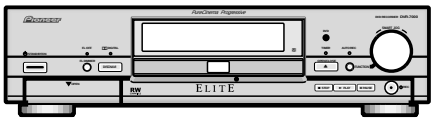
Pioneer sound.vision.soul



DVD RECORDER

DVR-7000

THIS MANUAL IS APPLICABLE TO THE FOLLOWING MODEL

Type	Model	Power Requirement	Region No.	Remarks
	DVR-7000			
KU/CA	◯	AC120V	1	

CONTENTS

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PIONEER ELECTRONICS ASIACENTRE PTE. LTD. 253 Alexandra Road, #04-01, Singapore 159936

1. SAFETY INFORMATION

This service manual is intended for qualified service technicians ; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING
This product contains lead in solder and certain electrical parts contain chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm.

Health & Safety Code Section 25249.6 – Proposition 65

NOTICE
(FOR CANADIAN MODEL ONLY)
Fuse symbols (fast operating fuse) and/or (slow operating fuse) on PCB indicate that replacement parts must be of identical designation.

REMARQUE
(POUR MODÈLE CANADIEN SEULEMENT)
Les symboles de fusible (fusible de type rapide) et/ou (fusible de type lent) sur CCI indiquent que les pièces de remplacement doivent avoir la même désignation.

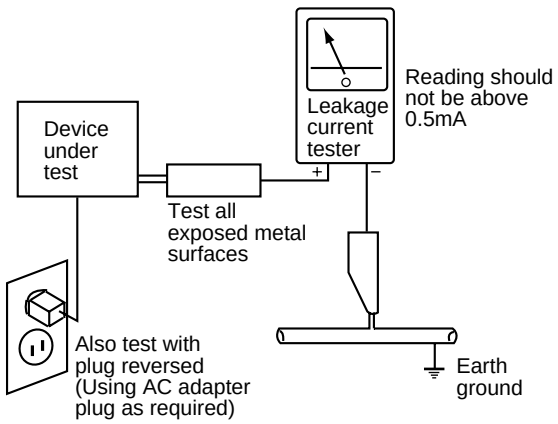
(FOR USA MODEL ONLY)

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.
The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

IMPORTANT

THIS PIONNER APPARATUS CONTAINS LASER OF CLASS 1.
SERVICING OPERATION OF THE APPARATUS SHOULD BE DONE BY A SPECIALLY INSTRUCTED PERSON.

LASER DIODE CHARACTERISTICS

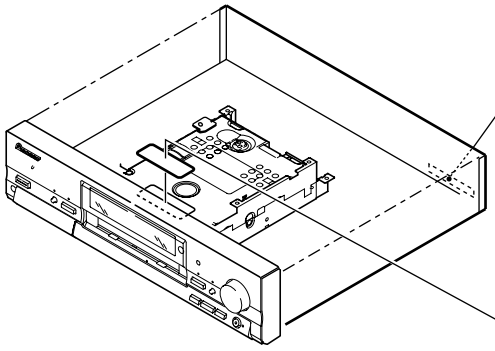
MAXIMUM OUTPUT POWER : 35 mw
WAVELENGTH : 658 nm

WARNING!

DEVICE INCLUDES LASER DIODE WHICH EMITS INVISIBLE INFRARED RADIATION WHICH IS DANGEROUS TO EYES. THERE IS A WARNING SIGN ACCORDING TO PICTURE 1 INSIDE THE DEVICE CLOSE TO THE LASER DIODE.

LASER
Picture 1
Warning sign for laser radiation

■ LABEL CHECK



DANGER
VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN.
AVOID DIRECT EXPOSURE TO BEAM.

Printed on Rear Panel

DANGER
VISIBLE AND INVISIBLE LASER RADIATION WHEN OPEN. AVOID DIRECT EXPOSURE TO BEAM.

