

MiniDisc Deck

Operating Instructions

EN

Mode d'emploi

F



MDS-JA50ES

On the MiniDisc cartridge

- Do not open the shutter to expose the MD.
- Do not place the cartridge where it will be subject to extremes of sunlight, temperature, moisture or dust.

On cleaning

Clean the cabinet, panel and controls with a soft cloth slightly moistened with a mild detergent solution. Do not use any type of abrasive pad, scouring powder or solvent such as alcohol or benzine.

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

Welcome!

Thank you for purchasing the Sony MiniDisc Deck. Before operating the deck, please read this manual thoroughly and retain it for future reference.

About This Manual

Conventions

- Controls in the instructions are those on the deck; these may, however, be substituted by controls on the remote that are similarly named or, when different, appear in the instructions within brackets.
- The following icons are used in this manual:



Indicates a procedure that requires use of the remote.



Indicates tips for making the task easier and hints.

TABLE OF CONTENTS

Getting Started

Unpacking	4
Hooking Up the System	4
Setting the Clock	6

Playing an MD	7
Recording on an MD	8

Recording on MDs

Notes on Recording	10
Useful Tips for Recording	11
Recording Over Existing Tracks	12
Adjusting the Recording Level	13
Marking Track Numbers While Recording (Track Marking)	14
Starting Recording With 6 Seconds of Prestored Audio Data (Time Machine Recording)	15
Synchro-Recording With Audio Equipment of Your Choice (Music Synchro-Recording)	16
Synchro-Recording With a Sony CD Player	17
Fading In and Out (Fader)	18
Recording on an MD Using a Timer	19

Playing MDs

Using the Display	20
Locating a Specific Track	21
Locating a Particular Point in a Track	22
Playing Tracks Repeatedly	22
Playing in Random Order (Shuffle Play)	23
Creating Your Own Program (Program Play)	24
Useful Tips When Recording From MDs to Tape	25
Starting Playback From a Specific Position the Next Time You Start Playback (Resume Play)	26
Playing Back With Different Tones (Digital Filter)	27
Fading In and Out (Fader)	27
Playing an MD Using a Timer	28

Editing Recorded MDs

Notes on Editing	29
Erasing Recordings (Erase Function)	29
Erasing a Part of a Track (A-B Erase Function)	30
Dividing Recorded Tracks (Divide Function)	31
Combining Recorded Tracks (Combine Function)	32
Moving Recorded Tracks (Move Function)	33
Labeling Recordings (Title Function)	33
Undoing the Last Edit (Undo Function)	36

Additional Information


Display Messages	37
System Limitations	37
Troubleshooting	38
Specifications	39
Guide to the Serial Copy Management System	40
Index	41
Table of Setup Menus	43

Unpacking

Check that you received the following items:

- Audio connecting cords (2)
- Remote commander (remote) RM-D13M (1)
- Sony SUM-3 (NS) batteries (2)
- Operating Instructions
- Warranty card

Inserting batteries into the remote

You can control the deck using the supplied remote. Insert two R6 (size-AA) batteries by matching the + and - on the batteries. When using the remote, point it at the remote sensor  on the deck.



When to replace batteries

With normal use, the batteries should last for about six months. When the remote no longer operates the deck, replace all the batteries with new ones.

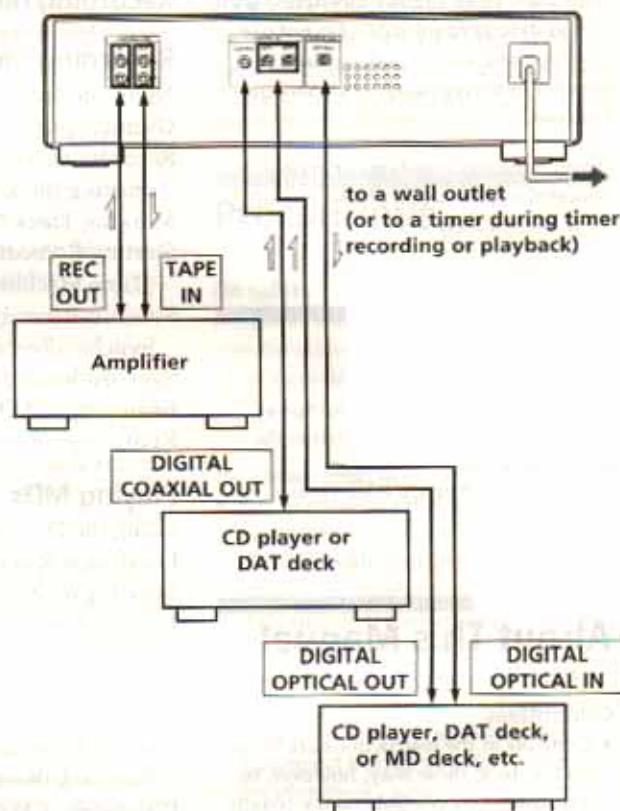
Notes


- Do not leave the remote near an extremely hot or humid place.
- Do not drop any foreign object into the remote casing, particularly when replacing the batteries.
- Do not expose the remote sensor to direct sunlight or lighting apparatuses. Doing so may cause a malfunction.
- If you don't use the remote for an extended period of time, remove the batteries to avoid possible damage from battery leakage and corrosion.

Hooking Up the System

Overview

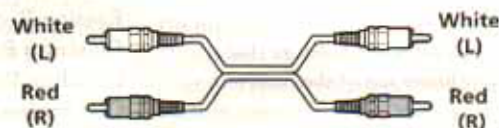
This section describes how to hook up the MD deck to an amplifier or other components such as a CD player or DAT deck. Be sure to turn off the power of each component before connection.



: Signal flow

What cords will I need?

- Audio connecting cords (supplied) (2)



- Optical cable (not supplied) (3)



- Coaxial digital connecting cable (not supplied) (1)

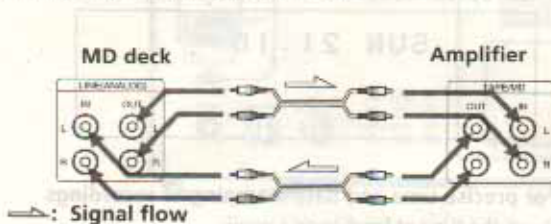


Playing an MD

Hookups

Connecting the deck to an amplifier

Connect the amplifier to the LINE(ANALOG) IN/OUT jacks using the audio connecting cords (supplied), making sure to match the color-coded cords to the appropriate jacks on the components: red (right) to red and white (left) to white. Be sure to make connections firmly to prevent hum and noise.

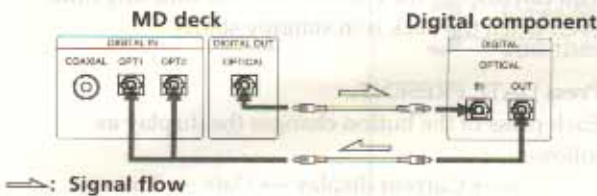


Connecting the deck to a digital component such as a CD player, DAT deck, digital amplifier, or another MD deck

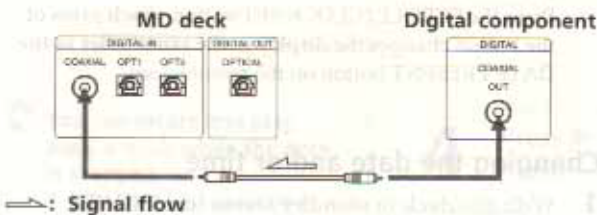
Connect the component through the DIGITAL IN/OUT connectors with two or three optical cables and/or a coaxial digital connecting cable (not supplied).

When using the optical cables

Take the caps off the connectors before plugging in the cables.



When using the coaxial digital connecting cable



Automatic conversion of digital sampling rates during recording

A built-in sampling rate converter automatically converts the sampling frequency of various digital sources to the 44.1 kHz sampling rate of your MD deck. This allows you to record sources such as 32- and 48-kHz DAT or satellite broadcasts, as well as compact discs and other MDs. The sampling frequency of the input signal is displayed during recording (see page 11).

Note

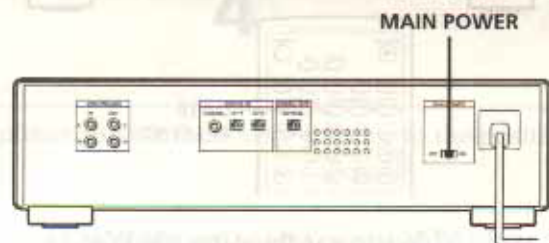
If "Cannot Copy" appears in the display, recording through the digital connector is not possible. In this case, record the program source through the LINE(ANALOG) IN jacks with INPUT set to ANALOG.

Connecting the AC power cord

Connect the AC power cord to a wall outlet or to the outlet of a timer.

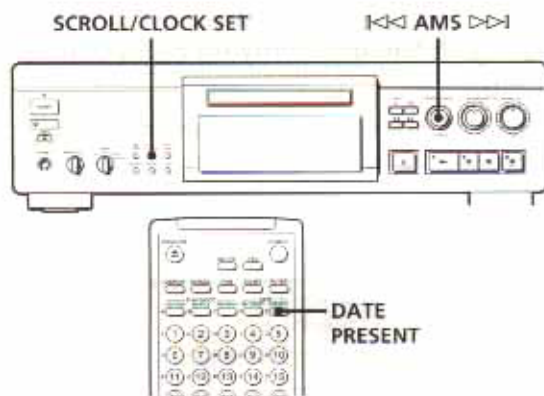
Turning on the unit (only on European model)

Set MAIN POWER on the rear of the deck to ON. The unit enters standby status.



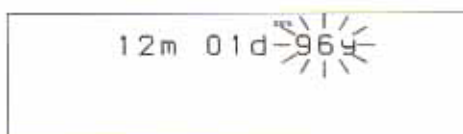
Setting the Clock

Once you set the MD deck's internal clock, the MD deck will automatically record the date and time of all recordings. When playing a track, you can display the date and time the track was recorded (see page 21). Time on this deck is displayed on a 12-hour clock (Canadian model only) or a 24-hour clock (European model only).

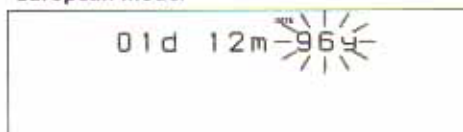


- 1 With the deck in standby status (the POWER indicator lights red), press SCROLL/CLOCK SET down for about 2 seconds until the year indication in the display starts flashing.

Canadian model

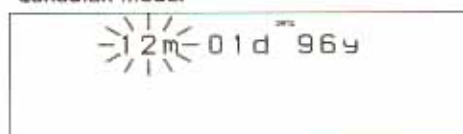


European model

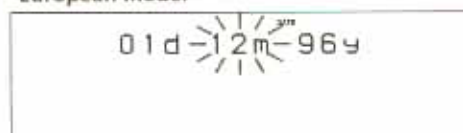


- 2 Turn AMS to enter the current year, then press AMS. The year indication stops flashing, and the month indication starts flashing.

Canadian model

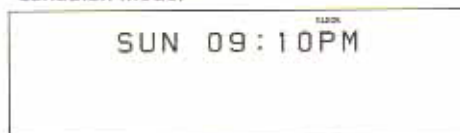


European model



- 3 Repeat Step 2 to enter the month, day, hour, and minute.

Canadian model



European model



For precise time and date stamping of recordings
Reset the time at least once a week.

Note

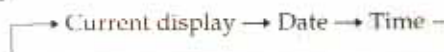
If the AC power cord is disconnected or the MAIN POWER switch on the rear panel has been set to OFF (only on the European model) for a long time, the memorized clock settings will disappear and "STANDBY" will flash in the display the next time you plug in and turn on the deck. If this happens, reset the clock.

Displaying the current date and time

You can display the current date and time any time even when the deck is in standby status.

Press DATE PRESENT.

Each press of the button changes the display as follows:



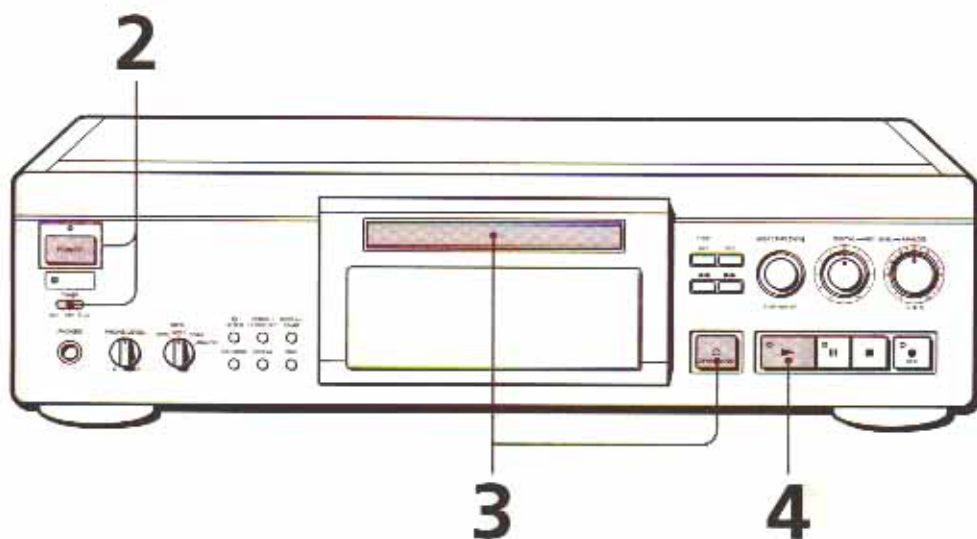
You can display the current date and time with an on-deck button

Press the SCROLL/CLOCK SET button. Each press of the button changes the display in the same order as the DATE PRESENT button on the remote does.

