15	BCKO	O	Serial bit clock output (8.4672MHz or 8.6436MHz)
16	V _{DD}	I	Power supply (connected to +5V)

• IC802 (LC7881B): D/A converter

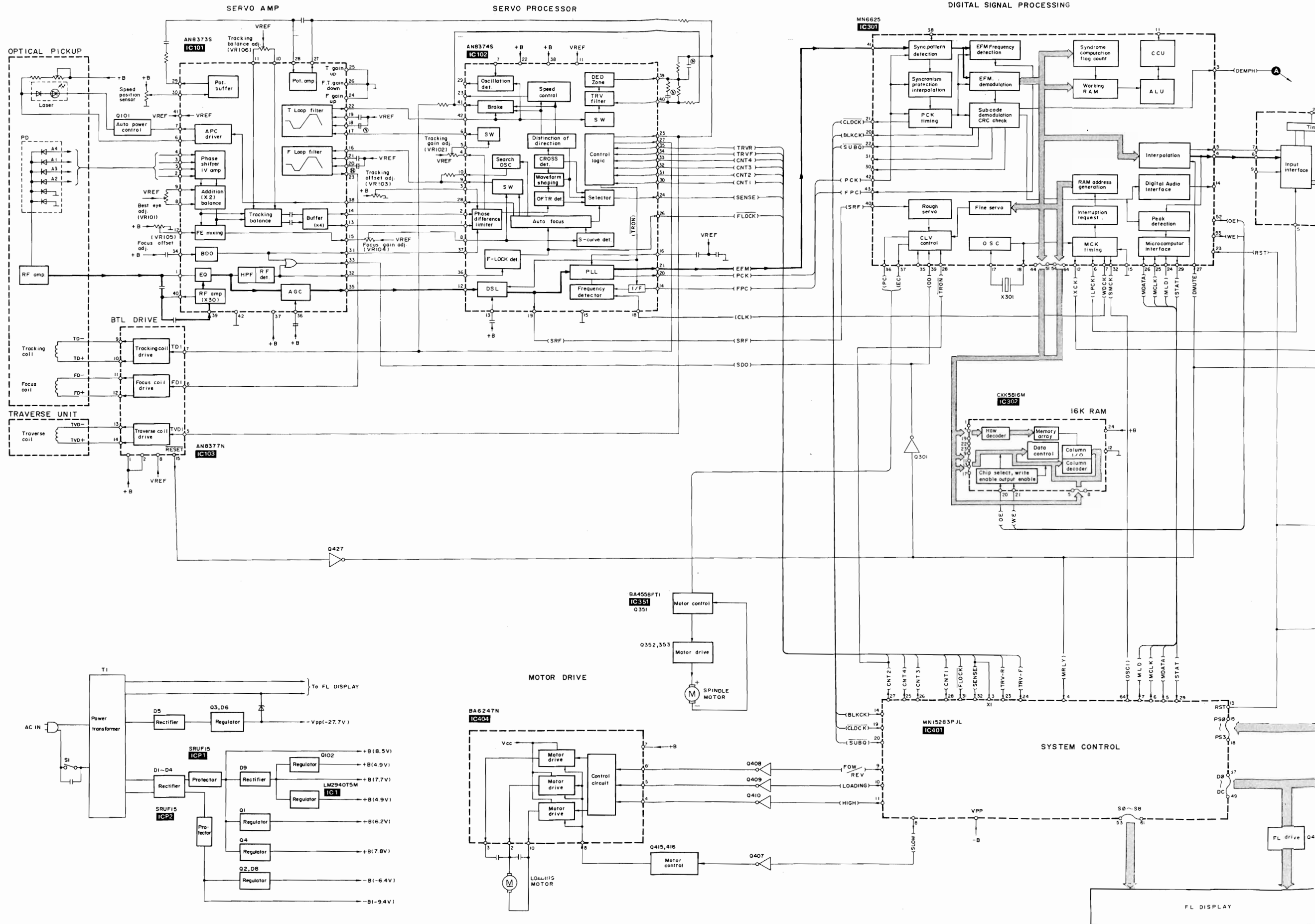
Pin No.	Mark	I/O Division	Function
1	CH1 OUT	O	CH1 (Rch) data output
2	VREF H1	I	Reference voltage input terminal (1)
3	VREF H2	I	Reference voltage input terminal (2) (Not used, connected to +5V)
4	V _{DD}	I	Power supply (connected to +5V)
5	WCLK 2	I	Word clock (2) input terminal (Not used, connected to GND)
6	LRCK	I	LR clock input terminal
7	WCLK 1	I	Word clock (1) input terminal
8	DATA	I	Serial data input
9	BCLK	I	Serial bit clock input
10	V _{DD}	I	Power supply terminal (connected to +5V)

Pin No.	Mark	I/O Division	Function
11	TST OUT	O	Test output terminal (Not used, open)
12	TST1	I	Test terminal (1) (connected to GND)
13	TST2	I	Test terminal (2) (connected to GND)
14	IF	I	Interface select terminal (Not used, connected to +5V)
15	GND	I	GND terminal
16	VREFL 1	I	Reference voltage "L" input terminal (1) (Not used, connected to GND)
17	GND	I	GND terminal
18	VREFL 2	I	Reference voltage "L" input terminal (2) (Not used, connected to GND)
19	NC	—	Not connected
20	CH2 OUT	O	CH2 (Lch) data output

■ BLOCK DIAGRAM

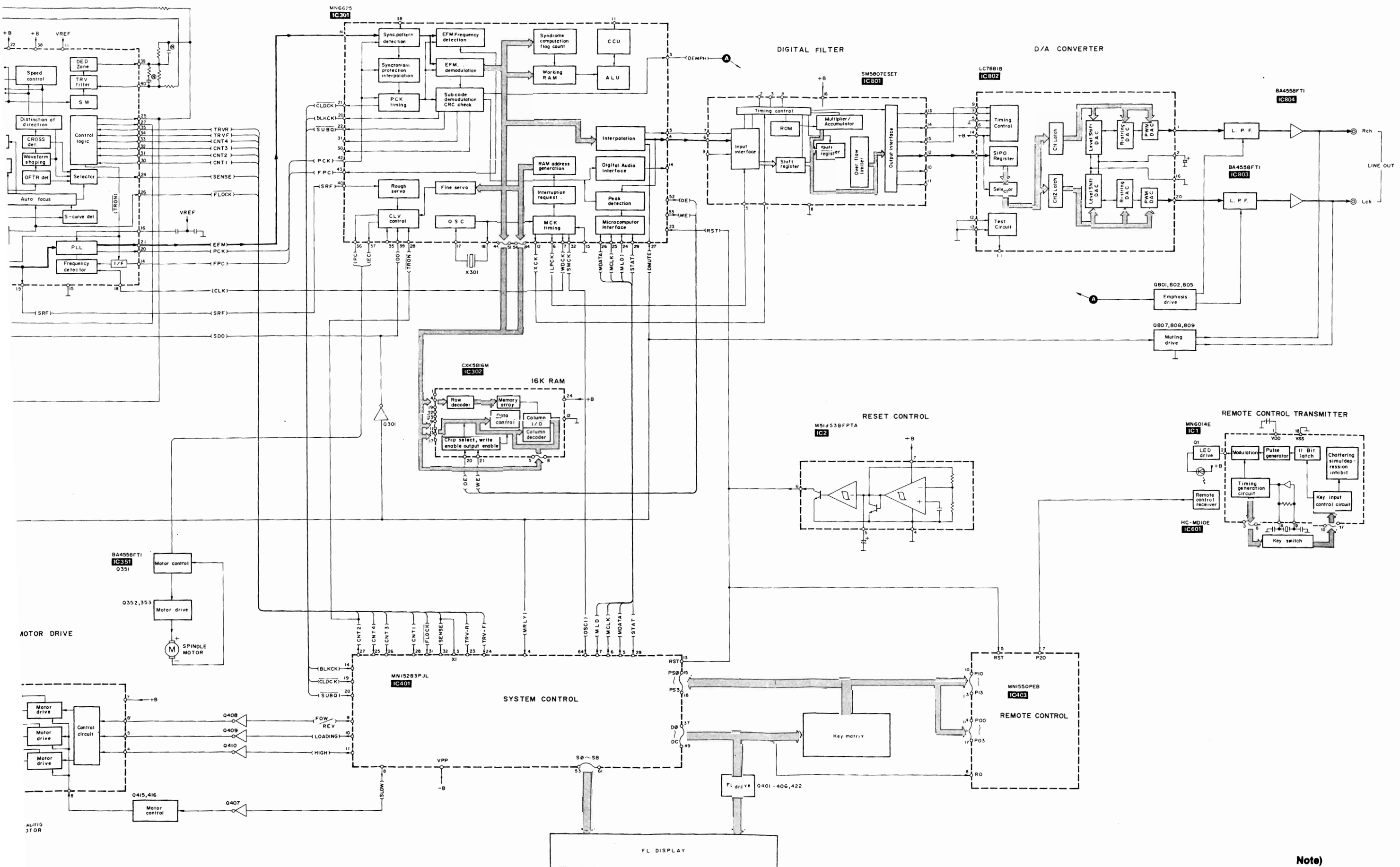
Function
1 signal output Not used, open)
1 signal output Not used, open)
output
rol clock signal
rol clock signal
ock output or 8.6436MHz)
ly (connected to +5V)

Function
terminal open)
al (1) to GND)
al (2) to GND)
lect terminal connected to +5V)
1al
voltage "L" input
connected to GND)
1al
voltage "L" input
connected to GND)
ted
data output



I/O PROCESSOR

DIGITAL SIGNAL PROCESSING

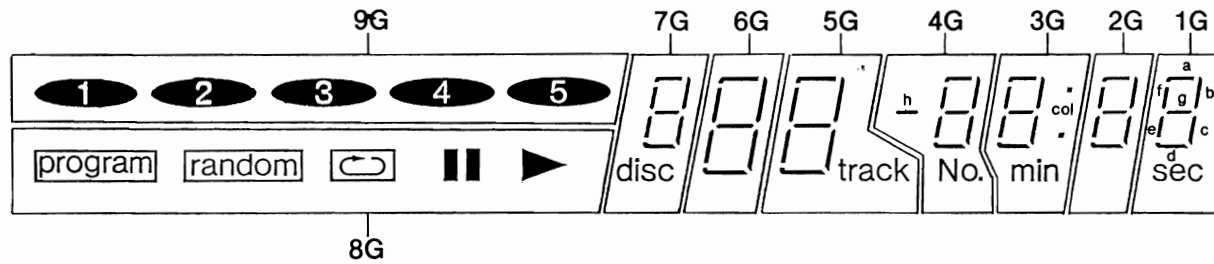


Note)

• → Audio signal

INTERNAL CONNECTION OF FL

Grid connection diagram



Anode connection table

	9G	8G	7G	6G	5G	4G	3G	2G	1G
a	—	—	a	a	a	a	a	a	a
b	5	program	b	b	b	b	b	b	b
c	4	random	c	c	c	c	c	c	c
d	3	—	d	d	d	d	d	d	d
e	2	—	e	e	e	e	e	e	e
f	1	▶	f	f	f	f	f	f	f
g	—	◀	g	g	g	g	g	g	g
h	—		disc	—	track	—	min, col	—	sec
i	—	—	—	—	—	No.	—	—	—

Pin connection

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
CONNECTION	F 1	F 1	N P	N P	N P	N P	N P	N P	N P	N P	N P	N P	N P	N P	N P	N P	N P	N P	N P	N P	8 G	7 G	6 G	5 G	4 G	3 G	2 G
PIN NO.	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42												
CONNECTION	1 G	9 G	i	h	g	f	e	d	c	b	a	N P	N P	F 2	F 2												

SCHEMATIC DIAGRAM

(Parts list on pages 39 ~ 47)

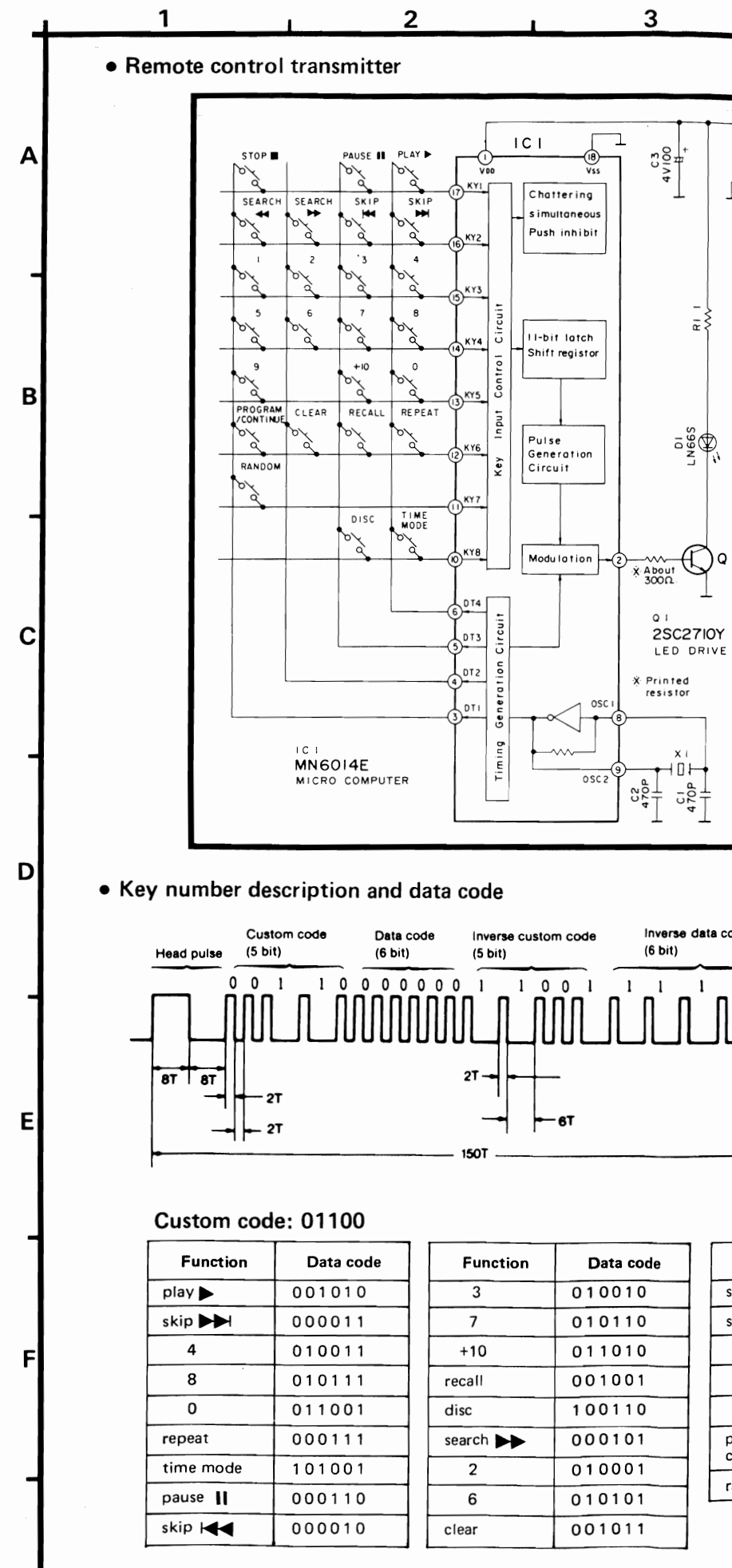
(This schematic diagram may be modified at any time with development of new technology.)

