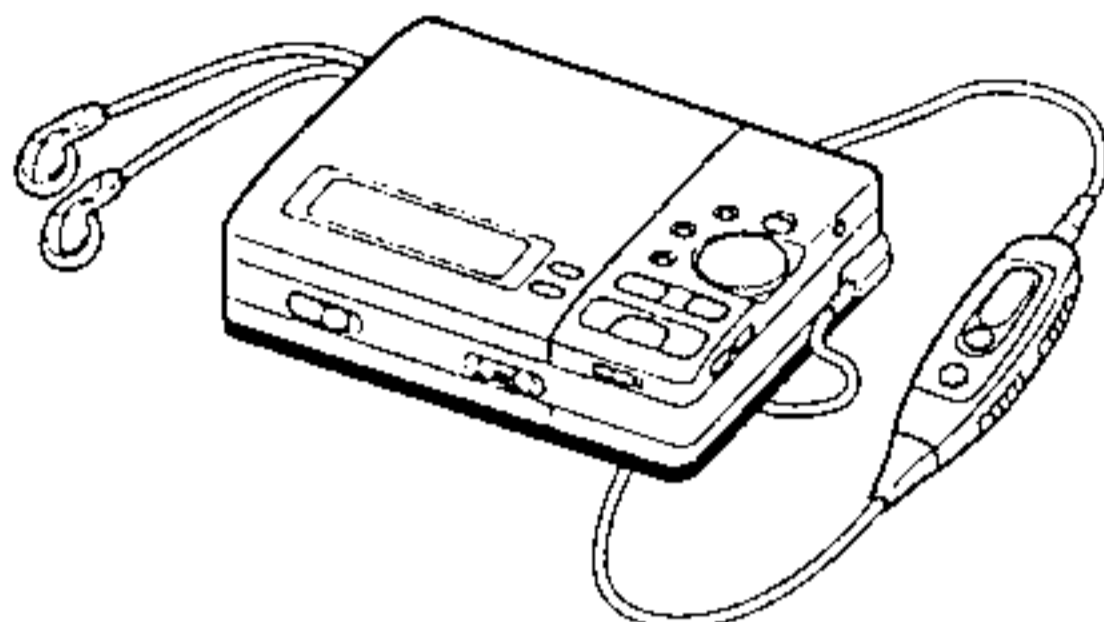


# MZ-R3

## SERVICE MANUAL

*US Model  
Canadian Model  
AEP Model  
UK Model  
E Model  
Australian Model  
Tourist Model*



Model Name Using Similar Mechanism	MZ-R2
MD Mechanism Type	MT-MZR3-109
Optical Pick-up Type	KMS-194A/J-N

### SPECIFICATIONS

#### System

##### Audio playing system

MiniDisc digital audio system

##### Laser diode properties

Material: GaAlAs

Wavelength:  $\lambda = 780 \text{ nm}$

Emission duration: continuous

Laser output: less than  $44.6 \mu\text{W}$

(This output is the value measured at a distance of 200 mm from the lens surface on the optical pick-up block.)

##### Recording and playback time

Maximum 74 minutes (MDW-74, stereo recording)

Maximum 148 minutes (MDW-74, monaural recording)

##### Revolutions

400 rpm to 900 rpm (CLV)

##### Error correction

Advanced Cross Interleave Reed

Solomon Code (ACIRC)

##### Sampling frequency

44.1 kHz

##### Coding

Adaptive Transform Acoustic Coding (ATRAC)

##### Modulation system

EFM (Eight to Fourteen Modulation)

##### Number of channels

2 stereo channels

1 monaural channel

##### Frequency response

20 to 20,000 Hz  $\pm 2 \text{ dB}$

#### Wow and Flutter

Below measurable limit

#### Inputs

Microphone: stereo mini-jack, 0.22 – 0.78 mV

Line in: stereo mini-jack, 69 – 194 mV

Optical (Digital) in: optical (digital) mini-jack

#### Outputs

Headphones: stereo mini-jack, maximum output level 5 mW + 5 mW, load impedance 16 ohm

Line out: stereo mini-jack, 194 mV, load impedance 10 kilohm

#### General

##### Power requirements

Sony AC Power Adaptor (supplied) connected at the DC IN 4.5 V jack: 220–

230 V AC, 50/60 Hz (European model)

120 V AC, 60 Hz (Canadian model)

100–240V AC, 50/60 Hz (Other models)

Two R6 (size AA) alkaline batteries (not supplied)

Nickel metal hydride rechargeable battery BP-DM20 (not supplied)

Lithium-ion rechargeable battery LIP-12 (not supplied)

##### Battery operation time

See "Using on dry batteries" (page 27)

##### Dimensions

Approx. 115.8 × 29.8 × 81 mm (w/h/d)  
(4 <sup>5</sup>/<sub>8</sub> × 1 <sup>3</sup>/<sub>16</sub> × 3 <sup>1</sup>/<sub>4</sub> in.)

#### Mass

Approx. 265 g (9.4 oz) recorder only

Approx. 360 g (12.7 oz) incl. a recordable MD, remote controller, and two Sony alkaline AM3 (N) batteries

##### Supplied accessories

AC power adaptor (1)

Connecting cord (1)

Headphones with a remote controller (1)

R6 (size AA) alkaline batteries (2, supplied only with tourist model)

Nickel metal hydride rechargeable battery (1, supplied only with tourist model)

Battery case (1, for LIP-12 Lithium-ion Battery)

Recordable MD (1)

Carrying case (1)

US and foreign patents licensed from Dolby Laboratories Licensing Corporation

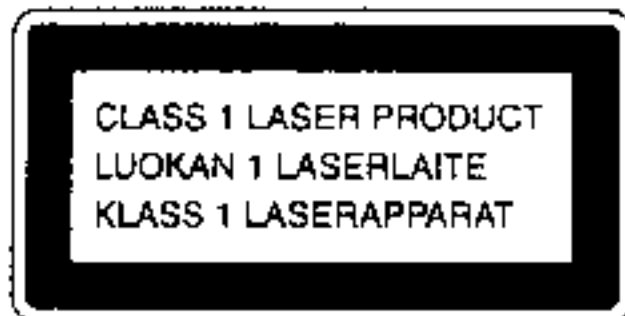
Design and specifications are subject to change without notice.

PORTABLE MINIDISC RECORDER  
**SONY**®



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For Customers in Europe



This MiniDisc Recorder is classified as a CLASS 1 LASER product. The CLASS 1 LASER PRODUCT label is located on the bottom exterior.

IN NO EVENT SHALL SELLER BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE, OR LOSSES OR EXPENSES RESULTING FROM ANY DEFECTIVE PRODUCT OR THE USE OF ANY PRODUCT.

"MD WALKMAN" is a trademark of Sony Corporation.

## CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

## Notes on chip component replacement

- Never reuse a disconnected chip component.
- Notice that the minus side of a tantalum capacitor may be damaged by heat.

## Flexible Circuit Board Repairing

- Keep the temperature of the soldering iron around 270 °C during repairing.
- Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
- Be careful not to apply force on the conductor when soldering or unsoldering.

## SAFETY-RELATED COMPONENT WARNING !!

COMPONENTS IDENTIFIED BY MARK  $\Delta$  OR DOTTED LINE WITH MARK  $\Delta$  ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

## ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!!

LES COMPOSANTS IDENTIFIÉS PAR UNE MARQUE  $\Delta$  SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

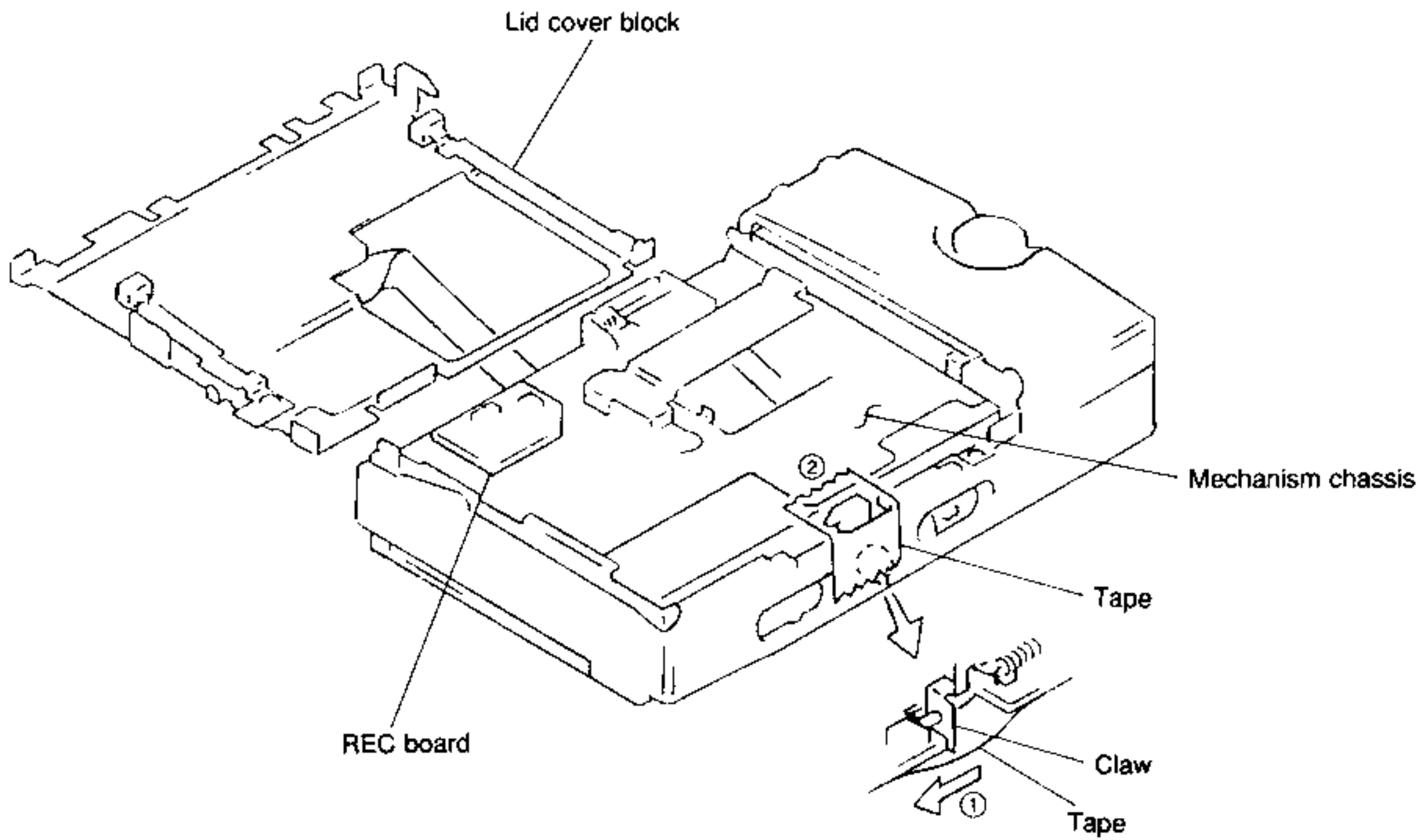
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# SECTION 1

## SERVICING NOTE

Open the upper panel assembly and lid cover block when measuring the REC board, etc. This will prevent the unit from operating.