Changing the date and/or time

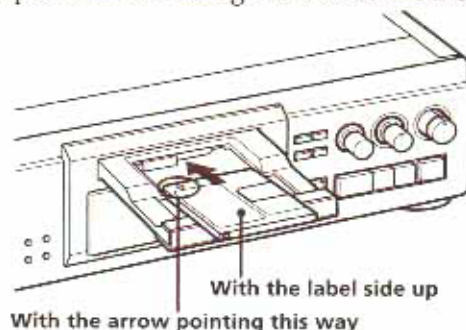
- 1 With the deck in standby status (the POWER indicator lights red), press SCROLL/CLOCK SET down for about 2 seconds until the year indication in the display starts flashing.
- 2 Press AMS repeatedly until the item you want to change flashes.
- 3 Turn AMS to change the contents of the selected item.
- 4 To complete the setting, press AMS repeatedly until all items stop flashing.

Playing an MD



See pages 4 and 5 for hookup information.

- 1** Turn on the amplifier and set the source selector to the position for MD deck.
- 2** After confirming that **TIMER** is set to **OFF**, press **POWER**. The **POWER** indicator changes from red to green.
- 3** Press **OPEN/CLOSE** to open the disc tray, insert an MD, and then press the button again to close the disc tray.



- 4** Press **▶**. The deck starts playing. Adjust the volume on the amplifier.

You can locate and play back a track while the deck is stopped

- 1** Turn **AMS** (or press **◀◀** or **▶▶**) until the number of the track you want to play appears.
- 2** Press **AMS** or **▶**.

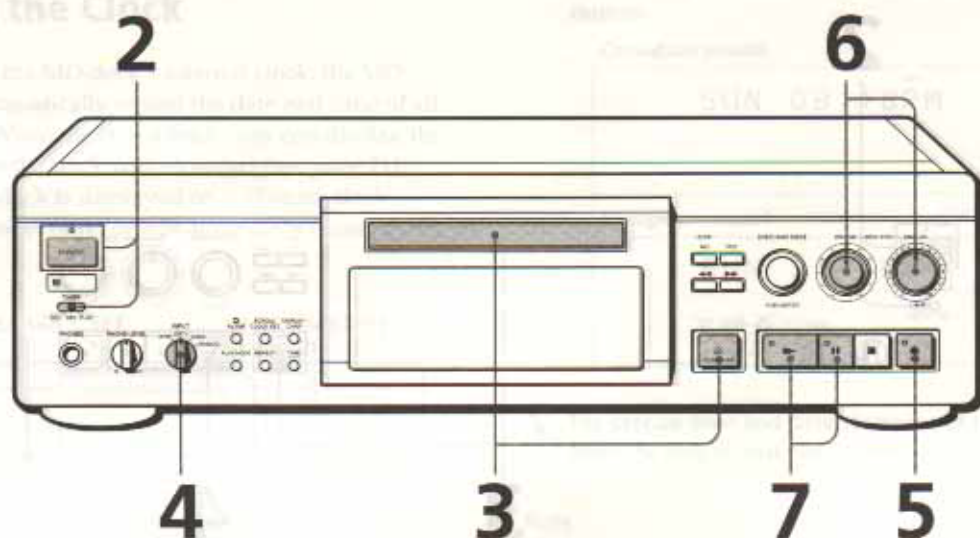
To use headphones

Connect them to **PHONES** jack. Use **PHONE LEVEL** to adjust the volume.

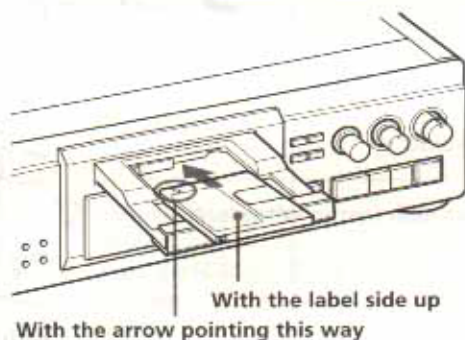
To	Do the following:
Stop playing	Press ■ .
Pause playing	Press ⏸ . Press the button again or press ▶ to resume playing.
Go to the next track	Turn AMS clockwise (or press ▶▶ on the remote).
Go to the preceding track	Turn AMS counterclockwise (or press ◀◀ on the remote).
Take out the MD	Press OPEN/CLOSE after stopping playing.

Recording on an MD

Setting the Clock



- 1** Turn on the amplifier and play the program source you want to record.
- 2** After confirming that TIMER is set to OFF, press POWER. The POWER indicator changes from red to green.
- 3** Insert a recordable MD and close the disc tray.



If the MD has a recorded material on it, the deck will automatically start recording from the end of the last recorded track.

- 4** Set INPUT to the corresponding input connector.

To record through	Set INPUT to
LINE(ANALOG) IN	ANALOG
DIGITAL IN COAXIAL	COAX
DIGITAL IN OPT1	OPT1
DIGITAL IN OPT2	OPT2

- 5** Press **●** REC.
The deck becomes ready to record.
- 6** Adjust the recording level.
- When recording through the DIGITAL IN COAXIAL, OPT1, or OPT2 connector**
Setting the DIGITAL REC LEVEL control at 0 is satisfactory for most purposes. For details, see page 13.
- When recording through the LINE(ANALOG) IN connectors**
Setting the ANALOG REC LEVEL L/R controls at 4 is satisfactory for most purposes. For details, see page 14.
- 7** Press **▶** or **||**.
Recording starts.
- 8** Start playing the program source.

Do not disconnect the deck from the power source immediately after recording

If you do, recorded material may not be saved to the MD. To save the material, after recording, press **⊞** OPEN/CLOSE to take out the MD or change the deck to standby by pressing POWER. "TOC Writing" will flash in the display at this time.

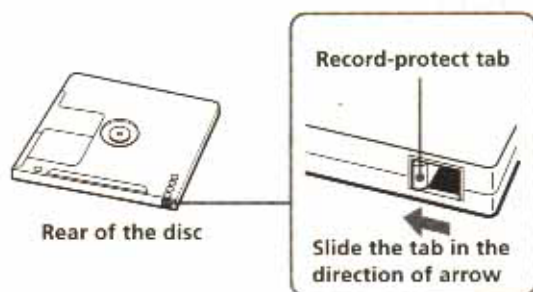
After "TOC Writing" stops flashing and goes out, you can pull out the AC power cord.

To	Press
Stop recording	■
Pause recording*	 . Press the button again or press ▶ to resume recording.
Take out the MD	⊞ OPEN/CLOSE after stopping

* Whenever you pause recording, the track number increases by one. For example, if you paused recording while recording on track 4, the track number increases by one and recording continues on the new track when restarted.

To protect an MD against accidental erasure

To make it impossible to record on an MD, slide the tab in the direction of arrow, opening the slot. To allow recording, close the slot.



Notes on Recording

If "Protected" appears in the display

The MD is record-protected. Close the slot to record on the disc (see "To protect an MD against accidental erasure" on page 9).

If "Din Unlock" flashes in the display

- The digital program source is not connected as you set with the INPUT switch in Step 4 on page 8. To continue, connect the program source properly.
- The program source is not on. Turn on the program source.

Depending on the menu settings and source being recorded, track numbers are marked in following ways:

- When recording from a CD or MD with the INPUT switch set at COAX, OPT1, or OPT2 and the source connected through the respective DIGITAL IN connector:
The deck automatically marks track numbers in the same sequence as the original. If, however, a track is repeated two or more times (e.g. by single-track repeat play) or two or more tracks with the same track number (e.g. from different MDs or CDs) are played, the track or tracks are recorded as part of a single, continuous track with a single track number. If the source is an MD, track numbers may not be marked for tracks of less than 4 seconds.
- When recording from a source connected through the LINE(ANALOG) IN connectors with the INPUT switch set at ANALOG or when recording from a DAT or satellite broadcast connected through one of the DIGITAL IN connectors with the INPUT switch set at the respective digital position and "T.Mark Off" selected in the S02 menu:
The source will be recorded as a single track.
- Even while recording an analog source or a DAT or satellite broadcast, you can mark track numbers if a setting other than "T.Mark Off" is selected in the S02 menu (see "Marking Track Numbers While Recording" on page 14).
- When recording from DAT or satellite broadcasts with the INPUT switch set at the respective digital position, the deck automatically marks a track number whenever the sampling frequency of the input signal changes regardless of the S02 menu setting.

You can mark track numbers during or after recording

For details, see "Marking Track Numbers While Recording" (page 14) and "Dividing Recorded Tracks" (page 31).

You can mark track numbers at 1- or 5-minute intervals

For details, see "Marking track numbers automatically at regular intervals" (page 15).

When "TOC Writing" flashes in the display

The deck is currently updating the Table Of Contents (TOC). Do not move the deck or pull out the AC power cord. Changes to an MD made through recording are saved only when you update the TOC by ejecting the MD or changing the deck to standby by pressing the POWER switch.

The MD deck uses the SCMS (Serial Copy Management System on page 40)

MDs recorded through digital input connector cannot be copied onto other MDs or DAT tapes through the digital output connector.

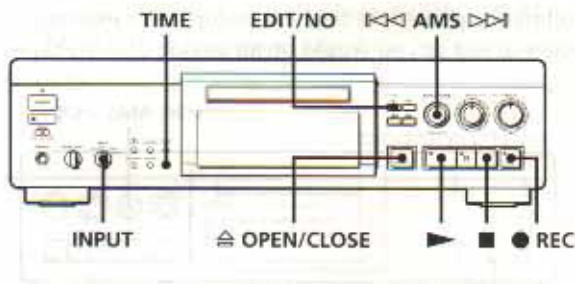
When recording digital signals that have been emphasized (in the higher frequencies)

The signal is automatically de-emphasized (with attenuation proportional to the degree of emphasis) and the level of the de-emphasized signal is indicated on the peak level meters.

When the deck is recording or in recording pause, digital signals input through one of the DIGITAL IN connectors are output to the DIGITAL OUT OPTICAL connector with the same sampling rate

To change the digital input signal to another sampling rate for output (without recording it to an MD), use Input Monitor Function (see page 11).

Useful Tips for Recording



Checking the remaining recordable time on the MD

Press TIME.

- When you press the TIME button while recording, the remaining recordable time on the MD appears.
- When you press the TIME button repeatedly while the deck is stopped, the display alternates between total disc playing time and remaining recordable time on the MD (see page 20).

Monitoring the input signal (Input Monitor)

Before starting recording, you can monitor the selected input signal through the deck's output connectors.

- 1 Press \cong OPEN/CLOSE to remove the MD.
- 2 Set INPUT according to the input signal you want to monitor.

When the INPUT switch is set at ANALOG

The analog signal input through the LINE(ANALOG) IN connectors is output to the DIGITAL OUT OPTICAL connector after A/D conversion, and then to the LINE(ANALOG) OUT connectors and the PHONES jack after D/A conversion.

When the INPUT switch is set to a digital source

After passing through the sampling rate converter, the digital signal input through the respective DIGITAL IN connector is output to the DIGITAL OUT OPTICAL connector, and after D/A conversion to the LINE(ANALOG) OUT connectors and PHONES jack. Either "32kHz", "44.1kHz", or "48kHz" appears in the display depending on the sampling rate of the digital signal.

- 3 Press \bullet REC.
If the INPUT switch is set at ANALOG, "AD-DA" appears in the display.
If the INPUT switch is set at a digital position, "-DA" appears in the display.

If "Auto Cut" appears in the display (Auto Cut)

There has been no sound input for 30 seconds during recording. The 30 seconds of silence are replaced by a blank of about 3 seconds and the deck changes to recording pause.



You can turn off the Auto Cut Function

For details, see "To turn off the Smart Space Function and Auto Cut Function" below. Note that when you turn off the Auto Cut Function, the Smart Space Function is turned off automatically.

If "Smart Space" appears in the display (Smart Space)

There has been an extended silence of 4 to 30 seconds in length during recording. The silence is replaced with a blank of about 3 seconds and the deck continues recording. Note that new track numbers may not be marked for portions recorded while this function is activated.

To turn off the Smart Space Function and Auto Cut Function

- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S08 menu, then press AMS.
- 3 Turn AMS to select "S.Space Off", then press AMS.
- 4 Press EDIT/NO.

To turn on the Smart Space Function and Auto Cut Function again

- 1 Do Steps 1 and 2 in "To turn off the Smart Space Function and Auto Cut Function" above.
- 2 Turn AMS to select "S.Space On", then press AMS.
- 3 Press EDIT/NO.

Notes

- When you turn off the Smart Space Function, the Auto Cut Function is also turned off automatically.
- The Smart Space Function and Auto Cut Function are factory set to on.
- The Smart Space Function does not affect the order of the track numbers being recorded, even if the blank space occurs in the middle of a track.
- If you turn off the deck or disconnect the AC power cord, the deck will recall the last setting (On or Off) of the Smart Space and Auto Cut Functions the next time you turn on the deck.

