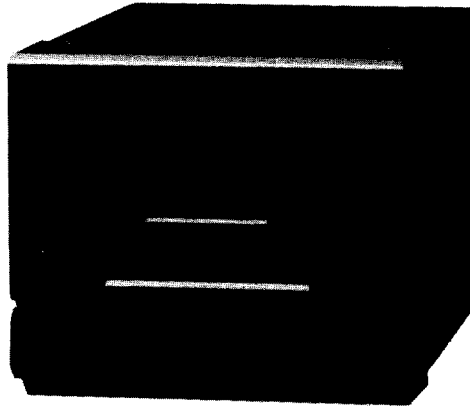


MDS-MX1

SERVICE MANUAL

*AEP Model
UK Model*



MDS-MX1 is the MINIDISC DECK
section in CMT-M1.

Model Name Using Similar Mechanism	MDS-302
MD Mechanism Type	MDM-2E
Base Unit Type	MBU-2B
Optical Pick-up Block Type	KMS-210A/J-N

SPECIFICATIONS

System MiniDisc digital audio system

Disc MiniDisc

Laser Semiconductor laser ($\lambda = 780$ nm)

Laser output power Less than 44.6 μ 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)
Approx. 400 rpm to 900 rpm

Error correction
Advanced Cross Interleave
Reed Solomon Code (ACIRC)

Sampling frequency
44.1 kHz

Modulation system
EFM (Eight-to-Fourteen
Modulation)

Number of channels
2 stereo channels

Frequency response
5 to 20,000 Hz \pm 0.5 dB

Signal-to-noise ratio
Over 95 dB (during playback)

Wow and flutter
Below measurable limit

Inputs
ANALOG LINE IN:
Phone jacks, sensitivity 300mV,
47 kilohms
DIGITAL IN (CD OPTICAL
IN):
Square optical connector jack,
impedance optical wave length
660 nm
AU BUS

Outputs
ANALOG LINE OUT:
Phone jacks, rated output 2
Vrms (at 50 kilohms),
load impedance over 10
kilohms

Power requirements
220 - 230 V AC, 50/60 Hz

Power consumption
15W

Dimensions
Approx. 142 x 125 x 252 mm
(w/h/d) (5⁸/₅ x 5 x 10 inches)

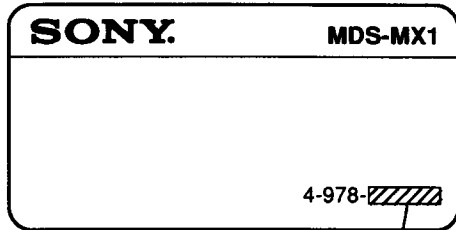
Mass
Approx. 2.4 kg (5 lb 4.7 oz)



MINIDISC DECK
SONY®

MODEL IDENTIFICATION

— Specification Label —

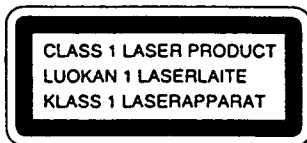


AEP model : 474-□□
UK model : 475-□□

CAUTION

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

Laser component in this product is capable of emitting radiation exceeding the limit for Class 1.



This appliance is classified as a CLASS 1 LASER product.
The CLASS 1 LASER PRODUCT MARKING is located on the rear exterior.

This caution label is located inside the unit.

CAUTION :	INVISIBLE LASER RADIATION WHEN OPEN. AVOID EXPOSURE TO BEAM.
ADVARSEL:	USYNLIG LASERSTRÅLING VED ÅBNING NÅR Sikkerhedsafbrydere er ude af funktion. UNDGÅ UDSÆTTELSE FOR STRÅLING.
VARO!	AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTITINA LASERSÄTEILYLLE.
VARNING :	LASERSTRÅLING NÅR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD.
ADVERSEL:	USYNLIG LASERSTRÅLING NÅR DEKSEL ÄPNES UNNGÅ EKSPONERING FÖR STRÅLEN.

US and foreign patents licensed from
Dolby Laboratories Licensing Corporation.

Notes on chip component replacement

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

Flexible Circuit Board Repairing

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

SAFETY-RELATED COMPONENT WARNING !!

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

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SECTION 1

SERVICE NOTE

1. How to turn the POWER ON.

This unit does not have the power button.

Turn the power on according to the followings.

PROCEDURE

1. Plug the power plug into an outlet.
2. Press the **SCROLL** button and **▲** button simultaneously to turn the power on.

To turn the power off, unplug the power plug from an outlet.

Note : If a disc is loaded, the power will be turned on automatically, but if the power plug is unplugged while loading a disc and plug it again, the power is not turned on automatically. In this case, turn the power on following the above procedure.

2. Note for replacement of IC121 and IC171 on the BD board

IC121 on the BD board of this unit has modified from CXD2535AR to CXD2535BR due to an improvement.

Some contents of nonvolatile memory in the IC171 are modified according to this modification. When replacing IC171, the previous contents for IC121 (CXD2535AR) are written as an initialized value from the system control IC. (When replacing IC171, turn the power on once to write an initialized value.)

In case the IC171 on the BD board is replaced, which uses CXD2535BR to IC121, see the following procedure to rewrite the contents of nonvolatile memory. As for replacement of IC121, use CXD2535BR to rewrite the contents of IC171.

TABLE Comparison between CXD2535AR and CXD2535BR regarding the contents of nonvolatile memory

ADDRESS	CXD2535AR	CXD2535BR
15	90	93
2D	33	1A
2E	33	1A

How to rewrite the nonvolatile memory

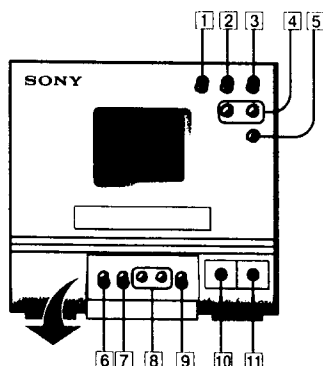
- ① Plug in the power plug to an outlet pressing the STOP button, and release the STOP button.
- ② Press the AMS (◀▶) button to be displayed "EEP MODE".
If the YES button is pressed, the display will be changed to "EEP ** @@".
(** : address, @@ : data)
- ③ Press the AMS button to be displayed "EEP 15 @@".
- ④ If the CD SYNC button is pressed, "EEP 15 @@ > @@" will be displayed. So turn the AMS button to be displayed "EEP 15 @@ > 93".
- ⑤ Pressing the YES button, "Complete!" is displayed once, "EEP 15 93" is displayed, and the data is rewritten.
- ⑥ As for the address 2D and 2E, rewrite each of them to "1A" following the steps ③ to ⑤ as well.
- ⑦ After the all modification are complete, press the NO key to be displayed "EEP MODE".
- ⑧ Press the **REPEAT** button, unplug the power plug from an outlet after five or six seconds to be out from the EEP rewriting mode.

Note : The modification in the contents of nonvolatile memory is not reflected if the power is not turned off once.

SECTION 2 GENERAL

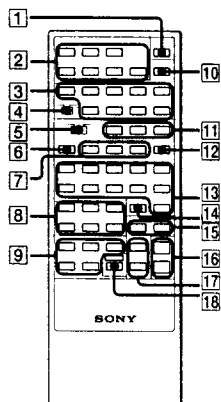
This section is extracted
from instruction manual.

Front Panel



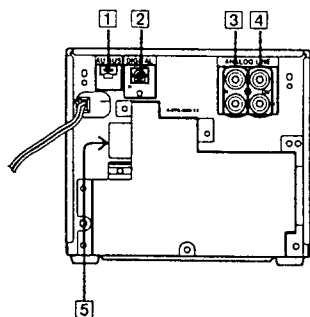
- 1 ►|| (MD play/pause) button* (10, 14)
- 2 ■ (MD stop) button (10, 14)
- 3 ▲ (MD eject) button (10)
- 4 ◀◀ and ▶▶ (MD AMS / search) buttons (12, 15)
- 5 DISPLAY button (17)
- 6 EDIT/NO button (18)
- 7 YES button (18)
- 8 ◀ and ▶ (MD / character search) buttons (15, 21)
- 9 SCROLL button (17)
- 10 ● REC button (11)
- 11 CD SYNC (CD synchro-recording) button (10)

Remote (RM-SM1)



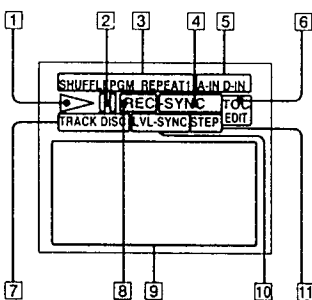
- 1 SYSTEM POWER switch (31, 32)
- 2 CD operating buttons
 - ▶ (CD play) button (7)
 - || (CD pause) button (7)
 - (CD stop) button (7)
 - ◀◀ and ▶▶ (AMS) buttons (7)
 - ◀◀ (fast backward) and ▶▶ (fast forward) buttons (7)
- 3 MD and tape operating buttons
 - ▶ (MD / the front side of a tape play) button (10, 23)
 - ◀ (the reverse side of a tape play) button (23)
 - || (MD/TAPE pause) button (14, 23)
 - (MD/TAPE stop) button (14, 23)
 - ◀◀ and ▶▶ (MD/TAPE AMS/character select) buttons (12, 15, 18, 21)
 - ◀◀ and ▶▶ (MD fast backward and forward / character enter, TAPE fast leftward and rightward) buttons (12, 15, 21)
- 4 MD/TAPE switch (12, 24)
- 5 MD/CD/TUNER switch (8, 11, 26)
- 6 DISPLAY button (9, 16)
- 7 PLAY MODE buttons
 - CONTINUE button (8, 15, 16)
 - SHUFFLE button (8, 15)
 - PROGRAM button (8, 15)
- 8 Tuner operating buttons
 - BAND button (26)
 - TUNING + and - (26)
 - STEREO/MONO button (26)
 - TUNING MODE button (26)
 - MEMORY button (27)
- 9 Timer operating buttons
 - TIMER SET button (6, 31)
 - TIMER +/- button (6, 31)
 - TIMER SELECT button (31)
 - SLEEP button (30)
- 10 SCROLL button (16)
- 11 WRITE buttons
 - NAME button (21)
 - CAPS button (21)
 - NUM button (21)
- 12 CLEAR button (21)
- 13 Number buttons (8, 13)
- 14 REPEAT button (9, 16)
- 15 BALANCE L and R buttons (29)
- 16 VOL + and - buttons (7, 14, 25)
- 17 Sound adjustment buttons
 - DBFB button (28)
 - SURROUND button (28)
- 18 ENTER button (6, 8)

Rear Panel



- 1 AU (audio) BUS connector (4)
- 2 DIGITAL IN connector (4)
- 3 ANALOG LINE IN jacks (4)
- 4 ANALOG LINE OUT jacks (4)
- 5 AC OUTLET connector (Except for UK models) (4)

Display Window



- 1 MD play indication (10, 17)
- 2 MD pause indication (10)
- 3 MD play mode indications (15, 16)
- 4 SYNC (synchro-recording) indication (10)
- 5 Input indications
- 6 TOC EDIT indication (10, 18)
- 7 TRACK and DISC indications (12)
- 8 REC (record) indication
- 9 Character information display (34)
- 10 LVL-SYNC indication (13)
- 11 STEP indication

Notes on Recording

If "Protected" appears in the display
The MD is record-protected. Close the slot to record on the MD (see p.33).

If "Din Unlock" flashes in the display
The program source is not connected to the MD deck with the optical cable. Connect the optical cable securely, and then start recording.

Depending on source being recorded, track numbers are marked in following ways:

- When recording from a CD onto an MD:
The MD deck automatically marks track numbers in the same sequence as the original. In the following cases however, the track or tracks are recorded as part of a single, continuous track with a single track number.
 - If a track is repeated two or more times (e.g., by single-track repeat play).
 - If two or more tracks with the same track number (e.g., from different CDs) are played.
- When recording from the radio or a tape while "LVL-SYNC" does not appear:
The source will be recorded as a single track.
You can divide the track afterwards using the divide function (see p.19), or you can mark track numbers during recording by using the Automatic Track Marking function (see p.12).

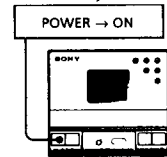
When "TOC" flashes in the display
the MD deck is currently updating the Table Of Contents (TOC).

Do not move the MD deck or pull out the mains lead. Changes to an MD made through recording are saved only when you update the TOC by ejecting the MD or by pressing POWER to switch the MD deck to standby.

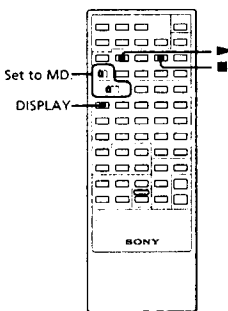
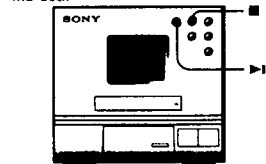
The MD deck uses the SCMS (Serial Copy Management System)
MDs recorded through DIGITAL IN cannot be copied onto other MDs or DAT tapes using digital connection (p.36).

Useful Tips for Recording

Tuner CD Player



MD deck



Checking the remaining recordable time on the MD

Set the CD/MD/TUNER switch to MD.

Press DISPLAY.

- While recording, the remaining recordable time on the MD appears.
- While the MD deck is stopped, each time you press DISPLAY, the display changes as follows:
total recorded time → remaining recordable time on the MD → disc name (see p.17).

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

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

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

There has been an extended silence of 4 to 30 seconds in length while recording from a CD. The silence is replaced with a blank of about 3 seconds and the MD deck continues recording.

Playing back tracks just recorded

You can listen to the tracks that have just been recorded.

Press **II** (or **II** for MD on the remote) immediately after stopping recording. Playback starts from the first track of the material just recorded.

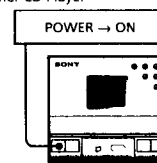
To play from the first track of the MD after recording

- 1 Press **II** on the MD deck again after stopping recording.
- 2 Press **II** (or **II** for MD on the remote). Playback starts from the first track of the MD.

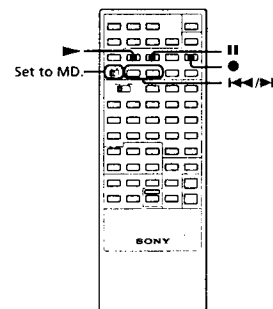
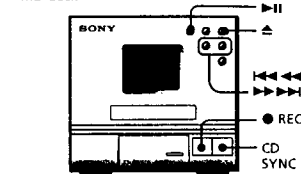
Recording Over Existing Tracks

You can record over existing material just as you would on an analog cassette tape. Set the MD/TAPE switch to MD.