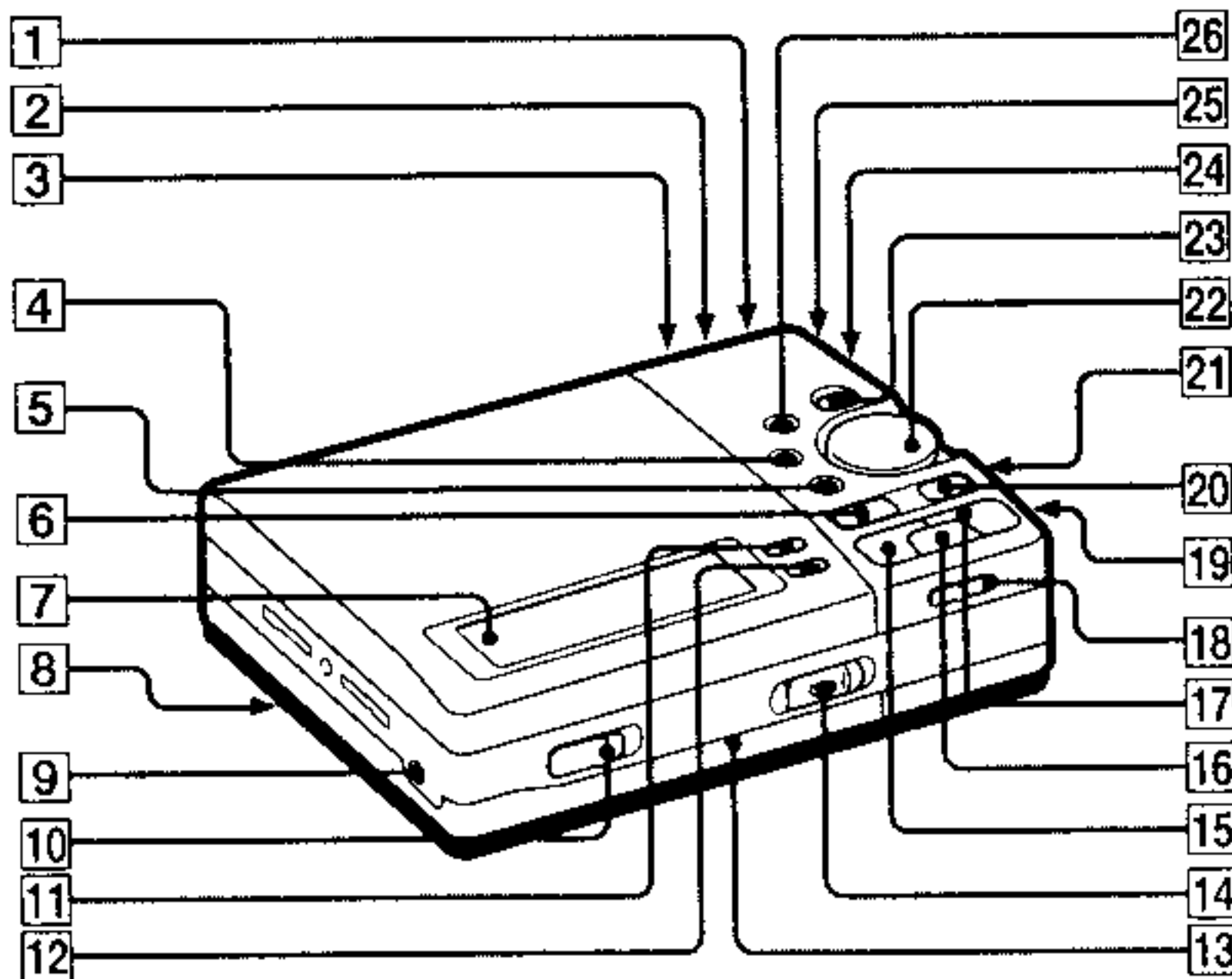
- ① Secure the open/close detection switch claw with tape in the direction of the arrow.
- ② Secure the mechanism chassis with tape so that it does not move.



## Looking at the controls

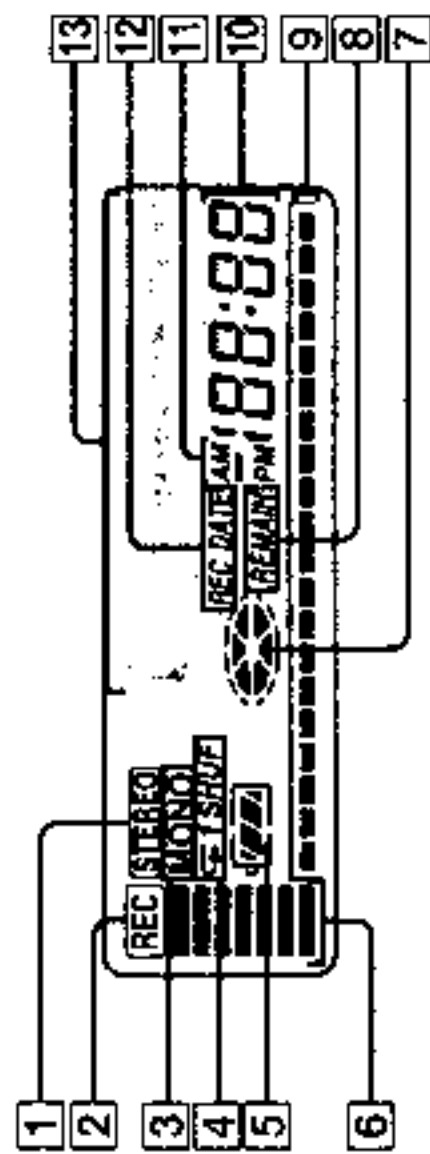
See pages in ( ) for more details.

### The recorder



- |  |  |
|--|--|
| <b>1</b> LINE OUT jack (20)                    | <b>13</b> Record indicator                         |
| <b>2</b> LINE IN (OPTICAL) jack (6)            | <b>14</b> REC (record) switch (7)                  |
| <b>3</b> BASS BOOST switch (20)                | <b>15</b> ◀◀ (search / AMS) button (7, 9)          |
| <b>4</b> END SEARCH button (7)                 | <b>16</b> ▶ (play) button (9)                      |
| <b>5</b> ERASE button (24)                     | <b>17</b> ▶▶ (search / AMS) button (7, 9)          |
| <b>6</b> ■ STOP/CHARGE button                  | <b>18</b> HOLD switch (19)                         |
| <b>7</b> Display window (7, 9, 15)             | <b>19</b> VOLUME +/- button (9)                    |
| <b>8</b> CLOCK SET button (on the bottom) (17) | <b>20</b>    (pause) button (7, 9)                 |
| <b>9</b> DC IN 4.5 V jack (6)                  | <b>21</b> Battery compartment (on the bottom) (27) |
| <b>10</b> OPEN button (6)                      | <b>22</b> Select dial (23)                         |
| <b>11</b> DISPLAY button (15)                  | <b>23</b> TITLE/ENTER button (23)                  |
| <b>12</b> MODE button (12)                     | <b>24</b> MIC (PLUG IN POWER) jack (12)            |
|  | <b>25</b> Ⓞ (headphones)/REMOTE jack (8)           |
|  | <b>26</b> TRACK MARK button (13)                   |

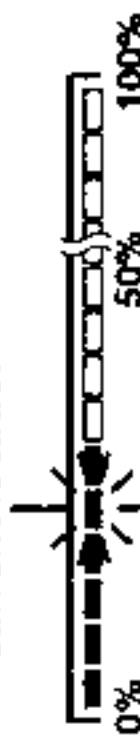
### The display window



- 1 STEREO indication
- 2 REC indication (7)  
Lights up while recording. When flashing, the recorder is in record standby mode.
- 3 MONO (monaural) indication
- 4 Play mode indication (18)  
Shows the play mode of the MD.
- 5 Battery indication  
Shows battery condition
- 6 Level meter  
Shows the volume of the MD being played or recorded.
- 7 Disc indication  
Shows that the disc is rotating for recording, playing or editing an MD.
- 8 REMAIN (remaining time/tracks) indication (15, 19)  
Lights up along with the remaining time of the track, the remaining time of the MD, or the remaining number of tracks.

- 9 Position indicator (7, 9)  
Shows the current location on the MD. The point under recording or playing flashes. The recorded portion lights up.

#### Current location



#### Recorded portion

#### Disc length

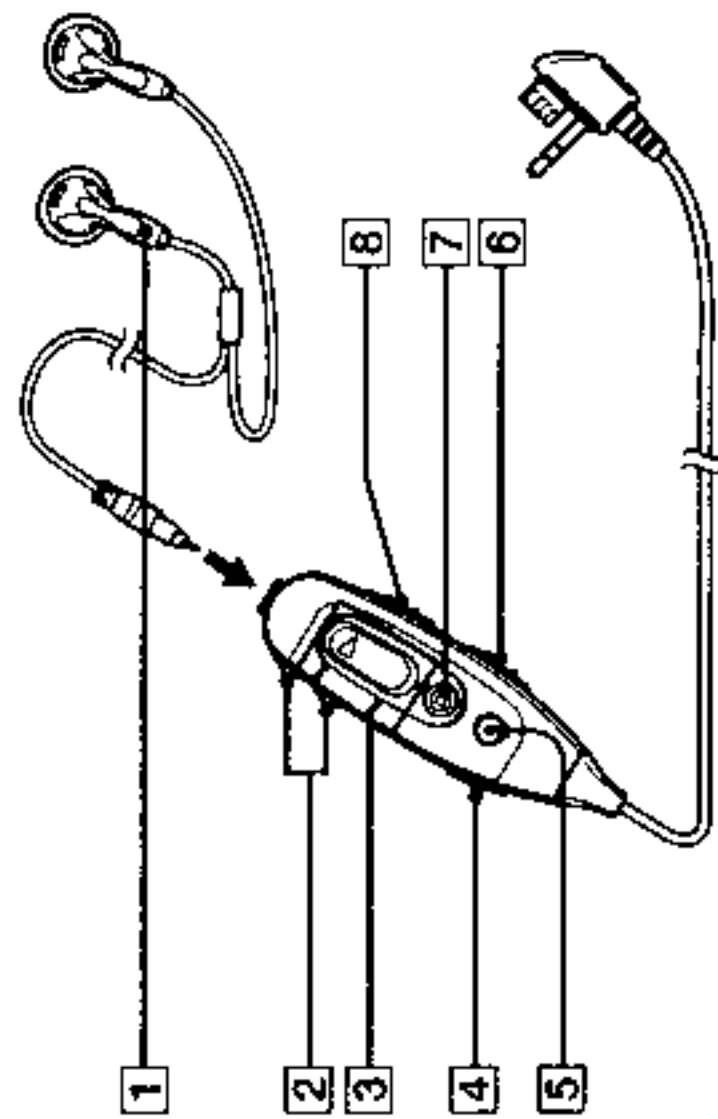
- 10 Time display (15, 19)  
Shows the recorded time, current time, elapsed time of the track or MD being recorded or played.
- 11 AM/PM indication (17)  
Lights up along with the time indication in the 12-hour system.
- 12 REC DATE (recorded/current date) indication (19)  
Lights up along with the date and time the MD was recorded. When only "DATE" lights up, the current date and time are displayed.
- 13 Character information display  
Displays the disc and track names, date, error messages, track numbers, etc.

