MZ-1

SERVICE MANUAL

US Model
Canadian Model
AEP Model
UK Model
E Model
Tourist Model

MD WALKMAN
Mini Disc

SPECIFICATIONS

Model Name Using Similar Mechanism	NEW
Mechanism Type	MT-MZ1-106
Optical Pickup Block Type	KMS130B

System

Audio playing system
    MiniDisc digital audio system
Laser diode properties
    Material: GaAlAs
    Wavelength: $\lambda = 780$ 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.)
Revolutions   400 rpm to 900 rpm (CLV)
Error correction Advanced Cross Interleave Reed
    Solomon Code (ACIRC)
Sampling frequency
    44.1 kHz
Modulation system
    EFM (Eight to Fourteen Modulation)
Number of channels
    2 stereo channels
Frequency response
    20 to 20,000 Hz ± 1 dB
Wow and Flutter
    Below measurable limit

Inputs

	Jack Type	Rated Input	Minimum Input
Microphone	Stereo mini-jack	1.38 mV	0.55 mV
Line In	Stereo mini-jack	245 mV	100 mV

MICROFILM

Outputs

	Jack Type	Rated Output	Maximum Output Level	Load Impedance
Head-phones	Stereo mini-jack	—	5 mW + 5 mW	16 Ω
Line Out	Stereo mini-jack	245 mV	—	10 kΩ

General

Power requirements
    • BP-MZ1 Rechargeable Battery
      (supplied)
    • Sony AC Power Adaptor (supplied)
      connected at the DC IN 10.5 V
      jack: 120 V AC, 60 Hz (US, Canadian model)
          240 V AC, 50 Hz (UK model)
          220-230 V AC, 50 Hz (AEP model)
          100-240 V AC, 50/60 Hz (Other models)
    • DCC-E1105L Sony Car Battery
      Cord (not supplied) connected at
      the DC IN 10.5 V jack: 12 V car
      battery

PORTABLE MINIDISK RECORDER
SONY®

Battery operation time
    60 minutes of consecutive recording
    with fully charged BP-MZ1
Lithium battery life
    Approximately 6 months
Dimensions   Approximately 114 × 43 × 139 mm
    (w/h/d) (4^1/$_2$ × 1^3/$_4$ × 5^1/$_2$ in.)
Weight   Approximately 690 g (1lb 8oz) incl.
   rechargeable battery

Accessories

Supplied
- AC-MZ1 AC Power Adaptor (1)
- BP-MZ1 Rechargeable Battery (1)
- CR-2025 Lithium Battery (1)
- Stereo Headphones (1)
- MDW-60 Recordable MiniDisc (1)
- Line Cable (stereo mini-plug-2 phono plugs) (1)
- Carrying Case (1)

Design and specifications subject to change without notice.

Note
This appliance conforms with EEC Directive 87/308/EEC regarding interference suppression.

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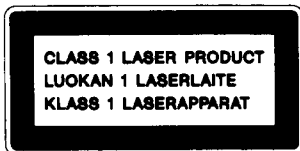
This MiniDisc Recorder is classified as a CLASS 1 LASER product. The CLASS 1 LASER PRODUCT label is located on the bottom exterior.

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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 IDENTIFIÉS 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 PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

Welcome !

Welcome to the world of the MiniDisc ! The Sony MiniDisc Recorder is the result of Sony's on-going commitment to leadership in audio-video technology. Here are some of the capabilities and features you'll discover with the new MiniDisc Recorder.

Quick Random Access
You can access any music track or phrase without waiting for reeling time.

Digital Sound
MiniDiscs play with nearly the same noiseless, high-fidelity sound as CDs.

Recordability
You can record up to 74 minutes of digital audio on one ultra-compact (2.5-inch) MD.

Digital/Analog Recording
Record from either digital or analog audio sources.

Title Function
This feature lets you label your own recordings, so along with premastered discs you can light up disc and track titles while you're playing an MD.

Shock-Resistant Memory
The MiniDisc Recorder protects discs against shocks and vibrations during playback. This means no jitters or skipping while you are jogging or driving.

Hold Function
This feature locks the controls so that none of the buttons are accidentally operated while you're walking or jogging.

What is the MiniDisc?

▓▓▓ How MiniDiscs work ▓▓▓

MiniDiscs (MD) come in two types: premastered (prerecorded) and recordable (blank). Premastered MDs, recorded at music studios, can be played back almost endlessly. However, they can't be recorded on or over like cassette tapes. To record, you use a "recordable MD".
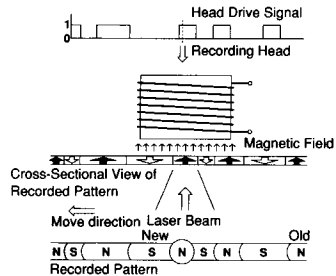
Premastered MDs
Premastered MDs are recorded and played like regular CDs. A laser beam focuses on the pits in the surface of the MD and reflects the information back to the lens in the recorder. The recorder then decodes the signals and plays them back as music.

Recordable MDs
Recordable MDs, which use magneto-optical (MO) technology, can be recorded again and again. The laser inside the recorder applies heat to the MD, demagnetizing the magnetic layer of the MD. (See illustration below.) The recorder then applies a magnetic field to the layer. This magnetic field corresponds exactly to the audio signals generated by the connected source. (The north and south polarities equate to digital "1" and "0".) The demagnetized MD adopts the polarity of the magnetic field, resulting in a recorded MD.

■ **Recording Mechanism**

Head Drive Signal
Recording Head
Magnetic Field
Cross-Sectional View of Recorded Pattern
Move direction Laser Beam
New   Old
N(S(N (S (N)S(N (S (N
Recorded Pattern

▓▓▓ How the MiniDiscs get so small ▓▓▓

The 2.5-inch MiniDisc, encased in a plastic cartridge that looks like a 3.5-inch diskette (see illustration below), uses a new digital audio compression technology called ATRAC (Adaptive TRansform Acoustic Coding). To store more sound in less space, ATRAC extracts and encodes only those frequency components actually audible to the human ear.

■ **Parts Making Up a MiniDisc**

Plastic Cartridge

Disc

Shutter
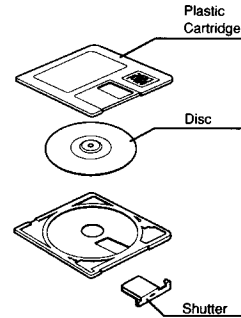
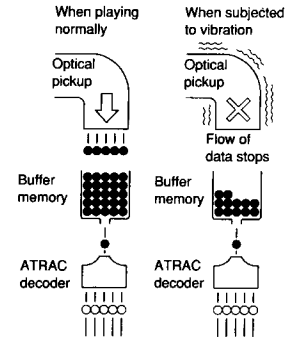### ▓▓▓ How Quick Random Access and the TOC systems work ▓▓▓

Like CDs, MDs offer instantaneous random access to the beginning of any music track. Premastered MDs are recorded with location addresses corresponding to each music selection. Recordable MDs are manufactured with a "User TOC* Area" to contain the order of the music. The TOC system is similar to the "directory management system" of floppy disks. In other words, starting and ending addresses for all music tracks recorded on the disc are stored in this area. This lets you randomly access the beginning of any track as soon as you enter the track number (AMS), as well as label the location with a track name as you would a file on a diskette.

* TOC is the acronym for Table of Contents.

▓▓▓ How the Shock-Resistant Memory works ▓▓▓

One major drawback of optical read systems is that they can skip or mute when subjected to vibration. The MD system resolves this problem by using a buffer memory that stores up to 3 seconds of audio data. This is possible because of a 1 second lag between the time audio data is picked up and when it is decoded (see illustration below). Should the optical pickup be jarred out of position, the correct audio data plays from the buffer memory. Using a concept called "sector repositioning," the optical pickup has the ability to within 13 milliseconds identify the disruption and resume reading from the correct point. As long as the optical pickup returns to the correct position within 3 seconds, you never experience mistracking or muting.

■ **Shock-Resistant Memory System**

When playing normally   When subjected to vibration

Optical pickup   Optical pickup
                            Flow of data stops
Buffer memory   Buffer memory
ATRAC decoder   ATRAC decoder

Unpacking

Take the recorder out of the box and check that you
have all the supplied accessories. You should have:

CR-2025 Lithium
Battery

AC Power Adaptor*

BP-MZ1
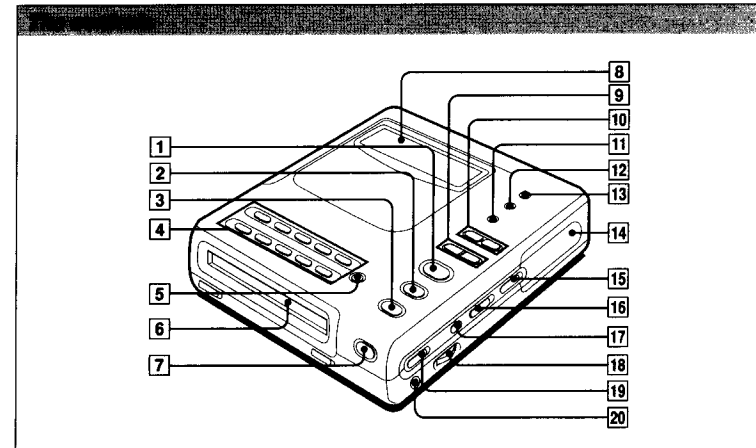Rechargeable
Battery

Recordable MD
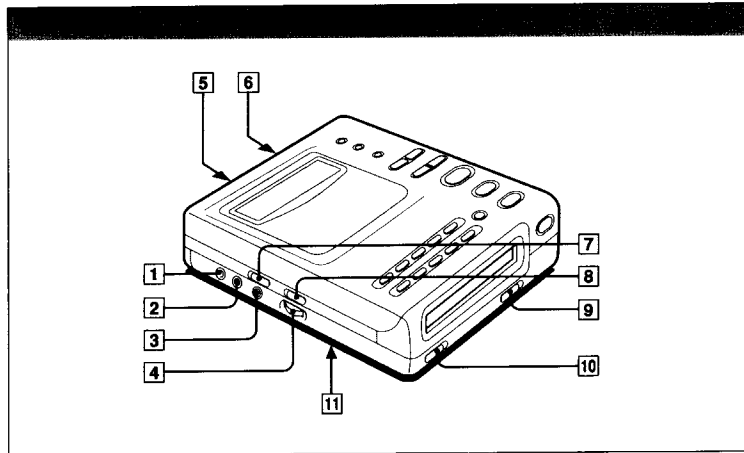(60-minute)

Stereo
Headphones*

Line Cables (2)

Carrying
Case

4
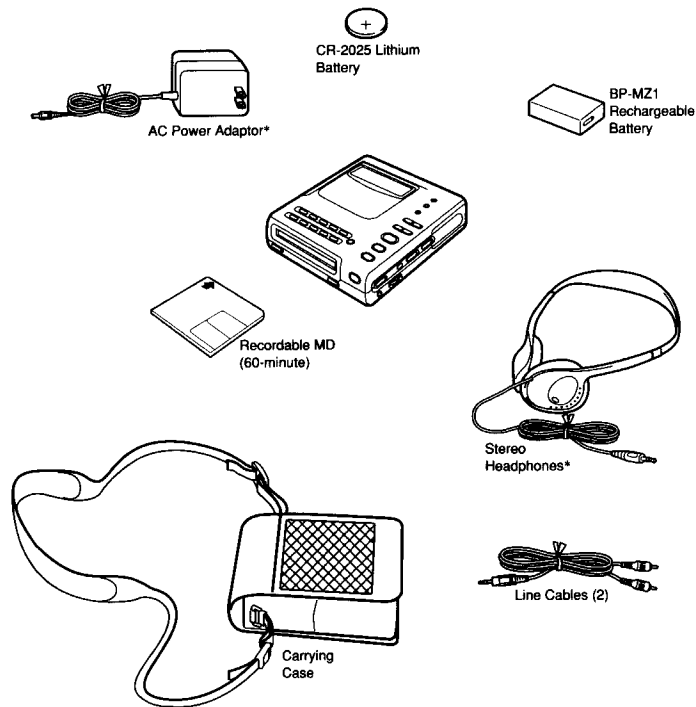
* Illustration conforms to US model.

Looking at the controls


1 ► Play button
Press to start playing an MD.

2 II Pause button
Press to momentarily interrupt play or record.

3 ■ STOP/CHARGE
Press to stop the MD or to charge the battery.

4 Number keys
Press to find the beginning of a track, set the clock
or make music programs.

5 ENTER/REPEAT
Press to enter programmed selections or repeat
tracks.

6 Disc compartment
Insert the MD here. The power goes on
automatically.

7 ⏏ Eject button
Press to remove an MD. The power goes off
automatically.

8 Display window

9 ◄◄/►► Search buttons
Press to find a point in a track.

10 I◄◄/►►I AMS (Automatic Music Sensor)
buttons
Press to find the beginning of a track.

11 DATE
Press to display the recording date or current time.

12 DISC NAME
Press to display the MD name.

13 TRACK NAME
Press to display the track name.

14 Rechargeable battery compartment

15 RESUME
Slide to play from the point the MD stopped.

16 BASS BOOST
Select to emphasize low frequency (bass) sounds.

17 VOLUME
Rotate to adjust the volume through the
headphones.

18 PLAY MODE
Press once to play a single track, twice tracks in
random order, or three times to set up a play list of
up to 21 selections.

19 Ω Headphones jack
Connect the headphones here.

20 HOLD
Slide to lock the controls.

1 OPTICAL (DIGITAL)/LINE OUT
When playing or recording with digital equipment, connect from here to the optical digital in jack of a digital amplifier using the POC-MZ1 (optional) optical connecting cord; with analog equipment, connect to the line in jacks of the analog unit using the Line cable (supplied).

2 OPTICAL (DIGITAL)/LINE IN
When recording a digital source, connect from here to the optical digital out jack of another MD player, CD player or digital amplifier using the POC-MZ1 (optional) optical connecting cord; when recording an analog source, connect from here to the line out jacks of the analog unit using the Line cable (supplied).

3 MIC (microphone)—PLUG IN POWER
Connect a microphone here.

4 REC LEVEL (recording level)
When recording from analog sources, adjust the recording level while observing the level meter. The maximum recording level should be about –12 dB.

5 DC IN 10.5 V
Connect the supplied AC power adaptor here.

6 Lithium Battery holder
Keep a lithium battery in the recorder to operate the clock and memory.

7 MIC ATT (microphone attenuation)
Usually set to 0 dB. For high volume recordings, to avoid sound breakup, set to 20 dB.

8 AGC (Automatic Gain Control)
Only for use with analog sources.
Switch to ON: for the recording level to set automatically.
Switch to OFF: to set the recording level manually using the REC LEVEL dial.

9 ● REC (record)
Slide to start recording.

