MZ-NF610

SERVICE MANUAL

US Model
Canadian Model

Ver 1.0 2003. 03

US and foreign patents licensed from Dolby Laboratories.

- SonicStage, OpenMG and the OpenMG logo, MagicGate, Net MD and the Net MD logo are trademarks of Sony Corporation.
- Microsoft, Windows, Windows NT and Windows Media are trademarks or registered trademarks of Microsoft Corporation in the United States and /or other countries.
- IBM and PC/AT are registered trademarks of International Business Machines Corporation.
- Macintosh is a trademark of Apple Computer, Inc. in the United States and/ or other countries.
- MMX and Pentium are trademarks or registered trademarks of Intel Corporation.
- All other trademarks and registered trademarks are trademarks or registered trademarks of their respective holders.
- ™ and ® marks are omitted in this manual.

Model Name Using Similar Mechanism	MZ-R410
Mechanism Type	MT-MZN710-177
Optical Pick-up Name	LCX-5R

SPECIFICATIONS

MD recorder

Audio playing system
MiniDisc digital audio system

Laser diode properties
Material: GaAlAs
Wavelength: λ = 790 nm
Emission duration: continuous
Laser output: less than 44.6 μW
(This output is the value measured at a distance of 200 mm from the lens surface on the optical pick-up block with 7 mm aperture.)

Recording and playback time (when using MDW-80)
Maximum 160 min. in monaural
Maximum 320 min. in LP4 stereo

Revolutions
380 rpm to 2,700 rpm (CLV)

Error correction
ACIRC (Advanced Cross Interleave Reed Solomon Code)

Sampling frequency
44.1 kHz

Sampling rate converter
Input: 32 kHz/44.1 kHz/48 kHz

Coding
ATRAC (Adaptive TRansform Acoustic Coding)
ATRAC3 — LP2/LP4

– Continued on next page –

PORTABLE MINIDISC RECORDER

9-877-144-01
2003C167800-1

Sony Corporation
Personal Audio Company
Published by Sony Engineering Corporation

SONY®

Modulation system
EFM (Eight to Fourteen Modulation)
Frequency response
20 to 20,000 Hz ± 3 dB
Inputs[1)]
Line in:
stereo mini-jack for analog input (minimum input level 49 mV)
optical (digital) mini-jack for optical (digital) input
Outputs
🎧: stereo mini-jack
Maximum output level
USA model:
5mW + 5mW; load impedance 24Ω
Canadian model:
5mW + 5mW; load impedance 16Ω

Radio
Frequency range
USA model:
FM: 87.5-108 MHz
AM: 530-1,710 kHz (10 kHz step)
531-1,710 kHz (9 kHz step)
TV: 2-13 CH
WEATHER: 1-7 CH
Canadian model:
FM: 87.5-108 MHz
AM: 530-1,710 kHz (10 kHz step)
531-1,710 kHz (9 kHz step)
Antenna
FM/TV/WEATHER:
Headphones/earphones cord antenna
AM:
Built-in ferrite bar antenna

General
Power requirements
Sony AC Power Adaptor connected at the DC IN 3V jack:
120 V AC, 60 Hz (Models for USA, Canada, Mexico, and Taiwan)
230 V AC, 50/60 Hz (Models for continental Europe and Chili)
240 V AC, 50 Hz (Model for Australia)
220 V AC, 50 Hz (Model for China)
230 V AC, 50 Hz (Models for U.K. and Hong Kong)
220 V AC, 60 Hz (Model for Korea)
100 - 120 V/220 - 240 V AC, 50/60 Hz (Other models)
The recorder:
Nickel metal hydride rechargeable battery NH-7WMAA 1.2V 700 mAh (MIN) Ni-MH
LR6 (size AA) alkaline battery
Dimensions
Approx. 81.0 × 27.7 × 74.4 mm (w/h/d) (3 1/4 × 1 1/8 × 3 in.)
Mass
Approx. 103 g (3.6 oz) the recorder only

[1)]The LINE IN (OPTICAL) jack is used to connect either a digital (optical) cable or a line (analog) cable.
[2)]The 🎧 jack connects either headphones/ earphones or a line cable.
[3)]Measured in accordance with JEITA.

Supplied accessories
AC power adaptor (1)
NH-7WMAA Nickel metal hydride rechargeable battery (1)
Headphones with a remote control (1)
(for USA model)
Earphones with a remote control (1)
(for Canadian model)
Dedicated USB cable (1)
Battery carrying case (1)
CD-ROM (SonicStage Ver. 1.5) (1)*

*Do not play a CD-ROM on an audio CD player.

US and foreign patents licensed from Dolby Laboratories.

Design and specifications are subject to change without notice.

Battery life

The battery life may be shorter due to operating conditions, the temperature of the location, or alkaline dry battery you use.

When recording
(Unit: approx.hours)(JEITA[1)])

Batteries	SP Stereo	LP2 Stereo	LP4 Stereo
Nickel metal hydride rechargeable battery[2)]	5.5	8	9
LR6 Sony alkaline dry battery[3)]	9	12	16

[1)] Measured in accordance with the JEITA (Japan Electronics and Information Technology Industries Association) standard.
[2)] When using a 100% fully charged nickel metal hydride rechargeable battery (NH-7WMAA).
[3)] When using a Sony LR6 (SG) "STAMINA" alkaline dry battery (produced in Japan).

When playing
(Unit: approx.hours)(JEITA)

Batteries	SP Stereo	LP2 Stereo	LP4 Stereo
Nickel metal hydride rechargeable battery	14.5	15.5	17.5
LR6 Sony alkaline dry battery	36	42.5	48

When using the radio
(Unit: approx.hours)(JEITA)

Batteries	FM/ AM	TV/Wb (weather) (USA model only)
Nickel metal hydride rechargeable battery	7.5	7
LR6 Sony alkaline dry battery	18.5	17

Note
When you use the radio, it is recommended that you use a fully charged rechargeable battery or a new dry battery since more power is consumed by the radio than by MD playback.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ 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 IDENTIFÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈSES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPÉMENTS PUBLIÉS PAR SONY.

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

On power sources

- Use house current, nickel metal hydride rechargeable battery, LR6 (size AA) battery, or car battery.
- For use in your house: Do not use any other AC power adaptor since it may cause the recorder to malfunction.

Polarity of the plug

- Connect the AC power adaptor to an easily accessible AC outlet. Should you notice an abnormality in the AC power adaptor, disconnect it from the AC outlet immediately.
- The recorder is not disconnected from the AC power source (mains) as long as it is connected to the wall outlet, even if the recorder itself has been turned off.
- If you are not going to use this recorder for a long time, be sure to disconnect the power supply (AC power adaptor, dry battery, rechargeable battery, or car battery cord). To remove the AC power adaptor from the wall outlet, grasp the adaptor plug itself; never pull the cord.

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.

UNLEADED SOLDER

Boards requiring use of unleaded solder are printed with the lead-free mark (LF) indicating the solder contains no lead.
(Caution: Some printed circuit boards may not come printed with the lead free mark due to their particular size)

: LEAD FREE MARK

Unleaded solder has the following characteristics.

- Unleaded solder melts at a temperature about 40 ˚C higher than ordinary solder.
  Ordinary soldering irons can be used but the iron tip has to be applied to the solder joint for a slightly longer time.
  Soldering irons using a temperature regulator should be set to about 350 ˚C .
  Caution: The printed pattern (copper foil) may peel away if the heated tip is applied for too long, so be careful!
- Strong viscosity
  Unleaded solder is more viscous (sticky, less prone to flow) than ordinary solder so use caution not to let solder bridges occur such as on IC pins, etc.
- Usable with ordinary solder
  It is best to use only unleaded solder but unleaded solder may also be added to ordinary solder.

TABLE OF CONTENTS

SECTION 1
SERVICING NOTES

NOTES ON HANDLING THE OPTICAL PICK-UP BLOCK OR BASE UNIT

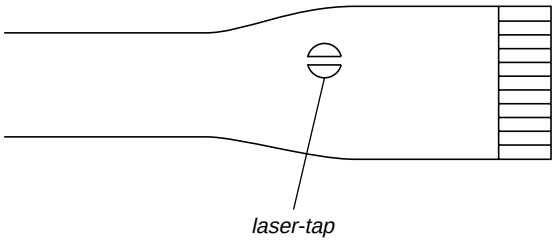
The laser diode in the optical pick-up block may suffer electrostatic break-down because of the potential difference generated by the charged electrostatic load, etc. on clothing and the human body.
During repair, pay attention to electrostatic break-down and also use the procedure in the printed matter which is included in the repair parts.
The flexible board is easily damaged and should be handled with care.

NOTES ON LASER DIODE EMISSION CHECK

Never look into the laser diode emission from right above when checking it for adjustment. It is feared that you will lose your sight.

NOTES ON HANDLING THE OPTICAL PICK-UP BLOCK (LCX-5R)

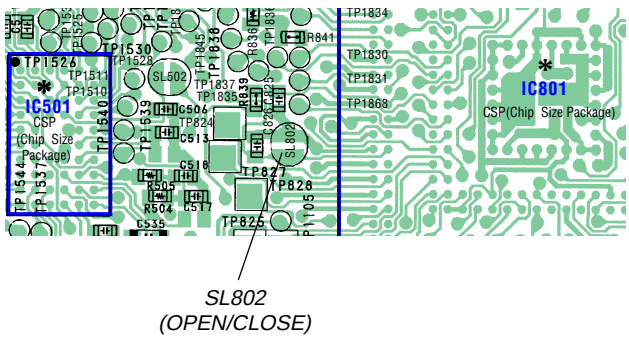
The laser diode in the optical pick-up block may suffer electrostatic break-down easily. When handling it, perform soldering bridge to the laser-tap on the flexible board. Also perform measures against electrostatic break-down sufficiently before the operation. The flexible board is easily damaged and should be handled with care.



OPTICAL PICK-UP FLEXIBLE BOARD

- In performing the repair with the power supplied to the set, removing the MAIN board causes the set to be disabled.
  In such a case, make a solder bridge to short SL802 (OPEN/CLOSE) on the MAIN board.

– MAIN Board (Side B) –



System requirements

The following hardware and software are required in order to use the SonicStage software for the Net MD.

Computer	IBM PC/AT or Compatible
	CPU: Pentium II 400 MHz or higher (Pentium III 450 MHz or higher is recommended.) Hard disk drive space[1]: 120 MB or more RAM: 64 MB or higher (128 MB or higher is recommended)
	Others CD-ROM drive (capable of digital playback by WDM) Sound Board USB port (supports USB 2.0 Full Speed (previously USB 1.1))
Operating System	Factory installed: Windows XP Home Edition/Windows XP Professional/Windows Millennium Edition/Windows 2000 Professional/Windows 98 Second Edition
Display	High Color (16bit) or greater, 800 · 480 dots or more (800 · 600 dots or more is recommended)
Others	Internet access: for Web registration and EMD services Windows Media Player (version 7.0 or higher) installed for playing WMA files

[1] **Note on hard disk drive space**

120 MB or more free space on the hard disk drive is required. If your computer does not have enough space, the software will not be properly installed. The required free space differs according to the version of your Windows OS, or the amount of audio files that you handle.

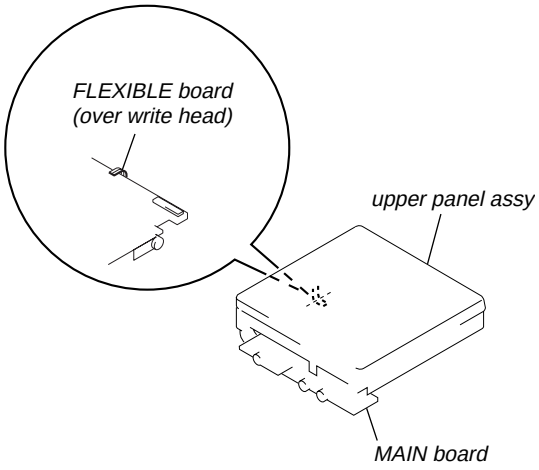
This software is not supported by the following environments:

- Macintosh
- Windows XP versions other than Home Edition or Professional
- Windows 2000 versions other than Professional
- Windows 98 versions other than Second Edition
- Windows NT
- Windows 95
- Personally constructed PCs or operating systems
- An environment that is an upgrade of the original manufacturer-installed operating system
- Multi-boot environment
- Multi-monitor environment

Notes

- We do not ensure trouble-free operation on all computers that satisfy the system requirements.
- We do not ensure trouble-free operation of the system suspend, sleep, or hibernation function on all computers.

- Handle the FLEXIBLE board (over write head) with care, as it has been soldered directly to the MAIN board.
  In repairing the component side of MAIN board, connect the FLEXIBLE board (over write head) and the MAIN board with the lead wires in advance.



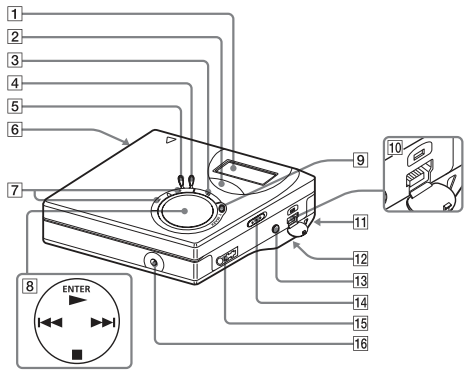
- This set requires the patch data in the nonvolatile memory (IC851) to be rewritten using the application, when the MAIN board was replaced. (See page 31)

SECTION 2
GENERAL

This section is extracted from instruction manual.

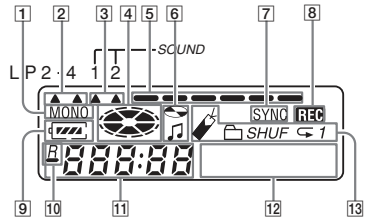
Looking at controls

The recorder



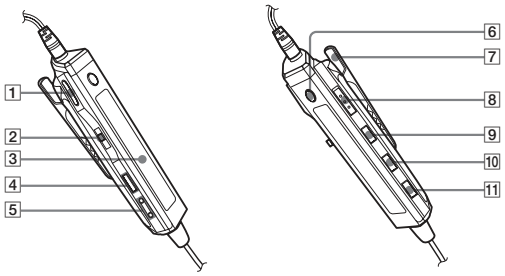
1 Display window
2 GROUP button
3 ❚❚ (pause) button
4 END SEARCH button
5 MENU button
6 OPEN button
7 VOL +*, – button
* VOL + has a tactile dot.
8 4-way control key
ENTER • ►*
I◄◄ ,►►I (search/AMS)
■ • CANCEL/CHG (stop/cancel/charge)
* ► has a tactile dot.
9 REC (record) • T MARK button
10 USB connecting jack
11 Handstrap hole
Use the hole to attach your own strap.
12 Battery compartment (at the bottom)
13 LINE IN (OPTICAL) jack
14 HOLD switch
To prevent the buttons from being accidentally operated when you carry the recorder, use this function.
15 ∩ (headphones/earphones) jack
16 DC IN 3V jack

The display window of the recorder



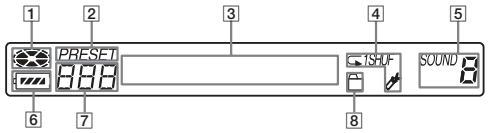
1 MONO (monaural) indication
2 LP mode indication
3 Sound indications
4 Disc indication
Shows that the disc is rotating for recording or playing an MD.
5 Level meter
Shows the volume of the MD being played or recorded.
6 Disc name/track name indication
Lights up when labeling a disc or a track.
7 SYNC (synchro-recording) indication
8 REC indication
Lights up while recording. When flashing, the recorder is in record standby mode.
9 Battery indication
Shows approximate battery condition.
10 ▬ : Indication for remaining playing time of the current track or of the disc
R : Indication for remaining recordable time of the disc
11 Time display
12 Character information display
Displays the disc and track names, error messages, track numbers, etc.
13 Play mode indications
Shows the play mode (shuffle play, repeat play, group play, bookmark play, etc.) of the MD.