Tuner CD Player



MD deck



1 Do steps 1 to 3 in "Synchro-Recording a CD on an MD" (p.10) or steps 1 to 2 in "Recording on an MD manually" (p.11).

2 Press **II** or **II** for MD on the remote) until the number of the track to be recorded over appears.

3 To record from the start of the track, continue from step 4 in "Synchro-Recording a CD on an MD" or from step 3 in "Recording on an MD manually".

To record partway through the track

- 1 After step 2 above, press **II** to start playback.
- 2 Press **II** where you want to start recording.
- 3 Do step 3 above.

Note

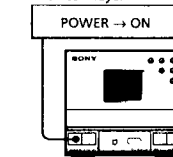
You cannot record partway through an existing track while "PGM" or "SHUFFLE" lights up.

While "TRACK" flashes in the display
The MD deck is recording over an existing track. When it reaches the end of the recorded portion, "TRACK" stops flashing.

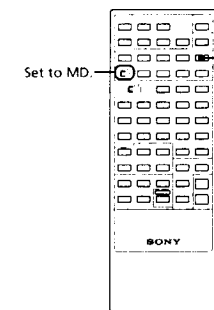
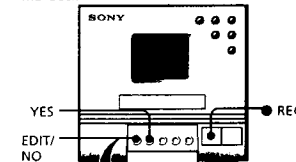
Marking Track Numbers While Recording (Track Marking)

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 editing functions.

Tuner CD Player



MD deck



Marking track numbers manually (Manual Track Marking)

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

Press **● REC** on the MD deck (or **●** for MD on the remote) at the place you want to add a track mark while recording.

Marking track numbers automatically (Automatic Track Marking)

The MD deck adds track marks differently in the following cases:

- When recording from CDs
The MD deck marks track numbers automatically. The track numbers are marked as they are found on the original.
- When recording a radio programme or from a tape
While "LVL-SYNC" lights up, the MD deck marks a new track number whenever the signal level drops and rises to a certain point*. If "LVL-SYNC" does not light up, do as follows:

- 1 Press **EDIT/NO** until "LevelSync?" appears in the display while recording or recording pause.
 - 2 Press **YES** twice to change the display to show "LevelSync ON".
"LVL-SYNC" lights up.
- * The signal level must remain low for 2 or more seconds before a new track number is marked.

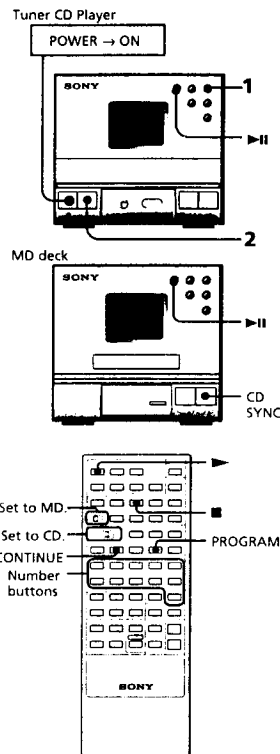
To cancel Automatic Track Marking

- 1 Press **EDIT/NO** until "LevelSync?" appears during recording or recording pause.
- 2 Press **YES**.
"LevelSyncON?" appears in the display.
- 3 Press **EDIT/NO** until "LevelSyncOFF" appears in the display.

When you want to mark track numbers after you have finished recording
Divide the recorded tracks (p.19).

Recording Tracks from a CD in the Desired Order

Set the MD/TAPE switch to MD, and the MD/CD/TUNER switch to CD.



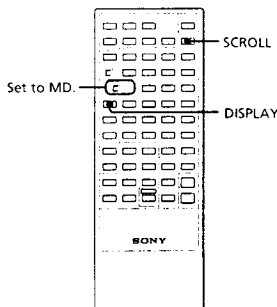
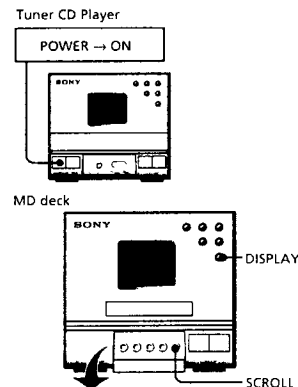
- 1 Press **●** on the CD player, and place a CD on the CD tray.
- 2 Press **FUNCTION** until "CD" appears in the display on the CD player.
- 3 Programme tracks.
Do steps 2 to 4 in "Playing Tracks in the Desired Order (Programme Play)" (p.8).
- 4 Do steps 4 and 5 in "Synchro-Recording a CD on an MD" (p.10).

To cancel recording tracks in the desired order
Press **CONTINUE**.

Using the Display

You can use the display on the MD deck to check MD and track information such as the total track number, total playing time of the tracks, and remaining recordable time of the MD.

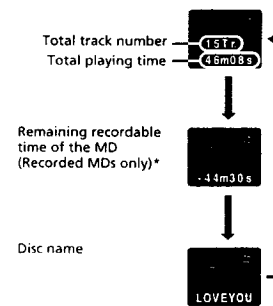
Set the MD/TAPE switch and the MD/CD/TUNER switch to MD.



Checking the Total Track Number, Total Playing Time, Remaining Recordable Time of the MD, and the Disc Name

Press **DISPLAY** repeatedly while the MD deck is stopped.
Each time you press **DISPLAY**, the display changes as follows:

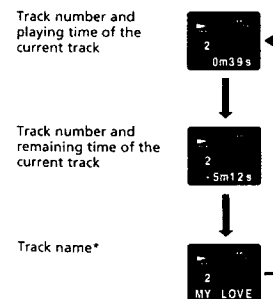
Total track number and total playing time of all recorded tracks



* The remaining recordable time of the disc is not shown for premastered MDs.

Checking the Remaining Time of the MD or a Track Name

Press **DISPLAY** repeatedly while playing an MD.
Each time you press **DISPLAY**, the display changes as follows:



* If no title is recorded, "No Name" appears, followed by the elapsed playing time.

You can check the track name at any time while playing an MD by pressing SCROLL.

Since the display shows up to 7 characters at a time, press **SCROLL** again to see the rest of the track title if the title has 8 characters or more.

Press **SCROLL** again to pause scrolling, and again to continue scrolling.

You can create titles for your recorded MDs and tracks.

See "Labelling Recordings (Title Function)" (p.21).

Chapter 5: Editing Recorded MDs

Notes on Editing

Erasing Recordings (Erase Function)

Dividing Recorded Tracks (Divide Function)

Combining Recorded Tracks (Combine Function)

Moving Recorded Tracks (Move Function)

Labelling Recordings (Title Function)

Notes on Editing

You can edit the recorded MDs by adding or erasing track marks, erasing tracks, or labelling MDs and tracks. Note that all the editing operations except the labelling function can be done only with the buttons on the MD deck.

If "Protected" appears in the display
The MD deck could not erase the specified track because the record-protect slot on the MD is open. Erase the track after closing the slot.

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

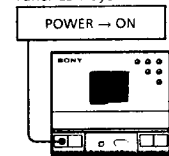
Erasing Recordings (Erase Function)

Do the procedures below to erase the following:

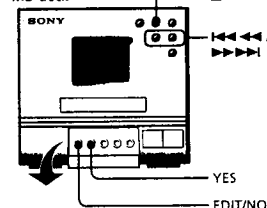
- A single track
- All tracks
- Parts of a track

Since erasing updates the TOC, you do not have to record over materials. Note that once erased, MD data cannot be recovered.

Tuner CD Player



MD deck



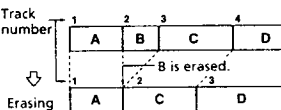
Erasing a single track

You can erase a track simply by specifying its 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.

When erasing two or more tracks

To avoid confusion, 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 Press **▶▶▶▶** or **◀◀◀◀** on the MD deck (**▶▶▶▶** or **◀◀◀◀** for MD on the remote) until the track number you want to erase appears in the display.
- 2 Press EDIT/NO until "Erase?" appears in the display.
- 3 Press YES.
The track selected in step 1 is erased, and "Complete" appears for a few seconds and the total number of tracks in the music calendar decreases by one. When you erase a track during playback, the track following the deleted track begins playing.

4 Repeat steps 1 to 3 to erase more tracks.

To cancel erasing a track

Press EDIT/NO or **■** on the MD deck. Or press **▶▶▶▶** or **◀◀◀◀** on the MD deck (**▶▶▶▶** or **◀◀◀◀** for MD on the remote) to change the track number. "Erase?" disappears.

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.

- 1 Press EDIT/NO until "All Erase?" appears in the display on the MD deck.
- 2 Press YES.
"All Erase??" appears in the display.

3 Press YES again.

When the disc name, all recorded tracks, and titles on the MD have been erased, "Complete" appears for a few seconds.

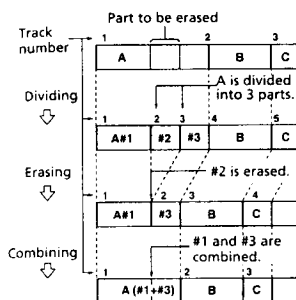
To cancel erasing all tracks

Press EDIT/NO or **■** on the MD deck. "All Erase?" disappears.

Erasing a part of a track

By using the divide (see this page), erase (see p.18), and combine (see p.20) functions, you can erase specific portions of a track.

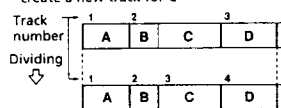
Example: Erasing a part of track A



Dividing Recorded Tracks (Divide Function)

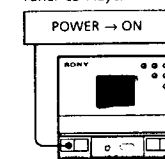
With the divide function you can assign a track number at places that you want to randomly access afterwards. Use this function to add tracks to MDs recorded from an analog source (and therefore contain no track numbers), or to divide an existing track into multiple portions. When you divide a track, 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

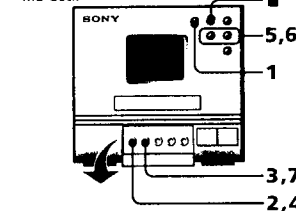


Track 2 is divided, creating a separate track for C, and all the following tracks are renumbered.

Tuner CD Player



MD deck



- 1 While playing the MD, press **▶▶** on the MD deck (or **▶▶** for MD on the remote) at the point where you want to create a new track.
The deck pauses playing.
- 2 Press EDIT/NO repeatedly until "Divide?" appears in the display.
- 3 Press YES.
"Rehearsal" alternates with "Position ok?" in the display, and the starting portion of the new track begins playing repeatedly.

- 4 If the starting position is incorrect, press EDIT/NO.
If it is correct, go to step 7.



- 5 While monitoring the sound, press **▶▶▶▶** or **◀◀◀◀** on the MD deck to find the starting position of the new track.
The starting portion of the new track is played back repeatedly.
"Rehearsal" alternates with "Position ok?" in the display. The starting position can be moved within a maximum range of -128 to +128 steps of about 0.06 second each within a track.

- 6 If the starting position is still incorrect, repeat step 5 until it is correct.

- 7 Press YES when the position is correct. When the track has been divided, "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.

To cancel dividing recorded tracks
Press **■** on the MD deck.

You can undo a track division
Combine the tracks again (p.20), then redivide the tracks if necessary.

You can divide a track while recording
Use the track marking function (p.12).

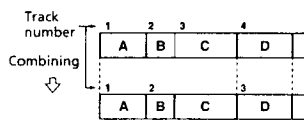
Combining Recorded Tracks

(Combine Function)

Use the combine function while the deck is stopped, playing or in pause to combine consecutive tracks on a recorded MD. 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.

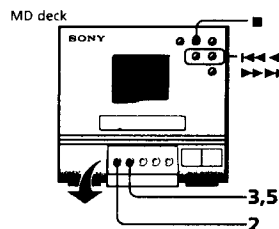
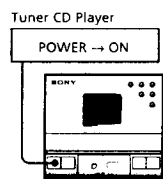
Example: Combining B and C



B and C are combined into one track.

GB

20



1 Press **▶▶▶▶** or **◀◀◀◀** on the MD deck (**▶▶** or **◀◀** for MD on the remote) until the second track of the two to be combined appears. For example, when combining tracks 3 and 4, press the button until 4 appears.

2 Press EDIT/NO repeatedly until "Combine?" appears in the display.

3 Press YES. "Rehearsal" alternates with "Track ok?" in the display. The place where the two tracks will join (i.e., the end of the first track and the beginning of the second track) repeatedly plays back.

4 If the track is the wrong one, press EDIT/NO or **■**, then start from step 1 again.

5 If the place is correct, press YES. When the tracks have been combined, "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 combining recorded tracks
Press EDIT/NO or **■** on the MD deck.

You can undo a track combination
Divide the tracks again (p.19), then repeat the combine function with the correct tracks if necessary.

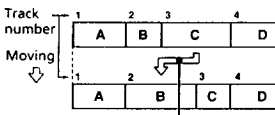
Note
If "Sorry" appears in the display, the tracks cannot be combined. This sometimes happens when you have edited the same track many times. This is due to a technical limitation of the MD system, not a mechanical error.

Moving Recorded Tracks

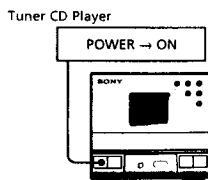
(Move Function)

You can change the order of any track. After you move a track, the track numbers between the new and old track positions are automatically renumbered.

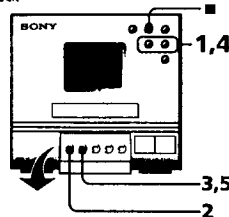
Example: Moving C to track position 2



Track C moves to track position 2.



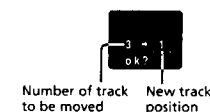
MD deck



1 Press **▶▶▶▶** or **◀◀◀◀** on the MD deck (**▶▶** or **◀◀** for MD on the remote) until the second track of the two to be combined appears.

2 Press EDIT/NO until "Move?" appears in the display on the MD deck.

3 Press YES.



4 Press **▶▶▶▶** or **◀◀◀◀** on the MD deck until the new track position appears.

5 Press YES. After you have moved the track, "Complete" appears for a few seconds and the moved track begins playing back if the MD deck is in playback mode.

To cancel moving recorded tracks
Press EDIT/NO or **■** on the MD deck.

Labelling Recordings

(Title Function)

You can create titles for your recorded MDs and tracks.

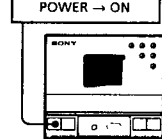
Titles may consist of uppercase and lowercase letters, numbers and symbols for a maximum of about 1,700 characters per disc. The titles appear in the display during MD operation.

You can label a track while it is playing, pausing or recording.