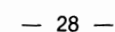
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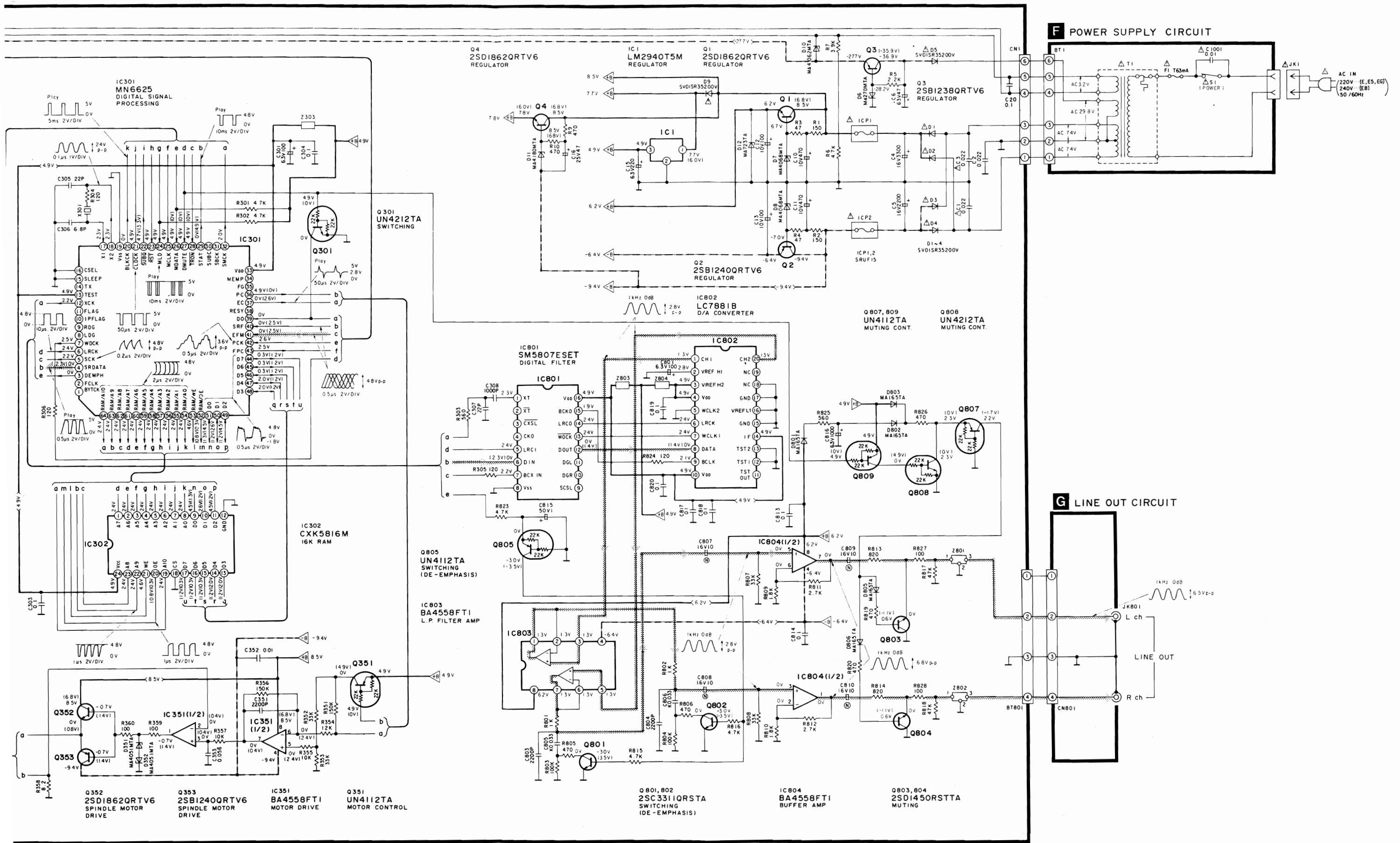
- S1 : Power switch in "on" position.
- S401~405 : Disc select (disc, 1~5) switches.
[S401: 1, S402: 2, S403: 3, S404: 4, S405: 5]
- S406 : Time mode select (time mode) switch.
- S407, 408 : Skip (◀◀ skip ▶▶) switches.
S407: ◀◀, S408: ▶▶
- S409, 410 : Search (◀◀ search ▶▶) switches.
S409: ◀◀, S410: ▶▶
- S411 : Program/continue (program/continue) switch.
- S412 : Repeat (repeat) switch.
- S413 : Pause (|| pause) switch.
- S414 : Play (▶ play) switch.
- S415 : Random (random) switch.
- S416 : Stop (■ stop) switch.
- S417 : Disc skip (disc skip) switch.
- S451 : Clamp switch.
- The voltage value and waveforms are the reference voltage of this unit measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis.
Accordingly, there may arise some error in voltage values and waveforms depending upon the internal impedance of the tester or the measuring unit.
- *The parenthesized are the values of voltage generated during playing (Test disc 1 kHz, L+R, 0dB), others are voltage values in stop mode.
- Important safety notice:
Components identified by Δ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
- — < > — / — < > — : Positive voltage lines and negative voltage lines.
- : audio signal lines.

Caution!

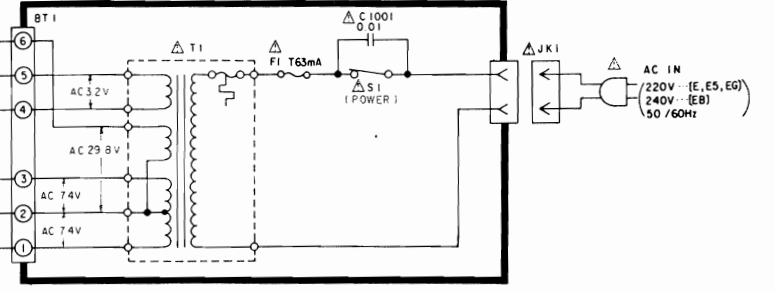
- IC and LSI are sensitive to static electricity. Secondary trouble can be prevented by taking care during repair.
- Cover the parts boxes made of plastics with aluminum foil.
- Ground the soldering iron.
- Put a conductive mat on the work table.
- Do not touch the pins of IC or LSI with fingers directly.



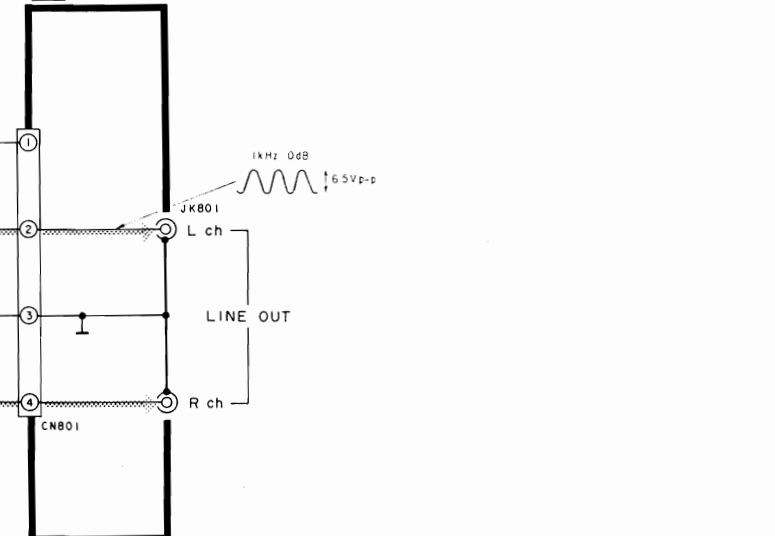




F POWER SUPPLY CIRCUIT



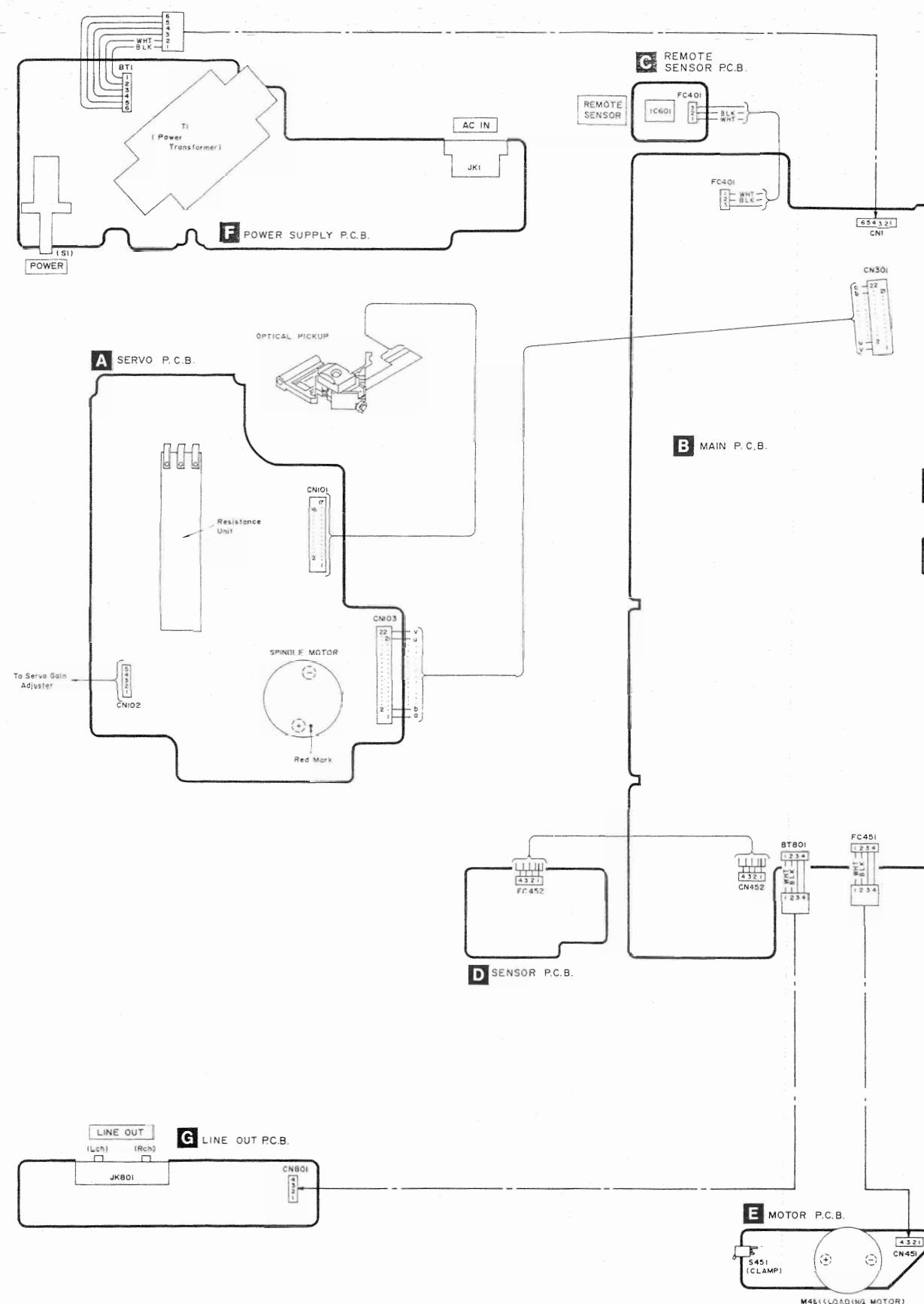
G LINE OUT CIRCUIT



■ TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES

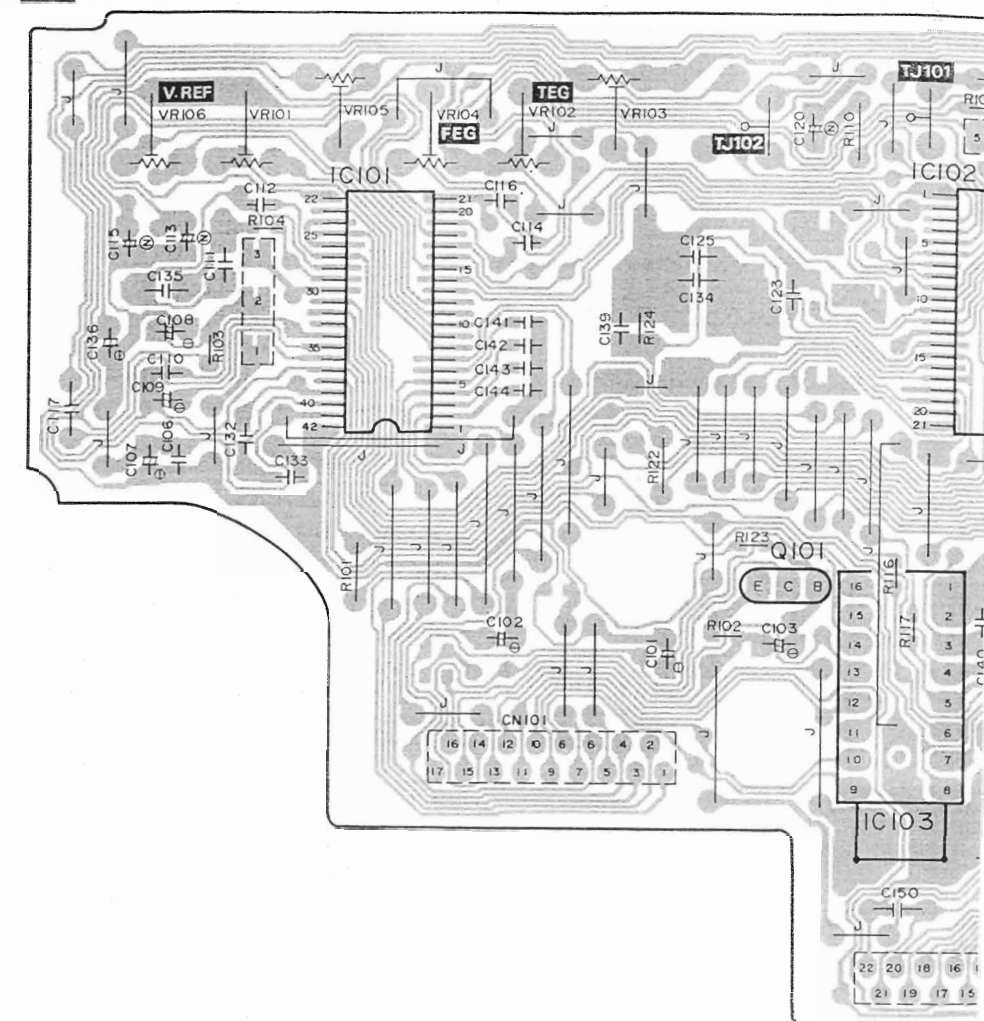
BA6247N 10 Pin 	SVDGP1S53 	LM2940T5M
	M51953BFPTA 8 Pin BA4558FTI 16 Pin SM5807ES 24 Pin CXK5816M	AN8373S 42 Pin AN8374S 18 Pin MN1550PEB
AN8377N 16 Pin 	MN6625 64 Pin 	MN15283PJL 64 Pin LC7881B 20 Pin
SRUF15 		UN4112TA, UN4114TA
2SD1450RST, 2SC3311QRS, 2SA1309QRS, 2SA1547QSTV2 	UN4212TA 	2SB1238QSTV6, 2SD1862QRTV6, 2SB1240QRTV6
MA165TA, SVD1SR35200V, MA723TA 		MA4091M, MA4030M, MA4062M, MA4033M, MA4051M, MA4068M, MA4180M, MA4270M

■ WIRING CONNECTION DIAGRAM

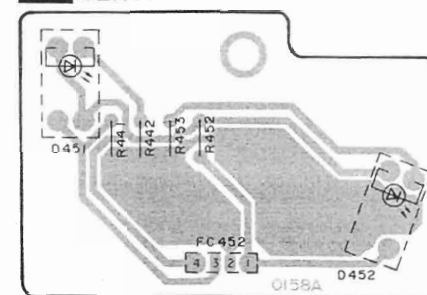


■ PRINTED CIRCUIT BOARDS

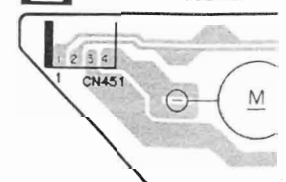
A SERVO P.C.B.



