

Service Manual



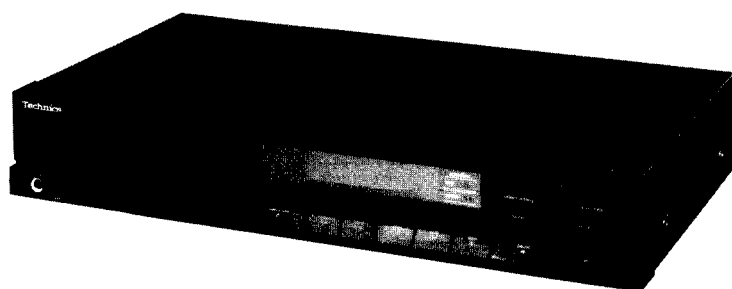
Compact Disc Player

Compact Disc Player

SL-P120

Color

(K) Black Type



Color	Areas
(K)	[M] U.S.A.
(K)	[MC] ... Canada.
(K)	[E] Switzerland and Scandinavia.
(K)	[EK] ... United Kingdom.
(K)	[XL] ... Australia.
(K)	[EG] ... F.R. Germany.
(K)	[EB] ... Belgium.
(K)	[EH] ... Holland.
(K)	[EF] ... France.
(K)	[Ei] Italy.
(K)	[XA] ... Asia, Latin America, Middle Near East, Africa and Oceania.
(K)	[XB] ... Saudi Arabia.
(K)	[PA] ... East PX.
(K)	[PE] ... European Military.
(K)	[PC] ... European Audio Club.

Please use this manual together with the service manual for Model No. SL-P320, Order No. HAD8702603C0.

Notes: ★ Mentioned in this service manual are the differences from Model No. SL-P320.

★ Please note the following major difference when servicing.

1. This product is not provided with remote control unit and remote control circuit on the main P.C.B.
2. This product is not provided with the numeric switches on the operation P.C.B.

Technics

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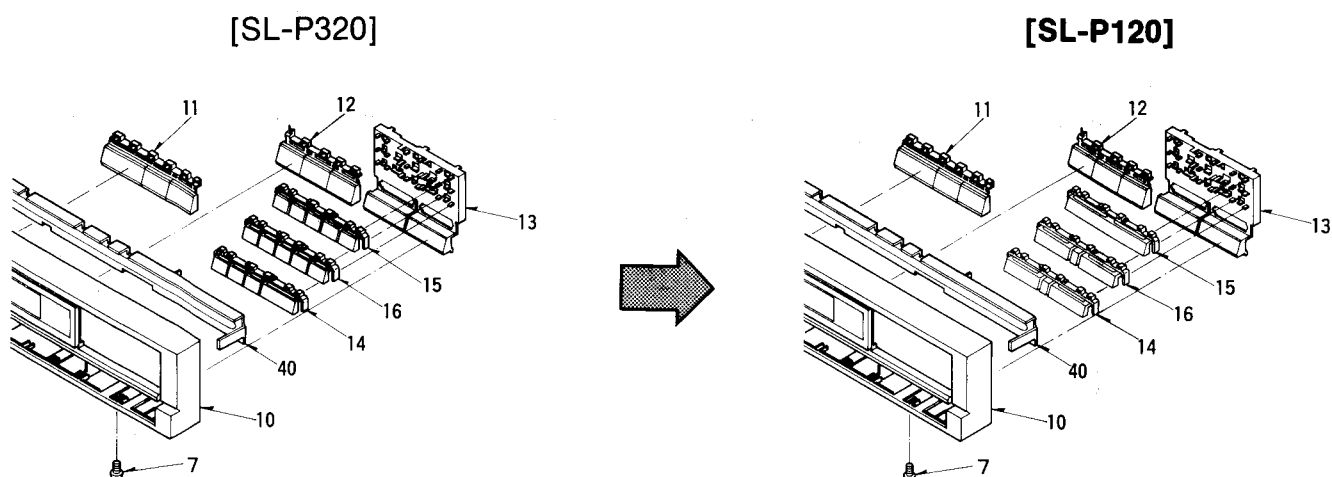
CHANGES

■ REPLACEMENT PARTS LIST

Note: Mentioned in this parts list are only those parts different from Model No. SL-P320.
All other parts are the same as for Model No. SL-P320.

Ref. No.	Change of Part No.		Part Name & Description
	SL-P320 (K)	SL-P120 (K)	
[INTEGRATED CIRCUITS]			
IC801	SVIPCM54JP	SVIPCM54HP	I.C., D/A CONVERTER
[CABINET AND CHASSIS]			
9 (E)	SGPLP320-KE	SGPLP120-KE	CHASSIS
(EB, EH, EF, Ei)	SGPLP320-KEB	SGPLP220-KEB	CHASSIS
(EG)	SGPLP320-KEG	SGPLP120-KEG	CHASSIS
(EK)	SGPLP320-KEK	SGPLP120-KEK	CHASSIS
(M)	SGPLP320-KM	SGPD670ZF0B	CHASSIS
(MC)	SGPLP320-KMC	SGPLP120-KMC	CHASSIS
(PA, PE, PC)	SGPLP320-KPA	SGPLP120-KPA	CHASSIS
(XA)	SGPLP320-KXA	SGPLP120-KXA	CHASSIS
(XB)	SGPLP320-KXB	SGPLP120-KXB	CHASSIS
(XL)	SGPLP320-KXL	SGPLP120-KXL	CHASSIS
10	SGYLP320-KM	SGYLP120-KM	FRONT PANEL ASS'Y
14	SBCD4620ZK0B	SBCD4630ZK0C	BUTTON MEMORY
15	SBCD4610ZK0C	SGXD3070ZK0B	KNOB HEADPHONES
16	SBCD4610ZK0D	SBCD4630ZK0D	BUTTON TIME
[PACKINGS]			
P1 (MC)	SPND203	SPND199	CARTON BOX
P1 (EF)	SPND204	SPND200	CARTON BOX
P1 (others)	SPND202	SPND198	CARTON BOX
[ACCESSORIES]			
A1 (M)	SQUD210	SQUD201	INSTRUCTION MANUAL
(XL, XA)	SQUD212	SQUD203	INSTRUCTION MANUAL
(EG)	SQUD214	SQUD205	INSTRUCTION MANUAL
(EF)	SQUD215	SQUD206	INSTRUCTION MANUAL
(Ei)	SQUD216	SQUD207	INSTRUCTION MANUAL
(EK)	SQUD217	SQUD208	INSTRUCTION MANUAL
(E, EB, EH)	SQULP320-KE	SQULP120-KE	INSTRUCTION MANUAL
(MC)	SQULP320-KMC	SQULP120-KMC	INSTRUCTION MANUAL
(PA, PE, PC)	SQULP320-KPA	SQULP120-KPA	INSTRUCTION MANUAL
(XB)	SQULP320-KXB	SQULP120-KXB	INSTRUCTION MANUAL
[INTEGRATED CIRCUITS]			
IC404	MN1550P0T	——	MICRO COMPUTER
IC602 (M, MC)	SVIBX1438M	——	REMOTE RECEIVER
IC602 (others)	SVIBX1439E	——	REMOTE RECEIVER
[DIODES]			
D407	MA165	——	DIODE
D409-411	MA165	——	DIODE
D415-418	MA165	——	DIODE
[SWITCHES]			
S411-420	EVQQS405K	——	PROGRAM SWITCHES
[RESISTORS]			
R423	ERDS2TJ103	——	CARBON
R424	ERDS2TJ473	——	CARBON
R429-432	ERDS2TJ222	——	CARBON
[ACCESSORIES]			
A5 (M, MC)	UM-3NEP	——	BATTERY
A5 (others)	UM-3NE	——	BATTERY
[CAPACITORS]			
C406	ECCD1H220K	——	CERAMIC

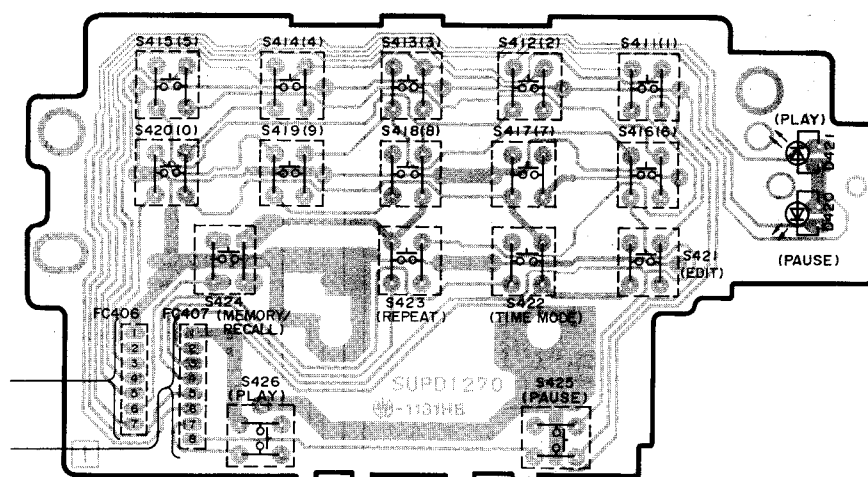
■ EXPLODED VIEWS



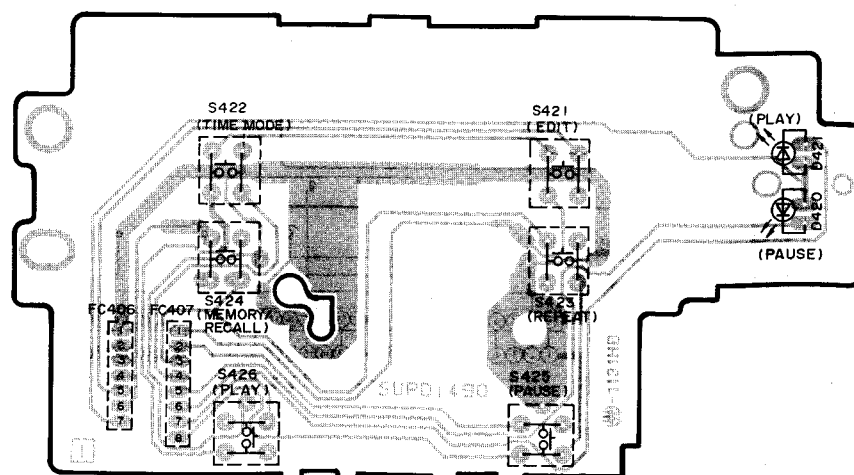
■ PRINTED CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

• OPERATION P.C.B.

[SL-P320]



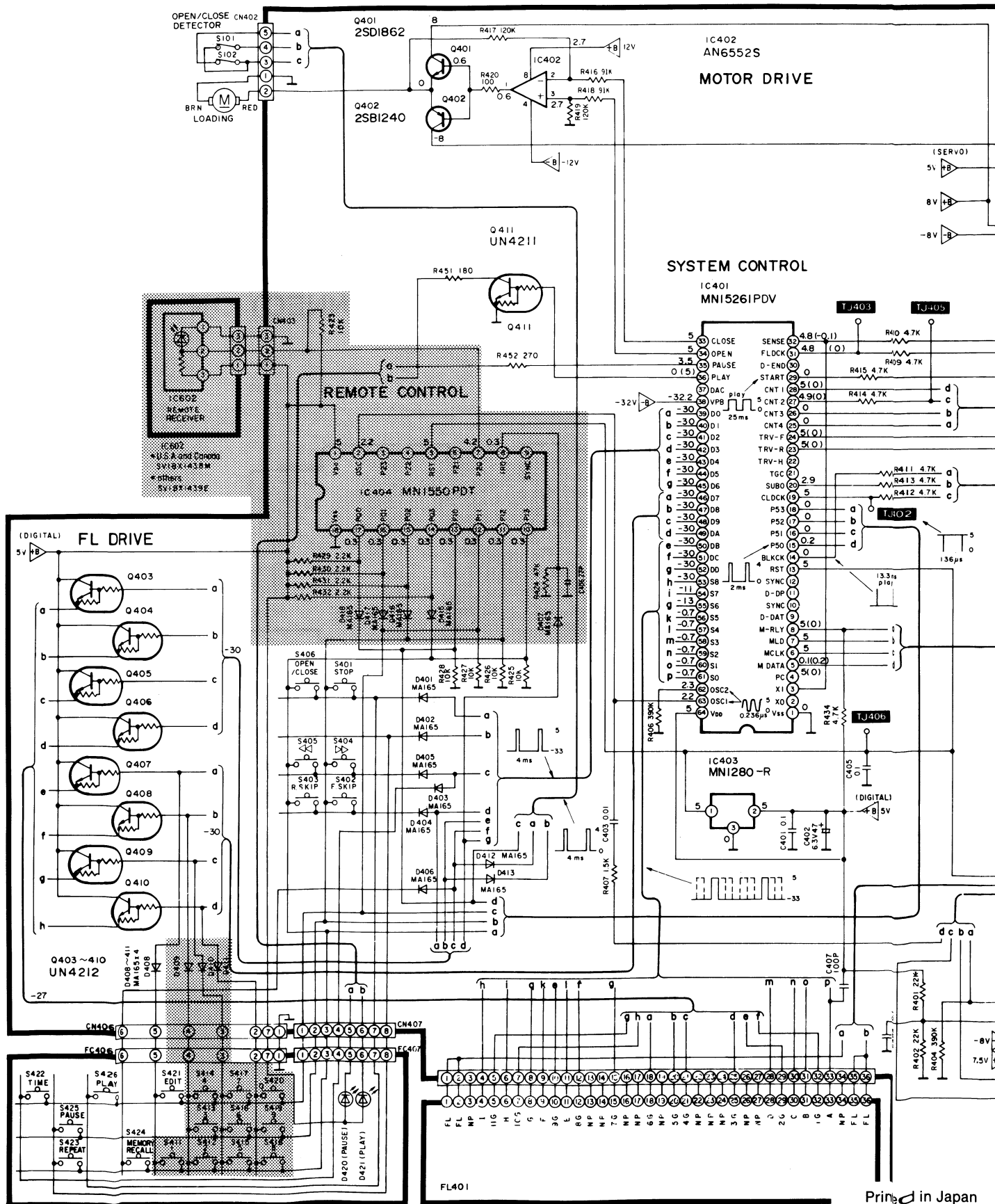
[SL-P120]



■ SCHEMATIC DIAGRAM

Note: This product is not provided with the parts in the following 2 circuitry in the shaded area.

1. Remote control circuit on the main P.C.B.
2. Numeric switches on the operation P.C.B.



Service Manual

Supplement

COMPACT
disc
DIGITAL AUDIO

DIGITAL

Compact Disc Player
SL-P120

Color

(K) Black Type

Please file and use this supplement manual together with the service manual for Model No. SL-P120, Order No. HAD8703023A0.

Note:

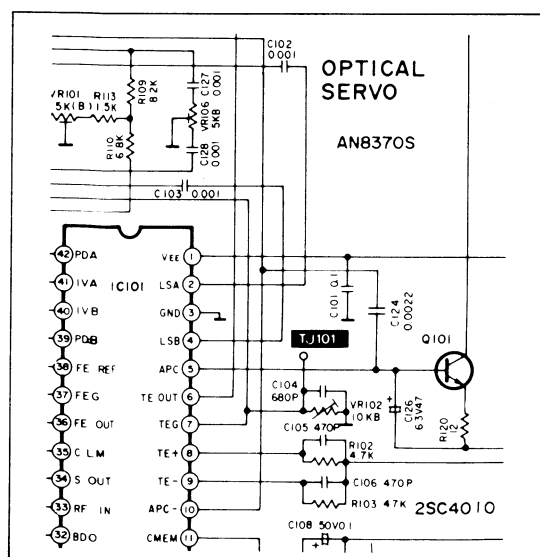
- This supplement has been issued to inform you that the optical servo circuit has been changed in units having serial number suffixes "C" or later. (Refer to "How to read the serial number" on page 2.)

CHANGES

■ SCHEMATIC DIAGRAM

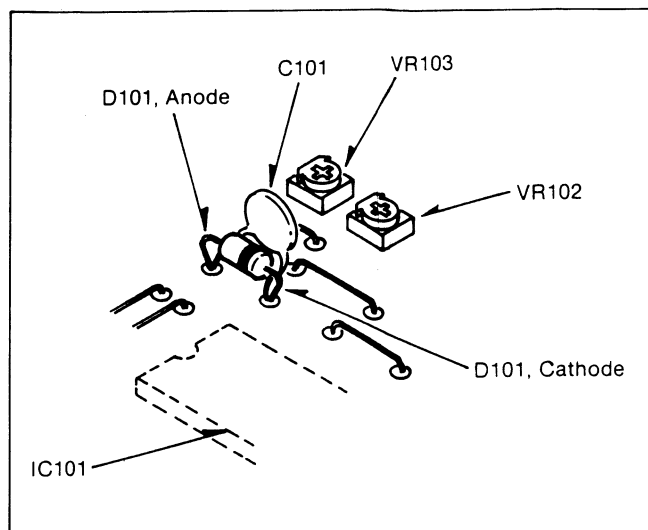
Note: D101 (Diode, Schottky) has been added to improve the efficiency of the laser diode.

(OLD)



■ REPLACEMENT OF DIODE (D101)

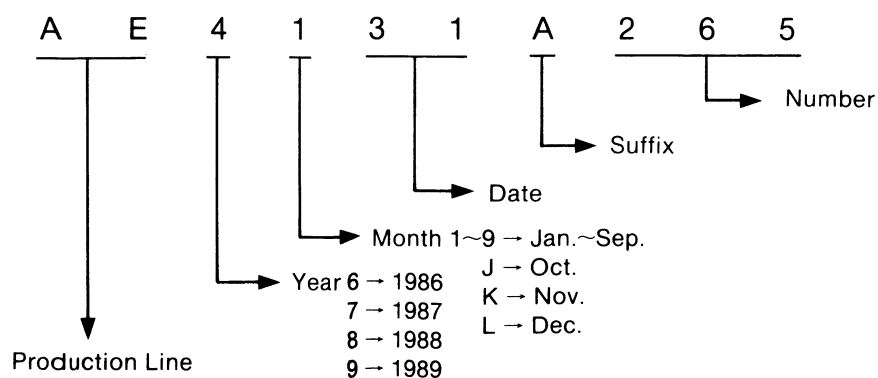
•As shown in the figure, the diode has been added on the parts side of the main P.C.B.



■ REPLACEMENT PARTS LIST

Ref. No.	Change of Part No.		Part Name & Description	Remarks
	OLD	➡ NEW		
DIODE				
D101		MA723	Diode, Schottky	Addition

■ HOW TO READ THE SERIAL NUMBER



Service Manual

Compact Disc Player

**DIGITAL****SL-P120**

Compact Disc Player

Color

(S)..... Silver Type

Color	Areas
(S)	[MC] ... Canada.
(S)	[E] Switzerland and Scandinavia.
(S)	[EG] ... F.R. Germany.
(S)	[EB] Belgium.
(S)	[EH] Holland.
(S)	[EF] France.
(S)	[Ei] Italy.
(S)	[EK] United Kingdom.
(S)	[XL] Australia.
(S)	[XB] Saudi Arabia.
(S)	[XA] Asia, Latin America, Middle Near East, Africa and Oceania.

Please use this manual together with the service manual for Model No. SL-P120, Order No. HAD8703023A0.

CHANGES

■ REPLACEMENT PARTS LIST

Note: Mentioned in this parts list are only those changed in Model No. SL-P120. (Black Type)

Ref. No.	Change of Part No.		Part Name & Description
	SL-P120 (K)	➡ SL-P120 (S)	
[CABINET AND CHASSIS]			
2	SBC666-5	SBC666	BUTTON, POWER
4	SKCD40KZ	SKCD40SY	TOP COVER
8	SNE2129-1	SNE2129	SCREW
10	SGYLP120-KM	SGYLP120-SE	FRONT PANEL
11	SBCD4590ZK0B	SBCD4590MA0A	BUTTON, OPEN
12	SBCD4600ZK0B	SBCD4600MA0A	BUTTON, STOP
13	SBCD4580ZK0B	SBCD4580MA0A	BUTTON, PLAY
14	SBCD4630ZK0C	SBCD4630MA0A	BUTTON, REPEAT

Ref. No.	Change of Part No.		Part Name & Description
	SL-P120 (K)	→ SL-P120 (S)	
15	SGXD3070ZK0B	SGXD3070MA0A	ORNAMENT PLATE
16	SBCD4630ZK0D	SBCD4630MA0B	BUTTON, TIME
17	SBN1161-2	SBN1161-3	KNOB, HEADPHONES
[LOADING MECHANICAL]			
101	SGXD3080ZK0B	SGXD3080MA0A	ORNAMENT PLATE
[PACKING]			
P1	SPND198	SPND211	CARTON BOX
P1 [EF]	SPND200	SPND212	CARTON BOX
P1 [MC]	SPND199	SPND220	CARTON BOX

Technics

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Printed in Japan
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Service Manual



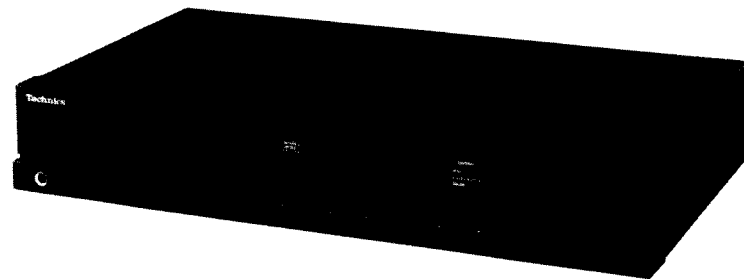
Compact Disc Player

Compact Disc Player

SL-P320

Color

(K)Black Type



Area	
Color	Area
(K)	(M).....U.S.A.
(K)	(MC).....Canada.
(K)	(E).....Switzerland and Scandinavia.
(K)	(Ei).....Italy.
(K)	(EG).....F.R.Germany.
(K)	(EB).....Belgium.
(K)	(EK).....United Kingdom.
(K)	(EF).....France.
(K)	(EH).....Holland.
(K)	(XL).....Australia.
(K)	(XA).....Southeast Asia, Oceania,Africa. Middle Near East and Central South America.
(K)	(PA).....Far East PX.
(K)	(PE).....European Military.
(K)	(PC).....European Audio Club.
(K)	(XB).....Saudi Arabia.