DANGER
PRÉSENCE DE RAYONNEMENT LASER VISIBLE ET INVISIBLE APRÈS OUVERTURE. ÉVITEZ TOUTE EXPOSITION DIRECTE AU RAYON LASER. DRW2069

DRW2069

Additional Laser Caution

1. The ON/OFF(ON:low level,OFF:high level) status of the CLAMP signals for detecting the loading state are detected by the drive CPUs, and the design prevents laser diode oscillation when the CLAMP signal turns OFF.
   In normal operation, if no disc is clamped, the laser diode oscillation is disabled.
   However, the interlock does not always operate in the test mode. *

2. When the cover is opened, close viewing of the objective lens with the naked eye will cause exposure to a Class 3A laser beam.

* Refer to pages 43 of DVR-A03 Service Manual(RRV2423).

2. ADJUSTMENT

2.1 3D Y/C ASSY ADJUSTMENT

No.	Adjustment Name	Adj. Point	Measurement Point	Adjustment Value	Adjustment State
1	Y/C input level adjustment (Input system adjustment)	VR3301	TUMJ ASSY CN3001 Pin10(SEL Y)	2.00Vp-p ± 80mV	Input a white 100%(1.0Vp-p) signal into Input 1 (composite). (75Ω termination)

2.2 TUMJ ASSY ADJUSTMENT

2.2.1 TUMJ ASSY ADJUSTMENT TABLE

Note : Use disc : [DVD test disc GGV1025]

No.	Adjustment Name	Adj. Point	Measurement Point	Adjustment Value	Adjustment State
1	Video level adjustment of terrestrial wave (Input system adjustment)	VR4101	TUMJ ASSY CN3001 Pin10(SEL Y)	2.00Vp-p ± 80mV	Input a signal of fv=EIA color-bar 60dBμV to terrestrial wave input. /through output.
2	Audio multiplex ATT adjustment (Input system adjustment) Refer to 6.2.2.	IC4601 (IIC bus adj.)	Audio ouput (R) (Rear panel)	310mVrms± 9.3mV	Input a signal of Mono 1kHz/100% modulation to terrestrial wave input. /through output. (Rec level = ± 0) Note 2
3	Audio multiplex WIDE BAND adjustment (Input system adjustment) Refer to 6.2.2.	IC4601 (IIC bus adj.)	Audio ouput (R) (Rear panel)	Best point of separation ≥30dB Note 1	Input a signal of Stereo 300Hz/30% modulation (NR-ON) to terrestrial wave input. /through output Note 2
4	Audio multiplex SPECTRAL adjustment (Input system adjustment) Refer to 6.2.2.	IC4601 (IIC bus adj.)	Audio ouput (R) (Rear panel)	Best point of separation ≥25dB Note 1	Input a signal of Stereo 3kHz/30% modulation (NR-ON) to terrestrial wave input. /through output Note 2
5	Y level adjustment of component system (Output system adjustment)	VR1311	Component ouput (Y) (75Ω terminate)	1.0Vp-p ± 40mV	100% white data playback (DVD-REF-A1 T2-C5,etc)
6	P_B level adjustment of component system (Output system adjustment)	VR1313	Component ouput (P_B) (75Ω terminate)	714mVp-p ± 28mV	100% white data playback (DVD-REF-A1 T2-C19,etc)
7	P_R level adjustment of component system (Output system adjustment)	VR1312	Component ouput (P_R) (75Ω terminate)	714mVp-p ± 28mV	100% white data playback (DVD-REF-A1 T2-C19,etc)

Note 1 : The values for channel separation is defined as those having passed through the following filters :
100Hz – 10kHz : +0/–0.5dB
15.75kHz – 100kHz : -40dB or more

Note 2 : The audio multiplex adjustment No.2 – No.4 is done under the debugging mode.
Refer to 6.2.2 about the details.