### Additional information

- 1 Headphones  
Can be replaced with optional headphones.
- 2 VOL (volume) +/- buttons (9)
- 3 Play (play)/Fast Forward (search, AMS) buttons (7, 9)  
Press ► to play. While playing, press the ◀◀ side to find beginning of the current or preceding tracks or to search backward, or press the ▶▶ side to find the beginning of the succeeding tracks or to search forward.

- 4 TRACK MARK button (13)
- 5 Pause button
- 6 AVLS (Automatic Volume Limiter System) switch (20)  
Slide to ON to limit the maximum volume.
- 7 Stop button
- 8 HOLD switch (19)  
Slide to lock the controls of the remote controller.

### The headphones with a remote controller



# SECTION 4 TEST MODE

## [Outline]

- The general adjustment mode of this unit performs CD and MO adjustments automatically when set. In this mode, the disc is determined if CD or MO and adjustments are automatically performed in order. If errors are detected, the faulty locations are displayed. The servo mode performs each adjustment automatically.

## [Setting the Test Mode]

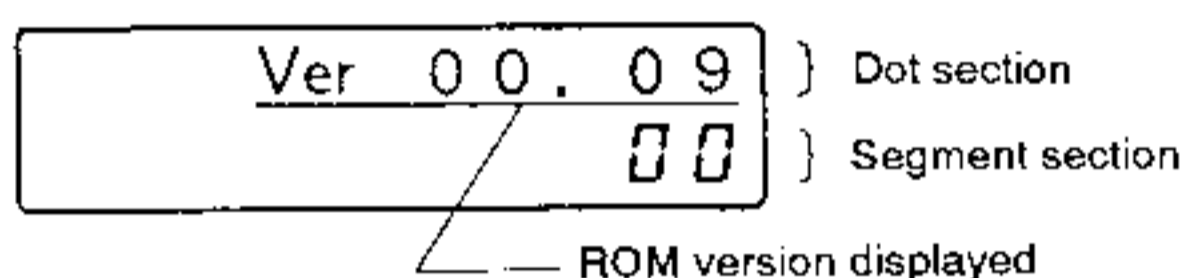
Short-circuit the soldering bridge of TAP801 (MODE) on the main board (connect Pin ④ of IC801 to the GND) and turn on the power supply.

## [Exiting the Test Mode]

Turn off the power supply and open the soldering bridge of TAP801 (MODE) on the main board.

## [Operations When Test Mode is Set]

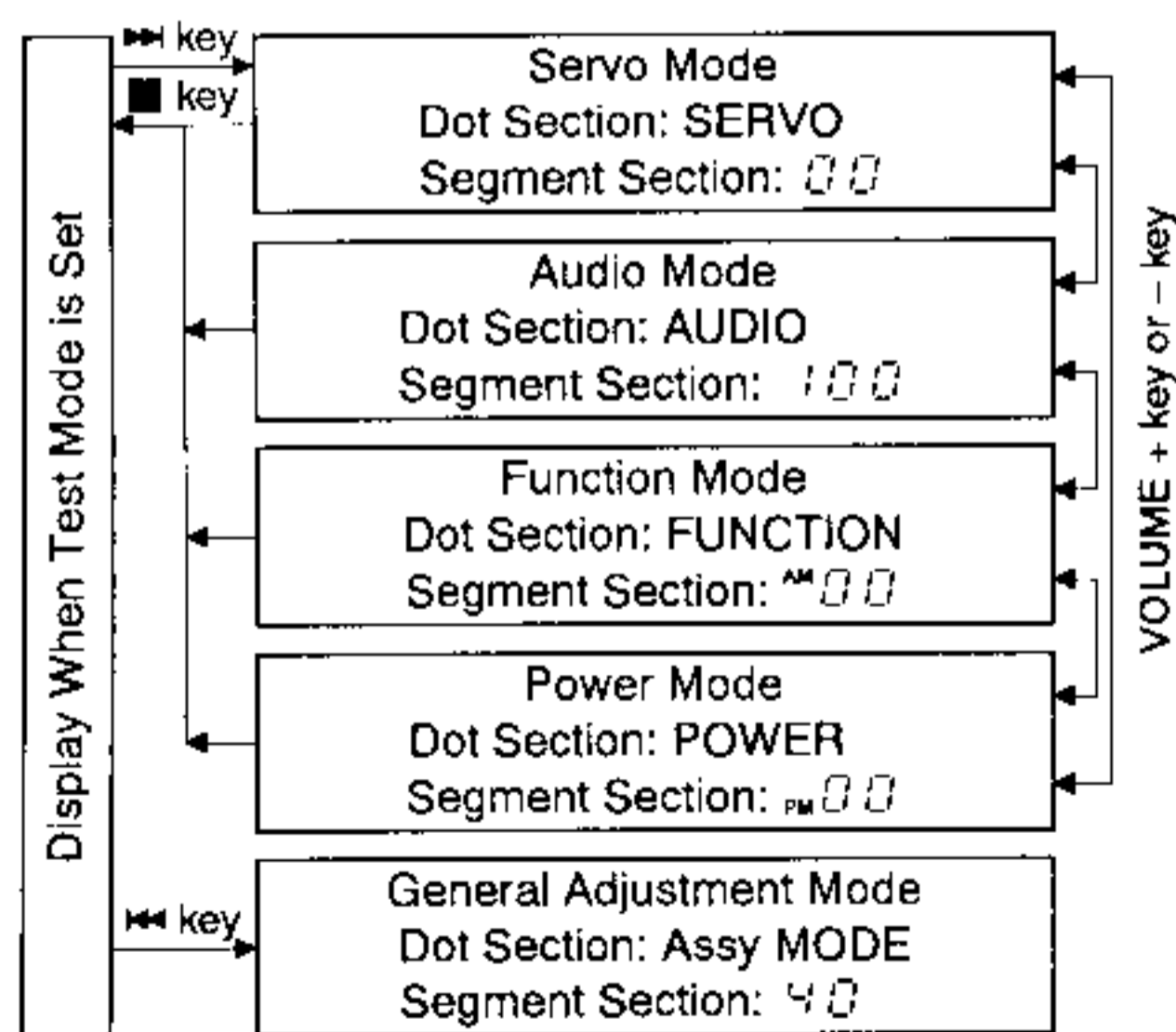
When the test mode is set, the LCD will display as follows.



- The LCD performs the following repeatedly.  
ROM version displayed → all lit → all off
- The display can be held and checked by pressing **||** key.

## [Structure of Test Mode]

The test mode of this unit consists of the following five modes.