SPECIFICATIONS

■ Audio

Number of channels: 2 (left and right, stereo)
Frequency response: 2-20,000 Hz (EIAJ)
Dynamic range: More than 96dB (EIAJ)
S/N ratio: More than 96dB (EIAJ)
Harmonic distortion: 0.002% (1kHz, 0dB)
Total harmonic distortion: 0.004% (1kHz, 0dB) (EIAJ)
Channel separation: More than 96dB (EIAJ)
Wow and flutter: Below measurable limit
Low-pass filter: High-resolution digital filter

■ Signal Format

Sampling frequency: 44.1kHz
Correction system: Technics Super Decoding Algorithm
D-A conversion: 16-bit linear

■ Pickup

Access time: 1 second (access to the last track)
Light source: Semiconductor laser
Wavelength: 780nm
Traverse system: High-speed linear access system

■ Functions

Automatic play: All tracks
Direct access play: Track number
Repeat play: Entire disc or programmed tracks

Search:

Forward/backward track skip
Forward/backward manual search

Program play:

For up to 20 selections

Preset edit play:

Up to 99 minutes

Display:

(for program play)
Total tracks (up to 99)
Programmed
Current track
Time display (min., sec./dB)
Time modes display

Indicators:

Music matrix (20)
Overflow indicator
Disc indicator
Edit indicator
Repeat indicator
Level indicator
(When using remote control unit)
Play indicator
Pause indicator
Motor-driven horizontal type
15mW max. 32Ω(variable)
1/4 inch stereo

Disc loading:

Headphone output level:

Plug:

Matsushita Services Company
50 Meadowland Parkway,
Secaucus, New Jersey 07094

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6th Floor, world Trade Center Bldg.,
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Minato-ku, Tokyo 105, Japan

■ General

Power supply:

For U.S.A. and Canada:
AC120V, 60Hz
For United Kingdom and Australia:
AC240V, 50Hz
For Continental Europe:
AC220V, 50Hz
For Others:
AC110~127V/220~240V, 50/60Hz

Power consumption:

12W
2V (at 0dB) (EIAJ)

Output voltage:

Approx. 600Ω

Output impedance:

More than 10kΩ

Load impedance:

More than 10kΩ

Dimensions(WxDxH)

43 X 24.4 X 8 cm
(16-15/16" X 9-19/32" X 3-5/32")
<When disc holder is opened:
37.2 cm (14-21/32") (D) >
3.1kg (6.8lbs.)

Weight:

■ Infrared remote control unit

Dimensions(WxDxH)

6.5 X 15.5 X 1.8 cm
UM-3 "AA" batteries or IEC R6 or
equivalent (1.5V X 2)
140g (including batteries)

Batteries:

Weight:

Specifications are subject to change without notice.
Weight and dimensions are approximate.
Measured by EIAJ (CP-307)

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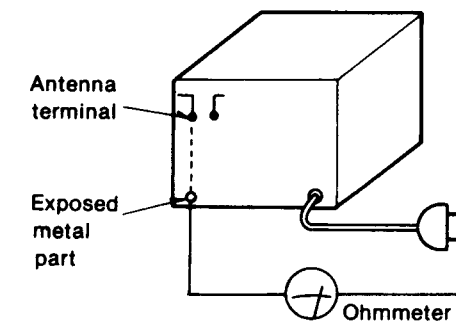
■ SAFETY PRECAUTION (This "safety precaution" is applied only in U.S.A.)

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

● INSULATION RESISTANCE TEST

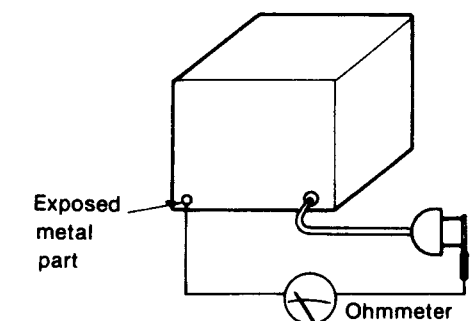
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3MΩ and 5.2MΩ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = 3MΩ—5.2MΩ



(Fig. B)

Resistance = Approx ∞

4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

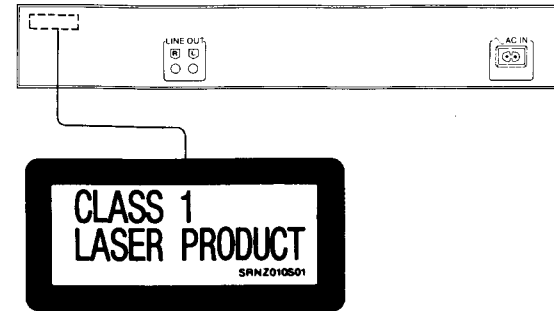
Technics

■ PRECAUTION OF LASER DIODE

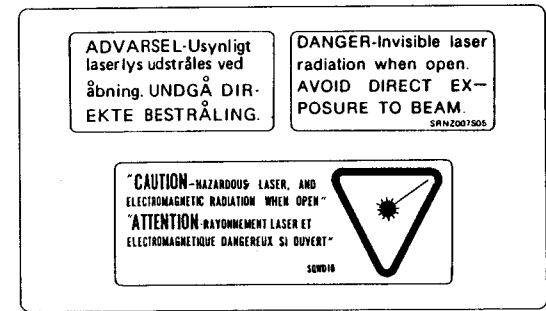
Caution: This product utilizes a laser diode.
ADVARSEL: I dette a apparat anvendes laser.

• Use of caution labels Note: ○ Mark is used, × Mark is not used.

Areas	SRNZ007S05	SQWD10	SRNZ010S01	SRNZ010S02
[M]	○	×	×	×
[MC]	×	○	×	×
[E]	○	×	○	○
[EK], [XL], [EG], [EB], [EH], [EF], [Ei], [XB], [XA]	○	×	○	○



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

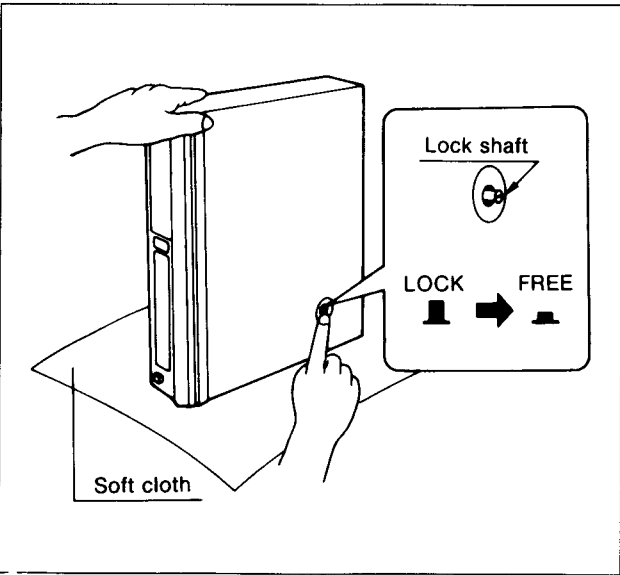


VAROITUS! Laite sisältää laserdiodin,
joka lähettää näkymätöntä silmille
vaarallista lasersäteilyä

■ BEFORE USING THIS UNIT

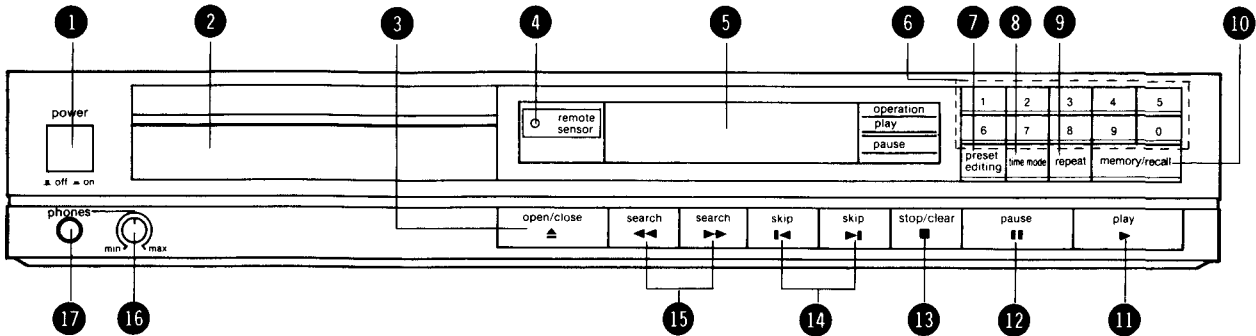
1. Place a soft cloth under the unit to protect it from scratches.
2. Press the lock shaft on the bottom panel to the in (FREE) position (▲→■).

NOTE:
IF THE UNIT IS TRANSPORTED AGAIN, PERFORM THE FOLLOWING STEPS:
1) Remove the disc from the holder.
2) Pull the lock shaft to the out (LOCK) position (■→▲).
CAUTION:
Do not transport the unit without locking the lock shaft.
SEVERE DAMAGE WILL RESULT.



■ LOCATION OF CONTROLS

Front panel



- 1 Power switch**
Press (▲→■) to switch power on and press again (■→▲) to switch power off.

2 Disc holder
The disc is inserted in this holder with the label side up.

3 Open/close button
Press this button to open and close the disc holder.

4 Remote control sensor
Receives signals from the infrared remote control unit.

5 Display panel
See next page.

6 Numeric buttons (1 ~ 0)
Use these buttons to specify track numbers and preset edit time.

7 Preset editing button
Press this button to specify the playing time (min/sec.).

8 Time mode select button
Use this button to select the desired time display mode.
① Disc remaining playing time.
② Track number and remaining playing time of the current track.
③ Playing time from the beginning of the first track.
④ Track number and elapsed playing time from the beginning of the current track.

9 Repeat button
This button activates repeat play mode.
Press this button to activate the repeat mode. (The repeat indicator illuminates.)
Press again to cancel the repeat mode.

10 Memory/recall button
This button is used for the following three operations.
1. To program track numbers before starting play (**program play**).
(A maximum of 20 selections can be programmed.)
2. To display programmed track numbers during program play (**program confirmation**).
3. To enter preset editing time into memory.
- 11 Play button**
Press this button to begin disc play.

12 Pause button
Press this button to briefly stop play.
To continue play, press the play button.

Pause mode:
Play is stopped, but the pickup remains where it was at the time when the pause button was pressed. The disc rotates while the unit is in the pause mode.

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.

13 Stop/clear button
Press this button to stop play and/or cancel all previous program settings.
When this button is pressed, the unit returns to the stop mode.

Stop mode:
In the stop mode, the pickup is at the beginning of the first track and the display shows the total number of tracks and total playing time of the disc.
(The disc does not rotate.)

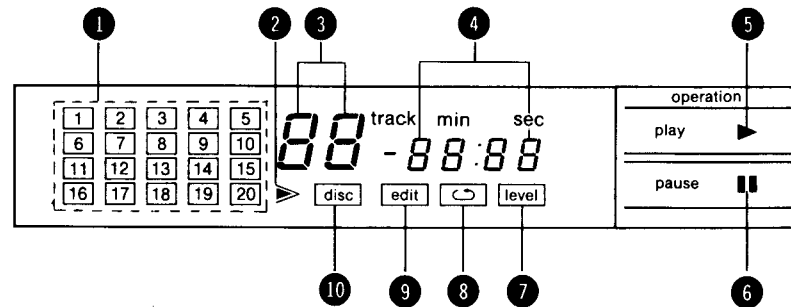
14 Backward and forward skip buttons
Use these buttons to move the pickup to the beginning of the forward or backward track (forward and backward skip play function).

15 Backward and forward search buttons
Use these buttons to move the pickup forward and backwards (manual search play function).

16 Phones level control knob
Use to control the output level to the headphones.

17 Headphones jack
Connect the optional headphones plug to this jack.
When listening to music with stereo headphones, avoid listening for prolonged periods of time. Hearing experts advise against continuous extended play.

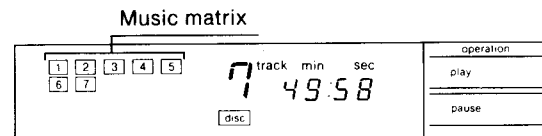
Display panel



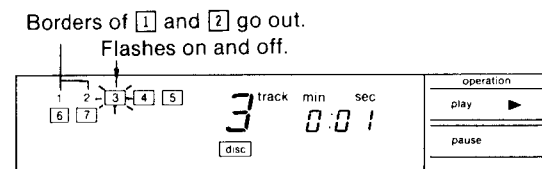
1 Music matrix ()

The music matrix has the following three display modes.

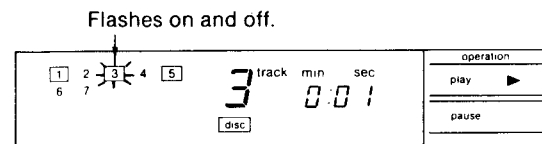
1. When a disc is loaded, this music matrix shows the total number of tracks (up to 20 tracks).
For example, the music matrix below shows that the disc has 7 tracks.



2. If a track number is specified and then play is started. The specified track number is displayed and then play begins. The border around the track number currently being played flashes on and off. For example, if track 3 is specified, the display appears as shown below at the beginning of the track.
For example, the diagram below shows that play is to begin from track 3.



3. If track numbers are programmed and then play is started. For example, if tracks 5, 3 and 1 are programmed in that order, the borders of those three track numbers illuminate and the border of the track being played flashes on and off.



2 Overflow indicator ()

- ▶ Illuminates when a disc containing more than 20 tracks is inserted.
- > Flashes on and off when track number 21 or higher is played. (At this time, the illuminated borders around the numbers in the music matrix go out.)

3 Track number display (track)

Track numbers (up to 99) are shown here.

4 Time display (min. sec.)

- During play, the current track number and track elapsed playing time is shown.
- Each time the time mode select button is pressed during play, this display changes to show one of four time modes.
- If the memory/recall button is pressed during program play, the programmed order is shown on the sec. display.
- The digital attenuation level (dB) is also displayed here, when using the remote control unit.

5 Play indicator ()

Illuminates when the play mode is activated and goes out when play is stopped.

6 Pause indicator ()

Illuminates when the pause mode is activated and goes out when the pause mode is cancelled.

7 Level indicator ()

Illuminates when the output level is decreased by operating the remote control unit. Goes out when the level is returned to 0 dB.

8 Repeat indicator ()

Illuminates when the repeat mode is activated and goes out when the repeat button is pressed once again.

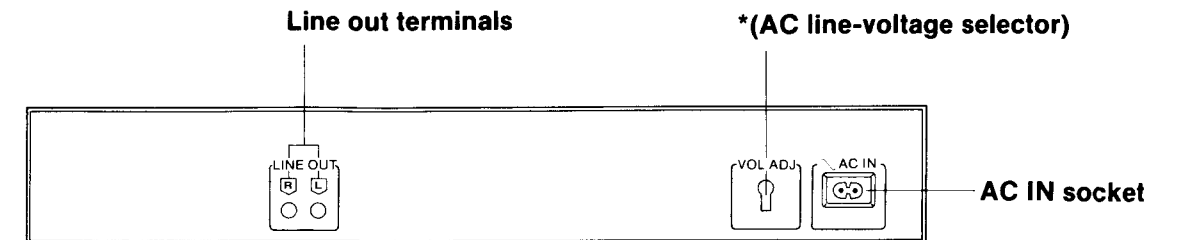
9 Edit indicator ()

Illuminates when the preset editing button is pressed, and goes out when it is pressed again.

10 Disc indicator ()

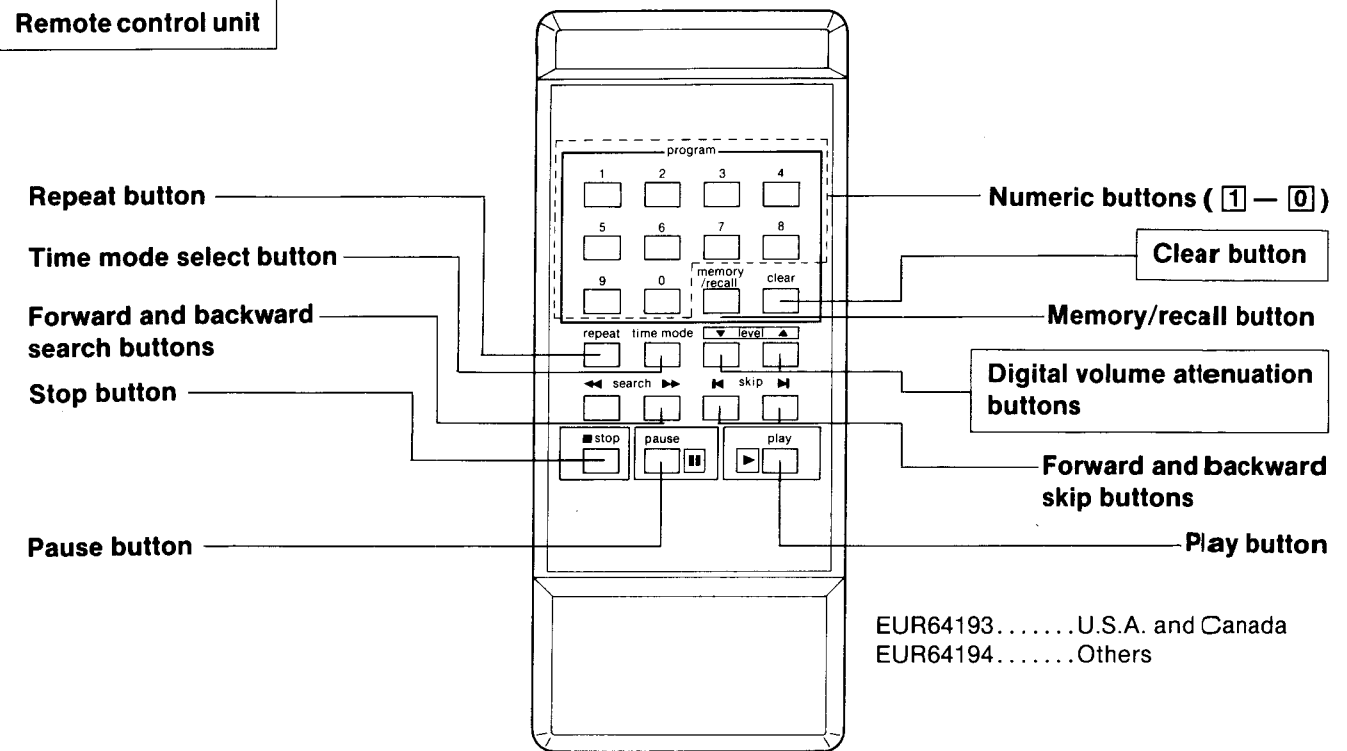
Flashes on and off when the disc holder is opening or closing.
Illuminates when a disc is in the holder (if power is on) and the disc holder is closed.

Rear panel



*Only the product for [XA], [XB], [PA], [PE] and [PC] areas is provided with the AC line-voltage selector.

Remote control unit



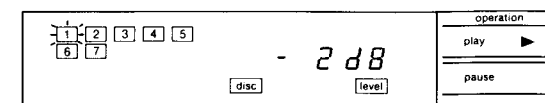
EUR64193.....U.S.A. and Canada
EUR64194.....Others

When using the remote control unit, press the buttons slowly and accurately to avoid incorrect operation.

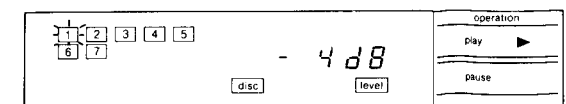
Digital volume attenuation function

- Each time the button or button is pressed, the display mode changes to the attenuation mode (dB display). The current digital volume level setting is displayed momentarily in the time display. Pressing one of these buttons again while the dB display is illuminated will cause a volume level change as described below.
- To lower the volume level press the button. The volume level can be lowered to -12 dB in 2 dB steps.

For example, when the button is pressed once:



When the button is pressed again:



- Press the button to return to 0 dB in 2 dB steps.
 - After the dB display has gone out, the playing time is shown again.
 - Volume attenuation is also returned to 0 dB automatically when power is switched off.
- Note:** Headphone level is also affected.

Program clear function

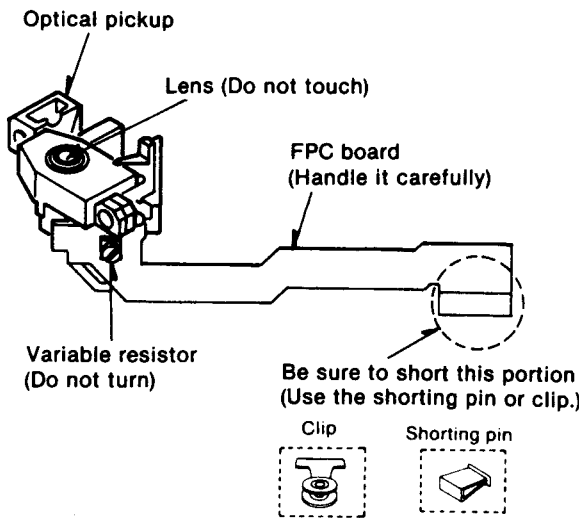
- If you make a mistake when entering a track number, press the clear button to cancel that entry. Each time this button is pressed, the previous entry is cleared.
- During play, however, the entire program is cleared when this button is pressed. (Preset edit play is also cancelled.)

■ 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

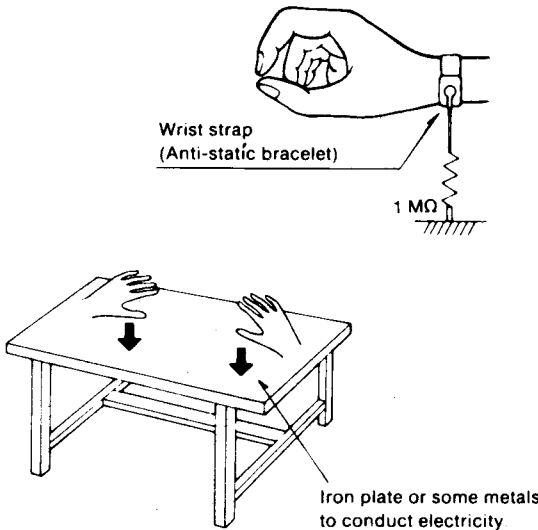
- 1. Do not give excessive shock to the optical pickup because it is of extremely precise structure.
- 2. To prevent the breakdown of the laser diode, an anti-static shorting pin is inserted into the flexible board. (FPC board)
When removing or connecting the short pin, finish the job in as short time 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 relieve 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.

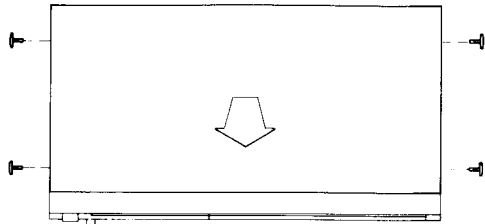
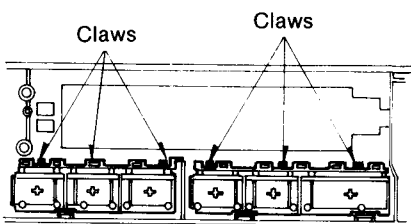
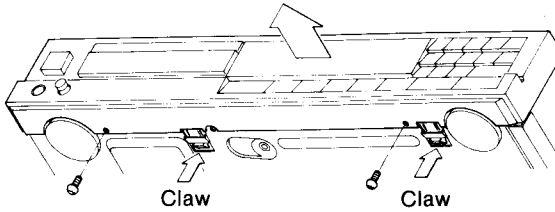
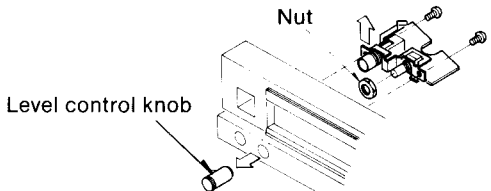
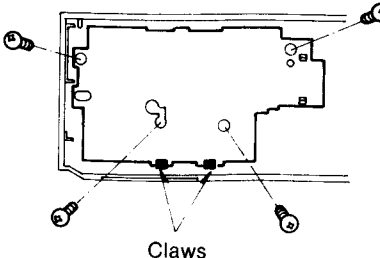
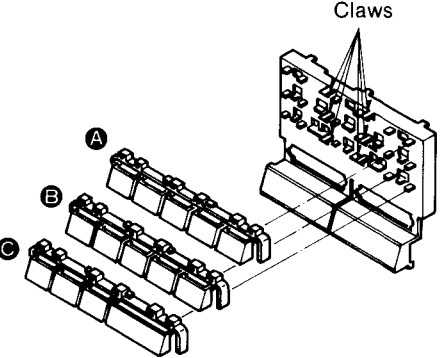
Caution:
The static electricity of your clothes will not be grounded through the wrist strap. So, take care not to let your clothes touch the optical pickup.