10 EDIT
Slide to combine, divide, erase or give a track name to MDs you have recorded.

11 CLOCK SET
Press here with a pen nib to set the clock.
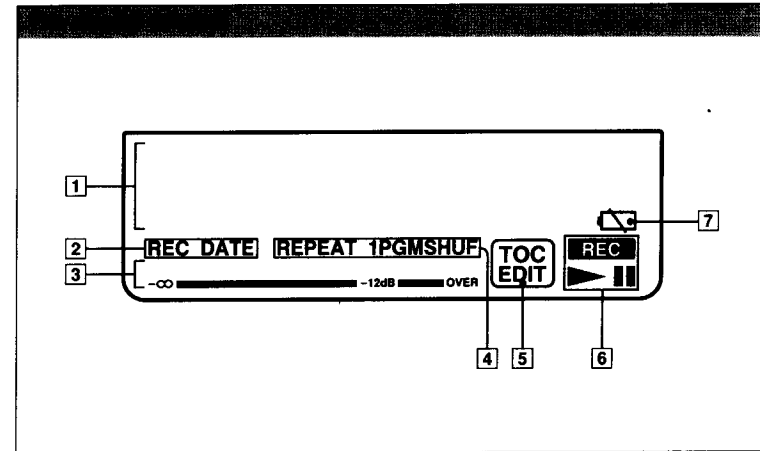
1 Character information display
Displays the disc and track names, date and time.

2 REC DATE/DATE
REC DATE: Lights up along with the date to show when the MD was recorded.
DATE: Lights up along with the current date.

3 Level meter
Shows the volume on the MD being played or recorded.

4 Play mode indicators
1: lights to indicate one track will play.
PGM: lights to indicate a programmed play list will play.
SHUF: lights to indicate tracks will play in random order.
REPEAT: lights to indicate tracks will be repeated according to the play mode chosen.

5 TOC EDIT
Lights up when an MD is being recorded or edited.

6 Battery indicator
Flashes when the battery is weak or dead.

7 Play, pause and recording indicators
► indicates the MD is playing; ❚❚ indicates the MD has paused; REC indicates the MD is recording.

Choosing power sources

Before using the recorder or installing the rechargeable battery, install the CR-2025 lithium battery. The lithium battery operates the clock and powers the player's memory.

1 Release the lithium battery compartment with a pen nib (as shown) and slide out the lithium battery holder.
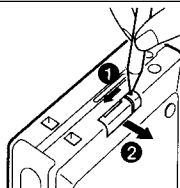
2 Insert the CR-2025 lithium battery with the + (plus) side facing up.

3 Slide the holder back in.

4 Reset the clock if necessary.

The battery should last about 6 months. If the clock begins to lose time or the display flashes, replace the battery with a Sony CR-2025 lithium battery. If you use any other than the Sony CR-2025, you may risk fire or explosion.

Warning!
- Keep the lithium battery out of the reach of children. Should the battery be swallowed, immediately consult a doctor.
- Wipe the battery with a dry cloth to assure good contact.
- Be sure to install the battery with the correct polarity.
- Do not hold the battery with metallic tweezers. Doing so may cause a short-circuit.
- Do not crush the battery or dispose of it in a fire. Doing so may cause it to explode. Carefully dispose of the used battery.

The MiniDisc Recorder is operable on AC and rechargeable battery power. To operate the recorder on AC power, just insert the narrow end of the supplied AC power adaptor to the terminal on the recorder marked DC IN 10.5 V and the other end to the wall outlet. To operate the recorder on battery power, read the following section.

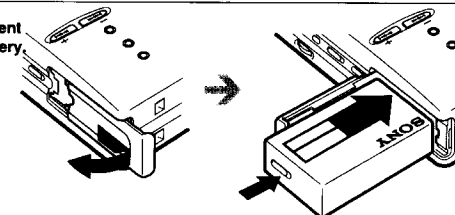**Note on the AC power adaptor**
Use the supplied AC power adaptor only. Do not use any other AC power adaptor.

Polarity of the plug

Before using the rechargeable battery for the first time, you must charge it.

1 Slide open the battery compartment lid (as shown) and insert the battery.

2 Close the compartment lid.

3 Recharge the battery.
(See the next section for how to charge the battery.)

Ideally, the recorder should be operated until no charge remains (the battery indicator flashes). You should avoid recharging a half-charged battery. If any charge is left when the battery starts charging, the recorder will discharge the residual amount ("refreshing") to avoid weakening the capacity of the battery.

1 **After you have installed the rechargeable battery, connect the supplied AC power adaptor.**

AC power adaptor

to wall outlet

DC IN 10.5 V
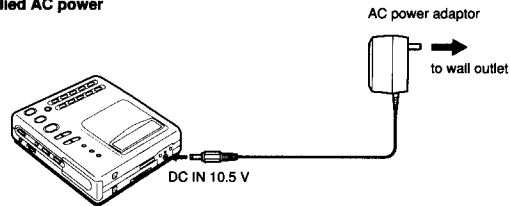
2 **Press ■ STOP/CHARGE to start charging the battery.**

"REFRESHING" lights in the display as residual battery charge is discharged.
Refreshing may take up to one hour depending on how much charge is left.

The display changes to "CHARGING" when refreshing ends. When the battery is ready to use, "CHARGING" goes out. Charging takes from 60 to 90 minutes.

REFRESHING

CHARGING
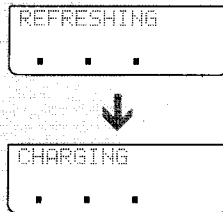
3 **Disconnect the AC power adaptor.**

The battery should power consecutive playback for about 75 minutes and record for about 60 minutes before you need to charge it again.

When to charge the battery
When the battery is weak, the ▭ low battery indication will flash continuously. Recharge the battery then.

When to replace the rechargeable battery
When the operating time of the fully charged battery decreases to about half, replace it with a new one (BP-MZ1).

Recharging and battery cautions
• Be sure to use the supplied AC power adaptor.
• Use the battery where the temperature is between 41° and 95°F (5° and 35°C) for the best results.
• Do not discard the battery in fire.
• Do not short-circuit the battery.
• Do not disassemble the battery. If the electrolyte inside the battery should come into contact with clothes or skin, immediately wash the contaminated objects with water.

Connecting to a stereo system

The MiniDisc Recorder is connectable to a digital or analog stereo system. Once hooked up, the recorder automatically recognizes the device as digital or analog. Note, however, that you can't hook up a digital device unless it has the same sampling frequency as the MD recorder (44.1 kHz). If it isn't the same, use the analog connection described in the following section.

OPTICAL (DIGITAL)/
LINE OUT jack

MD recorder

POC-MZ1 optical cable
(not supplied)

Digital amplifier

Optical digital input
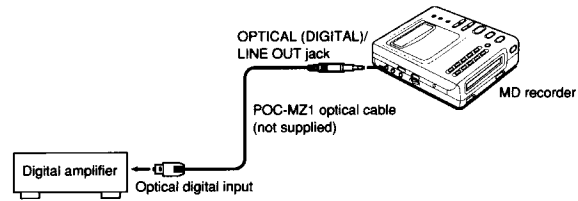
Note
To ensure good signal transmission, keep the plug ends
of the optical cable free from tarnish.

Hooking up an analog amplifier (or tape player)

OPTICAL (DIGITAL)/
LINE OUT jack

MD recorder

Line in jacks   Line cable
                       (supplied)
L (white)

Analog amplifier
or tape player

R (red)
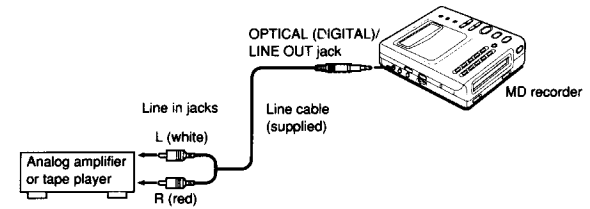
Setting the clock

To stamp the date on the MD when you record,
you need to set the time.

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1 Press CLOCK SET at the bottom of the
recorder with a pen nib.

The first digit of the year flashes.

---
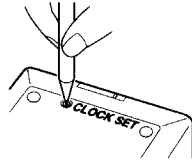
2 Enter the current year by pressing the
number keys.

---

3 Press ENTER/REPEAT.

The year you set is stored in memory and the first
digit of the month flashes.

---

4 Repeating steps 2 and 3, enter the current
month and day.

To enter a single-digit month or day, enter 0 as the
first digit.

---

5 Choose AM or PM by pressing DATE. Press
ENTER/REPEAT.

The cursor moves to the hour location and the first
digit of the hour flashes.

---

6 Enter the current hour and minutes as you
did month and day in steps 2 and 3.

When you press ENTER/REPEAT to set the minutes,
the clock starts operating.

If you make a mistake while setting the time
Press ENTER/REPEAT until the item you want to
change flashes. Re-enter the number using the
number keys.

To display the time
Press DATE in stop mode. The time indication
disappears after 10 seconds or when you press
DATE.

To display the time in the 24-hour system
Press DATE to display the time and then press
ENTER/REPEAT.

Playing an MD (normal play)

Listening to an MD is easy — just plug in the headphones, insert the MD and turn up the volume.

▶ (play)

VOLUME

Ω

1 Connect the headphones at the jack marked Ω.

2 With the label side up, and the arrow pointing toward the opening (as shown), slide the MD into the disc compartment until the recorder grips it.

The power will go on automatically. The name of the MD will light on the first line. The second line will alternate between the total number of tracks and the total playing time.
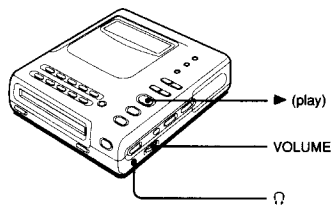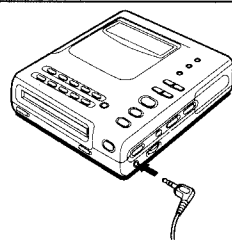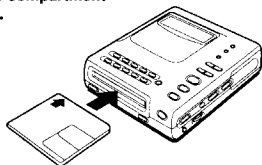

3 Press ▶ (play).

The track number, playing time and name light up in the display window, and the MD starts playing. If "REPEAT" is lit in the display window, all the tracks will play again. (See *Playing tracks repeatedly*.)

4 Adjust the volume.
(See the section, *Emphasizing the bass*.)

To	Press
stop play	■ STOP/CHARGE*
interrupt play momentarily	II (pause)
resume play after pause	▶ (play) or II (pause)
eject the MD	⏏ (eject)

* When you stop the recorder, the power goes off.

You can quickly find any track while playing an MD using the AMS (Automatic Music Sensor) buttons or number keys. You can also find tracks while in pause mode.

To find	Press
the beginning of the current or preceding tracks	I◄◄
the beginning of the next or succeeding tracks	►►I
a specific track	number keys and ENTER/REPEAT

While listening to an MD you may want to hear a particular section of a track. To find that section, press one of the ◄◄/►► Search buttons until you hear the part you want. Release it to return to normal play.

To	Press
search backward	◄◄
search forward	►►

The BASS BOOST feature intensifies low frequency sound for richer quality audio reproduction.

To emphasize	Set to
heavy bass slightly	MID
heavy bass greatly	MAX
no emphasis	NORM

Note
If the volume is too high, the sound may crack or distort. If this happens, turn down the volume.

If you are playing a premastered or recorded MD that's been electronically labeled, you can display information on the MD while it's playing or paused.* (To find out how to label an MD you've recorded, see *Labeling Recordings (title function).*) The display disappears after 10 seconds or when you press the button again.

To display	Press
name of MD playing	DISC NAME
name of track playing	TRACK NAME
date recorded (if not a premastered MD)	DATE

* Some premastered MDs may not have been electronically labeled.

Playing a single track

Because of the durable nature of MDs, you can play a favorite track once or over and over without wear to the disc. To play a track once just follow the procedure below.

To play the same track repeatedly, see *Playing tracks repeatedly*.

Number keys ———— I◀◀/▶▶I AMS
▶ (play)
PLAY MODE
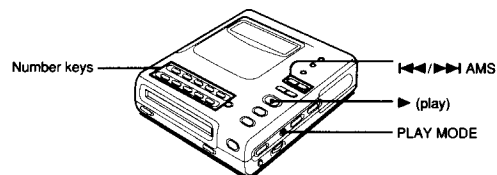
1 Press ▶ (play).

2 Display the track number you want to play using the I◀◀/▶▶I AMS or one of the number keys.

No803 00m00s
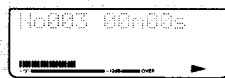
3 Press PLAY MODE until "1" lights in the display window.

The recorder will stop after the current selection has played. If "REPEAT" is also lit in the display window, the same track will play continuously.

No803 00m00s

To stop single track play
Press ■ STOP/CHARGE.

To cancel single track play
Press PLAY MODE until "1" disappears from the display window.

Playing tracks in random order (shuffle play)

In shuffle play tracks will play in random order. For example, instead of tracks 5, 6, 7 playing in order, they will play in any order such as 6, 5, 7.
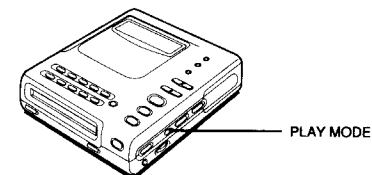
PLAY MODE

While the MD is playing, press PLAY MODE until "SHUF" lights in the display window.

"Access" lights up in the display while the player is looking for the first track to play.

The recorder will stop after all the tracks on the MD have played randomly. If "REPEAT" is lit in the display window, the MD will play in a continuously random order. (See *Playing tracks repeatedly*.)

No803 02m34s
SHUF

To stop shuffle play
Press ■ STOP/CHARGE.

To cancel shuffle play
Press PLAY MODE until "SHUF" disappears from the display window.

Note
When you press I◀◀ AMS or ◀◀ Search, the MD returns to the beginning of the current track only. To go back beyond the current track, you must cancel shuffle play.

Playing tracks in specific order (program play)

You can program up to 21 tracks to play in any order you like. Just enter the track numbers you want played in the order you want them played.

Number keys

ENTER/REPEAT

▶ (play)

PLAY MODE

1 While the MD is playing, press PLAY MODE until "PGM" lights in the display window.

"PGM" will flash signaling you to enter a track number.

No00※ step01

2 Press the number key or keys of the track you want to program.

The track number lights in the display, and the recorder continues to play the current selection.

No01※ step01

3 Press ENTER/REPEAT to enter your choice.

No00※ step02

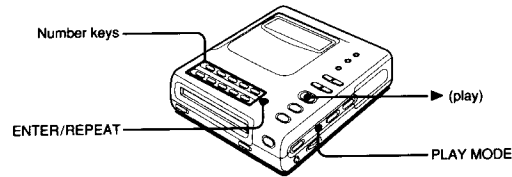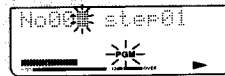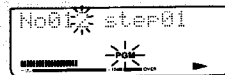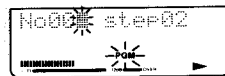**4** Repeat steps 2 and 3 until you have entered all the tracks you want played.

You can program up to 21 tracks.

5 Decide whether or not the order you want the tracks to play is correct (if not, see the options below), then press ENTER/REPEAT.

If tracks are left from a previous play list, enter "0" to erase the succeeding tracks.
"PGM" lights and the first track of the new play list is displayed.

No012 step01

PGM

6 Press ▶ (play).

The recorder will stop after playing all the tracks in the play list. If "REPEAT" is lit, the play list will play continuously. (See *Playing tracks repeatedly*.) The programmed play list will stay in memory until you program over it, erase it, take out the disc or turn off the recorder.

No012 00m01s

PGM
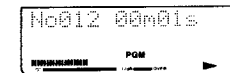
To check the order of the tracks you've entered
Before pressing ▶ (play), press ENTER/REPEAT. Each time you press ENTER/REPEAT, the next track number lights in the display.

Tracks 6, 2, and 9 have been entered.