The headphones/earphones with a remote control



1 VOL +, – buttons
Press to adjust the volume.
2 Jog lever (I◄◄ • ►❚❚/ENT • ►►I, TUNE – • BAND • TUNE +)
►❚❚/ENT (to press): play, pause, enter
I◄◄ (to slide towards): REW
►►I (to slide towards): FF
BAND (to press): select a band
TUNE – (to slide towards): tune backward
TUNE + (to slide towards): tune forward
3 Display window
4 ■ (stop) button
5 🗀 (group) +, – buttons
6 RADIO ON/OFF button
Press to turn on or off the radio.
7 Clip
8 HOLD switch
To prevent the buttons from being accidentally operated when you carry the recorder, use this function.
9 DISPLAY button
10 P-MODE/ ⊂ button
11 SOUND button

The display window of the remote control

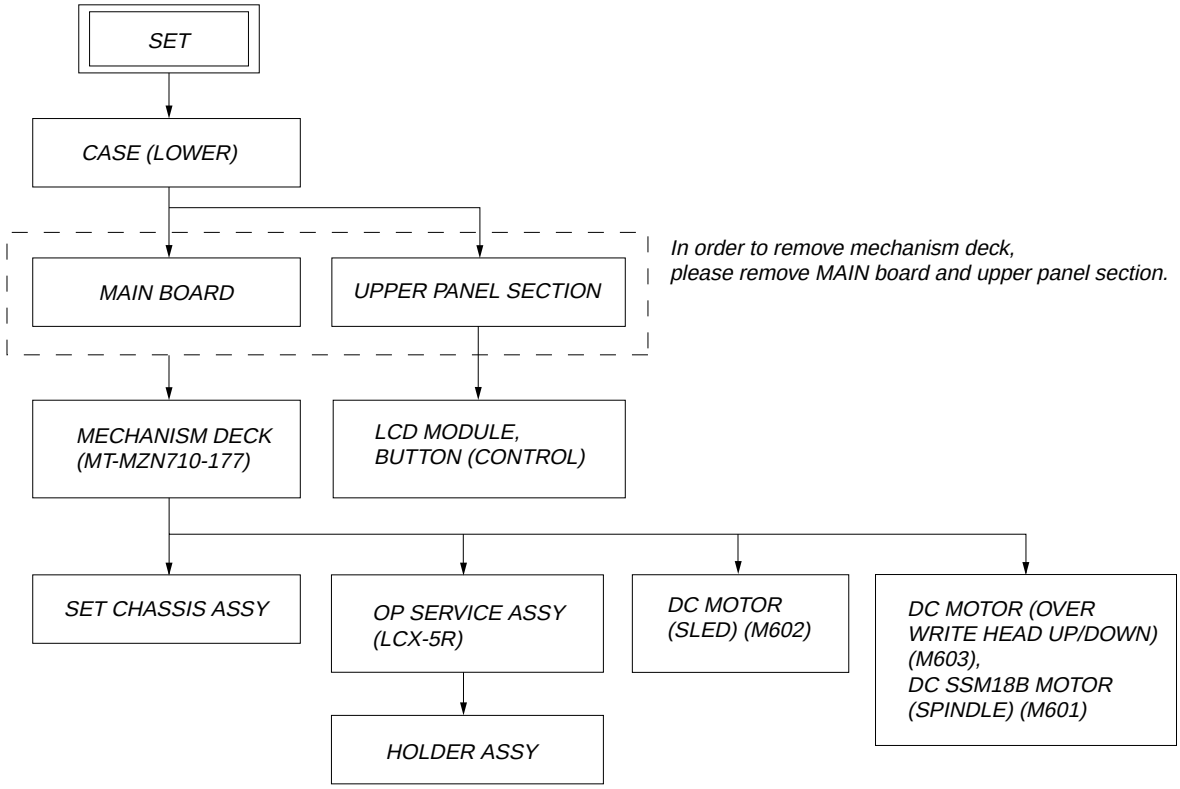


1 Disc indication
2 PRESET indication
3 Character information display
4 Play mode indication
5 SOUND indication
6 Battery level indication
7 Track number/Band/Preset number display
8 Group indication

SECTION 3
DISASSEMBLY

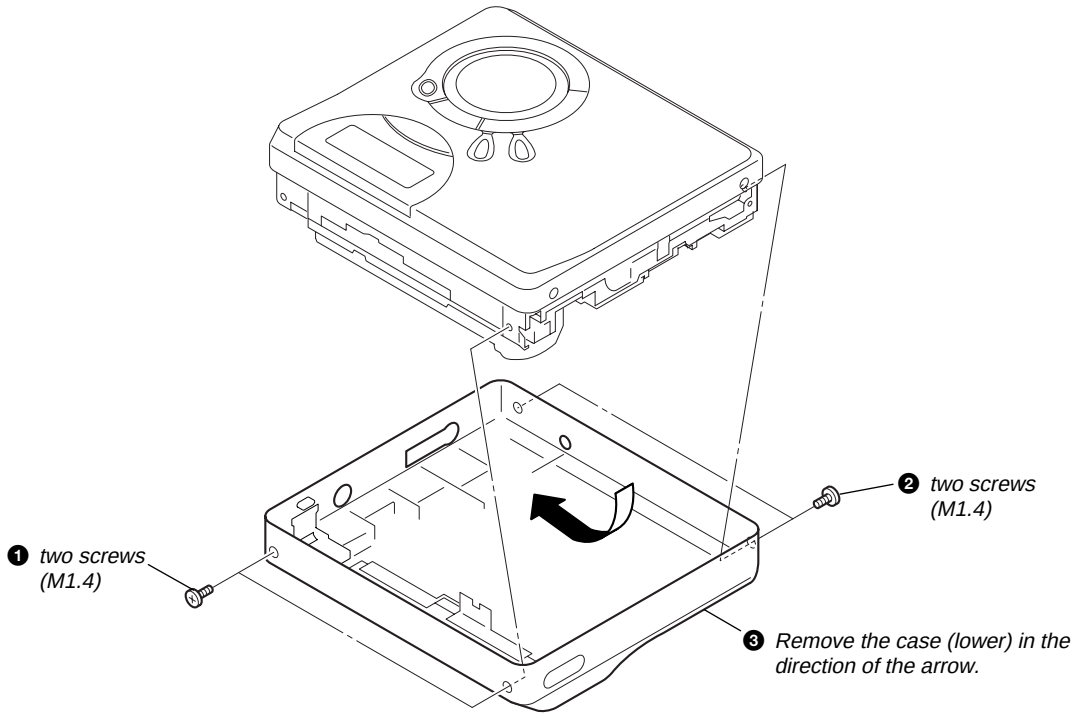
• This set can be disassembled in the order shown below.

3-1. Disassembly Flow

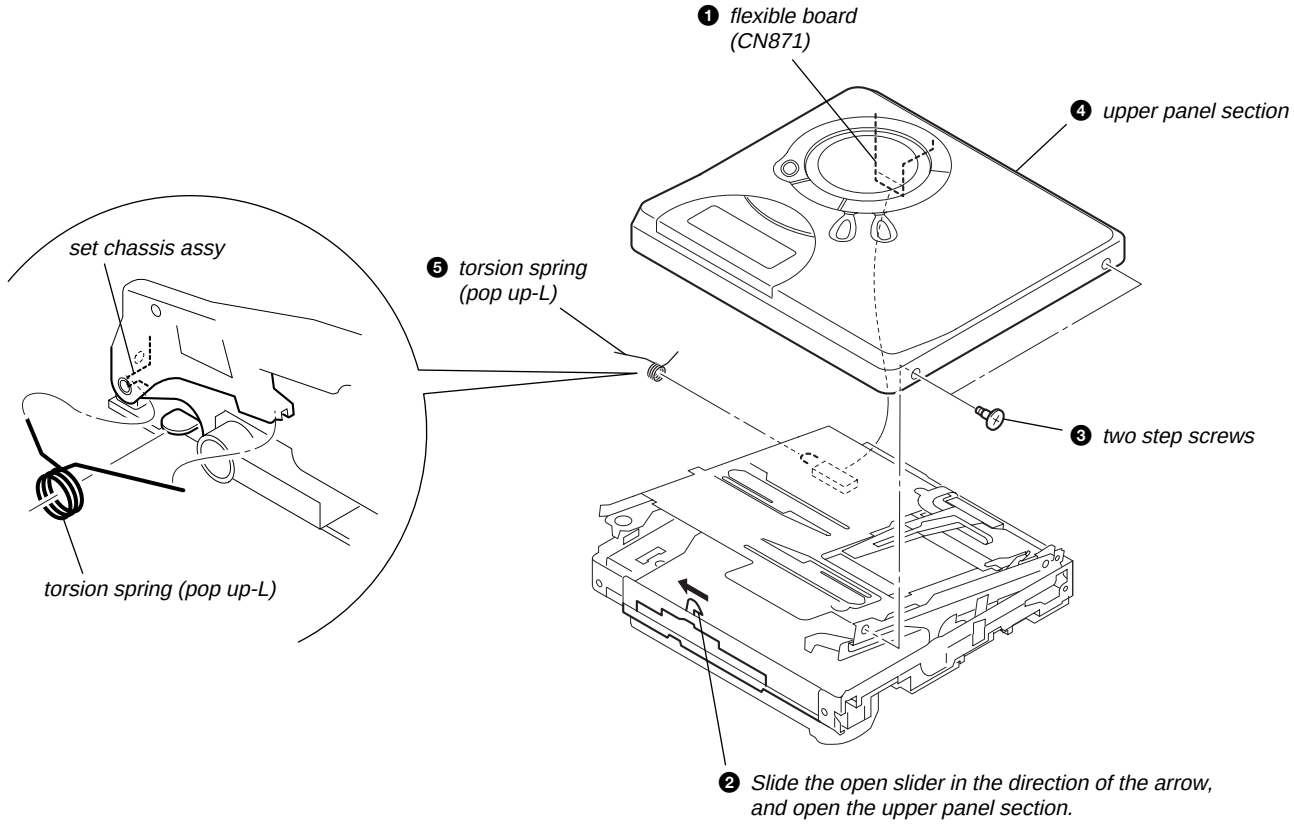


Note: Follow the disassembly procedure in the numerical order given.

3-2. Case (Lower)

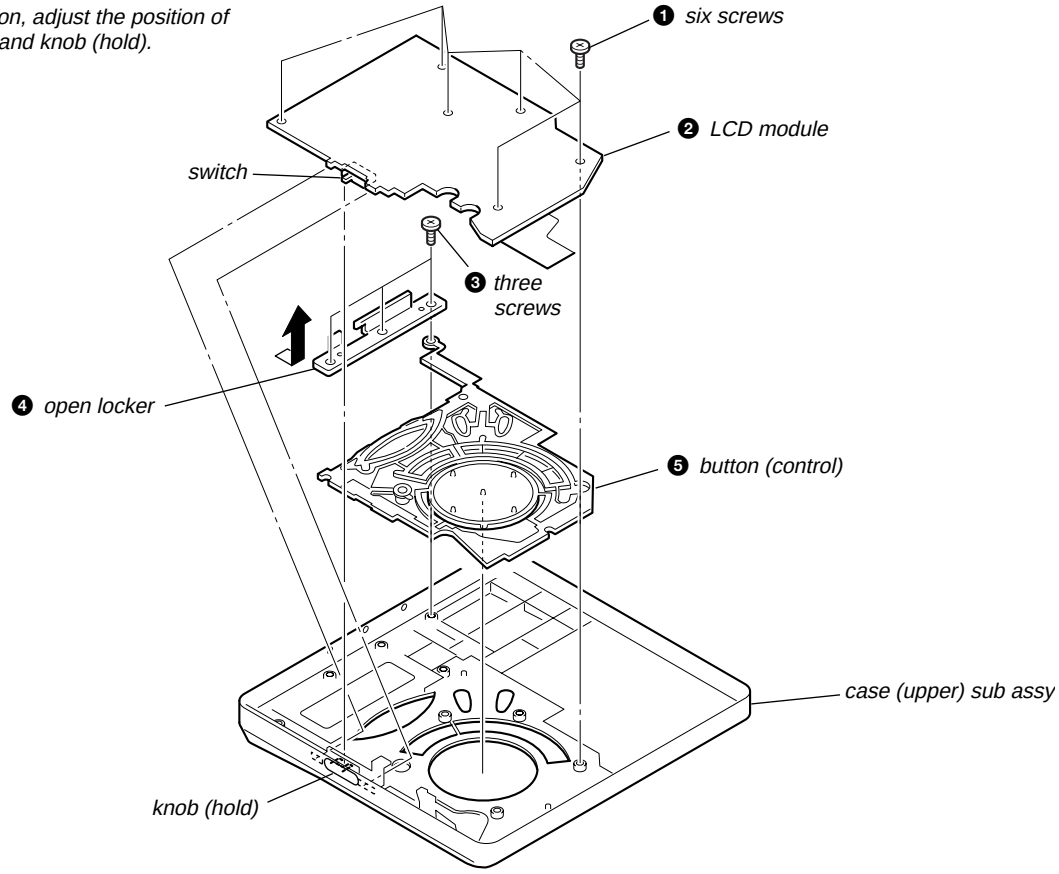


3-3. Upper Panel Section

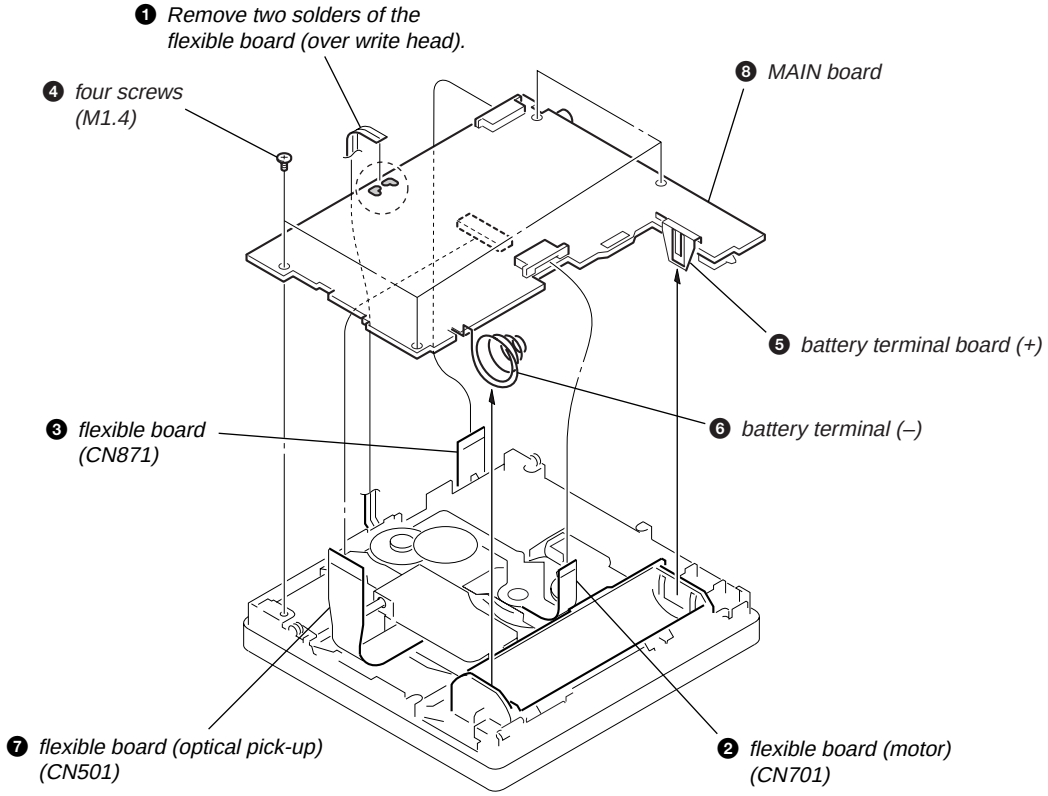


3-4. LCD Module, Button (Control)