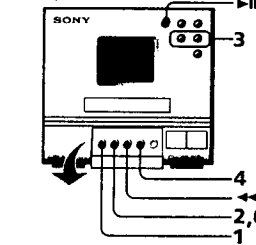
If the track is playing, be sure to finish labelling before the track ends.

If the track ends before you have completed the labelling procedure, the characters already entered are not recorded and the track will remain unlabelled.

Tuner CD Player



MD deck



1 Press EDIT/NO on the MD deck until "Name in?" 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 labelled, or stopped after locating the track to be labeled
An MD	Stopped with no track number appearing in the display

2 Press YES.

A cursor flashes in the display.



3 Press **▶▶▶▶** or **◀◀◀◀** on the MD deck (**▶▶** or **◀◀** for MD on the remote) until the desired character appears in the display. The selected character flashes.

Letters, numbers, and symbols appear in sequential order. You can use the following symbols in titles:
! " # \$ % & ' () * + , - . / : ; < = > ? @ _

4 Press **▶▶**.

The cursor shifts rightward and stands by for the input of the next character.

5 Repeat steps 3 and 4 until you have entered the entire title.

If you entered the wrong character Press **▶▶** or **◀◀** on the MD deck until the character to be corrected starts flashing, and repeat steps 3 and 4 to enter the correct character.

To erase a character

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

To enter a space

Press **▶▶** on the MD deck while the cursor is flashing.

6 Press YES.

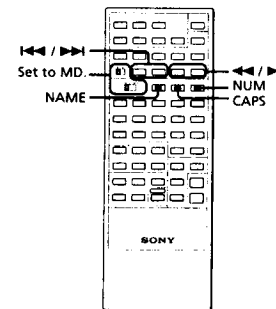
This completes the labelling procedure and the title appears on the left side of the display.

To cancel labelling

Press **■** on the MD deck.

Labelling Tracks and MDs with the Remote

Set the MD/TAPE switch and MD/CD/TUNER switch to MD.



1 Press NAME. A cursor flashes in the display. Do the following:

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

2 Press CAPS or NUM to select the character type as follows.

To select	Press
Lowercase letters	CAPS repeatedly until "a" appears in the display.
Uppercase letters	CAPS repeatedly until "A" appears in the display.
Numbers	NUM repeatedly until "1" appears in the display.

3 Press **▶▶** or **◀◀** for MD to select a letter (or a number), and press **▶▶**. The cursor shifts rightward and stands by for the input of the next character.

4 Repeat steps 2 and 3 until you enter the entire title.

If you entered the wrong character

Press **▶▶** or **◀◀** for MD until the character to be corrected starts flashing, then repeat steps 2 and 3. To erase the incorrect character, press CLEAR then enter the correct one.

Continue to next page →

→ Continued

- 5** Press NAME again.
The entered title appears on the left side of the display window after the label has been recorded.

To cancel labelling
Press ■ for MD.

Changing an Existing Title

- 1** Press NAME.
A track title or a disc title appears in the display on the MD deck.
Do the following:

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

- 2** Keep pressing EDIT/NO on the MD deck (or CLEAR for MD on the remote) until the current title is erased.
- 3** Enter a new title.
Do the steps in "Labelling Recordings" (p.21) or steps 2 to 5 in "Labelling Tracks and MDs with the Remote" (p.21).

Erasing All Titles on a Disc (Name Erase Function)

You can erase all titles on an MD simultaneously.

Note that once erased, titles cannot be recovered.

- 1** Keep pressing EDIT/NO while the deck is stopped until "Name Erase?" appears in the display.
- 2** Press YES.
All titles are erased.

To cancel erasing all titles
Press ■ on the MD deck.

You can erase all recorded tracks and titles.

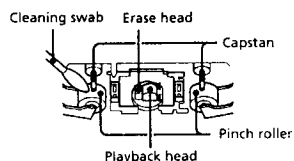
See "Erasing all tracks on an MD" (p.18).

Maintenance

To clean the tape heads and tape path

Contaminated tape heads cause poor recording or sound drop-out in playback. We recommend cleaning after every 10 hours of operation.

Open the tape compartment and wipe the heads, the pinch rollers and the capstans with a cleaning swab slightly moistened with cleaning fluid or alcohol. Wipe the parts shown below:



Insert a tape when the areas cleaned are completely dry.

To demagnetize the tape heads

After 20 to 30 hours of use, enough residual magnetism will have built up on the heads to begin to cause loss of high frequencies and hiss. At this time, demagnetize the heads and all metal parts in the tape path with a commercially available tape head demagnetizer. Refer to the instructions of the demagnetizer.

To clean the cabinet

Use a soft cloth slightly moistened with mild detergent solution.

To clean the CD

When a CD is dirty, clean it with a cleaning cloth. Wipe the CD from the centre out.

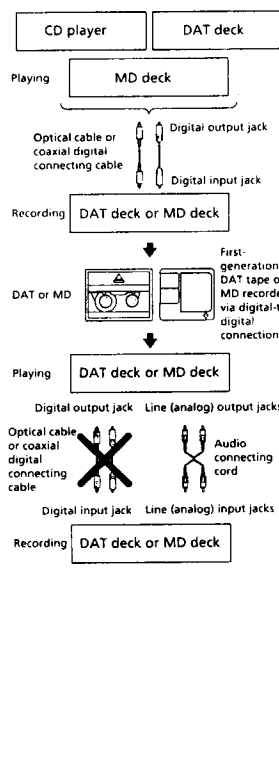
Notes on CD

- Do not use solvents such as benzene, thinner, commercially available cleaners, or anti-static spray intended for vinyl LPs.
- If there is a scratch, dirt or fingerprints on the CD, it may cause a tracking error.

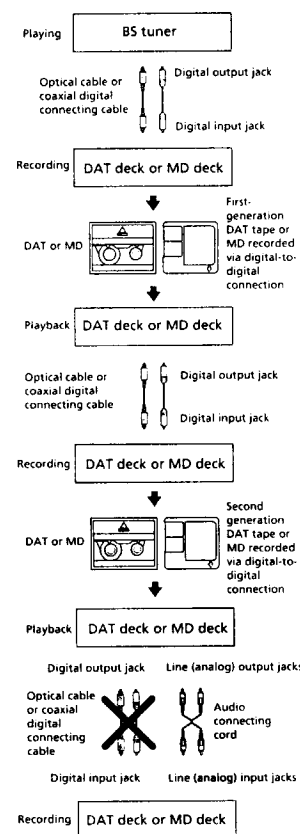
Guide to the Serial Copy Management System

This MD deck uses the Serial Copy Management System, which allows only first-generation digital copies to be made of premastered software via the deck's digital input jack. An outline of this system appears below:

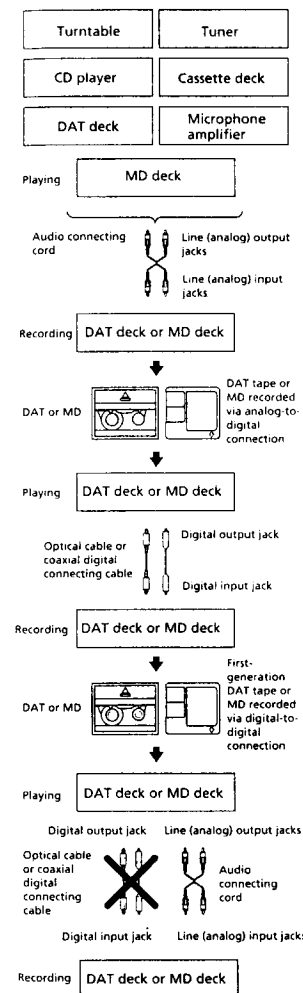
- 1** You can record from digital program sources (CDs, DATs or premastered MDs) onto a DAT tape or recordable MD via the digital input jack on the DAT or MD deck. You cannot, however, record from this recorded DAT tape or MD onto another DAT tape or recordable MD via the digital input jack on the DAT or MD deck.



- 2** You can record the digital input signal of a digital satellite broadcast onto a DAT tape or recordable MD via the digital input jack on the DAT or MD deck which is capable of handling a sampling frequency of 32 kHz or 48 kHz. You can then record the contents of this recorded DAT tape or MD (first-generation) onto another DAT tape or recordable MD via digital input jack on the DAT or MD deck to create a second-generation digital copy. Subsequent recording from the second-generation copy onto another recordable DAT tape or MD is possible only through the analog input jack on the DAT or MD deck. Note, however, that on some BS tuners, second-generation digital copying may not be possible.



- 3** You can record a DAT tape or MD recorded via the DAT or MD deck's analog input jack onto another DAT tape or MD via the DAT or MD deck's digital output jack. You cannot, however, make a second-generation DAT tape or MD copy via the DAT or MD deck's digital output jack.

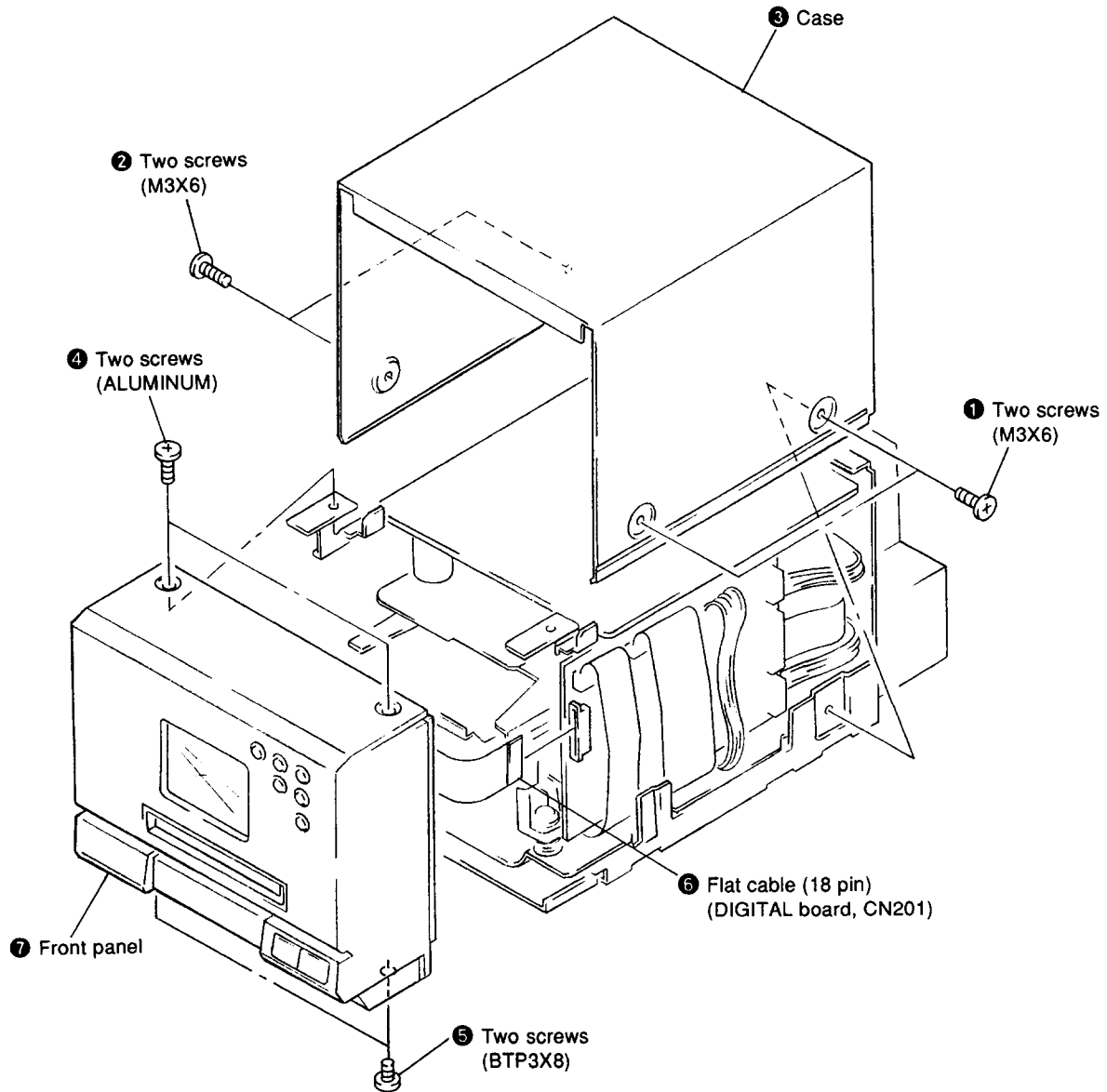


SECTION 2

DISASSEMBLY

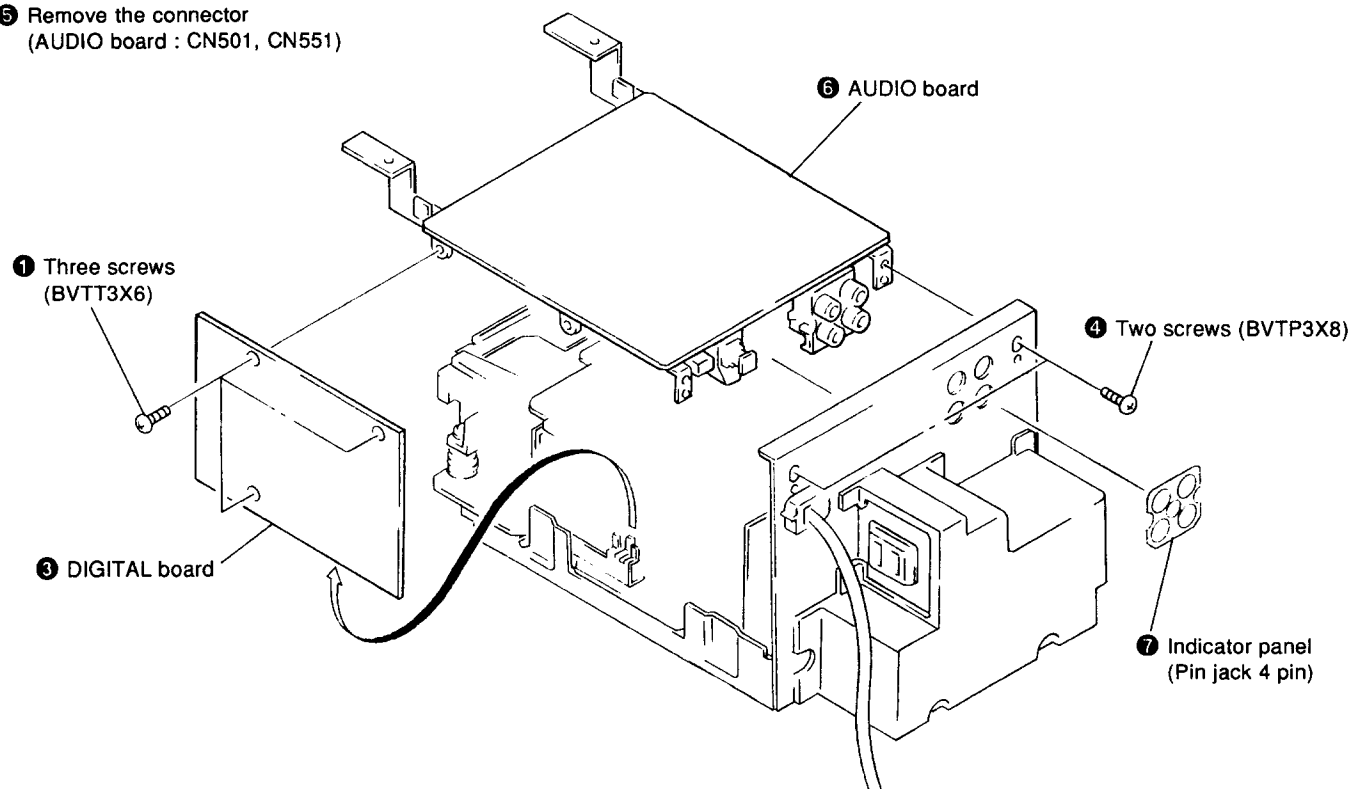
Note : Follow the disassembly procedure in the numerical order given.