No006 step01

No002 step02

No009 step03

No000 step04
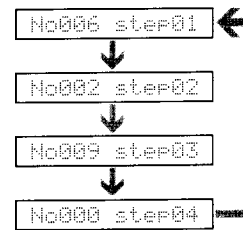
(Nothing has been programmed from the fourth step on.)

To change a track in the program
Before pressing ▶ (play), press ENTER/REPEAT to display the track you want to change. Press a number key to change the track number to the one you want. Press ENTER/REPEAT to save the new number.

To change the order of a play list
After you have pressed ▶ (play), you can only change the order of the tracks by re-programming new tracks over the old ones. Do this by following steps 1 through 5. Those tracks you do not program over will remain in the play list. For example, the old play list contains tracks 2, 3 and 4 and you program tracks 1 and 2 over 2 and 3. The new program will play tracks 1, 2 and 4. You can also erase the whole program, then re-enter a completely new program.

To erase a program
Display "PGM" and enter "0" at the beginning of the programmed tracks you want to erase. The succeeding programmed tracks will be cleared. For example, if you want to erase all the tracks in a play list, enter "0" at the first track. If you want to erase the 5th through last programmed track, enter "0" at the 5th track.

To stop a program while playing
Press ■ STOP/CHARGE.

To cancel program play
Press PLAY MODE until "PGM" disappears. The programmed play list will not be erased.

Note
If you try to program more than 21 tracks, the step number display will return to "1". If that happens, every tracks you program beyond the 21st will erase a programmed track number starting from the first.

12

Playing tracks repeatedly

You can play tracks repeatedly in normal, single, shuffle or program play modes. In shuffle mode, the tracks will be repeated in a different order each time they are played. For how to normal play, see

Playing an MD; for single play, see *Playing a single track*; for shuffle play, see *Playing tracks in random order*; for program play, see *Playing tracks in specific order*.
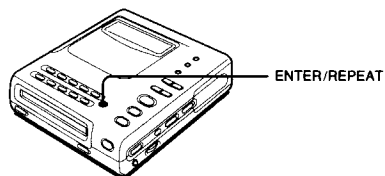
ENTER/REPEAT

While the MD is playing, press ENTER/REPEAT until "REPEAT" appears in the display window.

Make sure you press ENTER/REPEAT sometime before play ends. For example, when playing a single track, press ENTER/REPEAT before the track finishes. When playing programmed tracks, press ENTER/REPEAT before the play list ends.

The MD recorder will play all the desired tracks beginning from the designated first track, then go back and play them again.

Connecting other sound sources

Before you start recording, you need to connect this recorder to a sound source or a microphone. The sound source will be one of two types: a digital source (for example, another MD player, CD player or digital amplifier) or an analog source (such as a cassette player, radio or analog amplifier). Microphone recording connections are explained in the section, *Recording from a microphone*.

OPTICAL (DIGITAL)/
LINE IN jack

POC-MZ1
(not supplied)   MD recorder

Digital out

Digital sound
source
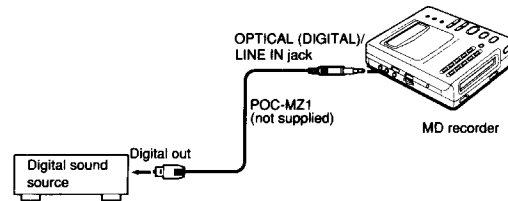
Notes on recording
• A digital source which has a different sampling frequency (such as the DAT Walkman) cannot be recorded using the digital connection. Use instead the analog (line out) connection (in the next section).
• If you use the above connection to record your MD, you will not be able to make copies from the recorded disc copy. You can only make copies from a home-recorded MD by using the analog (line out) connection.

When you record through the OPTICAL (DIGITAL)/ LINE IN jack, the recorder automatically recognizes the analog source and switches to analog input.

OPTICAL (DIGITAL)/
LINE IN jack

Line out   Line cable
(supplied)   MD recorder
L (white)

Analog sound
source
R (red)

— 14 —
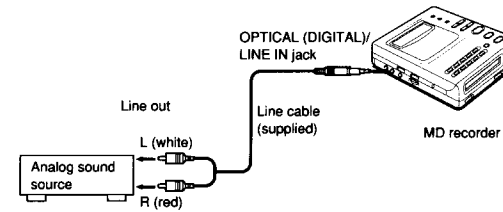
Recording an MD

Before you start recording, connect the MD recorder to a sound source (see *Connecting other sound sources*). Use a "recordable MD" to record. Premastered discs cannot be recorded over. (For more information on the difference between the two, read the section, *What is the MiniDisc ?*).

If you are recording from a digital source digitally connected, the track divisions are copied to the new recording. Tracks are copied where there is space for them on the disc, so there is no need to find a blank space to record into. The tracks are then renumbered automatically.

- ■ STOP/CHARGE
- ● REC
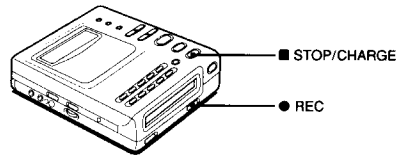
1 Insert the MD.

The disc name (if labeled) lights on the first line. On the second line the total number of tracks recorded and the recording time light alternately.

`000tracks`

⬇ ⬆

`00m00s`
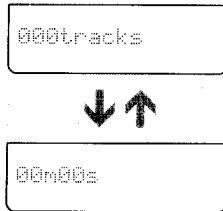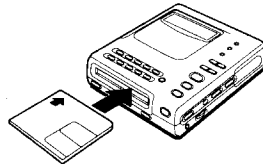
2 Find the music, track or selection on the source you want to record and if necessary, set the AGC.
(See the section *Adjusting the recording level* for how to set the AGC.)

3 Slide ● REC on the MD recorder to the right.

The switch will spring back to its original position. The ▶ and ▆▆▆▆ indications will come on and the available recording time on the MD will light up in the display. Recording starts. The time counts down as you record.

If a screen message flashes in the display
See the section *Error Messages* for an explanation.

`No001 00m01s`
`remain59m59s`

Available recording time

4 Play the recording source in normal play mode (i.e. not shuffle or program play).

5 Press ■ STOP/CHARGE to start rewriting the new TOC data to the MD.

Pressing ⏏ (eject) also will cause the new TOC data to start writing to the MD.
"TOC EDIT" starts flashing. You will hear whirring inside the recorder while the new TOC data* is writing to the MD. After about a second, the whirring will stop and "TOC EDIT" will go out. The new TOC is written to the MD.

Caution
Do not move or jog the recorder while"TOC EDIT" is flashing in the display.
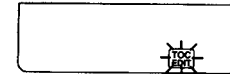
To	Press
Stop recording	■ STOP/CHARGE
Pause	II (pause)

To start recording precisely
1. Insert the MD and hold down the II (pause) button.
2. Slide the ● REC switch to the right.
   The recorder enters recording/pause mode.
3. Play the source. When the source comes to the part you want to record, press II (pause) again.

To check the last track recorded
Before you start recording, slide RESUME to the ON position. Press ▶ (play) after you finish step 5 above. Instead of playing from the first track, the recorder will play from the last track recorded.

To record-protect a MiniDisc
To the record-protect an MD, slide open the tab at the side of the MD (so the white part is concealed). In this position, the MD cannot be recorded.

Slide open the tab.
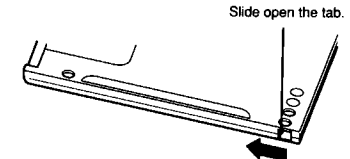
* The TOC (Table of Contents) represents the addresses for the beginning and ending of tracks on the MD.

Track marking is essentially adding tracks while recording. The track marking feature is useful particularly when recording conferences or discussions where a number of people are speaking. Insert a track mark (a new track number) every time the speaker changes. Track marking must be done while recording.

While recording, press ENTER/REPEAT. The track number will increment one.
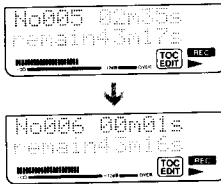
To play from a track mark
Press one of the I◄◄/►►I AMS buttons.
The MD will start play as soon as it detects a track mark.

Sound levels of digital sources are automatically copied to the MD. However, if you are recording from an analog source, you can set the recording level manually.

Setting levels automatically
Before recording, switch the AGC (Automatic Gain Control) to the ON position.

Setting levels manually
1 Switch the AGC to the OFF position.
2 Find the selection you want to record.
3 Slide the ● REC switch to the right while pressing II (pause).
4 Play the source at the loudest point.
5 While observing the level meter, adjust the recording level using the REC LEVEL dial so the audio level is about –12 dB.
6 Rewind or return to the selection to be recorded and release the pause button.
   The selection will record without cracking or breaking up at peak sound levels.

When you record over a previous recording, note that all the succeeding tracks will be erased.

1 Play the MD you want to record.
2 Find the place on the MD you want to record over using the I◄◄/►►I AMS or ◄◄/►► Search buttons.
3 Press II (pause) to stop the MD at that point.

   Caution
   All tracks following this point will be erased as soon as you start recording.

4 Find the selection on the sound source you want to play.
5 Slide ● REC to the right.
   Recording starts.

Recording from a microphone

To record through the microphone, first connect a stereo microphone (such as the Sony ECM-909 or ECM-727P) at the MIC jack.

MIC ATT
● REC
MIC
AGC
ECM-909
Stereo Microphone
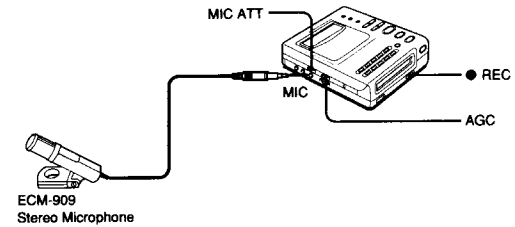
1 Set MIC ATT to 0 dB.

If the sound you're recording is very loud (a rock concert for instance), set it to 20 dB to reduce the recorder's sensitivity to the microphone and avoid sound break-up.

MIC ATT
20dB ● ● 0dB

2 Adjust the AGC (Audio Gain Control).

Switch to ON: for the recording level to adjust automatically.
Switch to OFF: to set the recording level manually.
(See *Adjusting the recording level* for more details.)

AGC
OFF ● ● ON

3 Slide the ● REC switch on the MD recorder to the right.

● REC
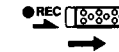
Dividing recorded tracks

If you are recording from an analog source or via an analog connection, all the selections will record to the MD as one track. If you don't want them as one track, you will need to divide the selections into individual tracks again. (See illustration below.)

Dividing Analog Recorded Tracks

| A | B | C | D | E | Original tracks |

↓

| A | B | C | D | E | As recorded |

Cue to
this point to
divide selections
A and B

↓

| A | B | C | D | E | After dividing |
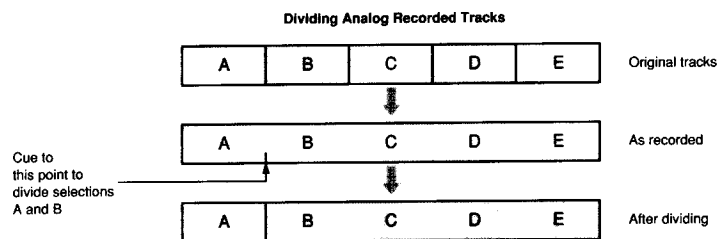
1 Press ► (play).

2 Using the ◄◄/►► Search buttons, cue to the end of the first of two selections you want to divide.

3 Press II (pause) at that point.

4 Slide the EDIT switch to the right several times until "Divide" lights in the display.

The first time you slide EDIT

The second time you slide EDIT

5 Press ENTER/REPEAT.
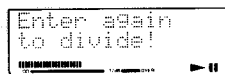
6 Press ENTER/REPEAT again to confirm your choice.

Pause is released and the new track starts playing. The track number in the display increments one and playing time of the new track appears. The track name before the divide remains in the display. (To change the track name, see *Labeling recordings (title function)*.)

7 Press ■ STOP/CHARGE.

"TOC EDIT" flashes and the new TOC data is written to the MD.

Caution
Do not move the recorder while "TOC EDIT" is flashing.

To cancel divide while dividing
Before you press ENTER/REPEAT, press ■ STOP/CHARGE or slide the EDIT switch in the direction of the arrow.

If you make a mistake
Recombine the tracks by using the procedure in "*Combining recorded tracks*" in the next section, and then divide the tracks again.

To change the order of two tracks
You can switch the order of adjoining tracks.

1 Press ► (play).
2 Using the I◄◄/►►I AMS buttons, find the second track of the two you want to switch. For example, to switch tracks 1 and 2, play track 2.
3 Keep ► (play) pressed and slide the EDIT switch to the right until "Swap" lights in the display.
4 Press ENTER/REPEAT.
   "Enter again to swap!" lights in the display.
5 Press ENTER/REPEAT again to confirm your choice.
   The two tracks switch places.
6 Press ■ STOP/CHARGE to rewrite the TOC data on the MD.

Combining recorded tracks

If you record from a digital source (using the digital connection) such as a CD or MD, every track division will be copied to the new MiniDisc. However, you may not want all of these divisions on your new disc. (*See illustration below.*) To get rid of extraneous track divisions or to correct mistakes made during dividing, use the combine function.

Combining Digital Recorded Tracks

| A | B | C | ▮ | Original tracks |

⬇

| A | B | C | ▮ | As recorded |

Cue to track C
to combine
tracks B and C → ⬇

| A | B | C | ▮ | After combining |
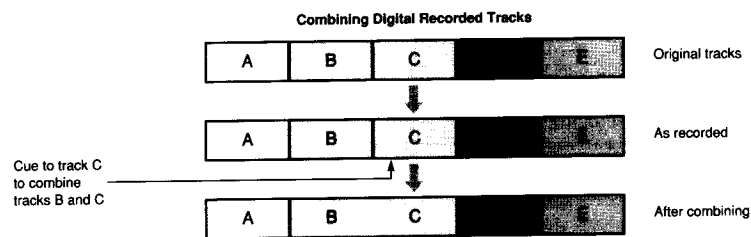
1 Press ► (play).

2 Using the I◄◄/►►I AMS or ◄◄/►► Search buttons, cue to any point in the second track of the two you want to combine.

3 Slide the EDIT switch to the right until "Combine" lights in the display.

4 Press ENTER/REPEAT.
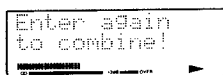
5 Press ENTER/REPEAT again to confirm your choice.

This combines the tracks. The number and name of the first track of the two lights up with the combined time.
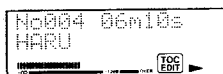
6 Press ■ STOP/CHARGE to rewrite the new TOC data to the MD.

"TOC EDIT" starts flashing.

Caution
Do not move the recorder while "TOC EDIT" is flashing.
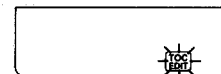
To cancel combine while combining
Before you press ENTER/REPEAT, press ■ STOP/CHARGE or slide the EDIT switch in the direction of the arrow.

If you make a mistake
Redivide the tracks by using the procedure in *Dividing recorded tracks* in the previous section, then recombine them using the procedure for combining.

To combine very short tracks
To combine tracks less than a minute long, press II (pause) before step 3 above.