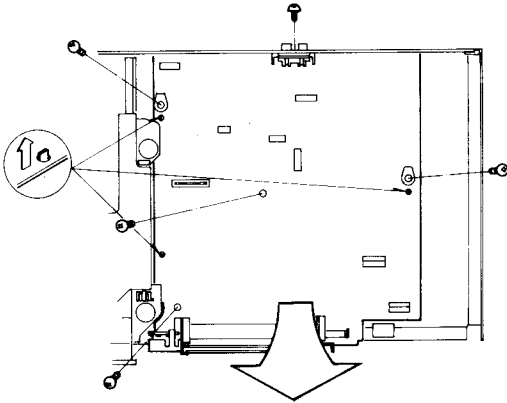
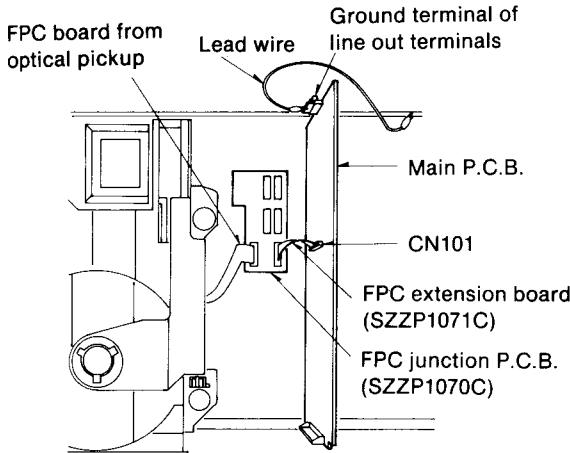
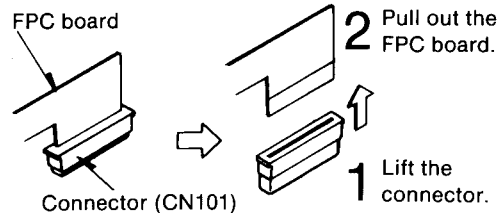
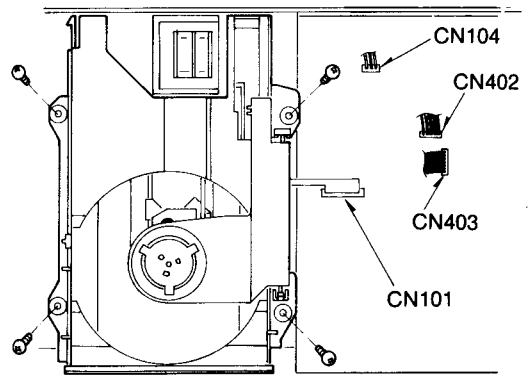
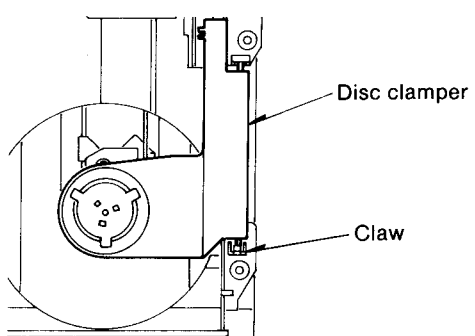


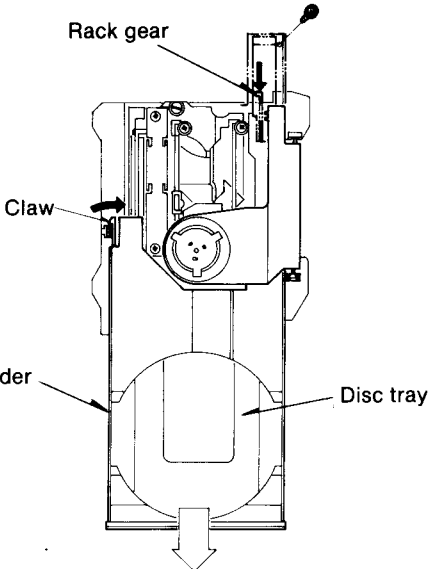
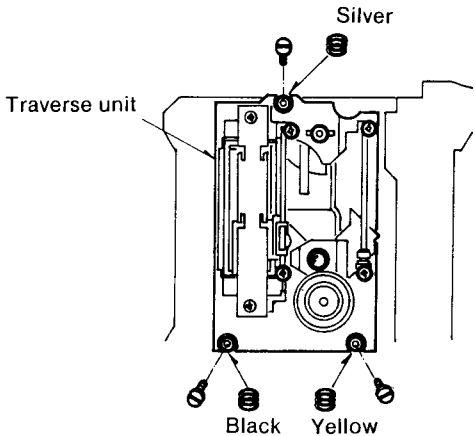
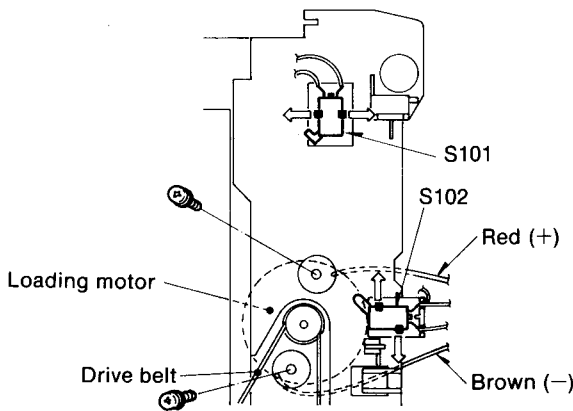
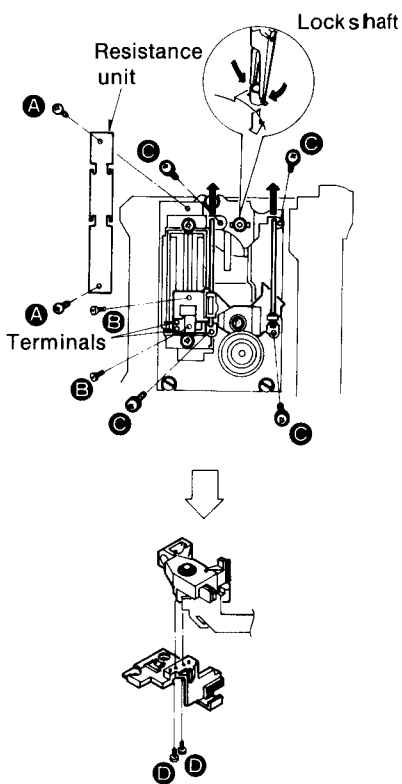
■ DISASSEMBLY INSTRUCTIONS

CAUTION:

- It is very dangerous to look at or touch laser radiation. (Laser radiation is invisible.)
- With the unit turned "on", laser radiation is emitted from the pickup lens.
- When doing the job, removing the cabinet and disc clumper of this unit, be sure to turn the power supply off.

Ref. No. 1	How to remove the cabinet	Ref. No. 3	How to remove the operation buttons
Procedure 1	• Remove the 4 screws.  Note: When doing the job, lock the lock shaft at the bottom of the unit. (See page 3.)	Procedure 1 ▶ 2 ▶ 3	• Release the 6 claws. 
Ref. No. 2	How to remove the front panel	Ref. No. 4	How to remove the headphones P.C.B.
Procedure 1 ▶ 2	1. Remove the 2 screws. 2. Release the 2 claws at the bottom of the front panel. 3. Remove in the direction of the arrow. 	Procedure 1 ▶ 2 ▶ 4	1. Pull off the level control knob. 2. Remove the 2 screws. 3. To remove the bracket, loosen the nut and remove it in the direction of the arrow. 
Ref. No. 5	How to remove the operation P.C.B.		
Procedure 1 ▶ 2 ▶ 5	1. Remove the 4 screws. 2. Release the 2 claws.   How to remove the numeric buttons 1. Release the 2 claws for the button ① and remove it. 2. Remove the button ② in the same way, then button ③.		

Ref. No. 6	How to remove the main P.C.B.	
Procedure 1♦2♦7	1. Remove the 5 screws. 2. Lift up the P.C.B. to remove it from the chassis tabs. 3. Remove in the direction of the arrow.	
 		How to check the main P.C.B. • When checking the soldered surface of the main P.C.B. and replacing the parts, do as shown. 1. Remove the main P.C.B. 2. Remove the FPC board (CN101).  Caution: Insert the short pin into the FPC board in order to prevent breakdown of laser diode. (See page 7.) 3. Connect FPC board from optical pickup to FPC junction P.C.B. (SZP1070C). Caution: Cover the foil of the FPC junction P.C.B. with friction tape to prevent a short-circuit between the foil and the chassis. 4. Connect FPC extension board (SZP1071C) to FPC junction P.C.B. and CN101 of main P.C.B. 5. Place the main P.C.B. as shown in the figure. Cautions: • Be sure to connect the P.C.B. ground terminal (line out terminal) and chassis with a lead wire.
Ref. No. 7	How to remove the loading base	Ref. No. 8
Procedure 1♦2♦7	1. Remove the 3 connectors (CN104, CN402, CN403). 2. Remove the FPC board (CN101). 3. Remove the 4 screws.	Procedure 1♦8 • Release the claw.
Refer to "HANDLING PRECAUTIONS FOR OPTICAL PICKUP" on page 7. 		

Ref. No. 9	How to remove the disc holder	Ref. No. 11	How to remove the traverse unit
Procedure 1➡9	1. Remove the screw. 2. Push the rack gear slowly in the direction of the arrow until the disc tray comes up. 3. Pull the disc holder until it stops. 4. Release the claw. 5. Further pull out the disc holder to remove it. 	Procedure 1➡2➡7➡8➡9➡11	• Remove the 3 screws.  Caution: Note the color of the 3 springs, they must be reinstalled to their original positions.
Ref. No. 10	How to remove the loading motor	Ref. No. 12	How to remove the optical pickup
Procedure 1➡2➡7➡8➡9➡10	1. Remove the drive belt. 2. Remove the 2 screws. Note: Red lead wire.....(+) terminal (close to the slit of the motor) Brown lead wire.....(-) terminal  How to remove the switches (S101, S102) • Release the claws. • Note the fitting direction before remove it.	Procedure 1➡2➡7➡8➡9➡12	1. Remove the 2 screws (A) and the resistance unit. 2. Unsolder the 2 terminals and 2 screws (B). 3. Release the claws by using the pliers to remove the lock shaft. Remove the 4 screws (C). 4. Pull out the optical pickup from the 2 guide shafts. 5. Remove the 2 screws (D) to separate the holder from the optical pickup. 

■ HOW TO REPLACE IC'S (Small outline type)

Replacing procedure		Cautions
1	Reduce the amount of solder on each pin of the integrated circuit by use of a solder sucker.	- Recommended tool - Special soldering iron * H605M and H-130. * H605E and H-130. - Do not touch the soldering iron to the area for a long time. It may otherwise cause removal of the print foil. - When shifting the pin upward, do the job quickly while the solder is melting. If the solder is hard, it may cause removal or breakage of the print foil. - When using a pencil type soldering iron. 1. Completely remove the solder from each IC pin by use of solder sucker. 2. Raise each pin by means of an eyeleteer, hold the pliers then remove IC package from P.C.B.
2	Melt the solder on the pin (one electrode) with the soldering iron.	
3	While the solder is melting, shift the pin upward by the soldering iron to remove it from the foil.	
4	Remove each pin from the foil according to the above-mentioned procedure.	

* Special soldering iron

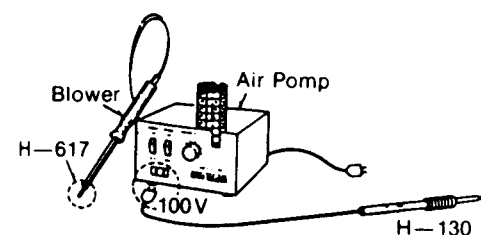
(Refer to Technical Information, ORDER NO. GAD84125486T1)...For U.S.A. and Canada

(Refer to Technical Information, ORDER NO. GAD84115476T8)...For others

• H-605 Spot Heater (hot-air solder iron)

This device that uses hot air to melt solder was developed to remove Flat-Package ICs, RHCs and chip parts.

- H-605M (For 120V power source)
- H-605E (For 200V/220V/240V power source)



• H-617 Twin Nozzle (for spot heater)

Special nozzle for the removal of RHCs and chip resistors. (Nozzle diameter: 1.0mm×2)

• H-130 Slim Pencil Solder Iron

An ultrasmall ceramic heater solder iron is extremely handy for soldering chip parts, RHCs, ICs etc., to high-density circuit boards.

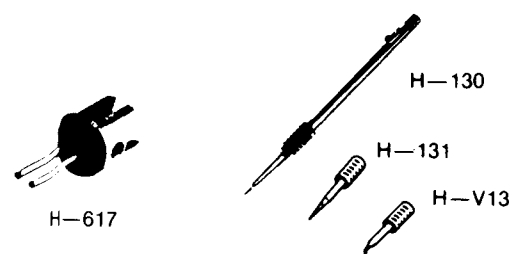
Features:

- Rated power: 100V, 15W
- Max. temp.: 400°C
- Heater: ceramic (long life)
- Insulation resistance: 100MΩ
- Length: 178mm
- Weight: 16g (not including cord)

• H-131, H-V13 Cap Bits

Solder tip for the slim pencil Solder Iron is composed of a bit holder and a corrosion resistance solder tip. Permits changing of solder tips even while still hot.

- Solder tip: 0.3mm

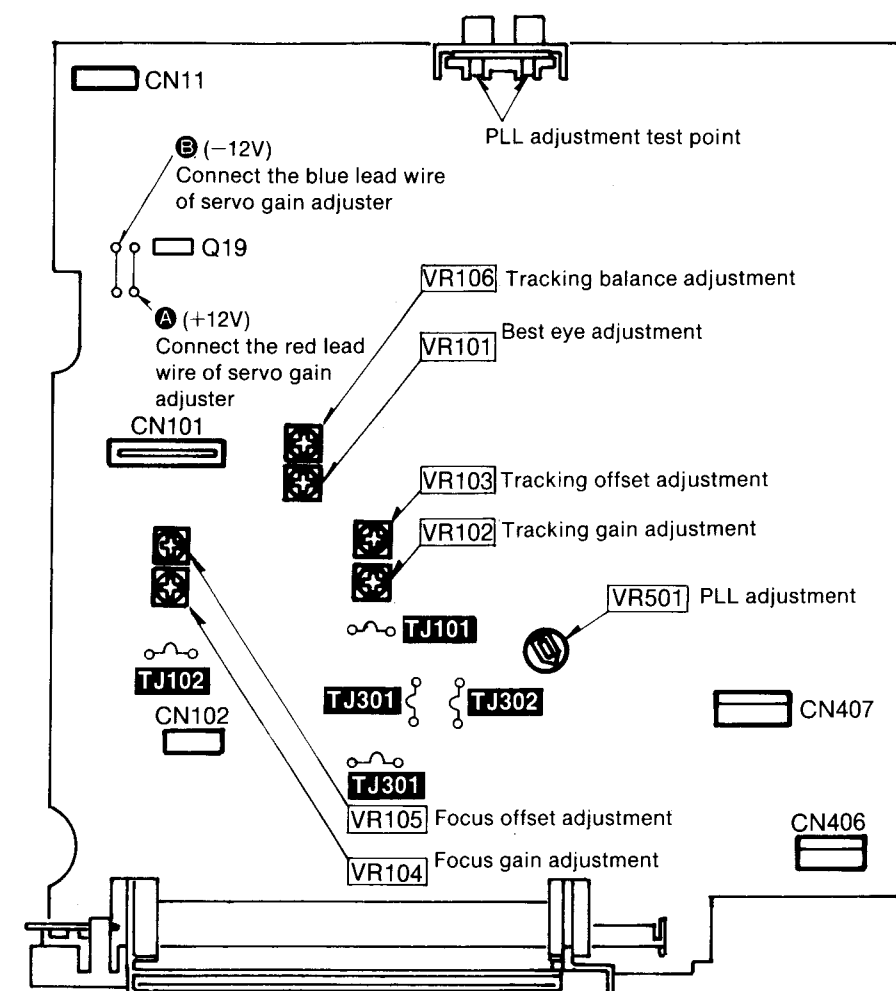


■ MEASUREMENTS AND ADJUSTMENTS

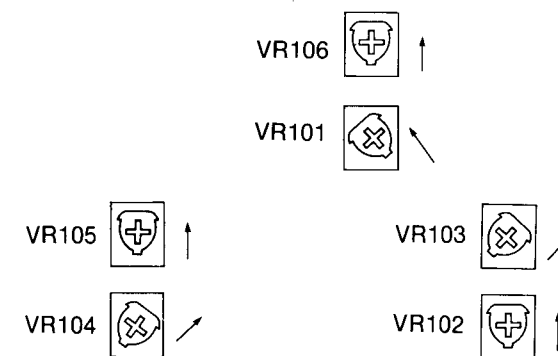
Caution:

- It is very dangerous to look at or touch the laser beam. (Laser radiation is invisible.)
- With the unit turned "on", laser radiation is emitted from the pickup lens.
- Avoid exposure to the laser beam, especially when performing adjustments.

ADJUSTMENT POINTS



• Temporary Setting of Each VR



ELECTRICAL ADJUSTMENT

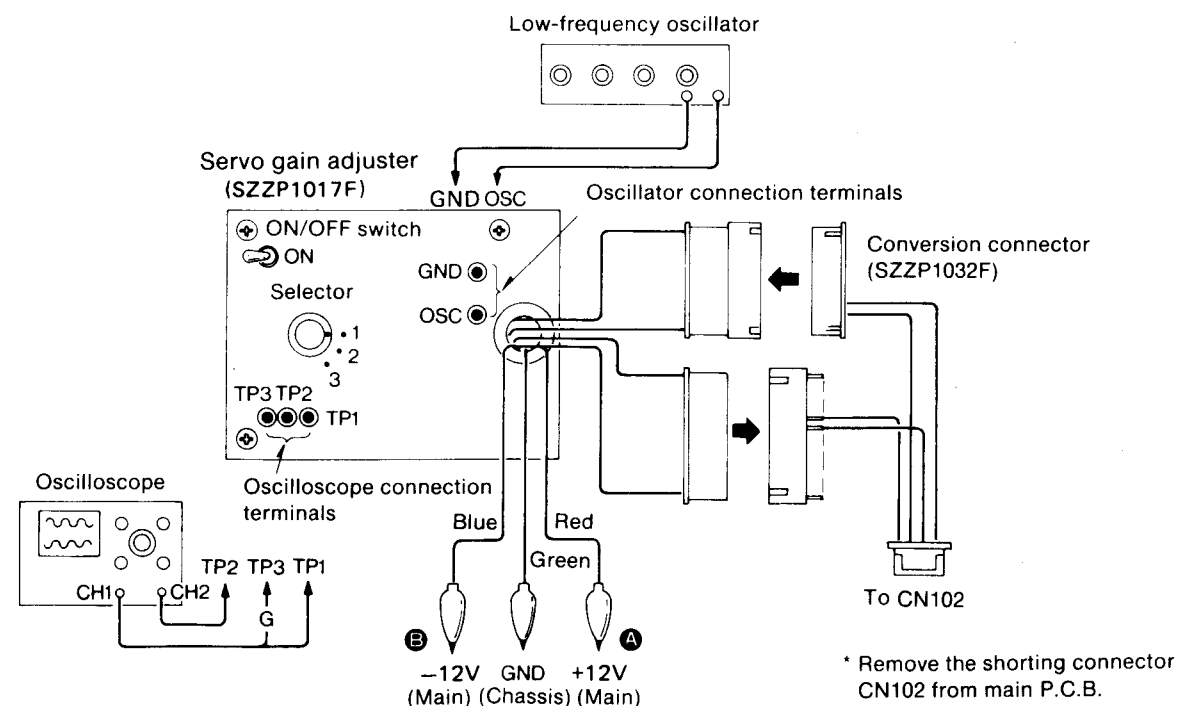
Measuring Instruments and Special Tools

- Servo gain adjuster (SZZP1017F)
- Test disc
 - Test disc(SZZP1014F) old and new type
 - Inspection test disc (SZZP1054C)
 - Unever disc (SZZP1056C)
 - Black band disc (SZZP1057C)
- Ordinary disc
- Two-channel oscilloscope (with trigger) of 30MHz or over
- Low frequency oscillator
- Conversion connector(SZZP1032F)

Adjustment Procedure

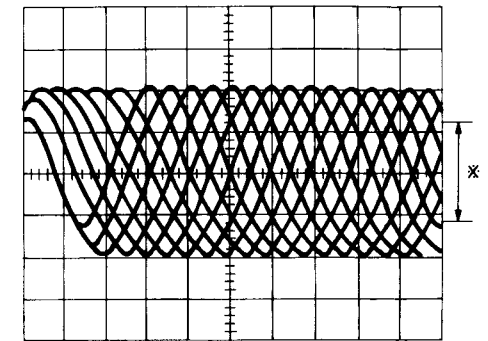
- | | |
|--|---|
| <p>Step 1: Remove the cabinet.
(Refer to page 8.)</p> <p>Step 2: Make the temporary setting of each VR . (Refer to page 12.)</p> <p>Step 3: Best eye (PD balance) adjustment.
(Refer to page 14.)</p> <p>Step 4: Connect the servo gain adjuster.
(Refer to page 13.)</p> <p>Step 5: Focus gain adjustment.
(Refer to page 14.)</p> <p>Step 6: Tracking gain adjustment.
(Refer to page 14.)</p> <p>Step 7: Temporary adjustment of focus and tracking offset.(Refer to page 15.)</p> | <p>Step 8: Focus offset adjustment.
(Refer to page 15.)</p> <p>Step 9: Tracking offset adjustment.
(Refer to page 15.)</p> <p>Step 10: Connect the servo gain adjuster.
(Refer to page 13.)</p> <p>Step 11: Tracking offset balance adjustment.(Refer to page 15.)</p> <p>Step 12: PLL adjustment.
(Refer to page 16.)</p> <p>Step 13: Check of operation after adjustment. (Refer to page 16.)</p> |
|--|---|

Connection of Servo Gain Adjuster



BEST EYE(PD BALANCE) ADJUSTMENT

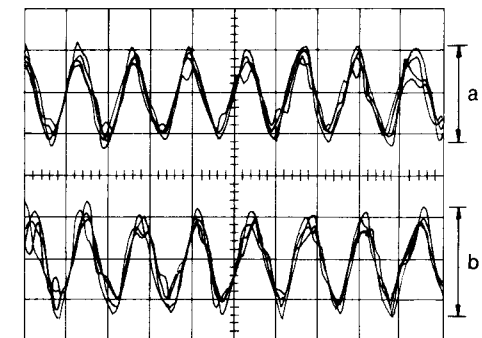
- 1.Connect CH1 of the oscilloscope to **TJ301 (+)** and **TJ302 (-)** of the main P.C.B.
Oscilloscope setting:VOLT.....200mV
SWEEP.....0.5μsec.
INPUT.....AC
- 2.Turn **ON** the power switch of the player and insert a test disc (SZZP1014F or SZZP1054C).
- 3.Set the player to the play mode.
- 4.Adjust **VR101** so that the eye pattern of RF signal is stretched to maximum.
- 5.Turn **OFF** the power switch of the player.



*Most stretched eye pattern

FOCUS GAIN ADJUSTMENT

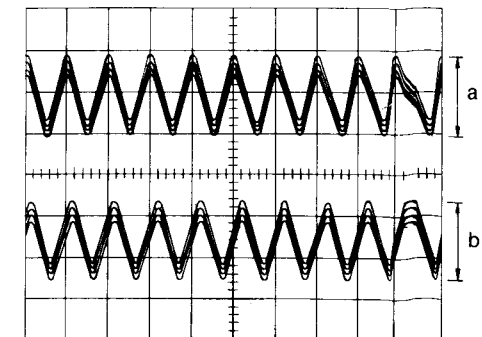
- 1.Connect the servo gain adjuster.(Refer to page 13.)
- 2.Set the selector switch of the servo gain adjuster to **2** and ON-OFF switch to **ON**.
- 3.Set the low frequency oscillator to a frequency of **750Hz** and an output voltage of **100mVp-p**. Then connect the oscillator to the **OSC (+)** and **GND (-)** terminals of the servo gain adjuster.
- 4.Connect CH1 and CH2 of the oscilloscope to **TP1** and **TP2** of the servo gain adjuster.(TP3 is the ground terminal.)
Oscilloscope setting:VOLT.....200mV(both channels)
SWEEP.....1msec.
INPUT.....DC
- 5.Turn **ON** the power switch of the player and insert a test disc (SZZP1014F or SZZP1054C).
- 6.Set the player to the play mode.
- 7.Set the selector switch of the servo gain adjuster from **"2" to "3"**.
- 8.**750Hz** signals will be displayed on the oscilloscope. Adjust **VR104** until the waveform amplitudes of both channels are equal.
- 9.Shift the selector switch of the servo gain adjuster from **"3" to "2"**.
- 10.Turn **OFF** the power switch of the player.