3-1. CASE AND FRONT PANEL

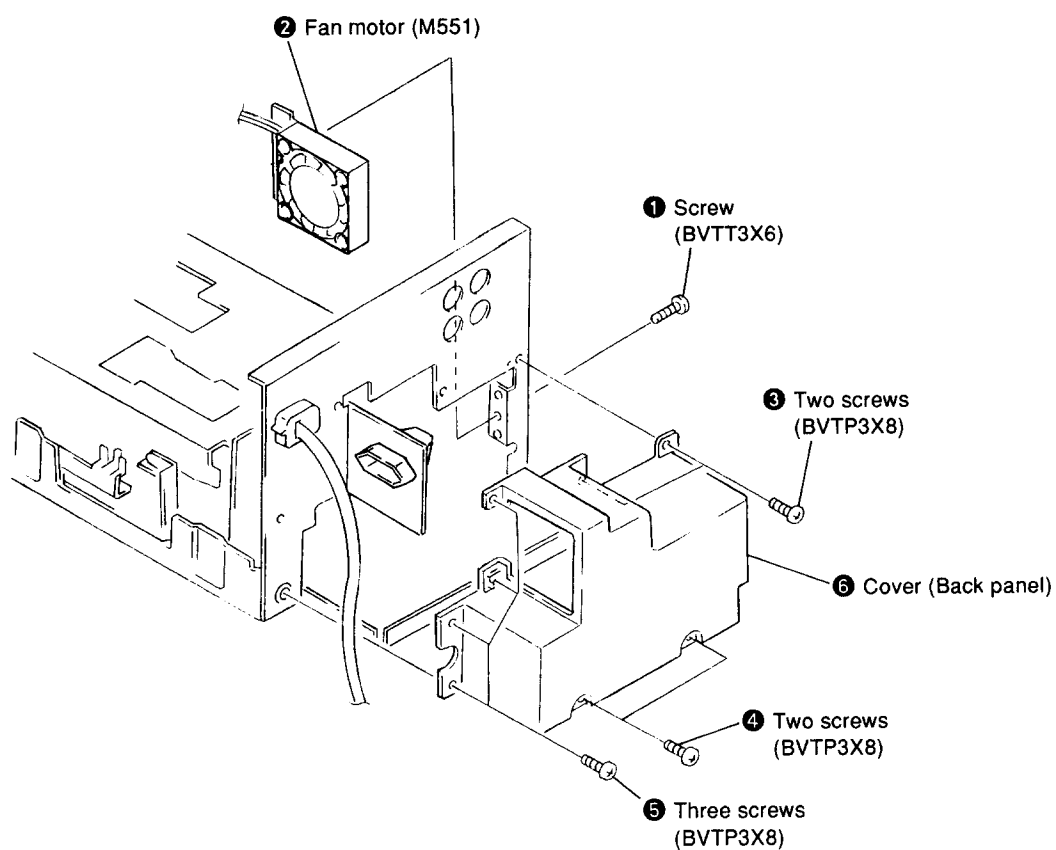


3-2. AUDIO BOARD AND DIGITAL BOARD

- ② Remove the connector
(DIGITAL board : CN202, CN221, CN222, CN223, CN251, CN281)
- ⑤ Remove the connector
(AUDIO board : CN501, CN551)

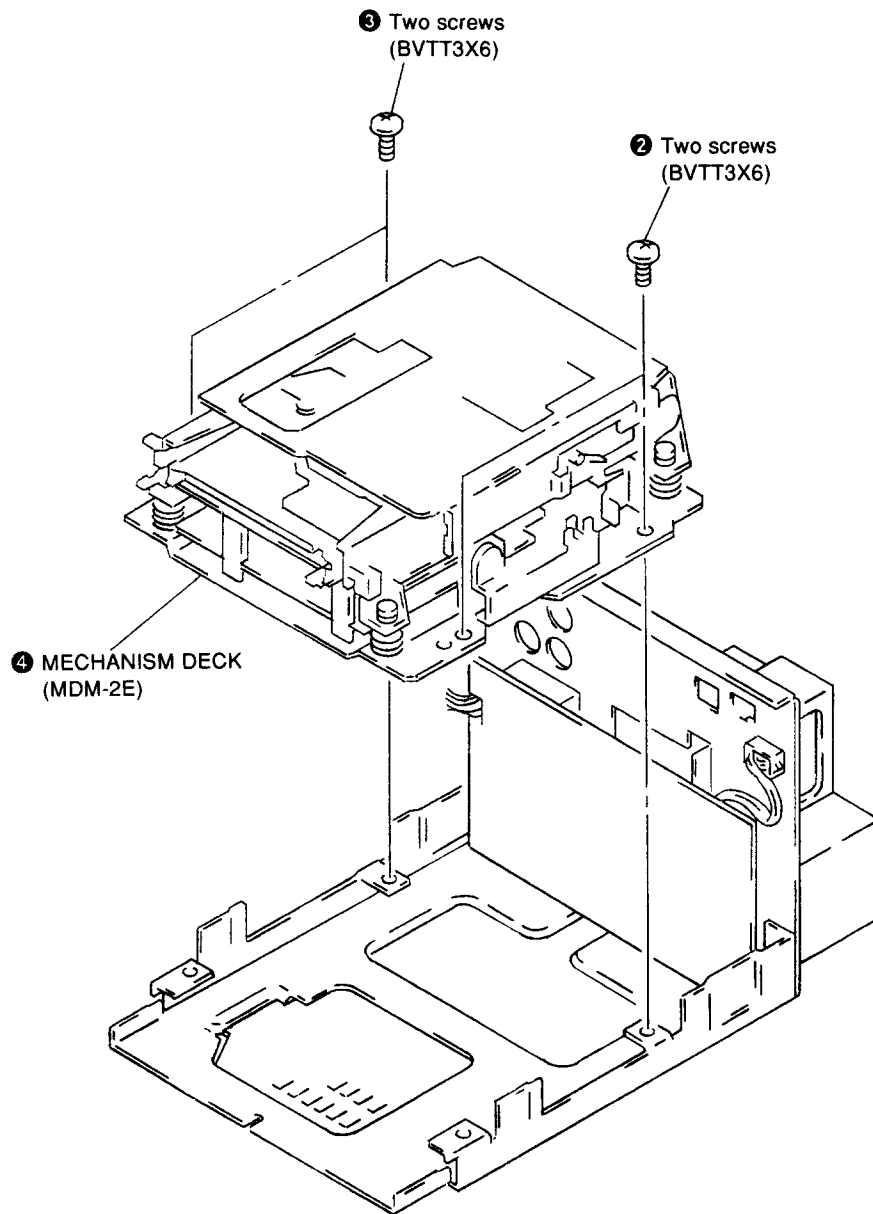


3-3. FAN MOTOR AND COVER (BACK PANEL)



3-4. MECHANISM DECK (MDM-2E)

- ❶ Remove the connector
(BD board : CN102, CN103)
(Motor board : CN19)



SECTION 4

TEST MODE

4-1. Setting the Test Mode

While pressing the STOP key, insert the power plug into the power supply inlet, and release the STOP key.

4-2. Exiting the Test Mode

Press the "REPEAT" button, and disconnect the power plug from the power supply inlet after five or six seconds.

4-3. Basic Operations of the Test Mode

All operations are performed using the AMS key, YES key, and NO key.

The functions of these keys are as follows.

Function	Contents
AMS key	Changes parameters and modes
YES key	Proceeds onto the next step. Finalizes input.
NO key	Returns to previous step. Stops operations.

4-4. Selecting the Test Mode

Eight test modes are selected by press the AMS key.

Display	Contents
TEMP ADJUST	Temperature compensation offset adjustment
LDPWR ADJUST	Laser power adjustment
EFBAL ADJUST	Traverse adjustment
FBIAS ADJUST	Focus bias adjustment
FBIAS CHECK	Focus bias check
CPLAY MODE	Continuous playback mode
CREC MODE	Continuous recording mode
EEP MODE	Non-volatile memory mode *

For detailed description of each adjustment mode, refer to 5. Electrical Adjustments.

If a different adjustment mode has been selected by mistake, press the NO key to exit from it.

* The EEP MODE is not used in servicing. If set accidentally, press the NO key immediately to exit it.

4-4-1. Operating the Continuous Playback Mode

1. Entering the continuous playback mode

- ① Set the disc in the unit (either MO or CD).
- ② Press the AMS key and display "CPLAY MODE".
- ③ Press the YES key to change the display to "CPLAYIN".
- ④ When access completes, the display changes to "C1 = 0000 AD = 00".

Note : The "00" displayed are arbitrary numbers.

2. Changing the parts to be played back

- ① Press the YES key during continuous playback to change the display to "CPLY MID", "CPLAY OUT".
When pressed another time, the parts to be played back can be changed.
- ② When access completes, the display changes to "C1 = 0000 AD = 00".

Note : The "00" displayed are arbitrary numbers.

3. Ending the continuous playback mode

- ① Press the NO key. The display will change to "CPLY MODE".
- ② Press the EJECT key and remove the disc.

Note 1 : The playback start addresses for IN, MID, and OUT are as follows.

IN 40h cluster
MID 300h cluster
OUT 700h cluster

4-4-2. Operating the Continuous Recording Mode

1. Entering the continuous recording mode

- ① Set the MO disc in the unit.
- ② Press the AMS key and display "CREC MODE".
- ③ Press the YES key to change the display to "CREC IN".
- ④ When access completes, the display changes to "CREC (0000)" and **REC** lights up.

Note : The "0000" displayed are arbitrary numbers.

2. Changing the parts to be recorded

- ① When the YES key is pressed during continuous recording, the display changes to "CREC MID", "CREC OUT" and **REC** goes off.

When pressed another time, the parts to be recorded can be changed.

- ② When access completes, the display changes to "CREC (0000)" and **REC** lights up.

Note : The "0000" displayed are arbitrary numbers.

3. Ending the continuous recording mode

- ① Press the NO key. The display changes to "CREC MODE" and **REC** goes off.
- ② Press the EJECT key and remove the disc.

Note 1 : The recording start addresses for IN, MID, and OUT are as follows.

IN 40h cluster

MID 300h cluster

OUT 700h cluster

Note 2 : The NO key can be used to stop recording anytime.

Note 3 : During the test mode, the erasing-protection tab will not be detected. Therefore be careful not to set the continuous recording mode when a disc not to be erased is set in the unit.

Note 4 : Do not perform continuous recording for long periods of time above 5 minutes.

Note 5 : During continuous recording, be careful not to apply vibration.

4-4-3. Non-Volatile Memory Mode

This mode reads and writes the contents of the non-volatile memory.

It is not used in servicing. If set accidentally, press the NO key immediately to exit it.

4-5. Functions of Other keys

Function	Contents
▶	Sets continuous playback when pressed in the STOP state. When pressed during continuous playback, the tracking servo turns ON/OFF.
■	Stops continuous playback and continuous recording.
▶▶	The sled moves to the outer circumference only when this is pressed.
◀◀	The sled moves to the inner circumference only when this is pressed.
●	Turns recording ON/OFF when pressed during continuous playback.
SCROLL	Switches between the pit and groove modes when pressed.
DISPLAY	Switches the display when pressed. Returns to previous step. Stops operations.

Note : The erasing-protection tab is not detected during the test mode. Recording will start regardless of the position of the erasing-protection tab when the ● (REC) key is pressed.

4-6. Test Mode Displays

Each time the DISPLAY key is pressed, the display changes in the following order.

MODE display→Error rate display→Address display

1. MODE display

Displays “TEMP ADJUST”, “CPLAY MODE”, etc.

2. Address display

Addresses are displayed as follows.

h = 0000 s = 0000 (MO pit and CD)

h = 0000 a = 0000 (MO groove)

h = : Header address

s = : SUBQ address

a = : ADIP address

* is displayed when the address cannot be read.

3. Error rate display

Error rates are displayed as follows.

C1 = 0000 AD = 0000

C1 = : Indicates C1 error

AD = : Indicates ADER

4-7. Meanings of Other Displays

Display	Contents		
	Light	Off	Blinking
▶	During continuous playback	STOP	
II	Tracking servo OFF	Tracking servo ON	
REC	Recording mode ON	Recording mode OFF	
PGM	CLV LOCK	CLV UNLOCK	
TRACK	Pit	Groove	
DISC	High reflection	Low reflection	
SHUFFLE	CLV-S	CLV-A	
LVL-SYNC	ABCD adjustment completed		
REPEAT 1	(Focus auto gain successful Tracking auto gain successful)		(Focus auto gain successful Tracking auto gain failed)

4-8. Precautions for Use of Test Mode

- ① As loading related operations will be performed regardless of the test mode operations being performed, be sure to check that the disc is stopped before setting and removing it.
Even if the EJECT key is pressed while the disc is rotating during continuous playback, continuous recording, etc., the disc will not stop rotating.
Therefore, it will be ejected while rotating.
Always press the NO key first before pressing the EJECT key.
- ② The erasing-protection tab is not detected in the test mode. Therefore, when modes which output the recording laser power such as continuous recording mode and traverse adjustment mode, etc. are set, the recorded contents will be erased regardless of the position of the tab. When using a disc that is not to be erased in the test mode, be careful not to enter the continuous recording mode and traverse adjustment mode.
- ③ Most keys can not be used while the error rate is displayed because of IC121 CXD2535AR bugs.