Playing back tracks just recorded

Do this procedure to immediately play back tracks that have just been recorded.

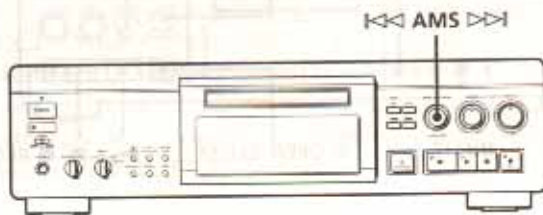
Press ► immediately after stopping recording. Playback starts from the first track of the material just recorded.

To play from the first track of the MD after recording

- 1 Press ■ again after stopping recording.
- 2 Press ►.
Playback starts from the first track of the MD.

Recording Over Existing Tracks

Follow the procedure below to record over existing material just as you would on an analog cassette tape.



- 1 Do Steps 1 to 4 in “Recording on an MD” on page 8.
- 2 Turn AMS (or press ◀◀ or ▶▶) until the number of the track to be recorded over appears.
- 3 To record from the start of the track, continue from Step 5 in “Recording on an MD” on page 9.



While “TR” flashes in the display

The deck is recording over an existing track, and stops flashing when it reaches the end of the recorded portion.



To record from the middle of the track

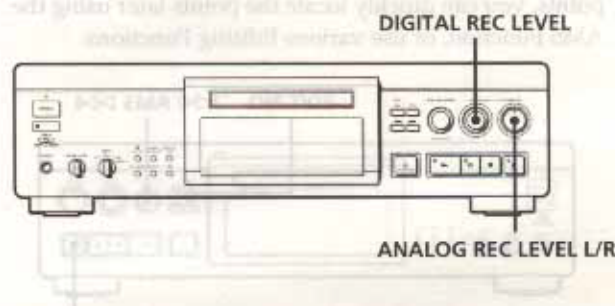
- 1 After Step 2 above, press ► to start playback.
- 2 Press || where you want to start recording.
- 3 Continue from Step 5 in “Recording on an MD” on page 9.

Note

You cannot record from the middle of an existing track when the “PROGRAM” or “SHUFFLE” is on.

Adjusting the Recording Level

Use the DIGITAL REC LEVEL control or the ANALOG REC LEVEL L/R controls to adjust the recording level before starting recording.



Adjusting the digital recording level

- 1 Do Steps 1 to 5 in "Recording on an MD" on pages 8 and 9.
- 2 Play the portion of the program source with the strongest signal level.
- 3 While monitoring the sound, turn DIGITAL REC LEVEL (or press DIGITAL REC LEVEL +/-) to adjust the recording level so that the peak level meters reach their highest point without turning on the OVER indication. Occasional lighting of "OVER" is acceptable.



- 4 Stop playing the program source.
- 5 To start recording, do the procedure starting from Step 7 in "Recording on an MD" on page 9.

You can use the S12 menu to select the signal levels adjusted by the DIGITAL REC LEVEL control

- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S12 menu, then press AMS.

- 3 Turn AMS to select the levels to be adjusted by turning DIGITAL REC LEVEL.

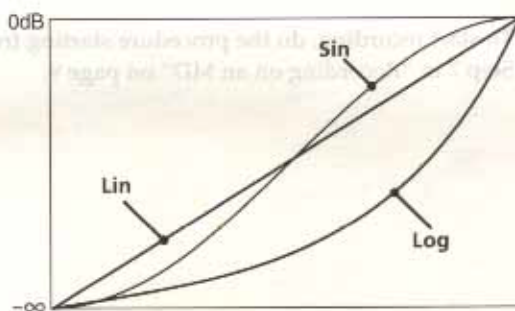
To	Select
adjust both the recording and playback levels	DigLvl All
adjust the recording level only	DigLvl Rec
disable the DIGITAL REC LEVEL control	DigLvl Off

- 4 Press EDIT/NO.

You can select the type of increment/decrement curve for adjusting recording and/or playback level

- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S13 menu, then press AMS.
- 3 Turn AMS to select "DigLvl Lin", "DigLvl Sin", or "DigLvl Log", then press EDIT/NO.

The increment/decrement curves are shown in the graph below. All curves become "Lin" when the signal level goes beyond 0 dB.




The No Clip Function can be used to decrease the recording level gradually when a signal of excessively high level is input during digital recording

To turn on the No Clip Function by menu setting

- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S09 menu, then press AMS.
- 3 Turn AMS to select "No Clip On", then press EDIT/NO.

To turn on the No Clip Function using the remote
Press NO CLIP to display "No Clip On."

(Continued)

 The Peak Hold Function freezes the level meter display at the highest level reached by the input signal.

To turn on the Peak Hold Function by menu setting

- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S10 menu, then press AMS.
- 3 Turn AMS to select "P.Hold On", then press EDIT/NO.

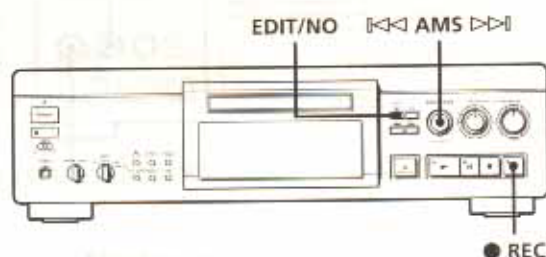
To turn on the Peak Hold Function using the remote
Press P.HOLD to display "P.Hold On."

Adjusting the analog recording level

- 1 Do Steps 1 to 5 in "Recording on an MD" on pages 8 and 9.
- 2 Play the portion of the program source with the strongest signal level.
- 3 While monitoring the sound, turn ANALOG REC LEVEL L and R.
- 4 Stop playing the program source.
- 5 To start recording, do the procedure starting from Step 7 in "Recording on an MD" on page 9.

Marking Track Numbers While Recording (Track Marking)

You can mark track numbers either manually or automatically. By marking track numbers at specific points, you can quickly locate the points later using the AMS Function, or use various Editing Functions.



Marking track numbers manually (Manual Track Marking)

You can mark track numbers at any time while recording on an MD.

Press ● REC at the place you want to add a track mark while recording.

Marking track numbers automatically (Automatic Track Marking)

The deck adds track marks differently in the following cases:

- When recording from CDs or MDs with the INPUT switch set at a digital source:
The deck marks track numbers automatically.
- In all other cases:
If "T.Mark LSyn" is selected in the S02 menu, the deck marks a new track number whenever the signal drops to the specified level or below for a specified amount of time or longer, then rises to a specified level. To select "T.Mark Off" or "T.Mark LSyn" in the S02 menu, do the procedure below:

- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S02 menu, then press AMS.
- 3 Turn AMS to select "T.Mark Off" or "T.Mark LSyn", then press AMS.
"L.SYNC" lights up when you select "T.Mark LSyn."
- 4 Press EDIT/NO.

💡 You can set the reference level and duration that must pass before a rise triggers a new track mark. In Automatic Track Marking, the input signal must remain at or below a given reference level for a given duration before a rise above the reference level will trigger a new track marking. Do the following procedure to specify the reference level and duration.

- 1 While the deck is stopped, press EDIT/NO twice.
- 2 **To set the reference level:**
Turn AMS to display the S03 menu, then press AMS.
To set the duration:
Turn AMS to display the S04 menu, then press AMS.
- 3 Turn AMS to set the reference level or duration.
You can set the reference level at -72 dB to 0 dB in 2 dB steps and the duration at 0 second to 9.5 seconds in 0.5 second steps.
- 4 After selecting the reference level or duration, press AMS.
- 5 Press EDIT/NO.

Marking track numbers automatically at regular intervals

The deck can mark track numbers automatically at regular intervals of 1 or 5 minutes. This is useful when recording from an analog record, satellites broadcast, or FM broadcast for locating tracks afterwards since the track numbers show the elapsed recording time (i.e., playing time).

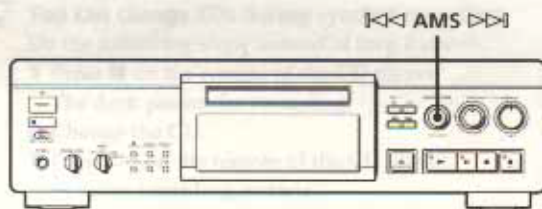
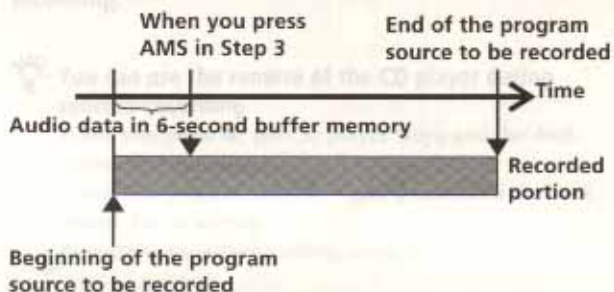
- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S02 menu, then press AMS.
- 3 Turn AMS to select "T.Mark 1min" or "T.Mark 5min", then press AMS.
- 4 Press EDIT/NO.

Note

If you turn off the deck or disconnect the AC power cord, the deck will recall the last settings of the Automatic Track Marking Function the next time you turn on the deck.

Starting Recording With 6 Seconds of Prestored Audio Data (Time Machine Recording)

When recording from an FM or satellite broadcast, the first few seconds of material are often lost due to the time it takes you to ascertain the contents and press the record button. To prevent the loss of this material, the Time Machine Recording Function constantly stores 6 seconds of the most recent audio data in a buffer memory so that when you begin recording the program source using this function, the recording actually begins with the 6 seconds of audio data stored in the buffer memory in advance as shown in the illustration below.



- 1 Do Steps 1 to 5 in "Recording on an MD" on pages 8 and 9.
The deck changes to recording pause.
- 2 Start playing the program source you want to record.
The most recent 6 seconds of audio data is stored in the buffer memory.
- 3 Press AMS (or T.REC) to start Time Machine Recording.
Recording of the program source starts with the 6 seconds of audio data stored in the buffer memory.

(Continued)

To stop Time Machine Recording

Press ■.

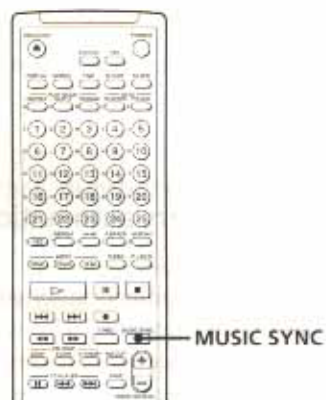
Note

The deck starts storing audio data when the deck is in recording pause and you start playing of the program source. With less than 6 seconds of playing of the program source and audio data stored in the buffer memory, Time Machine Recording starts with less than 6 seconds of audio data.

Synchro-Recording With Audio Equipment of Your Choice (Music Synchro-Recording)

By using the MUSIC SYNC button on the remote, you can automatically start recording in sync with the signal input from the program source.

The method of marking track numbers differs, depending on the program source being recorded and the setting of the S02 menu (see "Notes on Recording" on page 10).



- 1 Do Steps 1 to 4 in "Recording on an MD" on page 8.
- 2 Press MUSIC SYNC.
The deck changes to recording pause.
- 3 Start playing the program source you want to record.
The deck starts recording automatically.



To stop Music Synchro-Recording

Press ■.

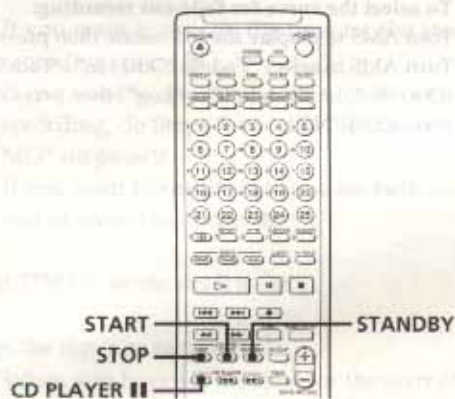
Note

When Music Synchro-Recording, the Smart Space Function and the Auto Cut Function turn on automatically regardless of their setting (On or Off) and type of input (digital or analog).

Synchro-Recording With a Sony CD Player

By connecting your deck to a Sony CD player or Hi-Fi Component System, you can easily dub CDs onto MDs using the CD synchro buttons on the remote. If your deck is connected to a Sony CD player by a digital input cable, track numbers are automatically marked as appear on the original even when "T.Mark Off" is selected in the S02 menu. If your deck is connected to a Sony CD player by audio connecting cords through the LINE(ANALOG) IN connectors, track numbers are automatically marked when you set the S02 menu to "T.Mark LSyn" (see page 14).

As the same remote controls both the CD player and the deck, you may have trouble operating both units if they are far from each other. If you do, place the CD player close to this deck.



- 1 Set the source selector on the amplifier to CD.
- 2 Do Steps 2 to 4 in "Recording on an MD" on page 8 to prepare the deck for recording.
- 3 Insert a CD into the CD player.
- 4 Select the playback mode (Shuffle Play, Program Play, etc.) on the CD player.
- 5 Press STANDBY.
The CD player pauses for playing and the deck pauses for recording.