*Make a=b

TRACKING GAIN ADJUSTMENT

- 1.Set the low frequency oscillator to a frequency of **1.0kHz** and an output voltage of **100mVp-p**. Then connect the oscillator to the **OSC (+)** and **GND (-)** terminals of the servo gain adjuster.
- 2.Connect CH1 and CH2 of the oscilloscope to **TP1** and **TP2** of the servo gain adjuster.(TP3 is the ground terminal.)
Oscilloscope setting:VOLT.....200mV(both channels)
SWEEP.....1msec.
INPUT.....DC
- 3.Turn **ON** the power switch of the player and insert a test disc (SZZP1014F or SZZP1054C).
- 4.Set the player to the play mode.
- 5.Set the selector switch of the servo gain adjuster from **"2" to "1"**.
- 6.**1.0kHz** signals will be displayed on the oscilloscope. Adjust **VR102** until the waveform amplitudes of both channels are equal.
- 7.Shift the selector switch of the servo gain adjuster from **"1" to "2"**.
- 8.Turn **OFF** the power switch of the player.
- 9.Disconnect the servo gain adjuster,and insert the short connector of CN102 to the original position.



*Make a=b

TEMPORARY ADJUSTMENT OF FOCUS AND TRACKING OFFSET

(Temporary adjustment of focus offset)

- 1.Connect CH1 of the oscilloscope to the **TJ102 (+)** and **TJ302 (-)** of the main P.C.B.

Oscilloscope setting: VOLT.....100mV
SWEEP.....5msec.
INPUT.....DC

- 2.Turn **ON** the power switch of the player and insert a test disc (SZZP1057C).
- 3.Set the player to the play mode.
- 4.After reading TOC, set the player to the stop mode.
- 5.Adjust **VR105** so that the voltage at the waveform center of the oscilloscope is **0mV**.

(Temporary adjustment of tracking offset)

- 1.Connect CH1 of the oscilloscope to **TJ101 (+)** and **TJ302 (-)** of the main P.C.B.

Oscilloscope setting: VOLT.....100mV
SWEEP.....5msec.
INPUT.....DC

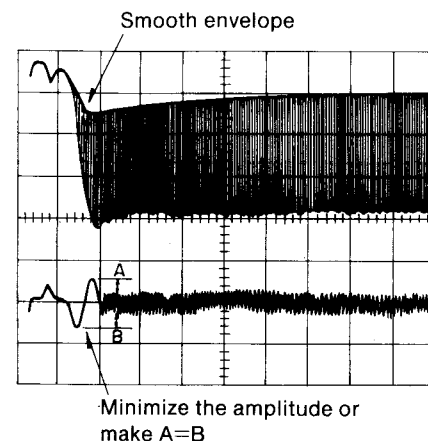
- 2.Turn **ON** the power switch of the player and insert a test disc (SZZP1057C).
- 3.Set the player to the play mode.
- 4.After reading TOC, set the player to the stop mode.
- 5.Adjust **VR103** so that the voltage at the waveform center of the oscilloscope is **0mV**.

FOCUS OFFSET ADJUSTMENT

- 1.Connect CH1 of the oscilloscope to the **TJ301 (+)** and **TJ302 (-)** of the main P.C.B.
Connect CH2 of the oscilloscope to the **TJ102 (+)** and **TJ302 (-)** of the main P.C.B.

Oscilloscope setting: VOLT.....200mV(both channels)
SWEEP.....0.5msec.
INPUT.....AC(CH1),DC(CH2)
MODE.....NORM
(Triggering via CH1)

- 2.Turn **ON** the power switch of the player and insert a test disc (SZZP1057C).
- 3.Set the player to the play mode.
- 4.Check the waveform of CH1 and CH2 on the oscilloscope and adjust **VR105**, so that the waveform around the triggering point becomes as shown in the illustration.

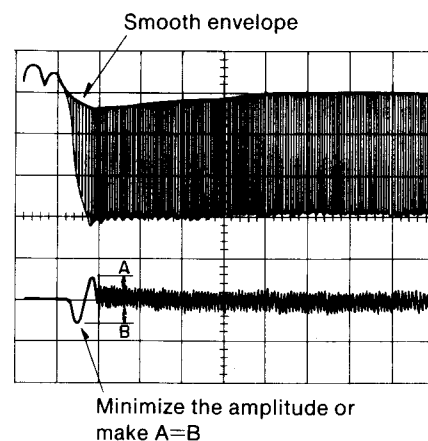


TRACKING OFFSET ADJUSTMENT

- 1.Connect CH1 of the oscilloscope to the **TJ301 (+)** and **TJ302 (-)** of the main P.C.B.
Connect CH2 of the oscilloscope to the **TJ101 (+)** and **TJ302 (-)** of the main P.C.B.

Oscilloscope setting: VOLT.....200mV(both channels)
SWEEP.....0.5msec.
INPUT.....AC(CH1),DC(CH2)
MODE.....NORM
(Triggering via CH1)

- 2.Turn **ON** the power switch of the player and insert a test disc (SZZP1057C).
- 3.Set the player to the play mode.
- 4.Check the waveform of CH1 and CH2 on the oscilloscope and adjust **VR103**, so that the waveform around the triggering point becomes as shown in the illustration.



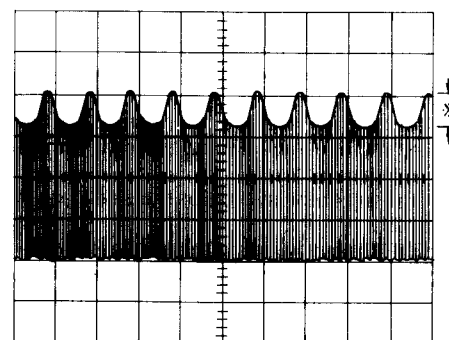
TRACKING OFFSET BALANCE ADJUSTMENT

- 1.Connect the servo gain adjuster. (Refer to page 13.)
- 2.Set the selector switch of the servo gain adjuster to **2** and ON-OFF switch to **ON**.
- 3.Set the low frequency oscillator to a frequency of **1kHz** and an output voltage of **200mVp-p**. Then connect the oscillator to the **OSC (+)** and **GND (-)** terminals of the servo gain adjuster.
- 4.Connect CH1 of the oscilloscope to **TJ301 (+)** and **TJ302 (-)** of the main P.C.B.

Oscilloscope setting: VOLT.....200mV
SWEEP.....0.5msec.
INPUT.....AC

- 5.Turn **ON** the power switch of the player and insert a test disc (SZZP1014F or SZZP1054C).
- 6.Set the player to the play mode.
- 7.Set the selector switch of the servo gain adjuster from **"2" to "1"**.
- 8.Adjust **VR106** so that the output waveform is as shown (jitter is minimized).

- 9.Shift the selector switch of the servo gain adjuster from **"1" to "2"**.
- 10.Turn **OFF** the power switch of the player.
- 11.Disconnect the servo gain adjuster, and insert the short connector of CN102 to the original position.



*Jitter should be minimized.

PLL ADJUSTMENT

- 1.Connect CH1 of the oscilloscope to the **LINE OUT terminal** (either of Lch or Rch) and **ground**.

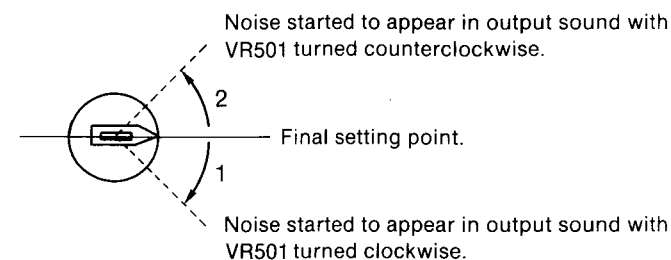
Oscilloscope setting: VOLT.....1V
SWEEP.....1msec.
INPUT.....DC

- 2.Turn **ON** the power switch of the player and insert a test disc (SZZP1054C).
- 3.Play **Track 6 (wedge 0.7mm)** of the test disc.
- 4.Check the waveform displayed on the oscilloscope and adjust **VR501** in the following steps.

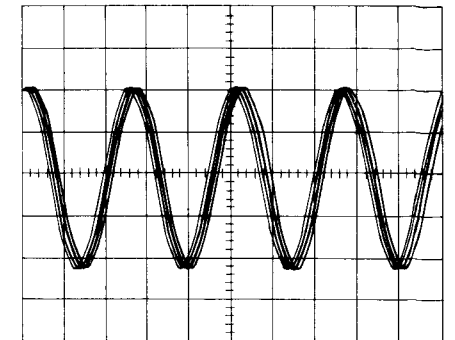
Step 1. Turn **VR501** clockwise slowly and observe the point at which the waveform on the oscilloscope begins to be disturbed.

Step 2. Turn **VR501** counterclockwise slowly and observe the point at which the waveform on the oscilloscope begins to be disturbed.

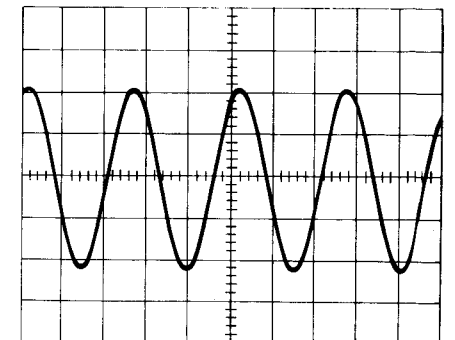
Step 3. Set **VR501** in the middle between the points observed in the above steps "1" and "2".



• NG



• OK



CHECK OF PLAY OPERATION AFTER ADJUSTMENT

Check of skip search

- 1.Play an ordinary disc.
- 2.Press the skip button and verify skip search operation (forward and reverse).

Check of manual search

- 1.Play an ordinary disc.
- 2.Press the manual search button and verify that smooth manual search can be performed at low and high speeds (forward and reverse).

Check of playability

- 1.Play the test disc (SZZP1054C).
- 2.Play the track 6 (wedge 0.7mm) and verify that there is no skip sound or noise.
- 3.Play the track 13 (black dot 0.7mm) and verify that there is no skip sound or noise.

OPTICAL PICKUP ADJUSTMENT

Measuring Instruments and Special Tools

- Tow-channel oscilloscope (with trigger) of 30mHz or over
- Test disc
Test disc (SZZP1014F) old and new type
Inspection test disc (SZZP1054C)
Unever disc (SZZP1056C)

- Hexagonal wrench (SZZP1044C.....1.5mm)
- Screw lock paint (RZZ0L01)

Adjustment Procedure

- If the optical pickup is replaced, adjust it according to the following procedure.

Step 1: Assemble the set to make it ready for power ON check.

Step 2: Make the temporary setting of each VR. (Refer to page 12.)

Step 3: Turntable height adjustment. (Refer to page 17.)

Step 4: Mechanical adjustment. (Refer to page 17.)

Step 5: Electrical adjustment. (Refer to page 13.)

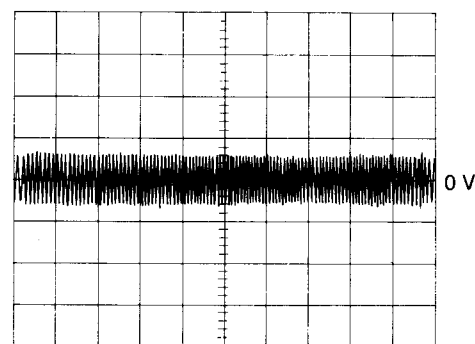
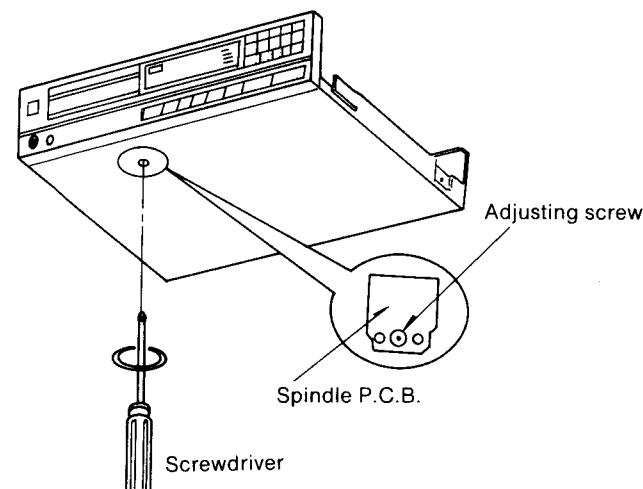
TURNTABLE HEIGHT ADJUSTMENT

1. Connect CH1 of the oscilloscope to **TJ102 (+)** and **TJ302 (-)** of the main P.C.B.

Oscilloscope setting: VOLT.....100mV
SWEEP.....5msec.
INPUT.....DC

2. Set the oscilloscope to DC zero balance.
3. Turn **ON** the power switch of the player and insert a test disc (SZZP1014F or SZZP1054C).
4. Set the player to the play mode.

5. Turn the **adjusting screw** at the bottom of the spindle motor drive P.C.B. with a flat screwdriver so that the waveform is balanced at $0 \pm 50\text{mV}$.
6. Turn **OFF** the power switch of the player.
7. After the adjustment, apply **screw lock paint(RZZ0L01)** to the adjusting screw.



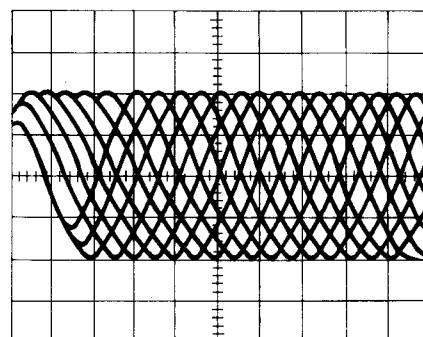
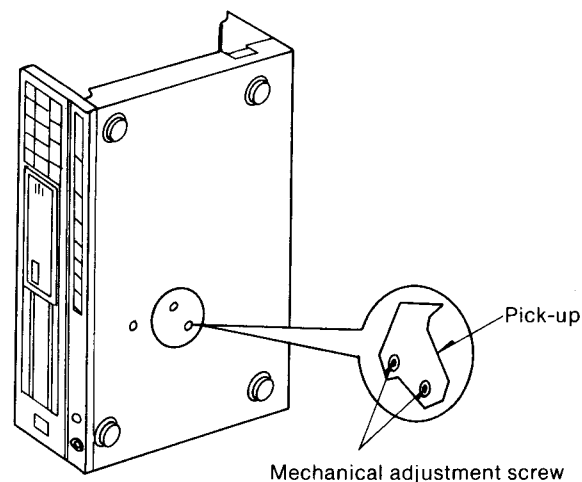
MECHANICAL ADJUSTMENT

1. Connect CH1 of the oscilloscope to **TJ301 (+)** and **TJ302 (-)** of the main P.C.B.

Oscilloscope setting: VOLT.....200mV
SWEEP.....0.5μsec.
INPUT.....AC

2. Turn **ON** the power switch of the player and insert a test disc (SZZP1056C).

3. Monitoring the RF signal on the oscilloscope, adjust the **two adjusting screws** alternately so that the vertical fluctuation of RF signal is minimized and the eye pattern is most stretched.
4. Turn **OFF** the power switch of the player.
5. After the adjustment, apply **screw lock paint(RZZ0L01)** to the adjusting screw.



Note: The mechanical adjustment screws has been already locked with screw lock paint at the factory. So, it might be hard to turn them.

■ TERMINAL FUNCTION OF LSI

• MN6617S (Digital Signal Processing: EFM Decoder, Error Correction, CLV Servo)

Pin No.	Mark	I/O	Function	Pin No.	Mark	I/O	Function
1	BLKCK	O	Sub-code block (Q data) clock (75 Hz)	34	DA8	O	Synchronizing detection signal (Not used, open)
2	CLDCK	O	Sub-code frame (Q data) clock (7.35 kHz)	35	DA7	O	Interpolation flag for each byte (Not used, open)
3	SUBQ	O	Sub-code (Q data) output	36	DA6	I/O	Interpolation prohibited (Not used, connected to GND)
4	CRC	O	Sub-code (Q data) CRC check (Not used, open)	37	DA5	O	C2 decoder correction flag 3 (Not used, open)
5	RST	I	Reset signal input (reset at "L")	38	DA4	O	C2 decoder correction flag 2 (Not used, open)
6	MLD	I	Command load input	39	DA3	O	C2 decoder correction flag 1 (Not used, open)
7	MCLK	I	Command clock input	40	DA2	O	C1 decoder correction flag 2 (Not used, open)
8	MDATA	I	Command data input	41	DA1	O	C1 decoder correction flag 1 (Not used, open)
9	DMUTE	I	Muting control	42	DA0	O	Crystal frame clock (Not used, open)
10	TRON	I	Tracking servo ON signal (tracking servo ON at "L")	43	D7	I/O	16 K RAM data output
11	STAT	O	Processing condition (CRC, OTC, CLVOK, TTSTOP) output	50	D0	I/O	
12	SMCK	O	Clock output (4.2336 MHz)	51	REMOTE	O	16 K RAM OE signal
13	PMCK	O	Picth control clock output (Not used, open)	52	RAMWE	O	16 K RAM WE signal
14	ITC	I	Track counter input signal (Not used, open)	53	RAMA 0	O	16 K RAM address signal (RAMA0 : LSB, RAMA10: MSB)
15	TEST	I	Test mode selection (Not used, connected to +5V)	63	RAMA10	O	
16	X2	O	Clock output	64	PC	O	Spindle motor ON signal (ON at "L")
17	X1	I	Clock input	65	EC	O	Spindle motor drive signal
18	SEL	I	DA output parallel/serial selection (serial at "L")	66	FG	I	Spindle motor FG signal input (Not used, open)
19	LDG	O	L channel deglitch signal (Not used, open)	67	VCNT	—	(Not used, connected to GND)
20	RDG	O	Clock signal output for spindle motor control	68	REXT	—	(Not used, connected to GND)
21	DEMPH	O	De-emphasis ON signal (de-emphasis ON at "H")	69	VDD	I	Power supply (+5V)
22	IPFLAG	O	Interpolation flag (interpolation at "H")	70	PD	—	(Not used, open)
23	FLAGO	O	Error flag (error at "H")	71	PCKO	—	(Not used, open)
24	FLAG6	O	16 K RAM address reset signal (reset at "H")	72	PCK	I	PLL extract clock input
25	XCK	O	Clock (16.9344 MHz) output	73	VDD	I	Power supply Connected to +5V)
26	DA15	O	Serial data output (MSB first)	74	EFM	I	EFM signal input (PL L)
27	DA14	O	(Not used, open)	75	SRF	I	EFM signal input (DSL)
28	DA13	O	Serial data beat clock	76	DO	I	Drop-out signal (Drop-out at "H")
29	DA12	O	Serial data word clock (Not used, open)	77	CLVS	O	11T servo OK signal (OK at "H")
30	DA11	O	Serial data byte clock (Not used, open)	78	FPC	O	PLL frequency comparison signal
31	GND	I	GND terminal	79	BSSEL	O	PLL frequency in take operation signal. (Not used, open)
32	DA10	O	R/L channel changeover signal	80	SRFO	—	(Not used, open)
33	DA9	O	Resynchronizing signal (Not used, open)	81	NSRF	—	(Not used, open)
				82	RF	—	(Not used, open)
				83	SUBC	O	Sub-code serial output data (Not used, open)
				84	SBCK	I	Clock for sub-code serial output (Not used, open)

• MN6618A (Digital Filter)

Pin No.	Mark	I/O	Function
1	NC	—	Not connected
2	D012	O	16-bit data output
3	D011	O	16-bit data output
4	D010	O	16-bit data output
5	GND	I	GND terminal
6	D09	O	16-bit data output
7	NC	—	Not connected
8	D08	O	16-bit data output
9	D07	O	16-bit data output
10	NC	—	Not connected
11	NC	—	Not connected
12	D06	O	16-bit data output
13	D05	O	16-bit data output
14	D04	O	16-bit data output
15	D03	O	16-bit data output
16	NC	—	Not connected
17	NC	—	Not connected
18	D02	O	16-bit data output
19	D01	O	16-bit data output
20	D00	O	16-bit data output
21	MDATA	I	Command data input
22	NC	—	Not connected

Pin No.	Mark	I/O	Function
23	MCLK	I	Command clock input
24	MLD	I	Command load input
25	NC	—	Not connected
26	RST	I	Reset signal input (reset at "L")
27	—	—	—
28	LRCK	I	L/R channel changeover signal
29	NC	—	Not connected
30	SFT	I	Serial data input clock
31	SIN	I	Serial data input
32	NC	—	Not connected
33	X OUT	O	Clock output (Not used, open)
34	X IN	I	Clock input (16.9244 MHz)
35	OSEL	I	DA output parallel/serial changeover (Parallel at "L")
36	LDGL	O	L channel deglitch signal
37	RDGL	O	R channel deglitch signal
38	VDD	I	Power supply (connected to +5V)
39	D015	O	16-bit data output (MSB)
40	D014	O	16-bit data output
41	NC	—	Not connected
42	D013	O	16-bit data output

• AN8370S (Optical Servo Control)

Pin No.	Mark	I/O	Function
1	VEE	I	Power supply (connected to -5V)
2	LSA	I	Phase difference input (A)
3	GND	I	GND terminal
4	LSB	I	Phase difference input (B)
5	APC	O	Auto laser power control output
6	TEOUT	O	Tracking error signal output
7	TEG	I	Tracking error gain adjusting input
8	TE+	I	Phase difference-to-voltage conversion (+)
9	TE-	I	Phase difference-to-voltage conversion (-)
10	APC-	I	Laser power inversion input
11	C-MEM	I	Capacitor connection for phase difference memory
12	APC+	I	Laser power input
13	VREF	O	Reference current generation
14	SENSE	O	Selector output (track-crossed)
15	HIN	I	Tracking hold circuit input
16	HOUT	O	Tracking hold circuit output
17	SPCNT	O	Track-cross speed control output (not used, open)
18	C-MSP	I	Track-cross reference speed setting capacitor connection (not used, open)
19	C-AF	I	Auto focus timer capacitor connection
20	KICK R/F	O	Track kick signal output
21	VCC	I	Power supply (connected to +5V)

Pin No.	Mark	I/O	Function
22	CNT1	I	Control input (FOON: Focus servo ON signal)
23	CNT2	I	Control input (TRON: Tracking servo ON signal)
24	CNT3	I	Control input (KICKF: Kick direction [Forward] command)
25	CNT4	I	Control input (KICKR: Kick direction [Reverse] command)
26	F-LOCK	O	Focus lock signal output
27	C-FBDO	O	Capacitor connection for inversion RF high speed detection
28	C-SBDO	O	Capacitor connection for inversion RF low speed detection
29	C-SBRT	O	Capacitor connection for non-inversion RF low speed detection
30	C-FBRT	O	Capacitor connection for non-inversion RF high speed detection
31	RF OUT	O	RF signal output
32	BDO	O	Drop-out detection output
33	RF IN	I	RF signal input
34	S-OUT	O	Focus search signal output
35	C-LW	I	Capacitor connection for triangular wave generation
36	FE-OUT	O	Focus error signal output
37	FEG	I	Focus error gain adjusting input
38	FE-REF	I	Focus error comparison voltage generation
39	PDB	I	Photo detector current input (B)
40	IVB	O	Current to voltage conversion (B)
41	IVA	O	Current to voltage conversion (A)
42	PDA	I	Photo detector current input (A)

• AN8290S (Spindle Motor Drive)

Pin No.	Mark	I/O	Function
1	GND	I	Minimum potential of IC control. (In this unit, it is connected to VEE [-8.0V])
2	DCR	I	Standard voltage of FAI, PC, CLK. (In this unit, it is connected to 2.5V.)
3	FAI	I	Torque command filter amp. input. (Normal rotation command when FAI < DCR.)
4	FAO	O	Filter amp. output.
5	DI	I	Absolute value circuit input.
6	LPF	I	Capacitor terminal for low pass filter of current feedback loop.
7	A1	O	Drive signal output.
8	A2	O	
9	A3	O	
10	PGND	I	Minimum potential of IC power. (In this unit, it is connected to VEE [-8.0V])
11	CS	I	Drive current detection resistor terminal.
12	PVCC	I	Power input for IC power.