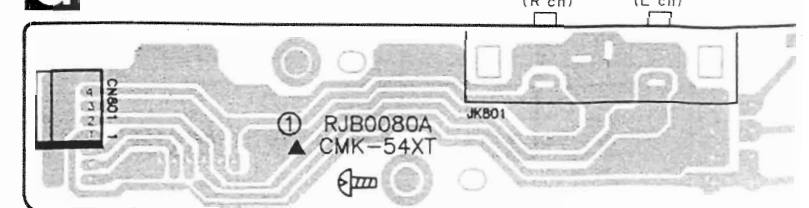
D SENSOR P.C.B.



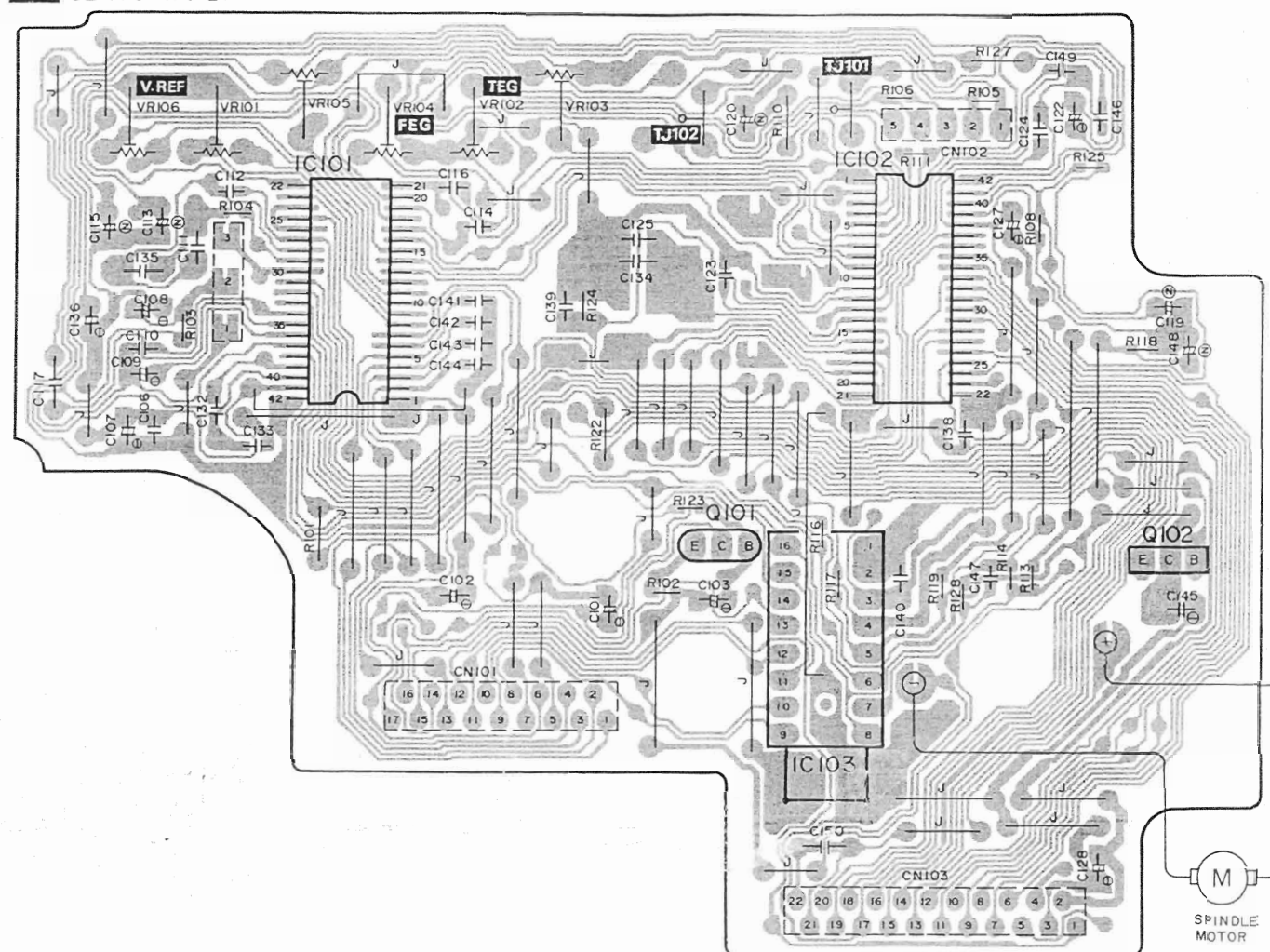
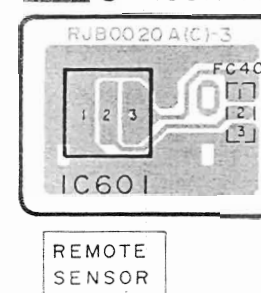
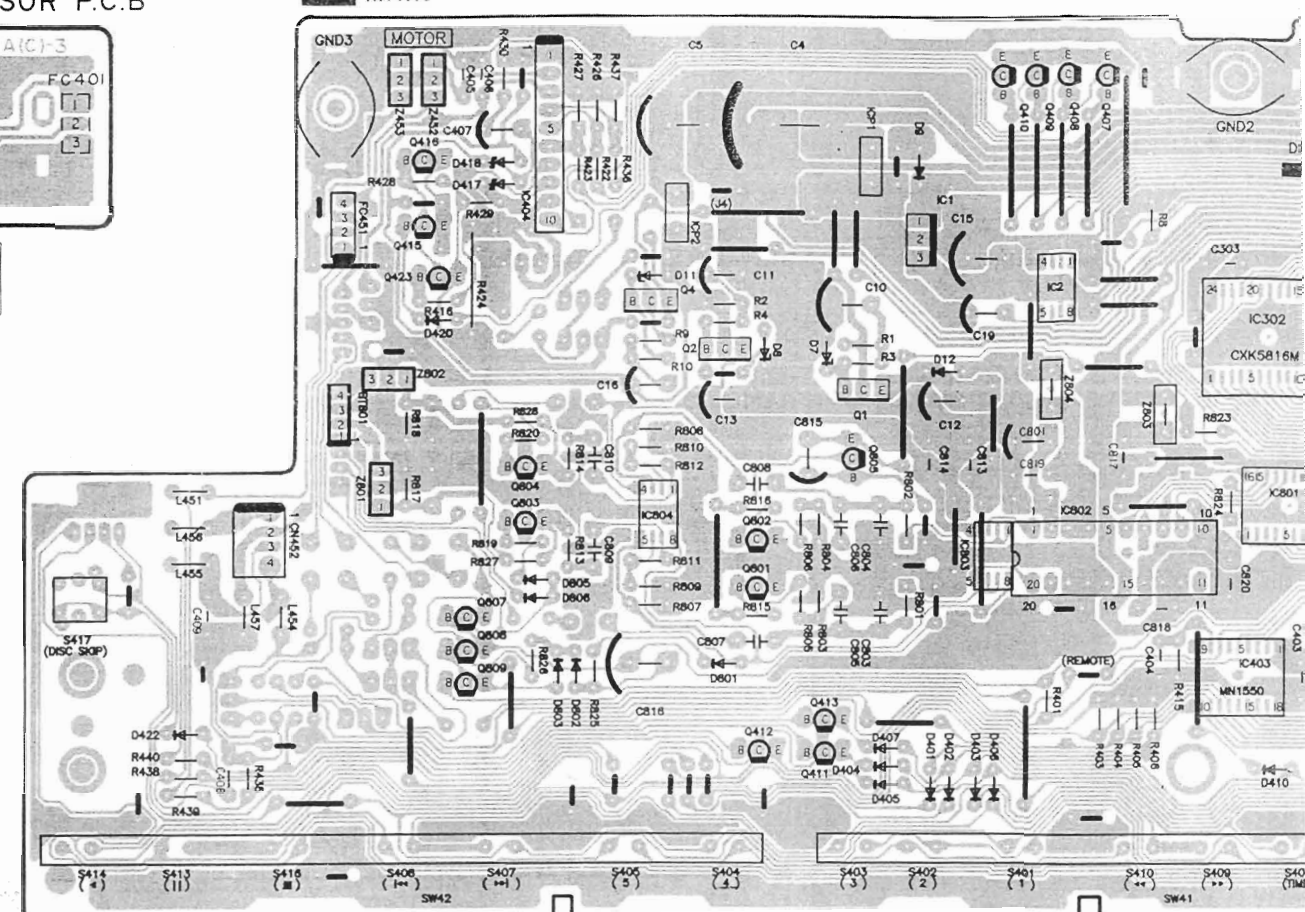
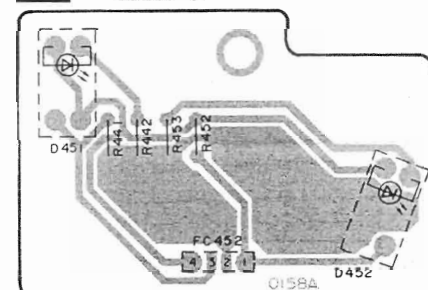
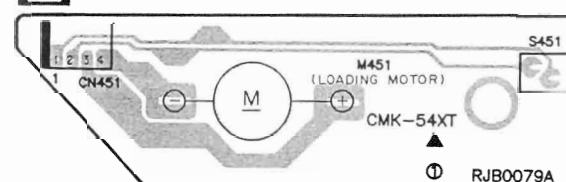
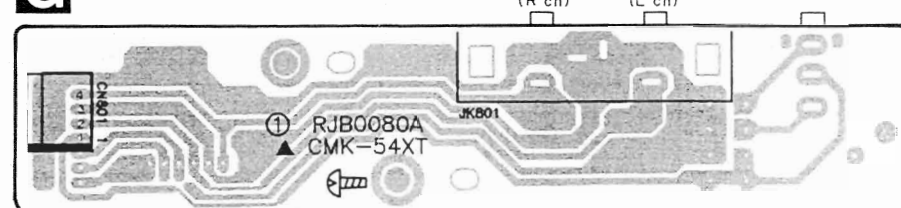
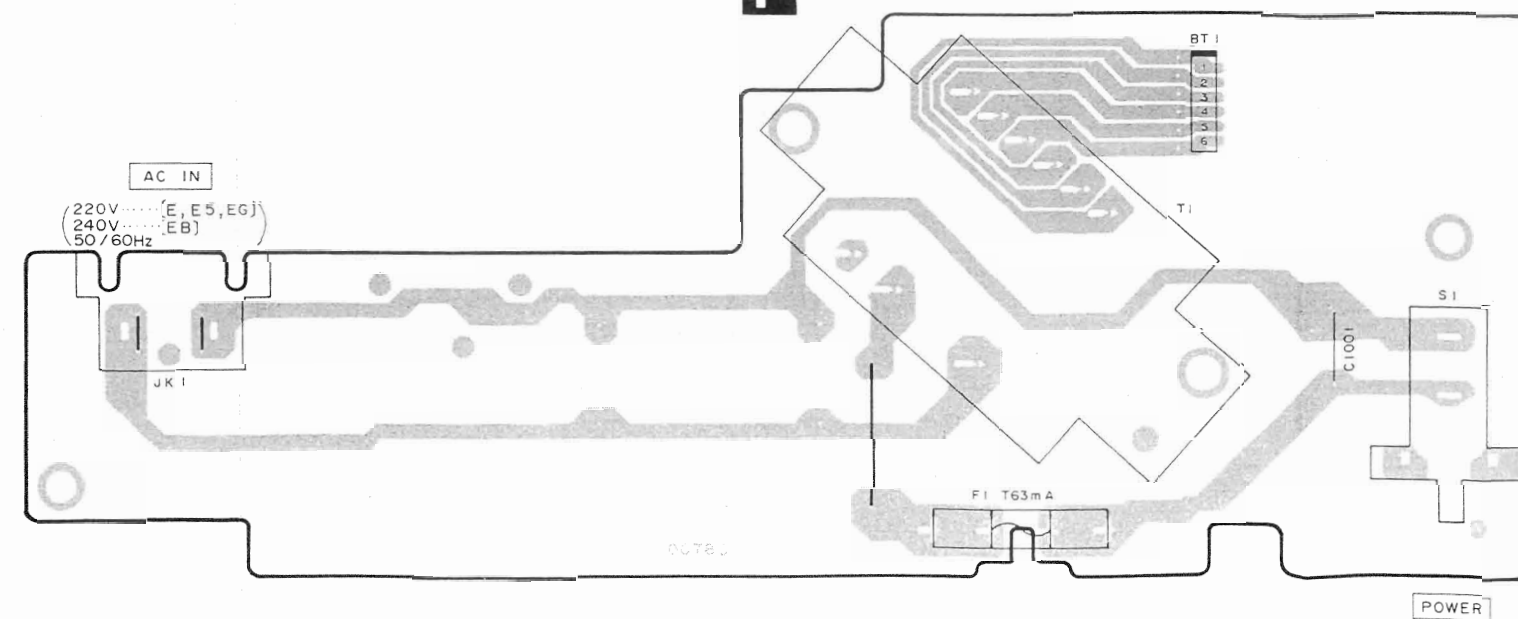
E MOTOR P.C.B.

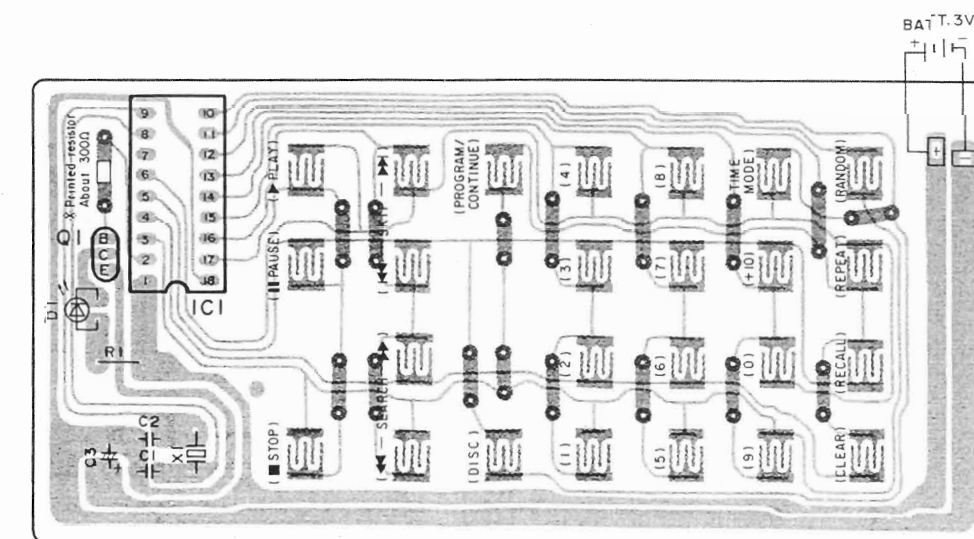
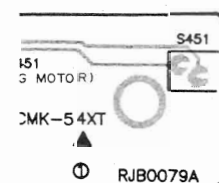


G LINE OUT P.C.B.



PRINTED CIRCUIT BOARDS

A SERVO P.C.B.**C** REMOTE SENSOR P.C.B.**B** MAIN P.C.B.**D** SENSOR P.C.B.**E** MOTOR P.C.B.**G** LINE OUT P.C.B.**F** POWER SUPPLY P.C.B.



REPLACEMENT PARTS LIST

Notes : • Important safety notice:
Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
• The parenthesized indications in the Remarks columns specify the areas. (Refer to the cover page for area.)
Parts without these indications can be used for all areas.