SECTION 5.

ELECTRICAL ADJUSTMENTS

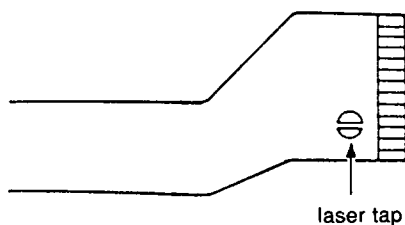
5-1. Precautions for Checking Laser Diode Emission

To check the emission of the laser diode during adjustments, never view directly from the top as this may lose your eyesight.

5-2. Precautions for Use of optical pickup (KMS-210A)

As the laser diode in the optical pickup is easily damaged by static electricity, solder the laser tap of the flexible board when using it.

Before disconnecting the connector, desolder first. Before connecting the connector, be careful not to remove the solder. Also take adequate measures to prevent damage by static electricity. Handle the flexible board with care as it breaks easily.



Optical pickup flexible board

5-3. Precautions for Adjustments

- When replacing the following parts, perform the adjustments and checks with ○ in the order shown in the following table.

	Optical Pickup	BD Board		
		IC171	D101	IC101, IC121, IC191
1. Temperature compensation offset adjustment	X	○	○	○
2. Laser power adjustment	○	X	X	○
3. Traverse adjustment	○	○	X	○
4. Focus bias adjustment	○	○	X	○
5. Error rate check	○	○	X	○

- Set the test mode when performing adjustments.
After completing the adjustments, exit the test mode.
- Perform the adjustments in the order shown.
- Use the following tools and measuring devices.
 - MD test disc (CD) TDYS-1 (Parts No. 5-965-646-01)
 - Laser power meter LPM-8001 (Parts No. J-2501-046-A)
 - Oscilloscope
 - Digital voltmeter
 - Thermometer
- When observing several signals on the oscilloscope, etc., make sure that VC and GND do not connect inside the oscilloscope.
(VC and GND will become short-circuited.)

5-4. Creating MO Continuously Recorded Disc

- * This disc is used in focus bias adjustment and error rate check. The following describes how to create a MO continuous recording disc.
- Insert a MO disc (blank disc) commercially available.
 - Press the AMS key and display "CREC MODE".
 - Press the YES key and display "CREC IN".
 - Press the YES key again to display "CREC MID".
"CREC (0300)" is displayed for a moment and recording starts.
 - Complete recording within 5 minutes.
 - Press the NO key and stop recording.
 - Press the EJECT key and remove the MO disc.

The above has been how to create a continuous recording data for the focus bias adjustment and error rate check.

Note :

- Be careful not to apply vibration during continuous recording.

5-5. Temperature Compensation Offset Adjustment

Save the temperature data at that time in the non-volatile memory as 25 °C reference data.

Note :

1. Usually, do not perform this adjustment.
2. Perform this adjustment in an ambient temperature of 22 °C to 28 °C. Perform it immediately after the power is turned on when the internal temperature of the unit is the same as the ambient temperature.
3. When D101 has been replaced, perform this adjustment after the temperature of this part has become the ambient temperature.

Adjusting Method :

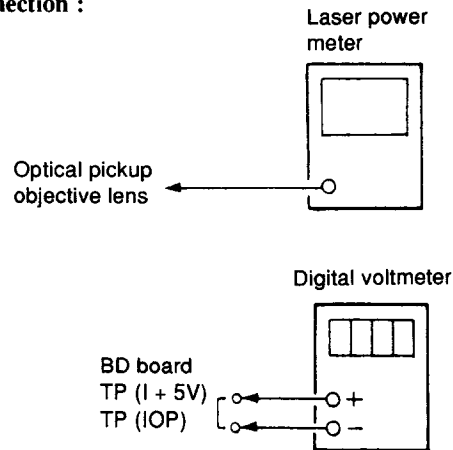
1. Press the AMS key and display "TEMP ADJUST".
2. Press the YES key and select the "TEMP ADJUST" mode.
3. "TEMP = $\square\square\square$ " and the current temperature data will be displayed.
4. To save the data, press the YES key.
When not saving the data, press the NO key.
5. When the YES key is pressed, "TEMP = $\square\square\square$ SAVE" will be displayed for some time, followed by "TEMP ADJUST".
When the NO key is pressed, "TEMP ADJUST" will be displayed.

Specifications :

The "TEMP = $\square\square\square$ " should be within E0 - EF", "F0 - FF", "00 - 0F", "10 - 1F" and "20 - 2F".

5-6. Laser Power Adjustment

Connection :



Adjusting Method :

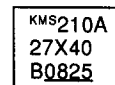
1. Set the laser power meter on the objective lens of the optical pickup. (When it cannot be set properly, press the ◀◀ key or ▶▶ key and move the optical pickup.)
Connect the digital voltmeter to TP (IOP) and TP (I+5V).
2. Press the AMS key and display "LDPWRADJUST".
(Laser power : For adjustment)
3. Press the YES key twice and display "LD \$ 4B = 3.5 mW".
4. Adjust RV102 of the BD board so that the reading of the laser power meter becomes $3.4^{+0.1}_{-0}$ mW.
5. Press the YES key and display "LD \$ 96 = 7.0 mW".
(Laser power:MO reading)
6. Check that the laser power meter and digital voltmeter readings satisfy the specified value.

Specification :

Laser power meter reading : 7.0 ± 0.3 mW

Digital voltmeter reading : Optical pickup displayed value $\pm 10\%$

(Optical pickup label)



I

lop = 82.5 mA in this case

lop (mA) = Digital voltmeter reading (mV) / 1 (Ω)

7. Press the YES key and display "LD \$ 0F = 0.7 mW".
(Laser power:MO reading)
8. Check that the laser power meter at this time satisfies the specified value.

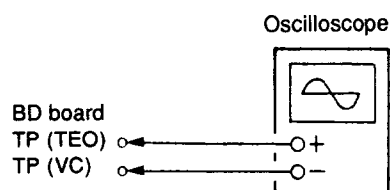
Specification :

Laser power meter reading : 0.70 ± 0.1 mW

9. Press the NO key and display "LDPWR ADJUST", and stop laser emission.
(The NO key is effective at all times to stop the laser emission.)

5-7. Traverse Adjustment

Connection :



Adjusting method :

1. Connect an oscilloscope to TP (TEO) and TP (VC) of the BD board.
2. Load a MO disc (any available on the market).
3. Press the ◀◀ key or ▶▶ key and move the optical pickup outside the pit.
4. Press the AMS key and display "EFBAL ADJUST".
5. Press the YES key and display "EFBAL MO-W".
(Laser power WRITE power/Focus servo ON/tracking servo OFF/spindle (S) servo ON)
6. Adjust RV101 of the BD board so that the waveform of the oscilloscope becomes the specified value.
(MO groove write power traverse adjustment)

(Traverse Waveform)



Specification A = B

7. Press the YES key and display "EFB = \$ ◻ MO-R".
(Laser power : MO reading)
8. Press the AMS key so that the waveform of the oscilloscope becomes the specified value.
(When the AMS key is pressed, the ◻ of "EFB- ◻" changes and the waveform changes.) In this adjustment, waveform varies at intervals of approx. 3%. Adjust the waveform so that the specified value is satisfied as much as possible.
(MO groove read power traverse adjustment)

(Traverse Waveform)



Specification A=B

9. Press the YES key, display "EFB = \$ ◻ SAVE" for a moment and save the adjustment results in the non-volatile memory.
Next "EFBAL MO-P" is displayed.
10. Press the YES key and display "EFB = \$ ◻ MO-P".
The optical pickup moves to the pit area automatically and servo is imposed.

11. Press the AMS key until the waveform of the oscilloscope moves closer to the specified value.
In this adjustment, waveform varies at intervals of approx. 3%. Adjust the waveform so that the specified value is satisfied as much as possible.

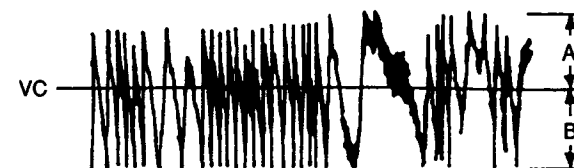
(Traverse Waveform)



Specification A=B

12. Press the YES key, display "EFB = ◻ SAVE" for a moment and save the adjustment results in the non-volatile memory.
Next "EFBAL CD" is displayed. The disc stops rotating automatically.
13. Press the EJECT key and remove the MO disc.
14. Load the test disc TDYS-1.
15. Press the YES key and display "EFB = ◻ CD". Servo is imposed automatically.
16. Press the AMS key so that the waveform of the oscilloscope moves closer to the specified value.
In this adjustment, waveform varies at intervals of approx. 3%. Adjust the waveform so that the specified value is satisfied as much as possible.

(Traverse Waveform)

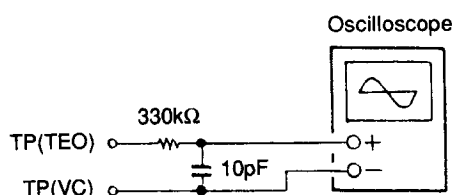


Specification A=B

17. Press the YES key, display "EFB = \$ ◻ SAVE" for a moment and save the adjustment results in the non-volatile memory.
Next "EFBAL ADJUST" is displayed.
18. Press the EJECT key and remove the test disc TDYS-1.

Note 1) Data will be erased during MO reading if a recorded disc is used in this adjustment.

Note 2) If the traverse waveform is not clear, connect the oscilloscope as shown in the following figure so that it can be seen more clearly.



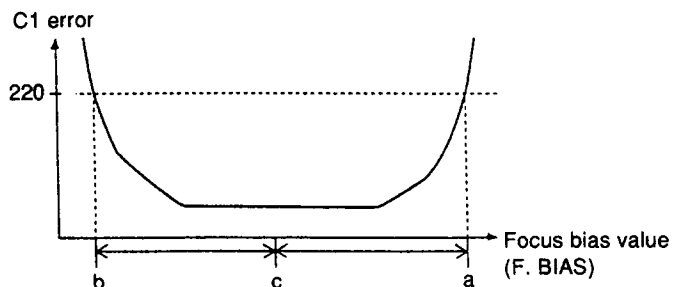
5-8. Focus Bias Adjustment

Adjusting Method :

1. Load a continuously recorded disc (Refer to “5-4. Creating MO Continuously Recorded Disc”).
2. Press the AMS key and display “CPLAY MODE”.
3. Press the YES key twice and display “CPLAY MID”.
4. Press the NO key when “C1 = 0000 AD = 00” is displayed.
5. Press the AMS key and display “FBIAS ADJUST”.
6. Press the YES key and display “0000/00 a = 00”.
The first four digits indicate the C1 error rate, the two digits after [/] indicate ADER, and the 2 digits after [a =] indicate the focus bias value.
7. Press the AMS key [▶▶] key in the clockwise direction and find the focus bias value at which the C1 error rate becomes 220.
8. Press the YES key and display “0000/00 b = 00”.
9. Press the AMS key [◀◀] in the counterclockwise direction and find the focus bias value at which the C1 error rate becomes 220.
10. Press the YES key and display “0000/00 c = 00”.
11. Check that the C1 error rate is below 50 and ADER is 00. Then press the YES key.
12. If the “(00)” in “00 - 00 - 00 (00)” is above 20, press the YES key.
If below 20, press the NO key and repeat the adjustment from step 2 again.
13. Press the NO key and press the EJECT key to remove the continuously recorded disc.

Note 1 : The relation between the C1 error and focus bias is as shown in the following figure. Find points a and b in the following figure using the above adjustment. The focal point position C is automatically calculated from points a and b.

Note 2 : As the C1 error rate changes, perform the adjustment using the average value.



5-9. Error Rate Check

5-9-1. CD Error Rate Check

Checking Method :

1. Load a test disc (CD) TDYS-1.
2. Press the AMS key and display “CPLAY MODE”.
3. Press the YES key twice and display “CPLAY MID”.
4. “C1 = 0000 AD = 00” is displayed.
5. Check that the C1 error rate is below 20.
6. Press the NO key, stop playback, press the EJECT key, and remove the test disc.

5-9-2. MO Error Rate Check

Checking Method :

1. Load a continuously recorded disc (Refer to “5-4. Creating MO Continuously Recorded Disc”).
2. Press the AMS key and display “CPLAY MODE”.
3. Press the YES key twice and display “CPLAY MID”.
4. “C1 = 0000 AD = 00” is displayed.
5. If the C1 error rate is below 50, check that ADER is 00.
6. Press the NO key, stop playback, press the EJECT key, and remove the continuously recorded disc.

5-10. Focus Bias Check

Change the focus bias and check the focus tolerance amount.

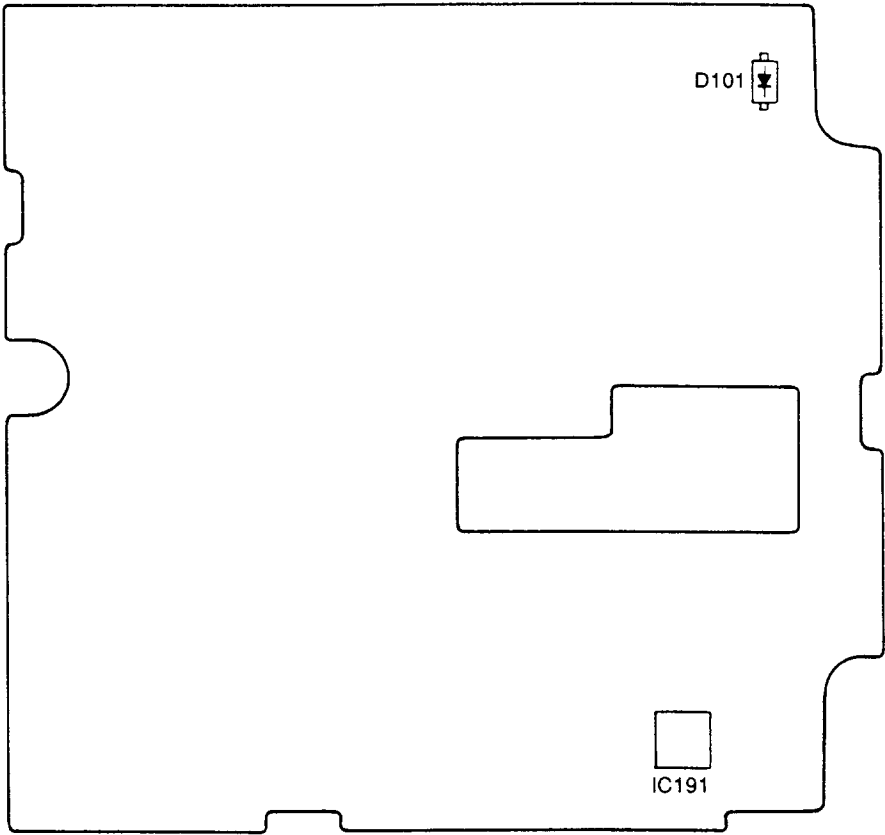
Checking Method :

1. Load a continuously recorded disc (Refer to “5-4. Creating MO Continuously Recorded Disc”).
2. Press the AMS key and display “CPLAY MODE”.
3. Press the YES key twice and display “CPLAY MID”.
4. Press the NO key when “C1 = 0000 AD = 00” is displayed.
5. Press the AMS key and display “FBIAS CHECK”.
6. Press the YES key and display “0000/00 c = 00”.
The first four digits indicate the C1 error rate, the two digits after [/] indicate ADER, and the 2 digits after [c =] indicate the focus bias value.
Check that the C1 error is below 50 and ADER is 00.
7. Press the YES key and display “0000/00 b = 00”.
Check that the C1 error is not below 220 and ADER is not above 00 every time.
8. Press the YES key and display “0000/00 a = 00”.
Check that the C1 error is not below 220 and ADER is not above 00 every time.
9. Press the NO key, next press the EJECT key, and remove the continuously recorded disc.