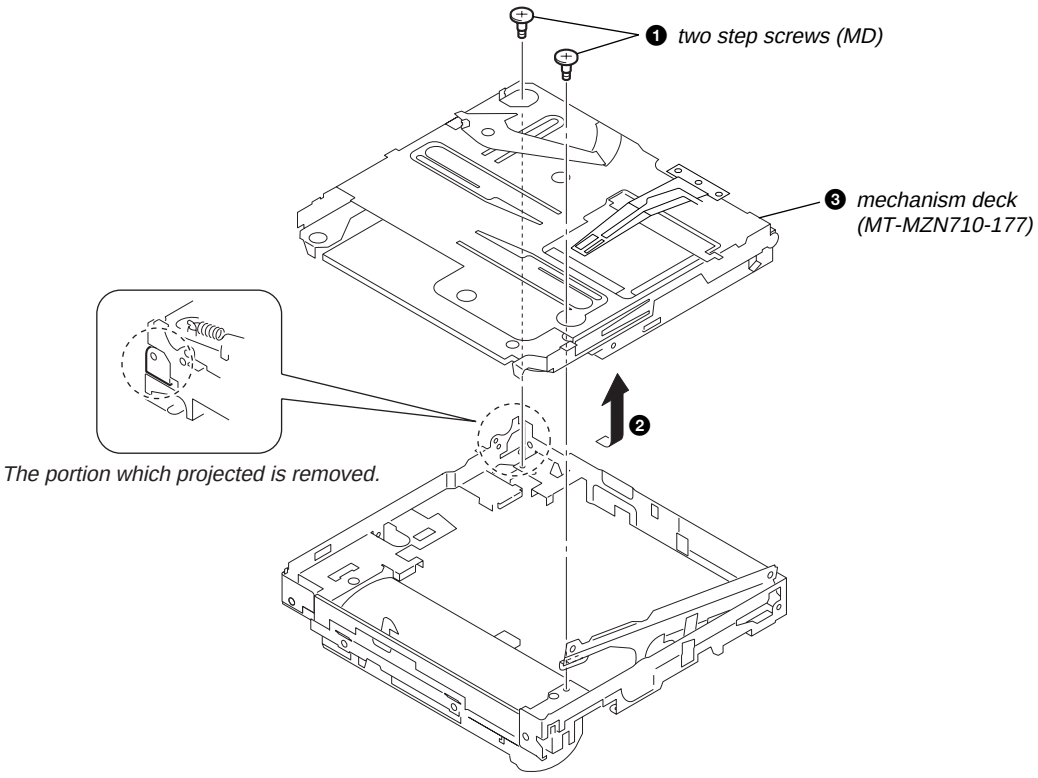
Note: On installation, adjust the position of both switch and knob (hold).



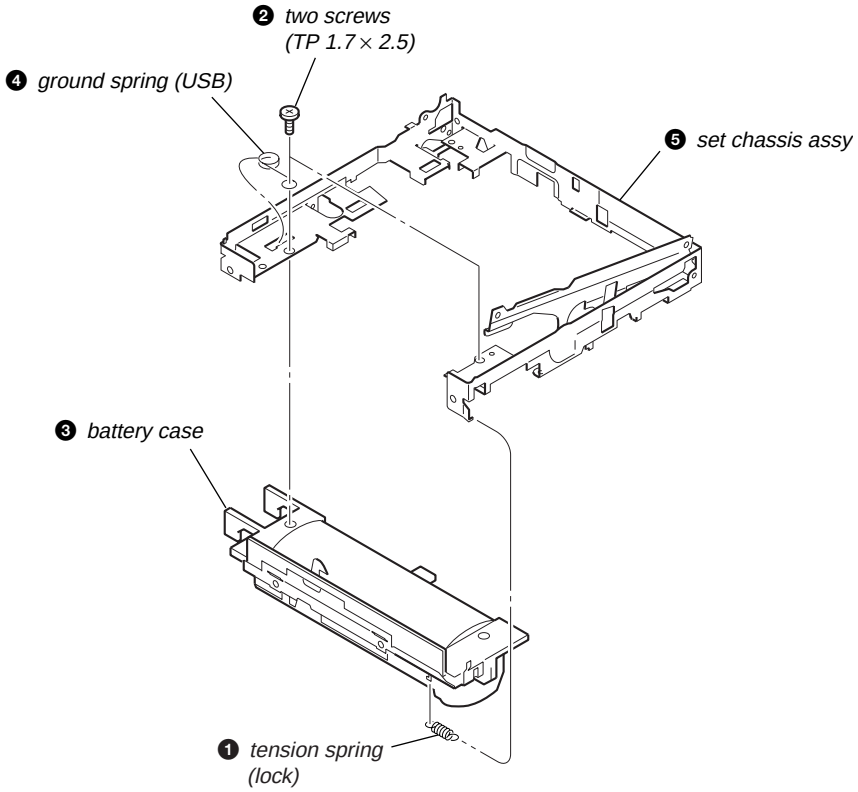
3-5. MAIN Board



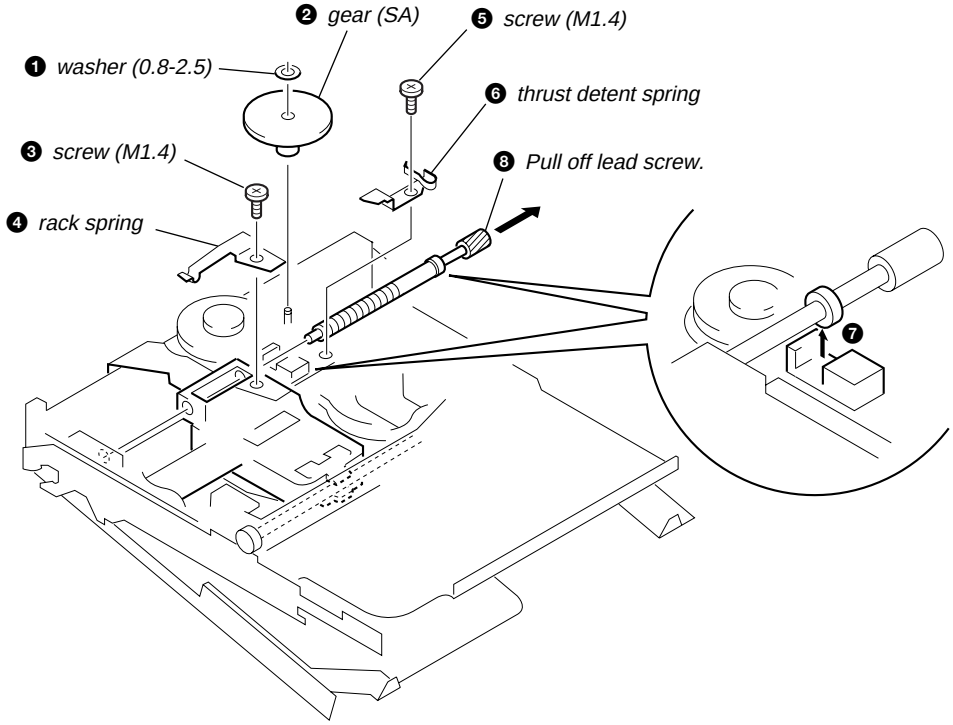
3-6. Mechanism Deck (MT-MZN710-177)

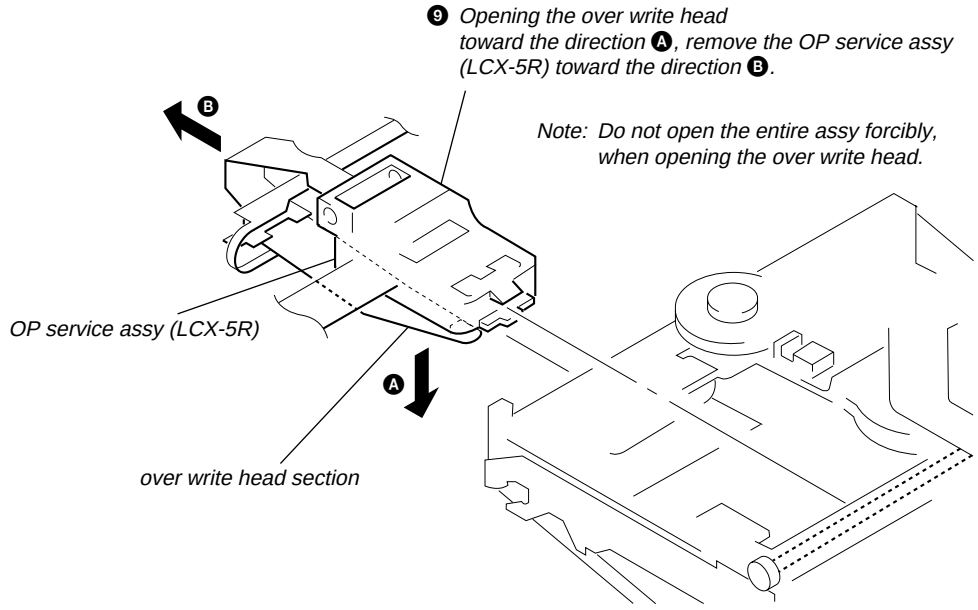


3-7. Set Chassis Assy

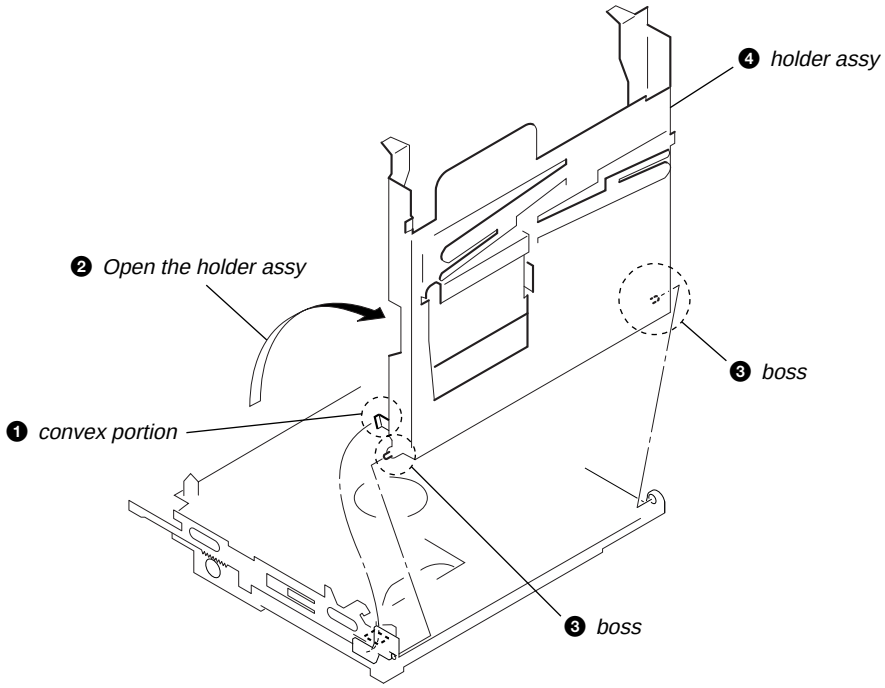


3-8. OP Service Assy (LCX-5R)