Ref. No.	Part No.	Part Name & Description	Remarks	Ref. No.	Part No.	Part Name & Description	Remarks
		INTEGRATED CIRCUIT(S)					
IC1	LM2940TSM	IC, REGULATOR		Q423	2SA1309QRSTA	TRANSISTOR	
IC2	M519538FPTA	IC, REGULATOR		Q427	UN4112TA	TRANSISTOR	
IC301	MN6625	IC, DIGITAL SIGNAL PROCESS- ING		Q801	2SC3311QRSTA	TRANSISTOR	
IC302	CKX5816M	IC, 16K RAM		Q802	2SC3311QRSTA	TRANSISTOR	
IC351	BA4558FT1	IC, MOTOR DRIVE		Q803	2SD1450RSTTA	TRANSISTOR	
IC401	MN15283PJL	IC, SYSTEM CONTROL		Q804	2SD1450RSTTA	TRANSISTOR	
IC403	MN1550PEB	IC, REMOTE CONTROL		Q805	UN4112TA	TRANSISTOR	
		DATA PROCESSING		Q807	UN4112TA	TRANSISTOR	
IC404	BA6247N	IC, MOTOR DRIVE		Q808	UN4212TA	TRANSISTOR	
IC601	HC-MD10E	IC, REMOTE CONTROL RECEIVER		Q809	UN4112TA	TRANSISTOR	
IC801	SM5807ESET	IC, DIGITAL FILTER				DIODE (S)	
IC802	LC7881B	IC, D/A CONVERTER					
IC803	BA4558FT1	IC, L. P. F.		D1	SVD1SR35200V	DIODE	Δ
IC804	BA4558FT1	IC, BUFFER AMP		D2	SVD1SR35200V	DIODE	Δ
ICP1	SRUF15	IC, PROTECTOR	Δ	D3	SVD1SR35200V	DIODE	Δ
ICP2	SRUF15	IC, PROTECTOR	Δ	D4	SVD1SR35200V	DIODE	Δ
		TRANSISTOR(S)		D5	SVD1SR35200V	DIODE	Δ
Q1	2SD1862QRTV6	TRANSISTOR		D6	MA4270MTA	DIODE	
Q2	2SB1240QRTV6	TRANSISTOR		D7	MA4068MTA	DIODE	
Q3	2SB1238QSTV6	TRANSISTOR		D8	MA4068MTA	DIODE	
Q4	2SD1862QRTV6	TRANSISTOR		D9	SVD1SR35200V	DIODE	Δ
Q301	UN4212TA	TRANSISTOR		D10	MA4062MTA	DIODE	
Q351	UN4112TA	TRANSISTOR		D11	MA4180MTA	DIODE	
Q352	2SD1862QRTV6	TRANSISTOR		D12	MA723TA	DIODE	
Q353	2SB1240QRTV6	TRANSISTOR		D351	MA4051MTA	DIODE	
Q401	UN4212TA	TRANSISTOR		D352	MA4051MTA	DIODE	
Q402	UN4212TA	TRANSISTOR		D401	MA165TA	DIODE	
Q403	UN4212TA	TRANSISTOR		D402	MA165TA	DIODE	
Q404	UN4212TA	TRANSISTOR		D403	MA165TA	DIODE	
Q405	UN4212TA	TRANSISTOR		D404	MA165TA	DIODE	
Q406	UN4212TA	TRANSISTOR		D405	MA165TA	DIODE	
Q407	UN4112TA	TRANSISTOR		D406	MA165TA	DIODE	
Q408	UN4112TA	TRANSISTOR		D407	MA165TA	DIODE	
Q409	UN4112TA	TRANSISTOR		D408	MA165TA	DIODE	
Q410	UN4112TA	TRANSISTOR		D410	MA165TA	DIODE	
Q411	2SA1309QRSTA	TRANSISTOR		D411	MA165TA	DIODE	
Q412	2SA1309QRSTA	TRANSISTOR		D412	MA165TA	DIODE	
Q413	2SA1309QRSTA	TRANSISTOR		D413	MA165TA	DIODE	
Q415	UN4212TA	TRANSISTOR		D414	MA165TA	DIODE	
Q416	UN4212TA	TRANSISTOR		D415	MA165TA	DIODE	
Q422	UN4212TA	TRANSISTOR		D416	MA165TA	DIODE	
				D417	MA4030MTA	DIODE	
				D418	MA4033MTA	DIODE	
				D420	MA165TA	DIODE	
				D422	MA165TA	DIODE	
				D451	SVDGP1553	DIODE	

Ref. No.	Part No.	Part Name & Description	Remarks	Ref. No.	Part No.	Part Name & Description	Remarks
D452	SVDGP1553	DIODE		CN452	SJSD0405	CONNECTOR (4P)	
D801	MA165TA	DIODE		CN801	SJTD414-W	CONNECTOR (4P)	
D802	MA165TA	DIODE				CABLES	
D803	MA165TA	DIODE					
D805	MA165TA	DIODE		BT1	REX0027	FLAT CABLE	
D806	MA165TA	DIODE		BT801	REX0070	SOCKET (4P)	
		COMPONENT COMBINATION (S)		FC401	REZ0013	FLAT CABLE	
2303	EXCELD35V	COMBINATION PART		FC451	REX0029	FLAT CABLE	
2452	DSS30654E222	COMBINATION PART		FC452	REZ0011	FLAT CABLE	
2453	DSS30654E222	COMBINATION PART				FL HOLDER	
2801	DSS30654B102	COMBINATION PART					
2802	DSS30654B102	COMBINATION PART		K401	RMN0014	FL HOLDER	
2803	EXCELD35V	COMBINATION PART				FUSE	
2804	EXCELD35V	COMBINATION PART					
		COIL (S)		F1	XBA2C006T80	FUSE	Δ
L401	ELEPK3R3KA	COIL				JACKS	
L451	ELEPK3R3KA	COIL					
L454	ELEPK3R3KA	COIL					
L455	ELEPK3R3KA	COIL		JK1	SJS9236	AC INLET	Δ
L456	ELEPK3R3KA	COIL		JK801	SJFDM	LINE OUT	
L457	ELEPK3R3KA	COIL				<SERVO P. C. B>	
		TRANSFORMERS				INTEGRATED CIRCUITS	
T1	RTPIK4E007-V	POWER TRANSFORMER	<E, ES, EG> Δ	IC101	AN8373S	IC, SERVO AMP	
T1	RTPIK4B006-V	POWER TRANSFORMER	<EB> Δ	IC102	AN8374S	IC, SERVO PROCESSOR	
		OSCILLATOR		IC103	AN8377N	IC, B. T. L. DRIVE	
X301	SVQAT1693ATA	OSCILLATOR				<SERVO P. C. B>	
		DISPLAY TUBE				TRANSISTORS	
FL401	RL0007F	DISPLAY TUBE		Q101	2SA1547QSTV2	TRANSISTOR	
		SWITCH(ES)		Q102	2SB1240QRTV6	TRANSISTOR	
						<SERVO P. C. B>	
						VARIABLE RESISTORS	
S1	ESB8249V	SW, POWER	Δ	VR101	EVND3AA00B14	V. R. BEST EYE ADJ.	
S417	EVQQT005R	SW, DISC SKIP		VR102	EVND3AA00B14	V. R. TRACKING GAIN ADJ.	
S451	SSPD12	SW, CLAMP		VR103	EVND3AA00B14	V. R. TRACKING OFFSET ADJ.	
SW41	RMN0010	SWITCH BLOCK(9)		VR104	EVND3AA00B14	V. R. FOCUS GAIN ADJ.	
SW42	RMN0011	SWITCH BLOCK(7)		VR105	EVND3AA00B14	V. R. FOCUS OFFSET ADJ.	
		CONNECTORS		VR106	EVND3AA00B24	V. R. TRACKING BALANCE ADJ.	
CN1	SJTD614	CONNECTOR (6P)				<SERVO P. C. B>	
CN301	SJSD2225	CONNECTOR (22P)				MAGNET RESISTOR ELEMENTS	
CN451	SJTD414-W	CONNECTOR (4P)		RA1	EW57M0A00Q53	RESISTANCE UNIT	

Notes : • Important safety notice:

Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

• The parenthesized indications in the Remarks columns specify the areas. (Refer to the cover page for area.)

Parts without these indications can be used for all areas.

• Remote Control Ass'y:

Supply period for three years from termination of production.

• Warning: This product uses a laser diode. Refer to caution statements on page 3.

• ACHTUNG: Die Lasereinheit nicht zerlegen.

Die Lasereinheit darf nur gegen eine vom hersteller spezifizierte einheit ausgetauscht werden.

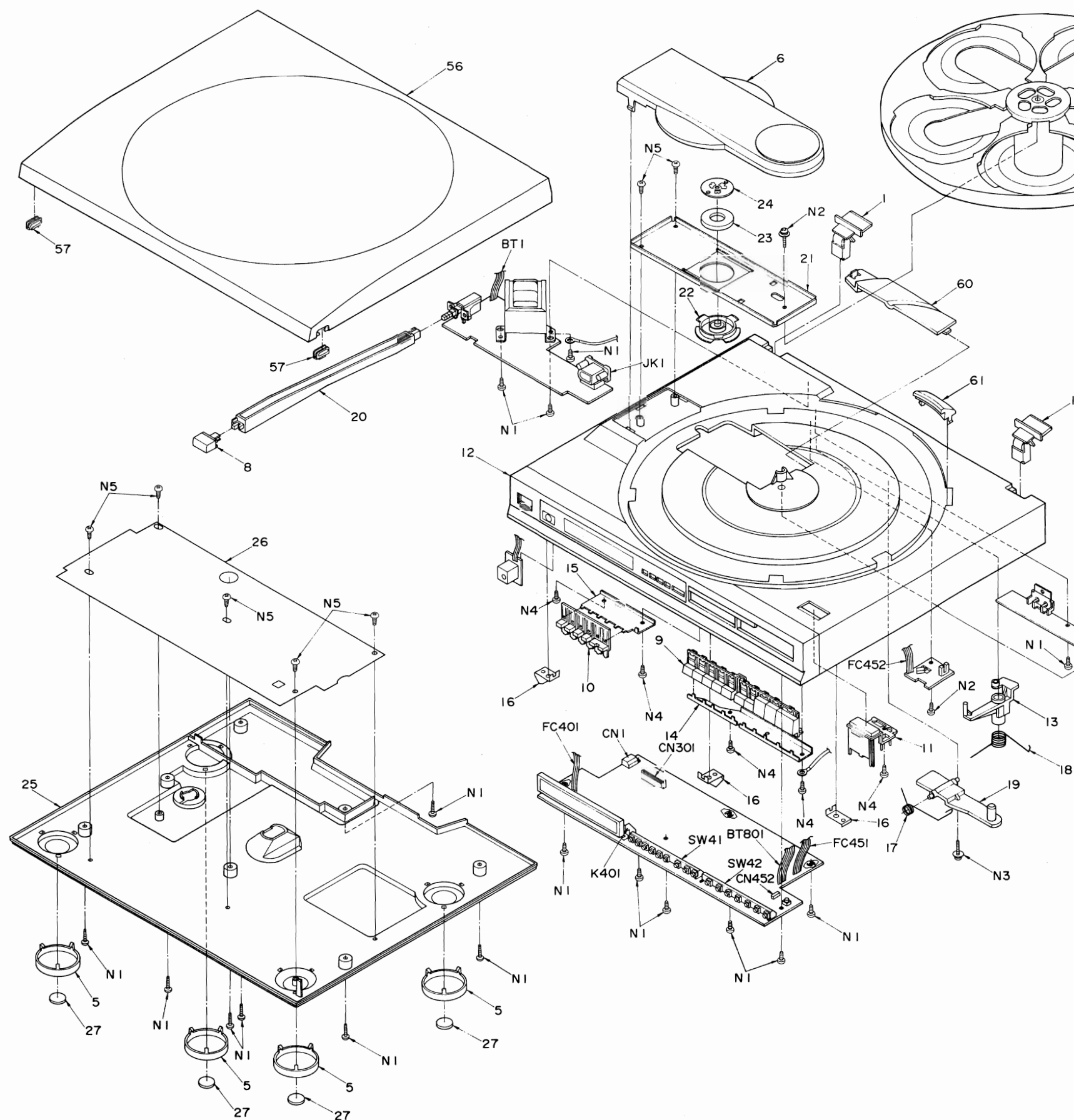
Ref. No.	Part No.	Part Name & Description	Remarks
		CABINET AND CHASSIS	
1	RK00002	HINGE	
4	RE20057	FLAT CABLE (22P)	
5	RG00060	ORNAMENT	
6	RG0012	COVER	
7	RG0001	TRAY	
8	RG00030	BUTTON, POWER	
9	RG00071-2	BUTTON, MAIN	
10	RG00072	BUTTON, SUB	
11	RG00073	BUTTON, SKIP	
12	RFKJLPC20E-K	CABINET ASS'Y	(E)
12	RFKJLPC20E5-K	CABINET ASS'Y	(E5)
12	RFKJLPC20EB-K	CABINET ASS'Y	(EB)
12	RFKJLPC20EG-K	CABINET ASS'Y	(EG)
13	RXL0008	LEVER ASS'Y	
14	RMA0060-1	PLATE	
15	RMA0061	PLATE	
16	RMA0062	ANGLE	
17	RME0027	SPRING	
18	RME0028	SPRING	
19	RML0048-1	LOCK LEVER	
20	RMD0015	ROD, POWER	
21	RMA0059	LID	
22	RMR0098	CLAMPER	
23	SOMD8	MAGNET	
24	SOYD2	YOKE	
25	RKU0004-2	BOTTOM COVER	
26	RSC0031	SHIELD PLATE	
27	SHG3020	FOOT RUBBER	
28	RMS0043-1	GUIDE SHAFT	
29	XUC3FY	E. RING	
30	RMB0037	SPRING	
31	RMR0079-1	SPACER	
32	SHGD153-1	RUBBER	
33	SUSD136-1	SPRING	
34	SUSD137-1	SPRING	
35	SUSD145-1	SPRING	
36	RMA0053	ROLLER	
37	RMS0039	SHAFT	
39	RMK0027	PLATE	
40	SHGB26	DUST COVER CUSHION	
41	MMNLPC10	MOTOR ASS'Y (LOADING)	
42	RDG0020	GEAR (PULLEY)	
43	RDG0035	GEAR (MAIN)	

Ref. No.	Part No.	Part Name & Description	Remarks
44	RDG0037	GEAR (DRIVE)	
45	RDK0004	ELEVATOR RACK	
46	RDV0005-1	BELT	
47	RMC0007	SPRING	
48	RMG0052	RUBBER T. T. SHAFT	
49	RMR0152	COVER (PULLEY GEAR)	
50	RFKJLPC20E-K	MECH CHASSIS ASS'Y	
51	RXL0009	PLATE ASS'Y (ROLL OVER)	
51-1	RDG0036	GEAR	
51-2	RMB0036	SPRING	
52	RMK0029-1	HOLDER	
53	RML0044	LEVER	
55	RMA0128	ANGLE	
56	RYF0010-K	DUST COVER	
57	SFGZJ02N01	RUBBER CUSHION	
58	RMG0053	RUBBER	
60	RKQ0007	COVER	
61	RKQ0008	TRAY HOLDER	
62	SJT388	FUSE HOLDER	
N1	XTB3+10JFZ	SCREW	
N2	XYN3+F8	SCREW	
N3	XTW3+8T	SCREW	
N4	XTB3+8G	SCREW	
N5	XTB3+8JFZ	SCREW	
N6	RHD30004	SCREW	
N7	RHD30005	SCREW	
N8	XYN26+C6	SCREW	
		ACCESSORIES	
A1	RQT0243-G	INSTRUCTION MANUAL	(E, E5)
A1	RQT0244-E	INSTRUCTION MANUAL	(E, E5)
A1	RQT0245-B	INSTRUCTION MANUAL	(EB)
A1	RQT0246-D	INSTRUCTION MANUAL	(EG)
A2	SJA187	POWER CORD	(E, E5, EG)
A2	SJA193	POWER CORD	(EB)
A3	SJP2249-3	OUTPUT CORD	
A4	RQCA0024	CAUTION	
		PACKING MATERIAL	
P1	RPC0208	PACKING CASE	
P2	RPND088A-1	PAD (FRONT)	