Erasing recordings

When you erase a selection, all the music between the selected track number and the next track number gets erased. For example, if there are five music selections between tracks 1 and 2, when you designate track 1 to erase, all five selections will be erased with track 1. If you want to erase only one of the selections, add track numbers at the starting and ending points of that selection (See *To erase part of a track*, below). **Note that once a recording has been erased, you cannot retrieve it.**

ENTER/REPEAT

◄◄/►►◄ AMS
► (play)
■ STOP/CHARGE

EDIT
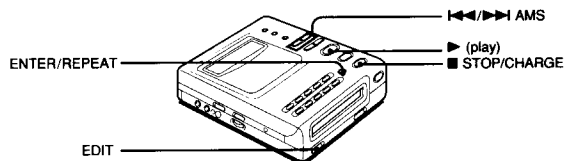
1 Press ► (play).

2 Using the ◄◄/►►◄ AMS buttons, find the track you want to erase.

3 Make sure the music between the track number now displayed and the next track number include only the music you want erased.

If not, add track numbers at either end of the selection. (See *To erase a part of a track*.)

4 Slide EDIT to the right several times until "Erase" lights in the display.

```
No004 00m01s
Erase
           ►
```

5 Press ENTER/REPEAT.

```
Enter again
to erase!
           ►
```

6 Press ENTER/REPEAT again to confirm your choice.

The track title and track number are erased from the MiniDisc, and the remaining tracks are renumbered. The track following the one just erased starts playing.
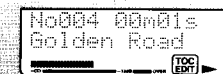
```
No004 00m01s
Golden Road
           TOC
           EDIT ►
```

7 Press ■ STOP/CHARGE to rewrite the new TOC data to the MD.

"TOC EDIT" starts flashing.

Caution
Do not move the recorder while the "TOC EDIT" is flashing.

To cancel erase while erasing
Before you press ENTER/REPEAT, press ■ STOP/CHARGE or slide the EDIT switch in the direction of the arrow.

To erase part of a track
1 Add track numbers at the start and end point of the music to be erased following the procedure in *Dividing recorded tracks*.
2 Erase the music using the instructions in *Erasing recordings* above.
3 Recombine the parts preceding and following the erased section following the procedure in *Combining recorded tracks*.

To erase a very short track
To erase a track less than a minute long, press Ⅱ (pause) before step 4 above.

To erase a disc
Erasing a recordable MD erases all the recorded tracks and the disc name.

1 Press ► (play).
2 Keep ► (play) pressed and slide the EDIT switch to the right until "Be careful! Erase all" flashes in the display.
3 Press ENTER/REPEAT.
   "Enter again to erase all" lights in the display.
4 Press ENTER/REPEAT again to confirm your choice.
   All the tracks on the disc are erased. After "TOC EDIT" flashes the disc stops.

Labeling recordings (title function)

The MiniDisc and song titles light up in the display when you insert a premastered MD and press ► (play). You can have the titles of a home recorded MD light in the display by creating labels for the MD.

You may want to label the MD before recording it, but first record tracks on the MD before creating labels for the tracks. Use the number keys to enter MD and track titles.

◄◄/►►I AMS
► (play)
ENTER/REPEAT
■ STOP/CHARGE
Number keys
EDIT
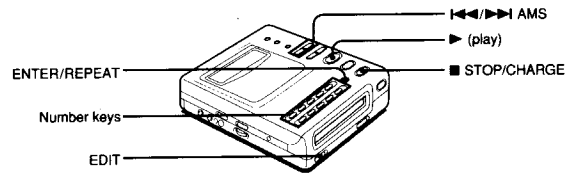
1 Press ► (play).

2 Choose which you want to label, an MD or an individual track:

To label an MD
Slide the EDIT switch several times to the right until "Disc Name" appears in the display.

Disc name ►

To label a track
① Use the I◄◄/►►I AMS buttons to find the track you want to name.
② Slide the EDIT switch several times to the right until "Track Name" appears in the display. Play will pause so that the track doesn't end before you have entered the name.

Track name ►II
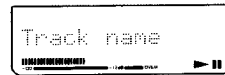
3 Press a number key until the letter you want appears in the display, (*see the illustration to the right*).

To enter a space, press "0" twice.
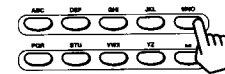
Each number key corresponds to two or three letters of the alphabet.

4 Press the ►►I AMS button to move to the next letter.

Disc name ►

5 Repeat steps 3 and 4 until you've entered the whole name.

You can enter up to 16 characters.

MY DIS
Disc name ►

6 Press ENTER/REPEAT.

The name you entered is displayed on the second line.

Enter again
MY DISC ►
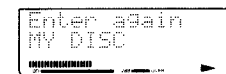
7 Press ENTER/REPEAT again to confirm your choice.

As soon as you've entered the track name, pause is released and play resumes.

MY DISC [TOC EDIT] ►

8 Press ■ STOP/CHARGE to write the new data to the MD.

"TOC EDIT" starts flashing.

Caution
Do not move the recorder while "TOC EDIT" is flashing in the display.

[TOC EDIT]

If you make a mistake
If you have not already pressed ENTER/REPEAT for the first time, press one of the I◄◄/►►I AMS buttons and enter the correct letter over the wrong one. To erase a letter, enter a space.
If you have already pressed ENTER/REPEAT, start again from step 2.

To change a name you have entered
When you have pressed ENTER/REPEAT for the second time, repeat "Labeling recordings" from major step 2.

Useful tips

![Resume playback from where the MD stops]

Instead of pressing **II** (pause), use the Resume function, to resume playback (in the same mode) from where you stopped playing. This is useful when you don't want the recorder to expend energy (as it would in pause mode), or start playing from the first track (as it would if you pressed ■ STOP/CHARGE only). The Resume function stores the stop point in memory and allows the recorder to play from where you stopped the recorder.

1 Switch RESUME to the ON position.

RESUME

OFF•• ON

➡

2 Press ■ STOP/CHARGE to stop the MD.

3 Press ► (play) to start play again.

Note
If you take the MD out or disconnect the power source (AC or battery power), the resume point will be lost.

![Preventing accidental operation]

Use the Hold function to prevent the buttons from being accidentally operated while you are jogging, walking or charging the battery (see *Battery charging tips*).

Slide the HOLD switch in the direction of the arrow to activate the Hold function.

HOLD ◢

➡

Battery charging tips

Use the HOLD function while charging
If a button is accidentally pressed while the battery is charging, charging will stop and "refreshing" will start again. To prevent this, slide the HOLD switch after the battery starts charging.

If you're in a hurry
If you don't want to wait for the battery to discharge completely ("refreshing"), you can interrupt the refreshing process and start charging immediately by pressing the ■ STOP/CHARGE button. However, we don't recommend you do this often with the same battery, since recharging a partially discharged battery weakens its capacity (i.e. it will operate for increasingly shorter periods).

To restore a weakened battery
If the battery capacity has been diminished considerably because of repeated partial rechargings, discharge and charge it a few times. This will restore the battery to full capacity. This also applies to when you use the battery for the first time or after a long period of disuse.

To remind yourself of the battery's charging state
Set the switch on the battery to the position where no mark is visible when the battery has finished charging. Set the switch to the red mark position when the battery has been discharged.

![Battery illustration]
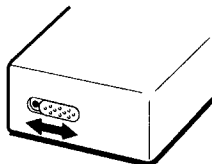
To best operate the battery
Keep the electrical contacts to the rechargeable battery compartment clean. If they are tarnished or dirty, battery operating time will decrease.

Precautions

On safety
• Since the laser beam used in this MiniDisc recorder is harmful to the eyes, do not attempt to disassemble the casing. Refer servicing to qualified personnel only.
• Do not put any foreign objects in the DC IN 10.5 V jack.

On power sources
• Use the rechargeable battery pack (supplied), house current or car battery.
• For use in your house: Use the AC power adaptor supplied with this recorder. Do not use any other AC power adaptor since it may cause the recorder to malfunction.
• 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, rechargeable battery pack or car battery cord). To remove the AC power adaptor from the wall outlet, grasp the adaptor plug itself; never pull the cord.
• For use in the car: Use the CPA-4 car connection pack (not supplied).

On installation
• Never use the recorder where it will be subject to extremes of light, temperature, moisture or vibration.
• Never wrap the recorder in anything when it is being used with the AC power adaptor. Heat build-up in the recorder may cause a malfunction or injury.

On the headphones
• *Do not use headphones while in traffic*
  Do not use headphones while driving, cycling, or operating any motorized vehicle. It may create a traffic hazard and is illegal in many areas. It can also be potentially dangerous to play your headset at high volume while walking, especially at pedestrian crossings. You should exercise extreme caution or discontinue using the headphones in potentially hazardous situations.
• *Preventing hearing damage*
  Avoid using the headphones at high volume. Hearing experts advise against continuous, loud and extended play. If you experience a ringing in your ears, reduce the volume or discontinue use.
• *Considering others*
  Keep the volume at a moderate level. This will allow you to hear outside sounds and to be considerate to the people around you.

On the MiniDisc cartridge
• Do not break open the shutter.
• Do not place the cartridge where it will be subject to light, temperature, moisture or dust.

On cleaning
• Clean the recorder casing with a soft cloth slightly moistened with water or a mild detergent solution. Do not use any type of abrasive pad, scouring powder or solvent such as alcohol or benzene as it may mar the finish of the casing.
• Wipe the disc cartridge with a dry cloth to remove dirt.

If you have any questions or problems concerning your recorder, please consult your nearest Sony dealer.

Error messages

If the recorder cannot carry out an operation, one
of the following error messages may flash in the
display window.

This message will flash	If
BLANK DISC	• you try to play a disc with no recording on it.
DISC ERROR	• the recorder cannot read the disc (it's scratched or dirty).
DISC FULL	• there is no more space on the disc (less than 4 seconds).
HOLD	• you try to operate the recorder with the HOLD switch slid in the direction of the arrow.
NO DISC	• you try to play or record with no disc in the recorder.
NO SWAPPED!	• you try to change the order of tracks while the first track on the disc is playing.
PB DISC	• you try to record or edit* on a pre-mastered disc ("PB" = playback).
PROTECTED	• you try to record or edit on a disc with the tab in the record-protect position.
SORRY PROHIBITED	• you try to combine tracks the recorder is not able to combine. If you have recorded or erased many times on the same disc, the data of a single track may be scattered throughout the disc. When the data is scattered in groups of less than 8 seconds long, the recorder will not be able to combine the tracks.
TR PROTECTED	• you try to record over or edit a track which has been track protected.**

*   "Edit" means you operated the EDIT switch.
**   Track-protected mini-discs — Some MD recorders
     will let you protect individual tracks from being
     recorded over. This recorder, however, does not offer
     this feature.

SECTION 2
DISASSEMBLY

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

2-1. UPPER PANEL AND BOTTOM PANEL

❾Raise the upper panel assembly from LCD side and push toward the front to remove in arrow ⑧ direction.
(When assembling, adjust the EJECT button position while engaging claw ⓑ with a groove in ornamental plate on front side.)

❺screws (P1.7×4.5)

⑧

❻screws (P1.7×4.5)

ⓑ claw

❼screws (P1.7×4.5)

volume dial

EJECT button

❽The battery case lid should be left open.

headphone jack

❷screws (P1.7×4.5)

Ⓐ

❸screws (P1.7×4.5)

ⓐ claws

EDIT

REC

❶battery case lid(lithium)

❹Remove the bottom panel assembly in arrow Ⓐ direction from the REC jack side. In such a case, push-in a little because claw ⓐ at two places gets stuck. (When assembling, shift EDIT switch and REC switch of bottom panel assembly in arrow direction, and adjust the headphone jack and volume dial positions while engaging claw ⓐ at two places with each groove in ornamental plates on both sides.)

2-2. CONTROL BOARD

❸ flexible board(CN802)

❶ screw(P1.7✕2.5)

❺ flexible board(CN901)

❻ flexible board(CN804)

❷ LCD module

❾ screw(M1.7✕1.6)

❹ connector(CN902)

❼ flexible board(CN801)

❿ Remove CONTROL board in arrow Ⓐ direction.

Ⓐ

❽ flexible board(CN803)

2-3. MAIN BOARD

⑫ *flexible board (CN602)*

⑪ *flexible board (CN801)*

⑩ *Turn over the MAIN board.*

⑥ *Remove MAIN board in arrow Ⓐ direction.*

⑧ *flexible board (CN503)*

③ *screws (P1.7×4.5)*

⑨ *flexible board (CN502)*

⑤ *screw (PTP1.7×3)*

Ⓐ

④ *screws (M1.7×3.5)*

short land

claws

❶ *screw (P1.7×4.5)*

❷ *Disengage two claws and remove ornamental plate (JACK).*

❼ *Note : Before removing flexible board (CN501), be sure to bridge the short land with solder. (Removing flexible board without solder bridge causes optical block to be damaged by static electricity.)*

2-4. BATTERY CASE

❸ *screws (P1.7×4.5)*

Ⓐ

HOLD

❹ *Remove battery case in arrow Ⓐ direction.*

RESUME

BASS BOOST

❶ *screw (P1.7×2.5)*

❷ *Remove ornamental plate(s). (When assembling, shift respective switches and knobs in arrow direction.)*

—25—

2-5. EJECT SHUTTER

red shutter

❷ ornamental plate assy

❶ screw (P1.7X2.5)

torsion spring

❸ Remove the eject shutter while bending
a little as shown.
(When assembling, press a red shutter and
insert eject shutter inside red shutter.)

2-6. MECHANICAL DECK

❶ Apply about 2V to loading motor terminals
to activate the loading status.

❷ Disconnect the magnetic head connector
(CONTROL board).
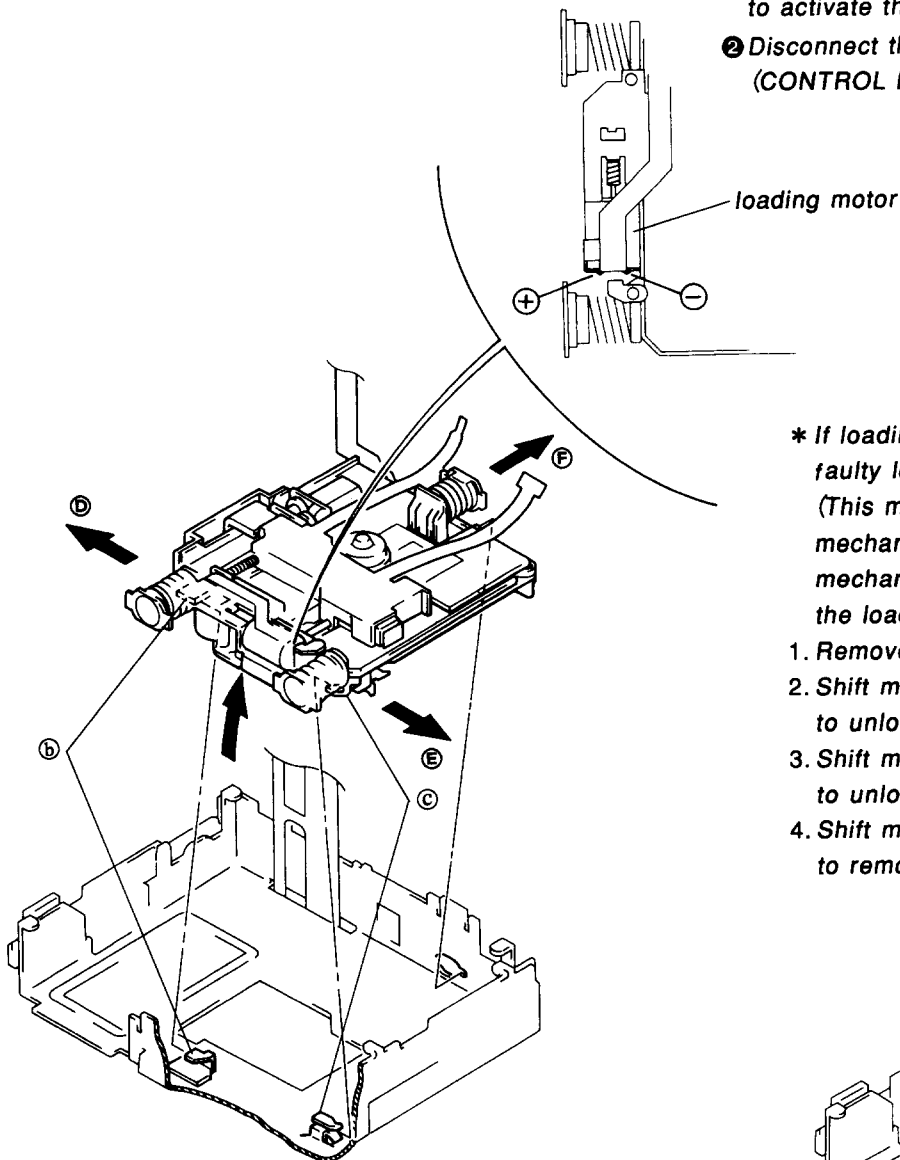
loading motor

* If loading status is not activated due to
faulty loading motor or a mechanical trouble.
(This method, however, puts burden on
mechanical components and therefore the
mechanical deck should be removed in
the loading status.)