Pin No.	Mark	I/O	Function
13	NC	I	Not used in this unit.
14	NC	I	
15	H2-	I	Negative output of Hall element is input.
16	H2+	I	Positive output of Hall element is input.
17	H1-	I	Negative output of Hall element is input.
18	H1+	I	Positive output of Hall element is input.
19	HSW	I	Bias switch of Hall element. (OFF when PC > DCR)
20	HB	I	Bias power of Hall element.
21	VCC	I	Power input for IC control.
22	PC	I	Power control. (Power down mode when PC > DCR)
23	CLK	I	Clock input. (DCR standard, operated at the edge of rise.)
24	TC	I	Triangular wave generation capacitor terminal.

• AN8371S (Data slice and PLL)

Pin No.	Mark	I/O	Function
1	VEE	I	Power supply (connected to -5V)
2	SRF	O	RF signal output data-sliced into digital value
3	EFM	O	EFM signal output synchronized with PCK
4	D-GND	I	GND terminal (digital system)
5	PCK	O	Clock output extracted from SRF
6	VCC	I	Power supply (connected to +5V)
7	VA	I	VCO free ran frequency adjusting current input
8	VC1	I	Capacitor connection for VCO oscillation frequency
9	VC2	I	Capacitor connection for VCO oscillation frequency
10	VR	I	Resistor connection for VCO oscillation frequency
11	PD	I	Capacitor connection for PLL DO protection
12	PL1	I	PLL loop filter constant connection

Pin No.	Mark	I/O	Function
13	PL2	I	PLL loop filter constant connection
14	FPC	I	Frequency comparison error signal input
15	RF	I	RF signal input
16	ARF	O	RF signal output with AGC applied
17	AGC	I	ARF signal input for AGC drop-out detection
18	AC	I	AGC loop filter constant connection
19	DO	O	Drop-out detection pulse output
20	A-GND	I	GND terminal (analog system)
21	DSL	I	RF signal input for data slicer
22	SLC	I	Slice level control signal input
23	FC1	I	Data slicer filter capacitor connection
24	FC2	I	Data slicer filter capacitor connection

• MN15261PDV (System Control and FL Drive)

Pin No.	Mark	Signal	I/O	Function
1	VSS	GND	I	GND terminal
2	XO	—	O	Not used (Open)
3	XI	SENSE	I	Optical servo condition input
4	P00	PC	O	(Not used, open)
5	P01	M DATA	O	Command data outut
6	P02	MCLK	O	Command clock output
7	P03	MLD	O	Command load output
8	P10	MRLY	I	Muting control
9	P11	B-DAT	I	(Not used, open)
10	P12	SYNC	I	(Not used, open)
11	P13	D-DP	I	(Not used, open)
12	SYNC	—	O	(Not used, open)
13	RST	RESET	I	Reset signal input (reset at "L")
14	IRQ	BLKCK	I	Sub-code block (Q data) clock (75 Hz) input
15 18	P50 P53	KEY	I	Key scan input
19	SBT	CLDCK	I	Sub-code frame clock (7.35 kHz)
20	SBD	SUBQ	I	Sub-code Q data input
21	P20	TGC	O	(Not used, open)
22	P21	TRV-H	O	(Not used, open)
23	P22	TRV-R	O	Traverse reverse command signal
24	P23	TRV-F	O	Traverse forward command signal
25	P30	CNT4	O	Optical servo IC control signal (KICKR: Kick direction [Reverse] command)

• MN1550PDT (Remote Control Signal Processing)

Pin No.	Mark	Signal	I/O	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	Signal	I/O	Function
26	P31	CNT3	O	Optical servo IC control signal (KICKF: Kick direction [Forward] command)
27	P32	CNT2	O	Optical servo IC control signal (TRON: Tracking servo)
28	P33	CNT1	O	Optical servo IC control signal (FOON: Focus servo)
29	P40	START	I	Key input strobe and processing status input from signal processing LSI traverse position detection.
30	P41	D-END	O	(Not used, open)
31	P42	FLOCK	I	Optical servo condition (focus) input
32	P43	SENSE	I	Optical servo condition (track cross) input
33	PE0	CLOSE	O	Loading motor close signal
34	PE1	OPEN	O	Loading motor open signal
35	P60	PAUSE	O	Pause LED drive
36	P61	PLAY	O	Play LED drive
37	DAC	DAC	O	(Not used, open)
38	VPP	—	I	FL drive power supply (connected to -32V)
39 52	D0 DD	—	O	FL grid signal and key scan signal
53 61	S8 S0	—	O	FL anode signal
62	OSC2	—	I	Clock terminal
63	OSC1	—	I	Clock input
64	VDD	—	I	Power supply (connected to +5V)

Pin No.	Mark	Signal	I/O	Function
9	P31	—	O	Remote control LED drive
10 13	P13 P0	Data	I	Key strobe
14 17	P03 P00	Data		
18	VSS	GND	I	GND terminal

■ RESISTORS & CAPACITORS

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.
* Bracketed indications in Ref. No. columns specify the area.
Parts without these indications can be used for all areas.

Numbering System of Resistor

ERD	25	F	J	102
Type	Wattage	Shape	Tolerance	Value
ERX	2	AN	J	471
Type	Wattage	Shape	Tolerance	Value
				47x10 ¹ (ohm)

Numbering System of Capacitor

ECKD	1H	102	Z	F
Type	Voltage	Value	Tolerance	Peculiarity
ECEA	50	M	330	
Type	Voltage	Peculiarity	Value	
			(33x10 ⁰ microfarad)	

Resistor Type	Wattage	Tolerance
ERD : Carbon	10 : 1/8W	J : ±5%
ERG : Metal Oxide	12 : 1/2W	F : ±1%
ERX : Metal Film	25 : 1/4W	G : ±2%
ERQ : Fuse Type Metal	1A : 1W	K : ±10%
ERD $\square$ L : Carbon (chip)	18 : 1/8W	
ERD $\square$ K : Metal Film (chip)	S2 : 1/4W	
ERC : Solid	S1 : 1/2W	
	2F : 1/4W	
	50 : 1/2W	
	2A : 2W	

Capacitor Type	Voltage	Tolerance
ECE : Electrolytic	0J : 6.3V	C : ±0.25pF
ECCD : Ceramic	1A : 10V	J : ±5%
ECKD : Ceramic	1C : 16V	K : ±10%
ECQM : Polyester	1E : 25V	Z : ±80%
ECQP : Polypropylene	1H : 50V	P : ±100%
	1V : 35V	-0%
	50 : 50V	
ECG : Ceramic	05 : 50V	M : ±20%
ECEADDDN : Non Polar Electrolytic	2H : 500V	
QCU $\square$: Ceramic (Chip Type)	2A : 100V	D : ±0.5pF
ECUX : Ceramic (Chip Type)	1 : 100V	G : ±2%
ECF : Semiconductor	KC : 400V AC	
	KC : 125VAC (UL)	
EECW : Liquid electrolyte double layer capcitor	1J : 63V	

Ref. No.	Part No.	Part Code	Ref. No.	Part No.	Part Code	Ref. No.	Part No.	Part Code
RESISTORS			R164	ERDS2TJ153	001 152 2361 7	R427, R428	ERDS2TJ103	001 152 2347 3
R11, R12	ERDS2TJ682	001 152 2365 1	R165	ERDS2TJ122	001 152 2423 8	R429, R430	ERDS2TJ222	001 152 2353 5
R13	ERDS2TJ101	001 152 2421 0	R166	ERDS2TJ102	001 152 2346 4	R431, R432	ERDS2TJ222	001 152 2353 5
R14	ERDS2TJ471	001 152 2361 5	R167	ERDS2TJ681	001 152 2449 8	R434	ERDS2TJ472	001 152 2362 4
R15, R16	ERDS2TJ561	001 152 2364 2	R168	ERDS2TJ272	001 152 2354 4	R451	ERDS2TJ181	001 152 2428 3
R17, R18	ERDS2TJ471	001 152 2361 5	R169	ERDS2TJ392	001 152 2439 0	R452	ERDS2TJ271	001 152 2435 4
R19, R20	ERDS2TJ471	001 152 2361 5	R170	ERDS2TJ101	001 152 2421 0	R501	ERDS2TJ224	001 152 2433 6
R21	ERDS2TJ222	001 152 2353 5	R171	ERDS2TJ270	001 152 2434 5	R502	ERDS2TJ562	001 152 2445 2
R22, R23	ERDS2TJ331	001 152 2356 2	R172	ERDS2TJ3R3	001 152 3152 8	R503	ERDS2TJ474	001 152 2443 4
R101	ERDS2TJ154	001 152 2427 4	R180	ERDS2TJ474	001 152 2443 4	R504	ERDS2TJ221	001 152 2431 8
R102, R103	ERDS2TJ472	001 152 2362 4	R181	ERDS2TJ471	001 152 2361 5	R505	ERDS2TJ104	001 152 2348 2
R104	ERDS2TJ223	001 152 2432 7	R182, R183	ERDS2TJ564	001 152 2447 0	R506	ERDS2TJ333	001 152 2358 0
R105	ERDS2TJ334	001 152 2438 1	R184	ERDS2TJ223	001 152 2432 7	R507	ERDS2TJ102	001 152 2346 4
R107	ERDS2TJ683	001 152 2450 5	R185, R186	ERDS2TJ473	001 152 2363 3	R601, R602	ERJ8GEYK1R5	001 151 6260 8
R108	ERDS2TJ332	001 152 2357 1	R187, R188	ERDS2TJ473	001 152 2363 3	R603	ERJ8GEYJ223	001 151 5630 6
R109	ERDS2TJ822	001 152 2455 0	R189, R190	ERDS2TJ123	001 152 2424 7	R801, R802	ERDS2TJ222	001 152 2353 5
R110, R111	ERDS2TJ682	001 152 2365 1	R191	ERDS2TJ154	001 152 2427 4	R803, R804	ERDS2TJ272	001 152 2354 4
R112	ERDS2TJ822	001 152 2455 0	R192	ERDS2TJ824	001 152 2457 8	R805, R806	ERDS2TJ473	001 152 2363 3
R113, R114	ERDS2TJ152	001 152 2350 8	R193	ERDS2TJ101	001 152 2421 0	R807, R808	ERDS2TJ561	001 152 2364 2
R115	ERDS2TJ102	001 152 2346 4	R194	ERDS2TJ683	001 152 2450 5	R809, R810	ERDS2TJ121	001 152 2349 1
R116, R117	ERDS2TJ182	001 152 2352 6	R195, R196	ERDS2TJ103	001 152 2347 3	R811, R812	ERDS2TJ473	001 152 2363 3
R118	ERDS2TJ102	001 152 2346 4	R197	ERDS2TJ473	001 152 2363 3	R813, R814	ERDS2TJ104	001 152 2348 2
R119	ERDS2TJ471	001 152 2361 5	R198	ERDS2TJ393	001 152 2440 7	R851	ERDS2TJ102	001 152 2346 4
R120	ERDS2TJ120	001 152 3146 6	R302	ERDS2TJ472	001 152 2362 4	R852	ERDS2TJ471	001 152 2361 5
R122	ERDS2TJ471	001 152 2361 5	R303, R304	ERDS2TJ102	001 152 2346 4	R853, R854	ERDS2TJ102	001 152 2346 4
R141	ERDS2TJ102	001 152 2346 4	R307	ERDS2TJ471	001 152 2361 5	R855, R856	ERDS2TJ472	001 152 2362 4
R142	ERDS2TJ333	001 152 2358 0	R309	ERDS2TJ472	001 152 2362 4	R857	ERDS2TJ104	001 152 2348 2
R143	ERDS2TJ224	001 152 2433 6	R401, R402	ERDS2TJ223	001 152 2432 7	R861, R862	ERDS2TJ102	001 152 2346 4
R144	ERDS2TJ333	001 152 2358 0	R403	ERDS2TJ472	001 152 2362 4	R871, R872	ERDS2TJ103	001 152 2347 3
R145	ERDS2TJ153	001 152 2351 7	R404, R406	ERDS2TJ394	001 152 2441 6	R873, R874	ERDS2TJ473	001 152 2363 3
R146	ERDS2TJ122	001 152 2423 8	R407	ERDS2TJ152	001 152 2350 8	R875, R876	ERDS2TJ121	001 152 2349 1
R147	ERDS2TJ682	001 152 2365 1	R409, R410	ERDS2TJ472	001 152 2362 4	R877, R878	ERDS2TJ103	001 152 2347 3
R148	ERDS2TJ104	001 152 2348 2	R411, R412	ERDS2TJ472	001 152 2362 4	R879, R880	ERDS2TJ222	001 152 2353 5
R149	ERDS2TJ152	001 152 2350 8	R413, R414	ERDS2TJ472	001 152 2362 4	CAPACITORS		
R150	ERDS2TJ103	001 152 2347 3	R415	ERDS2TJ472	001 152 2362 4	C1 Δ	ECKDKC103PF2	001 103 3734 7
R151	ERDS2TJ101	001 152 2421 0	R416	ERDS2TJ913	001 152 3708 4	C2, C3 Δ	ECKDIH103PF	001 103 1449 7
R152	ERDS2TJ153	001 152 2351 7	R417	ERDS2TJ124	001 152 2425 6	C11, C12	ECEA1CU222	001 120 3074 3
R153	ERDS2TJ270	001 152 2434 5	R418	ERDS2TJ913	001 152 3708 4	C13, C14	ECEA1CU331	001 120 3200 5
R154	ERDS2TJ3R3	001 152 3152 8	R419	ERDS2TJ124	001 152 2425 6	C15, C16	ECEA1VU101	001 120 2929 5
R161	ERDS2TJ333	001 152 2358 0	R420	ERDS2TJ101	001 152 2421 0	C17, C18	ECFF1E104ZF	001 103 4992 7
R162	ERDS2TJ222	001 152 2353 5	R423	ERDS2TJ103	001 152 2347 3	C19	ECEA1AFS101	001 120 5163 5
R163	ERDS2TJ333	001 152 2358 0	R424	ERDS2TJ473	001 152 2363 3	C20, C21	ECEA0JK101	001 120 0136 8
			R425, R426	ERDS2TJ103	001 152 2347 3			

Ref. No.	Part No.	Part Code	Ref. No.	Part No.	Part Code	Ref. No.	Part No.	Part Code
C22	ECBT1E103ZF	001 103 9102 9	C129	ECKD1H681K	001 103 1580 5	C504, C505	ECFF1E104ZF	001 103 4992 7
C23	ECEA0JK221	001 120 3156 2	C141	ECQM1H153JZ	001 106 0704 0	C506	ECCD1H150JC	001 103 0402 6
C25	ECFF1E104ZF	001 103 4992 7	C142	ECQM1H122KF	001 106 5383 7	C507	ECKD1H102KB	001 103 1414 8
C27, C28	ECBT1E103ZF	001 103 9102 9	C143	ECQM1H473KF	001 106 5386 4	C508	ECEA1CKN100	001 120 3185 7
C29, C30	REC1A101M0T	001 120 5628 3	C144	ECEA1HKN2R2	001 120 3231 8	C509	ECCD1H100KC	001 103 0321 6
C31, C32	ECEA1CU221	001 120 2833 2	C145	ECEA1HKNR22	001 120 4888 9	C510	ECQM1H104KF	001 106 5382 8
C40	ECEA1AFS101	001 120 5163 5	C161	ECQM1H153JZ	001 106 0704 0	C511	ECEA1HKNR47	001 120 0338 0
C101	ECFF1E104ZF	001 103 4992 7	C162	ECKD1H681K	001 103 1580 5	C512, C513	ECKD1H681K	001 103 1580 5
C102, C103	ECKD1H102KB	001 103 1414 8	C163	ECQM1H103KF	001 106 5381 9	C514	ECQM1H154JZ	001 106 0712 0
C104	ECKD1H681K	001 103 1580 5	C164	ECEA1EKN3R3	001 120 4796 2	C515	ECQM1H153JZ	001 106 0704 0
C105, C106	ECKD1H471KB	001 103 1551 0	C165	ECEA1HKN0R1	001 120 5291 8	C516	ECEA1HKN2R2	001 120 3231 8
C107	ECCD1H220K	001 103 0493 7	C181	ECQM1H474JZ	001 106 2709 7	C517	ECKD1H471KB	001 103 1551 0
C108	ECEA1HK0R1	001 120 0340 6	C182	ECKD1H221KB	001 103 1487 1	C601	ECEV1EV330	001 120 5624 7
C109	ECEA1HK010	001 120 0341 5	C183	ECQM1H682KF	001 106 5387 3	C602	ECEV1HV010	001 120 5625 6
C110	ECFF1E104ZF	001 103 4992 7	C184	ECEA1HKN010	001 120 2558 2	C604	GR426B273K50	001 103 9113 6
C111, C112	ECEA1CKS100	001 120 2600 7	C186	ECQM1H224JZ	001 106 0746 0	C606	GR426B152K25	001 103 9112 7
C113	ECEA1HKNR33	001 120 3230 9	C187	ECEA1HKN2R2	001 120 3231 8	C607	GR426B104Z25	
C114	RCBS1C182MXY	001 103 8660 8	C201	ECFTD103KXL	001 108 0341 7	C611, C612	ECEA1EM470S	001 120 2394 4
C115	ECKD1H682KB	001 103 1592 1	C301	ECCD1H220K	001 103 0493 7	C613	ECEA1EM470S	001 120 2394 4
C116	ECQM1H333KF	001 106 5385 5	C302	ECCD1H070CC	001 103 0271 9	C801, C802	ECKD1H221KB	001 103 1487 1
C117	RCBS1H221KBY	001 103 5603 9	C308	ECFF1E104ZF	001 103 4992 7	C803, C804	RBP1CN220CT	001 120 5015 6
C118	ECEA1HK010	001 120 0341 5	C309	ECCD1H070CC	001 103 0271 9	C805, C806	ECKD1H102KB	001 103 1414 8
C119	ECEA0JK220	001 120 0139 5	C310, C401	ECFF1E104ZF	001 103 4992 7	C809, C810	ECEA0JU471	001 120 2924 0
C120	ECKD1H681K	001 103 1580 5	C402	ECEA0JK470	001 120 0143 9	C811, C812	RBP1CN220CT	001 120 5015 6
C121	ECFTD103KXL	001 108 0341 7	C403	ECFTD103KXL	001 108 0341 7	C851	ECEA0JU471	001 120 2924 0
C122	ECBT1H101KB5	001 103 8122 9	C404, C405	ECFF1E104ZF	001 103 4992 7	C852	ECEA1CKN100	001 120 3185 7
C123	ECKD1H101KB	001 103 1412 0	C406	ECCD1H220K	001 103 0493 7	C861, C862	ECEA1CU101	001 120 2926 8
C124	ECKD1H222KB	001 103 1494 2	C407	ECBT1H101KB5	001 103 8122 9	C871, C872	ECBT1E223ZF	001 103 7589 2
C125	ECEA0JK220	001 120 0139 5	C501	ECQM1H104KF	001 106 5382 8	C873, C874	ECBT1E103ZF	001 103 9102 9
C126	ECEA0JK470	001 120 0143 9	C502	ECFF1E104ZF	001 103 4992 7	C875	ECBT1E103ZF	001 103 9102 9
C127, C128	ECKD1H102KB	001 103 1414 8	C503	ECEA1CKS100	001 120 2600 7	C877, C878	ECEA1HKN010	001 120 2558 2

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.

* Bracketed indications in Ref. No. columns specify the area.

Parts without these indications can be used for all areas.