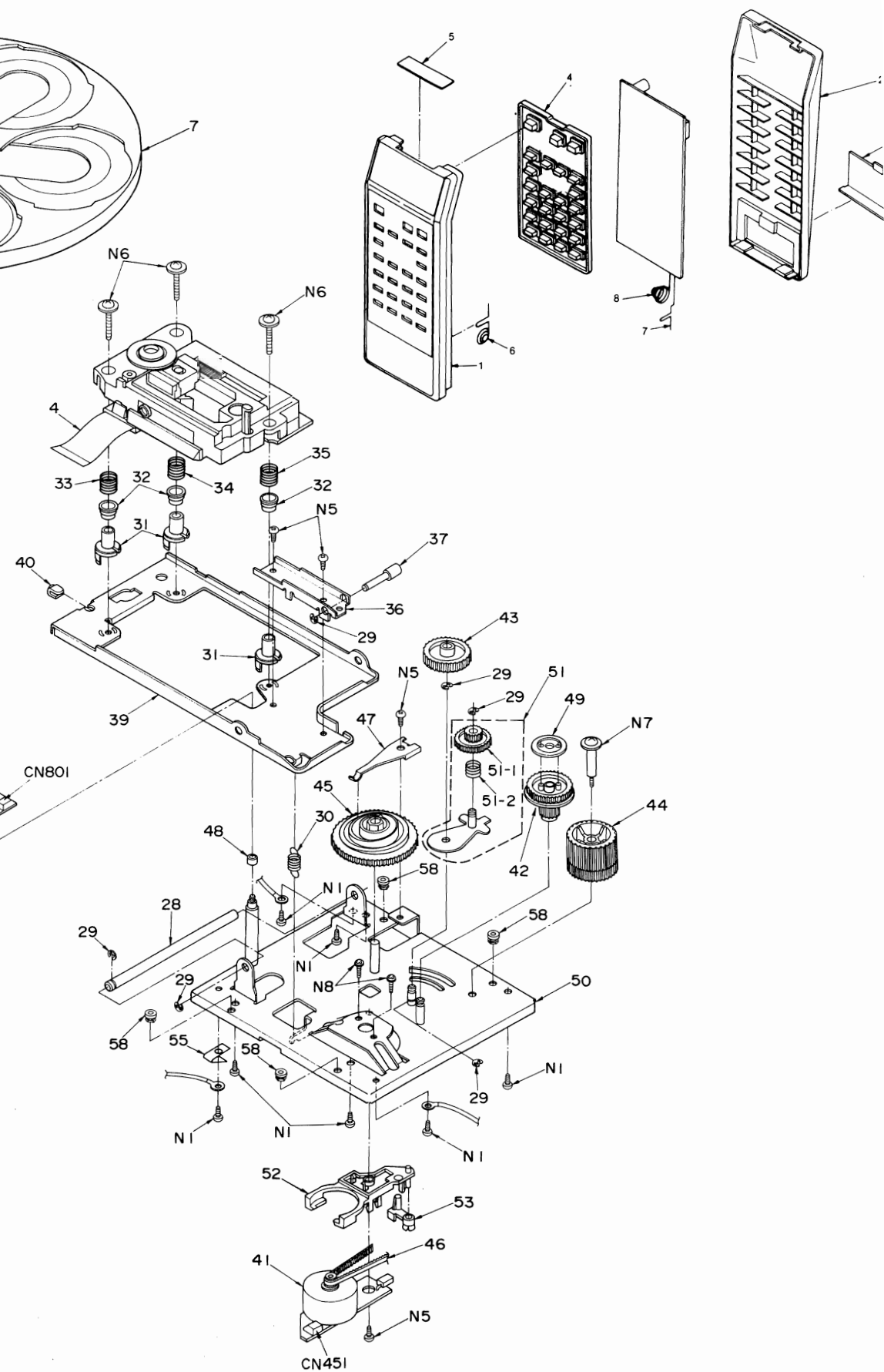
Ref. No.	Part No.	Part Name & Description	Remarks
P3	RPND088B-1	PAD (BACK)	
P4	RPQ0017-3	CLAMPER	
P5	XZB60XG0A01	PROTECTION BAG (UNIT)	
P6	XZB60X17C03	PROTECTION BAG (CORD)	
P7	RPFO024	PROTECTION BAG (DUST COVER)	
		CABINET <TRAVERSE DECK>	
102	SISD22-1	TRAVERSE BASE	
103	SD0028-1E	TURNTABLE	
103-1	XXE2605	SCREW	
104	SD0029-2	RING	
106	SRQA010N04	SPRING	
107	SORD37	ROLLER	
108	SORD38-E	COIL	
109	SJXD123-1	GUIDE SHAFT	
110	SOAD70A	OPTICAL PICKUP	Δ
111	SHRD176-E	COIL HOLDER	
113	SHGD148	STOPPER	
114	SOYD21-E	YOKE	
115	SOYD22	YOKE	
116	SHRD177-1	LOCK UNIT	
117	SHWD33	WASHER	
118	SHWD34	WASHER	
119	SNSD31	SCREW	
120	XTN2+5G	SCREW	
121	XYN2+C8	SCREW	
129	SJWD112	GUIDE SHAFT HOLDER	
134	XTB3+10G	SCREW	
149	SJGDRF310T-2	SPINDLE MOTOR	
157	SJSD1722M	SOCKET (17P)	
158	SJSD2222M	SOCKET (22P)	
161	EMCS0552MP	CONNECTOR (5P)	
		REMOTE CONTROL UNIT	
RC1	EUR64789B	REMOTE CONTROL ASS'Y	
		INTEGRATED CIRCUIT	
IC1	MN6014E	I. C. MICRO COMPUTER	
		TRANSISTOR	
Q1	2SC2710Y	TRANSISTOR	
		DIODE	
D1	LN66	L. E. D	
		OSCILLATOR	

EXPLODED VIEWS

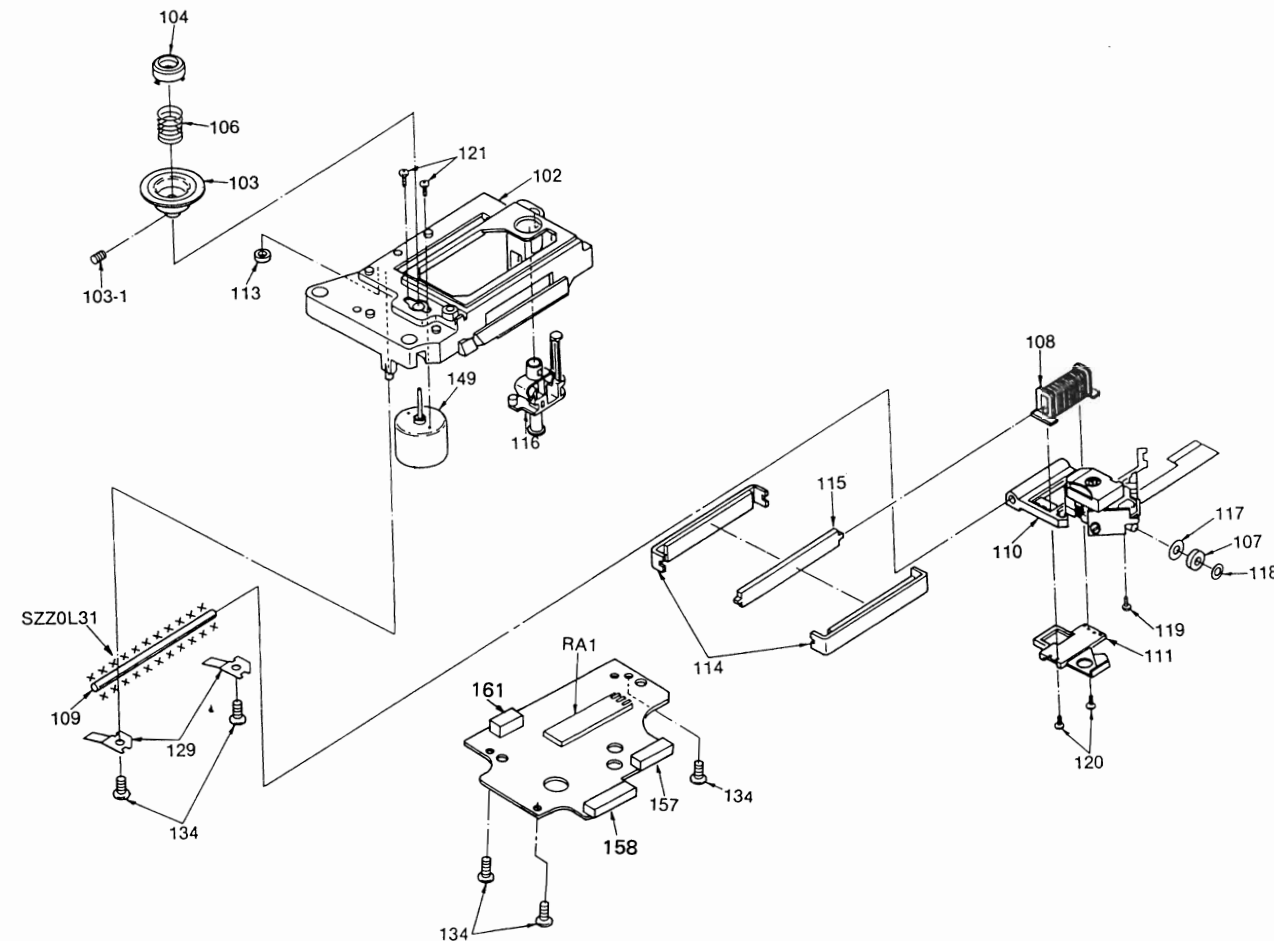
• Cabinet and chassis parts



• Remote control transmitter (EUR64789B)

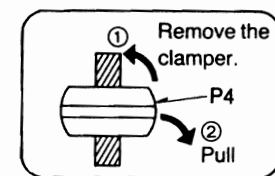


• Traverse deck parts



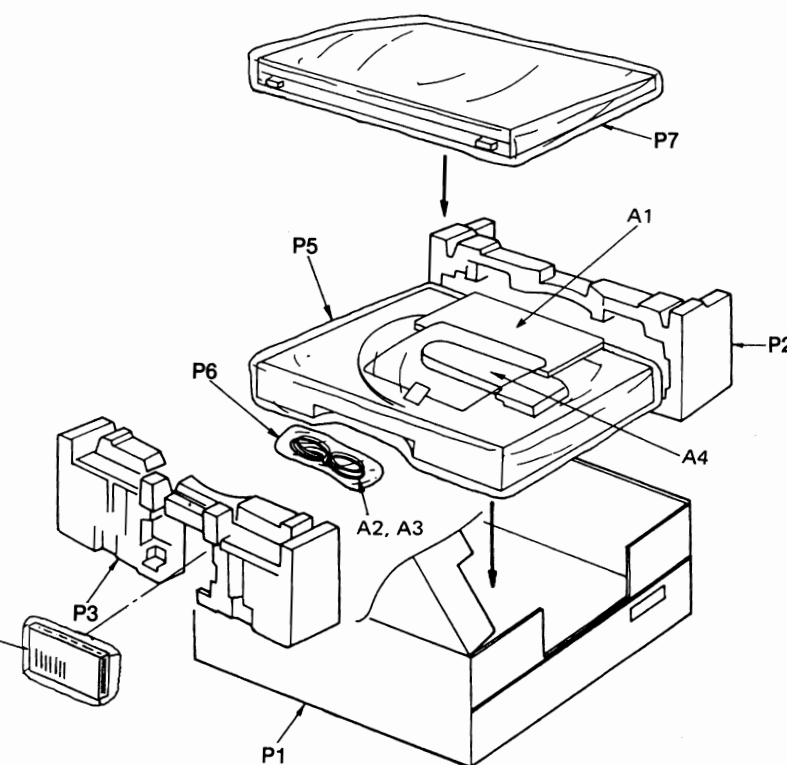
■ PACKING

(Parts list on page 41, 42.)



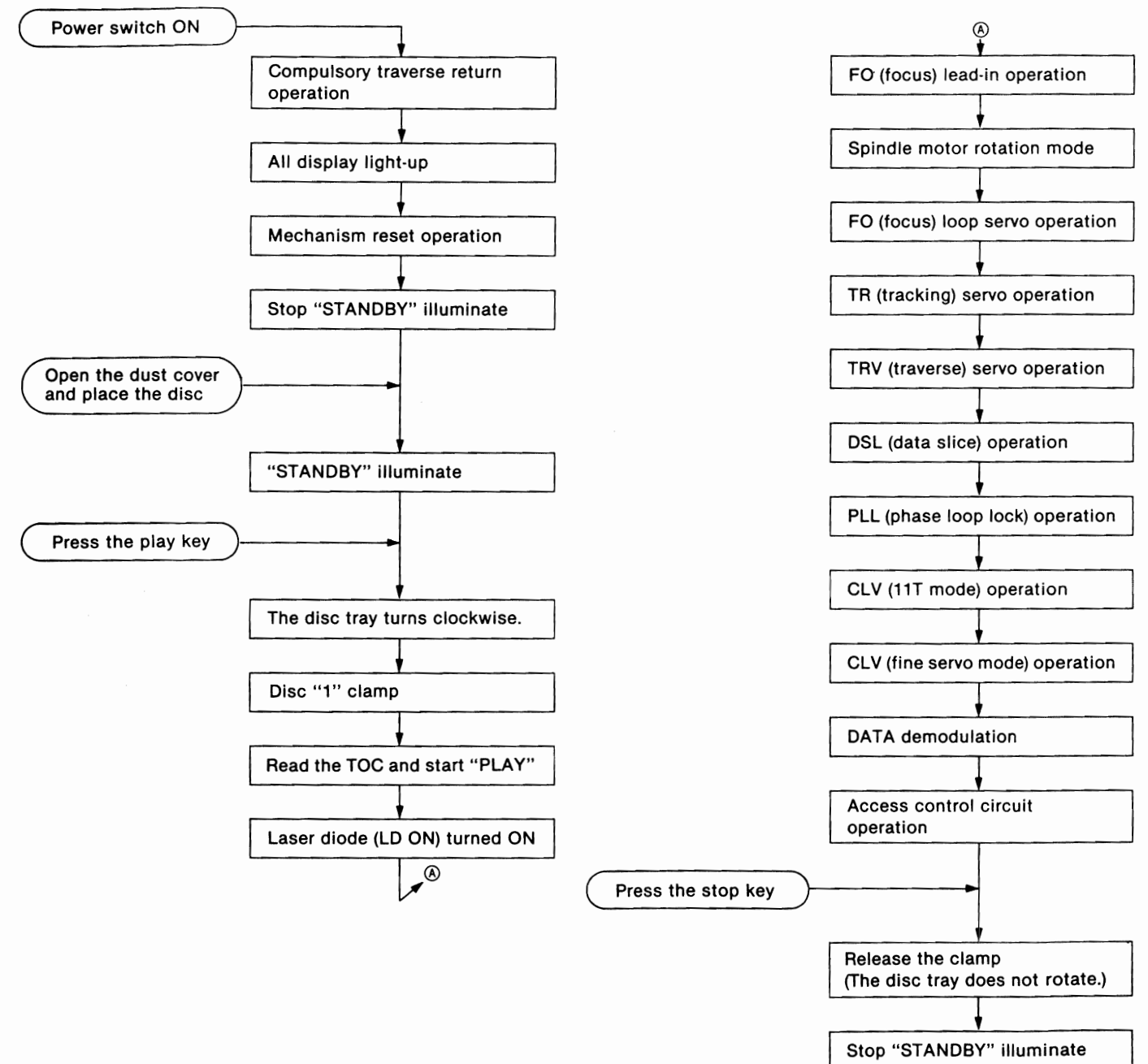
Soft cloth or similar material
(to prevent scratches)