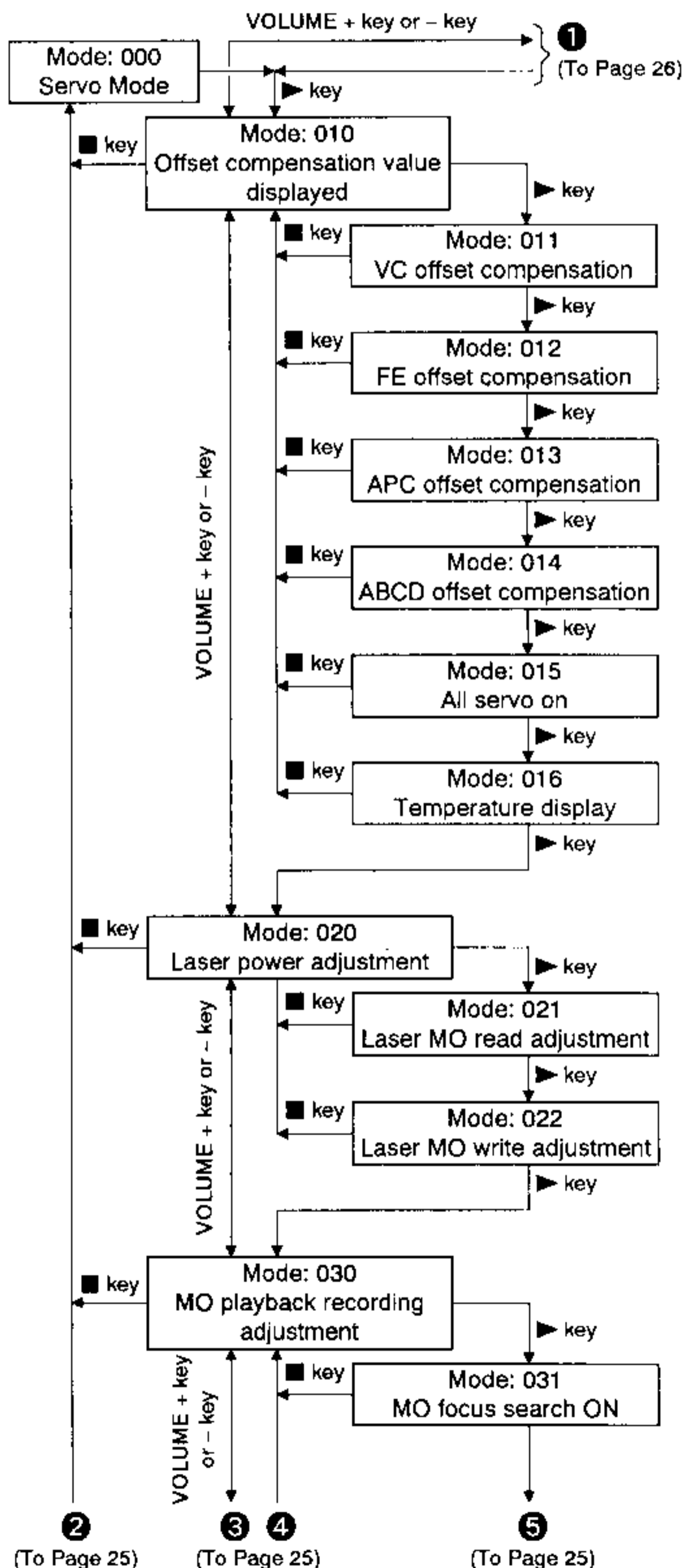


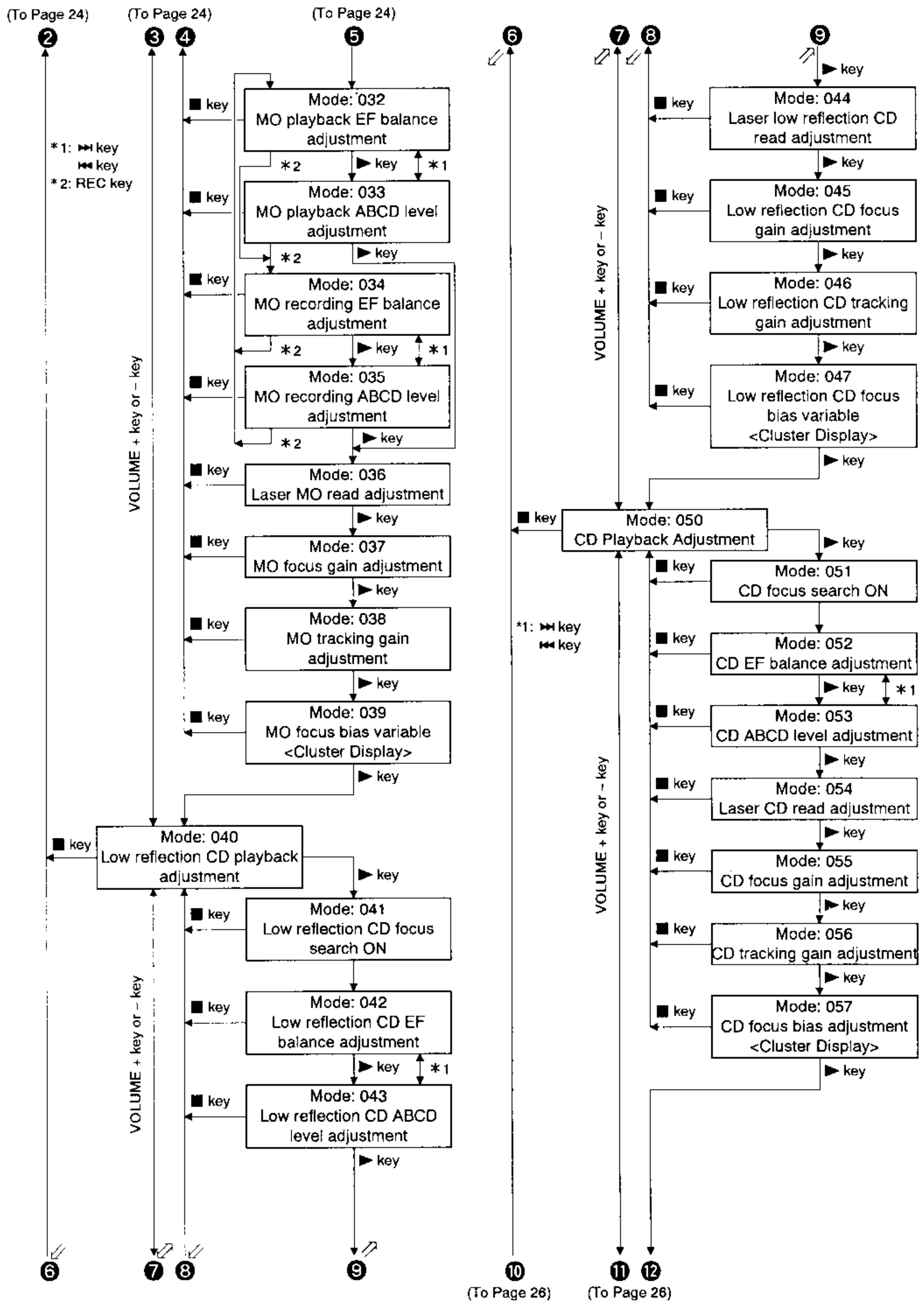
- In modes other than the general adjustment mode, the last two digits of the mode number will be displayed at the 00 section.

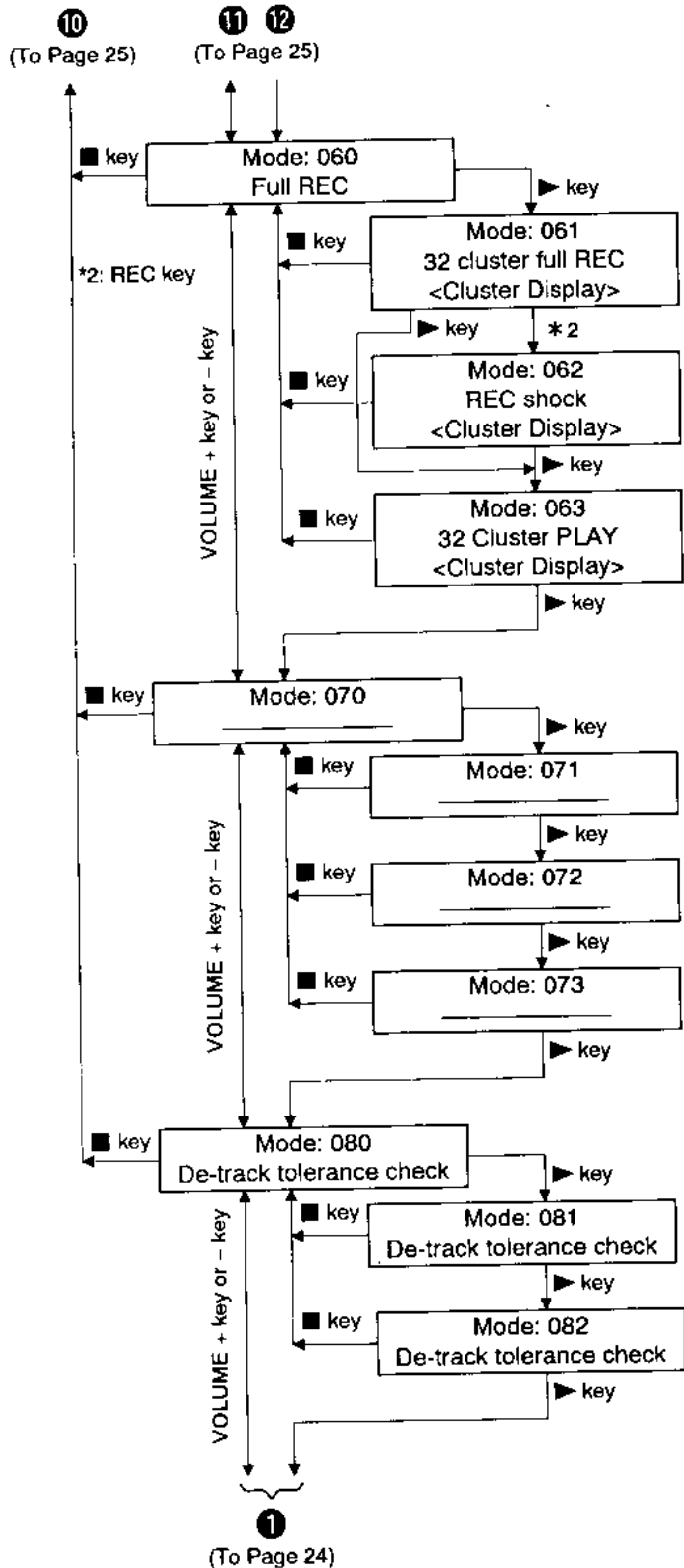
## [Servo Mode]

- Set the test mode, press the **▶▶** key, and set the servo mode using the VOLUME + and - keys.
- When the servo mode is set, the optical pickup will move to the outer circumference or inner circumference if the **▶▶** key or **◀◀** key is pressed.
- To set other modes, refer to "Structure of Test Mode".

## • Structure of Servo Mode

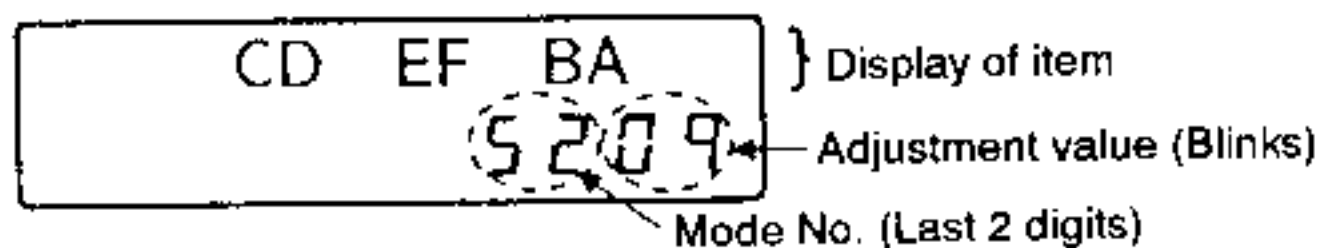




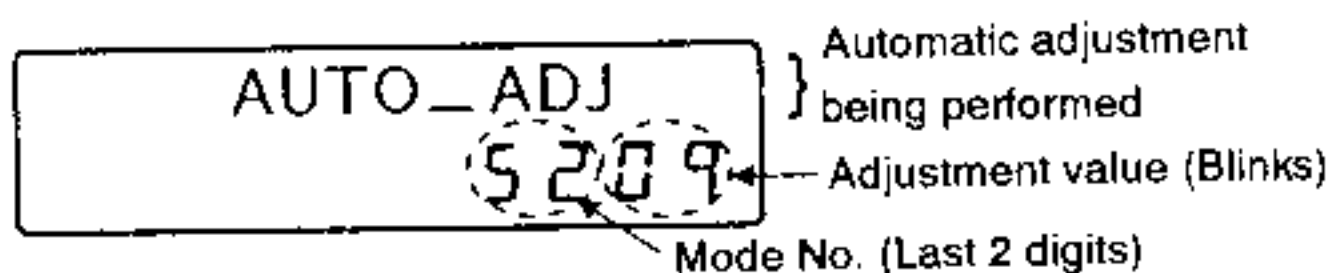


### • Adjusting Method

1. When the adjustment modes are set according to "Structure of Servo Mode", the last two digits of the mode number and the adjustment value written in the EEPROM will be displayed blinking.

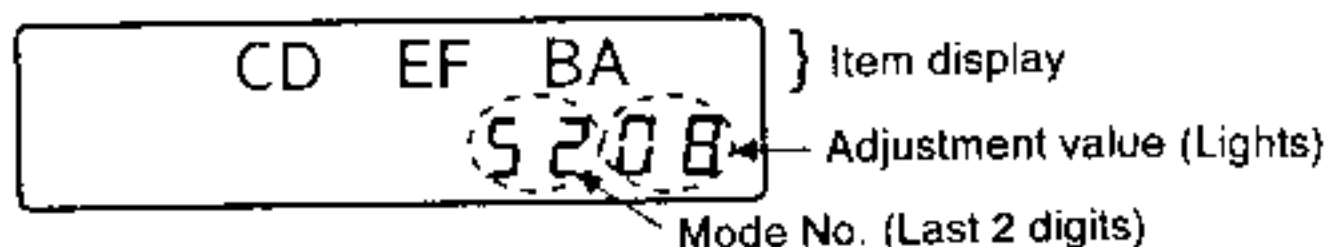


2. When the **||** key is pressed, the following will be displayed and adjustments will be performed automatically.

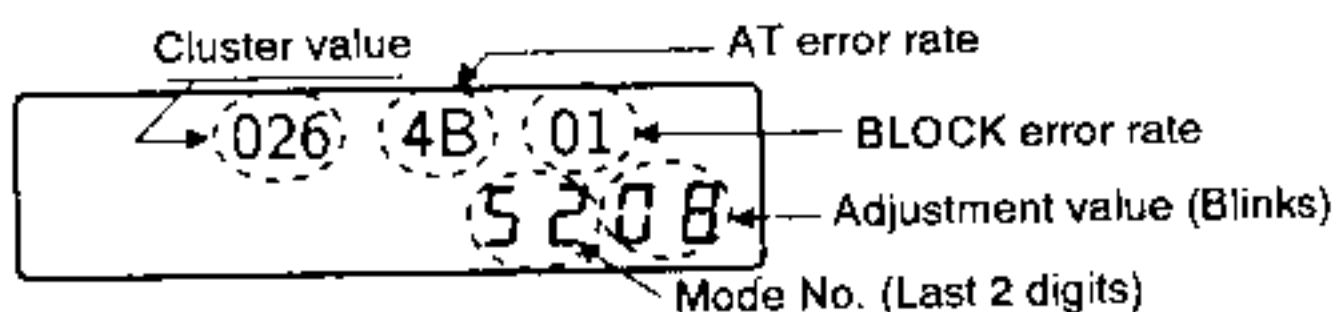


**Note)** The adjustment value can be changed as desired using the VOLUME + and - keys, but try to avoid this as much as possible.