2.2.2 AUDIO DEMULTIPLEX ADJUSTMENT MODE

This section describes how to set the each parameter of US Audio Multiplex Decoder IC (CXA2094Q) on the TUMJ ASSY and memorize the data on the EEPROM in the TUMJ ASSY.
The adjustable parameters and setting data are following :

- ATT 00 ~ 15
- Wideband 00 ~ 63
- Spectral 00 ~ 63

■ How to Setting

■ Use Service Remote Control Unit [GGF1067]

● How to Enter the Audio Demultiplex Adjustment Mode

Press the **[ESC]** and **[P.RUN]** buttons sequentially.
Then the screen turns to Audio Demultiplex Adjustment Mode, and displays the following screen.

```
  < Tuner  Audio  Separation   Adjustment  >
①  ATT            >>>>>>>>                  09
②  Wideband       >>>>>                     31
③  Spectral       >>>>>                     31

  ***  How to operate ( [Button  :  Action] )  ***
  [SPEED–,  SPEED+    :  Adjust  ATT]
  [SCAN<<,  SCAN>>    :  Adjust  Wideband]
  [STILL STEP<|,  STILL STEP|>  :  Adjust Spectral]
  [PLAY  :  Memorize the present status on TUFL–EEPROM]
  [ESC  :  Exit]
```

● How to Change the Parameter

① ATT Increase or decrease the setting data by **[SPEED+]** or **[SPEED–]**
② Wideband Increase or decrease the setting data by **[SCAN>>]** or **[SCAN<<]**
③ Spectral Increase or decrease the setting data by **[STILL STEP|>]** or **[STILL STEP<|]**

The level display(bar-graph) and setting data are displayed at the right side of each item.

● How to Memorize the Setting Data

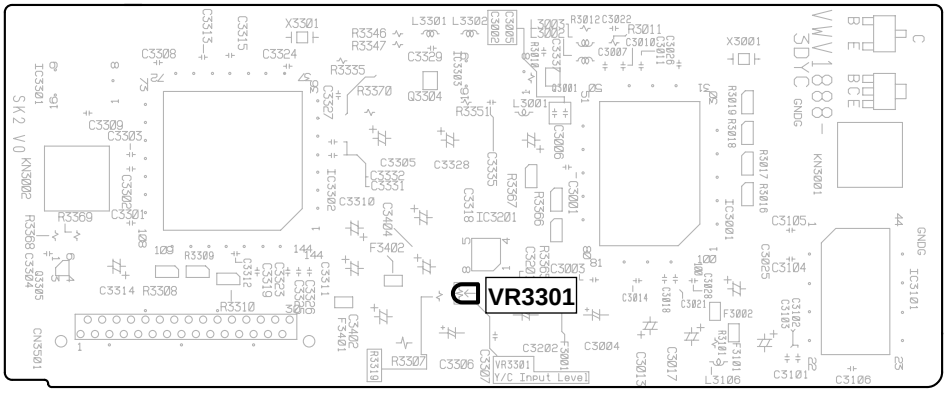
Press the **[PLAY]** key of GGF1067 to memorize the data on the EEPROM in the TUMJ ASSY after setting each parameter.
(The data is not erased even if the AC plug is disconnected from the outlet.)

● How to Exit the Audio Demultiplex Adjustment Mode

Press the **[ESC]** key of GGF1067 to exit the Audio Demultiplex Adjustment Mode.
Then the mode screen disappears.