RC1
(Remote control
transmitter)



■ TROUBLESHOOTING FLOW CHART

PLAYBACK FLOW CHART



RESISTORS & CAPACITORS

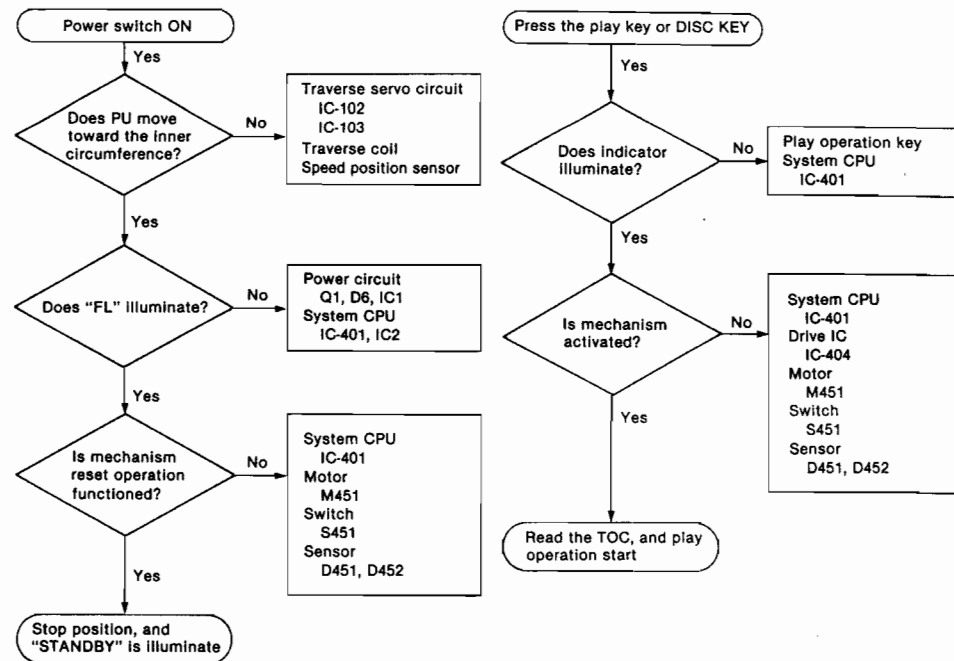
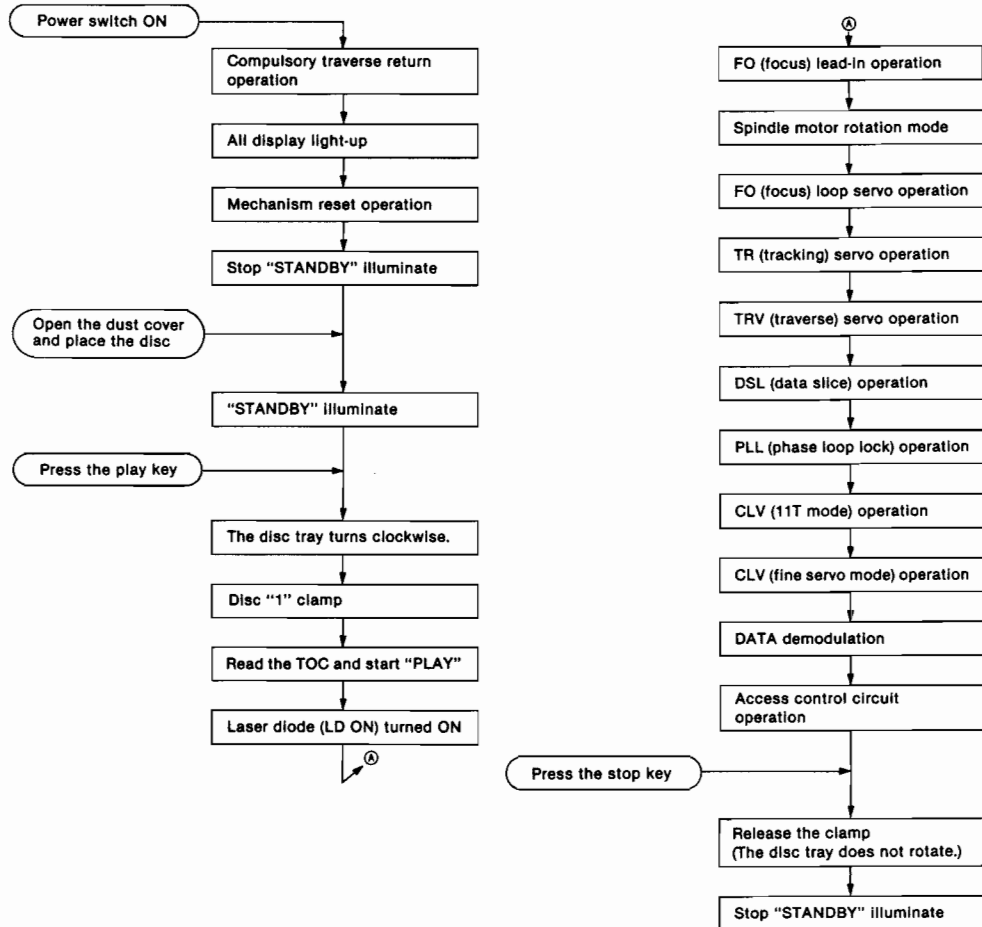
Notes : • Capacity value are in microfarads (uF) unless specified otherwise, P=Pico-farads (pF) F=Farads (F)
• Resistance values are in ohms, unless specified otherwise, 1K=1,000 (OHM) , 1M=1,000k (OHM)

Ref. No.	Part No.	Values & Remarks	Ref. No.	Part No.	Values & Remarks	Ref. No.	Part No.	Values & Remarks
		RESISTORS						
R1	ERDS2TJ151T	1/4W 150	R424	ERK1ANJ3R9H	1W 3.9	C4	ECEA1CU332E	16V 3300U
R2	ERDS2TJ151T	1/4W 150	R426	ERDS2TJ123T	1/4W 12K	C5	ECEA1CU222E	16V 2200U
R3	ERDS2TJ470T	1/4W 47	R427	ERDS2TJ123T	1/4W 12K	C6	ECEA1JU470BV	63V 47U
R4	ERDS2TJ470T	1/4W 47	R428	ERDS2TJ103T	1/4W 10K	C10	ECEA1AU471B	10V 470U
R5	ERDS2TJ222T	1/4W 2.2K	R429	ERDS2TJ102T	1/4W 1K	C11	ECEA1AU471B	10V 470U
R6	ERDS2TJ472T	1/4W 4.7K	R430	ERDS2TJ102T	1/4W 1K	C12	ECEA1AU101B	10V 100U
R7	ERDS2TJ392T	1/4W 3.9K	R435	ERDS2TJ103T	1/4W 10K	C13	ECEA1AU101B	10V 100U
R8	ERDS2TJ472T	1/4W 4.7K	R436	ERDS2TJ223T	1/4W 22K	C14	ECFRIE1042F5	25V 0.1U
R9	ERDS2TJ471T	1/4W 470	R437	ERDS2TJ123T	1/4W 12K	C15	ECEA0JU221B	6.3V 220U
R10	ERDS2TJ471T	1/4W 470	R438	ERDS2TJ103T	1/4W 10K	C16	ECEA1EU470B	25V 47U
R301	ERDS2TJ472T	1/4W 4.7K	R439	ERDS2TJ103T	1/4W 10K	C19	ECEA1H0R1B	50V 0.1U
R302	ERDS2TJ472T	1/4W 4.7K	R440	ERDS2TJ103T	1/4W 10K	C20	ECFRIE1042F5	25V 0.1U
R303	ERDS2TJ561T	1/4W 560	R441	ERDS2TJ473T	1/4W 47K	C301	ECEA0JU101B	6.3V 100U
R304	ERDS2TJ121T	1/4W 120	R442	ERDS2TJ331T	1/4W 330	C303	ECFRIE1042F5	25V 0.1U
R305	ERDS2TJ121T	1/4W 120	R450	ERDS2TJ152T	1/4W 1.5K	C304	ECFRIE1042F5	25V 0.1U
R306	ERDS2TJ121T	1/4W 120	R452	ERDS2TJ473T	1/4W 47K	C305	ECBT1H220J5	50V 22P
R307	ERDS2TJ121T	1/4W 120	R453	ERDS2TJ331T	1/4W 330	C306	ECBT1H6R8K5	50V 6.8P
R308	ERDS2TJ121T	1/4W 120	R801	ERDS2TJ102T	1/4W 1K	C307	ECBT1H220J5	50V 22P
R351	ERDS2TJ154T	1/4W 150K	R802	ERDS2TJ102T	1/4W 1K	C308	ECKR1H02KB5	50V 1000P
R352	ERDS2TJ333T	1/4W 33K	R803	ERDS2TJ104T	1/4W 100K	C351	ECKR1H22KB5	50V 2200P
R353	ERDS2TJ333T	1/4W 33K	R804	ERDS2TJ104T	1/4W 100K	C352	ECKR1H032F5	50V 0.01U
R354	ERDS2TJ123T	1/4W 12K	R805	ERDS2TJ471T	1/4W 470	C353	ECFRIE563MR	25V 0.056U
R355	ERDS2TJ103T	1/4W 10K	R806	ERDS2TJ471T	1/4W 470	C401	ECFRIE1042F5	25V 0.1U
R356	ERDS2TJ154T	1/4W 150K	R807	ERDS2TJ333T	1/4W 33K	C402	ECEA0JK470B	6.3V 47U
R357	ERDS2TJ103T	1/4W 10K	R808	ERDS2TJ333T	1/4W 33K	C403	ECFRIE1042F5	25V 0.1U
R358	ERDS2TJ8R2T	1/4W 8.2	R809	ERDS2TJ182T	1/4W 1.8K	C404	ECBT1H220J5	50V 22P
R359	ERDS2TJ101T	1/4W 100	R810	ERDS2TJ182T	1/4W 1.8K	C405	ECBT1E2232F5	25V 0.022U
R360	ERDS2TJ101T	1/4W 100	R811	ERDS2TJ272T	1/4W 2.7K	C406	ECBT1E2232F5	25V 0.022U
R401	ERDS2TJ472T	1/4W 4.7K	R812	ERDS2TJ272T	1/4W 2.7K	C407	ECEA0JU101B	6.3V 100U
R403	ERDS2TJ103T	1/4W 10K	R813	ERDS2TJ821T	1/4W 820	C408	ECFRIE1042F5	25V 0.1U
R404	ERDS2TJ103T	1/4W 10K	R814	ERDS2TJ821T	1/4W 820	C409	ECFRIE1042F5	25V 0.1U
R405	ERDS2TJ103T	1/4W 10K	R815	ERDS2TJ472T	1/4W 4.7K	C801	ECEA0JU101B	6.3V 100U
R406	ERDS2TJ103T	1/4W 10K	R816	ERDS2TJ472T	1/4W 4.7K	C803	ECQM1H22KV3	50V 2200P
R409	ERDS2TJ472T	1/4W 4.7K	R817	ERDS2TJ473T	1/4W 47K	C804	ECQM1H22KV3	50V 2200P
R410	ERDS2TJ472T	1/4W 4.7K	R818	ERDS2TJ473T	1/4W 47K	C805	ECQM1H33KF3	50V 0.033U
R411	ERDS2TJ472T	1/4W 4.7K	R819	ERDS2TJ471T	1/4W 470	C806	ECQM1H33KF3	50V 0.033U
R412	ERDS2TJ472T	1/4W 4.7K	R820	ERDS2TJ471T	1/4W 470	C807	ECEA1CN100BV	16V 10U
R414	ERDS2TJ152T	1/4W 1.5K	R823	ERDS2TJ472T	1/4W 4.7K	C808	ECEA1CN100BV	16V 10U
R415	ERDS2TJ473T	1/4W 47K	R824	ERDS2TJ121T	1/4W 120	C809	ECEA1CN100BV	16V 10U
R416	ERDS2TJ103T	1/4W 10K	R825	ERDS2TJ561T	1/4W 560	C810	ECEA1CN100BV	16V 10U
R417	ERDS2TJ222T	1/4W 2.2K	R826	ERDS2TJ471T	1/4W 470	C813	ECFRIE1042F5	25V 0.1U
R418	ERDS2TJ222T	1/4W 2.2K	R827	ERDS2TJ101T	1/4W 100	C814	ECFRIE1042F5	25V 0.1U
R419	ERDS2TJ222T	1/4W 2.2K	R828	ERDS2TJ101T	1/4W 100	C815	ECEA1H0K10B	50V 1U
R420	ERDS2TJ222T	1/4W 2.2K			CAPACITORS	C816	ECEA0JU102B	6.3V 1000U
R422	ERDS2TJ223T	1/4W 22K	C1	ECKR1H2232F5	50V 0.022U	C817	ECFRIE1042F5	25V 0.1U
R423	ERDS2TJ223T	1/4W 22K	C2	ECKR1H2232F5	50V 0.022U	C818	ECFRIE1042F5	25V 0.1U
			C3	ECKR1H2232F5	50V 0.022U	C819	ECFRIE1042F5	25V 0.1U
						C820	ECFRIE1042F5	25V 0.1U
						C1001	ECKMCK103PF2	400V 0.01U