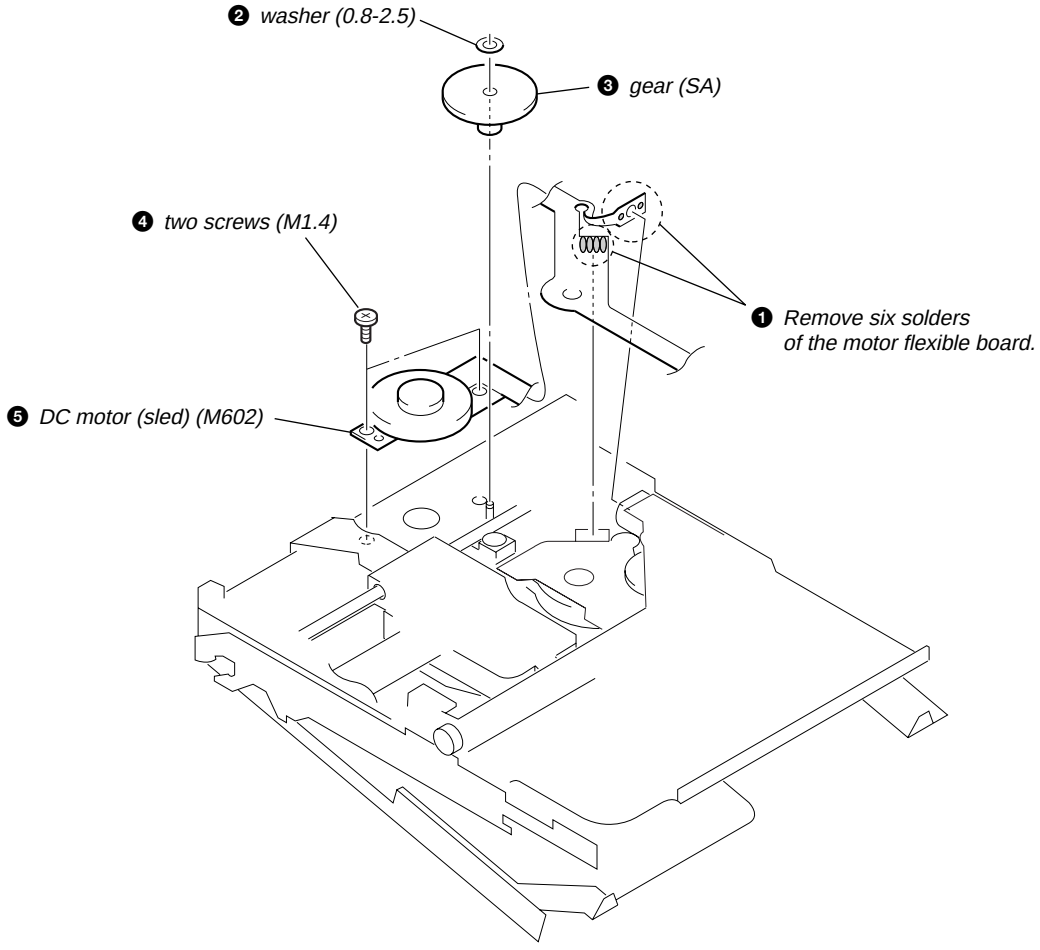




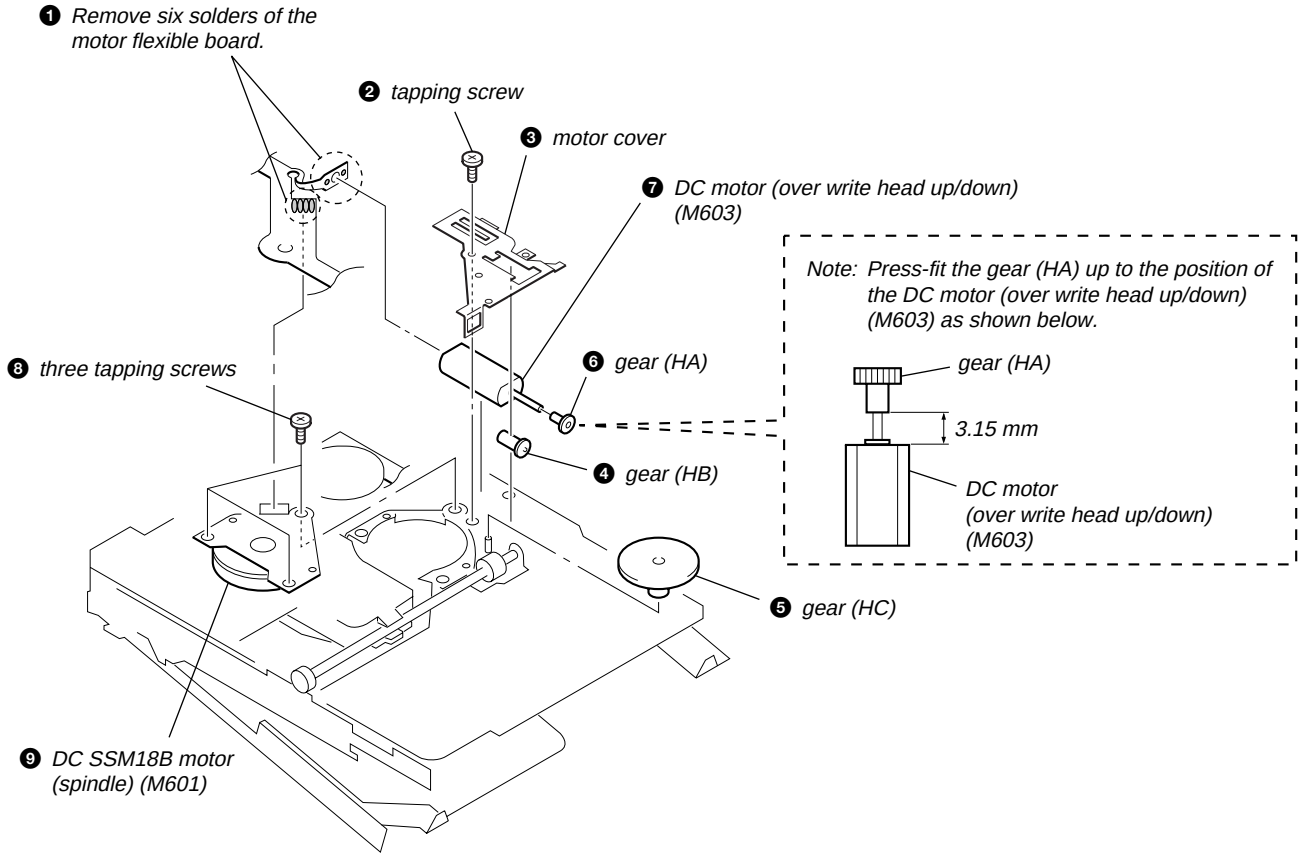
3-9. Holder Assy



3-10. DC Motor (Sled) (M602)



3-11. DC Motor (Over Write Head Up/Down) (M603), DC SSM18B Motor (Spindle) (M601)



SECTION 4
TEST MODE

Outline

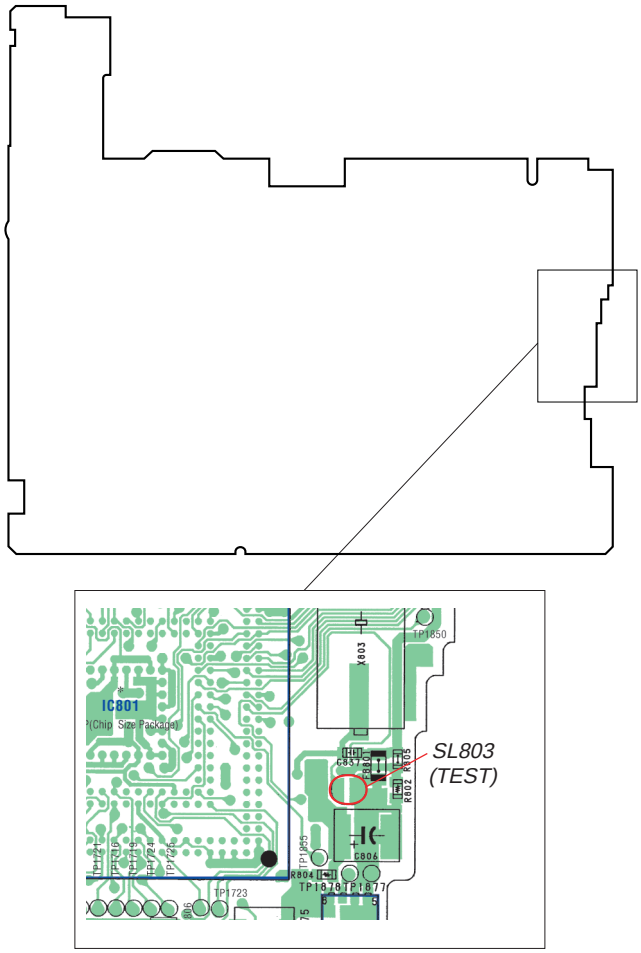
- This set provides the Overall adjustment mode that allows CD and MO discs to be automatically adjusted when in the test mode. In this overall adjustment mode, the disc is discriminated between CD and MO, and each adjustment is automatically executed in order. If a fault is found, the system displays its location. Also, the manual mode allows each individual adjustment to be automatically adjusted.
- Operation in the test mode is performed with the set. A key having no particular description in the text, indicates a set key.

Setting Method of Test Mode

There are three different methods to set the test mode:

① Short SL803 (TEST) on the MAIN board with a solder bridge (connect pin ⑫⑧ of IC801 to the ground). Then, turn on the power.

– MAIN Board (Side B) –



② In the normal mode, turn on the HOLD switch. While pressing the GROUP key press the following order:

⏭ → ⏭ → ⏮ → ⏮ → ⏭ →
⏮ → ⏭ → ⏮ → ⏸ → ⏸

③ In the normal mode, turn on the HOLD switch on the set. While pressing the ■CANCEL/CHG key on the set, press the keys on the remote commander with the following order :

⏭ → ⏭ → ⏮ → ⏮ → ⏭ →
⏮ → ⏭ → ⏮ → 🗀– → 🗀–

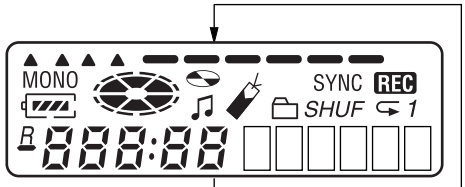
Note: If electrical adjustment (CD and MO overall adjustment) has not been finished completely, "ERROR" is displayed on LCD of the set.

Operation in Setting the Test Mode

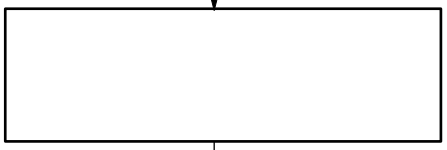
- When the test mode becomes active, first the display check mode is selected.
- Other mode can be selected from the display check mode.
- When the test mode is set, the LCD repeats the following display.

Set LCD display

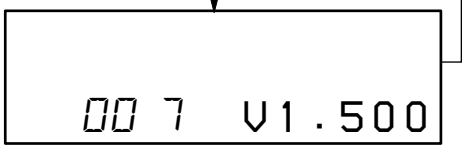
All lit



All off



Microcomputer version display



- When the ⏸ key is pressed and hold down, the display at that time is held so that display can be checked.

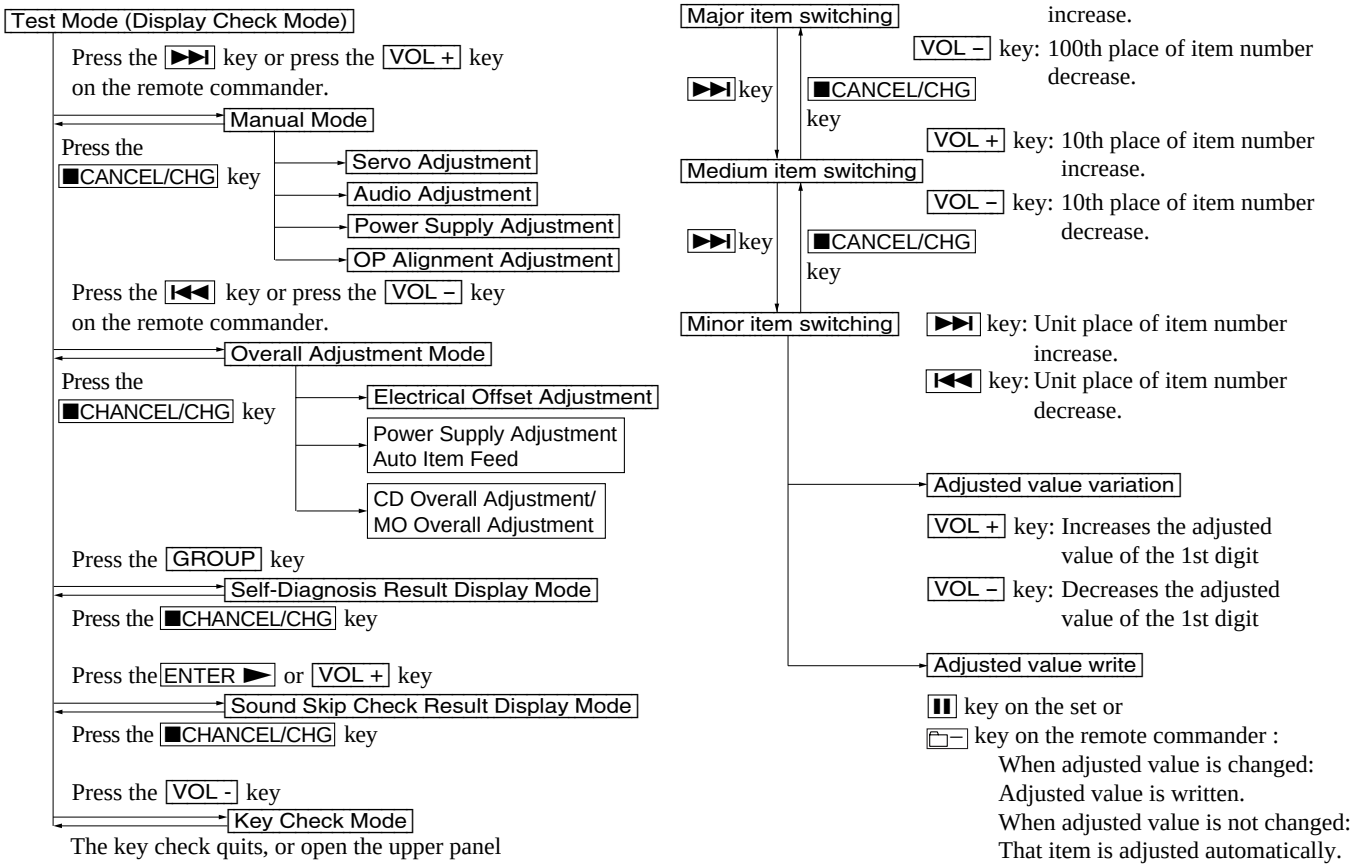
Releasing the Test Mode

For test mode set with the method ①:
Turn off the power and open the solder bridge on SL803 (TEST) on the MAIN board.

Note: Remove the solders completely. Remaining could be shorted with the chassis, etc.

For test mode set with the method ② or ③:
Turn off the power.

Configuration of Test Mode



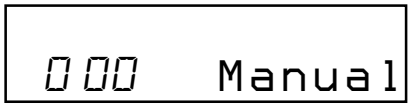
Manual Mode

Mode to adjust or check the operation of the set by function.
Normally, the adjustment in this mode is not executed.
However, the Manual mode is used to clear the memory, power supply adjustment, and laser power check before performing automatic adjustments in the Overall Adjustment mode.

- **Transition Method in Manual Mode**

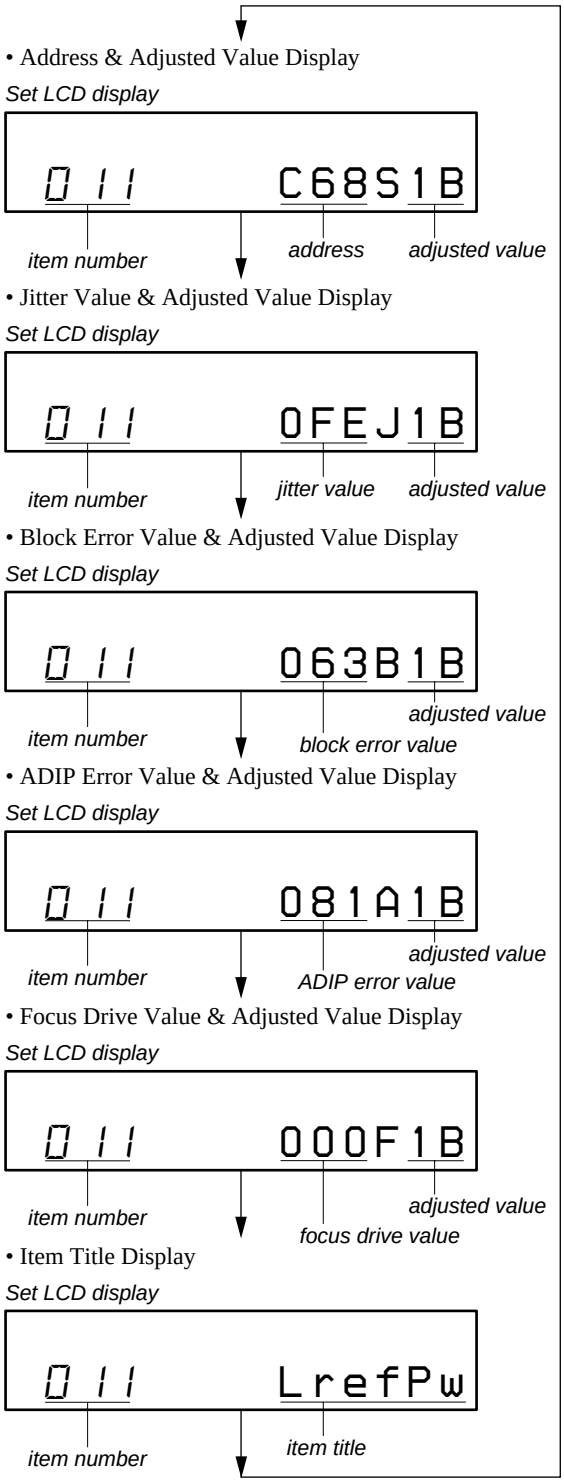
1. Set the test mode (see page 13).
2. Press the ▶▶I or press the VOL + key on the remote commander activates the manual mode where the LCD display as shown below.

Set LCD display



3. During each test, the optical pick-up moves outward or inward while the ▶▶I or I◀◀ key is pressed for several seconds respectively.
4. Each test item is assigned with a 3-digit item number;
   100th place is a major item, 10th place is a medium item, and unit place is a minor item.
   The values adjusted in the test mode are written to the nonvolatile memory (for the items where adjustment was made).

5. The display changes a shown below each time the END SEARCH key is pressed.



However in the power mode (item number 700's), only the item is displayed.

6. Quit the manual mode, and press the ■CANCEL/CHG key to return to the test mode (display check mode).

Overall Adjustment Mode

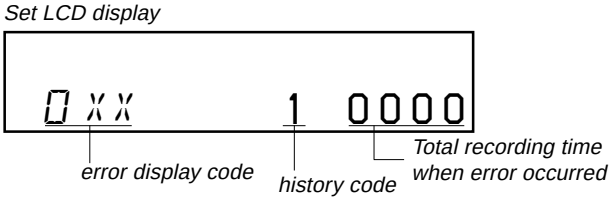
Mode to adjust the servo automatically in all items.
Normally, automatic adjustment is executed in this mode at the repair.
For further information, refer to "SECTION 5 ELECTRICAL ADJUSTMENTS" (see page 19).