1. Remove dampers at three places.
2. Shift mechanical deck in arrow ⓓ direction
to unlock ⓑ.
3. Shift mechanical deck in arrow ⓔ direction
to unlock ©.
4. Shift mechanical deck in arrow ⓕ direction
to remove.

❹ Remove the mechanical deck from ⓑ and
© sides where there are two dampers.
(When assembling, remove a damper on ⓐ
side and mount the chassis first, then the
mechanical deck from ⓐ side.)

Note : Do not touch optical block if possible,
when removing the mechanical deck.

Note : Run the loading motor to activate
loading status when assembling the
mechanical deck.
(Mechanical deck will not be assembled
unless the loading status is activated.)

damper

❸ Raise ⓐ at three places on chassis with a
screwdriver.

ⓐ

screwdriver

—27—

2-7. OPTICAL PICKUP BLOCK

❶ Run the loading motor to activate eject status.

❺ screws (M1.7×2.5)
(When tightening the screw, place
mechanical deck on the table as shown to
prevent magnetic head from being damaged.)

Note : Be careful for magnetic head during
removal and assembling.

❸ washer

❻ Remove optical pickup block
in arrow ⑧ direction.

❷ Rotating the gear in arrow Ⓐ direction, move
optical pickup block to the most inside track.

❹ shaft

2-8. HOLDER ASSY AND MAIN SLIDER ASSY
1. Removal

❺ *Remove holder assy in arrow Ⓐ direction.*

❶ *screw (M1.4×1.8)*

❷ *switch unit*

❼ *loading lever assy*

❻ *washer*

❽ *screw (M1.4×1.6)*

❾ *screw (K1.4×2.0)*

❿ *rack lever*

⓫ *Turning the positioning lever in arrow Ⓑ direction, remove main slider assembly.*

❸ *screw (M1.7×1.6)*

❹ *shaft stopper*

Note : The rack lever assembling position deeply affects the height of magnetic head, and the rack lever position has been finely adjusted in the factory. Therefore, do not remove this lever if possible.

positioning lever

2. Assembling

⑫ screw (M1.4×1.8)

⓫ switch unit

❽ Engage shafts ⓓ and ⓔ of holder assembly
with the top grooves in chassis and slider, and
the shaft ⓕ with a groove in loading lever.

ⓓ shaft

ⓕ shaft

❺ Assemble the loading lever assembly while
engaging with shaft ⓒ.

ⓔ shaft

❼ washer

❹ screw (K1.4×2.0)

❸ screw (M1.4×1.6)

❷ Assemble the rack lever while engaging with
shaft ⓑ.

❶ Assemble the main slider assembly while
engaging with the positioning lever ⓐ.

❾ shaft
stopper

⑩ screw (M1.7×1.6)

ⓑ shaft

❻ Run the loading motor so that
the shaft ⓒ on loading gear
comes to about 45° position.

ⓒ shaft

45°

loading gear

ⓒ shaft

ⓐ positioning lever

2-9. SLED MOTOR

❺ sled motor

❸ screw (PTP1.7×3)

marking

motor holder assy

Note : Assemble so that the printed face of motor is on the position shown in figure or the marking becomes ⊕.

printed face

❹ screw (M1.4×1.6)

❷ screws (M1.7×2.5)

lead screw assy

bracket

❶ Remove soldering.

2-10. LOADING MOTOR

* Remove the holder assembly and loading lever assembly.

❷ washer

❸ loading gear assy

❹ washer

❺ gear

❻ screws (M1.4×1.6)

❶ screws (P1.7×2.0)

❼ loading motor

❽ flexible board

printed face

Note : Assemble flexible board so that the printed face of motor is on the position as shown in figure.

2-11. SPINDLE MOTOR

❸ flexible board (CN702)

❹ screws (M1.7×2.5)

❷ Remove soldering.

❺ CLV board

❻ screws (M1.7×2.5)

❼ spindle motor

❶ Remove soldering.

1   2

3

When assembling, tighten screws in the order of 1, 2 and 3 while shifting the spindle motor in arrow direction.

SECTION 3
PIN FUNCTION

IC601 EFM/ACIR ENCODER/DECODER (CXD2525R)

*In the I/O column, (3) implies state output and (A) implies analog output.

Pin. No. QFP	Pin. No. VQFP	Name	I/O	Function
1	79	FSW	O(3)	Spindle motor output filter switching output. "Z" in CLV-P mode, or "L" in other modes.
2	80	NON	O	Spindle motor ON/OFF control output. ON at "H".
3	1	MDP	O(3)	Spindle motor servo control
4	2	MDS	O(3)	Spindle motor servo control
5	3	EFMI	I	EFM input in PLAY mode
6	4	ASY	O	EFM full-swing output in PLAY mode
7	5	LOCK	O	Lock status monitoring of spindle servo (CLV). Lock at "H".
8	6	VCOO	O	EFM decoder analog PLL oscillation output (196Fs=8.6436MHz)
9	7	VCOI	I	EFM decoder analog PLL oscillation input
10	8	TEST1	I	Test pin. Normally GND.
11	9	PDO	O(3)	EFM decoder analog PLL phase comparison output
12	10	VSS	—	Digital GND
13	11	EFMO	O	EFM output in REC mode
14	12	ATER	O	ADIP CRC flag output. Error at "H".
15	13	CNIN	I	Track jump count signal input
16	14	SENS	O(3)	Internal status output to serial bus address
17	15	SYPL	I	SQSY, ADSY, DQSY, MQSY polarity switching input. Active high at "H".
18	16	FILO	O(A)	Master PLL filter output for digital PLL
19	17	FILI	I	Master PLL filter input for digital PLL
20	18	PCO	O(3)	Master PLL phase comparison output for digital PLL
21	19	AVSS	—	Analog GND
22	20	CLTV	I	Master PLL VCO control voltage input for digital PLL
23	21	AVDD	—	Analog power supply
24	22	XRST	I	System reset input. Active low.
25	23	REC	I	Decoder at "L". Encoder at "H".
26	24	TEST8	I	Test pin. Normally GND.
27	25	SCLK	I	Serial bus clock input
28	26	XLAT	I	Serial bus latch input
29	27	SWDT	I	Serial bus write data input
30	28	SRDT	O(3)	Serial bus read data output
31	29	ADSY	O	ADIP Sync output
32	30	SQSY	O	Subcode Q Sync output
33	31	VDD	—	Digital power supply
34	32	DQSY	O	Output of subcodo Q Ssync(SCOR) in digital IN U-bit CD format.
35	33	TEST7	O	Open this pin.
36	34	DTI	I	Audio signal input in REC mode
37	35	DTO	O(3)	Audio signal output in PLAY mode. High impedance in REC mode
38	36	C2PO	O	C2PO in PLAY, D. IN-VFLAG in D.REC, 0 in A. REC.
39	37	BCK	O	2.8224MHz output (MCLK system)
40	38	XBCK	O	BCK inverted output (MCLK system)
41	39	LRCK	O	44.1kHz (=Fs) (MCLK system)
42	40	WDCK	O	88.2kHz (MCLK system)
43	41	FS4	O	176.4kHz (MCLK system)

Pin. No.		Name	I/O	Function
QFP	VQFP			
44	42	GTOP	O	Sync guard window open at "H" (INPUT EFM SYNC monitor output)
45	43	XUGFS	O	Unguarded Frame Sync at "L" (INPUT EFM SYNC monitor output)
46	44	XPLCK	O	EFM decoder PLL clock output (98Fs=4.3218MHz)
47	45	GFS	O	Frame Sync OK at "H" (INPUT EFM SYNC monitor output)
48	46	EPDO	O(3)	EFM encoder external PLL phase comparison output Freq. : low → "H"
49	47	RFCK	O	7.35kHz output (MCLK system)
50	48	EVCI	I	EFM encoder external PLL osxillation input (196Fs=8.6436MHz)
51	49	EVCO	O	EFM encoder external PLL osxillation output (196Fs=8.6436MHz)
52	50	VSS	—	Digital GND
53	51	MCLK	O	22.5792MHz output. Duty is not guaranteed.
54	52	XTAI	I	Crystal oscillation input (512Fs=22.5792MHz)
55	53	XTAO	O	Crystal oscillation output (512Fs=22.5792MHz)
56	54	TEST9	I	Fix to "L"
57	55	MVCI	I	Digital IN PLL oscillation input (512Fs=22.5792MHz)
58	56	MVCO	O	Digital IN PLL oscillation output (512Fs=22.5792MHz)
59	57	TEST2	O	Fix to "open"
60	58	DIPD	O(3)	Digital IN PLL phase comparison output Freq. : low → "L"
61	59	RAOF	O	RAM overflow output (Decoder monitor output)
62	60	MT3	O	Correction status monitor output in PLAY mode
63	61	MT2	O	Correction status monitor output in PLAY mode
64	62	MT1	O	Correction status monitor output in PLAY mode
65	63	MT0	O	Correction status monitor output in PLAY mode
66	64	WFCK	O	7.35kHz (EFM decoder PLL system in PLAY mode, EFM encoder PLL system in REC mode)
67	65	DIN	I	Digital audio input pin
68	66	MD2	I	Digital audio OUT ON/OFF pin. ON at "H".
69	67	DOUT	O	Digital audio output pin
70	68	DIDT	O	Audio data output pin for digital audio input pin
71	69	DODT	I	16-bit data input pin for digital audio output
72	70	DOVF	I	Validity flag input pin for digital audio output
73	71	VDD	—	Digital power supply
74	72	TEST3	I	Fis to "L"
75	73	TEST4	O	Fix to "open"
76	74	TEST5	I	Fix to "L"
77	75	TEST6	I	Fix to "L"
78	76	FMCK	I	ADIP read clock input (TTL Schmidt input)
79	77	FMDT	I	ADIP data input (TTL Schmidt input)
80	78	ADFG	I	ADIP carrier signal input (TTL Schmidt input)

Notes :   · XUGFS is Frame Sync taken from EFM signal and it is a negative pulse. It is a signal before Sync protection.
 · For the XPLCK, PLL is generated so that the inverted EFM PLL clock falling edge meets with the transition point of EFM signal.
 · GFS signal becomes "H" when Frame Sync meets with the internal guard timing.
 · C2PO signal indicates data error status.
 · RAOF signal is generated when 32kRAM exceeds±4F jitter margin.

IC602 SHOCK PROOF MEMORY CONTROLLER(CXD2526Q)

Pin. No.	Name	I／O	Function
1	A14	O	SRAM address bus A14 when RMSL=H, or WFFUL (note) when RMSL=L
2	A15	O	SRAM address bus A15 when RMSL=H, or RFEMP (note) when RMSL=L
3	A16	O	SRAM address bus A16 when RMSL=H, or WFOVF (note) when RMSL=L
4	A17	O	SRAM address bus A17 when RMSL=H, or WDTM (note) when RMSL=L
5	A18	O	SRAM address bus A18 when RMSL=H, or ZERO (note) when RMSL=L
6	A19	O	SRAM address bus A19 when RMSL=H, or MDTSC (note) when RMSL=L
7	A20	O	SRAM address bus A20 when RMSL=H, or CMPSY (note) when RMSL=L
8	LRCK	I	LRCK input from EFM encoder／decoder
9	BCK	I	BCK input from EFM encoder／decoder
10	C2PO	I	C2PO input from EFM decoder
11	DATA	I／O	I／O data from decoder in PLAY mode, or to encoder in REC mode
12	VSS	−	GND
13	TEST	I	Test pin. Normally fix to "L".
14	XRST	I	RESET input. Reset at "L".
15	MIN	I	External monitor signal input pin. Input a signal to be monitored.
16	SRDT	(HiZ) O	Microcomputer serial data output. Hi-z when CXD2526 read register is not selected.
17	SWDT	I	Microcomputer serial data input
18	XSLT	I	Microcomputer serial data latch signal input
19	SCK	I	Microcomputer serial data shift clock input
20	SCTX	I	Data output enable signal input in REC mode
21	RCPB	I	PLAY mode at "L"／REC mode at "H"
22	WRMN	I	WRITE mode at "H"／MONITOR mode at "L"
23	SBMN	I	Input signal recording based on SDCT at"H"／based on DCT at "L"
24	XINT	O	Interruput request output. "L" in the interrupt status.
25	MDSY	O	Input data MD Sync detection signal
26	MEMFUL	O	H when main data area is full
27	MEMEMP	O	H when main data area is empty
28	UNDER	O	H when RMS < THUND
29	OVER	O	H when RMS ≧ THOVR
30	ERWR	O	H when C2PO data is written in RAM
31	BTOV4	O	H when BCT ≧ 400(Hex)
32	TXST	O	H during data transfer
33	VDD		System power supply
34	BUSY	I／O	H during RAM access
35	ZZ2	I	Test signal. Fix to "L".
36	ZZ1	I	Test signal. Fix to "L".
37	ZZ0	I	Test signal. Fix to "L".
38	XALT	O	Data ready or latch signal to CXD2527
39	ADT1	I	Data input from CXD2527
40	ADTO	O	Data output to CXD2527
41	ACK	O	Data I／O clock output to CXD2527
42	AC2	O	C2PO output pin for output data to CXD2527
43	XRQ	I	Data request signal input from CXD2527
44	SDCK	I	External subdata I／F shift clock input
45	SBDT	I／O	External subdata I／F data output in PLAY mode, or data input in REC mode
46	XWT	O	External subdata I／F wait signal. When this pin is"L", clock to read new data must not be fed.