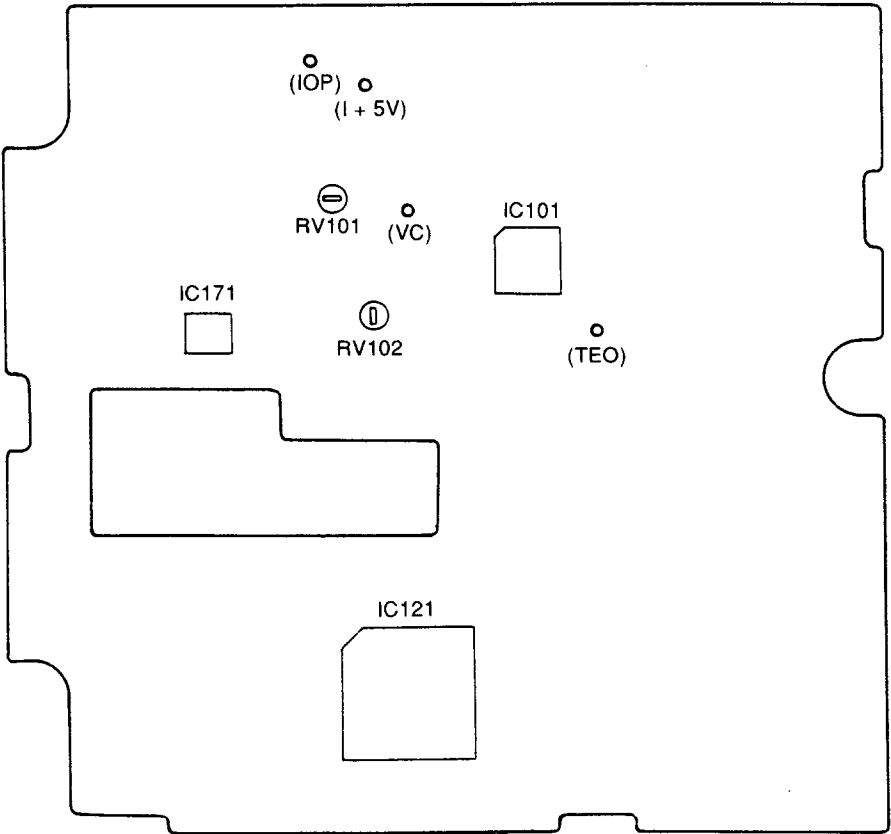
Note 1 : If the C1 error and ADER are above 00 at points a or b, the focus bias adjustment may not have been carried out properly. Adjust perform the beginning again.

5-11. Adjusting Points and Connecting Points

[BD BOARD] (COMPONENT SIDE)



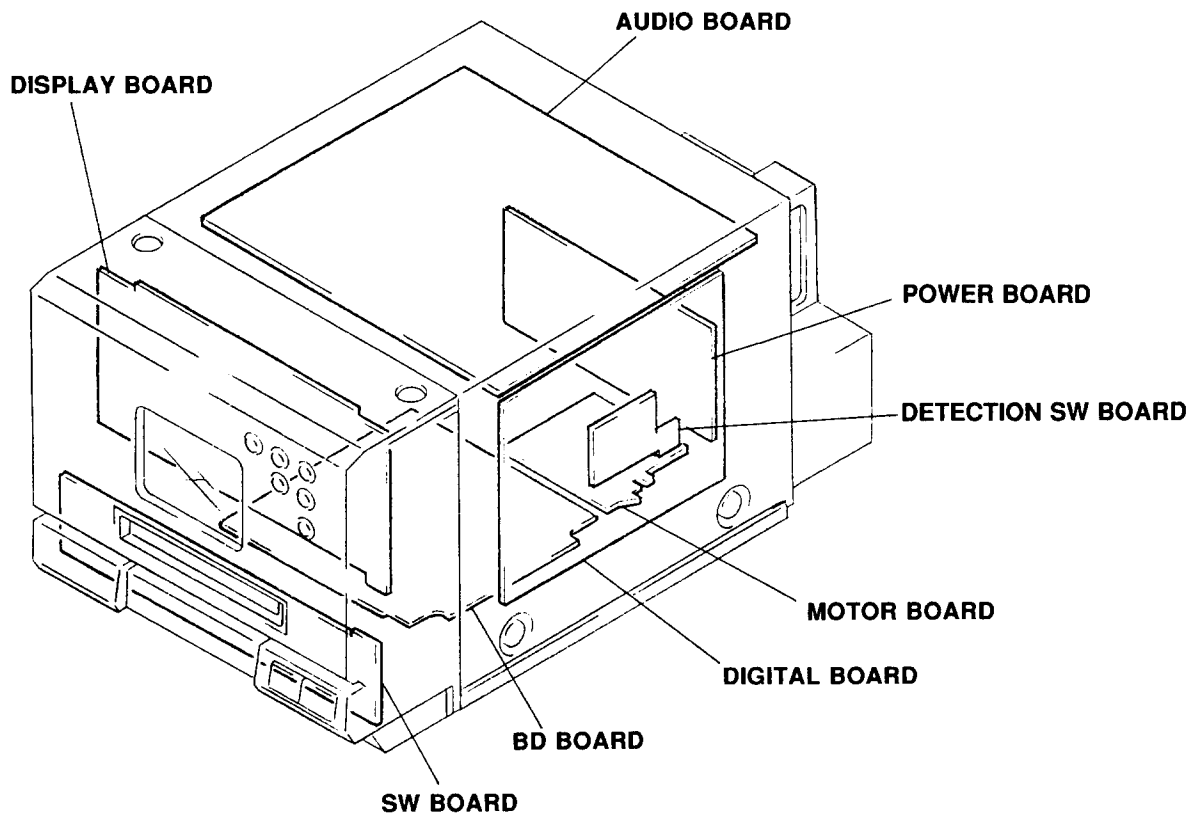
[BD BOARD] (CONDUCTOR SIDE)



SECTION 6

DIAGRAMS

6-1. CIRCUIT BOARDS LOCATION



6-11. IC PIN FUNCTIONS

• IC101 RF Amplifier (CXA1981AR)

Pin No.	Pin Name	I/O	Function
1	VC	O	Middle point voltage (2.5V) generation output pin
2 to 7	A to F	I	Input of signal from optical block detector
8	FI	I	F operation amplifier input
9	FO	O	F operation amplifier output
10	PD	I	Front monitor. Connected to photo diode
11	APCREP	I	Input pin for setting laser power
12	TEMPI	I	Temperature sensor connection pin
13	GND	—	Ground pin
14	AAPC	O	APC LD amplifier output pin
15	DAPC	O	Not used (Opened)
16	TEMPR	O	Temperature sensor reference voltage output pin
17	XRST	I	Input of reset signal from system controller (IC201). Reset: "L"
18	SWDT	I	Input of write data signal from system controller (IC201)
19	SCLK	I	Input of clock signal from system controller (IC201)
20	XLAT	I	Input of latch signal from system controller (IC201)
21	VREF	O	Reference voltage output. Not used in this unit (Opened)
22	TENV	O	Not used (Opened)
23	THLD	I	Not used (Connected to VC)
24	VCC	—	Power supply pin (+5V)
25	TFIL	I	Not used (Connected to VC)
26	TE	O	Output of tracking error signal to CXD2535BR (IC121)
27	TLB	I	Input pin of add signal to tracking error
28	CSLED	I	Sled error LPF pin
29	SE	O	Output of sled error signal to CXD2535BR (IC121)
30	ADFM	O	ADIP FM signal output
31	ADIN	I	Inputs ADIP FM signal by AC coupling
32	ADAGC	I	Connection pin of external capacitor for ADIP AGC
33	ADFG	O	Output of ADIP dual FM signal to CXD2535BR (IC121) (22.05 kHz \pm 1 kHz)
34	AUX	O	Output of auxiliary signal to CXD2535BR (IC121)
35	FE	O	Output of focus error signal to CXD2535BR (IC121)
36	FLB	I	Not used (Opened)
37	ABCD	O	Output of light amount signal to CXD2535BR (IC121)
38	BOTM	O	Output of bottom hold signal of light amount signal to CXD2535BR (IC121)
39	PEAK	O	Output of peak hold signal of light amount signal to CXD2535BR (IC121)
40	RFAGC	I	Connection pin of RF AGC circuit external capacitor
41	RF	O	Output of playback EFM RF signal to CXD2535BR (IC121)
42	ISCT	I	Internal circuit constant setting pin. 22 kHz BPF center frequency
43	AGCT	I	Inputs RF signal by AC coupling
44	RFO	O	Output pin of RF signal
45	MORFI	I	Inputs MO RF signal by AC coupling
46	MORFO	O	Output pin of MO RF signal
47, 48	I, J	I	Input of signal from optical block detector

• IC121 Digital signal processor, digital servo processor, EFM/ACIRC encoder/decoder (CXD2535BR)

Pin No.	Pin Name	I/O	Function
1	FS256	O	11.2896 MHz clock output (MCLK). Not used in this unit (Opened)
2	FOK	O	Output of FOK signal to system controller (IC201) Outputs "H" when focus is set
3	DFCT	O	Outputs defect ON/OFF switching signal to CXD2536R (IC221)
4	SHCK	O	Outputs track jump detection signal to system controller (IC201)
5	SHCKEN	I	Track jump detection enable input. Not used in this unit. (Fixed at "H" in this unit.)
6	WRPWR	I	Inputs laser power switching signal from system controller (IC201)
7	DIRC	I	Not used in this unit. (Fixed at "H" in this unit)
8	SWDT	I	Inputs write data signal from system controller (IC201)
9	SCLK	I	Inputs serial clock signal from system controller (IC201)
10	XLAT	I	Inputs serial latch signal from system controller (IC201)
11	SRDT	O	Outputs write data signal to system controller (IC201)
12	SENS	O (3)	Outputs internal status (SENSE) to system controller (IC201)
13	ADSY	O	ADIP sync signal output. Not used in this unit (Opened)
14	SQSY	O	Output subcode Q sync (SCOR) to system controller (IC201) Outputs "L" every 13.3 msec. Outputs "H" at all most mostly
15	DQSY	O	Outputs digital-in U-bit CD format subcode Q sync (SCOR) to system controller (IC201). Outputs "L" every 13.3 msec Outputs "H" at all most mostly
16	XRST	I	Inputs reset signal from system controller (IC201). Reset: "L"
17	TEST4	I	Test input (Fixed at "L")
18	CLVSCK	O	Not used in this unit (Opened)
19	TEST5	I	Test input (Fixed at "L")
20	DOUT	O	Digital audio signal output pin (For optical output) Not used in this unit
21	DIN	I	Digital audio signal input pin (For optical input)
22	FMCK	O	ADIP FM demodulation clock signal output
23	ADER	O	ADIP CRC flag output. "H":Error
24	REC	I	Input of recording/playback switching signal from system controller (IC201) Recording: "H". Playback: "L"
25	DVSS	—	Ground pin (Digital)
26	DOVF	I	Digital audio output validity flag input pin. Fixed at "L" in this unit
27	DODT	I	Input pin of 16bit data for digital audio output from CXD2536R (IC221)
28	DIDT	O	Output pin of 16bit data for digital audio input to CXD2536R (IC221)
29	DTI	I	Input pin of recording audio data signal from CXD2536R (IC221)
30	DTO	O (3)	Output pin of playback audio data signal to CXD2536R (IC221)
31	C2PO	O	Outputs C2PO signal to CXD2536R (IC221). (Output indicating data error status) Playback: C2PO ("H"). Digital recording: D.In-Vflag. Analog recording: "L"
32	BCK	O	Outputs bit clock signal (2.8224 MHz) to CXD2536R (IC221) (MCLK)
33	LRCK	O	Outputs L/R clock signal (44.1 kHz) to CXD2536R (IC221) (MCLK)
34	XTAO	O	System clock (512 Fs=22.5792 MHz) signal output. Not used in this unit (Opened)
35	XTAI	I	Input of system clock (512Fs=22.5792 MHz) signal input from CXD2536R (IC221)
36	MCLK	O	MCLK clock (22.5792 MHz) signal output
37	XBCK	O	Pin 32 (BCK) inversion output
38	DVDD	—	Power supply pin (+5V) (Digital)
39	WDCK	O	WDCK clock (88.2 kHz) signal output (MCLK)
40	RFCK	O	RFCK clock (7.35 kHz) signal output (MCLK)