Self-Diagnosis Result Display Mode

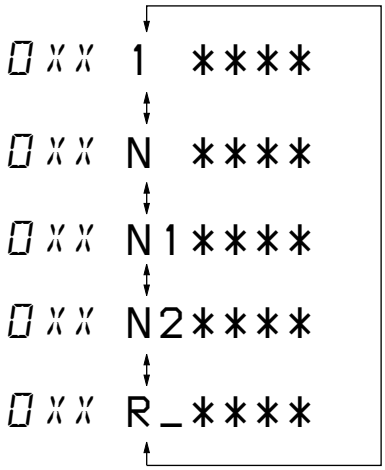
This set uses the self-diagnostic function system in which if an error occurred during the recording or playing, the mechanism control block and the power supply control block in the microcomputer detect it and record its cause as history in the nonvolatile memory.
By checking this history in the test mode, you can analyze a fault and determine its location.
Total recording time is recorded as a guideline of how long the optical pick-up has been used, and by comparing it with the total recording time at the time when an error occurred in the self-diagnosis result display mode, you can determine when the error occurred.
Clear both self-diagnosis history data and total recording time, if the optical pick-up was replaced.

• Self-Diagnosis Result Display Mode Setting Method

1. Set the test mode (see page 13).
2. In the display check mode, press the GROUP key activates the self-diagnosis result display mode where the LCD display as shown below.



3. Then, each time the ▶▶I key is pressed, LCD display descends by one as shown below. Also, the LCD display ascends by one when the I◀◀ key is pressed.



xx : Error code
**** : Total recording time

If the GROUP key is pressed with this display, the LCD switches to the simple display mode.

4. Quit the self-diagnosis result display mode, and press the ■CANCEL/CHG key to return to the test mode (display check mode).

• Description of Error Indication Codes

Problem	Indication code	Meaning of code	Simple display	Description
No error	00	No error	---	No error
Servo system error	01	Illegal access target address was specified	Adrs	Attempt to access an abnormal address
	02	High temperature	Temp	High temperature detected
	03	Focus error	Fcus	Disordered focus or can not read an address
	04	Spindle error	Spdl	Abnormal rotation of disc
TOC error	11	TOC error	TOC	Faulty TOC contents
	12	Data reading error	Data	data could not be read at SYNC
	13	TOC address error	Tadr	TOC address data error
Power supply system error	22	Low battery	LBat	Momentary interruption detected
Offset system error	31	Offset error	Ofst	Offset error
	32	Focus error ABCD offset error	ABCD	Focus error ABCD offset error
	33	Tracking error Offset error	TE	Tracking error Offset error
	34	X1 tracking error Offset error	X1TE	X1 tracking error Offset error
	35	MD DATA 2 disc error	MD2	MD DATA 2 disc error
	36	Mirror error	Mirr	Mirror retry over

• Description of Indication History

History code number	Description
1	The first error
N	The last error
N1	One error before the last.
N2	Two errors before the last.
R_	Total recording time

Reset the Error Display Code

After servicing, reset the error display code.

• Setting Method of Reset the Error Display Code

1. Set the test mode (see page 13).
2. Press the GROUP key activates the self-diagnosis result display mode.
3. To reset the error display code, press the ▮▮ key (twice) when the code is displayed (except "R_✱✱✱✱").
   (All the data on the 1, N, N1, and N2 will be reset)

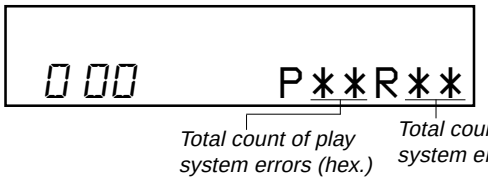
Sound Skip Check Result Display Mode

This set can display the count of errors that occurred during the recording/playing for checking.

• Setting Method of Sound Skip Check Result Display Mode

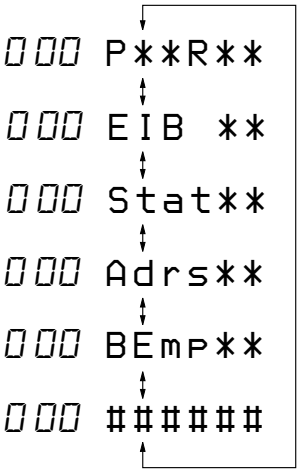
1. Set the test mode (see page 13).
2. Press the ENTER► key or VOL+ key, and the playing or recording sound skip result display mode becomes active respectively where the LCD displays the following.

Set LCD display

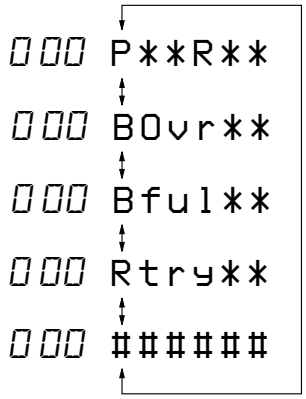


3. When the ENTER► key is pressed, total error count is displayed on the LCD, and each time the ►►I key is pressed, the display item moves down by one as shown below. Also, if the I◄◄ key is pressed, the display item moves up by one, then if the VOL+ key is pressed, the display in the record mode appears.
   When the VOL + key is pressed, total error count is displayed on the LCD, and each time the ►►I key is pressed, the display item moves down by one as shown below. Also, if the I◄◄ key is pressed, the display item moves up by one, then if the ENTER► key is pressed, the display in the play mode appears.

Playing sound skip result display



Recording sound skip result display



P**R**: *Total play/record errors (hex.)*
**: *Counter of sound skip check each item (hex.)*
######: *6-digit address where sound was skipped last (hex.)*

• Cause of Sound Skip Error

	Cause of error	Description of error
Play	EIB	Sound error correction error
	Stat	Decoder status error
	Adrs	Address access error
	BEmp	Buffer is empty
Record	BOvr	Buffer is full, and sounds were dumped
	Bful	Buffer capacity becomes less, and forcible writing occurred
	Rtry	Retry times over

4. To quit the sound skip check result display mode and to return to the test mode (display check mode), press the ■CANCEL/CHG key.

• Setting Method of Key Check Mode

1. Set the test mode (see page 13).
2. Press the VOL - key activates the key check mode.

Set LCD display

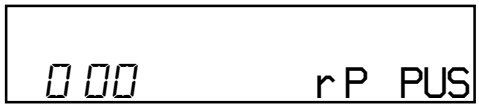
3. When each key on the set and on remote commander is pressed, its name is displayed on the set LCD. (Operated position is displayed for 4 seconds after the slide switch is operated.

Example1: When the ►►I key on the set is pressed:

Set LCD display

Example2: When the ►II /ENT key on the remote commander is pressed:

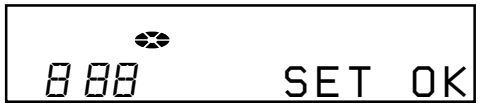
Set LCD display



4. When all the keys on the set and on the remote commander are considered as OK, the following displays are shown.

   Example1: When the keys on the set are considered as OK:

   Set LCD display



   Example2: When the keys on the remote commander are considered as OK:

   Set LCD display

5. When all keys were checked or if the upper panel is opened, the key check mode quits and the test mode (display check mode) comes back.

SECTION 5
ELECTRICAL ADJUSTMENTS

Outline

- In this set, automatic adjustment of CD and MO can be performed by entering the test mode.
  However, before starting automatic adjustment, the memory clear, power supply adjustment, and laser power check must be performed in the manual mode.
- A key having no particular description in the text, indicates a set key.

Precautions for Adjustment

1. Adjustment must be done in the test mode only.
   After adjusting, release the test mode.
2. Use the following tools and measuring instruments.
   - Test CD disc TDYS-1
     (Part No. : 4-963-646-01)
   - SONY MO disc available on the market
   - Digital voltmeter
   - Laser power meter LPM-8001
     (Part No. : J-2501-046-A)
   - Thermometer (using the Temperature Correction)
   - Personal computer
   - USB cable
3. Unless specified otherwise, supply DC 3V from the DC IN 3V jack (J951).
4. Switch position
   HOLD switch ..... ON

Adjustment Sequence

1. NV Reset (item number: 021)
   (EEPROM clear)
   ↓
2. Temperature Correction (item number: 015)
   ↓
3. Power Supply Manual Adjustment
   ↓
4. Laser Power Check
   ↓
5. CD Overall Adjustment (item number: 031)
   ↓
6. MO Overall Adjustment (item number: 034)
   ↓
7. RESUME Clear (item number 043)
   ↓
8. Rewriting the Patch Data
   (at replacement of the MAIN board)
   ↓
9. Rewriting the NV values

Items 1–4: Manual Mode
Items 5–6: Overall Mode
Item 7: Manual Mode

NV Reset

• Setting Method of NV Reset

1. Select the manual mode of the test mode, and set item number 021 NV Reset (see page 14).

   Set LCD display

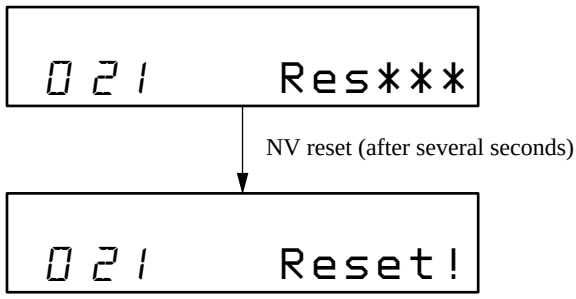
2. Press the [II] key.

   Set LCD display

3. Press the [II] key once more.

   Set LCD display

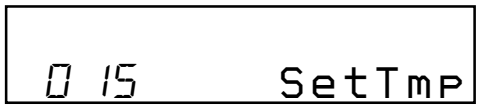
4. Press the [■CANCEL/CHG] key to quit the manual mode, and return to the test mode (display check mode).

Temparature Correction

• Adjustment Method of Temperature Correction

1. Select the manual mode of the test mode, and set the item number 015 (see page 14).

   Set LCD display

2. Measure the ambient temperature.
3. Adjust with [VOL +] or [VOL –] key so that the adjusted value (hexadecimal value) becomes the ambient temperature.
   (Initial value : 19h = 25˚C, Adjusting range : 80h to 7fh (–128˚C to +127˚C))
4. Press the [II] key or press the [–] key on the remote commander to write the adjusted value.

Power Supply Manual Adjustment

• Adjustment sequence

Adjustment must be done with the following steps.

1. VC1_LOW (PB) adjustment (item number : 741)
2. VC1_HIGH (REC) adjustment (item number : 742)
3. VC2_LOW adjustment (item number : 743)
4. VC2_HIGH adjustment (item number : 744)
5. REG1 adjustment (item number : 745)
6. REG3_LOW1 adjustment (item number : 747)
7. REG3_LOW2 adjustment (item number : 748)
8. REG3_HIGH adjustment (item number : 749)
9. VREC_LOW (X2 speed) adjustment (item number : 751)
10. VREC_MIDDLE (X4 speed)adjustment (item number : 752)
11. VREC_HIGH (HEAD MOTOR) adjustment (item number : 753)
12. CHGV_LOW adjustment (item number : 755)
13. CHGV_HIGH adjustment (item number : 756)
14. CHGI_LOW (current) adjustment (item number : 757)
15. CHGI_HIGH (current) adjustment (item number : 758)

• Setting Method of Power Supply Manual Adjustment

1. Make sure that the power supply voltage is 3V.
2. Select the manual mode of the test mode (see page 14).
3. Set item number.

Note1: BATT- terminal is not GND when AC adaptor is used.

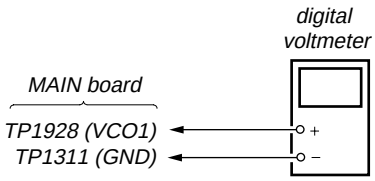
Note2: Power supply adjustment auto item feed mode (page 25) is available to perform the temperature Correction and Power Supply Adjustment without entering the manual mode.

- **Adjustment Method of VC1_LOW (PB) (item number: 741)**

Set LCD display

**: Adjusted value*

1. Connect a digital voltmeter to the TP1928 (VCO1) on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 2.35 ± 0.05V.



2. Press the ▮▮ key on the set or the 🗀– key on the remote commander to write the adjusted value.

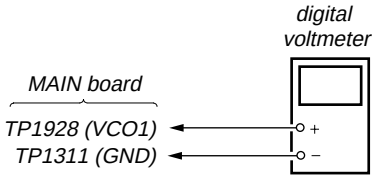
Adjustment and Connection Location: MAIN board (see page 24)

- **Adjustment Method of VC1_HIGH (REC) (item number: 742)**

Set LCD display

**: Adjusted value*

1. Connect a digital voltmeter to the TP1928 (VCO1) on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 2.50 ± 0.05V.



2. Press the ▮▮ key on the set or the 🗀– key on the remote commander to write the adjusted value.

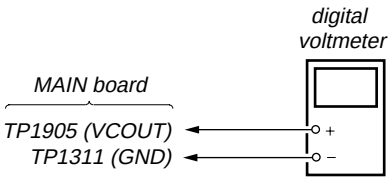
Adjustment and Connection Location: MAIN board (see page 24)

- **Adjustment Method of VC2_LOW (item number: 743)**

Set LCD display

**: Adjusted value*

1. Connect a digital voltmeter to the TP1905 (VCOUT) on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 2.30 ± 0.01V.



2. Press the ▮▮ key on the set or the 🗀– key on the remote commander to write the adjusted value.

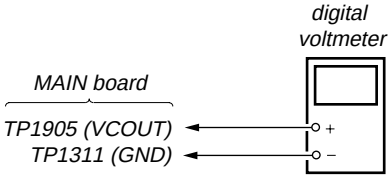
Adjustment and Connection Location: MAIN board (see page 24)

- **Adjustment Method of VC2_HIGH (item number: 744)**

Set LCD display

**: Adjusted value*

1. Connect a digital voltmeter to the TP1905 (VCOUT) on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 2.55 ± 0.01V.



2. Press the ▮▮ key on the set or the 🗀– key on the remote commander to write the adjusted value.

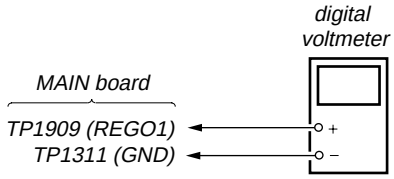
Adjustment and Connection Location: MAIN board (see page 24)

- **Adjustment Method of REG1 (item number: 745)**

Set LCD display

***: Adjusted value*

1. Connect a digital voltmeter to the TP1909 (REGO1) on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 2.05 ± 0.01V.



2. Press the ▮▮ key on the set or the ⏏– key on the remote commander to write the adjusted value.

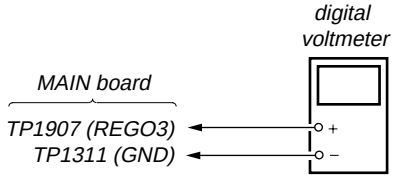
Adjustment and Connection Location: MAIN board (see page 24)

- **Adjustment Method of REG3_LOW1 (item number: 747)**

Set LCD display

***: Adjusted value*

1. Connect a digital voltmeter to the TP1907 (REGO3) on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 1.25 ± 0.01V.



2. Press the ▮▮ key on the set or the ⏏– key on the remote commander to write the adjusted value.

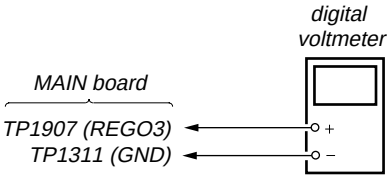
Adjustment and Connection Location: MAIN board (see page 24)

- **Adjustment Method of REG3_LOW2 (item number: 748)**

Set LCD display

***: Adjusted value*

1. Connect a digital voltmeter to the TP1907 (REGO3) on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 1.25 ± 0.01V.