Pin. No.	Name	I/O	Function
47	SRDY	O	External subdata I/F access permit signal. When this pin is "H", clock to read/write subdata is ignored, even if fed.
48	MCK	O	128Fs output
49	F256	O	256Fs output
50	XTLO	O	System clock output
51	XTLI	I	System clock input. Input 22.5792MHz.
52	VSS	—	GND
53	TEST	I	Fix to "L"
54	RMSL	I	External RAM selection. SRAM at "H"/DRAM at "L".
55	ERR	I/O	C2PO input/output when EXTC2R="H"
56	D7	O	SRAM data line D7 when RMSL="H"/Test signal at "L"
57	D4	I/O	RAM data bus D4 when RMSL="H"/Test signal at "L"
58	D0	I/O	RAM data bus D0
59	D1	I/O	RAM data bus D1
60	D3	I/O	RAM data bus D2
61	D2	I/O	RAM data bus D3
62	XCAS	I/O	DRAM $\overline{CAS}$ output when RMSL="L"/Data bus D5 when RMSL="H"
63	XOE	O	RAM output enable
64	A10	O	RAM address bus A10
65	XWE	O	RAM write enable
66	XRAS	I/O	DRAM $\overline{RAS}$ output when RMSL= "L"/Data bus D5 when RMSL= "H"
67	A11	O	RAM address bus A11
68	A9	O	RAM address bus A9
69	A0	O	RAM address bus A0
70	A1	O	RAM address bus A1
71	A2	O	RAM address bus A2
72	A3	O	RAM address bus A3
73	VDD	O	System power supply
74	A8	O	RAM address bus A8
75	A7	O	RAM address bus A7
76	A6	O	RAM address bus A6
77	A5	O	RAM address bus A5
78	A4	O	RAM address bus A4
79	A12	O	RAM address bus A12 when RMSL="H"/CS output at "L"
80	A13	O	RAM address bus A13 when RMSL="H"/SYOK OUTPUT AT "L"

Note : WFFUL "H" when the write FIFO is full.
RFEMP "H" when the read FIFO is empty.
WFOVF "H" when the write FIFO overflows.
WDTM The timing for window in D1 block is output.
ZERO "H" when BCT=0.
MDTSC "H" when the header sector of input data is 00-1F, or "L" for others.
CMPSY Internal synchronization timing.

SECTION 4
TEST MODE

The microcomputer of this set provides the TEST mode.

The following describes TEST mode function and its operating method.

[CAUTION ON LASER EMISSION]

Never look into the laser unit from top position when confirming laser emisson during adjustment. Otherwise, you could lose your eyesight.

[CAUTION in TEST mode]

· Pressing ENTER key with all servo ON erases the contents of disc(UTOC erasing).

· Confirm RF waveform since no playback signal is output during playback in the TEST mode.

## [Activation or deactivation of TEST mode]

1. With an AC cord unplugged and battery removed, short JR106 with solder jumper.

2. Plug—in the AC cord, and the TEST mode will be activated.

3. To deacativate the TEST mode, remove the solder jumper.

[Checking RF wavaeform]
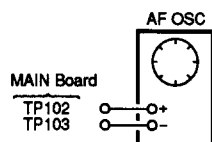
1. Place the set in STOP status, and connect an oscilloscope to TP102.

2. Select either CLV servo mode of "a" to "d" listed in Table 2 on page 39, and load a suitable disc(MO should have been already written).

3. Press the PLAY key, and RF waveform will be output.

4. Check that proper waveforms are output in all modes "a" to "d" listed in Table 2

RF signal Waveform
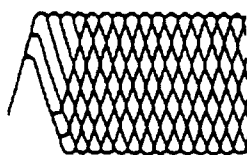
[Operation in TEST mode]

1. Output of SIN wave

1-1. After power ON initialization, the SIN wave of 1KHz —12dB is output from LINE OUT and PHONE, which will be continuously output until any key is pressed(but, this operation is only performed immediately after power ON).

1-2. The audio circuit will be normal if this signal is output.

* The 212—byte data is transferred from IC801 (microcomputer)to IC602 and IC602 gemerataes a canned pattern.

2. Checking loading operation of cassette compartment

2-1. Loading is started when caddy is inserted.

2-2. The caddy is ejected when EJECT key is pressed.

2-3. The head is moved up and down when pressing PAUSE key with an MO disc loaded. (Do not use CD disc.)

* Unplug the power cord immediately when you find any abnormality bcause the casette compartment keeps operating by ignoring mechanical failure.

3. Checking servo system

3-1. Checking laser emission

3-1-1. Confirm that repetitional operation of laser beam emis sion and lens up—down movement is performed when pressing the PLAY key without loading a disc.

3-2. Focus search and CLV kick up to rough servo

3-2-1. Load a disc and press the PLAY key in STOP status.

3-2-2. Focus search, Focus on and CLV—A are executed.

3-2-3. Disc reflection is checked, and the laser power is set to MO/CD READ power.

3-2-4. Tracking brake is turned on.

3-3. All servo ON

3-3-1. with the set in STOP status or during servo system check 3-2, press PLAY key.

3-3-2. Focus on, CLV—A, sled motor and tracking motor are turned on respectively.

3-4. Movement of optical pickup

3-4-1. With the set in STOP status or during servo system check 3-1, 3-2, 3-3, press NEXT key.

3-4-2. The sled motor and tracking motor run forward while the NEXT key is pressed.

3-4-3. With the set in STOP status or during servo system check 3-1, 3-2, 3-3, press PREV key.

3-4-4. The sled motor and tracking motor reverse while the PREV key is pressed.

3-4-5. Checd for smooth operation.

3-5. All servo OFF

3-5-1. With the set in STOP status or during servo system check 3-1, 3-2, 3-3, press STOP key.

3-5-2. Focus on, CLV−A, sled motor and tracking motor are turned off respetively.

4. Switching laser power

4-1. With the set in STOP status, press EDIT key.

4-2. Each time the EDIT key is pressed, laser power varies like : [CD-READ] → [MO-READ] → [3. 5mW] → [MO-WRITE] → [OFF] ([Laser CD PIT] → [Laser MO GRV] → [Laser1／2 GRV] → [Laser MOW GRV] → [Laser OFF PIT])

Remarks : In the CD／MO READ power mode, the module is turned on about 10ms after the laser is turned on.

＊ Use for MO−WRITE power adjustment and READ power checking.

5. Checking REC monitor system

5-1. With the set in STOP status, press REC key.

5-2. The input status at the time when REC key is pressed is activated (see Table 1).

Table 1

OPTICAL (DIGITAL) IN	MIC IN	INPUT STATUS
Not connected	Not connected	Analog
Connected	Not connected	Digital

Remarks : 1) IC301(MIC line IN, AMP)

IC309(AD converter)

IC603(ATRAC)input interface

ICA601(EFM encode, decode)digital

IN／OUT These can be checked.

Remarks : 2) IC601 COMMAND DATA

AIN : SYSTEM SET $ 80. 04

SYSTEM CONTROL $ 81. 20

DIN : SYSTEM SET $ 80. 24

SYSTEM CONTROL $ 81. 38

6. Selection of CLV servo mode

6-1. With the set in STOP status, press PLAY key and PLAY MODE key, so that each mode is selected depending on setting of REFLECT, RESUME and HOLD switches as shown in Table 2.

Table 2

Mode	Operation			Applicable disc	LCD DISPLAY	CLV mode
	REF.	RESUME	HOLD	Applicable area	PIAT/GRV	
a	L	ON	HOLD	CD:PIT	PIT	EFM
b	H	ON	HOLD	MO:PIT	PIT	EFM
c	H	OFF	HOLD	MO:Recorded	PIT	EFM
d	H	OFF	OFF	MO:Groove	PIT	ADIP

＊ Always use a disc suitable for each mode.

＊ REF. is automatically changed over when caddy is loaded, It is in "H" status when caddy is not loaded, or in "L" status when TP520 is connectd to GND.

＊ In mode "b" , optical pickup must be posioned on the most inside track.

＊ In mode "c" and "d" , move optical pickup to proper Groove area.

7. Linking data recording 1

(for checking recording error rate)

7-1. Load an Mo disc and press REC key(no IN terminal is connected : Analog recording).

7-2. Move optical pickup to a proper position in Groove area. (Inside from 0600. FC cluster)

7-3. Press PLAY key and PLAY MODE key to activate ALL SERVO ON status.

7-4. When pressing REC key, the pickup makes an access to 0600. FC cluster to start linking recording.

7-5. Upon display of 0700. FC cluster, press STOP key, and the pickup makes an access to 0600. FC and stops.

8. Linking data recording 2(for adjusting focus bias)

* This disc has been registered as a service tool.

* Prepare for focus bias adjustment because it takes about 20 minutes to complete this operation.

8-1. Load an MO dis and press REC key(no Interminal is connected : Analong recording).

8-2. Move optical pickup to a proper position in Groove area.

8-3. Press PLAY key, PLAY MODE key and "O" , and the pickup makes an access to 0032 cluster.

8-4. Perform linking recording over 0700. cluster display (for about 20 minutes), then stop by pressing the STOP key.

9. LCD display

POWER ON	'■■■■■■' (ALL on)
(POWER ON &	'Welcome to Disc World' (Comeinuous scroll)
LOAD/EJECT)	' [SONY] '
1st line	
PLAY KEY	'Focus Srch'
	'Focus ON ! '
STOP KEY	'ALL SV OFF'
P MODE KEY	'ALL SV ON'
NEXT KEY	'T. SLED FWD'
PREV KEY	'T. SLED RVS'
REC KEY	'REC' analog'
	'RED digital' (When DIGITAL IN is connected)
2nd line	
EDIT KEY	'Laser OFF PIT'
	'laser CD PIT'
	'laser MO GRV'
	'laser 1/2 GRV'
	'laser MOW GRV'
P MODE KEY	'xxxxC xxS' ⎫ ⎛Displayed alternately with
	'Error−xxxx' ⎬ DATE key.
	⎭ Cluster (error) is displayed at focud ON. ⎞

## [Reference]

1. Erasing of UTOC area

CAUTION : This should be executed only when the con tents of discare not erased completely through ALL ERASE operation beause the contents of UTOC area are all erased, resulting in an empty disc just as a new disc.

1-1. Press NEXT key to move optical pickupto a proper posi tion in Groove area.

1-2. Press PLAY key and PLAY MODE key to place the set in ALL SERVO ON status.

1-3. Wen pessing ENETER key, the pickup makes an access to inside track, erases UTOC area, and stops.

SECTION 5
ELECTRICAL ADJUSTMENTS

[Notes]

1. Adjust all items in the listed order (up to (1-10) when optical pickup is replaced).

2. Power supply voltagae : DC10. 5V

3. Use a disc(MO or CD)suitable for the CLV servo mode, whenever so specified.

4. Place the set in TEST mode before adjustment (see page 40)and reset the mode after adjustment.

5. Short the laser taps on flexible board with solder during removal and mounting, because optical pickup could easily be broken by static electricity.

optical pickup flexible board
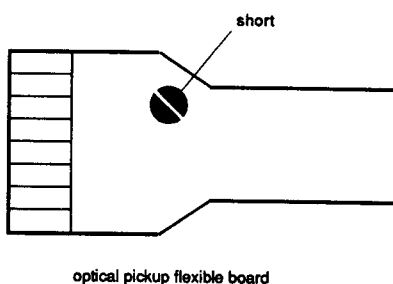
[Before adjustment]

Place the set in TEST mode, and perform operation check in TEST mode and confirm the following items.

1. Checking power supply

1-1. In the TEST mode, check that each output voltage satis fies standard value (in this set, no adjustment can be made because of parts layout, and therefore replace the unit if power supply is faulty).

	Standard value	
UPV	6. 5V±0. 5	TPA405
CPUV	4. 0V±0. 15	TP841
4. 5	4. 5±0. 2	TP402
VP	5. 5±0. 2	TP404
4. 1	4. 1V±0. 1	TP401
4. 75	4. 75V±0. 2	TP403
REC(recording)	4. 0V±0. 05	TP910
10	8. 7V±0. 2	TP1

[Adjustment]

### 1-1. Adjustment of temperature compensation

1. With the set in cold status, measure voltage at TP120.

2. Calculate voltate based on the room temperature, then adjust RV509 meeting that value.

Remarks : 1) Compensated voltage will vary in a step of −9mV╱deg (vlotage lowers by 9mV when room temperature rises 1° C) on the basis of voltage at TP120 at room temperature 25° C (VC=OV).

Remarks : 2) Temperature sensor : Q512 (on operation board)

1-2. Adjustment of MO write power

1. Sort R530 (between TP550 and TP120).

2. Press te EDIT key four times to display "LaserMOW" (write power mode).

3. Place a probe of laser power meter on objective lens and fix the prove where meter indicates the maximum reaking.

4. Adjust RV505 so that meter reading is 6. 8mW±0. 1.

5. Measure voltage between TP126 and 127 and calculate current from resistance across these test points to con firm that it is within ±30% of the value specified on optical pickup label.
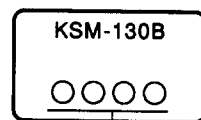
Current
(Example : 1072=107.2A)

6. Remove a short between TP120 and TP550.

* Some ofthe following adjustments use both CD (PIT) and MO(PIT╱Groove)discs. In suck a case, switch the CLV servo mode by referring to page.

* In order to acativate REF-L(Table 2 - a)without using a disc (CD status), TP520 must ba shorted to GND.

1-3. Adjustment of focus offset

1. Place the set in STOP status (disc must be removed).
2. Short TP105 to VC(TP101).
3. Adjust RV511 in PIT mode (a in Table 2), or RV510 in Groove mode (d in Table 2) so that the voltage at TP107 is VC±50mV.
4. Remove a short vetween TP105 and VC.

1-4. Adjustment of FOK offset

1. Place the set in STOP status(disc must be removed).
2. Adjust RV512 in PIT mode (a in Table 2), or RV512 in Groove mode (d in Table 2)so that the voltage at TP103 is VC±50mV.

1-5. Adjustment of tracking error

(Up to last dihet—12 of main board)
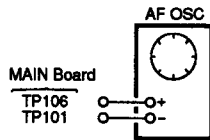
1. Activate MO-PIT, EFM-CLV mode(b in Table 2).
2. Load an MO disc and optical pickup moves to the most inside track, then press the PLAY key.
3. Connect an oscilloscope to TP106, and adjust RV504 so that a waveform at TP106 is vertically symmetric(noise measures).
4. Press the STOP key and optical pickup moves to middle track(Groove area).
5. With MO-GRV, ADIP-GRV mode (d in Table 2). press PLAY key for focusing, and press EDIT key to activate the write power mode("LaserMOW" is displayed).
   At this time, adjust RV501 so that a waveform at TP106 is vertically symmetric against VC.
6. Repeat steps 1) to 3) for adjustment, then unload the disc.
7. Activate CD-PIT, EFM-CLV mode (a in Table 2).
8. In the STOP status, adjust RV503 so that the voltage at TP106 is VC±50mV.
9. Load a CD disc, and adjust RV502 so that a waveform at TP106 is vertically symmetrid against VC.
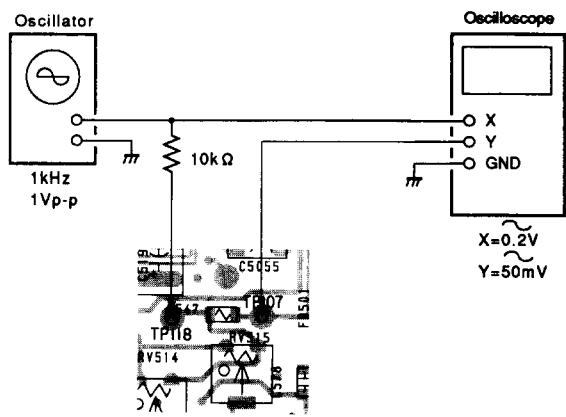
1-6. Adjustment of focus bias
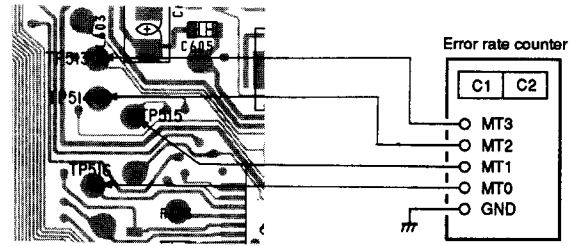
1. Load an MO disc on which the linking data recording 2 as descrived on page 40 was executed, and press PLAY key on inside track in Groove area, then the PLAY MODE key.
2. Adjust RV508 to search a point whre the error rate (c1)is about 100 or 200, then press STOP key.
3. Record voltage at TP105.
4. Again perform playback and adjust RV508 in reverse direction of step 2) to search a point where the error rate (c1) is about 100 or 200, then press STOP key.
5. Record voltage at TP105.
6. Adjust RV508 so that the voltage at TP105 is interme diate value of those measured in steps 3)and 5).