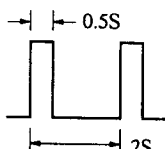
Pin No.	Pin Name	I/O	Function
41	WFCK	O	WFCK clock (7.35 kHz) signal output (Playback: EFM decoder PLL. Recording: EFM encoder PLL)
42	GTOP	O	"H": Opens playback EFM frame sync protection window
43	GFS	O	"H": Playback EFM sync and interpolation protection timing match
44	XPLCK	O	EFM decoder PLL clock output (98 Fs=4.3218 MHz) Falling edge and EFM signal edge match
45	EFMO	O	EFM signal output (Recording)
46	RAOF	O	Internal RAM overflow detection signal output (decoder monitor output) Outputs "H" when the disc rotation exceeds $\pm 4F$ jitter margin during playback
47	MVCI	I	Digital-in PLL oscillation input. Not used in this unit (Fixed at "L" in this unit)
48	TEST2	I	Test pin (Fixed at "L" in this unit)
49	DIPD	O (3)	Digital-in PLL phase comparison output Internal VCO: (Frequency: Low \rightarrow "H"). External VCO: (Frequency: Low \rightarrow "L")
50	DVSS	—	Ground pin (Digital)
51	DICV	I (A)	Digital-in PLL internal VCO control voltage input
52	DIFI	I (A)	Filter input when digital-in PLL internal VCO is used
53	DIFO	O (A)	Filter output when digital-in PLL internal VCO is used
54	AVDD	—	Power supply pin (+5V) (Analog)
55	ASYO	O	Playback EFM full-swing output (L=VSS, H=VDD)
56	ASYI	I (A)	Playback EFM asymmetry compare voltage input
57	BIAS	I (A)	Playback EFM asymmetry circuit constant current input
58	RFI	I (A)	Inputs playback EFM RF signal from CXA1981AR (IC101)
59	AVSS	—	Ground pin (Analog)
60	CLTV	I (A)	Decoder PLL master clock PLL VCO control voltage input
61	PCO	O (3)	Decoder PLL master clock PLL phase comparison output
62	FILI	I (A)	Decoder PLL master clock PLL filter input
63	FILO	O (3)	Decoder PLL master clock PLL filter output
64	PEAK	I (A)	Inputs peak hold signal for light amount signal from CXA1981AR (IC101)
65	BOTM	I (A)	Inputs bottom hold signal for light amount signal from CXA1981AR (IC101)
66	ABCD	I (A)	Light amount signal from CXA1981AR (IC101)
67	FE	I (A)	Input of focus error signal from CXA1981AR (IC101)
68	AUX1	I (A)	Input of auxiliary signal from CXA1981AR (IC101)
69	VC	I (A)	Input of middle point voltage (+2.5V) from CXA1981AR (IC101)
70	ADIO	O (A)	A/D converter input signal monitor output
71	TEST3	I (A)	Test input (Fixed at "L")
72	AVDD	—	Power supply pin (+5V) (Analog)
73	ADRT	I (A)	A/D converter operation range upper limit voltage input (Fixed at "H" in this unit.)
74	ADRB	I (A)	A/D converter operation range lower limit voltage input (Fixed at "L" in this unit.)
75	AVSS	—	Ground pin (Analog)
76	SE	I (A)	Input of sled error signal from CXA1981AR (IC101)
77	TE	I (A)	Input of tracking error signal from CXD1981AR (IC101)
78	AUX2	I (A)	Auxiliary input pin 2. Not used in this unit. (Fixed at "L")
79	DCHG	I (A)	Connected to GND
80	APC	I (A)	Laser APC input. Not used in this unit (Fixed at "L" in this unit)

Pin No.	Pin Name	I/O	Function
81	TEST1	I	Test pin (Fixed at "L" in this unit)
82	ADFG	I	Input of ADIP dual FM signal from CXA1981AR (IC101) (22.05 kHz \pm 1 kHz) (TTL Schmidt input)
83	TS25	I	Test pin (Fixed at "L" in this unit)
84	LDDR	O	Laser APC signal output
85	TRDR	O	Tracking servo drive signal output (-)
86	TFDR	O	Tracking servo drive signal output (+)
87	FFDR	O	Focus servo drive signal output (+)
88	DVDD	-	Power supply pin (+5V) (Digital)
89	FRDR	O	Focus servo drive signal output (-)
90	FS4	O	176.4 kHz clock signal output (MCLK)
91	SRDR	O	Sled servo drive signal output (-)
92	SFDR	O	Sled servo drive signal output (+)
93	SPRD	O	Spindle servo drive signal output (-)
94	SPFD	O	Spindle servo drive signal output (+)
95	DCLO	O	Not used normally (Opened in this unit)
96	DCLI	I	Not used normally (Fixed at "H" in this unit)
97	XDCL	O	Not used normally (Opened in this unit)
98	OFTRK	O	Off track signal output
99	COUT	O	Traverse count signal output
100	DVSS	-	Ground pin (Digital)

* (3) of I/O is 3-state output, (A) is analog output.

• IC201 System Control (M37610MD)

Pin No.	Pin Name	I/O	Function
1	C. SET1	I	} Fixed at "L" in this unit.
2	C. SET2	I	
3	KEY3	I	
4 to 6	KEY 2 to KEY 0	I	Key input (A/D input)*1
7	—	O	Fixed at "L" in this unit.
8	XINT	I	Interrupt status input from CXD2536R (IC221)
9	SENS	I	Internal status (SENSE) input from CXD2536R (IC121)
10	SHCK	I	Track jump signal input from CXD2536R (IC121)
11	AUBK	I	AUDIO BUS signal input.
12	\bar{S}/A	O	Not used in this unit (opened).
13	BEEP SW	I	Not used in this unit.
14	FAN CONT	O	FAN motor control signal output.
15	BEEP	O	Buzzer signal output. Not used in this unit.
16	F. BIAS/C2	I	Fixed at "L" in this unit.
17	GND (CNVSS)	—	GND
18	SYSTEM RST	I	System reset signal input "L" is input for several hundreds msec after the power supply activation, then it is changed to "H".
19	XIN T	I	} Not used in this unit. (Fixed at "L" in this unit.)
20	XOUT T	O	
21	GND	—	GND
22	XIN	I	Clock input (8MHz)
23	XOUT	O	Clock output (8MHz)
24	+5V	—	Power supply (+5V)
25	STB	O	Strobe signal output to the power supply circuit. ON: "H", standby: "L".
26, 27	MIC SW	I	Fixed at "L" in this unit.
28	BUS OUT	O	Audio bus signal output
29	—	O	} Fixed at "L" in this unit.
30	—	O	
31	REC	O	REC LED (D751) drive signal output
32	CD SYNC	O	CD SYNC LED (D752) drive signal output.
33	C1	I	} Fixed at "L" in this unit.
34	ADER	I	
35	NC	I	
36	MASTER/SLAVE	I	Master/slave switching input (Fixed at "H" in this unit.)
37, 38	JOG 1, JOG 0	I	Fixed at "L" in this unit.
39	SDA	I/O	Data signal input/output with the backup memory (IC171)
40	SCL	O	Clock signal output to the backup memory (IC171)
41	POWER DOWN	I	Power down detection input. Normally, "H" is input.
42	REMOCON	I	Remote control signal input
43	ATSY	I	ATP address sync or subcode Q sync (SCOR) input from CXD2535BR (IC121). "L" is input every 13.3 msec. Normally "H".
44	DQSY	I	Digital-in U-bit CD format subcode Q sync (SCOR) input from CXD2535BR (IC121). "L" is input every 13.3 msec. Normally "H".
45	—	O	Fixed at "L" in this unit.

Pin No.	Pin Name	I/O	Function
46	—	O	Fixed at "L" in this unit.
47	—	O	
48	—	I	
49	SCLK	O	Clock signal output to the serial bus
50	SWDT	O	Write data signal output to the serial bus
51	SRDT	I	Read data signal input from the serial bus
52	—	I	Connected to Pin 51.
53	FLCLK	O	Serial clock signal output to the display driver (IC701)
54	FLDATA	O	Serial data signal output to the display driver (IC701)
55	FLCS	O	Chip select signal output to the display driver (IC701)
56	—	I	Fixed at "L" in this unit.
57	TEST 0	I	
58	TEST 1	O	Reset signal output to CXD2536R (IC221)
59	—	I	Fixed at "L" in this unit.
60	—	I	
61	AFAST	I	
62	SLOW	I	
63	LDON	O	Laser ON/OFF control output. "H": Laser ON.
64	P/GROOVE	I	Pit/groove detection input. "H" is input for the playback-only disc or TOC area. Not used in this unit. (Fixed at "L" in this unit.)
65	FOK	I	FOK signal input from CXD2535BR (IC121) "H" is input when focusing.
66	MON	I	Not used in this unit. (Pull down when input.)
67	LOCK	O	Not used in this unit. (Pull down when output.)
68	WRPWR	O	Laser power switching signal output to the optical block and CXD2535BR (IC121)
69	DIG RST	O	Reset signal output to CXD1981AR (IC101) and CXD2535BR (IC121) and motor driver (IC151). Reset: "L".
70	DA RST	O	Reset signal output to the D/A converter (IC281), A/D converter (IC261). Reset: "L".
71, 72	SCMD 1, SCMD 0	O	Serial command control mode output to CXD2536R (IC221)
73	MOD	O	<p>Laser modulation switching signal output Playback power: "L", stop: "H". Recording power: </p>
74	REC/PB	O	Record/playback switching signal output to CXD2535BR (IC121). Recording: "H", playback: "L".
75	WR/MN	O	Write/monitor mode switching signal output to CXD2536R (IC221)
76	SCTX	O	Write data transfer timing output to CXD2536R (IC221) Also serves as ON/OFF output of the magnetic head.
77	XLATCH	O	Latch signal output to the serial bus
78	DF LATCH	O	Latch signal output to the D/A converter (IC281).
79	DF MUTE	O	Fixed at "L" in this unit.
80	AMUTE	O	Line out muting output

Pin No.	Pin Name	I/O	Function
81	LDOUT	O	Loading motor (M191) control output*2
82	LDIN	O	
83	CHKIN	I	Detection input from the chucking-in switch (S193). When chucking: "L".
84	INSW	I	Detection input from the loading-in switch (S191). When the magnetic head is lowered: "L", others: "H".
85	OUTSW	I	Detection input from the loading-out switch (S192). When loaded out: "L", others: "H".
86	PROTECT	I	Recording-protect claw detection from the protect detection switch (S102-1). When protected: "H".
87	REFLECT	I	Disc reflection rate detection from the reflect detection switch (S102-2). Disc with lower reflection rate: "H".
88	LIMIT IN	I	Detection from the limit-in switch (S101). Sled limit-in: "L".
89 to 92	C232C4 to C232C1	I/O	Fixed at "L" in this unit.
93 to 96	—	O	
97	AVSS (AGND)	—	GND (Analog)
98	VREF (+5V)	I	Reference voltage input (+5V)
99	TIMER REC/PLAY	I	Not used in this unit.
100	SORCE	I	Fixed at "H" in this unit.

*1 Key input

Voltage Pin	0V	0.9V	1.75V	2.5V	3.4V	4.2V	5V
KEY 0, 6 pin	S756 YES	S757 EDIT/NO					No key input
KEY 1, 5 pin	S755 ◀◀	S754 ▶▶	S753 SCROLL	S752 ● REC	S751 CD SYNC		No key input
KEY 2, 4 pin	S701 DISPLAY	S702 ▶▶	S703 ◀◀	S704 ▲	S705 ■	S706 ▶	No key input

*2 Loading motor control

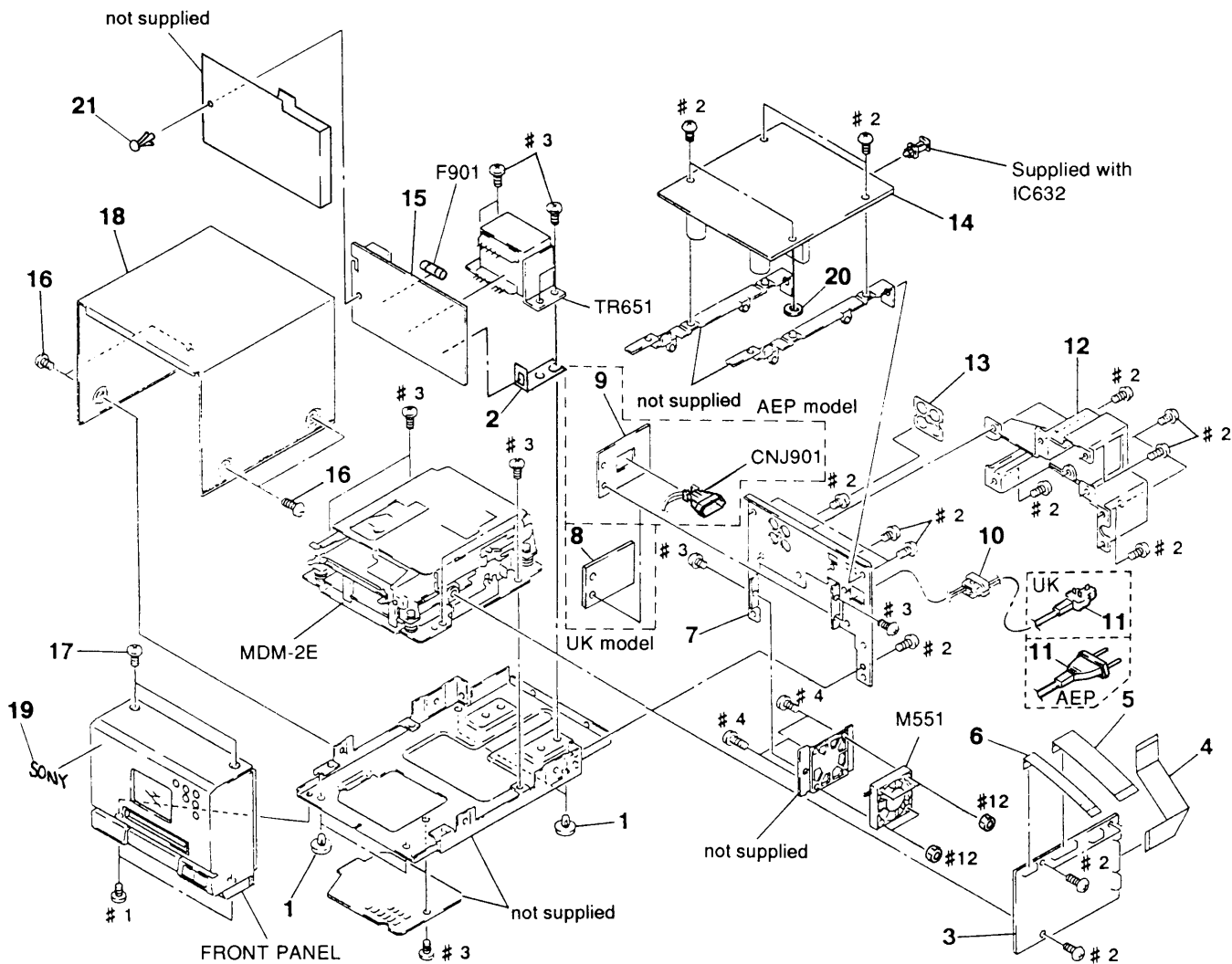
Operation Pin	IN	OUT	BRAKE
LDIN 82 pin	"H"	"L"	"H"
LDOUT 81 pin	"L"	"H"	"H"