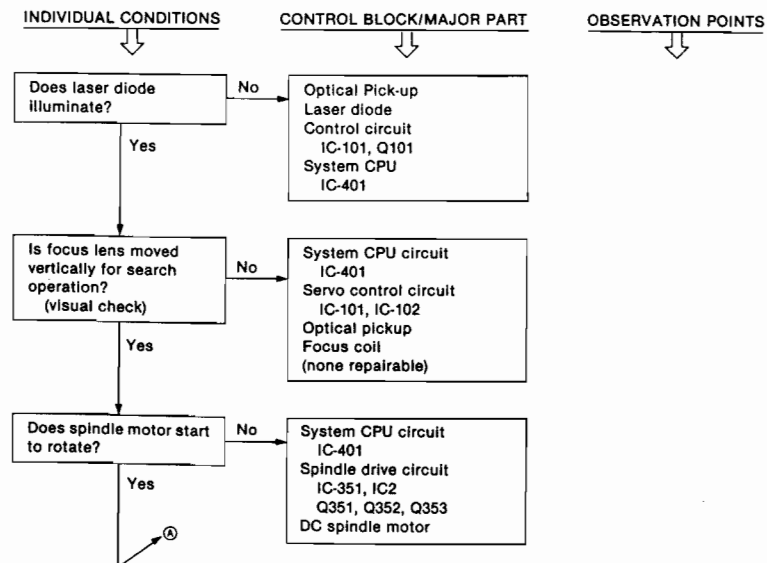
Ref. No.	Part No.	Values & Remarks	Ref. No.	Part No.	Values & Remarks
		RESISTORS-SERVO P.C.B.			
R101	ERDS2TJ471	1/4 470	C139	RCUV1H470KC	50V 47P
R102	ERJ6GEYJ120V	1/10 12	C140	RCUV1E103KB	25V 0.01U
R103	ERJ6GEYJ122	1/10 1.2K	C141-144	RCUV1H470KC	50V 47U
R104	ERJ6GEYJ471	1/10 470	C145	ECEA0JRF1011	6.3V 100U
R105, 106	RRJ6GCJ102TE	1/6 1K	C146	RCUV1H181MC	50V 180P
R108	ERJ6GEYJ224V	1/10 220K	C147	RCUV1H472KB	50V 0.0047U
R110	ERDS2TJ222	1/4 2.2K	C148	ECEA1ESN4R7I	25V 4.7U
R111	ERJ6GEYJ154V	1/10 150K	C149	RCUV1E1042F	25V 0.1U
R113	ERJ6GEYJ472V	1/10 4.7K	C150	RCUV1E103KB	25V 0.01U
R114	ERJ6GEYJ683V	1/10 68K			
R116	ERJ6GEYJ332V	1/10 3.3K			
R117	ERJ6GEYJ123	1/10 12K			
R118	ERJ6GEYJ333V	1/10 33K			
R119	RRJ6GCJ223TE	1/6 22K			
R122	ERDS2TJ104	1/4 100K			
R123	ERJ6GEYJ470V	1/10 47			
R124	RRJ6GCJ103TE	1/6 10K			
R125	RRJ6GCJ222TE	1/6 2.2K			
R127	ERDS2TJ681	1/4 680			
R128	RRJ6GCJ103TE	1/6 10K			
		CAPACITORS-SERVO P.C.B.			
C101	ECEA1CKS2201	16V 22U			
C102	ECEA1HKS0101	50V 1U			
C103	ECEA1CKS2201	16V 22U			
C106	RCUV1E1042F	25V 0.1U			
C107	ECEA0GKS1011	4V 100U			
C108	ECEA0JKS4701	6.3V 47U			
C109	ECEA1HKS0101	50V 1U			
C110	RCUV1H681KB	50V 680P			
C111	ECUV1C224KR	16V 0.22U			
C112	RCUV1H331KB	50V 330P			
C113	ECEA1HKS0101	50V 1U			
C114	RCUV1E333KB	25V 0.033U			
C115	ECEA1HKS0101	50V 1U			
C116	RCUV1E333KB	25V 0.033U			
C117	ECBT1H102KB5	50V 0.001U			
C119, 120	ECEA1CKM4R7I	16V 4.7U			
C122	ECEA0JKS2201	6.3V 22U			
C123	RCUV1E1042F	25V 0.1U			
C124	ECUV1E823KB	25V 0.082U			
C125	ECUV1C224KR	16V 0.22U			
C127	ECEA0JRF1011	6.3V 100U			
C128	ECEA1CKA1011	16V 100U			
C132	ECUV1E104KB	25V 0.1U			
C133	RCUV1H330KC	50V 33P			
C134, 135	ECUV1C224KR	16V 0.22U			
C136	ECEA0GKS1011	4V 100U			
C138	RCUV1E1042F	25V 0.1U			

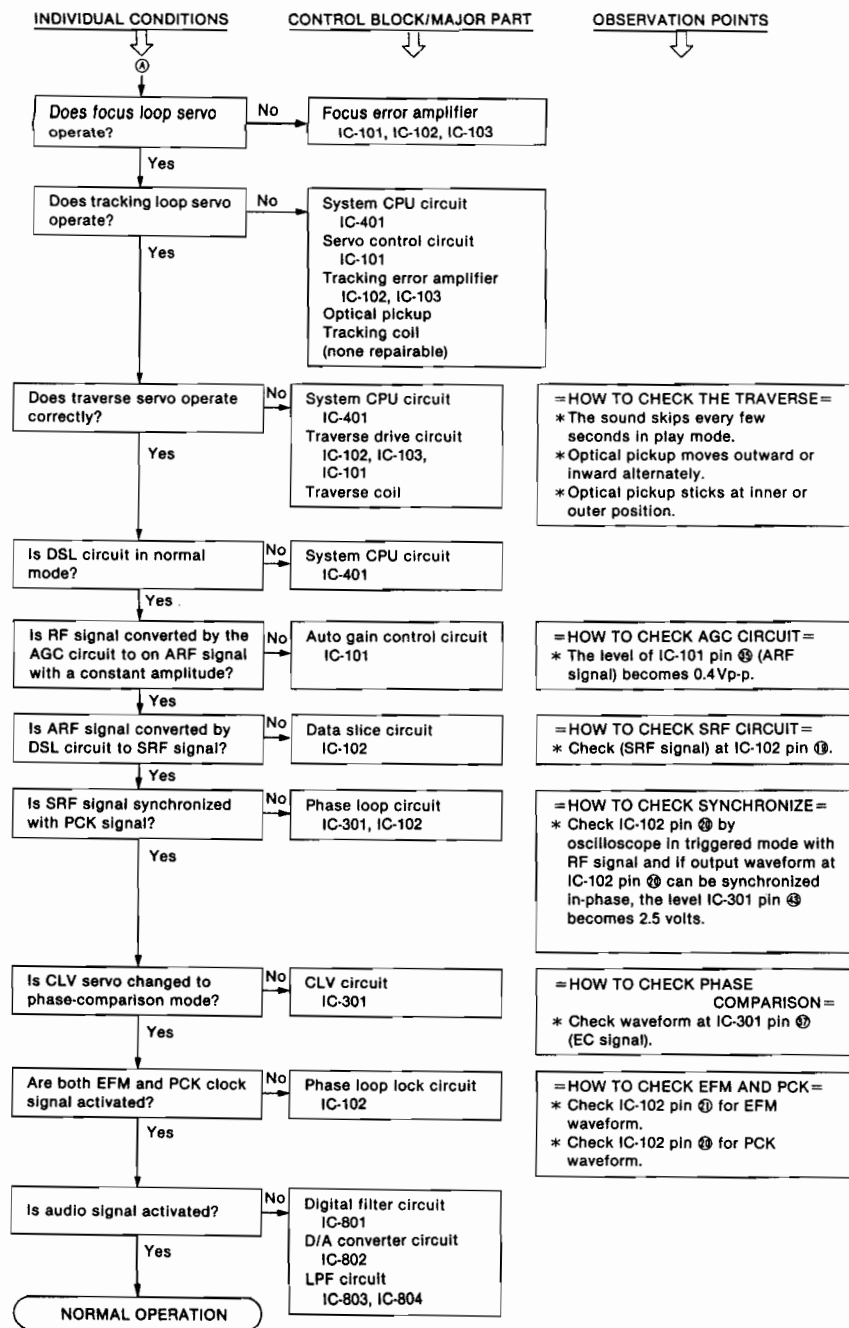
TROUBLESHOOTING FLOW CHART

PLAYBACK FLOW CHART



TOC READ OPERATION - PLAY OPERATION





TECHNICAL INFORMATION

This recently developed five-disc changer, equipped with a carousel type mechanism, replaces the previous magazine type changer. The mechanism has been designed to provide quick disc access, including for three-inch CD's; allowing for disc replacement without music interruptions. This section will describe the mechanism's construction and its operation.

1. Mechanism operation

When the power is switched on, the mechanism will operate in the following order.

A) Power is switched on.

B) The traverse deck will lift up and then immediately descend. However, if the carousel has been turned by hand while the mechanism was stopped, the operation may advance directly from A) to C), depending on the position at which the carousel was stopped.

C) The carousel will begin turning (in the clockwise direction).

D) The No. 5 disc will come to the position of the traverse deck, and the carousel will stop turning.

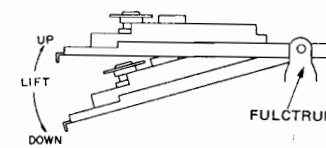


Figure 1 Traverse Deck

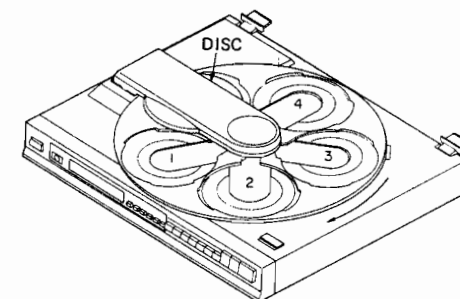


Figure 2 Disc Tray Operation

No matter which position the carousel was originally stopped at, when the power is switched on, it will turn to this position (disc No. 5) and then stop (standby condition).

E) Continuous play

1) When the PLAY button is pressed, the carousel will turn in the clockwise direction.

2) When disc No. 1 comes to the traverse deck, the carousel will stop. The traverse deck will lift up, and play of disc No. 1 will begin.

3) When play of disc No. 1 ends, the traverse deck will descend and the carousel will begin to turn toward disc No. 2.

- 4) The above operation will continue in order up to disc No. 5. After play of disc No. 5 ends, the traverse deck will descend and stop.
- 5) If a disc is not loaded on one of the trays, when that disc tray reaches the optical deck position, the deck assembly will still lift and search for the disc. After three search trials. If the disc is not detected, the traverse lowers and the carousel advances to the next disc position.

F) Programmed play

After steps A through D described above, play will be carried out in accordance with the programmed order.

G) Carousel lock

If the power is switched off while play is in progress, because the traverse deck will remain in the lifted up position, the carousel will lock and it will not be possible to turn the carousel by hand.

At the end of play or if play is stopped by the STOP button, the traverse deck will descend. Under this condition, or if the power is switched off this condition, it will be possible to turn the carousel by hand. (The carousel lock will be released when the traverse deck has lowered.)

2. Loading mechanism

The loading mechanism performs the following two functions.

- A) Rotation of the carousel in order to carry the discs to the traverse deck (play position).
- B) Lifting up of the traverse deck when a disc reaches the play position.

For these operations, the motor drive IC (IC-404) drives the loading motor (M451) in accordance with the signal from the system control IC-401. See figure 4.

The function of the loading motor (M451) is to rotate the carousel via intermediate gears or to lift the traverse deck up or down via a cam block.

2-1 Rotation of the carousel (Refer to figure 4)

- A) In order for the carousel to rotate, IC-404 supplies the motor (M451) with the proper voltage supply polarity, (pin 10 negative and pin 2 positive) in accordance with the signals from IC-401.
- B) M451 turns in the counterclockwise direction, thus causing gears A and B to turn.
- C) Gear B drives gear C so that it turns in the direction indicated by arrow C, thus causing gear C to shift in the direction indicated by arrow S and drive gear D, which in turn causes the carousel to rotate.
- D) Gear C is mounted to a lever (refer to figure 3), and it shifts either in the direction indicated by arrow S or in the opposite direction, in accordance with the direction in which gear B is turning.

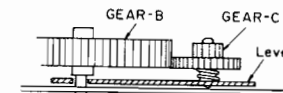


Figure 3 Lever Position

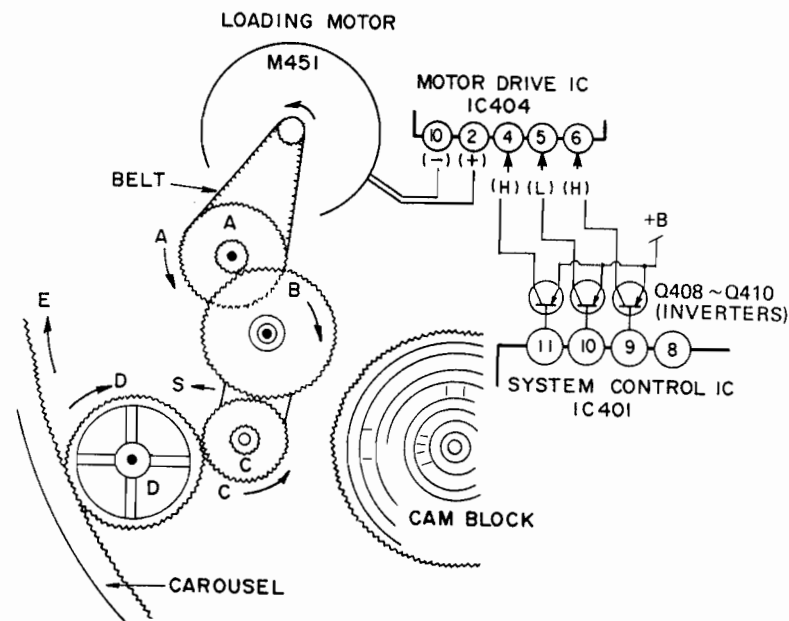


Figure 4 Carousel Drive System

2-2 Lifting up and down of the traverse deck (Refer to figure 5)

- A) In order for the traverse deck to move up or down, IC-404 supplies the motor (M451) with the proper voltage supply polarity, (pin 10 positive and pin 2 negative) in accordance with the signals from IC-401.
- B) M451 turns in the clockwise direction, and gear B drives gear C so that it turns in the direction indicated by arrow C, thus causing gear C to shift in the direction indicated by arrow T, causing the cam block to turn.

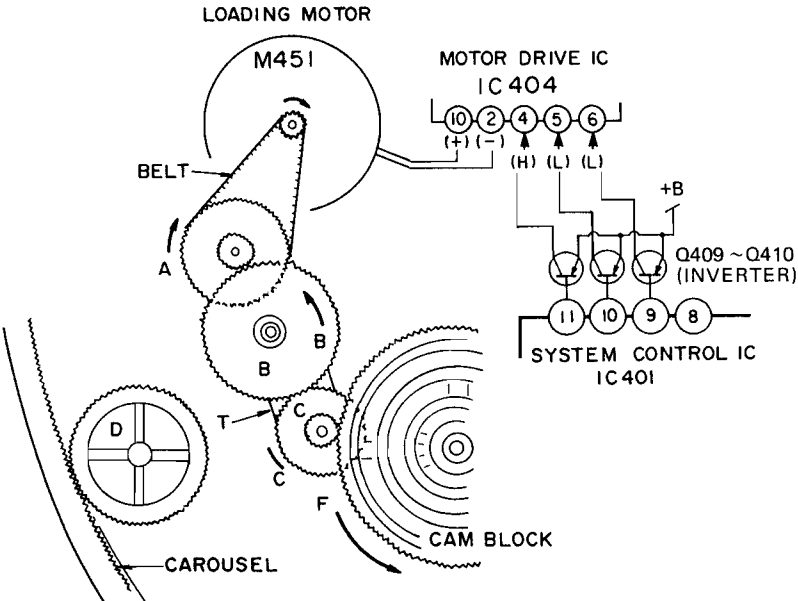


Figure 5 Traverse Up/Down Drive System

- C) The cam block turns in the direction indicated by arrow F, thus causing the traverse deck to lift up or down. (aarefer to figure 6).

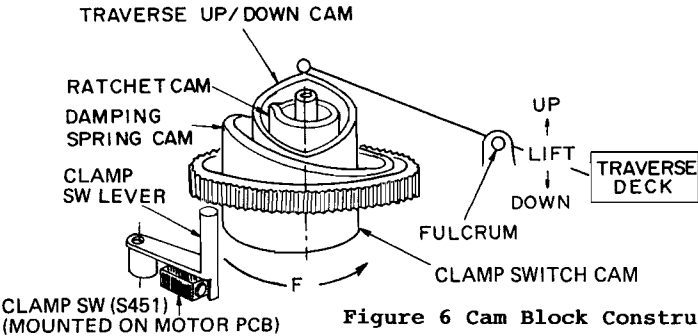


Figure 6 Cam Block Construction

D) Loading motor - Traverse deck truth table

The following truth table indicated the signals status relation between IC-401 (system control IC) and IC-404 (motor drive IC).

MODE		Motor drive IC (IC-404)						System contol (IC-401)			
		Output			Input			Traverse Deck or Carousel			Speed
Pin	10	2	3	4	5	6	11	10	9	8	
Traverse deck up		H	L	-	H	L	L	L	H	H	H/L
Traverse deck down		H	L	-	H	L	L	L	H	H	H/L
Carousel rotation		L	H	-	H	L	H	L	H	L	H/L
Stop/Play		L	L	-	L	L	L	H	H	H	H

Speed
(H: Slow)
(L: High)

Note: The output of pin 8 of IC-401 is the command signal for changing the rotation speed of the loading motor, and the speed is increased when the signal is L; more details will be explained later.

3. Disc number detection (disc position sensor)

The disc number detection is controlled by IC-401 via the detection of a series of pulses generated by photocoupler D451 in conjunction with a series of shutters molded on the bottom of the carousel.