C 3D Y/C ASSY

SIDE A



A TUMJ ASSY

SIDE A

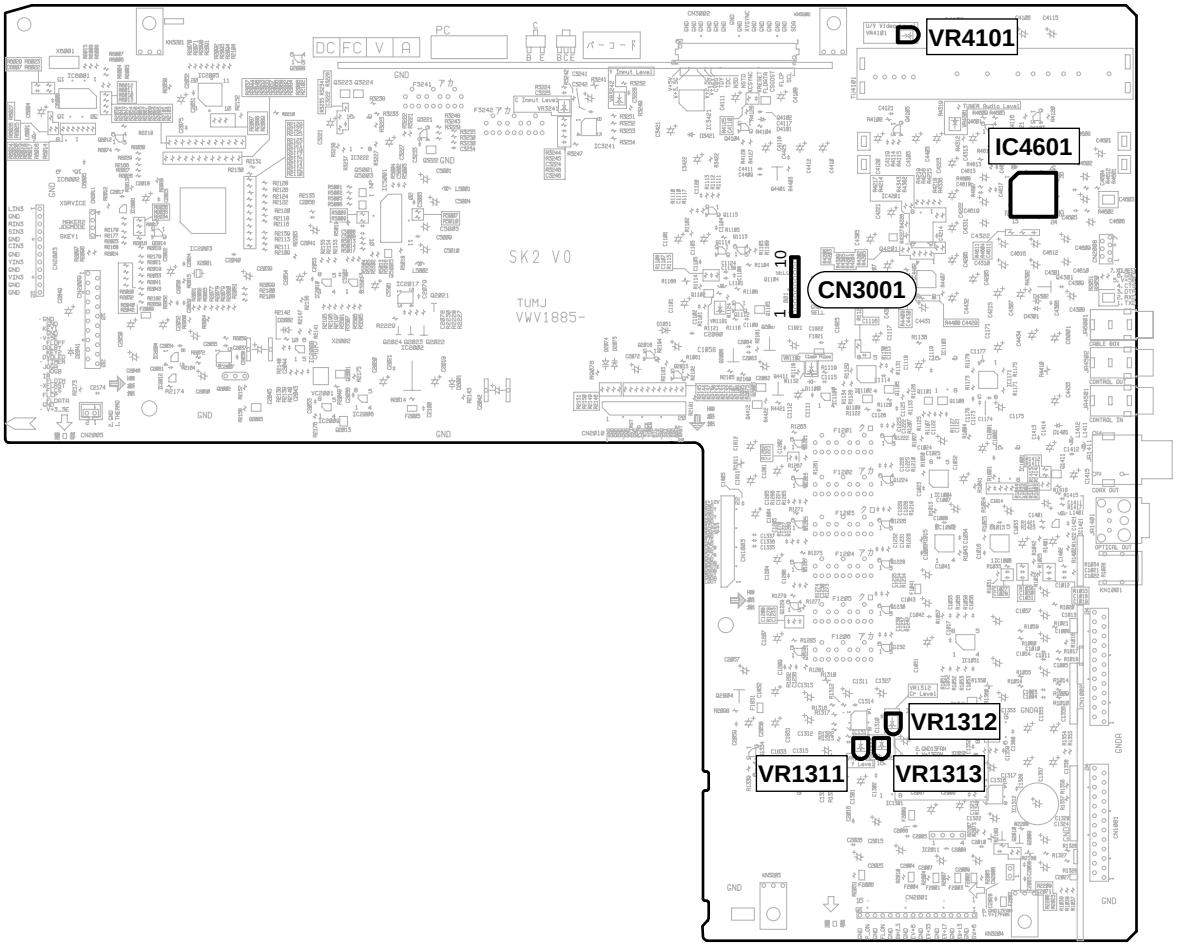


Fig1. Adjustment Point

2.3 MAIN ASSY ADJUSTMENT

Note : Use disc : [DVD test disc GGV1025]

No.	Adjustment Name	Adj. Point	Measurement Point	Adjustment Value	Adjustment State
1	Master clock free-running adjustment (Clock system adjustment)	VC3001	MAIN ASSY IC4007 Pin54 (CLKO) (M65774AFP)	27.000000MHZ ± 130Hz	No input signal or during test disc play-back
2	Y level adjustment of CVBS system (Output system adjustment)	VR7006	Y output of S terminal (75Ω termination)	1.00Vp-p ± 40mV	Playback the DVD test disc(100%white). Terminate the Y output of S terminal with 75Ω and adjust so that the level of between sync tip and white peak becomes 1.0Vp-p.
3	C level adjustment of CVBS system (Output system adjustment)	VR7007	C output of S terminal (75Ω termination)	286mVp-p ± 11mV	Playback the DVD test disc(100%color- bar). Terminate the C output of S terminal with 75Ω and adjust so that the amplitude of color burst becomes 286mVp-p.
4	Y level adjustment of component system (Output system adjustment)	VR7003	MAIN ASSY CN7001 Pin11 (Y Out)	800mVp-p ± 24mV	Playback the DVD test disc(100%white). At the pin 11 of CN7001 in the MAIN ASSY, adjust so that the level of between sync tip and white peak becomes 0.8Vp-p.
5	PB level adjustment of component system (Output system adjustment)	VR7004	MAIN ASSY CN7001 Pin13 (PB Out)	760mVp-p ± 22mV	Playback the DVD test disc(100%color- bar). At the pin 13 of CN7001 in the MAIN ASSY, adjust so that the level of between bottom and top becomes 0.76Vp-p in the 100% color-bar screen.
6	PR level adjustment of component system (Output system adjustment)	VR7005	MAIN ASSY CN7001 Pin15 (PR Out)	760mVp-p ± 22mV	Playback the DVD test disc(100%color- bar). At the pin 15 of CN7001 in the MAIN ASSY, adjust so that the level of between bottom and top becomes 0.76Vp-p in the 100% color-bar screen.