3. After the adjustments are completed, the item is displayed again and the adjustment value that was blinking lights up.



### • Cluster display



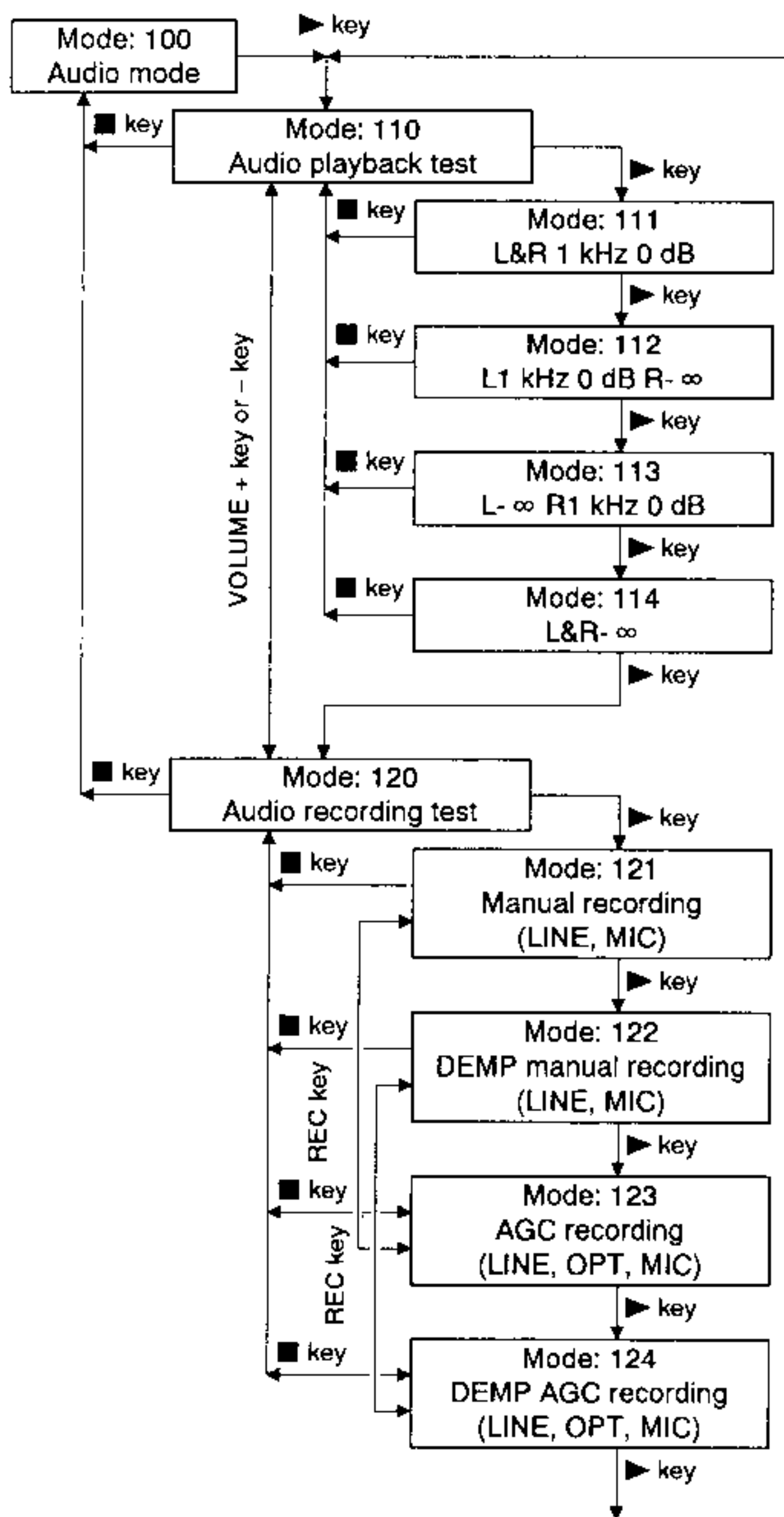
- Nothing is performed at mode numbers 070 to 073.
- At mode numbers 080 to 082, automatic adjustments are performed only in the general adjustment mode.



## [Audio Mode]

- Set the test mode, press the ► key, and set the audio mode using the VOLUME + and – keys.
- To set other modes, refer to “Structure of Test Mode”.

### • Structure of Audio Mode

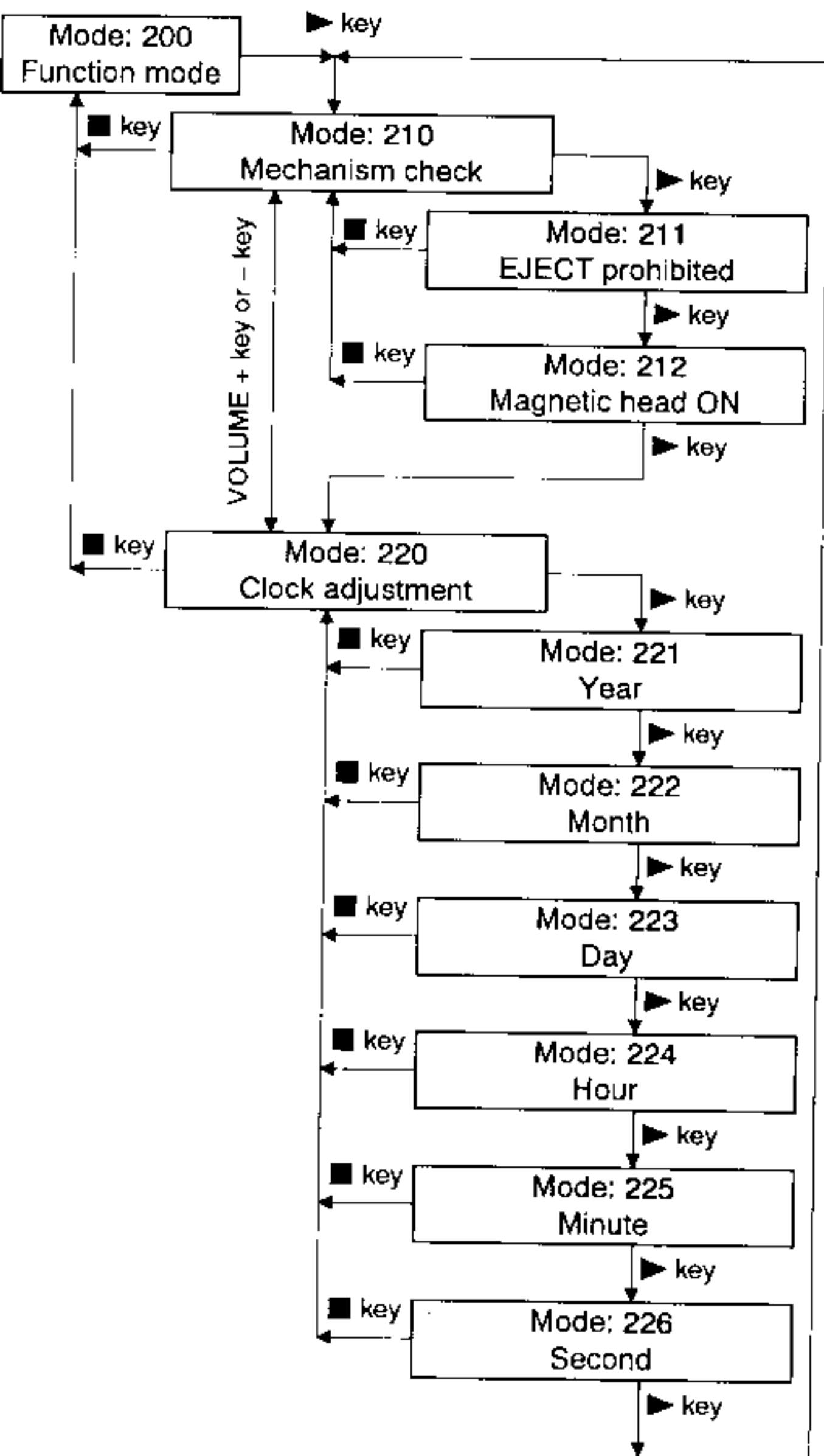


- When the ■ key is pressed at mode numbers 100, 110 to 114, the buzzer will sound.
- When the VOLUME keys + and – are pressed at mode numbers 111 to 113, 122 or 123, the volume of the headphone output will increase/decrease. When the ◀ key or ▶ key is pressed, the volume of the headphone output will become maximum/minimum.
- When the VOLUME keys + and – are pressed at mode numbers 121 or 122, the recording level will increase/decrease. When the ◀ key or ▶ key is pressed, the recording level will become maximum/minimum.
- At mode numbers 121 to 124, the recording LED will light up.
- At mode numbers 121 to 124, the microprocessor will detect the port and automatically determine the input.

## [Function Mode]

- Set the test mode, press the ►► key, and set the function mode using the VOLUME + and - keys.
- To set other modes, refer to "Structure of Test Mode".