• **IC221 Shock-Proof Memory Controller, ATRAC Encoder/Decoder (CXD2536R)**

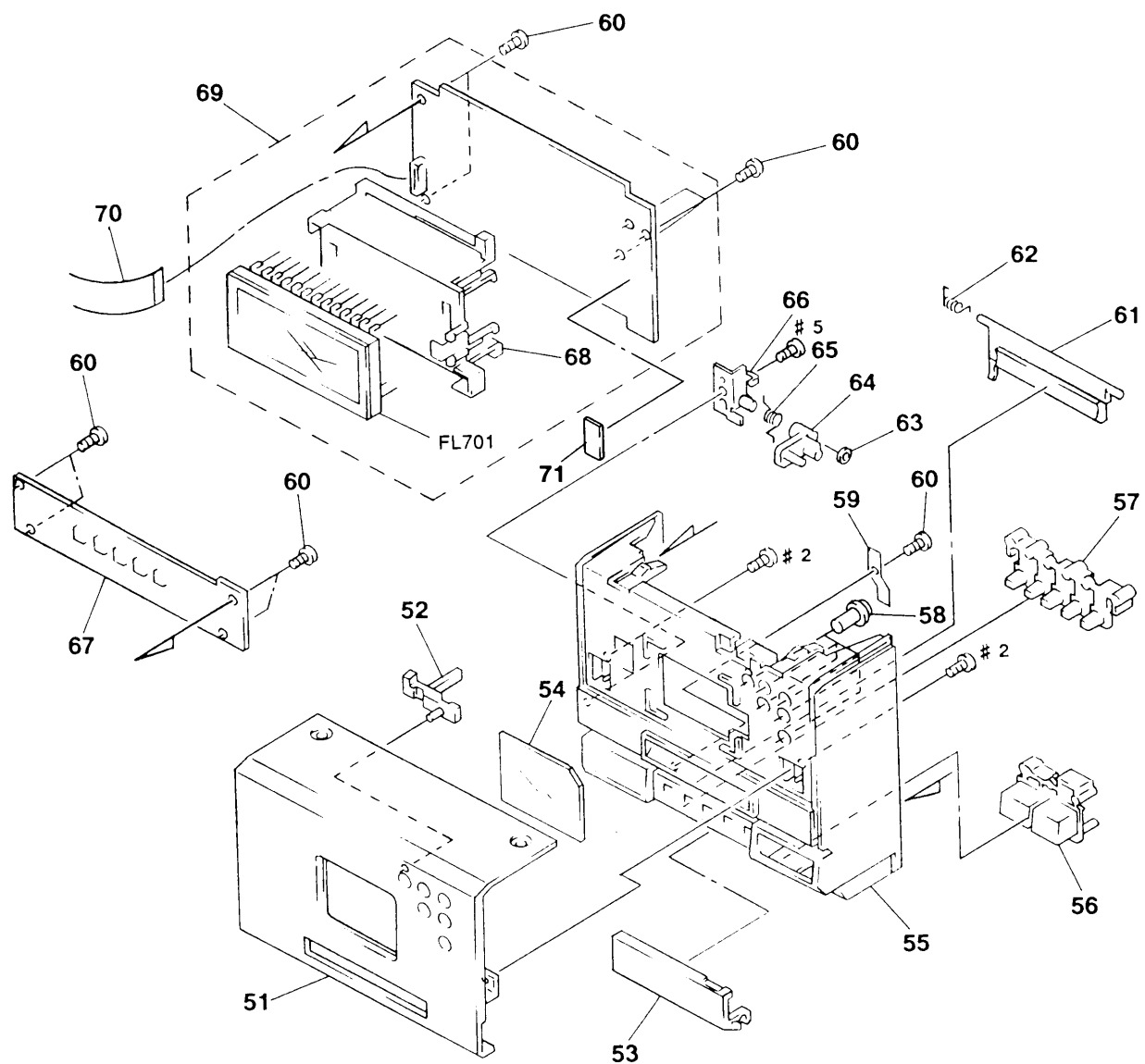
Pin No.	Pin Name	I/O	Function
1	VDD	—	Power supply pin (+5V)
2	SWDT	I	Input of write data signal from system controller (IC201)
3	SCK	I	Input of serial clock signal from system controller (IC201)
4	XLAT	I	Input of serial latch signal from system controller (IC201)
5	SRDT	O/Z	Output of read data signal to system controller (IC201)
6	SENSE	O/Z	Output of internal status (SENSE) to system controller (IC201)
7	SCMD0	I	Input of serial command control mode from system controller (IC201)
8	SCMD1	I	Input of serial command control mode from system controller (IC201)
9	XINT	O	Output of interrupt status to system controller (IC201)
10	RCPB	I	Recording/playback switching input. Not used in this unit (Fixed at "L" in this unit)
11	WRMN	I	Input of write/monitor mode switching signal from system controller (IC201)
12	TX	I	Input of write data transmission timing from system controller (IC201) Also used as magnetic field head ON/OFF output
13	VSS	—	Ground pin
14	SICK	I	Chip reservation pin (Fixed at "L" in this unit)
15	IDSL	I	Chip reservation pin (Fixed at "L" in this unit)
16	XILT	I	Chip reservation pin (Fixed at "H" in this unit)
17	XRST	I	Input of reset signal from system controller (IC201). Reset: "L"
18 to 21	TS0 to TS3	I	Test pin (Fixed at "L" in this unit)
22	EXIR	I	Chip reservation pin (Fixed at "L" in this unit)
23	SASL	I	Block selection in single use. "L": ATRAC. "H": RAM controller (Fixed at "L" in this unit)
24	SNGLE	I	Normally fixed at "L". Fixed at "H" when used as ATRAC or RAM controller for single. Fixed at "L" in this unit.
25	VSS	—	Ground pin
26	AIRCPB	O	Output pin of ATRAC and external audio block recording/playback mode signal (Not used)
27	XRQ	I/O	ATRAC I/F XRQ signal input/output pin (Not used)
28	ADTO	I/O	ATRAC decode data signal input/output pin (Not used)
29	ADTI	I/O	ATRAC encode data signal input/output (Not used)
30	XALT	I/O	ATRAC I/F XALT signal input/output pin (Not used)
31	ACK	I/O	ATRAC I/F ACK signal input/output pin (Not used)
32	AC2	I/O	ATRAC I/F error data signal input/output pin (Not used)
33	LCHST	I/O	ATRAC I/F Lch start data signal input/output pin (Not used)
34	EXE	I/O	ATRAC I/F EXE signal input/output pin (Not used)
35	MUTE	I/O	ATRAC I/F MUTE signal input/output pin (Not used)
36	OSCO	O	Clock output (45 MHz)
37	OSCI	I	Clock input (45 MHz)
38	VSS	—	Ground pin
39	ATT	I/O	ATRAC I/F ATT signal input/output pin (Not used)
40	F86	O	ATRAC block 11.6 msec timing signal output pin (Not used) (opened)
41	DOUT	O	Output of monitor/decode audio data signal to D/A converter (IC281)
42	ADIN	I	Input of recording signal from A/D converter (IC261)
43	ABCK	O	Output of bit clock signal to A/D and D/A converters (IC261, IC281)
44	ALRCK	O	Output of L/R clock to A/D and D/A converters (IC261, IC281)
45 to 47	SA2 to SA0	O	Address signal output. Not used in this unit (Opened)

Pin No.	Pin Name	I/O	Function
48, 49	A11, A10	O	Address signal output. Not used in this unit (Opened)
50	VSS	—	Ground pin
51	VDD	—	Power supply pin (+5V)
52 to 55	A03 to A00	O	Output of address signal to RAM (IC222)
56 to 60	A04 to A08	O	Output of address signal to RAM (IC222)
61	XOE	O	Output of output enable control signal to RAM (IC222)
62	XCAS	O	Output of column address strobe signal to RAM (IC222)
63	VSS	—	Ground pin
64	XCS	O	Output of chip select signal to RAM (IC222)
65	A09	O	Output of address signal to RAM (IC222)
66	XRAS	O	Output of row address strobe signal to RAM (IC222)
67	XWE	O	Output of read/write control signal to RAM (IC222)
68, 69	D1, D0	I/O	Input/output pin of data signal to/from RAM (IC222)
70, 71	D2, D3	I/O	Input/output pin of data signal to/from RAM (IC222)
72 to 74	D4 to D6	I/O	Data signal input/output pin. Not used in this unit (Opened)
75	VSS	—	Ground pin
76	D7	I/O	Data signal input/output pin. Not used in this unit (Opened)
77	ERR	I/O	Input/output pin of error (C2PO) data to external RAM. Not used in this unit (Opened)
78	EXTC2R	I	External RAM selection input for error data writing ("H": External RAM). Fixed at "L" in this unit
79	BUSY	O	RAM access BUSY signal output. Not used in this unit (Opened)
80	EMP	O	EMPTY or immediately before FULL of ATRAC data (When DSC=ASC+1: "H") (Not used)
81	FUL	O	FULL or immediately before EMPTY of ATRAC data (When ASC=DSC+1: "H") (Not used)
82	EQL	O	ATRAC data EMPTY (When DSC=ASC: "H") (Not used)
83	MDLK	O	Indicates recording/playback data main/sub ("H": Sub, Linking: "L": Main) (Not used)
84	CPSY	O	Interpolation sync signal output (Not used)
85	CTMD0	O	DSC counter mode output (Not used)
86	CTMD1	O	DSC counter mode output (Not used)
87	SPO	O	Output of system clock (512Fs=22.5792 MHz) signal to CXD2535BR (IC121)
88	VSS	—	Ground pin
89	MDSY	O	Main data sync detection signal output (Not used)
90	LRCK	I	Input of L/R clock signal from CXD2535BR (IC121) (44.1 kHz)
91	BCK	I	Input of bit clock signal from CXD2535BR (IC121) (2.8224 MHz)
92	C2PO	I	Input of C2PO signal from CXD2535BR (IC121) (Shows data error status) Playback:C2PO ("H"). Digital recording: D.In-Vflag. Analog recording: "L"
93	DATA	I/O	Recording:Output of recording audio data signal to CXD2535BR (IC121) Playback:Input of playback audio data signal from CXD2535BR (IC121)
94	DIDT	I	Input of digital audio input 16-bit data from CXD2535BR (IC121)
95	DODT	O	Output of digital audio output 16-bit data to CXD2535BR (IC121)
96	DIRCPB	O	Disc drive and EFM encoder/decoder recording/playback mode output Not used in this unit (Opened)
97	MIN	I	Input of defect ON/OFF switching signal from CXD2535BR (IC121)
98	SPOSL	I	Pin 87 (SPO) input/output switching input pin ("L":IN. "H":OUT). Fixed at "H" in this unit
99	MCK	O	RAM controller internal master clock output pin (Not used)
100	VSS	—	Ground pin

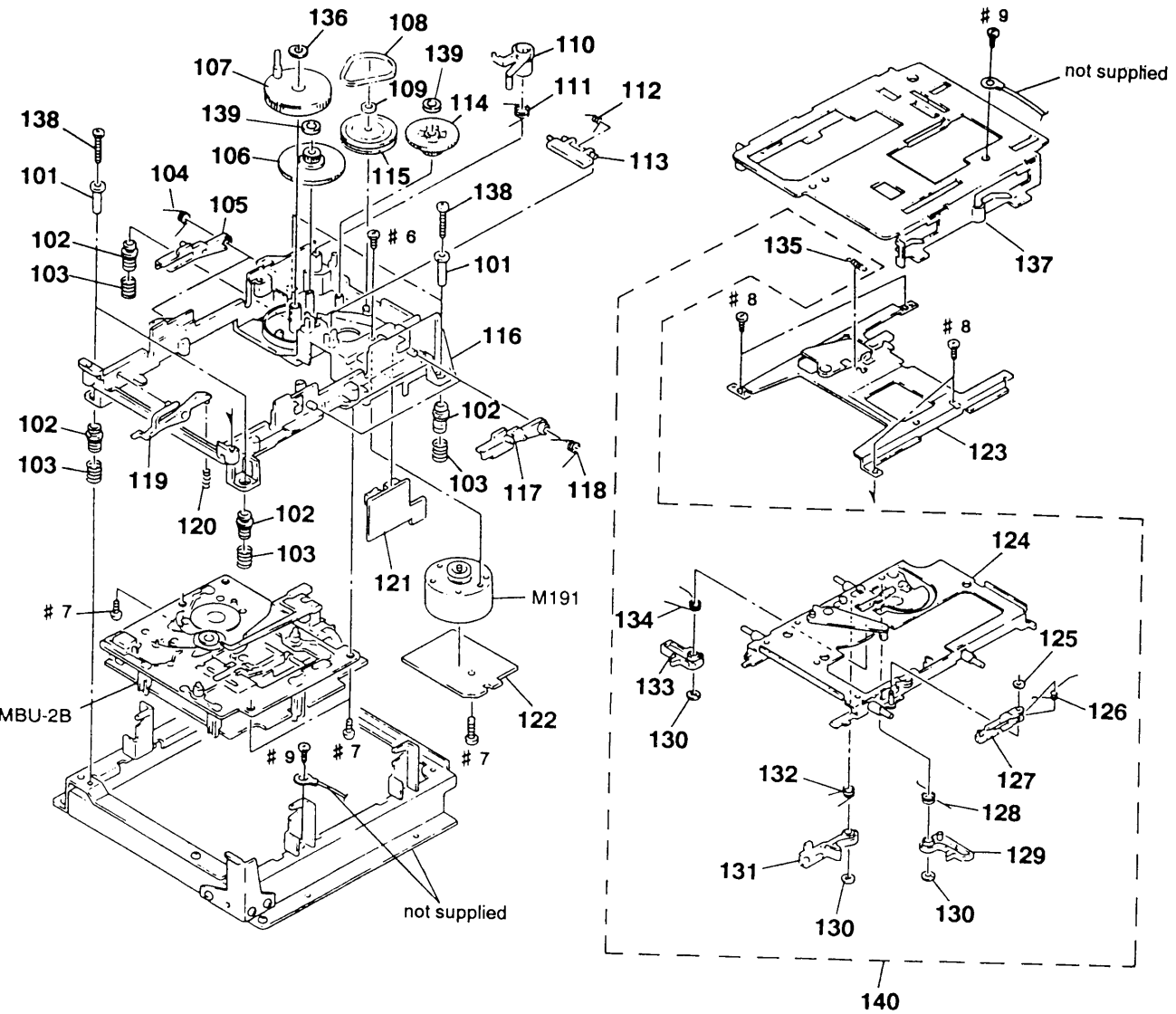
7-1. CABINET SECTION



7-2. FRONT PANEL SECTION



7-3. MECHANISM SECTION (MDM-2E)



7-4. BASE UNIT SECTION (MBU-2B)