Ref. No.	Part No.	Part Code	Description	Ref. No.	Part No.	Part Code	Description
INTEGRATED CIRCUITS				TRANSISTORS			
IC11	SV1LM2931Z	001 061 4828 9	I.C., REGULATOR	Q12	2SB1240QR	001 030 7208 2	TRANSISTOR
IC101	AN8370S	001 060 8399 8	I.C., SERVO	Q13, Q14	2SD1862QR	001 030 7210 8	TRANSISTOR
IC102	MN6636S	001 061 3044 7	I.C., ANALOG SW.	Q15	2SD1862QR	001 030 7210 8	TRANSISTOR
IC103	AN6554NS	001 060 4860 4	I.C., OPERATION AMP.	Q16	2SB1240QR	001 030 7208 2	TRANSISTOR
IC104, IC105	AN6552S	001 060 7386 7	I.C., OPERATION AMP.	Q19	2SB1238QS	001 030 7251 9	TRANSISTOR
IC301	MN6617	001 060 8411 9	I.C., SIGNAL PROCESSING	Q101	2SC4010Q	001 030 7233 1	TRANSISTOR
IC302	MN6618A	001 061 3043 8	I.C., DIGITAL FILTER	Q141	2SD1862QR	001 030 7210 8	TRANSISTOR
IC303	SV1CXK5816M	001 061 3298 7	I.C., 16K RAM	Q142	2SB1240QR	001 030 7208 2	TRANSISTOR
IC401	MN15261PDV	001 061 4935 7	I.C., SYSTEM CONTROL	Q161	2SD1862QR	001 030 7210 8	TRANSISTOR
IC402	AN6552S	001 060 7386 7	I.C., OPERATION AMP.	Q162	2SB1240QR	001 030 7208 2	TRANSISTOR
IC403	MN1280-R	001 060 8669 5	I.C., RESET	Q181	2SD1862QR	001 030 7208 2	TRANSISTOR
IC404	MN1550PDT	001 061 3639 6	I.C., MICRO COMPUTER	Q182	2SB1240QR	001 030 7208 2	TRANSISTOR
IC501	AN8371S	001 060 8400 2	I.C., PLL	Q401	2SD1862QR	001 030 7210 8	TRANSISTOR
IC601	AN8290S	001 061 3034 9	I.C., SPINDLE DRIVE	Q402	2SB1240QR	001 030 7208 2	TRANSISTOR
IC602	SV1BX1438M	001 061 3235 2	I.C., REMOTE RECEIVER	Q403, Q404	UN4212	001 030 3019 1	TRANSISTOR
IC602 (M, MC)	SV1BX1439E	001 061 3671 6	I.C., REMOTE RECEIVER	Q405, Q406	UN4212	001 030 3019 1	TRANSISTOR
IC602 (E, EK, XL, EG)				Q407, Q408	UN4212	001 030 3019 1	TRANSISTOR
IC602 (EB, EH, EF)							
IC602 (E1, XA, XB)							
IC602 (PA, PE, PC)							
IC801	SV1PCM54JP	001 061 4861 8	I.C., D/A CONVERTER				

Ref. No.	Part No.	Part Code	Description	Ref. No.	Part No.	Part Code	Description
Q409, Q410	UN4212	001 030 3019 1	TRANSISTOR	VR101	EVND3AA00B53	001 180 2644 9	V.R., 5K Ω (B)
Q411, Q851	UN4212	001 030 3019 1	TRANSISTOR	VR102, VR103	EVND3AA00B14	001 180 2642 1	V.R., 10K Ω (B)
Q852	UN4111	001 030 2899 5	TRANSISTOR	VR104, VR105	EVND3AA00B14	001 180 2642 1	V.R., 10K Ω (B)
Q853, Q854	2SD1330R	001 030 2521 6	TRANSISTOR	VR106	EVND3AA00B53	001 180 2644 9	V.R., 5K Ω (B)
Q855	UN4212	001 030 3019 1	TRANSISTOR	VR501	EVND3CA00B13	001 180 0549 5	V.R., 1K Ω (B)
Q856	UN4112	001 030 3018 2	TRANSISTOR	VR871	EVUN1A019A15	001 174 9033 8	V.R., 100K Ω (A)
Q857, Q858	2SC3311-Q	001 030 2936 7	TRANSISTOR	COILS AND TRANSFORMERS			
Q859	UN4112	001 030 3018 2	TRANSISTOR	L601	NL4532T100K2	001 211 3218 9	COIL
Q861	2SC3311-Q	001 030 2936 7	TRANSISTOR	T1 Δ	SLTD5K027SC	001 202 8858 4	POWER TRANSFORMER (M, MC)
Q862	2SA1309QRS	001 030 4058 0	TRANSISTOR	T1 Δ	SLTD5K028SE	001 202 8859 3	POWER TRANSFORMER (E, EG, EB, EH)
Q881, Q882	2SD1330R	001 030 2521 6	TRANSISTOR	T1 Δ	SLTD5K029SG	001 202 8860 0	POWER TRANSFORMER (EF, E1)
DIODES				T1 Δ	SLTD5K030SX	001 202 8861 9	POWER TRANSFORMER (EK, XL)
D11, D12 Δ	SVD1SR35200A	001 032 3951 4	RECTIFIER	T1 Δ			
D13, D14 Δ	SVD1SR35200A	001 032 3951 4	RECTIFIER				
D15, D16	SVD1SR35200A	001 032 3951 4	RECTIFIER				
D17, D18	SVD1SR35200A	001 032 3951 4	RECTIFIER				
D21	MA4056-M	001 032 7209 1	DIODE				
D22	MA4200M	001 032 7554 7	DIODE				
D23, D24	MA4058H	001 032 4952 9	DIODE				
D25	MA4330M	001 032 4967 2	DIODE				
D26	MA4068M	001 032 4954 7	DIODE				
D181, D182	MA165	001 032 0494 0	DIODE				
D401- D413	MA165	001 032 0494 0	DIODE				
D415, D416	MA165	001 032 0494 0	DIODE				
D417, D418	MA165	001 032 0494 0	DIODE				
D420, D421	LN021404P	001 033 0044 7	LED ASS'Y				
D601	MA153	001 032 0489 7	DIODE				
D851, D852	MA165	001 032 0494 0	DIODE				
D853, D856	MA165	001 032 0494 0	DIODE				
D857	MA165	001 032 0494 0	DIODE				
I.C. PROTECTORS							
ICP1, ICP2 Δ	SRUF38	001 061 2824 1	I.C. PROTECTOR				
(EK, XB, XA)							
(PA, PE, PC)							
SJ11, SJ12	SRUF15		I.C. PROTECTOR				
(EK)							
HALL ELEMENTS							
H601, H602	OH-001	001 036 0010 2	HALL ELEMENT				
VARIABLE RESISTORS							

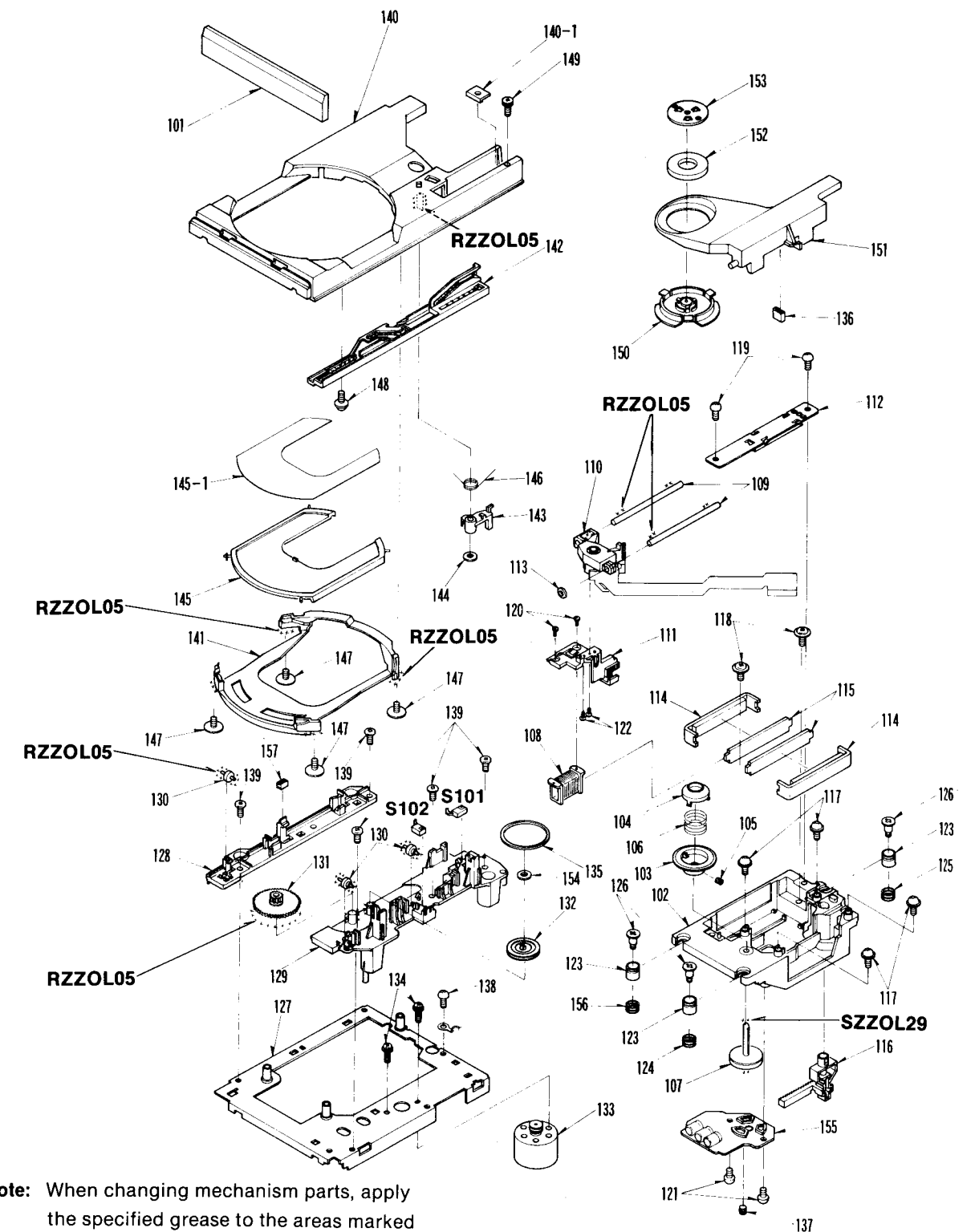
Ref. No.	Part No.	Part Code	Description	Ref. No.	Part No.	Part Code	Description
CABINET AND CHASSIS				11	SBCD4590ZK0B	016 702 6983 4	BUTTON, OPEN
1	SKLD7	016 828 0328 4	INSULATOR	12	SBCD4600ZK0B	016 702 6985 2	BUTTON, STOP
2	SBC666-5	016 702 6679 9	BUTTON, POWER	13	SBCD4590ZK0B	016 702 6981 6	BUTTON, PLAY
3	SUBD8-1	016 712 0360 7	ROD	14	SBCD4620ZK0B	016 702 6991 4	BUTTON, MEMORY
4	SKCD40KZ	016 800 2876 5	TOP COVER	15	SBCD4610ZK0C	016 702 6988 9	BUTTON, NUMER (UPPER)
5	XTV3+8G	005 501 0913 8	SCREW	16	SBCD4610ZK0D	016 702 6989 8	BUTTON, NUMER (LOWER)
6	XTV3+8J	005 501 0901 2	SCREW	17	SBN1161-2	016 700 1849 9	KNOB, HEADPHONES
7	XTV3+8JFZ	005 501 0919 2	SCREW	18	XTV3+8G	005 501 0913 8	SCREW
8	SNE2129-1	005 500 7938 6	SCREW	19	SJFD4	003 410 7707 6	OUTPUT TERMINAL
9	SGPLP320-KE		CHASSIS	20	SMND12	016 632 1878 3	HOLDER
(E)				21	SJSD16	003 400 7436 6	AC SOCKET
9	SGPLP320-KEB		CHASSIS	21 Δ			
(EB, EH, EF)				(XL)			
(E1)				21 Δ	SJS9236	003 403 4660 7	AC SOCKET
(EG)				(M, MC, E, EG)			
9	SGPLP320-KEG		CHASSIS	(EB, EH, EF)			
(EK)				(E1, EK, XB)			
9	SGPLP320-KEK		CHASSIS	(XA, PA, PE)			
(E1)				(PC)			
9	SGPLP320-KM		CHASSIS				
(M)				22	SRDJHLJ15401	003 400 6583 0	HEADPHONES JACK
9	SGPLP320-KMC		CHASSIS	23	SMND13-1	016 632 1881 8	BRACKET
(MC)				24	XNS7	005 507 1202 8	NUT
(PA, PE, PC)				25	SUSD62-1	016 726 0950 5	SPRING
9	SGPLP320-KPA		CHASSIS	26	LN021404P	001 033 0044 7	LED ASS'Y
(XA)				27	EMCS0350Z	003 402 1227 7	CONNECTOR (CN13)
9	SGPLP320-KXA		CHASSIS	28	EMCS0550Z	003 402 1233 9	CONNECTOR (CN40)
(XB)				29	EMCS0650Z	003 402 1235 7	CONNECTOR (CN113)
9	SGPLP320-KXB		CHASSIS	30	EMCS0750Z	003 402 1238 4	CONNECTOR (CN41)
(XL)				31	EMCS0552M	003 402 0112 1	CONNECTOR (CN40)
9	SGPLP320-KXL		CHASSIS	32	SRDJ001N14E	003 410 6157 8	SHORTING PIN (C12)
10	SGYLP320-KM	016 840 7578 8	FRONT PANEL	33	SJSD1709	003 403 6503 1	CONNECTOR (CN11)

Ref. No.	Part No.	Part Code	Description	Ref. No.	Part No.	Part Code	Description
35	SJSD0805	003 403 7205 4	CONNECTOR (CN407)	127	SIWLP320-KM	016 630 1813 0	LOADING BASE
36	EMCS0650ZL	003 400 4108 1	CONNECTOR (CN871)	128	SIRD43-1	016 652 0795 7	BRACKET, LOADING
37	SHGD123	016 653 1181 2	CUSHION RUBBER	129	SIRLP320KM3	016 652 0791 1	BRACKET, LOADING
38	SHGD122	016 653 1185 8	CUSHION RUBBER	130	SDRD2	016 740 0117 8	ROLLER
39	SHDD4	005 500 8051 2	SCREW	131	SDGD38	016 745 0231 2	MAIN GEAR
40	SUWD69	016 650 5365 5	BRACKET	132	SDGD39-2	016 745 0234 9	PULLEY GEAR
LOADING MECHANICAL				133	SMNLP320-KM	002 310 2510 2	LOADING MOTOR
101	SGXD3060ZK0B	016 846 3767 1	ORNAMENT PLATE	134	XYN26+T4	005 503 1310 5	SCREW
102	SISLP320-KM	016 630 1812 1	TRAVERSE BASE	135	SMBD3	016 754 0063 9	DRIVE BELT
103	SDOD7-1	016 766 0190 7	TURNTABLE ASS'Y	136	SHGD119	016 653 1175 0	CUSHION RUBBER
104	SDOD8	005 512 0399 3	RING	137	SNSD9	016 726 0765 4	SCREW
105	XXE26D5	005 500 5095 2	SCREW	138	XTV3+6BFN	005 501 0888 2	SCREW
106	SRQA010ND4	017 726 0412 8	SPRING	139	XTV3+8JFZ	005 501 0919 2	SCREW
107	SOMD9A	016 743 0060 3	ROTOR	140	SIRLP320KM2	016 652 0790 2	DISC TRAY
108	SORD21E	001 211 3925 9	COIL	140-1	SHGD118	016 653 1179 6	CUSHION RUBBER
109	SUXD78	016 634 0156 4	SHAFT	141	SIRD39	016 630 1809 6	BASE
110	SOAD32A	001 271 0705 5	OPTICAL PICKUP	142	SIRD40	016 630 1810 3	RACK GEAR
111	EWSL09A00000	016 652 0786 8	HOLDER	143	SIRD41	016 718 3379 4	LEVER
112	EWS7G0A00Q53	001 230 2843 7	RESISTANCE UNIT	144	SFUMZ15R61	017 643 0111 8	WASHER
113	SHGD47	016 653 1070 8	SPACER	145	SIRLP320KM1	016 652 0792 0	DISC HOLDER
114	SOYD8E-1	016 713 0380 8	YOKE	145-1	SHSD25	016 655 0657 1	SHEET
115	SOYD9	016 634 0125 1	YOKE	146	SUSD83	016 726 0943 4	SPRING
116	SHRD23	016 652 0633 4	LOCK SHAFT	147	SFXGQ06N01	005 500 4983 3	SCREW
117	SNSD10	005 500 5675 8	SCREW	148	SFPEV17202	005 500 0589 5	SCREW
118	SNSD27	005 500 7981 3	SCREW	149	SNSD24	005 500 7962 2	SCREW
119	XTV3+8G	005 501 0913 8	SCREW	150	SIRD28	016 631 0053 5	HOLDER
120	XTV2+4G	005 501 4806 4	SCREW	151	SIRLP320KM4	016 652 0802 5	CLAMPER
121	XTV3+12G	005 501 0844 4	SCREW	152	SOMD4	003 453 0241 8	MAGNET
122	XQN17+A6	005 500 4900 2	SCREW	153	SOYD2	016 634 0111 7	YOKE
123	SHGD110	016 653 1174 1	CUSHION RUBBER	154	SHWD20	016 643 1043 7	WASHER
124	SUSD84	016 726 0942 5	SPRING	155	SXPD1440	003 483 3040 5	SPINDLE P.C.B.
125	SUSD85	016 726 0941 6	SPRING	156	SUSD90	016 726 0945 2	SPRING
126	SFXGB20-01	005 500 0624 9	SCREW	157	SFGZB63M51	017 653 0144 3	CUSHION RUBBER

Ref. No.	Part No.	Part Code	Description	Ref. No.	Part No.	Part Code	Description
I.C. (REMOTE CONTROL)				(E, EK, XL, EG)			
IC1001	MN6030B	001 060 6133 0	I.C., TRANSMITTER	(EB, EH, EF)			
(E, EK, XL, EG)				(E1, XA, XB)			
(EB, EH, EF)				(PA, PE, PC)			
(E1, XA, XB)				C1002	ECKD1H101KB	001 103 1412 0	CERAMIC, 50V, 100PF
(PA, PE, PC)				(M, MC)			
IC1001	MN6030CA	001 060 8758 5	I.C., TRANSMITTER	C1002	ECKD1H121KB	001 103 1455 9	CERAMIC, 50V, 120PF
(M, MC)				(E, EK, XL, EG)			
TRANSISTORS (REMOTE CONTROL)				(EB, EH, EF)			
Q1001	UN1231	001 030 5092 4	TRANSISTOR	(E1, XA, XB)			
DIODES (REMOTE CONTROL)				(PA, PE, PC)			
D1001	LN66-S	001 032 3730 5	LED	C1003	ECEA0JK101	001 120 0136 8	ELECTROLYTIC, 6.3V, 100µF
D1002, D1003	MA154WA	001 032 3490 2	DIODE	REMOTE CONTROL TRANSMITTER			
D1004, D1005	MA154WA	001 032 3490 2	DIODE	201	UR64CS119	016 640 0420 1	TOP COVER
D1006, D1007	MA154WA	001 032 3490 2	DIODE	202	UR64CS120	016 640 0419 4	BOTTOM COVER
OSCILLATOR (REMOTE CONTROL)				203	UR64EC121	016 802 1716 4	COVER, BATTERY
X1001	CSB420PB1	001 030 0013 9	420 KHZ	204	UR64CT122	016 653 1011 9	RUBBER, SWITCH
(E, EK, XL, EG)				205	UR64BT123A	016 702 6323 4	BUTTON
(EB, EH, EF)				206	UR64PP398	016 840 7589 5	PANEL
(E1, XA, XB)				207	UR64LB406		LABEL
(PA, PE, PC)				(M, MC)			
X1001	CSB455EB1	001 241 0002 7	455KHZ	207	UR64LB407		LABEL
(M, MC)				(E, EK, XL, EG)			
RESISTORS (REMOTE CONTROL)				(EB, EH, EF)			
R1001	ERDS2TJ1R0	001 152 2419 4	CARBON, 1/4W, 1Ω	(E1, XA, XB)			
CAPACITORS (REMOTE CONTROL)				(PA, PE, PC)			
C1001	ECKD1H101KB	001 103 1412 0	CERAMIC, 50V, 100PF	208	UR64SB125	016 861 2468 6	PLATE
(M, MC)				209	UR52TD101	003 413 1406 5	TERMINAL
C1001	ECKD1H471KB	001 103 1551 0	CERAMIC, 50V, 470PF	210	UR64TD127	003 413 1407 4	TERMINAL (+)
				211	UR64TD128	003 413 1408 3	TERMINAL (-)
				212	XTS26+12GFZ	005 501 3122 9	SCREW

■ EXPLODED VIEWS

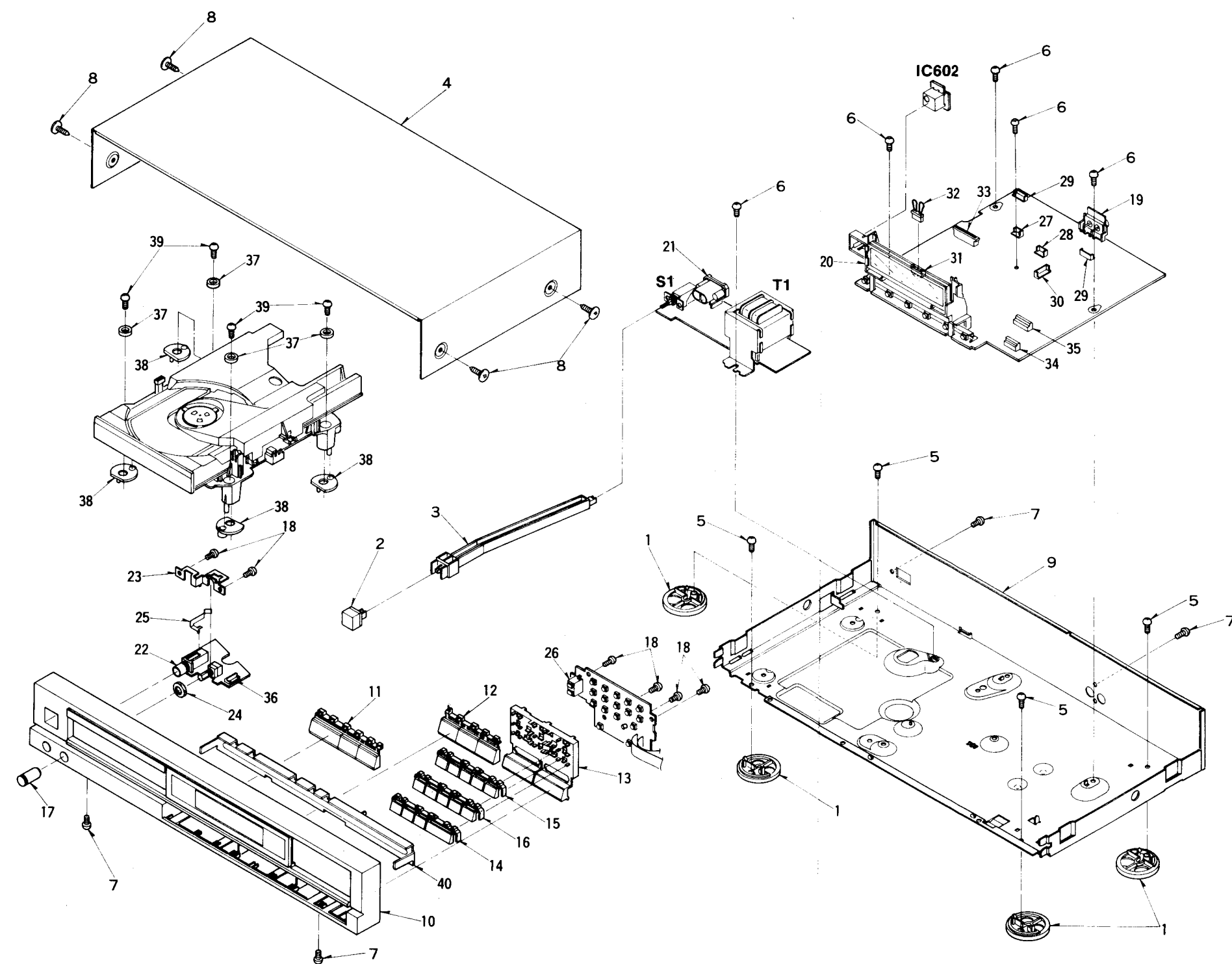
• Loading mechanical parts



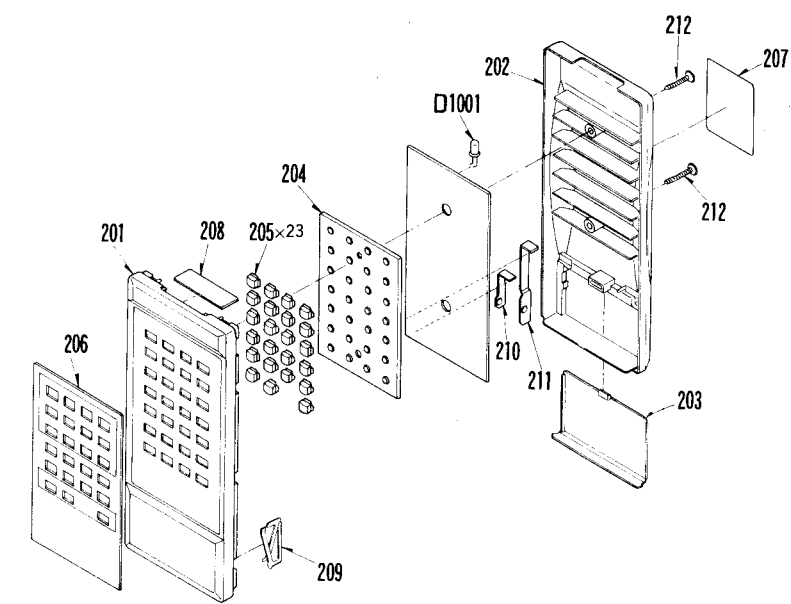
Note: When changing mechanism parts, apply the specified grease to the areas marked "xx" shown in the drawing.