2. Press the ▮▮ key on the set or the ⏏– key on the remote commander to write the adjusted value.

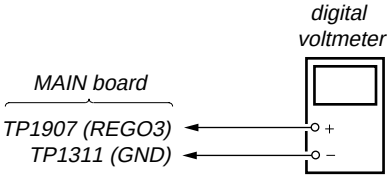
Adjustment and Connection Location: MAIN board (see page 24)

- **Adjustment Method of REG3_HIGH (item number: 749)**

Set LCD display

***: Adjusted value*

1. Connect a digital voltmeter to the TP1907 (REGO3) on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 1.25 ± 0.01V.



2. Press the ▮▮ key on the set or the ⏏– key on the remote commander to write the adjusted value.

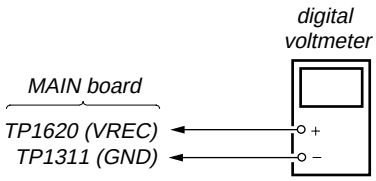
Adjustment and Connection Location: MAIN board (see page 24)

- **Adjustment Method of VREC_LOW (X2 speed) (item number: 751)**

Set LCD display

**: Adjusted value*

1. Connect a digital voltmeter to the TP1620 (VREC) on the MAIN board, and adjust [VOL +] key (voltage up) or [VOL –] key (voltage down) so that the voltage becomes 1.20 ± 0.02V.



2. Press the [II] key on the set or the [□–] key on the remote commander to write the adjusted value.

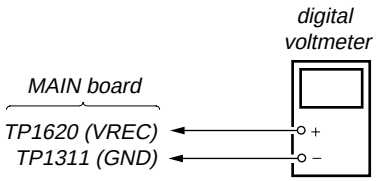
Adjustment and Connection Location: MAIN board (see page 24)

- **Adjustment Method of VREC_MIDDLE (X4 speed) (item number: 752)**

Set LCD display

**: Adjusted value*

1. Connect a digital voltmeter to the TP1620 (VREC) on the MAIN board, and adjust [VOL +] key (voltage up) or [VOL –] key (voltage down) so that the voltage becomes 1.20 ± 0.02V.



2. Press the [II] key on the set or the [□–] key on the remote commander to write the adjusted value.

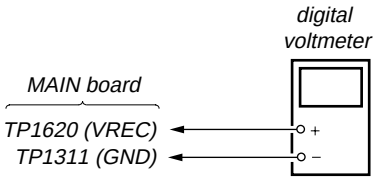
Adjustment and Connection Location: MAIN board (see page 24)

- **Adjustment Method of VREC_HIGH (HEAD MOTOR) (item number: 753)**

Set LCD display

**: Adjusted value*

1. Connect a digital voltmeter to the TP1620 (VREC) on the MAIN board, and adjust [VOL +] key (voltage up) or [VOL –] key (voltage down) so that the voltage becomes between 1.65V and 1.75V.



2. Press the [II] key on the set or the [□–] key on the remote commander to write the adjusted value.

Adjustment and Connection Location: MAIN board (see page 24)

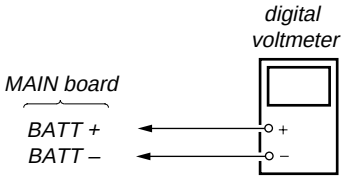
- **Adjustment Method of CHGV_LOW (item number: 755)**

Set LCD display

**: Adjusted value*

Note: Remove the rechargeable battery.

1. Connect a digital voltmeter to the BATT+ and BATT– on the MAIN board, and adjust [VOL +] key (voltage up) or [VOL –] key (voltage down) so that the voltage becomes 1.35 ± 0.01V.



2. Press the [II] key on the set or the [□–] key on the remote commander to write the adjusted value.

Adjustment and Connection Location: MAIN board (see page 24)

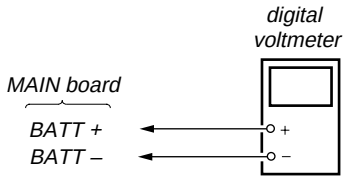
- **Adjustment Method of CHGV_HIGH (item number: 756)**

Set LCD display

**: *Adjusted value*

Note: Remove the rechargeable battery.

1. Connect a digital voltmeter to the BATT + and BATT – on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 1.80 ± 0.015V.



2. Press the ▮▮ key on the set or the ⊟– key on the remote commander to write the adjusted value.

Adjustment and Connection Location: MAIN board (see page 24)

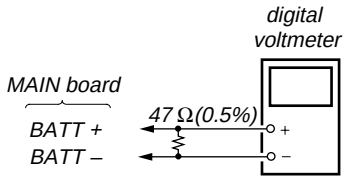
- **Adjustment Method of CHGI_LOW (Charge current) (item number: 757)**

Set LCD display

**: *Adjusted value*

Note: Remove the rechargeable battery.
Connect the resistor (47) (0.5%) between terminals of BATT + and BATT –.

1. Connect a digital voltmeter to the BATT + and BATT – on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 1.41 ± 0.015V.



2. Press the ▮▮ key on the set or the ⊟– key on the remote commander to write the adjusted value.

Adjustment and Connection Location: MAIN board (see page 24)

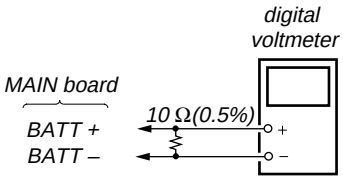
- **Adjustment Method of CHGI_HIGH (Charge current) (item number: 758)**

Set LCD display

**: *Adjusted value*

Note: Remove the rechargeable battery.
Connect the resistor (10) (0.5%) between terminals of BATT + and BATT –.

1. Connect a digital voltmeter to the BATT + and BATT – on the MAIN board, and adjust VOL + key (voltage up) or VOL – key (voltage down) so that the voltage becomes 1.40 ± 0.015V.

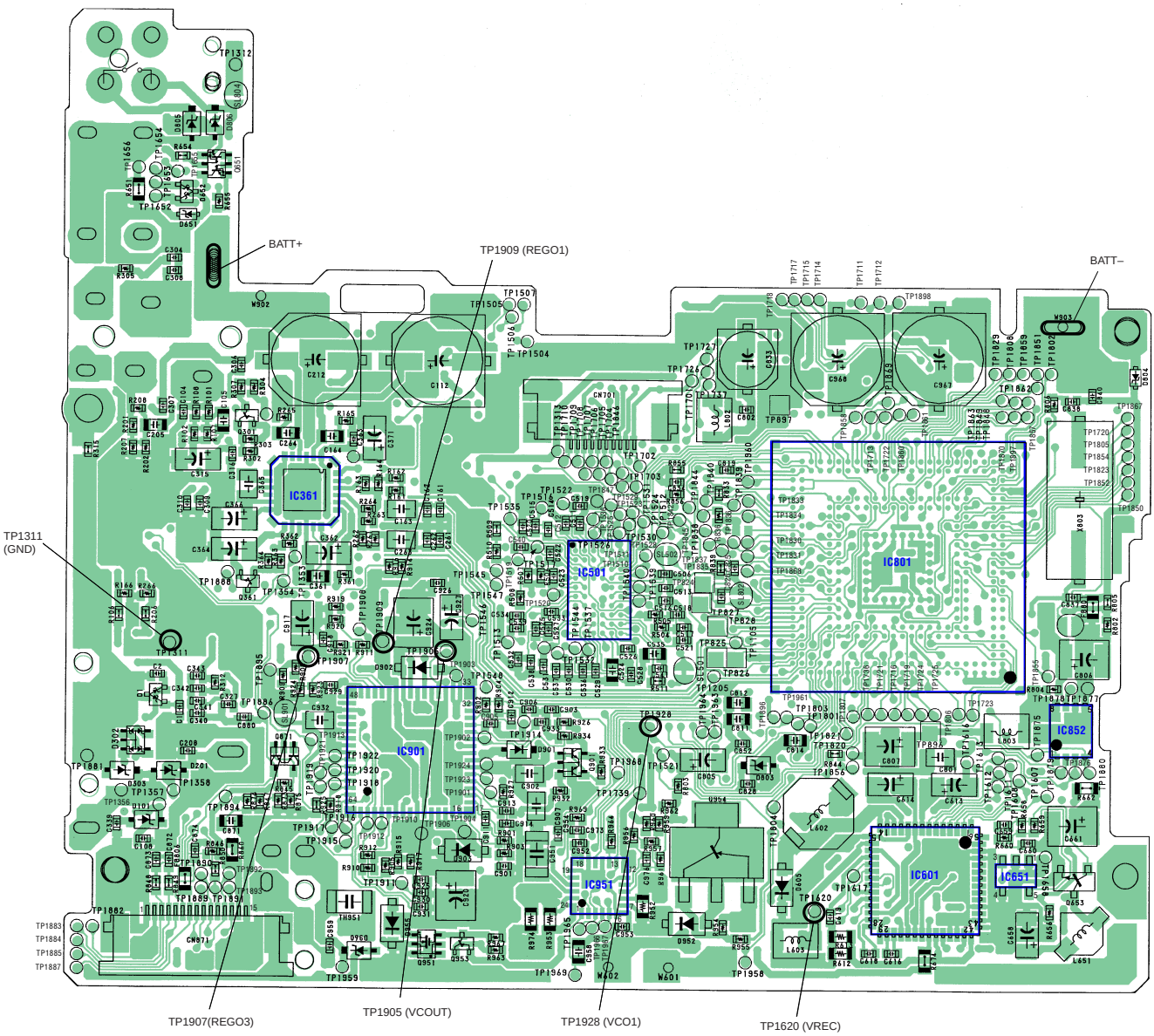


2. Press the ▮▮ key on the set or the ⊟– key on the remote commander to write the adjusted value.

Adjustment and Connection Location: MAIN board (see page 24)

Adjustment/checking and Connection Location:

【MAIN BOARD】(SIDE B)



Power Supply Adjustment Auto Item Feed

Note: This mode is available to perform the temperature correction and power supply adjustment without entering the manual mode.

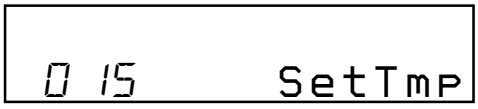
• Setting method of power supply adjustment auto item feed mode.

1. Set the test mode (see page 13)
2. Press the |◄◄ key or press the VOL – key on the remote commander to activate the overall adjustment mode.

Set LCD display

3. Press the END SEARCH key to set the temperature correction mode.

Set LCD display



4. To change the initial value (not displayed) adjust with the VOL + or VOL – key.
   Press the ▮▮ key to write the adjusted value, and the item number increases automatically.
   When not writing the adjusted value, press the ►►| key to move to the next item.

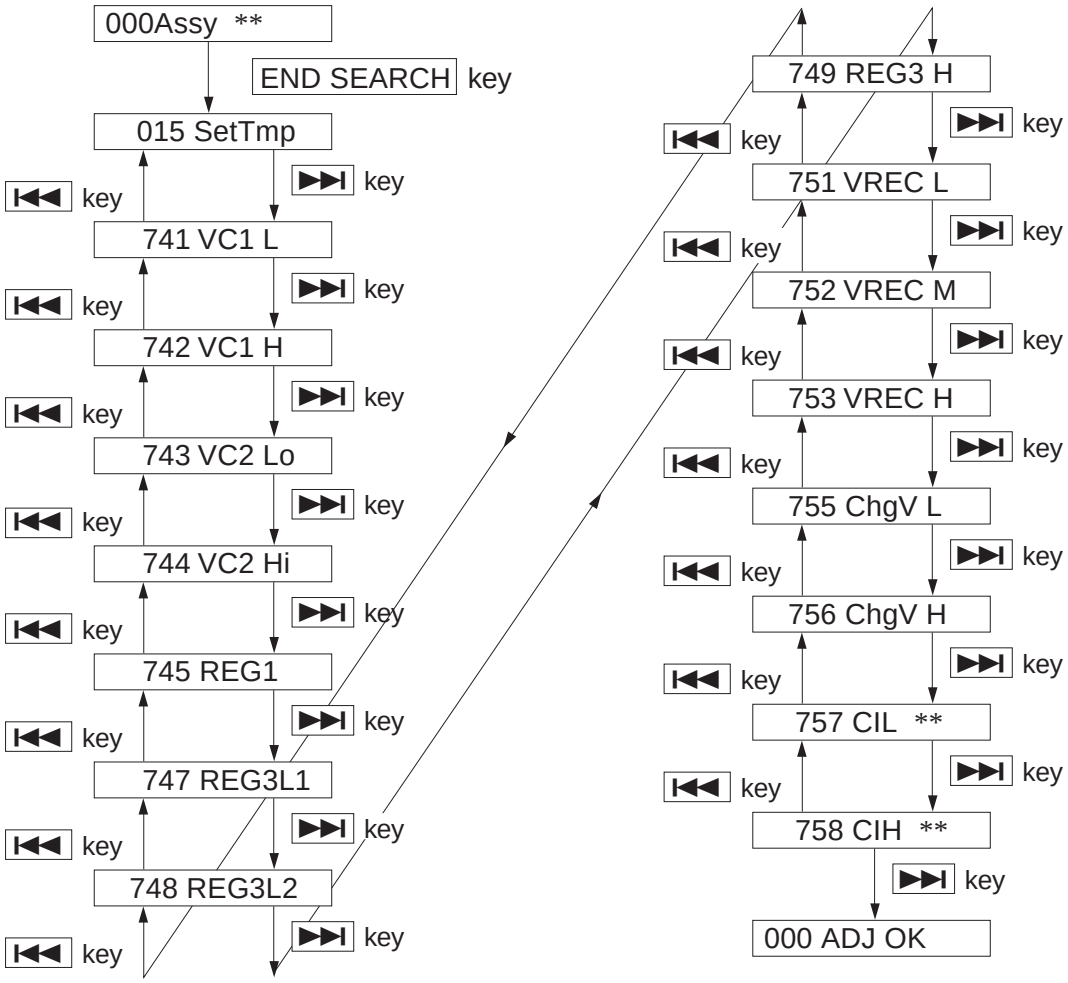
Set LCD display

5. Connect a digital voltmeter to the measuring points on the MAIN board, and adjust the voltage with the VOL + or VOL – key. (see page 19 to 23)
   Press the ▮▮ key to write the adjusted value, and the item number increases automatically.
6. When not writing the adjusted value, press the ►►| key to move to the next item. The |◄◄ key is available to back to the last item.
7. The following message is displayed after all power supply adjustments finish.

Set LCD display

8. Press the ■CANCEL/CHG key to return the test mode (display check mode).

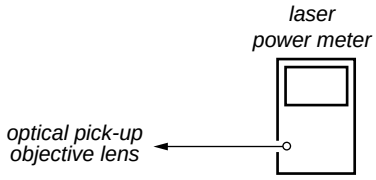
• **Configuration of power supply adjustment auto item feed**



Laser Power Check

Note: If result of measurement of the laser power does not satisfy the specification, either replace the OP (optical pick-up unit) or check whether the laser circuit block is working correctly.
When the result of laser power measurement does not satisfy the specification even though the laser circuit block is confirmed to be working correctly, replace the OP (optical pick-up unit).

- **Connection**



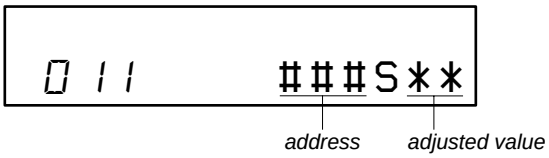
- **Checking method**

1. Select the manual mode of test mode (see page 14), and set the laser power checking mode (item number 010).

Set LCD display

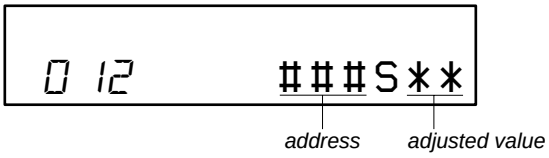
2. Press the |◄◄ key continuously until the optical pick-up moves to the most inward track.
3. Open the cover and set the laser power meter on the objective lens of the optical pick-up.
4. Press the ►►| key, and set the laser MO read check mode (item number 011).