- 6 Press START.
The deck starts recording and the CD player starts playback.
The track number and elapsed recording time of the track appear in the display.

If the CD player does not start playing

Some CD player models may not respond when you press START on the remote of the deck. Press **II** on the remote of the CD player instead.

- 7 Press STOP to stop synchro-recording.

To pause recording

Press STANDBY or CD PLAYER **II**.

To restart recording, press START or CD PLAYER **II**. A new track number is marked each time you pause recording.

You can use the remote of the CD player during synchro-recording

When you press **II**, the CD player stops and the deck pauses for recording.
When you press **II**, the CD player pauses and the deck pauses for recording.
To restart synchro-recording, press **▷**.

You can change CDs during synchro-recording

Do the following steps instead of Step 7 above.

- 1 Press **II** on the remote of the CD player.
The deck pauses for recording.
- 2 Change the CD.
- 3 Press **▷** on the remote of the CD player.
Synchro-recording restarts.

You can also do synchro-recording with a Sony video CD player

Using the procedure for synchro-recording with a Sony CD player, you can do synchro-recording with a Sony video CD player also.

To select the video CD player, press button number 2 while pressing down the POWER button on the remote before starting the procedure.

To select the CD player again, press button number 1 while pressing down the POWER button.

The deck is factory set to a CD player for synchro-recording.

You can check the remaining recordable time on the MD

Press TIME (see page 20).

Fading In and Out (Fader)

You can gradually increase the recording level at the beginning of a recording (fade in) or gradually decrease the recording level at the end of a recording (fade out).

This function is convenient when, for example, you don't want the track cut off abruptly when the disc reaches to its end.




Fade-in recording


During recording pause, press **FADE** at the position where you want to start fade-in recording. "FADE IN" flashes in the display and the deck performs the fade-in recording until the counter reaches "0.0s."

Fade-out recording

During recording, press **FADE** at the position where you want to start fade-out recording. "FADE OUT" flashes in the display and the deck performs the fade-out recording until the counter reaches "0.0s." The deck changes to recording pause when fade-out recording finishes.

 You can set the duration of fade-in and fade-out recording independently

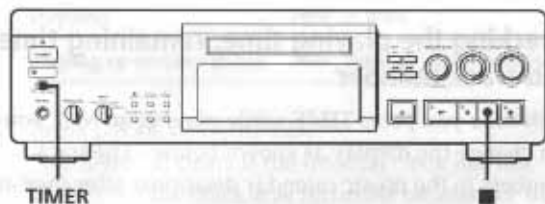
- 1 While the deck is stopped, press **EDIT/NO** twice.
- 2 To set the duration of fade-in recording:
Turn **AMS** to display the S14 menu, then press **AMS**.
To set the duration of fade-out recording:
Turn **AMS** to display the S15 menu, then press **AMS**.
- 3 Turn **AMS** to set the duration.
Both the fade-in and fade-out recording durations can be set within the following range:
1.0 to 3.0 seconds (in 0.2 second steps)
3.0 to 5.0 seconds (in 0.4 second steps)
5.0 to 15.0 seconds (in 1 second steps)
- 4 After selecting the duration, press **AMS**.
- 5 Press **EDIT/NO**.

 You can select the type of increment/decrement curve for fade-in/fade-out recording

- 1 While the deck is stopped, press **EDIT/NO** twice.
- 2 To select the curve for fade-in recording:
Turn **AMS** to display the S16 menu, then press **AMS**.
To select the curve for fade-out recording:
Turn **AMS** to display the S17 menu, then press **AMS**.
- 3 Turn **AMS** to select "FadeIn (Out) Lin", "FadeIn (Out) Sin", or "FadeIn (Out) Log", then press **AMS**.
- 4 Press **EDIT/NO**.

Recording on an MD Using a Timer

By connecting a timer (not supplied) to the deck, you can start and stop recording operations at specified times. For further information on connecting the timer and setting the starting and ending times, refer to the instructions that came with the timer.



- 1 Do Steps 1 to 6 in "Recording on an MD" on pages 8 and 9.
- 2
 - If you want to specify the time for the start of recording, press ■.
 - If you want to specify the time for the end of recording, do Steps 7 and 8 of "Recording on an MD" on page 9.
 - If you want to specify the time for both start and end of recording, press ■.
- 3 Set **TIMER** on the deck to **REC**.
- 4 Set the timer as required.
 - When you have set the time for the start of recording, the deck turns off. When the specified time arrives, the deck turns on and starts recording.
 - When you have set the time for the end of recording, recording continues. When the specified time arrives, the deck stops recording and turns off.
 - When you have set the time for both the start and end of recording, the deck turns off. When the starting time arrives, the deck turns on and starts recording. When the ending time arrives, the deck stops recording and turns off.

- 5 After you have finished using the timer, set **TIMER** on the deck to **OFF**. Then place the deck in standby status by plugging the AC power cord of the deck into a wall outlet or set the timer to continuous operation.
 - If **TIMER** is left at **REC**, the deck will automatically start recording the next time you turn the deck on.
 - If you do not change the deck to standby status for more than a month after timer recording has finished, the recorded contents may disappear.

Make sure to change the deck to standby status within a week after timer recording is completed

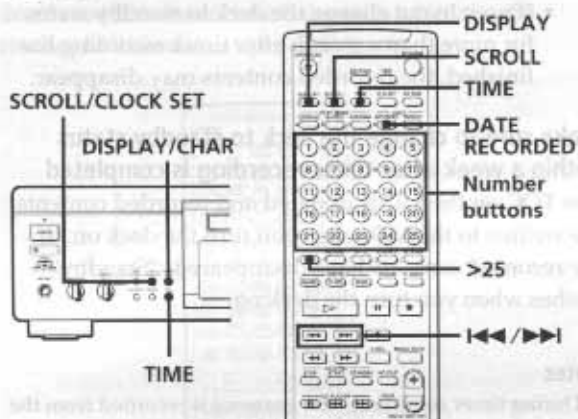
The TOC on the MD is updated and recorded contents are written to the MD when you turn the deck on. If the recorded contents have disappeared, "Standby" flashes when you turn the deck on.

Notes

- During timer recording, new material is recorded from the end of the recorded portion on the MD.
- Material recorded during timer recording will be saved to the disc the next time you turn the deck on. "TOC" will flash in the display at that time. Do not move the deck or pull out the AC power cord while "TOC" is flashing.
- Timer recording will stop if the disc becomes full.
- Set the digital recording level for timer recording using the **DIGITAL REC LEVEL** control on the deck. If you set the recording level using the **DIGITAL REC LEVEL +/-** buttons on the remote, the digital timer recording will be performed at the level set by the **DIGITAL REC LEVEL** control.

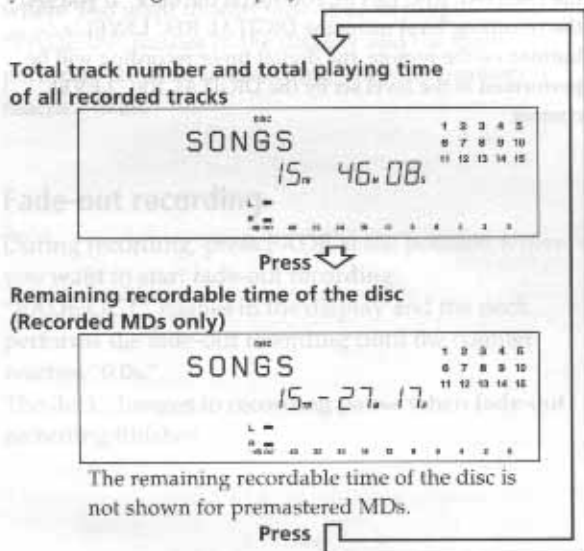
Using the Display

You can use the display to check disc and track information such as the total track number, total playing time of the tracks, remaining recordable time of the disc, disc name, and the date when a track was recorded.

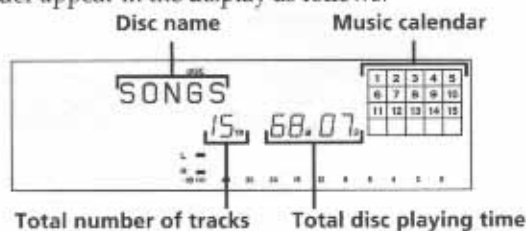


Checking the total track number, total disc playing time, remaining recordable time of the disc

Each time you press TIME while the deck is stopped, you can change the display as follows:



When you insert an MD, the disc name, total number of tracks, total disc playing time, and the music calendar appear in the display as follows:



A music calendar shows all the track numbers within a grid if the MD is a premastered disc, or without a grid if the MD is a recordable disc.

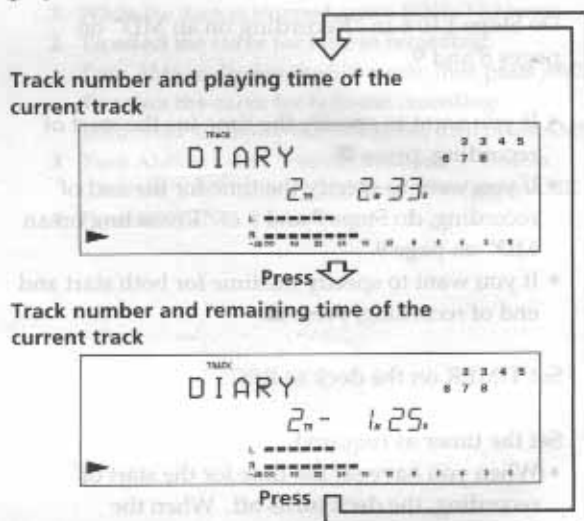
If the total track number exceeds 20, >25 appears to the right of number 20 in the music calendar.

Note

When you insert a new MD or turn off the deck and turn it on again, the last item displayed will reappear.

Checking the playing time, remaining time, and track number

Each time you press TIME while playing an MD, you can change the display as shown below. The track numbers in the music calendar disappear after they are played.



The track name and disc name are displayed as follows

The disc name appears whenever the deck is stopped, and the name of the current track appears when the track is playing. If no title is recorded, "No Name" appears instead of a title.

You can scroll a title of more than 12 characters

Press SCROLL/CLOCK SET (or SCROLL). Since the display shows up to 11 characters at a time, press SCROLL again to see the rest of the title if the title has 12 characters or more. Press SCROLL again to pause scrolling, and again to continue scrolling.

Displaying the recording date

When the internal clock has been set, the deck automatically records the recording date and time of all recordings. You can then check the recording date and time of a track.

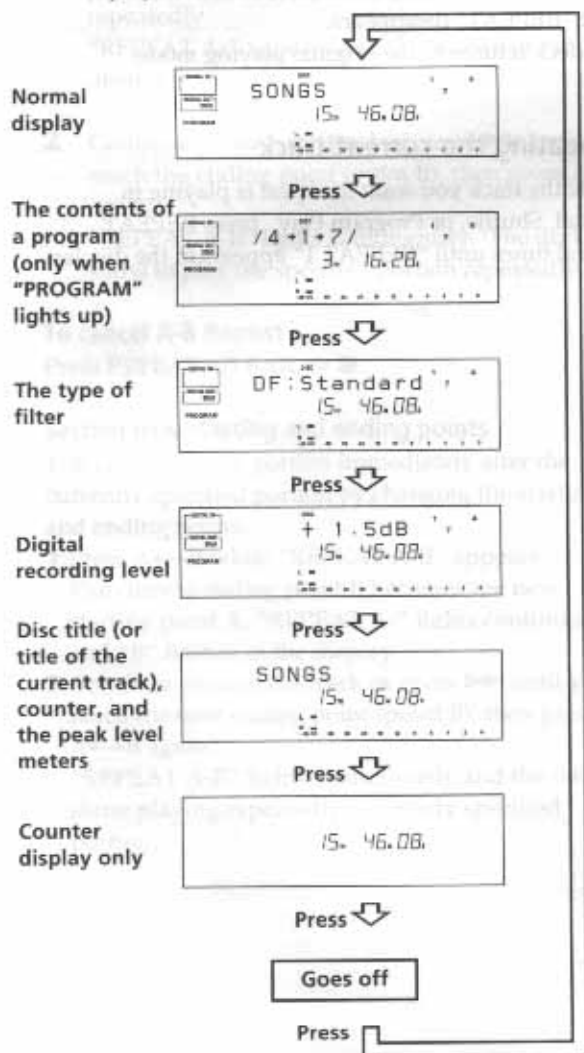
- 1 Locate the track for which you want to check the recording date and time.

When the deck is	Press
stopped	◀◀ or ▶▶
playing or on play pause	◀◀, ▶▶, or number buttons

- 2 Press DATE RECORDED.
"No Date" appears if the internal clock has not been set or the track was recorded on another MD deck without a date and time stamp function.