### • Structure of Function Mode

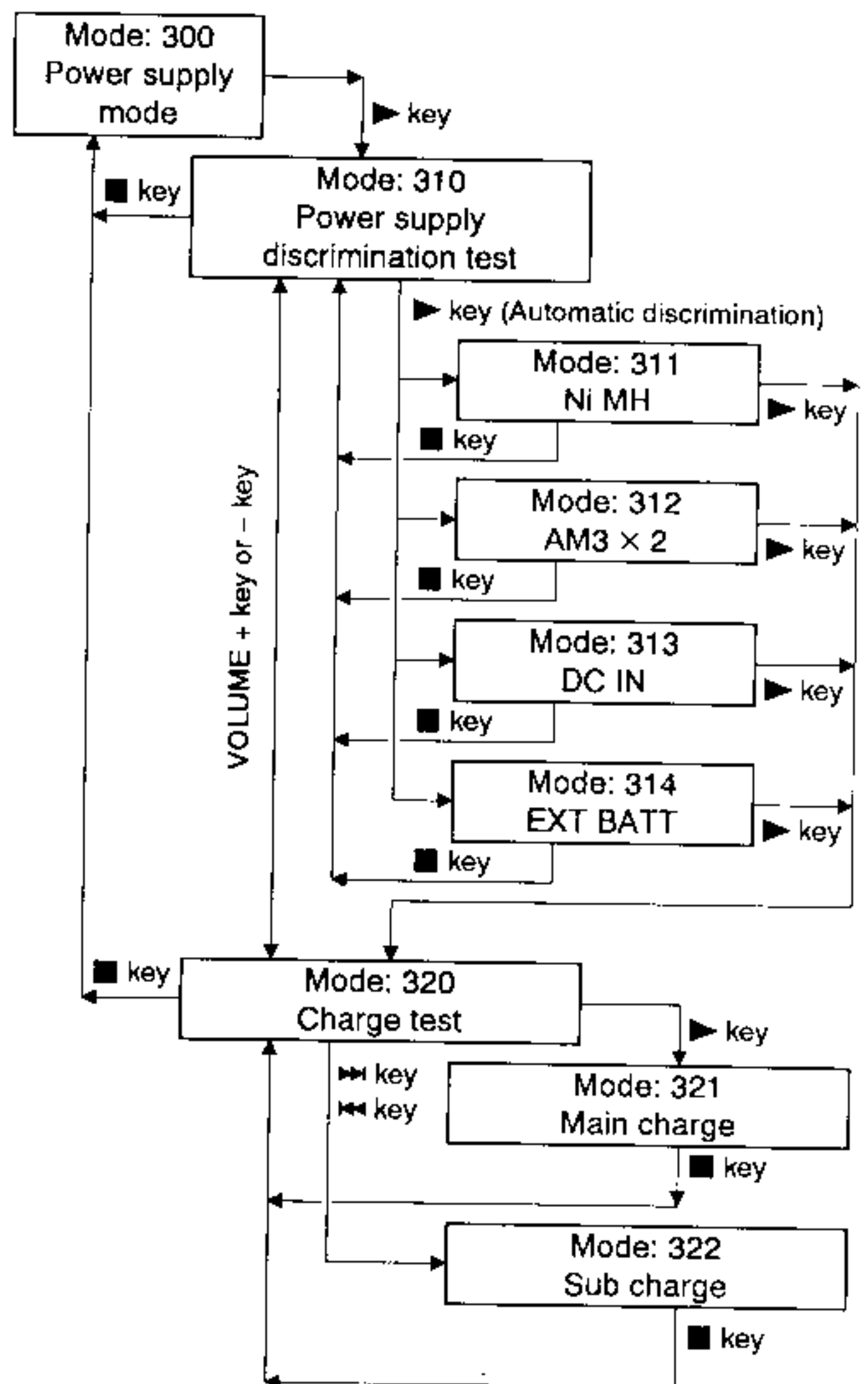


At mode numbers 200, 210 to 212, the optical pickup can be moved to the outer circumference or inner circumference using the ◀◀ or ▶▶ key.

## [Power Supply Mode]

- Set the test mode, press the ►► key, and set the power supply mode using the VOLUME + and - keys.
- To set other modes, refer to "Structure of Test Mode".

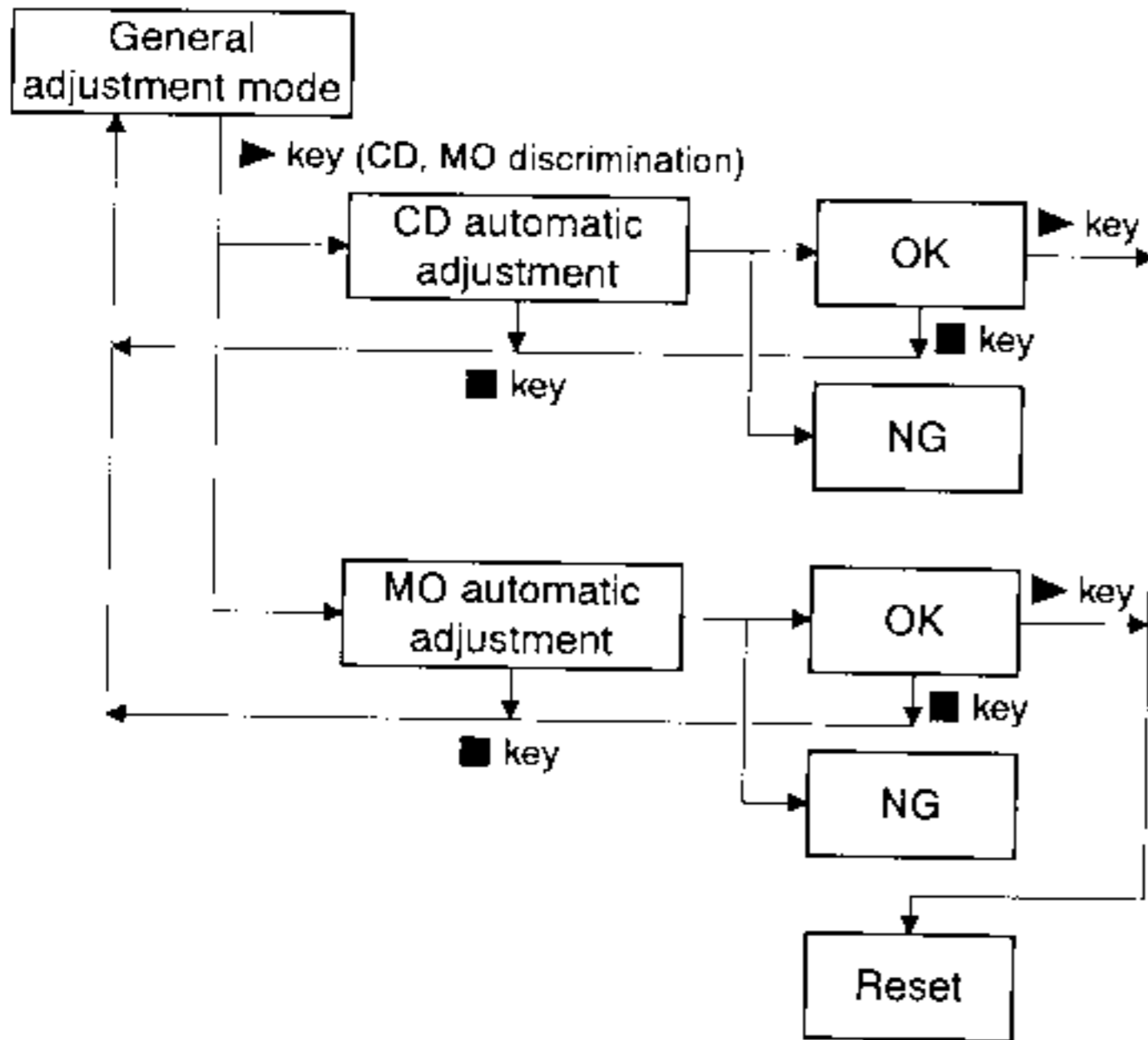
### • Structure of Power Supply Mode



## [General Adjustment Mode]

- Set the test mode, press the ◀◀ key, and set the general adjustment mode.
- To set other modes, exit the test mode once and set the test mode again.
- When the general adjustment mode is set, the LCD display will be as follows.

### • Structure of General Adjustment Mode



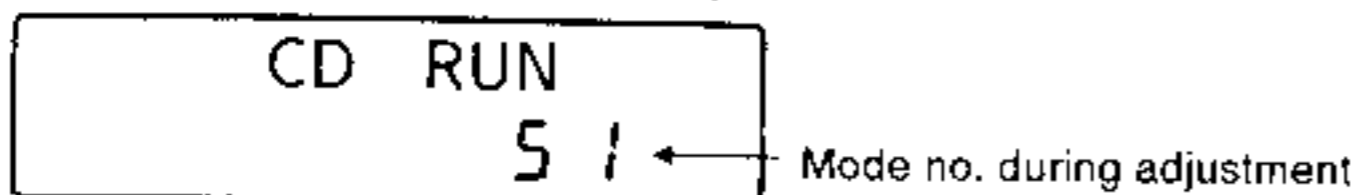
### • Adjusting Method

1. Set the test mode, press the ◀◀ key to set the general adjustment mode.
2. Load the CD test disc (TDYS-1) or SONY MO disc available on the market.
3. When the ▶ key is pressed, the disc is determined if CD or MO, the automatic adjustment modes are set, and adjustments are performed automatically in the following order.

#### • CD Automatic Adjustment

No.	Mode No.	Adjustment
1	052	CD EF balance adjustment
2	053	CD ABCD level adjustment
3	055	CD focus gain adjustment
4	056	CD tracking gain adjustment
5	057	CD focus bias adjustment

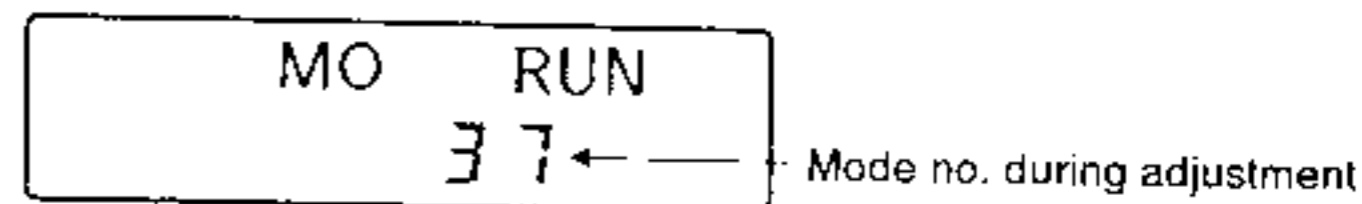
#### \* Display during CD automatic adjustment



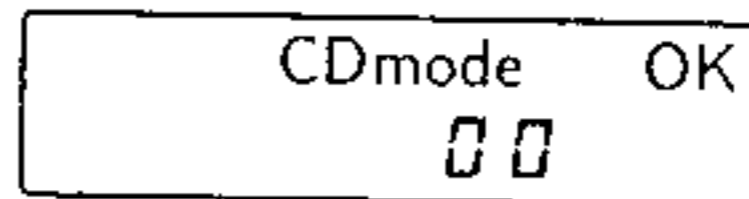
#### • MO Automatic Adjustment

No.	Mode No.	Adjustment
1	032	MO playback EF balance adjustment
2	033	MO playback ABCD level adjustment
3	034	MO recording EF balance adjustment
4	035	MO recording ABCD level adjustment
5	037	MO focus gain adjustment
6	038	MO tracking gain adjustment
7	061	32 cluster full REC
8	062	REC shock
9	063	32 cluster PLAY
10	039	MO focus bias adjustment
11	042	Low reflection CD EF balance adjustment
12	043	Low reflection CD ABCD level adjustment
13	045	Laser low reflection CD read adjustment
14	046	Low reflection CD tracking gain adjustment