Set LCD display



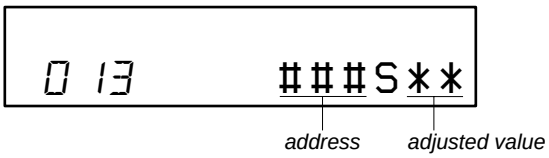
5. Check that the laser power meter reading is 0.800 ± 0.10 mW.
6. Press the ►►| key, and set the laser CD read check mode (item number 012).

Set LCD display



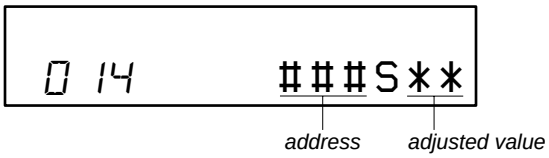
7. Check that the laser power meter reading is 0.910 ± 0.11 mW.
8. Press the ►►| key, and set the laser MO (X2 speed) write check mode (item number 013).

Set LCD display



9. Check that the laser power meter reading is 4.95 ± 0.59 mW.
10. Press the ►►| key, and set the laser MO (X4 speed) write check mode (item number 014).

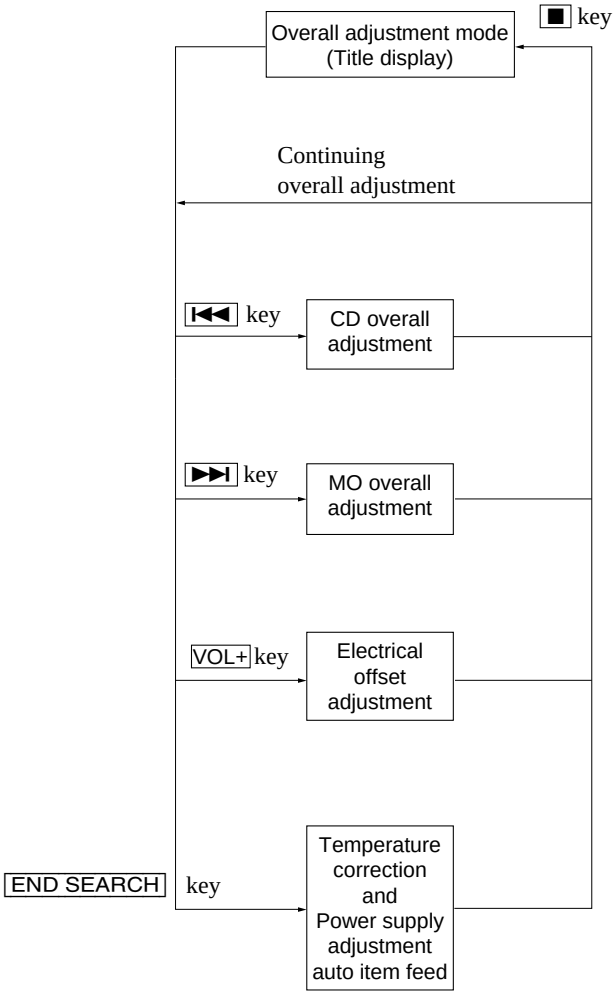
Set LCD display



11. Check that the laser power meter reading is 5.93 ± 0.71mW.
12. Press the ■CANCEL/CHG key to quit the manual mode, and activate the test mode (display check mode).

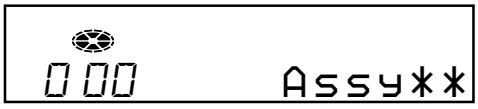
Overall Adjustment Mode

- **Configuration of Overall Adjustment Mode**



- **Overall Adjustment Mode (Title Display)**

Set LCD display



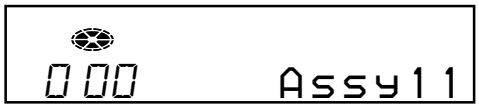
: (Disc mark) At end of power supply adjustment: Outside lit
***: Left side = MO overall adjustment information*
F**: MO overall adjustment completed*
1**: Manual adjustment exists (overall adj. not completed)*
0**: Not adjusted*
Right side = CD overall adjustment information
F: CD overall adjustment completed*
1: Manual adjustment exists (overall adj. not completed)*
0: Not adjusted*

Note: Adjust the CD first, when performing adjustment.

- **Adjustment Method of CD and MO Overall Adjustment Mode**

1. Set the test mode (see page 13).
2. Press the |◀◀ key or press VOL – on the remote commander key to activate the overall adjustment mode.

Set LCD display



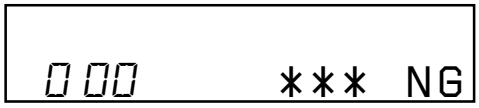
3. Insert CD disc in the set, and press the |◀◀ key to set the CD overall adjustment mode. Automatic adjustments are made.

Set LCD display

XXX: Item number for which an adjustment is being executed.

4. In case of CD overall adjustment NG, readjust from the NV reset (see page 19), The temperature correction (see page 19) may be omitted.

Set LCD display



**: NG item number.*

5. If OK through the CD overall adjustments, then perform MO overall adjustments.

Set LCD display

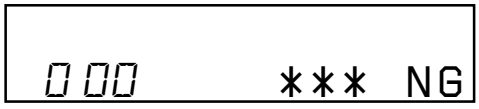
6. Insert MO disc in the set, and press the ▶▶| key to set the MO overall adjustment mode. Automatic adjustments are made.

Set LCD display

XXX: Item number for which an adjustment is being executed.

7. In case of MO overall adjustment NG, readjust from the NV reset (see page 19). The temperature correction (see page 19) may be omitted.

Set LCD display



**: NG item number.*

8. If OK through the MO overall adjustments, press the ■CANCEL/CHG key to return to the test mode and terminate the overall adjustment mode.

Set LCD display

- **Overall Adjustment error message**

The following message will be displayed if adjustment procedure is mistaken in the CD and MO overall adjustment.

Message	Display timing	Description
CLOSE!	During CD/MO/DISC automatic distinction overall adjustment	DISC is not inserted.
Set CD!	During MO/DISC automatic distinction overall adjustment During offset adjustment	• CD overall adjustment is not completed in the MO overall adjustment. • CD and MO overall adjustment is not completed in the offset adjustment.
Set MO!	During offset adjustment	MO overall adjustment is not completed in the offset adjustment
NoTmp!	During CD/MO/DISC automatic distinction overall adjustment	Temperature correction (item number 015) is not finished.
NoChg!	During CD/MO/DISC automatic distinction overall adjustment	Charge voltage adjustments (item number 755 and 756) are not finished.

- **CD and MO Overall Adjustment Items**

1. CD overall adjustment items

Item No.	Description
761	VC,VR power supply H/L selection
300	HPIT setting . servo OFF
561	SLED inward movement
562	SLED outward movement
High reflection electrical offset adjustment	
312	Laser ON . Focus UP . vc correction
ALFA offset adjustment	
313	IJ offset adjustment
314	FE offset adjustment
HPIT adjustment	
320	Focus servo ON
324	TE offset adjustment 1
321	TE gain adjustment
328	TWPP gain adjustment
324	TE offset adjustment 1
332	TE offset adjustment 2
330	Tracking servo ON
336	ABCD gain adjustment
337	KF gain correction
338	RF gain adjustment
344	FCS gain adjustment
345	TRK gain adjustment
521	Two-axis sensitivity (inner position)

Item No.	Description
522	Two-axis sensitivity (outer position)
300	HPIT setting . servo OFF

2. MO overall adjustment items

Item No.	Description
716	VC,VR power supply H/L selection
100	R_GRV setting . servo OFF
Low reflection electrical offset adjustment	
112	Laser ON . Focus UP vc correction
ALFA offset adjustment	
113	IJ offset adjustment
114	FE offset adjustment
118	Wpp denominator offset adjustment
LPIT adjustment	
200	LPIT setting . servo OFF
561	SLED inward movement
220	Focus servo ON
224	TE offset adjustment 1
221	TE gain adjustment
224	TE offset adjustment 1
232	TE offset adjustment 2
230	Tracking servo ON
236	ABCD gain adjustment
237	KF gain correction
238	RF gain adjustment
244	Focus gain adjustment
245	Tracking gain adjustment
READ GRV adjustment 1	
100	R_GRV setting . servo OFF
562	SLED outward movement
120	Focus servo ON
122	TON offset adjustment
121	TE gain adjustment
122	TON offset adjustment
123	TEIN offset adjustment
124	TWPP offset adjustment 1
130	Tracking servo ON
131	TWPP offset adjustment 1
136	ABCD gain adjustment
137	KF gain correction
139	ADIP BPF f0 adjustment
144	Focus gain adjustment
145	Tracking gain adjustment
134	TWPP gain adjustment
131	TWPP offset adjustment 1
132	TWPP offset adjustment 2
149	TWPP OP offset adjustment
WRITE GRV adjustment	
410	HEAD DOWN . GRV servo ON
420	READ → WRITE selection
421	TE gain adjustment
423	TEIN offset adjustment
430	Tracking servo ON
431	TWPP offset adjustment 1
436	ABCD gain adjustment

Item No.	Description
444	Focus gain adjustment
445	Tracking gain adjustment
434	TWPP gain adjustment
431	TWPP offset adjustment 1
432	TE offset adjustment 2
449	TWPP OP offset adjustment
410	READ → WRITE selection
411	TWPP offset adjustment 1
412	TE offset adjustment 2
418	TWPP OP offset adjustment
490	HCLV LCLV selection process
450	HEAD DOWN . GRV servo ON
460	READ → WRITE selection
461	TE gain adjustment
463	TEIN offset adjustment
470	Tracking servo ON
471	TWPP offset adjustment 1
476	ABCD gain adjustment
484	Focus gain adjustment
485	Tracking gain adjustment
451	TWPP offset adjustment 1
452	TE offset adjustment 2
460	READ → WRITE selection
470	Tracking servo ON
474	TWPP gain adjustment
471	TWPP offset adjustment 1
472	TE offset adjustment 2
489	TWPP OP offset adjustment
450	WRITE → READ selection
451	TWPP offset adjustment 1
452	TE offset adjustment 2
458	TWPP OP offset adjustment
448	30 sec continuous REC
400	GRV setting . servo OFF . HEAD UP
READ GRV adjustment 2	
120	Focus servo ON
130	Tracking servo ON
138	RF gain adjustment
141	FOCUS_BIAS
035	Stray light offset measurement
100	R_GRV setting . servo OFF

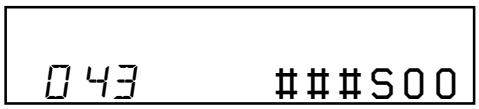
Remuse Clear

Perform the Resume clear when all adjustments completed.

- **Resume Clear Setting Method**

1. Select the manual mode of the test mode, and set item number 043 (see page 14).

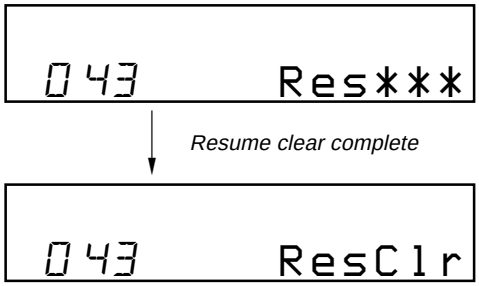
Set LCD display



###: Address

2. Press the [II] key.

Set LCD display



3. Press the [■CANCEL/CHG] key to return to the test mode (display check mode).

Rewriting the Patch Data at Replacement of Main Board

This set requires the patch data in the nonvolatile memory (IC852) to be rewritten using the application, when the MAIN board was replaced.

Caution: The application that meets the microcomputer version in this set must be used when rewriting the patch data. Rewriting the patch data using the application not suitable for the microcomputer version could cause the set to malfunction.
For a checking method of the microcomputer version, see "SECTION 4 TEST MODE" (page 13).

• Preparation

1. USB cable (attached to the set)
2. Personal computer in which the Net MD Driver has been installed. (For further information, see "System requirements" (page 4) in "SECTION 1 SERVICING NOTES")
3. Application "USB_PatchWriter" for patch data rewriting

• How to Get the Application "USB_PatchWriter" for Patch Data Rewriting

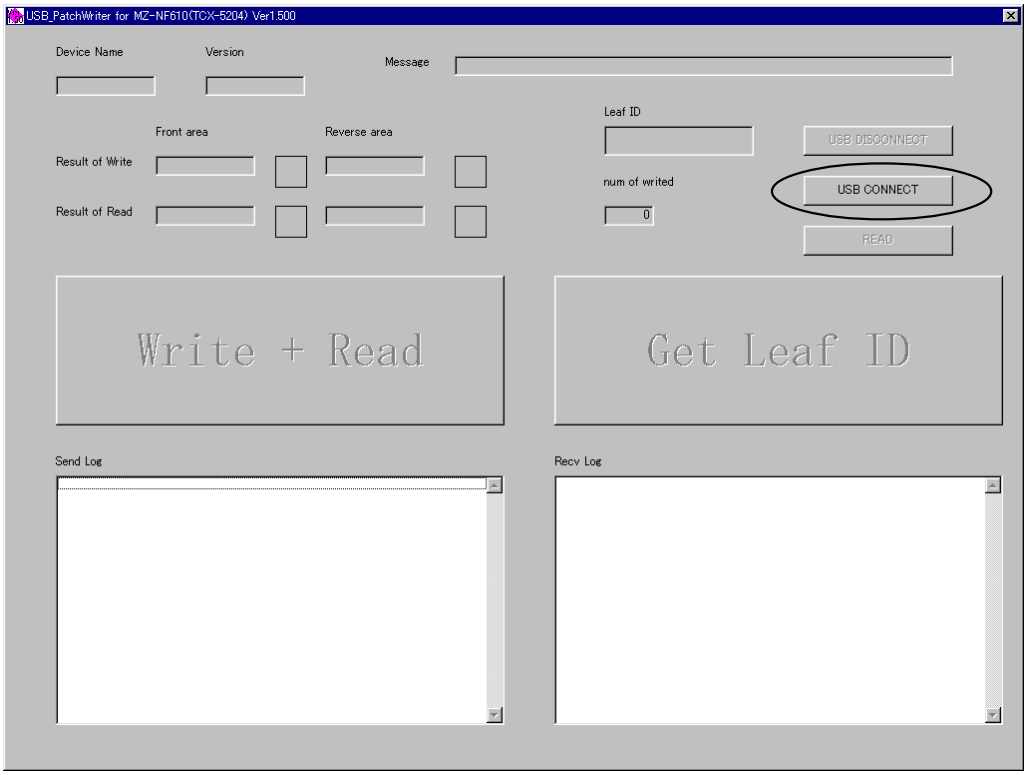
Contact our service technical support division to get the application.