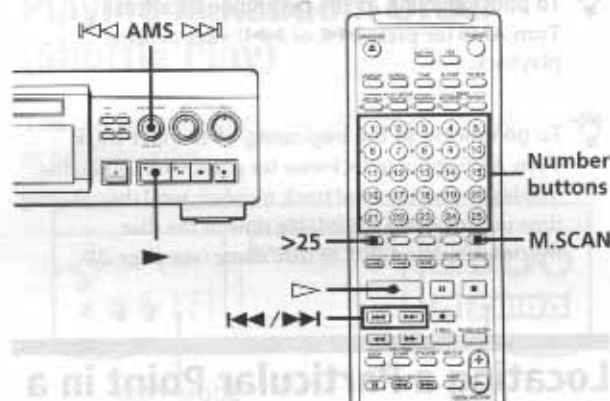
Changing the display



Each time you press DISPLAY/CHAR (or DISPLAY) while the deck is stopped or playing, you can change the display as follows:



Locating a Specific Track

You can quickly locate any track while playing a disc by using the AMS (Automatic Music Sensor) control, ◀◀ and ▶▶ buttons, number buttons, or M.SCAN button on the remote.



To locate	Do the following:
The next or succeeding tracks	During playback, turn AMS clockwise or press ▶▶ repeatedly until you find the track.
The current or preceding tracks	During playback, turn AMS counterclockwise or press ◀◀ repeatedly until you find the track.
A specific track directly 	Press number buttons to enter the track number.
A specific track by using AMS	<ol style="list-style-type: none"> 1 Turn AMS until the track number you want to locate appears while the deck is stopped. (The track number is flashing.) 2 Press AMS or ▶.
By scanning each track for 6 seconds (music scan) 	<ol style="list-style-type: none"> 1 Press M.SCAN before you start playing. 2 When you find the track you want, press ▷ to start playing.

When you directly locate a track with a number over 25

- You must press >25 first, before entering the corresponding digits.
- Press >25 once if it is a 2-digit track number, and twice if it is a 3-digit track number.
- To enter "0," press button 10.
- Examples:
 - To play track number 30: Press >25 once, then 3 and 10.
 - To play track number 100: Press >25 twice, then 1, 10 and 10.

(Continued)

- Lightbulb icon:** You can extend the playing time during music scan
 - 1 While the deck is stopped, press EDIT/NO twice.
 - 2 Turn AMS to display the S11 menu and press AMS.
 - 3 Turn AMS to select the playing time within a range of 6 to 20 seconds (in 1 second steps) and press AMS.
 - 4 Press EDIT/NO.

- Lightbulb icon:** To pause playing at the beginning of a track

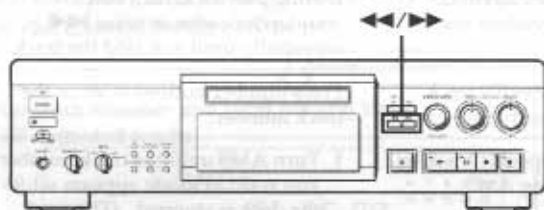
Turn AMS (or press **◀◀** or **▶▶**) after pausing playback.

- Lightbulb icon:** To go quickly to the beginning of the last track

Turn AMS counterclockwise (or press **◀◀**) while the display shows the total track number, total disc playing time or remaining recordable time of the disc (recordable disc only), or disc name (see page 20).

Locating a Particular Point in a Track

You can also use the **◀◀** and **▶▶** buttons to locate a particular point in a track during playback or playback pause.



To locate a point	Press
While monitoring the sound	▶▶ (forward) or ◀◀ (backward) and keep pressing until you find the point.
Quickly by observing the display during playback pause	▶▶ or ◀◀ and keep pressing until you find the point. There is no sound output during this operation.

- Lightbulb icon:** If “—Over—” appears while you are pressing **▶▶** during playback pause

The disc has reached its end. Press **◀◀** (or **◀◀◀**) or turn AMS counterclockwise to go back.

Notes

- If the disc reaches the end while you are pressing **▶▶** during sound monitoring, the deck stops.
- Tracks that are only a few seconds long may be too short to scan using the search function. For such tracks, it is better to play the MD at normal speed.

Playing Tracks Repeatedly

You can play tracks repeatedly in any play mode.



Press REPEAT.
 “REPEAT” appears in the display.
 The deck repeats the tracks as follows:

When the MD is played in	The deck repeats
Normal play (page 7)	All the tracks
Shuffle Play (page 23)	All the tracks in random order
Program Play (page 24)	The same program

To cancel repeat play

Press REPEAT several times (or CONTINUE once) until “REPEAT” disappears.
 The deck returns to the original playing mode.

Repeating the current track

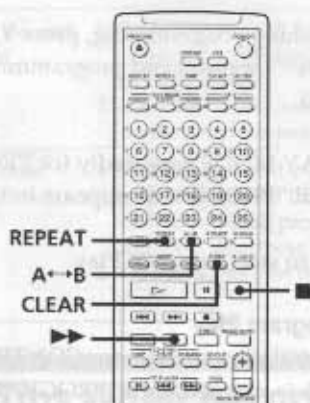
While the track you want to repeat is playing in normal, Shuffle, or Program Play, press REPEAT several times until “REPEAT 1” appears in the display.

Repeating a specific portion (A-B Repeat)



You can play a specific portion of a track repeatedly. This might be useful when you want to memorize lyrics.

Note that you can only repeat a portion within the boundaries of a single track.



- 1 While playing a disc, press A↔B at the starting point (point A) of the portion to be played repeatedly. "REPEAT A-" appears and "B" flashes in the display.
- 2 Continue playing the track or press ►► until you reach the ending point (point B), then press A↔B again. "REPEAT A-B" lights continuously. The deck starts to play the specified portion repeatedly.

To cancel A-B Repeat

Press REPEAT, CLEAR, or ■.

Setting new starting and ending points

You can repeat the portion immediately after the currently specified portion by changing the starting and ending points.

- 1 Press A↔B while "REPEAT A-B" appears. The current ending point B becomes the new starting point A, "REPEAT A-" lights continuously, and "B" flashes in the display.
- 2 Continue playing the track or press ►► until you reach the new ending point (point B), then press A↔B again. "REPEAT A-B" lights continuously and the deck starts playing repeatedly the newly specified portion.

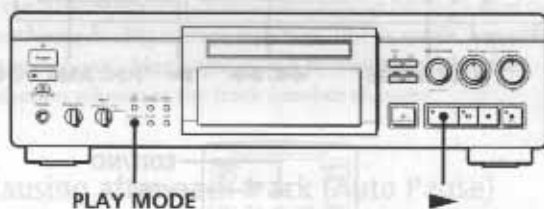
Note

If you turn off the deck or disconnect the AC power cord, the deck will recall the last setting of the Repeat Function the next time you turn on the deck.

The A-B Repeat settings, however, are lost.

Playing in Random Order (Shuffle Play)

You can have the deck "shuffle" tracks and play them in random order.



- 1 Press PLAY MODE repeatedly (or SHUFFLE once) until "SHUFFLE" appears in the display when the deck is stopped.
- 2 Press ►► to start Shuffle Play. "⌂" appears in the display while the deck is "shuffling" the tracks.

To cancel Shuffle Play

Press PLAY MODE repeatedly (or CONTINUE once) until "SHUFFLE" disappears.

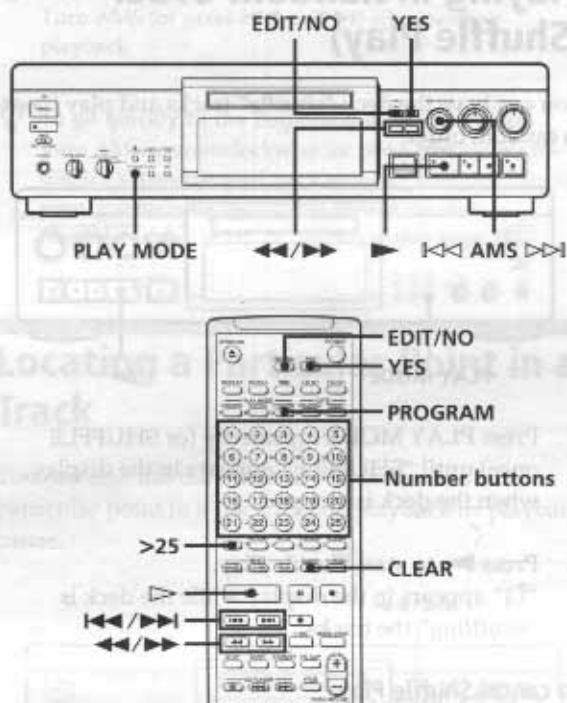


You can specify tracks during Shuffle Play

- To play the next track, turn AMS clockwise (or press ►►).
- To play from the beginning of the current track again, turn AMS counterclockwise (or press ◀◀). You cannot use AMS (or ◀◀) to go to tracks that have already been played.

Creating Your Own Program (Program Play)

You can specify the playback order of the tracks on an MD and create your own programs containing up to 25 tracks.



1 While the deck is stopped, press EDIT/NO twice.

2 Turn AMS to select the S01 menu and display "Program ?", then press AMS.

3 Do either a) or b):

a) When using the controls on the deck

- 1** Turn AMS until the track number you want appears in the display.
- 2** Press AMS.

If you enter the wrong track number

Press ◀ or ▶ until the wrong track number flashes, turn AMS to set the correct track number, then press AMS.

b) When using the remote

Press the number buttons to enter the tracks you want to program in the order you want. To program a track with a number over 25, use the >25 button (see page 21).

If you enter the wrong track number

Press ◀ or ▶ until the wrong track number flashes, then enter the correct track number with the number buttons.

- 4** Repeat Step 3 to enter other tracks. Each time you enter a track, the total program time is added up and appears in the display.
- 5** After finishing programming, press YES. "Complete!!" appears and programming is completed.
- 6** Press PLAY MODE repeatedly (or PROGRAM once) until "PROGRAM" appears in the display.
- 7** Press ▶ to start Program Play.

To cancel Program Play

Press PLAY MODE repeatedly (or CONTINUE once) when the deck is stopped until "PROGRAM" disappears.

💡 The program remains even after Program Play ends
When you press ▶, you can play the same program again.

Note

The display shows "--m -s" instead of the total playing time when the total playing time of the program exceeds 199 minutes.

Checking the track order

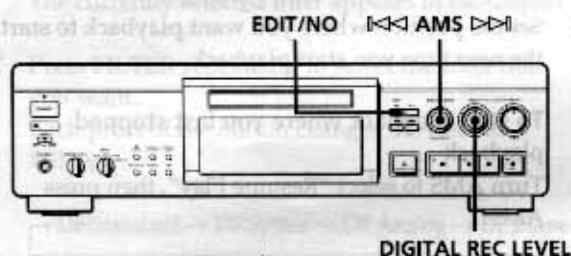
Turn AMS (or press ◀ or ▶) during playback or playback pause. The track numbers appear in the order they were programmed.

Changing the track order

You can change the order of the tracks in your program before you start playing.

To	Do the following:
Erase a track in the program [T]	<ol style="list-style-type: none"> 1 After Steps 1 and 2 on the previous page, press ►► until the track number you want to erase flashes. 2 Press EDIT/NO or CLEAR.
Add tracks to the end of the program	<ol style="list-style-type: none"> 1 After Steps 1 and 2 on the previous page, press ►► until the last track number flashes. 2 Press ►► again and do Steps 3 to 5 on the previous page.
Change the whole program completely	<ol style="list-style-type: none"> 1 After Steps 1 and 2 on the previous page, hold down EDIT/NO or CLEAR until all programmed track numbers disappear. 2 Do Steps 1 to 5 on the previous page.

Useful Tips When Recording From MDs to Tape



Inserting blank spaces while recording to tape (Auto Space)

The Auto Space Function inserts a 3-second blank space between each track while recording from MDs to tapes, allowing you to use the AMS function during later playback.

- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S07 menu, then press AMS.
- 3 Turn AMS to select "Auto Space", then press AMS.
- 4 Press EDIT/NO.

You can turn on the Auto Space Function using the remote

While the deck is stopped, press A.SPACE repeatedly until "Auto Space" appears in the display.

To cancel Auto Space

Canceling the function through menu operation on the deck

- 1 Do Steps 1 and 2 of "Inserting blank spaces while recording to tape" on this page.
- 2 Turn AMS to select "Auto Off", then press AMS.
- 3 Press EDIT/NO.

Canceling the function using the remote

While the deck is stopped, press A.SPACE repeatedly until "Auto Off" appears.

Note

If the Auto Space Function is on while recording a selection containing multiple track numbers, (for example, a medley or symphony), blank spaces will be inserted within the selection whenever the track number changes.

Pausing after each track (Auto Pause)

When the Auto Pause Function is on, the deck pauses after playing each track. Auto Pause is convenient when recording single tracks or multiple, nonconsecutive tracks.

Select "Auto Pause" instead of "Auto Space" in Step 3 on "Inserting blank spaces while recording to tape" on this page.

You can turn on the Auto Pause Function using the remote

While the deck is stopped, press A.SPACE repeatedly until "Auto Pause" appears in the display.

To restart playback

Press ► or II.

To cancel Auto Pause

Canceling the function through a menu operation on the deck

Do Steps 1 to 3 of "To cancel Auto Space" on this page.

Canceling the function using the remote

While the deck is stopped, press A.SPACE repeatedly until "Auto Off" appears.

Note

If you turn off the deck or disconnect the AC power cord, the deck will recall the last setting of the Auto Space and Auto Pause Functions the next time you turn on the deck.

Changing the bit length of the digital output signals

By changing the bit length, you can improve the sound quality of the signal output from the DIGITAL OUT OPTICAL connector to an MD deck or a 20-bit format DA converter.

- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S06 menu, then press AMS.
- 3 Turn AMS to select "Dout 20bit", then press AMS.
- 4 Press EDIT/NO.

Notes

- This function affects only digital signal output from the DIGITAL OUT OPTICAL connector.
- A momentary sound dropout occurs when the bit length setting is changed during playback or recording.

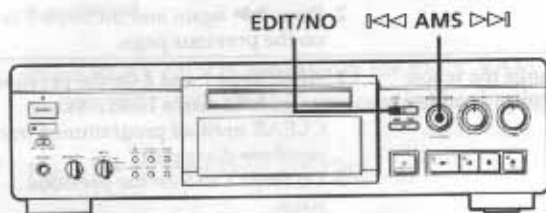
Adjusting the analog signal level

You can adjust the level of an analog signal for output to an amplifier connected through the LINE(ANALOG) OUT connectors.

- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S12 menu, then press AMS.
- 3 Turn AMS to select "DigLvl All", then press AMS.
- 4 Press EDIT/NO.
- 5 Turn DIGITAL REC LEVEL (or DIGITAL REC LEVEL +/-) to adjust the analog output level. The maximum level is output when you set the control to 0. Turning the control function in the + direction does not result in a further increase in output level.

Starting Playback From a Specific Position the Next Time You Start Playback (Resume Play)

You can specify the start of playback from the position where playback was last stopped or the deck was turned off, or from next track after that position.



- 1 While the deck is stopped, press EDIT/NO twice.
- 2 Turn AMS to display the S05 menu, then press AMS.
- 3 Set the position where you want playback to start the next time you start playback.

To start playback where you last stopped playback

Turn AMS to select "Resume Play", then press AMS.

To start playback from the track after the position where you stopped playback

Turn AMS to select "Resume Next", then press AMS.

- 4 Press EDIT/NO.
After you stop playback or turn the deck off and press the ► button to start playback again, playback starts from the position you set in Step 3 above.

To turn off the Resume Play Function

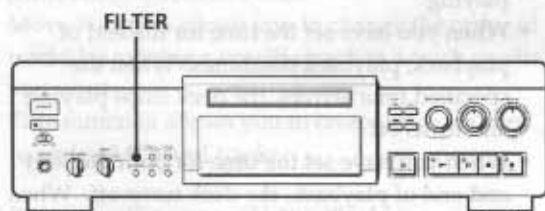
- 1 Do Steps 1 and 2 above.
- 2 Turn AMS to select "Resume Off", then press AMS.
- 3 Press EDIT/NO.

Playing Back With Different Tones (Digital Filter)

This deck is equipped with the V.C. (Variable Coefficient) filters to allow you adjust the tone to match your audio system, listening environment, and the source being played back.

Note

The digital filters are effective only on the analog signals output from the LINE(ANALOG) OUT connectors and the PHONES connector.



- 1 Press FILTER.
The currently selected filter appears in the display.
- 2 Press FILTER repeatedly to select the filter that you want.
Each press of the button changes the filter as follows:

→ DF:Standard → DF:Spline → DF:Analog → DF:Plane

- You can select the filter using the remote
Press FILTER repeatedly until the filter that you want appears in the display.

What is a V.C. (Variable Coefficient) filter?

A variable coefficient filter changes the sound characteristics of a signal by applying specific frequency cut-off conditions. Such filters are provided on digital devices such as CD players and MD decks to remove aliasing noise. Your deck comes with four types of digital filters: standard, spline, plane, and analog. A brief description is given below of the sound characteristics of each filter.

Standard

This filter produces an expansive sound of wide range.

Spline

This filter produces a sound that is clearly positioned and smooth.

Plane

This filter produces a fresh and powerful sound.

Analog

This filter produces a resonant and mellow sound.

Notes

- A momentary sound dropout occurs when the filter setting is changed during playback or recording.
- The change in sound characteristics caused by digital filters occur mainly in the inaudible range, not the audible range as in the case of an amplifier.

Fading In and Out (Fader)

You can gradually increase the playback level of the signal output from the LINE(ANALOG) IN/OUT connectors and the PHONES connector at the beginning of a playback (fade in) or gradually decrease the playback level at the end of a playback (fade out). This function is convenient when, for example, you want to start or end playback in the middle of the track.



Fade-in playback

During playback pause, press FADE at the position where you want fade-in playback to start. "FADE IN" flashes in the display and the deck performs fade-in playback until the counter reaches to "0.0s."

Fade-out playback

During playback, press FADE at the position where you want fade-out playback to start. "FADE OUT" flashes in the display and the deck performs fade-out recording until the counter reaches "0.0s."

The deck changes to play pause when fade-out playback finishes.

Note on the peak level meters display during fade-in/fade-out playback

The peak level meters show the level of the original signal (input from the LINE(ANALOG) IN connectors or output to the LINE(ANALOG) OUT connectors and the PHONES connector). Therefore, the level shown on the meters does not increase or decrease ever as the output fades in or out.

You can set the duration of fade-in and fade-out playback independently

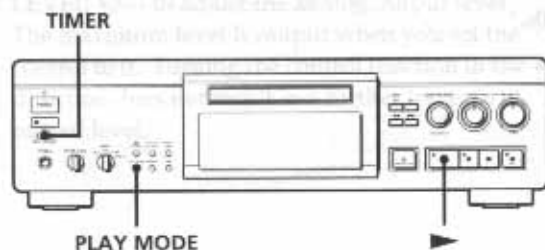
Do Steps 1 to 5 in "You can set the duration of the fade-in and fade-out recording independently" on page 18.

You can select the type of increment/decrement curve for fade-in/fade-out recording

Do Steps 1 to 4 in "You can select the type of increment/decrement curve for fade-in/fade-out recording" on page 18.

Playing an MD Using a Timer

By connecting a timer (not supplied) to the deck, you can start and stop playback operations at specified times. For further information on connecting the timer or setting the starting and ending times, refer to the instructions that came with the timer.



- 1 Do Steps 1 to 3 in "Playing an MD" on page 7.
- 2 Press PLAY MODE repeatedly (or one of the PLAY MODE buttons once) to select the play mode you want.
To play only specific tracks, create a program (see page 24).

- 3
 - If you want to specify the time for the start of playback, go to Step 4.
 - If you want to specify the time for the end of playback, press ► to start playback, then go to Step 4.
 - If you want to specify the time for both start and end of playback, go to Step 4.

- 4 Set TIMER on the deck to PLAY.

- 5 Set the timer as required.
 - When you have set the time for the start of playback, the deck turns off. When the specified time arrives, the deck turns on and starts playing.
 - When you have set the time for the end of playback, playback continues. When the specified time arrives, the deck stops playing and turns off.
 - When you have set the time for both the start and end of playback, the deck turns off. When the starting time arrives, the deck turns on and starts playing. When the ending time arrives, the deck stops playing and turns off.

- 6 After you have finished using the timer, set TIMER on the deck to OFF.

Note

You can select Program Play in Step 2. Note, however, that programs eventually fade away when the standby status is off, and therefore if you set the time too far in the future, the program may be gone when the specified time arrives. If this has occurred, the deck enters normal play mode at the specified time and the tracks play in consecutive order.

Notes on Editing

You can edit the recorded tracks after recording, using the following functions:

- Erase Function allows you to erase recorded tracks simply by specifying the corresponding track number.
- A-B Erase Function allows you to specify a portion within a track to erase it.
- Divide Function allows you to divide tracks at specified points so that you can quickly locate those points afterwards, using the AMS function.
- Combine Function allows you to combine two consecutive tracks into one.
- Move Function allows you to change the order of tracks by moving a specific track to a track position you want.
- Title Function allows you to create titles for your recorded MDs and tracks.

If "Protected" appears in the display

The deck could not edit because the record-protect slot on the MD is open. Edit after closing the slot.

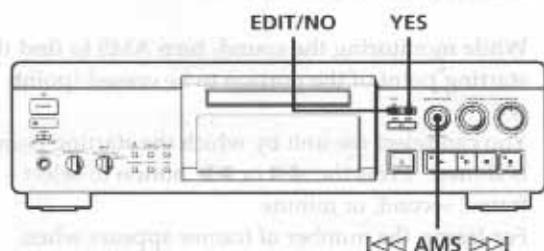
When "TOC" flashes in the display

Do not move the deck or pull out the AC power cord. After editing, "TOC" lights continuously until you eject the MD or turn off the power. "TOC Writing" flashes while the deck is updating the TOC. When the deck finishes updating the TOC, "TOC" goes off.

Erasing Recordings (Erase Function)


Do the procedures below to erase following:

- A single track
- All tracks

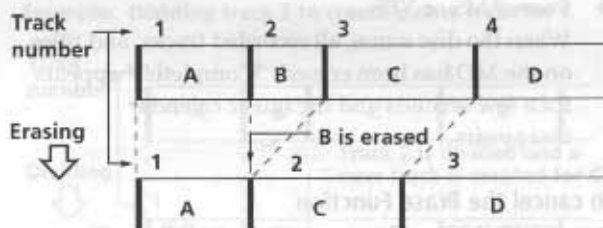


Erasing a single track

You can erase a track simply by specifying the respective track number. When you erase a track, the total number of tracks on the MD decreases by one and all tracks following the erased one are renumbered. Since erasing merely updates the TOC, there is no need to record over material.

-  To avoid confusion when erasing multiple tracks, you should proceed in order of high to low track number to prevent the renumbering of tracks that have not been erased yet.

Example: Erasing B



- 1 While the deck is stopped, playing, or pausing, press EDIT/NO.
- 2 Turn AMS until "Erase ?" appears in the display.
- 3 Press AMS.
The display for erasing tracks appears and playback of the displayed track starts.
- 4 Turn AMS to select the track to be erased.
- 5 Press AMS or YES.
When the track selected in Step 4 has been erased, "Complete!!" appears for a few seconds and the total number of tracks in the music calendar decreases by one.
If you erase a track during playback, the track following the deleted track begins playing afterwards.
- 6 Repeat Steps 1 to 5 to erase more tracks.

To cancel the Erase Function

Press EDIT/NO or ■.

Note


If "Erase ????" appears in the display, the track was recorded or edited on another MD deck and is record-protected. If this indication appears, press YES to erase the track.

Erasing all tracks on an MD

Erasing a recordable MD deletes the disc name, all recorded tracks, and titles (see page 36).

- 1 While the deck is stopped, playing, or pausing, press EDIT/NO.
- 2 Turn AMS until "All Erase?" appears in the display.
- 3 Press AMS. "All Erase??" appears in the display and all tracks in the music calendar start flashing.
- 4 Press AMS or YES. When the disc name, all recorded tracks, and titles on the MD has been erased, "Complete!!" appears for a few seconds and the music calendar disappears.

To cancel the Erase Function

Press EDIT/NO or  to turn off the "All Erase?" or "All Erase??" indication.

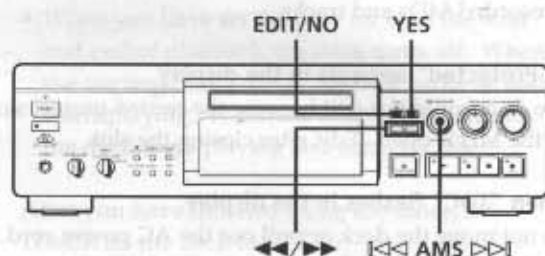
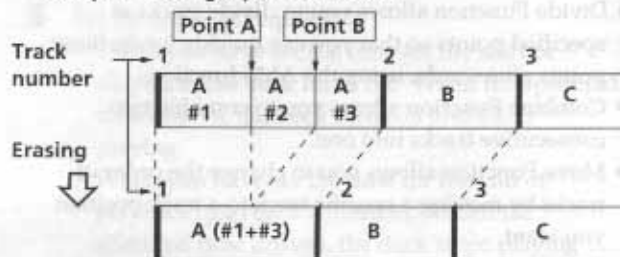
You can undo the Erase Function



See "Undoing the Last Edit" on page 36.

Erasing a Part of a Track (A-B Erase Function)

You can specify a portion within a track and erase the portion with ease. It is convenient when erasing unnecessary sections after recording satellite broadcast or FM broadcast.

Example: Erasing a part of track A



- 1 While the deck is stopped, playing, or pausing, press EDIT/NO.
- 2 Turn AMS until "A-B Erase?" appears in the display.
- 3 Press AMS.
- 4 Turn AMS to select the number of the track, then press AMS. "-Rehearsal-" and "Point A ok?" alternates in the display while the deck plays back the selected track from the beginning.
- 5 While monitoring the sound, turn AMS to find the starting point of the portion to be erased (point A). You can select the unit by which the starting point is shifted. Press the  or  button to select frame, second, or minute. For frame, the number of frames appears when you turn the AMS control; for second and minute, "S" or "M" flashes in the display.
- 6 If the point A is still incorrect, repeat Step 5 until it is correct.

- 7** Press YES or AMS if the position is correct. "Point B Set" appears in the display and playback for setting the end point of the portion to be erased (point B) starts.
- 8** Continue playback until the deck reaches point B, then press YES or AMS. "A-B Ers" and "Point B ok?" alternates in the display while the deck repeats a portion of a few seconds before point A and after point B successively.
- 9** Repeat Step 5 if point B is not correct.
- 10** Press YES or AMS when the position is correct. "Complete!!" appears for a few seconds and the portion between point A and B is erased.