#### \* Display during MO automatic adjustment

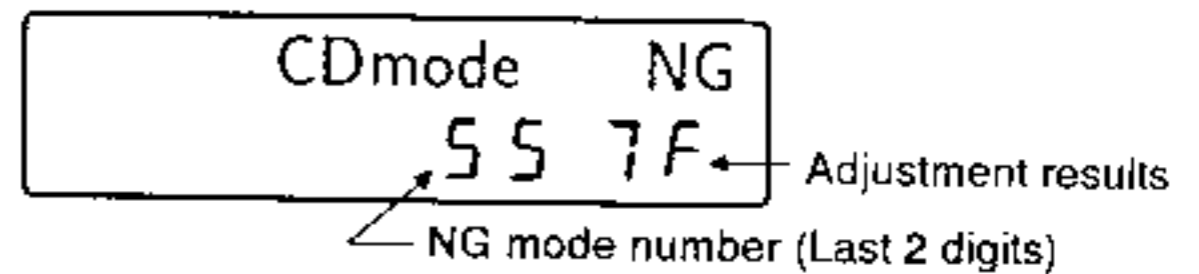


4. If the automatic adjustment results are OK, the following will be displayed.

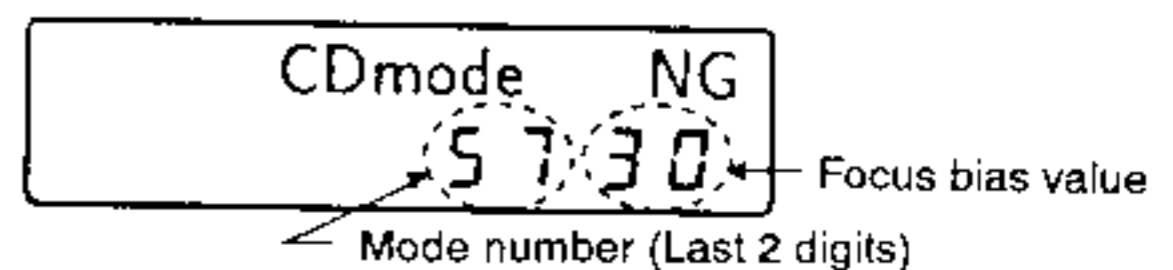


- \* In this case, when the ▶ key is pressed, the unit will be reset.

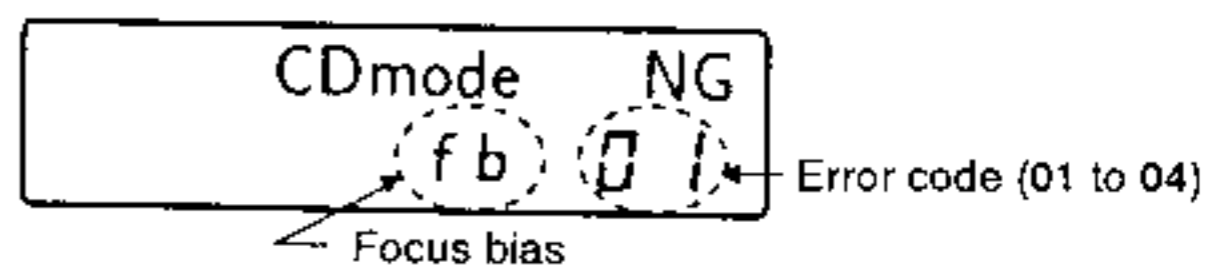
5. If the automatic adjustment results are NG, the following will be displayed.



- \* When the mode number is 039, 057 and the focus bias value is NG, the following will be displayed repeatedly.



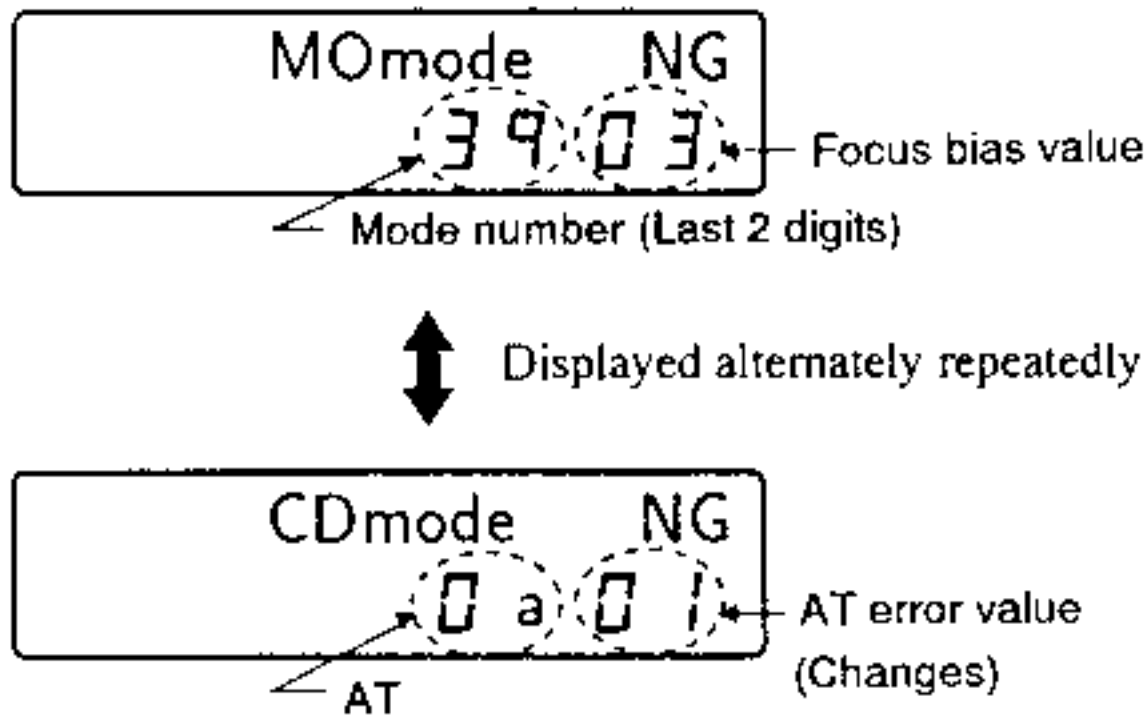
↕ Displayed alternately repeatedly



## SECTION 5

### ELECTRICAL ADJUSTMENTS

- \* When the mode number is 039, 061 and the AT error rate is NG, the following will be displayed repeatedly.



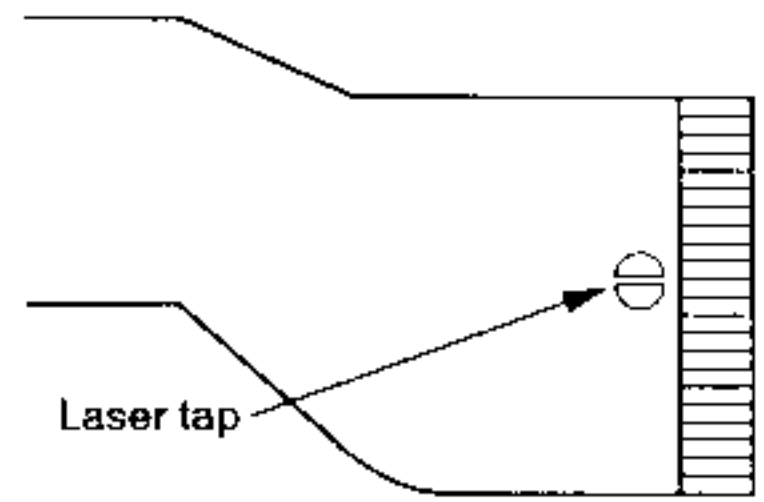
- \* When NG, set the servo mode and perform the automatic adjustment of the NG item. (Refer to "Servo Mode".)

#### [Precautions for Laser Diode Emission Check]

When checking the emission of the laser diode during adjustments, never view directly downwards as this may lead to blindness.

#### [Precautions for Using Optical Pick Up (KMS-194A/J-N)]

As the laser diode inside the optical pickup damages by static electricity easily, solder the laser tap of the flexible board when handling. Also take the necessary measures to prevent damages by static electricity. Handle the flexible board with care as it breaks easily.



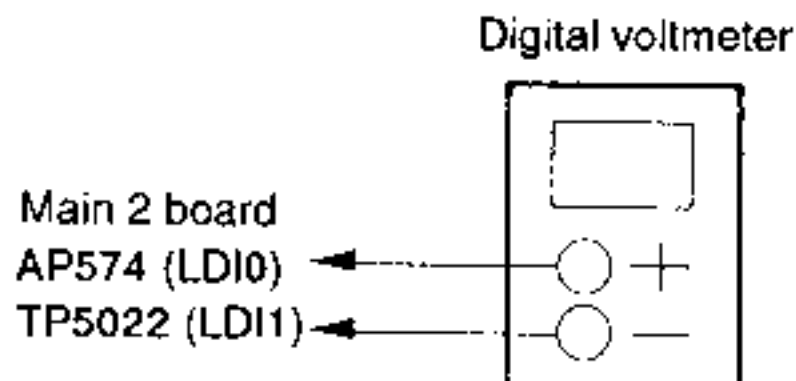
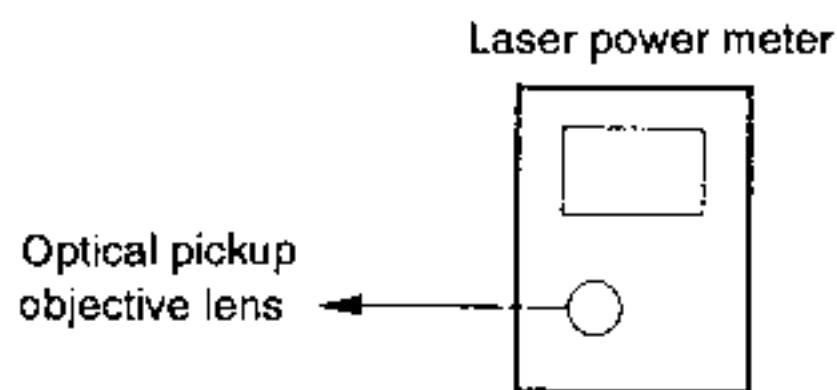
Optical pickup flexible board

#### [Precautions for Adjustment]

- 1) Perform all adjustments in the order given in the test mode. After adjusting, exit the test mode.
- 2) Use the following tools and measuring instruments.
  - CD test disc TDYS-1  
(Parts Code: 4-963-646-01)
  - Recorded MO disc PTDM-1  
(Parts Code: J-2501-054-A)
  - Laser power meter LPM-8001  
(Parts Code: J-2501-046-A)
  - Oscilloscope (Frequency band above 40 MHz. Perform the calibration of probe first before measuring.)
  - Digital voltmeter
- 3) Unless specified otherwise, supply DC4.5V from the DC IN 4.5V jack.
- 4) Switch, knob positions  
Hold switch .....OFF  
AVLS switch (Remote control).....OFF