101~120	101							113 120	108	110	104	103	114 111	107	118 119	109	107	114
													106	102	105		115	112 117
121~140	130	139	129	131	139	140	134	139	138	140-1	133	123	132	135	122	124	121	137
	128		127			130				123	126							126
141~157	147	145-1		157	147	148	144	147	145	142	149	150	153		152	155	151	15
	145	141			147				143	143	156							

● Cabinet and chassis parts



● Remote control unit parts

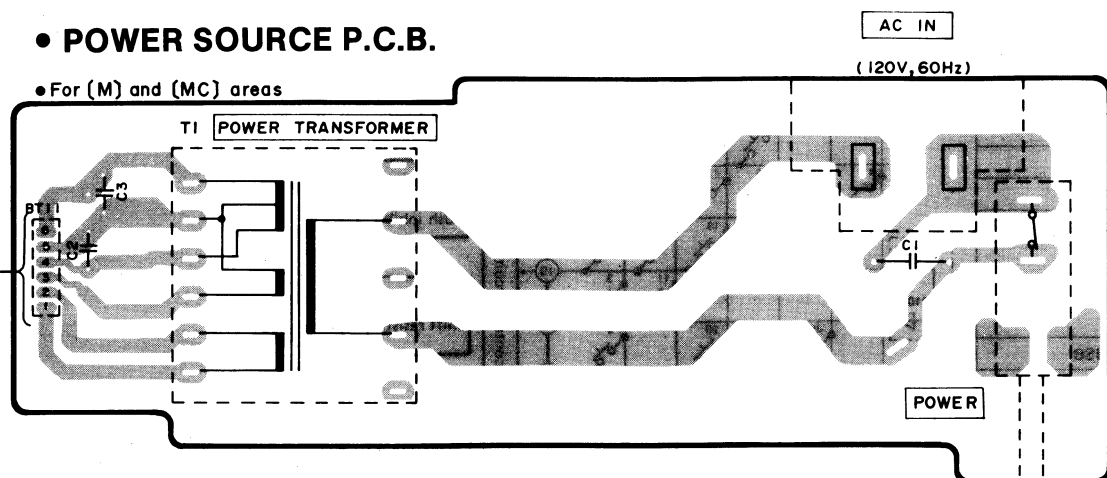


1~20	17	8	7	8	18	2 11 7	3 10	4	12 14	16	15	8	13	1	18	5	6	20 1	6	5	7	6 9 5	6 19	1	5	7
21~40	38	38	39 23 25 22	37	24	37 36	38	40	26	21	32 31	33	27 28 29 34 35 30													

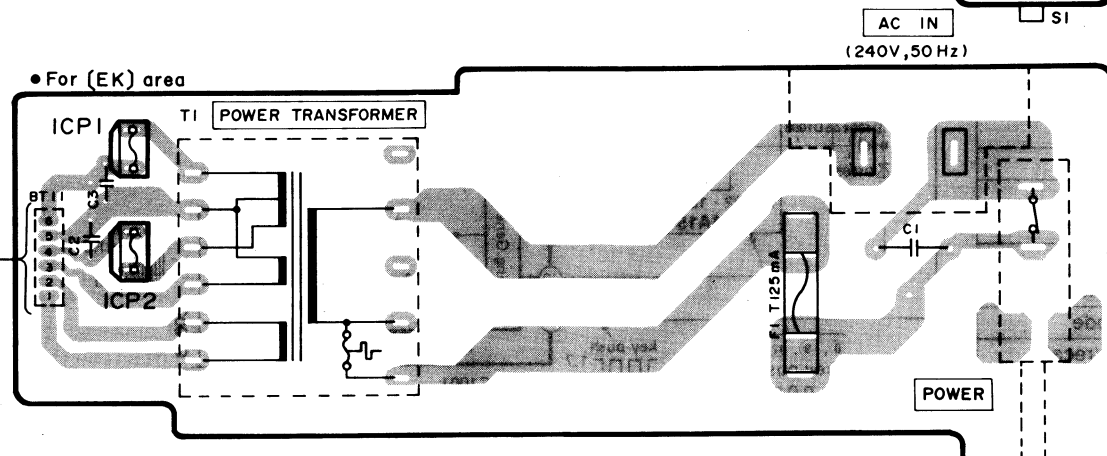
■ CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

• **POWER SOURCE P.C.B.**

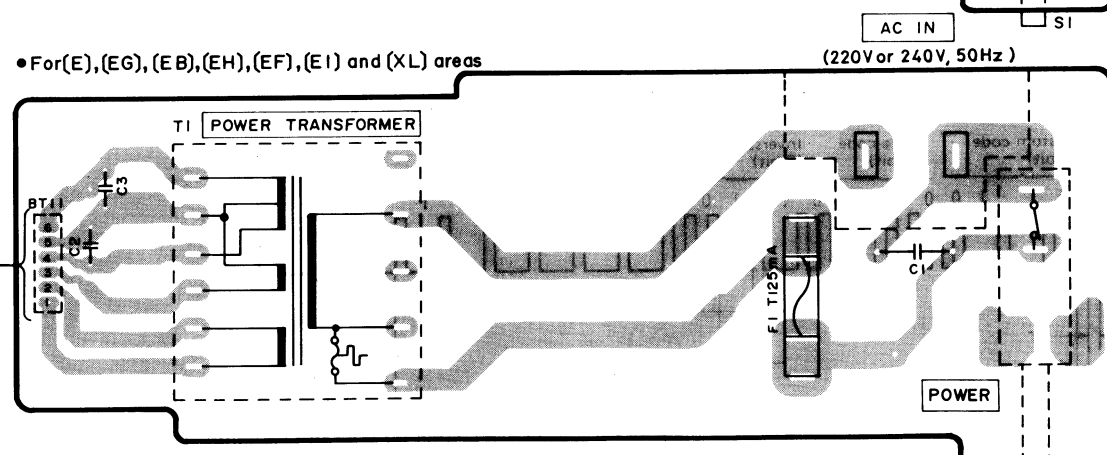
- For (M) and (MC) areas



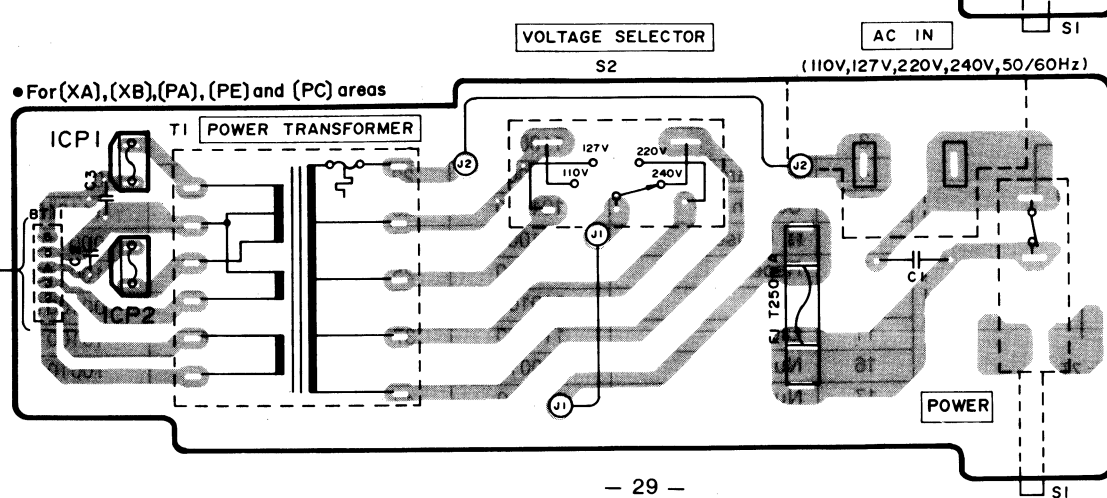
- For (EK) area



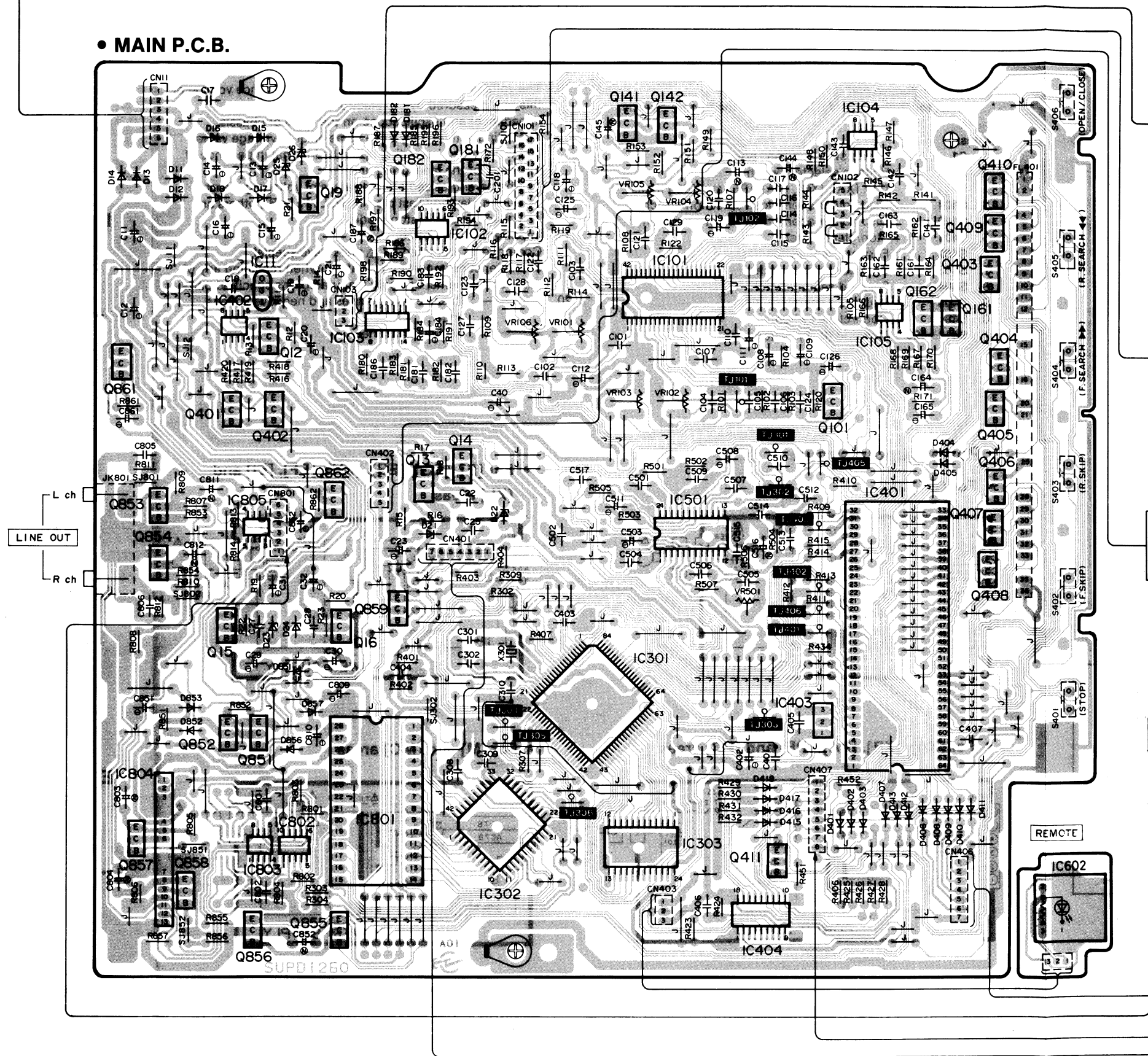
• For (E), (EG), (EB), (EH), (EF), (EI) and (XL) areas



●For (XA), (XB), (PA), (PE) and (PC) areas

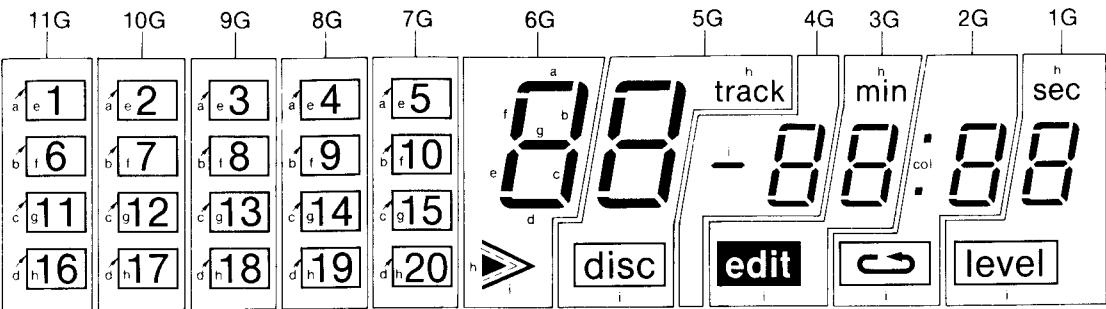


- **MAIN P.C.B.**



Internal connection of FL401

Grid connection diagram



Anode connection table

	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
a	1	2	3	4	5	a	a	a	a	a	a
b	6	7	8	9	10	b	b	b	b	b	b
c	11	12	13	14	15	c	c	c	c	c	c
d	16	17	18	19	20	d	d	d	d	d	d
e	1	2	3	4	5	e	e	e	e	e	e
f	6	7	8	9	10	f	f	f	f	f	f
g	11	12	13	14	15	g	g	g	g	g	g
h	16	17	18	19	20	▶	track	-	min	col	sec
i	-	-	-	-	-	>	disc	-	edit	↺	level

Terminal guide of IC's, transistors and diodes

AN8370S 42 pin SVIL833M 8 pin SVINJM4560M 8 pin AN6552 8 pin MN6636S 10 pin AN6554NS 14 pin MN1550PDT 18 pin AN8371S 24 pin SVICXK5816M 24 pin	MN15261PDV 64 pin SVIPCM54HP-1 28 pin	MN6617S 84 pin MN6618A 42 pin	MN1280-R 1---OUT 2---Vss 3---VDD	2SA1309 2SC3311	UN4111 UN4212
No 1	No 1	Mark No 1	MA4068 MA4200 MA4056 MA4330 Cathode Anode	SVIHAF0238 12p	MA153
2SC4010 2SB1862 2SD1240 2SD1330	MA165 Cathode Anode	SVDMGP06G Cathode Anode	SVILM2931Z		

SCHEMATIC DIAGRAM

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

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 legs of IC or LSI with the fingers directly.

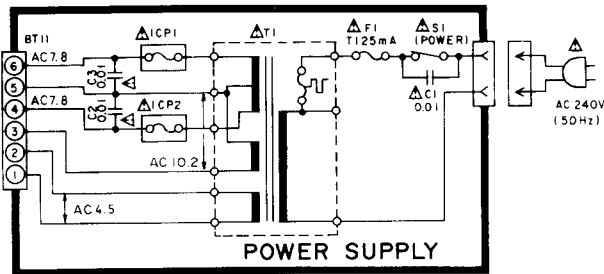
Notes:

- S1 : Power switch in "on" position.
- S2 : Voltage selector switch.
(For [XA], [XB], [PA], [PE] and [PC] areas)
- S101 : Disc holder open/close detection switch.
- S102 : Disc holder open/close detection switch.
- S401 : Stop/clear switch.
- S402 : Forward skip switch.
- S403 : Backward skip switch.
- S404 : Forward search switch.
- S405 : Backward search switch.
- S406 : Open/close switch.
- S411~420 : Numeric (0~9) switch.

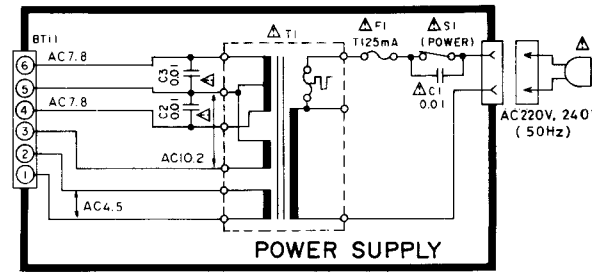
- S421 : Preset editing switch.
- S422 : Time mode select switch.
- S423 : Repeat switch.
- S424 : Memory/recall switch.
- S425 : Pause switch.
- S426 : Play switch.
- The voltage value and waveform are the reference voltage of this unit measured by DC electronic voltmeter (high impedance) and oscilloscope 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 1kHz, 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.

Power supply circuit

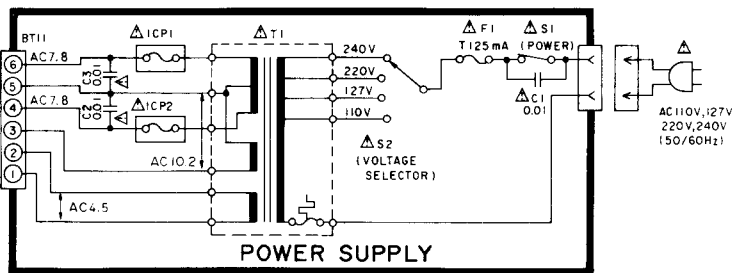
For [EK] area



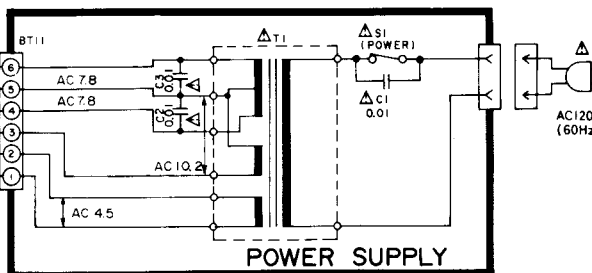
For [E], [EG], [EB], [EH], [EF], [Ei] and [XL] areas



For [XA], [XB], [PA], [PE] and [PC] areas



For [M] and [MC] areas



SCHEMATIC DIAGRAM

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

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 legs of IC or LSI with the fingers directly.

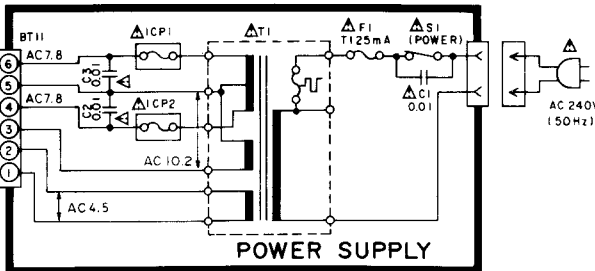
Notes:

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(For [XA], [XB], [PA], [PE] and [PC] areas)
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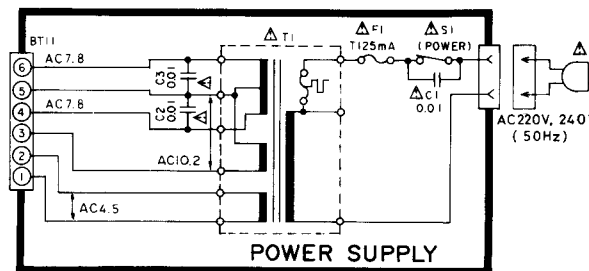
- S421** : Preset editing switch.
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- S423** : Repeat switch.
- S424** : Memory/recall switch.
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* The parenthesized are the values of voltage generated during playing (Test disc 1kHz, L+R, 0dB), others 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.

### Power supply circuit

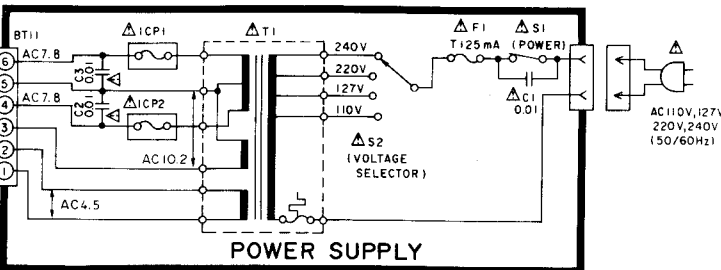
#### For [EK] area



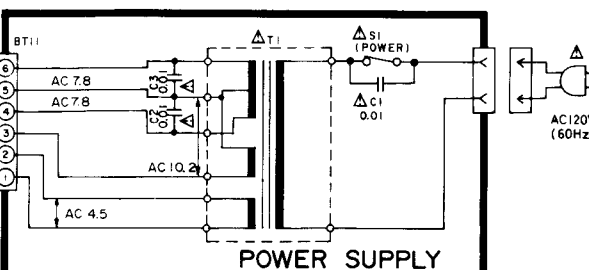
#### For [E], [EG], [EB], [EH], [EF], [Ei] and [XL] areas



#### For [XA], [XB], [PA], [PE] and [PC] areas

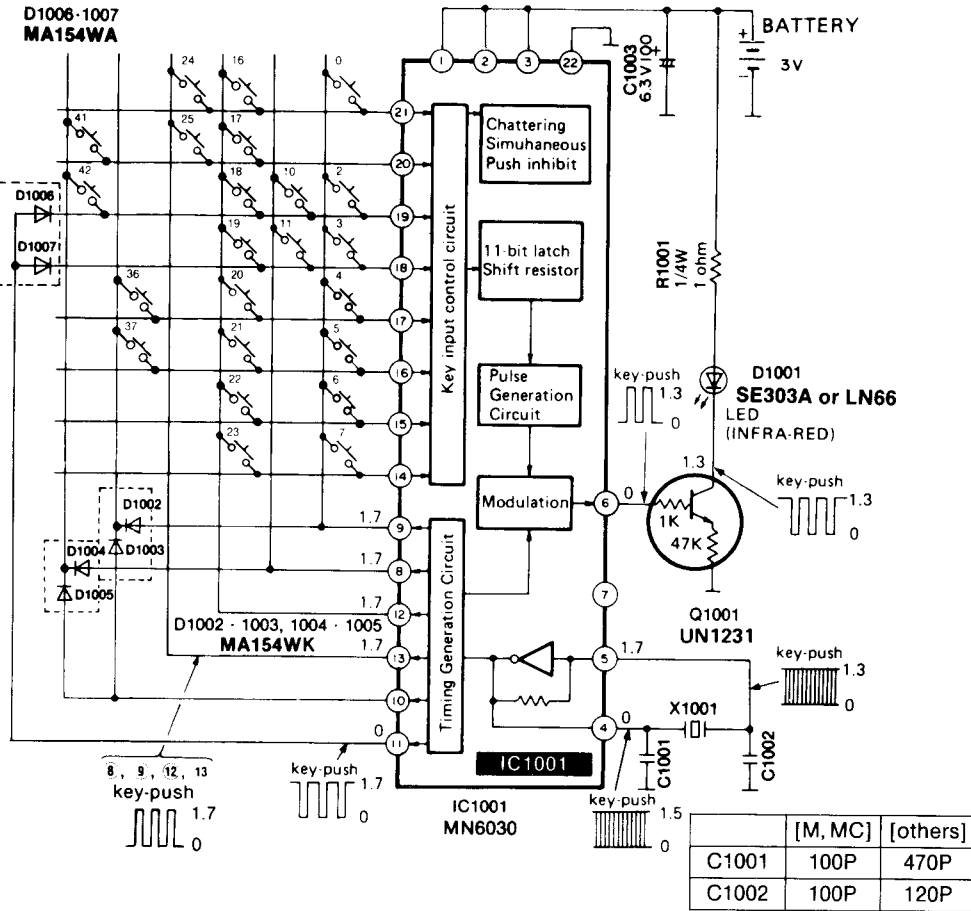


#### For [M] and [MC] areas

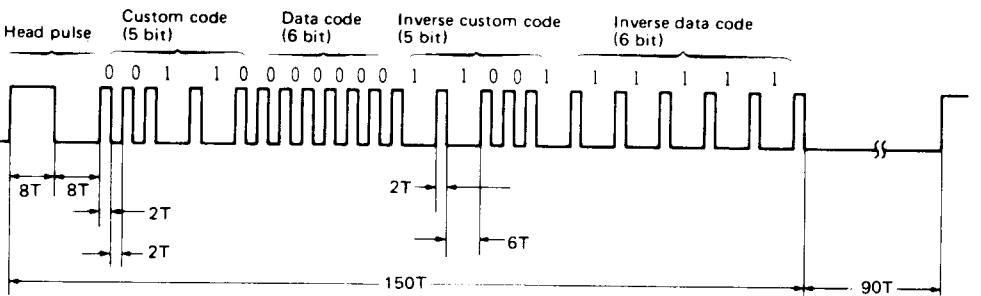


### Remote control unit

| Key No. | Function      |
|---------|---------------|
| 0       | Stop          |
| 2       | Skip ◀        |
| 3       | Skip ▶        |
| 4       | ◀◀ Search     |
| 5       | Search ▶▶     |
| 6       | ▮▮ Pause      |
| 7       | Repeat        |
| 10      | Play/pause    |
| 11      | Clear         |
| 16      | Numeric 1     |
| 17      | Numeric 2     |
| 18      | Numeric 3     |
| 19      | Numeric 4     |
| 20      | Numeric 5     |
| 21      | Numeric 6     |
| 22      | Numeric 7     |
| 23      | Numeric 8     |
| 24      | Numeric 9     |
| 25      | Numeric 0     |
| 36      | Level Up ▲    |
| 37      | Level Down ▼  |
| 41      | Time mode     |
| 42      | Memory/recall |