To cancel the A-B Erase Function

Press ■.

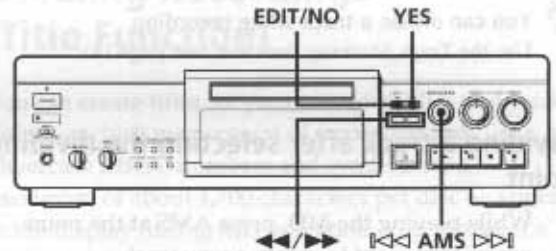
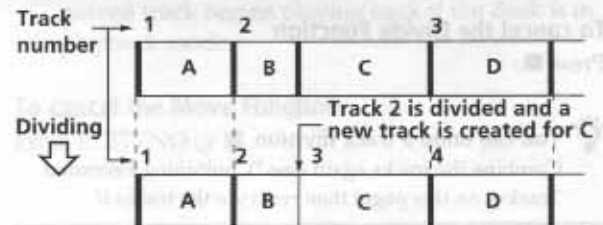
Note

If "Impossible" appears in the display, the specified portion cannot be erased. This is due to a technical limitation of the MD system and is not a mechanical error.

Dividing Recorded Tracks (Divide Function)

With the Divide Function you can assign a track number at places that you want to randomly access afterwards. Use this function to add tracks to MDs recorded from an analog source (and therefore contain no track numbers), or to divide an existing track into multiple portions for locating positions in the middle of a track. When you divide a track, the total number of tracks on the MD increases by one and all tracks following the divided track are renumbered.

Example: Dividing track 2 to create a new track for C



Dividing a track after selecting the track

- 1** While the deck is stopped, playing, or pausing, press EDIT/NO.
- 2** Turn AMS until "Divide ?" appears in the display and press AMS.
- 3** Turn AMS to select the track to be divided and press AMS. "Rehearsal" appears in the display and the deck plays back the selected track from the beginning.



(Continued)

- While monitoring the sound, turn AMS to find the point to divide the track.

You can select the unit by which the starting point is shifted. Press the ◀◀ or ▶▶ button to select frame, second, or minute.

For frame, the number of frames appears when you turn the AMS control; for second and minute, "S" or "M" flashes in the display.

- Press YES or AMS when the position is correct. "Complete!!" appears for a few seconds and the newly created track begins playing. The new track will have no track title even if the original track was labeled. The total number of tracks in the music calendar increases by one.

To cancel the Divide Function

Press ■.

You can undo a track division

Combine the tracks again (see "Combining Recorded Tracks" on this page) then redivide the tracks if necessary.

You can divide a track while recording

Use the Track Marking Function (see page 14).

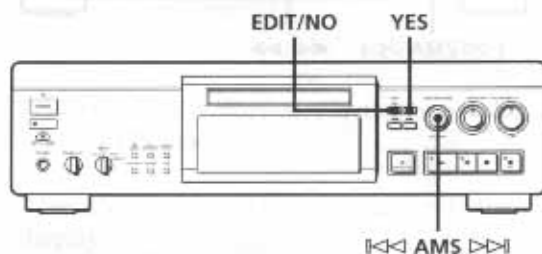
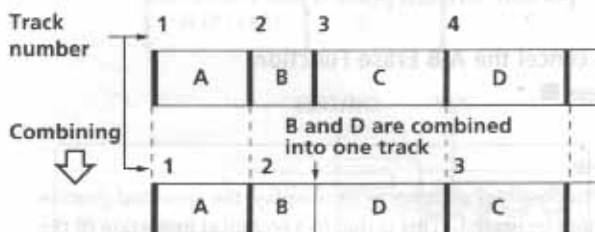
Dividing a track after selecting the dividing point

- While playing the MD, press AMS at the point where you want to create a new track. "Rehearsal" appears in the display and playback continues from the position you selected.
- To make fine adjustment on the dividing position, do Step 4 in "Dividing a track after selecting the track" on this page.
- Press EDIT/NO to display "Divide ?" and press YES or AMS.

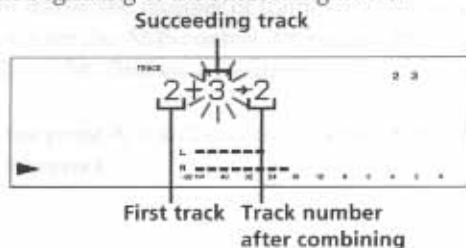
Combining Recorded Tracks (Combine Function)

Use the Combine Function to combine tracks on a recorded MD. The two tracks to be combined need not be consecutive and the latter track to be combined can be the track which comes before the former one in the track number order. This function is useful for combining several songs into a single medley, or several independently recorded portions into a single track. When you combine two tracks, the total number of tracks decreases by one and all tracks following the combined tracks are renumbered.

Example: Combining B and D



- While the deck is stopped, playing, or pausing, press EDIT/NO.
- Turn AMS until "Combine ?" appears in the display.
- Press AMS.
- Turn AMS to select the first track of the two to be combined and press AMS. The display for selecting the second track appears and the deck repeats the portion where the two tracks will join (i.e., the end of the first track and the beginning of the succeeding track).



- Turn AMS to select the second track of the two to be combined and press YES or AMS.
"Complete!!" appears for a few seconds and the total number of tracks in the music calendar decreases by one.
If both of the combined tracks have track titles, the title of the second track is erased.

To cancel the Combine Function

Press EDIT/NO or ■.

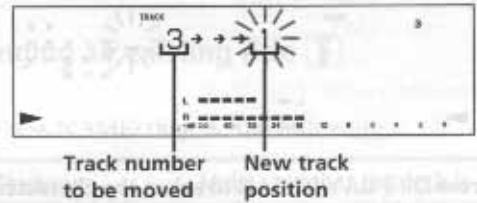
You can undo the Combine Function

Divide the tracks again (see "Dividing Recorded Tracks" on page 31), then repeat the combine function with the correct tracks if necessary.

Note

If "Impossible" appears in the display, the tracks cannot be combined. This sometimes happens when you've edited the same track many times, and is due to a technical limitation of the MD system, not a mechanical error.

- Press AMS.
- Turn AMS to select the track to be moved and press AMS.
- Turn AMS until the new track position appears.



- Press YES or AMS.
"Complete!!" appears for a few seconds and the moved track begins playing back if the deck is in playback mode.

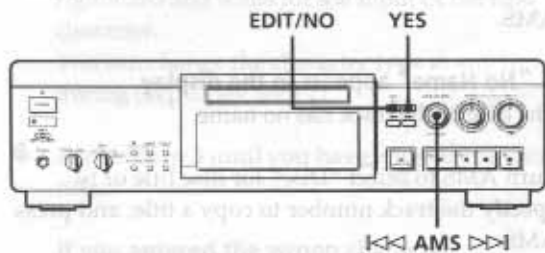
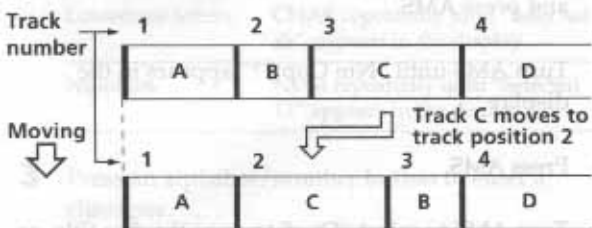
To cancel the Move Function

Press EDIT/NO or ■.

Moving Recorded Tracks (Move Function)

Use the Move Function to change the order of any track. After you move a track, the track numbers between the new and old track positions are automatically renumbered.

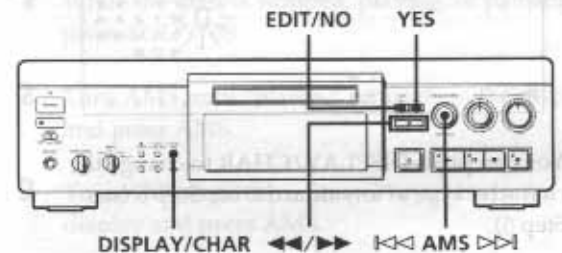
Example: Moving track C to track position 2



- While the deck is stopped, playing, or pausing, press EDIT/NO.
- Turn AMS until "Move ?" appears in the display.

Labeling Recordings (Title Function)

You can create titles for your recorded MDs and tracks. Titles — which may consist of uppercase and lowercase letters, numbers and symbols for a maximum of about 1,700 characters per disc — appear in the display during MD operation. You can label a track or an MD by using the controls on the deck or on the remote.



Use the following procedure to label a track or an MD. You can label a track while it is playing, pausing or recording. If the track is playing or recording, be sure to finish labeling before the track ends. If the track ends before you've completed the labeling procedure, the characters already entered are not recorded and the track will remain unlabeled.

- Press EDIT/NO.
- Turn AMS until "Name ?" appears in the display and press AMS.

(Continued)

3 Turn AMS until "Name in ?" appears in the display, then press AMS.

4 Turn AMS to select "Disc" to label an MD, or to specify the track to label, and press AMS. A flashing cursor appears in the display.



5 Press DISPLAY/CHAR to select the character type as follows:

To select	Press DISPLAY/CHAR repeatedly until
Uppercase letters	"A" appears in the display
Lowercase letters	"a" appears in the display
Numbers	"0" appears in the display

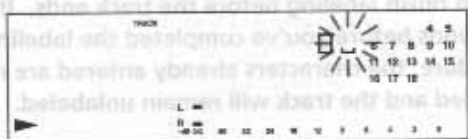


6 Turn AMS to select the character. The selected character flashes. Letters, numbers, and symbols appear in sequential order as you turn AMS. You can use the following symbols in titles: ! " # \$ % & * () * + , - . / : ; < = > ? @ _ `



You can press DISPLAY/CHAR to change the character type at any time during Step 6 (see Step 5).

7 Press AMS to enter the selected character. The cursor shifts rightward and waits for the input of the next character.



8 Repeat Steps 6 and 7 until you have entered the entire title.

If you entered the wrong character

Press ◀ or ▶ until the character to be corrected starts flashing, and repeat Steps 6 and 7 to enter the correct character.

To erase a character

Press ◀ or ▶ until the character to be erased starts flashing, then press EDIT/NO.

To enter a space

Press AMS or ▶ while the cursor is flashing.

9 Press YES. This completes the labeling procedure and the title appears in the display.

To cancel labeling

Press ■.

Note

You cannot label a track or an MD while you are recording over an existing track.

Copying a track or disc title

You can copy a track or disc title to use it as a title of another track or the disc title within a disc. Note that you can do this operation by using the controls on the deck only.

- 1 Press EDIT/NO.
- 2 Turn AMS until "Name ?" appears in the display and press AMS.
- 3 Turn AMS until "Nm Copy ?" appears in the display.
- 4 Press AMS.
- 5 Turn AMS to select "Disc" to copy the disc title, or the track whose title you want to copy and press AMS.

If "No Name" appears in the display

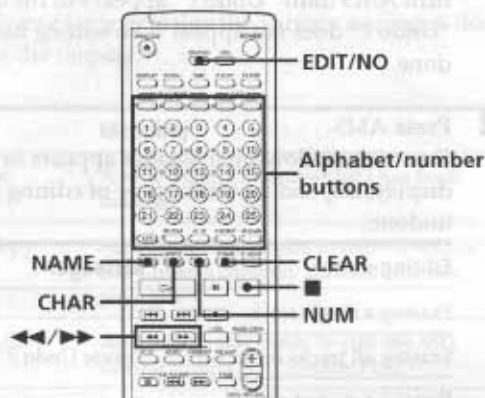
The disc or the track has no name.

- 6 Turn AMS to select "Disc" for disc title or to specify the track number to copy a title, and press AMS. "Complete!" appears for a few seconds to indicate that the copying operation is completed.

To cancel title copying

Press EDIT/NO or ■.

Labeling tracks and MDs with the remote



- 1 Press NAME repeatedly until a flashing cursor appears in the display, then do the following:

To label	Make sure that the deck is
A track	Playing, pausing, recording the track to be labeled, or stopped after locating the track to be labeled
An MD	Stopped with no track number appearing in the display

- 2 Select the character type as follows:

To select	Press
Uppercase letters	CHAR repeatedly until "Selected AB" appears in the display
Lowercase letters	CHAR repeatedly until "Selected ab" appears in the display
Numbers	NUM repeatedly until "Selected 12" appears in the display

- 3 Press an alphabet/number button to enter a character.
After you enter a character, the cursor shifts rightward and waits for the input of the next character.
You can change the character type at any time during Step 3 (see Step 2).
- 4 Repeat Step 3 until you have entered the entire title.


If you entered the wrong character

Press ◀ or ▶ until the character to be corrected starts flashing.
Press CLEAR to erase the incorrect character, then enter the correct one.

- 5 Press NAME again.
This completes the labeling procedure and the title appears in the display.

To cancel labeling

Press ■.

Changing an existing title 

- 1 Press NAME, then do the following:

To change	Make sure that the deck is
A track title	Playing, pausing the track whose title is to be changed, or stopped after locating the track whose title is to be changed
A disc name	Stopped with no track number appearing in the display

- 2 Hold down CLEAR or EDIT/NO until the current title is erased.
- 3 Enter the new title.
Do Steps 5 to 8 of "Labeling Recordings" on page 34, or Steps 2 to 4 of "Labeling tracks and MDs with the remote" on this page.
- 4 Press NAME.