• Pre-check

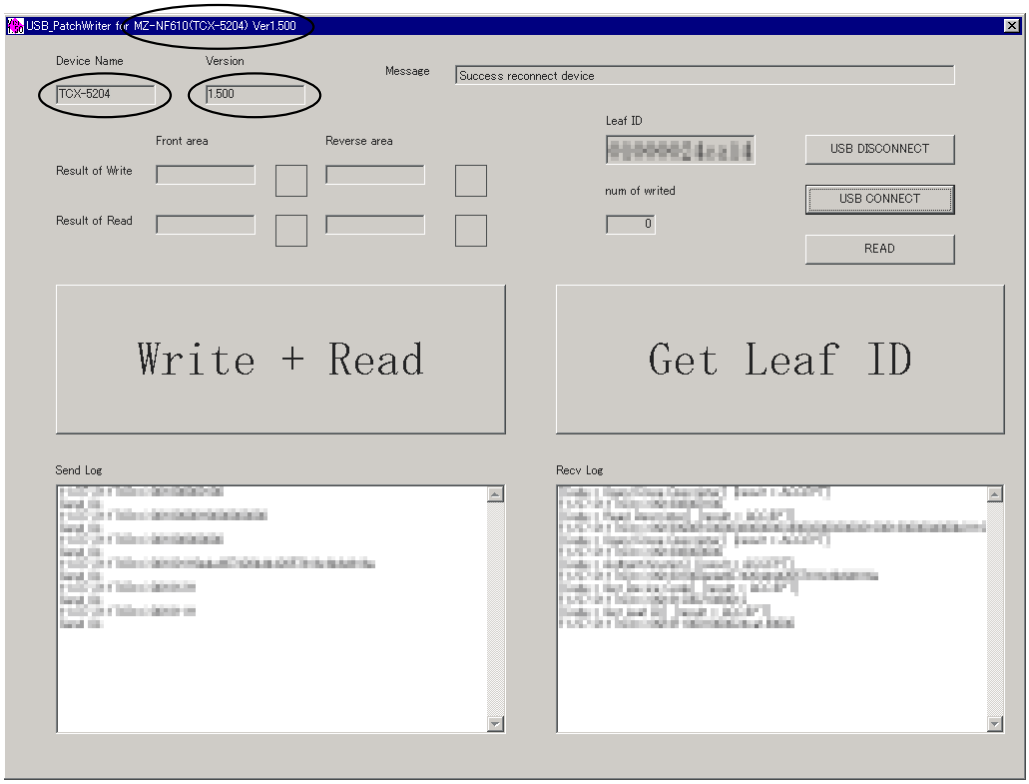
1. Check the microcomputer version in this set. (For a checking method of the microcomputer version, see "SECTION 4 TEST MODE" (page 13).)
2. Check that the Net MD Driver has been installed in the personal computer.
3. Make sure that the set is in the Normal mode.
   Note: Do not rewrite the patch data in the Test mode.

• Rewriting the Patch Data

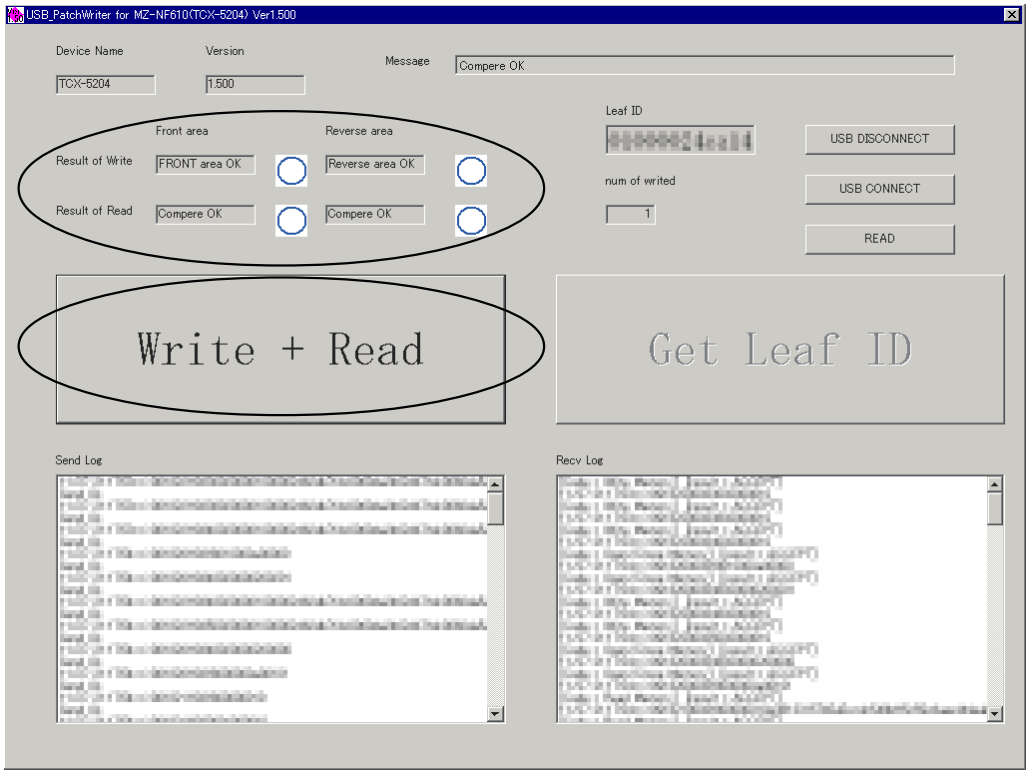
1. Connect the set to the personal computer with the USB cable.
2. Start the application "USB_PatchWriter".
3. Make sure that the following window opens.
4. Click the [USB CONNECT] button.



5. Confirm that the model and version indicated on the title bar coincide with the codes displayed in the Device Name block and the Version block in the window.

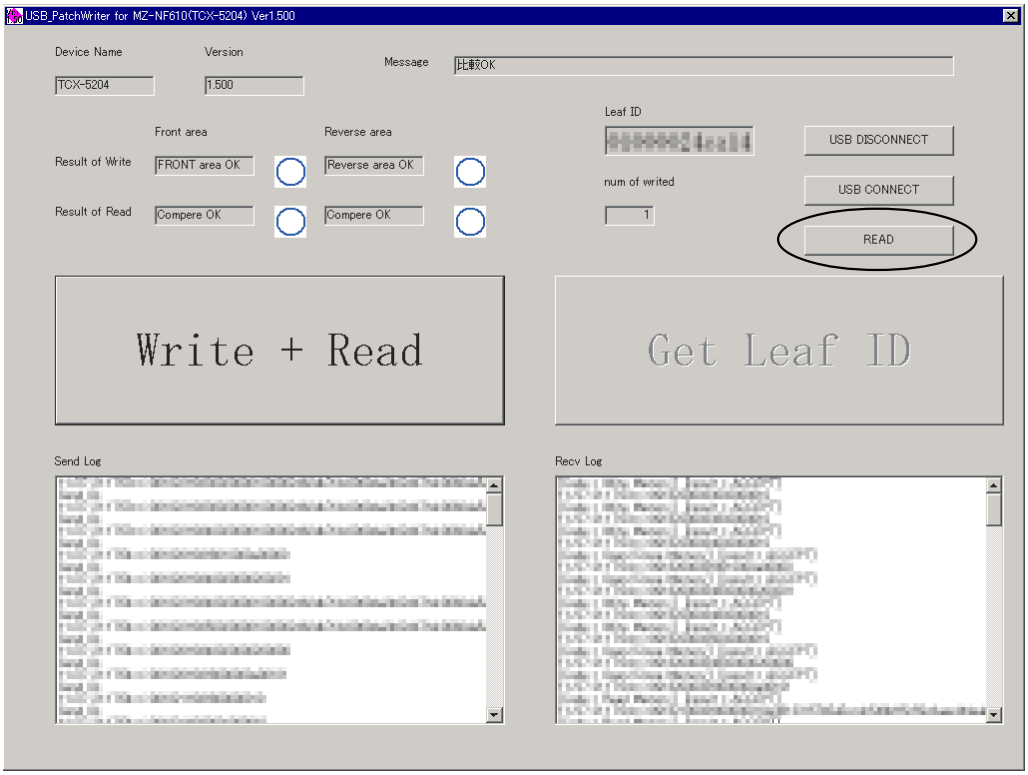


6. Click the [Write + Read] button.
   The patch data writing and the verify processing will be executed automatically in the following order:
   1) Writing to patch area (front area)
   2) Writing to patch area (reverse area)
   3) Verifying patch area (front area)
   4) Verifying patch area (reverse area)
7. The operation will terminate with the ○ (blue) mark given to all areas.
   If the × (red) mark is given to any area, the nonvolatile memory will be faulty.

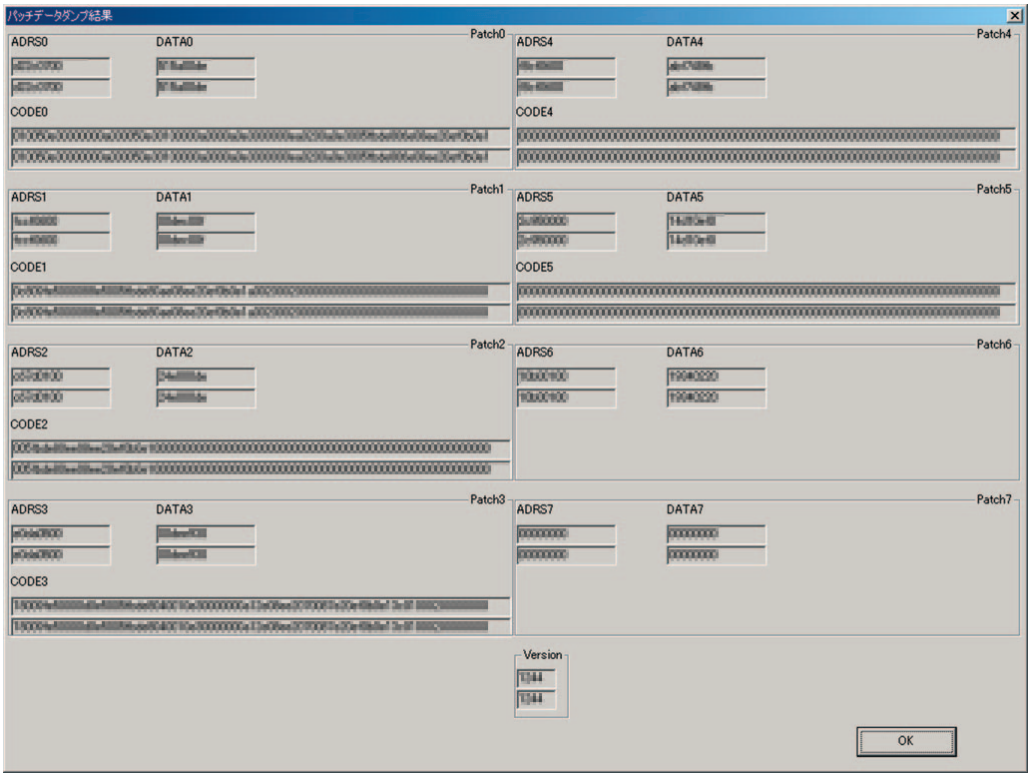


• Confirmation of contents of the patch data rewrited

1. Click the [READ] button to confirm the contents of the patch data rewrited.



2. The application reads out the front and reverse patch areas and displays the results in the edit box. Confirm that the upper column coincides with the lower column as the following window.
3. Click the [OK] button to close the window.

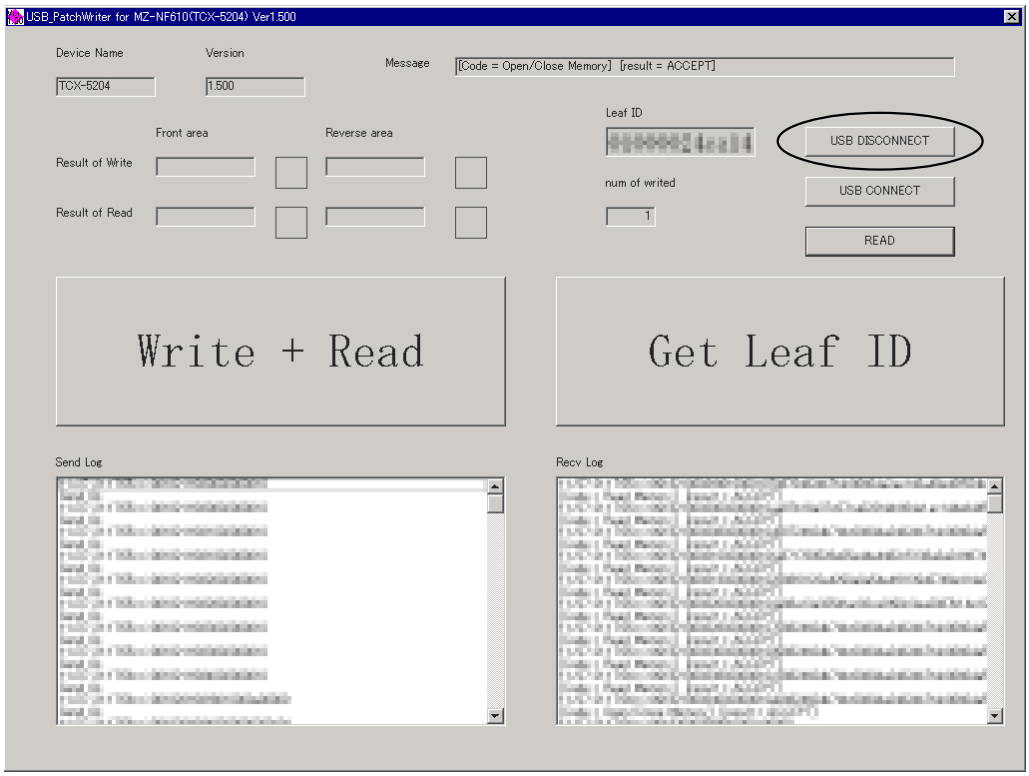


• Disconnecting the USB cable

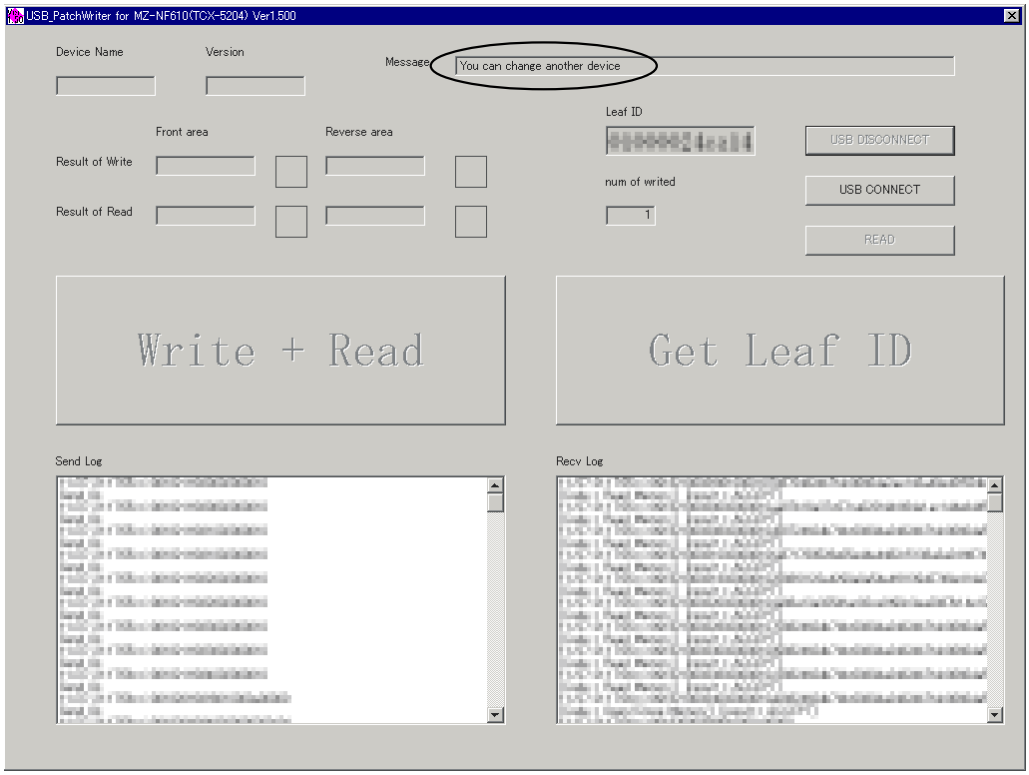
Disconnect the USB cable as the following procedure after rewriting the patch data and confirmation.

Note : When the following procedure is not completed but USB cable is extracted, the application does not recognize the set at exchanging of the set.

1. Click the [USB DISCONNECT] button.



2. Confirm that "You can change another device" is displayed in the message block.



3. Disconnect the USB cable from the personal computer and the set.