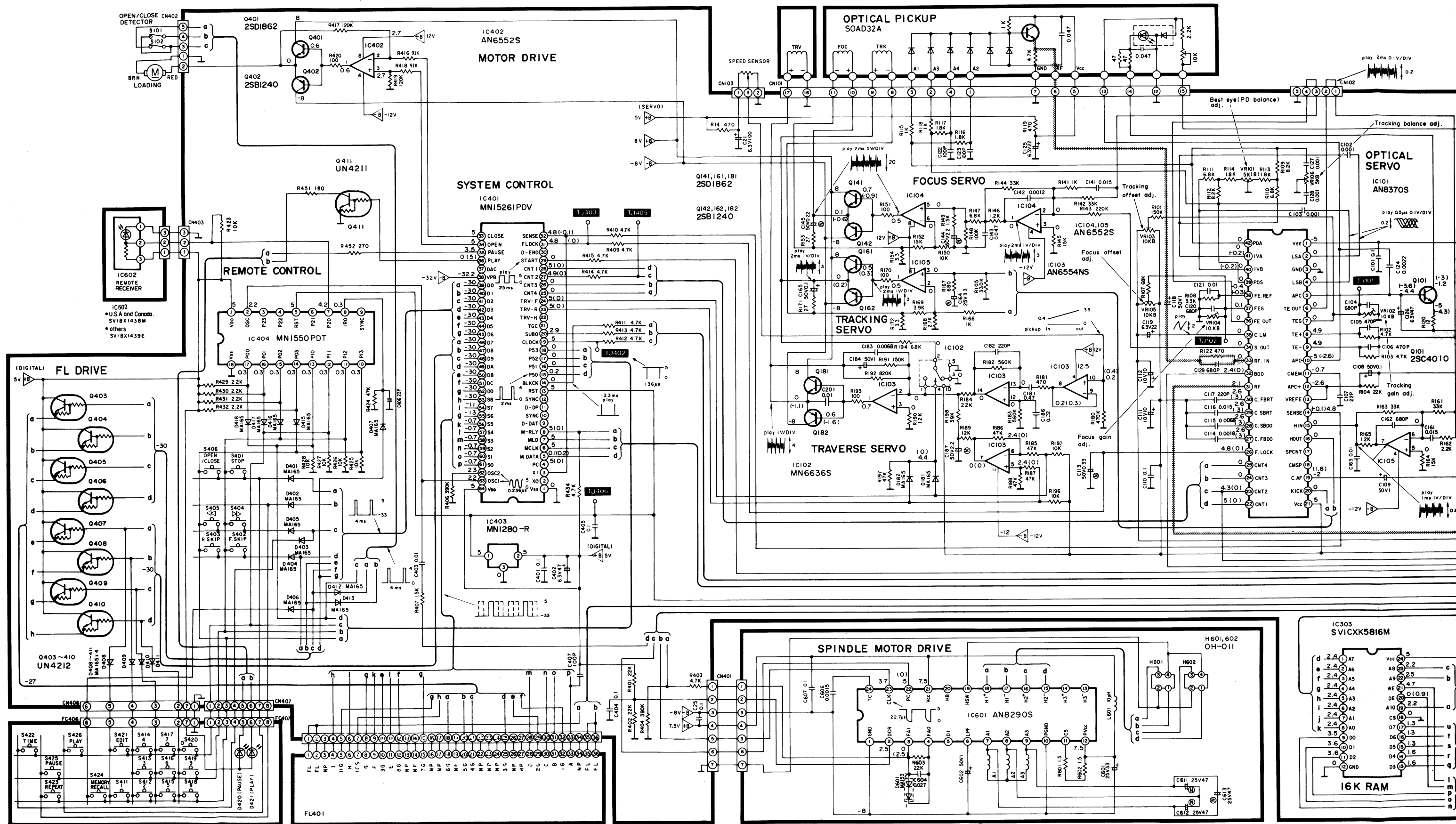


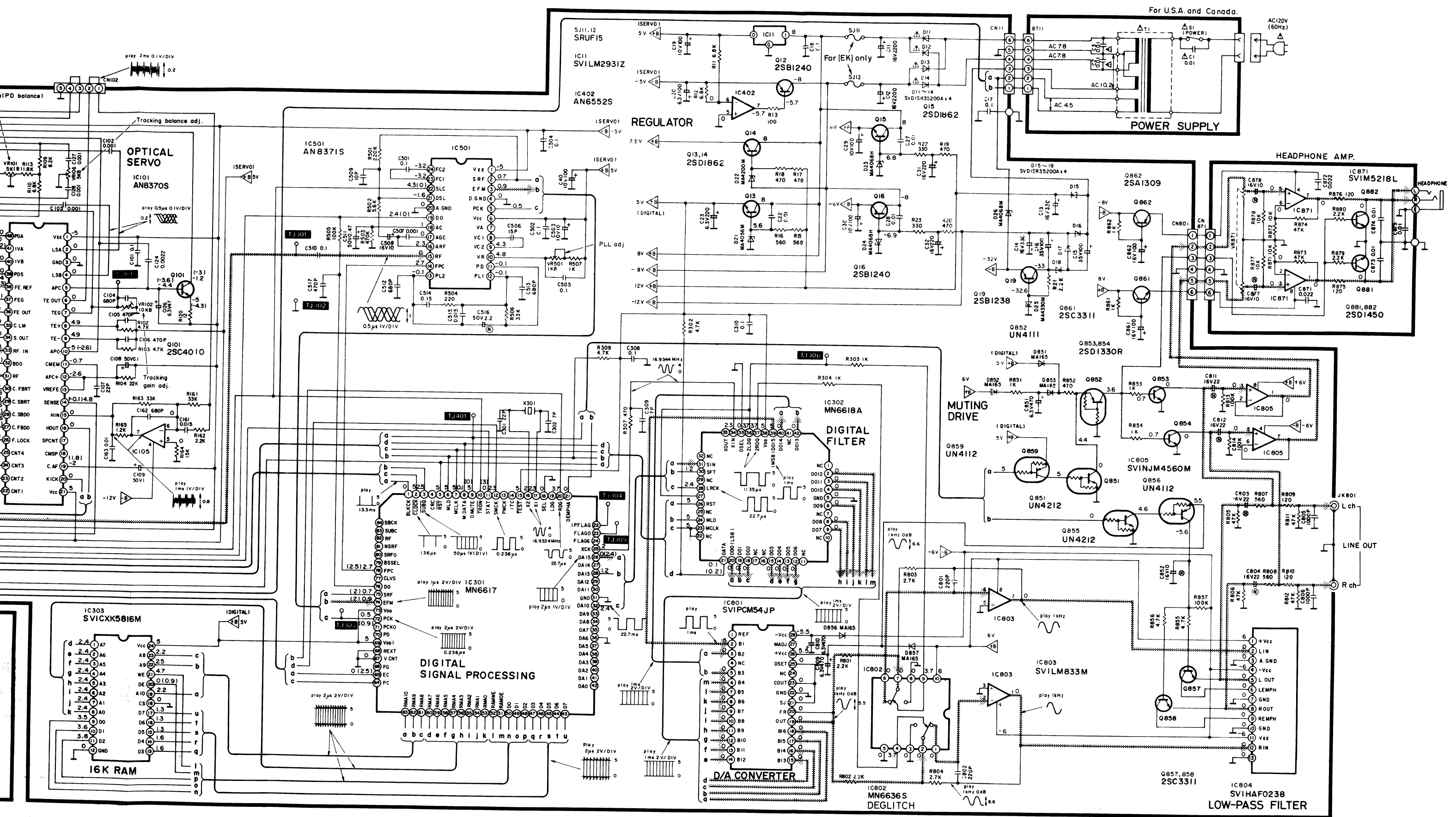
### Key number description and data code



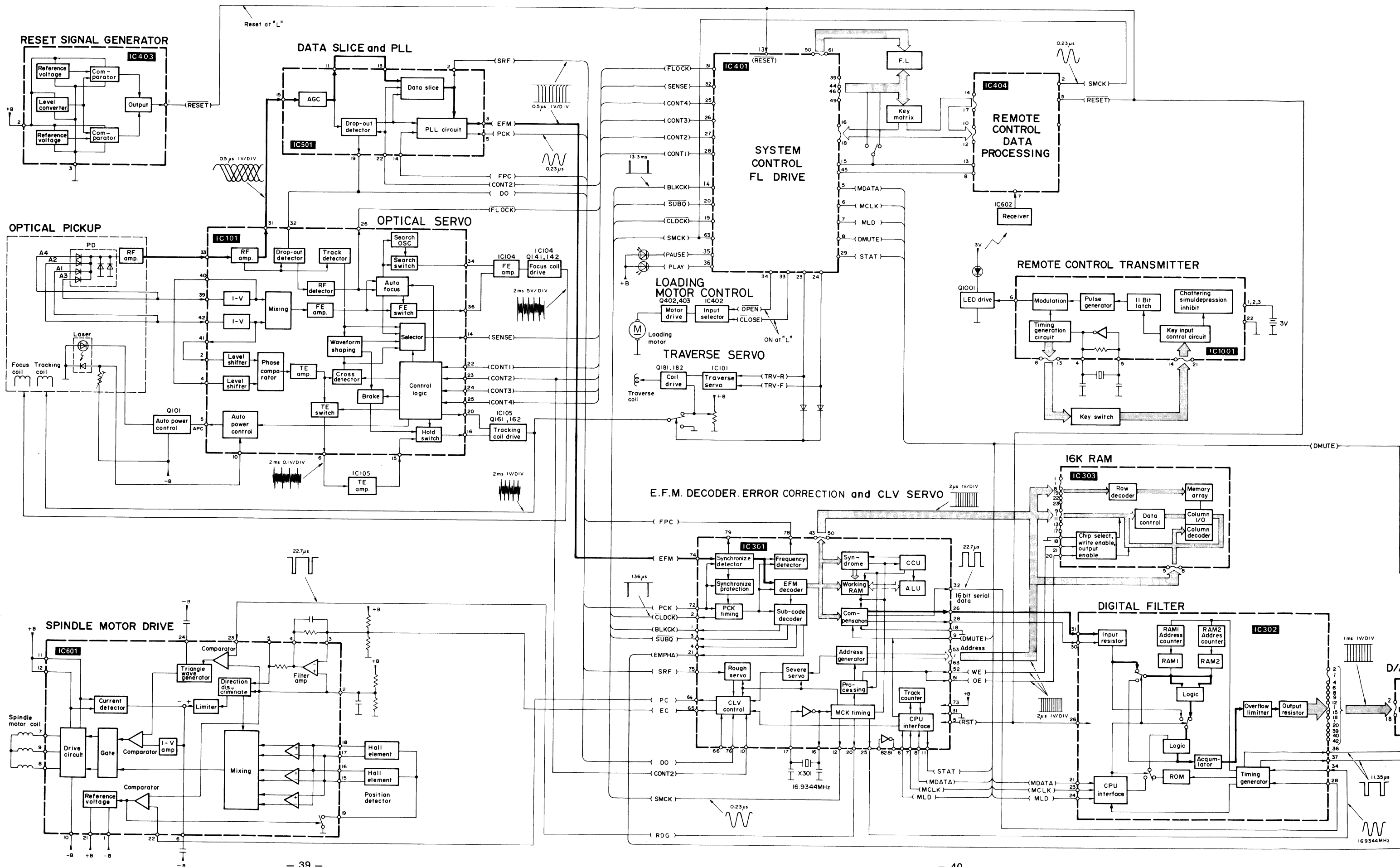
★ 1T=0.420ms ~ 0.424ms (U.S.A. and Canada)  
1T=0.454ms ~ 0.460ms (Europe and others)

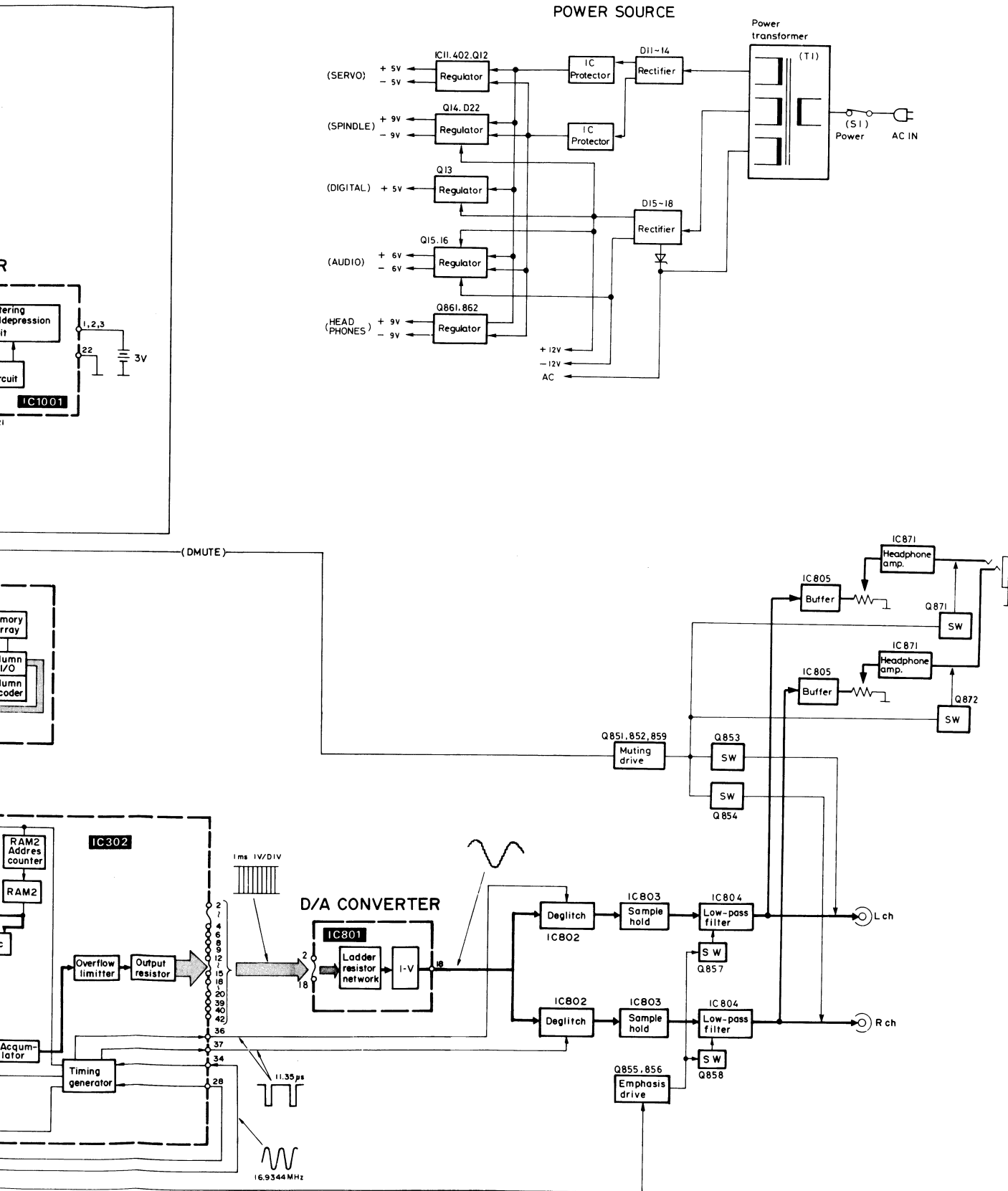
| Key No. | Function  | Data Code | Key No. | Function      | Data Code |
|---------|-----------|-----------|---------|---------------|-----------|
| 0       | Stop      | 000000    | 19      | Numeric 4     | 110010    |
| 2       | Skip ◀    | 010000    | 20      | Numeric 5     | 001010    |
| 3       | Skip ▶    | 110000    | 21      | Numeric 6     | 101010    |
| 4       | ◀◀ Search | 001000    | 22      | Numeric 7     | 011010    |
| 5       | Search ▶▶ | 101000    | 23      | Numeric 8     | 111010    |
| 6       | ▮▮ Pause  | 011000    | 24      | Numeric 9     | 000110    |
| 7       | Repeat    | 111000    | 25      | Numeric 0     | 100110    |
| 10      | Play      | 010100    | 36      | Level Up ▲    | 001001    |
| 11      | Clear     | 110100    | 37      | Level Down ▼  | 101001    |
| 16      | Numeric 1 | 000010    | 41      | Time Mode     | 100101    |
| 17      | Numeric 2 | 100010    | 42      | Memory/recall | 010101    |
| 18      | Numeric 3 | 010010    |         |               |           |



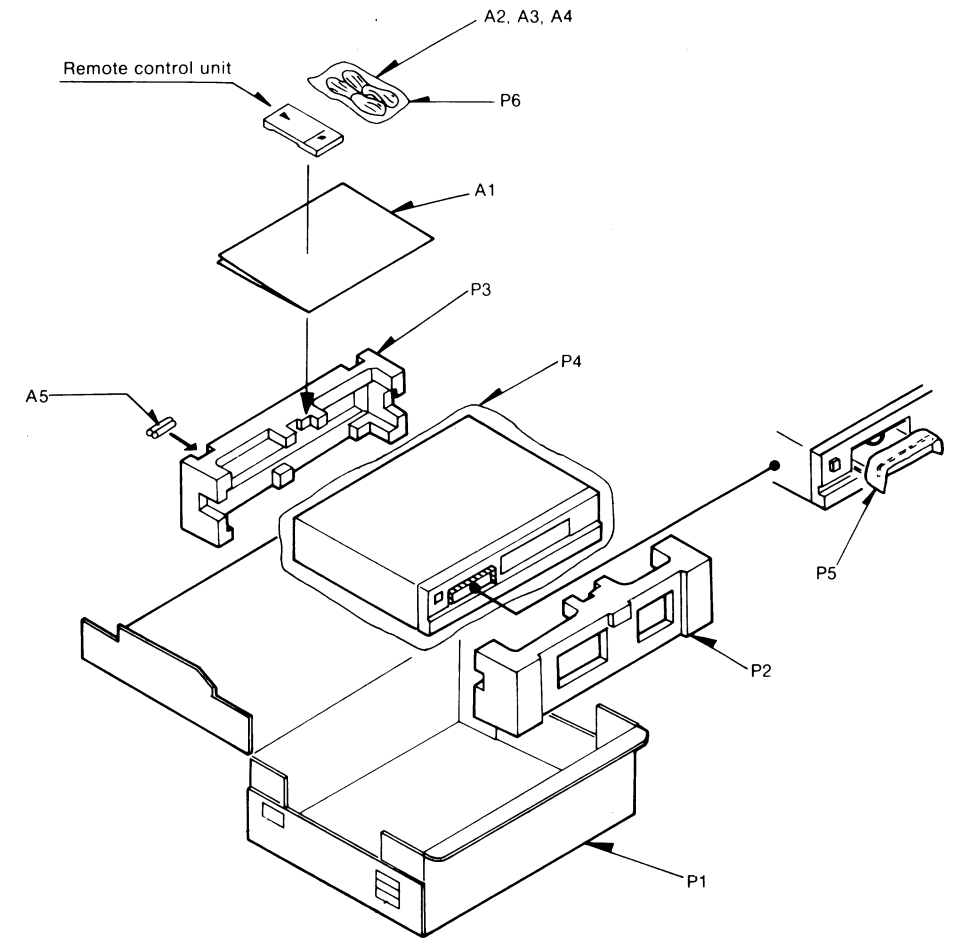


# BLOCK DIAGRAM





## PACKING



## REPLACEMENT PARTS LIST

| Ref. No.           | Part No.     | Part Code      | Description        | Ref. No.           | Part No.     | Part Code      | Description        |
|--------------------|--------------|----------------|--------------------|--------------------|--------------|----------------|--------------------|
| <b>PACKINGS</b>    |              |                |                    | A1 (PA, PE, PC)    | SQULP320-KPA | 016 983 5083 8 | INSTRUCTION MANUAL |
| P1 (M, E, EG, EB)  | SPND202      | 016 971 4989 5 | CARTON BOX         | A1 (XB)            | SQULP320-KXB | 016 983 5086 5 | INSTRUCTION MANUAL |
| (EH, E1, EK)       |              |                |                    | A2 (EK)            | SFDAC05G02   | 003 490 2613 3 | POWER CORD         |
| (XL, XA, XB)       |              |                |                    | A2 (XA, PA, PE)    | SJA168       | 003 490 4122 9 | POWER CORD         |
| (PA, PE, PC)       |              |                |                    | (PC)               |              |                |                    |
| P1 (MC)            | SPND203      | 016 971 4987 7 | CARTON BOX         | A2 (MC)            | SJA170       | 003 490 4064 2 | POWER CORD         |
| P1 (EF)            | SPND204      | 016 971 4988 6 | CARTON BOX         | A2 (M)             | SJA170-1     | 003 490 5022 8 | POWER CORD         |
| P2                 | SPSD110      | 016 977 3277 4 | PAD                | A2 (E, EG, EB, EH) | SJA171       | 003 490 4160 3 | POWER CORD         |
| P3                 | SPSD111      | 016 977 3278 3 | PAD                | (EF, E1)           |              |                |                    |
| P4                 | XZB55X40A01  | 016 978 0472 0 | PROTECTION BAG     | A2 (XL)            | SJA173       | 003 490 4161 2 | POWER CORD         |
| P5                 | SPSD68       | 016 977 3081 4 | SHEET              | A2 (XB)            | SJA183       | 003 490 4873 7 | POWER CORD         |
| P6                 | XZB26X17C03  | 016 978 0526 3 | POLYETHYLENE BAG   | A3 (XB, XA, PA)    | RJP120ZBS-H  | 003 402 1437 9 | ADAPTOR            |
| <b>ACCESSORIES</b> |              |                |                    | (PE, PC)           |              |                |                    |
| A1 (M)             | SQUD210      | 016 983 5093 6 | INSTRUCTION MANUAL | A4                 | SJP2249-1    | 003 492 6446 4 | OUTPUT CORD        |
| A1 (XL, XA)        | SQUD212      | 016 983 5092 7 | INSTRUCTION MANUAL | A5 (E, EG, EB)     | UM-3NE       |                | BATTERY            |
| A1 (EG)            | SQUD214      | 016 983 5091 8 | INSTRUCTION MANUAL | (EH, EF, E1)       |              |                |                    |
| A1 (EF)            | SQUD215      | 016 983 5090 9 | INSTRUCTION MANUAL | (EK, XL, XB)       |              |                |                    |
| A1 (E1)            | SQUD216      | 016 983 5089 2 | INSTRUCTION MANUAL | (XA, PA, PE)       |              |                |                    |
| A1 (EK)            | SQUD217      | 016 983 5087 4 | INSTRUCTION MANUAL | (PC)               |              |                |                    |
| A1 (E, EB, EH)     | SQULP320-KE  | 016 983 5084 7 | INSTRUCTION MANUAL | A5 (M, MC)         | UM-3NEP      |                | BATTERY            |
| A1 (MC)            | SQULP320-KMC | 016 983 5085 6 | INSTRUCTION MANUAL |                    |              |                |                    |