Erasing a title on a disc (Name Erase)

Use this function to erase a title on a disc.

- 1 While the deck is stopped, playing, or pausing, press EDIT/NO.
- 2 Turn AMS until "Name ?" appears in the display and press AMS.
- 3 Turn AMS until "Nm Erase ?" appears in the display and press AMS.
- 4 Turn AMS to select "Disc" to erase the disc title, or the track whose title you want to erase and press AMS.
"Complete!!" appears for a few seconds and the title is erased.

To cancel Name Erase Function

Press ■.

Erasing all titles on a disc (Name All Erase)

Use this function to erase all titles on an MD simultaneously.

- 1 While the deck is stopped, press EDIT/NO.
- 2 Turn AMS until "Name ?" appears in the display and press AMS.
- 3 Turn AMS until "Nm All Ers ?" appears in the display and press AMS.
"Nm All Ers?" appears in the display.
- 4 Press AMS.
"Complete!!" appears for a few seconds and the all the titles is erased.

To cancel the Name All Erase Function

Press ■.



You can undo the Name All Erase Function

See "Undoing the Last Edit" on this page.



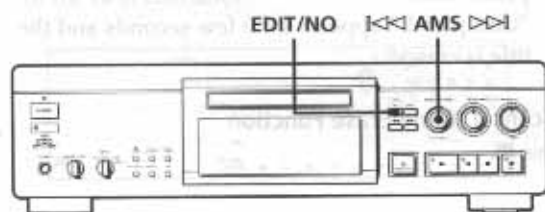
You can erase all recorded tracks and titles

See "Erasing all tracks on an MD" on page 30.

Undoing the Last Edit (Undo Function)

You can use the Undo Function to cancel the last edit and restore the contents of the MD to the condition that existed before editing was done. Note, however, that you cannot undo an edit if you do any of the following after the edit:

- Press the ● REC button on the deck.
- Press the ● button, the MUSIC SYNC button, or the CD SYNC STANDBY button on the remote.
- Update the TOC by turning off the power or ejecting the MD.
- Disconnect the AC power cord or set the MAIN POWER switch on the rear panel to OFF (only on European model).



- 1 With the deck stopped and no track number appearing in the display, press EDIT/NO and turn AMS until "Undo ?" appears in the display. "Undo ?" does not appear if no editing has been done.

- 2 Press AMS.
One of the following messages appears in the display, depending on the type of editing to be undone:

Editing done:	Message:
Erasing a single track	
Erasing all tracks on an MD	"Erase Undo ?"
Erasing a part of a track	
Dividing a track	"Divide Undo ?"
Combining tracks	"CombinUndo ?"
Moving a track	"Move Undo ?"
Labeling a track or an MD	
Changing an existing title	"Name Undo ?"
Erasing all titles on an MD	
Copying a title	

- 3 Press AMS again.
"Complete!!" appears for a few seconds and the contents of the MD are restored to the condition that existed before the edit.

To cancel the Undo Function

Press EDIT/NO or ■.

Display Messages

The following table explains the various messages that appear in the display.

Message	Meaning
Blank Disc	A new (blank) or erased MD has been inserted.
Cannot Copy	An attempt was made to make a second copy from a digitally dubbed MD (see page 40).
Cannot Edit	An attempt was made to edit the MD during Program or Shuffle Play.
Disc Error	The MD is scratched or missing a TOC. Erase all tracks on a new recordable MD before use (see "Erasing all tracks on an MD" on page 30).
Disc Full	The MD is full (see "System Limitations" on this page).
Impossible	The deck cannot do the specified editing operation.
Name Full	The titling capacity of the MD has reached its limit (about 1,700 characters).
NO DISC	There is no MD in the deck.
Protected	The inserted MD is record-protected.
STANDBY (flashing)	The contents recorded by timer have disappeared over time and are not be available for saving to disc, or Program Play could not be activated since the program has disappeared over time.

System Limitations

The recording system in your MiniDisc deck is radically different from those used in cassette and DAT decks and is characterized by the limitations described below. Note, however, that these limitations are due to the inherent nature of the MD recording system itself and not to mechanical causes.

"Disc Full" lights up even before the MD has reached the maximum recording time (60 or 74 minutes)

When 255 tracks have been recorded on the MD, "Disc Full" lights up regardless of the total recorded time. More than 255 tracks cannot be recorded on the MD. To continue recording, erase unnecessary tracks or use another recordable MD.

"Disc Full" lights up before the maximum number of tracks is reached

Fluctuations in emphasis within tracks are sometimes interpreted as track intervals, incrementing the track count and causing "Disc Full" to light up.

The remaining recording time does not increase even after erasing numerous short tracks

Tracks under 12 seconds in length are not counted and so erasing them may not lead to an increase in the recording time.

Some tracks cannot be combined with others

Track combination may become impossible when tracks are edited.

The total recorded time and the remaining time on the MD may not total the maximum recording time (60 or 74 minutes)

Recording is done in minimum units of 2 seconds each, no matter how short the material. The contents recorded may thus be shorter than the maximum recording capacity. Disc space may also be further reduced by scratches.

Tracks created through editing may exhibit sound dropout during search operations.

Track numbers are not recorded correctly

Incorrect assignment or recording of track numbers may result when CD tracks are divided into several smaller tracks during digital recording. Also, when the Automatic Track Marking Function is activated during recording, track numbers may not marked as in the original depending on the program source.

"TOC Reading" appears for a long time

If the inserted recordable MD is brand new, "TOC Reading" appears in the display longer than for MDs that have been used.

Tracks edited too many times may exhibit sound dropout during playback.

Limitations when recording over an existing track

- The correct remaining recording time may not be displayed.
- You may find it impossible to record over a track if that track has been recorded over several times already. If this happens, erase the track using the Erase Function (see page 29).
- The remaining recording time may be shortened out of proportion to the total recorded time.
- Recording over a track to eliminate noise is not recommended since this may shorten the duration of the track.
- You may find it impossible to label a track while recording over it.

The correct recorded/playing time may not be displayed during playback of monaural-format MDs.

Troubleshooting

If you experience any of the following difficulties while using the deck, use this troubleshooting guide to help you remedy the problem. Should any problem persist, consult your nearest Sony dealer.

The deck does not operate or operates poorly.

- ➔ The MD may be damaged ("Disc Error" appears). Take the MD out and insert it again. If "Disc Error" remains, replace the MD.

The deck does not play back.

- ➔ Moisture has formed inside the deck. Take the MD out and leave the deck in a warm place for several hours until the moisture evaporates.
- ➔ The deck is not on. Make sure that MAIN POWER on the rear panel is set to ON (only on European model) and press POWER to turn the deck on.
- ➔ The MD is inserted in the wrong direction. Slide the MD into the disc compartment with the label side up and the arrow pointing towards the opening.
- ➔ The MD may not be recorded (the music calendar does not appear). Replace the disc with one that has been recorded.

The deck does not record.

- ➔ The MD is record-protected ("Protected" appears). Close the record-protect slot (see page 9).
- ➔ The deck is not connected properly to the sound source. Make connections properly to the sound source.
- ➔ The recording level is not adjusted properly (in case of input through LINE(ANALOG) IN). Turn ANALOG REC LEVEL L/R to adjust the recording level properly (see page 9).
- ➔ A premastered MD is inserted. Replace it with a recordable MD.
- ➔ There is not enough time left on the MD. Replace it with another recordable MD with fewer recorded tracks, or erase unnecessary tracks.
- ➔ There has been a power failure or the AC power cord has been disconnected during recording. Data recorded to that point may be lost. Repeat the recording procedure.

The deck does not work during synchro-recording.

- ➔ The currently selected CD player type (CD player or video CD player) does not match the CD player being used. Reset the CD player type (see page 17).

The sound has a lot of static.

- ➔ Strong magnetism from a television or a similar device is interfering with operations. Move the deck away from the source of strong magnetism.

Note

If the deck does not operate properly even after you've attempted the prescribed remedies, turn off the power, then reinsert the plug into the power outlet.

Specifications

System	MiniDisc digital audio system
Disc	MiniDisc
Laser	Semiconductor laser ($\lambda = 780 \text{ nm}$) Emission duration: continuous
Laser output	Less than $44.6 \mu\text{W}^*$ * This output is the value measured at a distance of 200 mm from the objective lens surface on the Optical Pick-up Block with 7 mm aperture.
Laser diode properties	Material: GaAlAs
Revolutions (CLV)	400 rpm to 900 rpm
Error correction	Advanced Cross Interleave Reed Solomon Code (ACIRC)
Sampling frequency	44.1 kHz
Coding	Adaptive Transform Acoustic Coding (ATRAC)
Modulation system	EFM (Eight-to-Fourteen Modulation)
Number of channels	2 stereo channels
Frequency response	5 to 20,000 Hz $\pm 0.3 \text{ dB}$
Signal-to-noise ratio	Over 105 dB during playback
Wow and flutter	Below measurable limit

Inputs

	Jack type	Input impedance	Rated input	Minimum input
LINE(ANALOG) IN	Phono jacks	47 kilohms	500 mVrms	125 mVrms
DIGITAL IN COAXIAL	Phono jack	75 ohms	0.5 Vp-p, $\pm 20\%$	—
DIGITAL IN OPT1	Square optical connector jack	Optical wave length: 660 nm	—	—
DIGITAL IN OPT2	Square optical connector jack	Optical wave length: 660 nm	—	—

Outputs

	Jack type	Rated output	Load impedance
PHONES	Stereo phone jack	28 mW	32 ohms
LINE(ANALOG) OUT	Phono jacks	2 Vrms (at 50 kilohms)	Over 10 kilohms
DIGITAL OUT OPTICAL	Square optical connector jack	-18 dBm	Wave length: 660 nm

General

Power requirements

Where purchased	Power requirements
U.S.A.	120 V AC, 60 Hz
Continental Europe	220 - 230 V AC, 50/60 Hz

Power consumption	26 W
Dimensions (approx.) (w/h/d) incl. projecting parts	430 x 125 x 375 mm (17 x 5 x 14 ⁷ / ₁₆ in.)
Mass (approx.)	14.3 kg (31 lbs 3 oz)

Supplied accessories

See page 4.

Optional accessories

Recordable MDs	MDW-60 (60 min), MDW-74 (74 min)
Optical cable	POC-15A
Coaxial digital connecting cable	VMC-10

U.S. and foreign patents licensed from Dolby Laboratories Licensing Corporation.

Design and specifications are subject to change without notice.

Table of Setup Menus

You can make various settings on this deck by using setup menus. Operation related to each menu were explained in the previous sections. The table below outlines each menu, including the various parameters and default settings.

Menu number	Function	Parameters	Default setting	See
S01	Creates a program.	—	—	page 24
S02	Sets the track marking function.	T.Mark Off, T.Mark L.Syn, T.Mark 1min, T.Mark 5min	T.Mark L.Syn	page 14
S03	Sets the reference level of the input signal when "T.Mark L.Syn" is selected in the S02 menu	LS(T)-72 to 0dB	LS(T)-50dB	page 15
S04	Sets the duration of silence portion to be detected when "T.Mark L.Syn" is selected in the S02 menu	LS(W)0.0 to 9.5s	LS(W)1.5s	page 15
S05	Sets the Resume Play mode.	Resume Off, Resume Play, Resume Next	Resume Off	page 26
S06	Switches the bit length for the digital output signal.	Dout 20bit, Dout 16bit	Dout 20bit	page 26
S07	Turns the Auto Space and Auto Pause Functions on and off.	Auto Off, Auto Space, Auto Pause	Auto Off	page 25
S08	Turn the Smart Space Function on and off.	S.Space Off, S.Space On	S.Space On	page 11
S09	Turns the No Clip Function on and off.	No Clip On, No Clip Off	No Clip Off	page 13
S10	Turns the Peak Hold function on and off for the peak level meters.	P.Hold On, P.Hold Off	P.Hold Off	page 14
S11	Sets the playing time during music scan.	M.Scan 6 to 20s	M.Scan 6s	page 22
S12	Selects the signal to be adjusted using the DIGITAL REC LEVEL control.	DigLvl Off, DigLvl Rec, DigLvl All	DigLvl Rec	pages 13 and 26
S13	Selects the type of increment/decrement curve of the signal level when the DIGITAL REC LEVEL control is turned.	DigLvl Lin, DigLvl Sin, DigLvl Log	DigLvl Lin	page 13
S14	Sets the duration of fade-in recording and playback.	FadeIn 1.0 to 15s	FadeIn 5.0s	pages 18 and 28
S15	Sets the duration of fade-out recording and playback.	FadeOut 1.0 to 15s	FadeOut 5.0s	pages 18 and 28
S16	Selects the type of increment curve of the signal level for fade-in recording and playback.	FadeIn Lin, FadeIn Sin, FadeIn Log	FadeIn Lin	pages 18 and 28
S17	Selects the type of decrement curve of the signal level for fade-out recording and playback.	FadeOut Lin, FadeOut Sin, FadeOut Log	FadeOut Lin	pages 18 and 28