## [Laser Power Check]

### Connection:

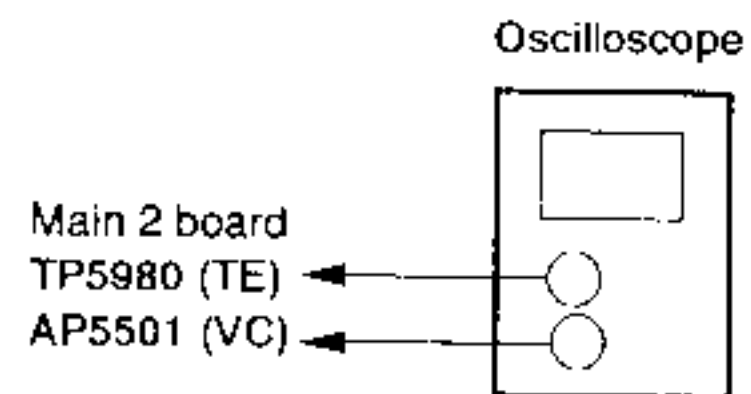


### Adjusting Method:

1. Set the servo mode of the test mode (Mode: 000).
2. Press the ► key, and set the laser power adjustment mode (Mode: 020) using the volume + and - keys.
3. Press the ◀◀ key and move the optical pickup to the inner most circumference.
4. Open the cover and set the laser power meter on the objective lens of the optical pickup.
5. Press the ► key, and set the laser MO read adjustment mode (Mode: 021).
6. Check that the laser power meter reading is  $0.85 \pm 0.06$  mW.
7. Check that the voltage between AP574 (LDI0) and TP5022 (LDI1) at this time is below 61 mV.
8. Press the ► key, and set the laser MO write adjustment mode (Mode: 022).
9. Check that the laser power meter reading is  $6.8 \pm 0.05$  mW.
10. Press the ■ key to finalize the adjustment data.
11. Check that the voltage between AP574 (LDI0) and TP5022 (LDI1) at this time is below 132 mV.
12. Press the ■ key.
13. Exit the test mode.

## [MO Traverse Adjustment]

### Connection:



### Adjusting Method:

1. Set the servo mode of the test mode (Mode: 000).
2. Press the ► key, and set the MO playback adjustment mode (Mode: 030) using the volume + and - keys.
3. Press the ◀◀ and ▶▶ keys and move the optical pickup to the center circumference.
4. Load any MO disc available on the market.
5. When the ► key is pressed, the MO playback EF balance adjustment mode (Mode: 032) will be set after focus search ON (Mode: 031).
6. Press the ■ key to perform automatic adjustment, and check that the traverse waveform is symmetrical at the top and bottom.
7. Slide the recording key and set the MO recording EF balance adjustment mode (Mode: 034).
8. Press the ■ key to perform automatic adjustment, and check that the traverse waveform is symmetrical at the top and bottom.

(Traverse Waveform)



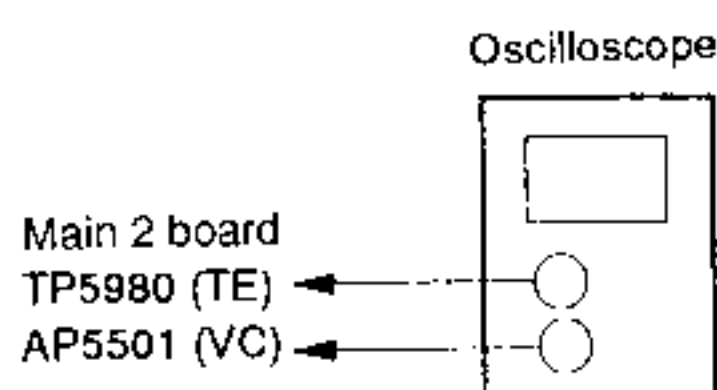
Specification:  $A=B, C \geq 2.0$  Vp-p

9. Check that the traverse level at this time is above 2.0 Vp-p.
10. Press the ■ key.
11. Exit the test mode.

**Note)** Using a recorded disc in this adjustment will erase the data.

## [Low Reflection CD Traverse Adjustment]

### Connection:



### Adjusting Method:

1. Set the servo mode of the test mode (Mode: 000).
2. Press the ► key, and set the low reflection CD playback adjustment mode (Mode: 040) using the volume + and - keys.
3. Load any MO disc available on the market.
4. When the ► key is pressed, the low reflection CD playback EF balance adjustment mode (Mode: 042) will be set after low reflection CD focus search ON (Mode: 041).
5. Press the ■ key to perform automatic adjustment, and check that the traverse waveform is symmetrical at the top and bottom.

(Traverse Waveform)

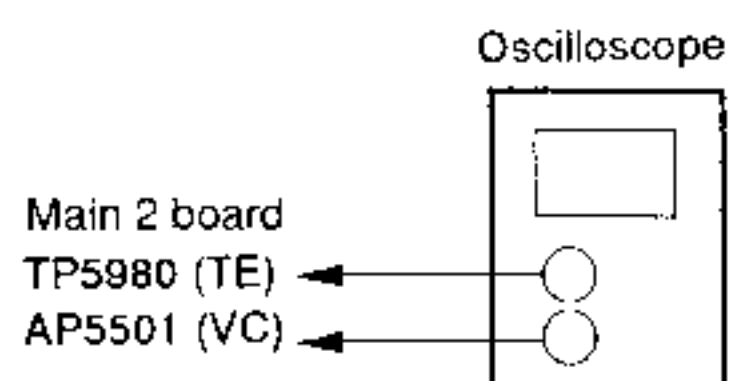


Specification:  $A=B$ ,  $C \geq 2.0 \text{ Vp-p}$

6. Check that the traverse level at this time is above  $2.0 \text{ Vp-p}$ .
7. Press the ■ key.
8. Exit the test mode.

## [CD Traverse Adjustment]

### Connection:



### Adjusting Method:

1. Set the servo mode of the test mode (Mode: 000).
2. Press the ► key, and set the CD playback adjustment mode (Mode: 050) using the volume + and - keys.
3. Press the ◀ and ▶ keys and move the optical pickup to the center circumference.
4. Load a CD test disc (TDYS-1).
5. When the ► key is pressed, the CD playback EF balance adjustment mode (Mode: 052) will be set after CD focus search ON (Mode: 051).
6. Press the ■ key to perform automatic adjustment, and check that the traverse waveform is symmetrical at the top and bottom.

(Traverse Waveform)

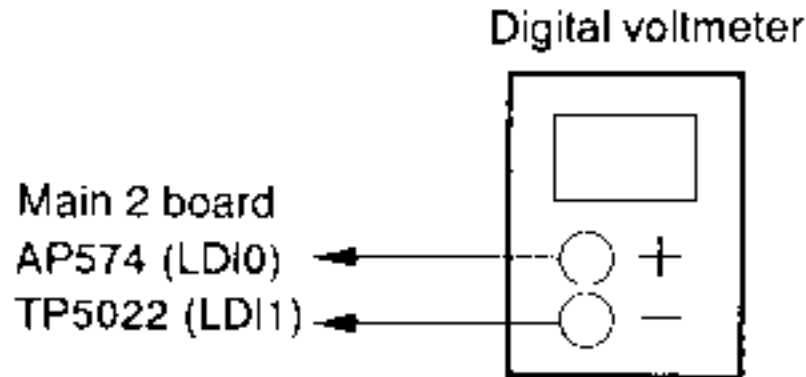
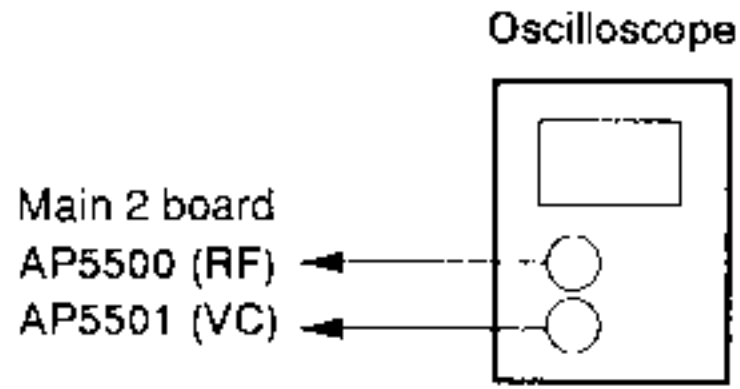


Specification:  $A=B$ ,  $C \geq 2.0 \text{ Vp-p}$

7. Check that the traverse level at this time is above  $2.0 \text{ Vp-p}$ .
8. Exit the test mode.

## [CD RF Level Check]

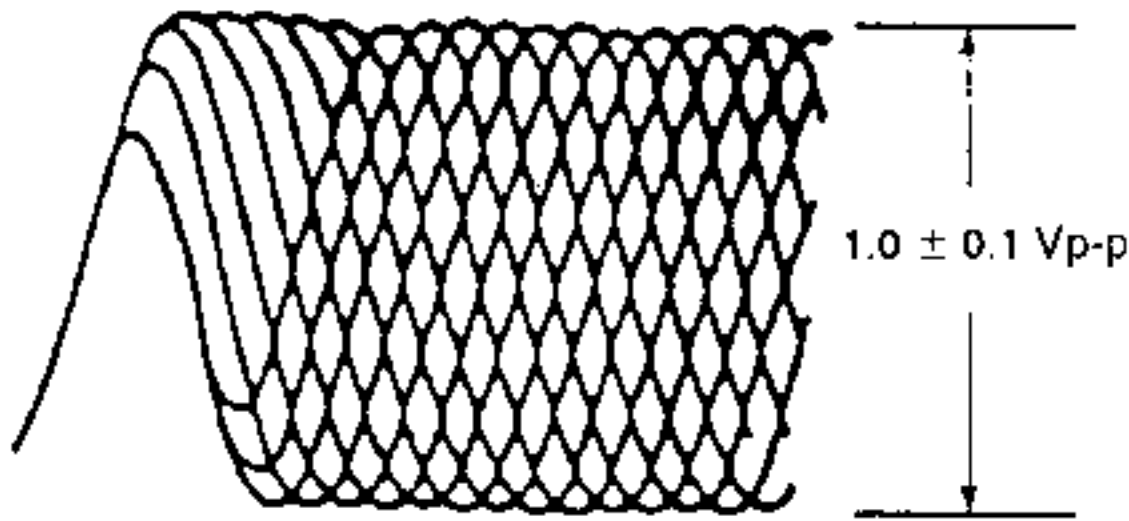
### Connection:



### Adjusting Method:

1. Set the servo mode of the test mode (Mode: 000).
2. Press the ► key, and set the CD playback adjustment mode (Mode: 050) using the volume + and – keys.
3. Press the ◀◀ and ▶▶ keys and move the optical pickup to the center circumference.
4. Load a CD test disc (TDYS-1).
5. When the ► key is pressed, the CD EF balance adjustment mode (Mode: 052) will be set after CD focus search ON (Mode: 051).
6. When the ► key is pressed, the ABCD level adjustment mode (Mode: 053) is set.
7. Press the ■ key to perform automatic adjustment, and check that the RF level is  $1.0 \pm 0.1$  Vp-p.

(RF Waveform)



8. Check that the voltage between AP574 (LDI0) and TP5022 (LDI1) at this time is below 61 mV.
9. Press the ■ key.
10. Exit the test mode.