A) Carousel construction

Figure 7 shows the top view of the carousel indicating the positional relationships of the discs, interrupters, and photocoupler figure 8 is the bottom view.

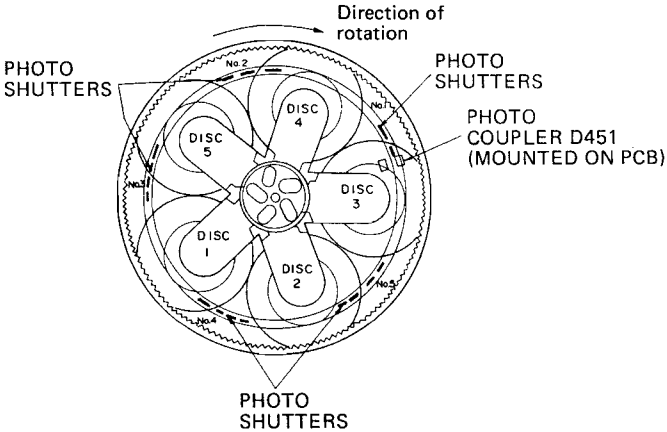


Figure 7 Carousel Construction (Top view)

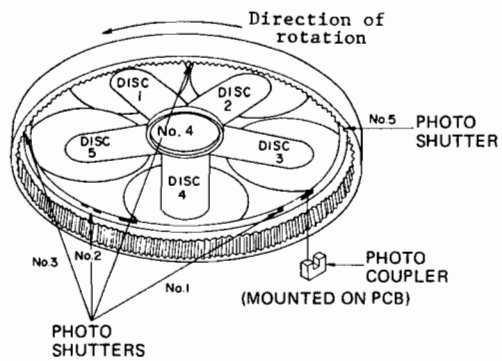


Figure 8 Carousel Construction (Bottom view)

B) Detection circuit (Refer to figure 9)

When the carousel rotates, the pulse train shown in the figure 9 is generated at the photocoupler.

When the output signal is L, Q413 is switched ON and the signal from pin 38 of IC-401 is fed to pin 15.

The number of times which Q413 is switched ON/OFF (actually the falling edge of the signal) is counted, and IC-401 detects the disc number.

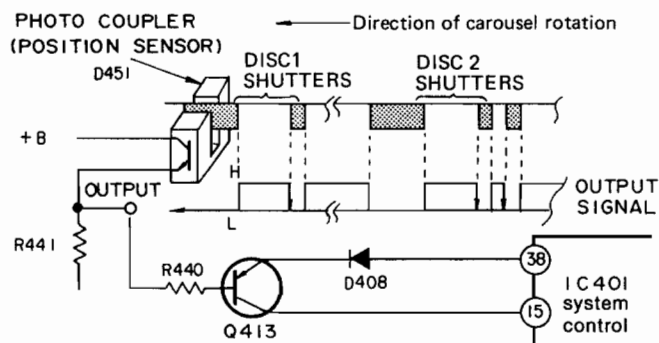


Figure 9 Pulse Generation and Detection

4. Rest detection (rest sensor)

The rest position detection is controlled by IC-401 via the detection of pulses generated by photocoupler D452 in conjunction with a series of shutters molded on the bottom of the carousel.

As the carousel approaches its designated position, the loading motor's supply voltage decreases from 6.3 volts to 3.0 volts in order to slow down the carousel.

A) Rest position detection shutters (Refer to figure 10)

The rest detection shutters are located on the inner side of the disc detection shutters.

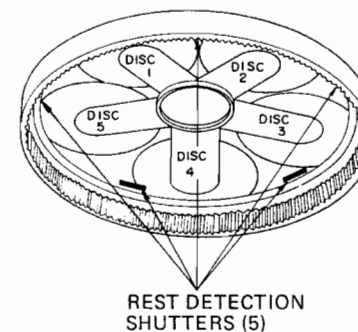


Figure 10 Shutter's Location (Bottom view)

B) Detection circuit (Refer to figure 11)

As the carousel rotates, the pulses shown in figure 11 are generated at the photocoupler.

The pulses cause Q411 to switch ON/OFF and the signal from pin 39 of IC-401 is fed to pin 15.

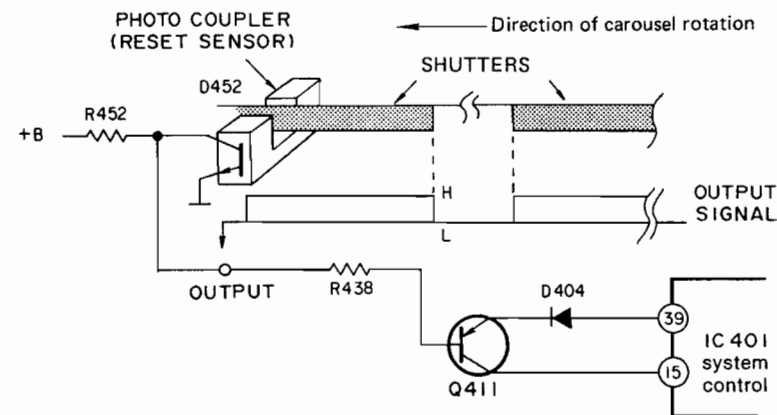


Figure 11 Rest Position Detection Circuit

5. Clamp switch

This switch (S451) detect whether the traverse deck is at either the uppermost or lowermost position. It is operated by the cam located at the bottom of the cam block. (refer to figure 6).

The switch (S451) is ON when the deck is at its lowermost position.

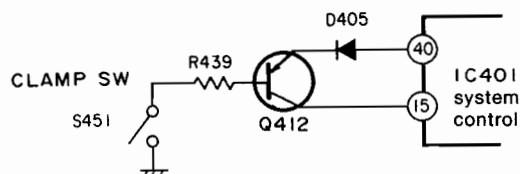


Figure 12 Traverse Deck Position Detection

6. Loading timing (Refer to figure 13)

A) Rotation of the carousel

- 1) When the PLAY button is pressed, pin 8 of IC-401 immediately outputs an H signal for 500 ms. (The H changes to L after 500 ms.)
- 2) This H signal causes a counterclockwise rotation voltage of 3 volts supplied from pins 2 (+) and 10 (-) of the motor drive IC-404 to the loading motor.
- 3) After 500 ms, the signal from pin 8 of IC-401 changes to L, thus causing the loading motor's voltage described above to change to 6.3 volts.

The purpose of this operation is to provide a smooth start of the rotation of the carousel, followed by an increase in the rotation speed.

- 4) The rotation of the carousel causes the rest sensor to function. The generation of an H signal (at point A) causes IC-401 to perform the rest detection so that the signal output from pin 8 changes to H, and this signal causes the voltage being supplied to the motor to drop to 3 volts.

The purpose of this operation is to decrease the speed as the carousel approaches its destination to ensure smooth stop action.

During this time, pins 9 and 11 are L, and the motor turns in the counterclockwise direction. (Refer to the loading motor signal truth table page 55.)

The switching of the motor voltage from 3 volts to 6.3 volts will be explained later.

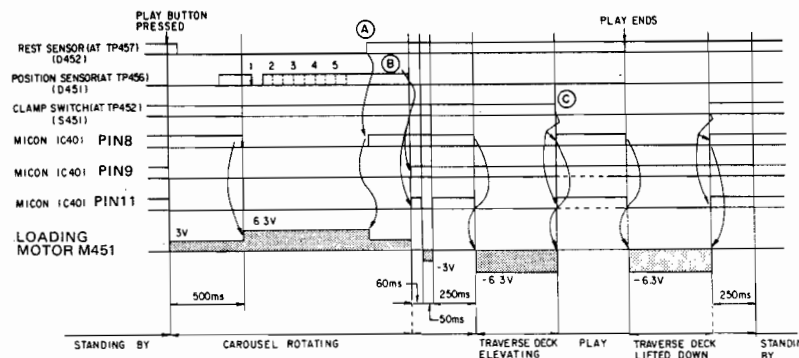


Figure 13 Timing Chart

B) Lifting up and down of the traverse deck

- 1) When the rotation of the carousel causes the position sensor signal (at TP456) to become L (point B), pins 9 and 11 of IC-401 simultaneously change to H. The voltage supply to the motor is not longer supplied, and the carousel stops.
- 2) Next, pin 11 outputs an L signal for a short period of time (approximately 50 ms), and the motor turns in the clockwise direction, at low speed thus causing gear C (refer to the loading mechanism section page 54) to become linked with the cam block.
- 3) After a 250 ms pause, pins 8 and 11 of IC-401 then change to L. The motor turns in the clockwise direction, and the lifting up of the traverse deck begins.
- 4) When the traverse deck reaches the uppermost position, the clamp switch (S451) turns off, and the output of pins 8 and 11 of IC-401 change to H (point C).
- 5) When play is finished:
 - (a) During normal play, TOC is read at its starting of play, and IC-401 changes output at pins 8 and 11 of itself from H to L with detection of last music from TOC data.
 - (b) During program (or random) play, IC-401 detects last music according to sequence of music programmed (or set random) then changes output at pin 8 and 11 from H to L.

6) Next, the motor turns (in the clockwise direction), thus turning the cam block, and the traverse deck begins to descend. When the traverse deck reaches the lowermost position, the clamp switch (S451) turns on.

7) The operation of the clamp switch causes the output of pins 8 and 11 of IC-401 to change to H, thus stopping the mechanism in a standby condition waiting for the next disc.

8. Loading motor drive circuit (Refer to figure 14)

A) Switching of the motor drive voltage (3 volts / 6.3 volts).

The motor drive voltage is 3 volts at the start and just before the end of the rotation of the carousel, and it is 6.3 volts during high speed rotation. The following is an explanation of this voltage switching.

- 1) Pin 8 of IC-401 is the input terminal controlling the motor drive voltage appearing at pins 2 and 10. The voltage at these two pins changes from 3 volts to 6.3 volts, in accordance with the control logic at pin 8.
- 2) At the start and just before the end of the rotation of the carousel, an H signal is output from pin 8 of IC-401, and Q407 is switched off.
- 3) The switching off of Q407 causes the bias voltage being applied to the base of Q415 to be discontinued, thus causing Q415 to be switched off.
- 4) The Q415 therefore causes Q416 to be switched on. The 3.3 volts zener diode D418 (for 3.3 volts) is short circuited, and the 3 volts drop across D417 (for 3 volts) is applied to pin 8 of IC-404.
- 5) When the L signal is output from pin 8 of IC-401, Q407 is switched on, a bias voltage is applied to the base of Q415 via D420, Q415 is switched on, and Q416 is switched off.
- 6) Thus, the combined voltage of D417 and D418 (6.3 volts) is applied to pin 8 of IC-404 so that the motor drive voltage becomes 6.3 volts, and the speed of the carousel is increased.

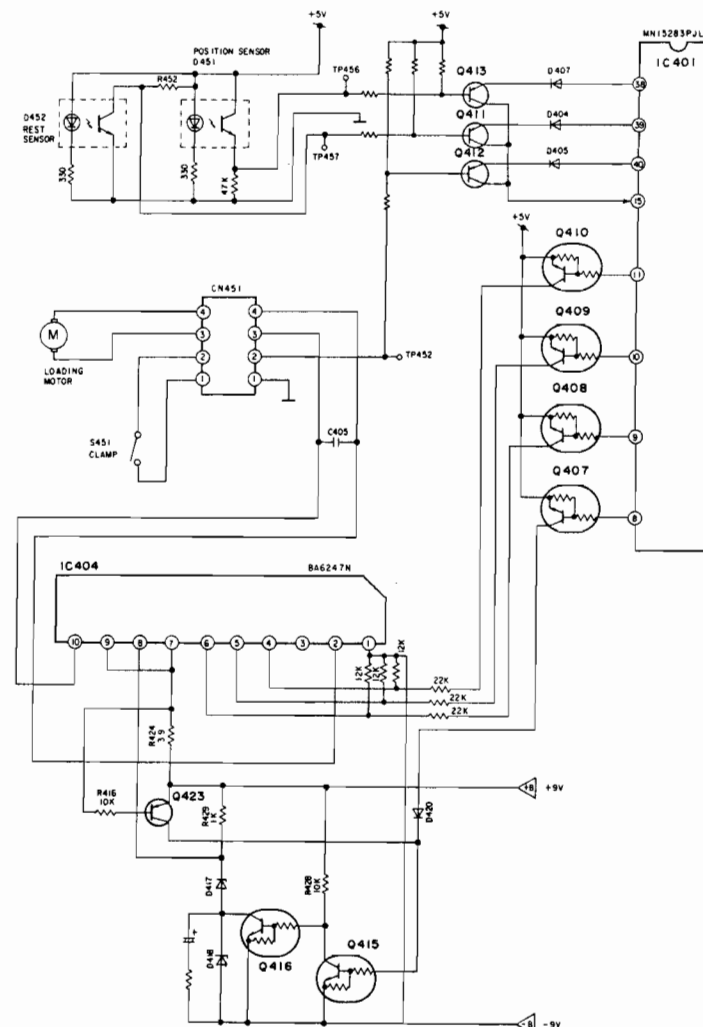


Figure 14 Loading Motor Drive Circuit

B) Operation of pins 7 and 9 of IC-404

Pins 7 and 9 of IC-404 are the input terminals for the motor current control.

1) Purpose of Q423

When low speed rotation (low speed) of the carousel begins, if some external force makes it difficult to start rotation, Q423 functions as described below in order to change the voltage being supplied to the motor to 6.3 volts and thus provide increased torque.

6) No volts are supplied to the motor for the low speed start ion, if some external force causes the motor load to the current flowing through pins 7 and 9 of IC-404

SL-PC20

current increases, the voltage drop (equal to the voltage of Q423) across R424 increases, and Q423 is on.

The switching on of Q423 causes a bias voltage from the +9 volts source to be applied to Q415 via Q423, Q416 is switched off. The combined voltage of D417 and D418 (6.3 volts) is applied to pin 8 of IC-404, then IC-404 changes the voltage being supplied to the motor to 6.3 volts and the motor torque is increased.

9. Other functions of the cam block (Refer to figure 15)

In addition to the traverse deck up / down cam and clamp switch cam, the cam block also includes a ratchet cam and a damping spring cam.

A) Ratchet cam

The ratchet cam operates the ratchet in order to lock the carousel and prevent it from being turned by hand or through some other external force while the traverse deck is in the up position.

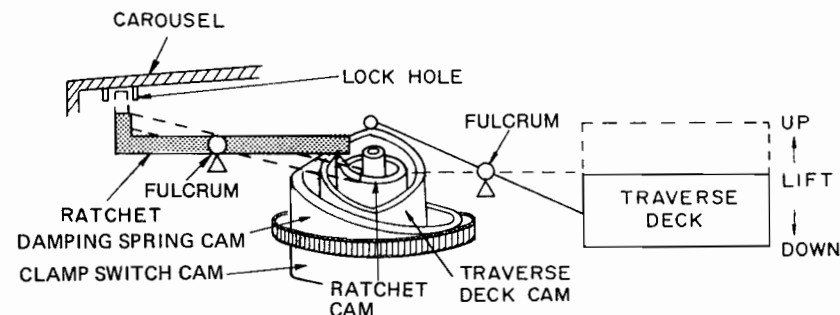


Figure 15 Traverse Deck Up/Down Construction

- 1) As shown in the figure above, if the traverse deck is in the lowermost position, the carousel is unlocked and can be turned by hand (solid lines).
- 2) When the cam block turns and the traverse deck is lifted up, the left side of the ratchet also rises up as indicated by the dashed lines, and the left end of the ratchet enters the lock hole provided on the inside of the carousel, thus locking the carousel to prevent it from being turned by hand.

B) Damping spring cam

This cam is held down by the damping spring, and it applies a brake to prevent the cam block from turning too far during the various operations of the mechanism.