1-7. Adjustment of CD read power

1. Load a CD disc.
2. Turn on the HOLD and RESUME switch (Servo＝PIT, CLV＝EFM). (See Table 2 - a)
3. Press the PLAY key, then the PLAY MODE key.
4. Adjust RV519(on main F board)so that the RF amplitude(at TP102)is 1. 0V±0. 1.
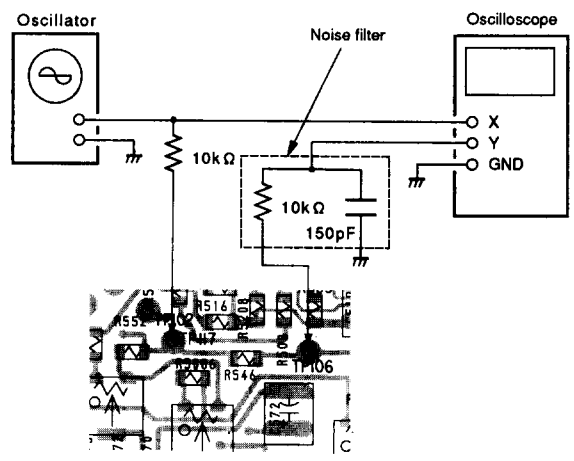
1-8. Adjustment of focus gain

1. Load a disc(CD/MO), and press the PLAY key, then PLAY MODE key.
2. Enter 1kHz 1Vpp from oscillator to TP118 through 10kΩ.
3. Draw Lissajous' figure on oscilloscope with the oscillator output assumed as X axis and TP107 output as Y axis.
4. Adjust on the oscilloscope so as to attain the status (a=b) shown in Fig. 1.
5. Adjust each RV so that phase difference is 95±5 deg(Fig. 1).

   For CD (a in Table 2) ： RV515
   For MO (d in Table 2)： RV514

1-9. Adjustmetnt of tracking gain

1. Load a disc(CD/MO), and press the PLAY KEY, then PLAY MODE key.
2. Enter 1kHz 2Vpp from oscillator to TP117 through 10kΩ.
3. Draw Lissajous' figure on oscilloscope with the oscillator output assumed as X axis and TP106 output as Y axis.
4. Adjust on the oscilloscope so as to attain the status (a=b) shown in Fig. 2.
5. Adjust each RV so that phase difference is 95±5 deg (Fig. 2).

   For CD (a in Table 2) ： RV517
   For MO (d in Table 2)： RV516

* The phase should be subtracted by 5 deg (phase difference 100 deg). when a noise filter of 100kΩ 150pF is inserted in Y axis.
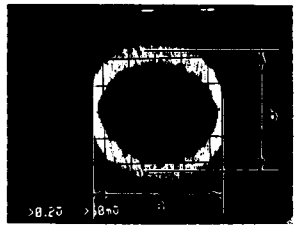

Set b to the center of noise.
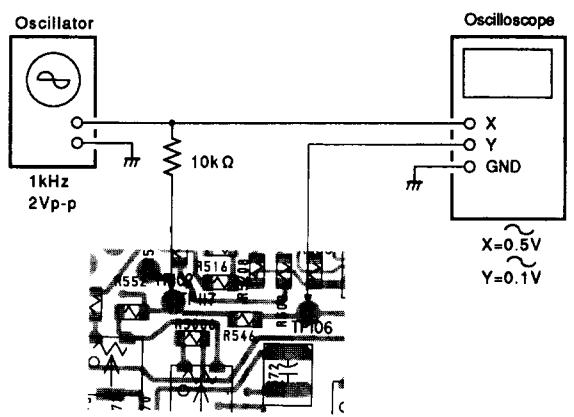Make a=b.

Fig. 1　Focus gain adjustment
(95 deg)

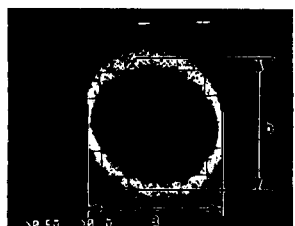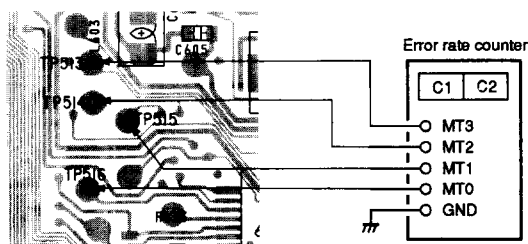Set b to the center of noise.
Make a=b.

Fig. 2　Tracking gain adjustment
(100 deg : inserting noise filter)

1-10. Confirmation of recording(playbak)error rate

1. Connet the error rate counter (TP513−516, GND).

2. Perform the linking data recording 1 from 0600. FC cluster to 0700. FC cluster (for more than 2 minutes), then press the STOP key.

3. Press the PLAY key, and the PLAY MODE key. (d in table 2)

4. Confirm error rate from 0600. FC clulster to the end of recording.

   Max. C1 error rate : 100 or less

          C2 error   : No interpolation

∗ If this condition is not satisfied, check disc for damage or dust.

Remarks : LCD display will be switched between error and cluster number each time the DATE key is pressed.

1-11. Adjustment of encoder PLL

1. Make sure that nothing is connected to the DIGITAL LINE IN terminal.

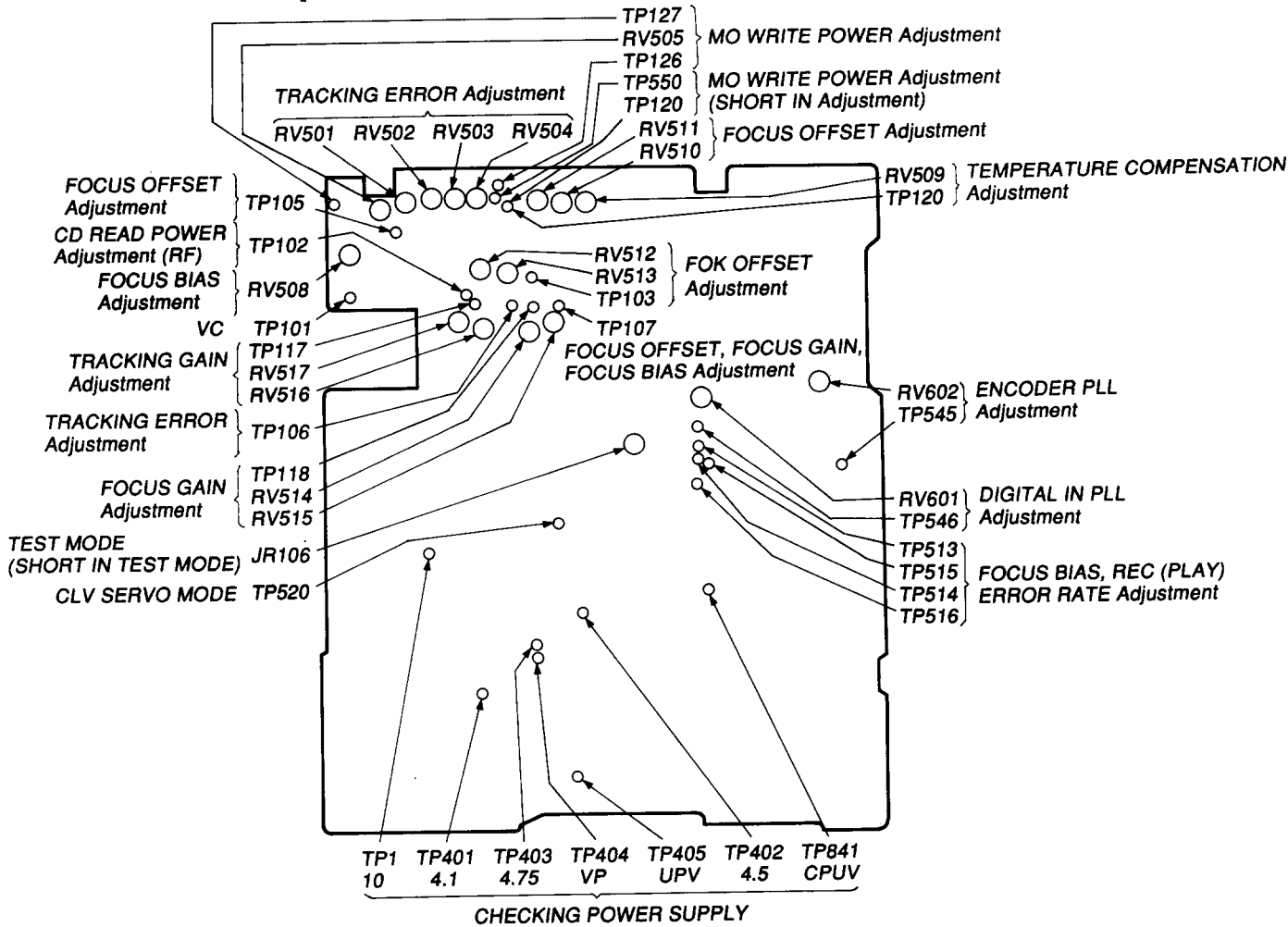2. Press the REC key, and adjust RV602 so that the waveform at TP545 is vertically symmetric against VC.

1-12. Adjustment of DIGITAL IN PLL

1. Connect digital output of CD player to the DIGITAL IN terminal of the set, and plase the CD player in play back status.

2. Press the REC key, and adjust RV601 so that the wave form at TP546 is vertically symmetric against VC.

1-13. Confirmation of charging operation

1. Connecat an AC plug (power test mode) while presing the DATE (DISPLAY mode) key.

2. Connect a resistor $7\Omega / 20W$ between battery terminals " + " and " − " .

3. Press the PLAY key to activate the charging mode.

4. Confirm that the charging voltage and current are within 7V, 1A ± 10%.

5. Connect a resistor $330\Omega / 0.25W$(parallel to 7Ω) between battaery terminals " + " and " − " .

6. Confirm that charging is stopped.

[MAIN BOARD] (SIDE-B)

TP127 ⎫
RV505 ⎬ MO WRITE POWER Adjustment
TP126 ⎭

TP550 ⎫ MO WRITE POWER Adjustment
TP120 ⎭ (SHORT IN Adjustment)

TRACKING ERROR Adjustment

RV511 ⎫ FOCUS OFFSET Adjustment
RV510 ⎭

RV501 RV502 RV503 RV504

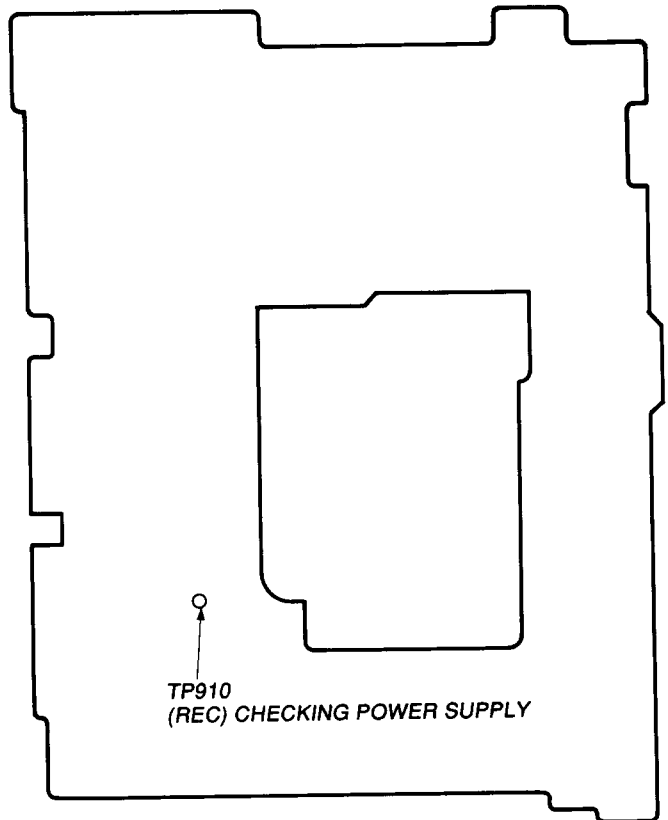FOCUS OFFSET
Adjustment } TP105

RV509 ⎫ TEMPERATURE COMPENSATION
TP120 ⎬ Adjustment

CD READ POWER
Adjustment (RF) } TP102

RV512 ⎫
RV513 ⎬ FOK OFFSET
TP103 ⎭ Adjustment

FOCUS BIAS
Adjustment } RV508

VC   TP101

TP107

FOCUS OFFSET, FOCUS GAIN,
FOCUS BIAS Adjustment

TRACKING GAIN
Adjustment {
TP117
RV517
RV516

RV602 ⎫ ENCODER PLL
TP545 ⎭ Adjustment

TRACKING ERROR
Adjustment } TP106

FOCUS GAIN
Adjustment {
TP118
RV514
RV515

RV601 ⎫ DIGITAL IN PLL
TP546 ⎭ Adjustment

TEST MODE
(SHORT IN TEST MODE) JR106

TP513 ⎫
TP515 ⎬ FOCUS BIAS, REC (PLAY)
TP514 ⎭ ERROR RATE Adjustment
TP516

CLV SERVO MODE   TP520

TP1   TP401   TP403   TP404   TP405   TP402   TP841
10   4.1   4.75   VP   UPV   4.5   CPUV

CHECKING POWER SUPPLY

[MAIN F BOARD] (Component side)

RV519
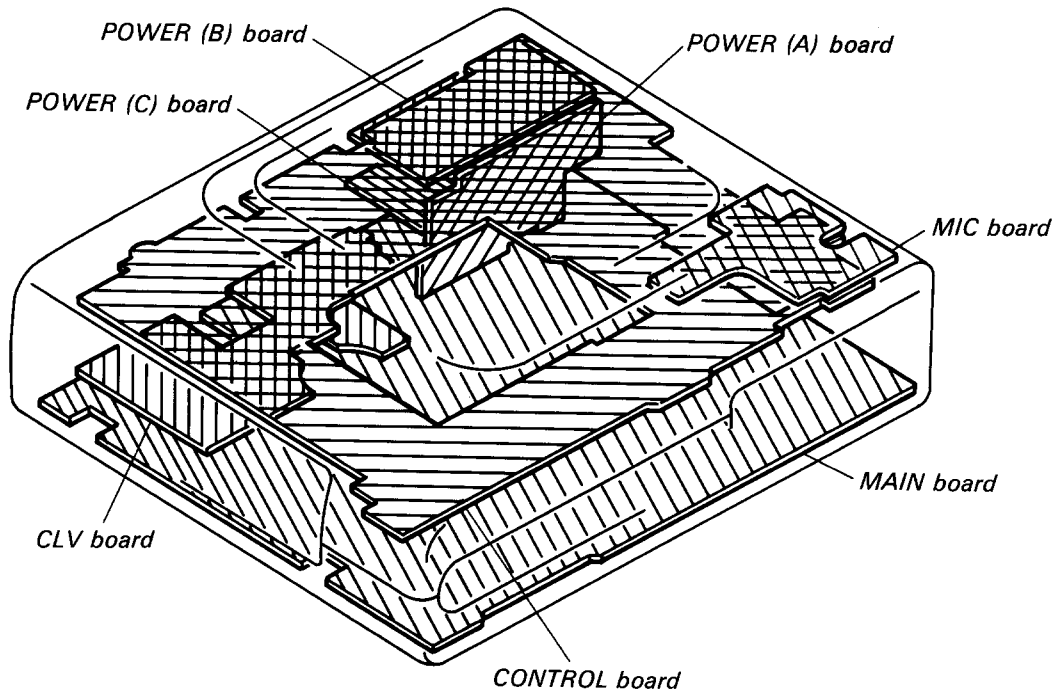CD READ POWER Adjustment

[CONTROL BOARD] (Component side)

TP910
(REC) CHECKING POWER SUPPLY

—45—

SECTION 6
DIAGRAMS

6-1. BLOCK DIAGRAM

KEYS

IC801
SYSTEM CONTROLLER

DISPLAY

IC507
SERVO CONTROL

SERVO MOTOR

SPINDLE MOTOR

OPTICAL PICKUP

LENS

CARTRIDGE

DISC

IC309(2/2)
16BITS D/A CONVERTOR

AUDIO OUT

IC603, 604
ENCODER/ DECODER (ATRAC)

IC602
SHOCK PROOF MEMORY CONTROLLER CD-ROM2

IC601
ENCODER/ DECODER (EFM, ACIRC)

IC501
RF AMP

IC502
ADDRESS DECODER

IC309(1/2)
16BITS A/D CONVERTOR

AUDIO IN

IC605
DRAM(4MBITS)

DIGITAL IN

DIGITAL OUT

IC901, 902
HEAD DRIVER

WRITE HEAD
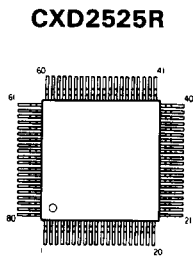
6-7. CIRCUIT BOARDS LOCATION

POWER (B) board
POWER (A) board
POWER (C) board
MIC board
MAIN board
CLV board
CONTROL board

● Semiconductor Lead Layouts

CXA1381R
CXA1602R

(TOP VIEW)

CXD2527R

(TOP VIEW)

CXP817P40Q-1-100

CXD2525R

CXD2527R-1

(TOP VIEW)

MPC1718FU
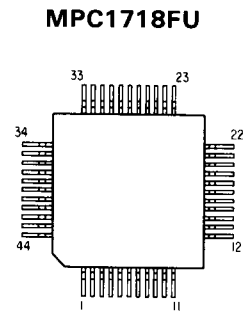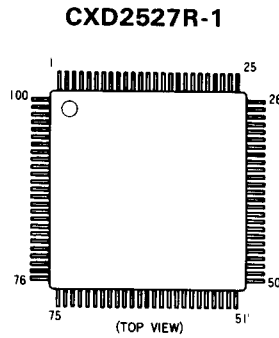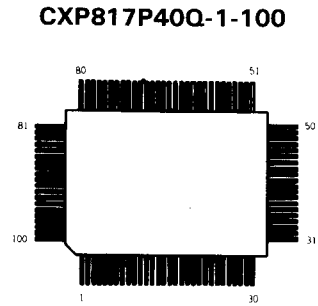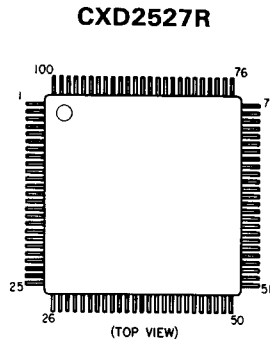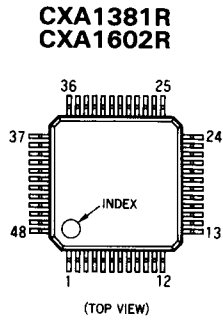
● IC Block Diagrams

IC501 CXA1381R

F0FST F0KOFST EQ RFO RFI VEE EFM D.GND ASY CP RFSW1 RFSW0
48 47 46 45 44 43 42 41 40 39 38 37

RF EQ Amp. EFM Comp MIRR

VR 1
VC 2
RF1 3
RF2 4
-A 5
-B 6
-C 7
-D 8
-E 9
-F 10
TOFST 11
ATC1 12

ABCD Amp.
F.E. Amp.
T.E. Amp.
ADIP Amp.
AGC
APC

REFLECTIVITY
FOK
OFF Track
DEFECT
Tcount

36 REFLECT
35 FOK
34 AGCIN
33 ABCD
32 OFTIN
31 Vcc
30 OFTRK
29 PKHLD
28 CC
27 DFCT
26 CB
25 TCOUNT

13 14 15 16 17 18 19 20 21 22 23 24
ATC2 APCDET LDO LD TEMPI TEMPO VEE APCREF ADIPFM FE FBIAS TE

IC502 CXA1380M

Vcc ADIPFG LF3K PC6K0 FMCK EDGE FMDT ISET FM COMP LPFO
20 19 18 17 16 15 14 13 12 11

Vcc
CLOCK REGENERATOR 6.3kHz PLL
EDGE DETECTOR
DEFECT DETECTOR
COMP

1/2 Vcc
22.05kHz BPF
COMP
FM DEMODULATOR 22.05kHz PLL
BUF
3.15kHz LPF

1 2 3 4 5 6 7 8 9 10
FSET VM ADIPFM BPFO PC22KI PC22KO BUFI BUFO LPF GND

IC603, 604 CXD2527R

A0-A14 11-17, 19-24, 27, 28   D0-D15 6-1, 100, 99, 96-89   MEME 34

LRCK 79
WDCK 80
BCK 81

SCLK 50
XLAT 47
SWDT 48

ACDO 44
ACDI 43
XARQ 40
ARQI 67
XABS 45
ACLK 42
C2PO 41
XRES 63
EXEC 54
REC 55
ATT 51
STRO 52
MUTE 53

MICRO COMPUTER INTERFACE
SCLK
XLAT
SWDT

SHOCK PROOF INTERFACE
ACDO
ACDI
XARQ
ARQI
XABS
ACLK
C2PO
XRES

ATRAC ENCODER/DECODER
MEME CLK
ADDR
DATA
DRO
FLGI
FLGO
IN

FRAME SYNC
FSNC
SYNC
DECO

PRIMARY/ SECONDARY SELECTOR
PSSL

L-CH/R-CH MIX
DODT
DOUT
DOVF
DECI
OVFI
DRI

L-CH/R-CH SELECTOR
CHSL

A IN/O IN SELECTOR
INSL
DIDT
ADIN

31 DECO
9 DRO
77 DODT
65 DOUT
74 DOVF
69 DRI
68 DECI
73 OVFI
84 CHSL
85 PSSL
66 MCKO
82 MCKI
56 INSL
78 DIDT
64 ADIN

MCKO MCKI

57 61 59 60 72 86
IN FLGO FLGI
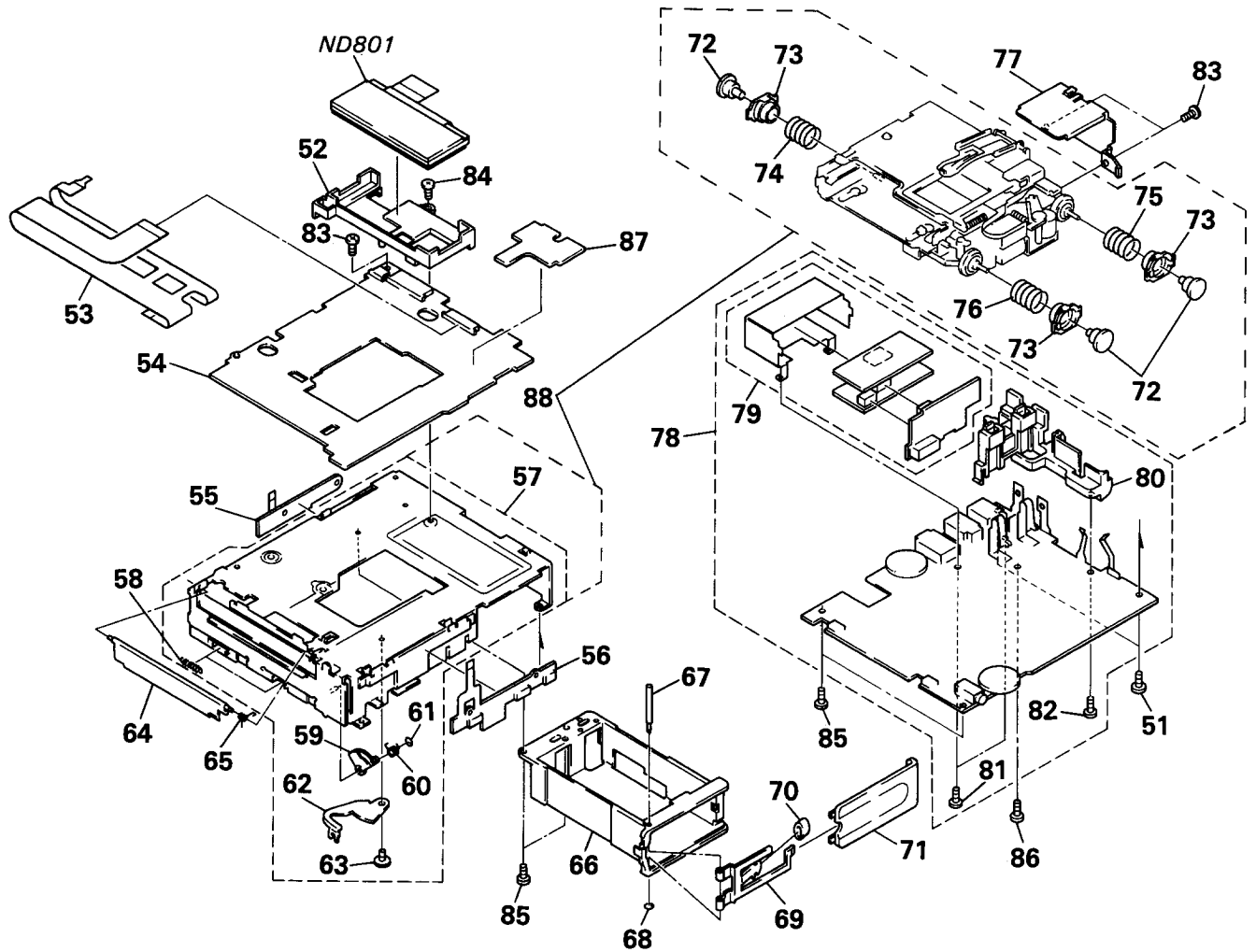
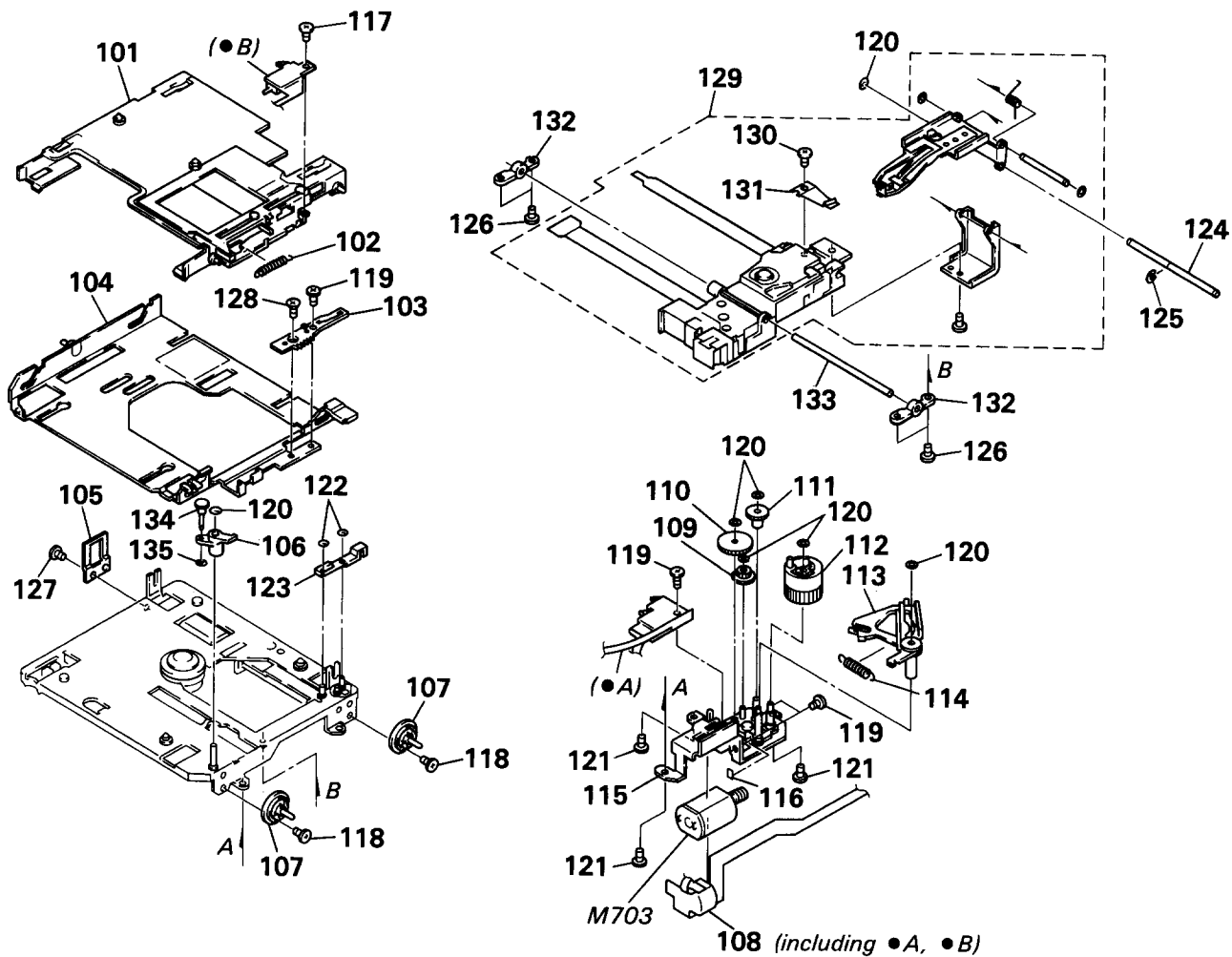# 7-1. UPPER PANEL AND BOTTOM PANEL SECTION

7-3. MECHANISM SECTION-1 (MT-MZ1-106)

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

7-4. MECHANISM SECTION-2 (MT-MZ1-106)