E MAIN ASSY

SIDE A

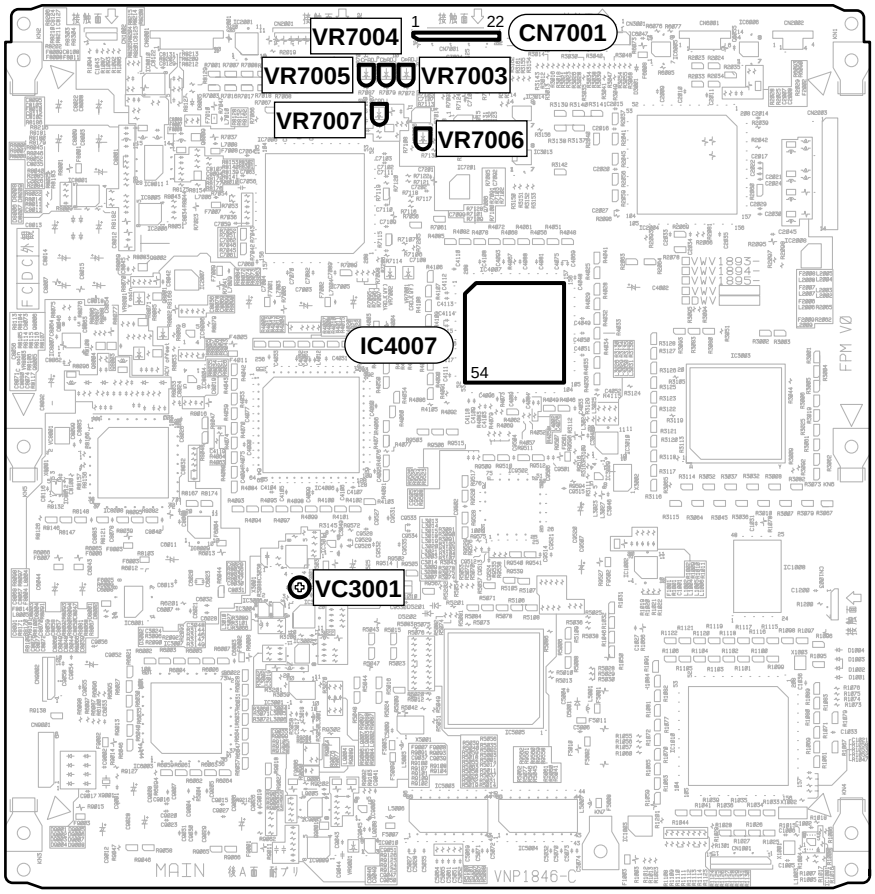


Fig.2 Adjustment Point

3. GENERAL INFORMATION
3.1 DIAGNOSIS
3.1.1 MODEL TYPE AND REGION SETTING
■ Setting the Model type and Region No. for DVD Recorder

For the DVD recorder DVR-7000/KU/CA and /LB type, it is necessary to set the region No. [1 or 3] on the FLASH ROM in the MAIN ASSY and the model type [KU or LB] on the EEPROM in the TUMJ ASSY. So when the MAIN ASSY or TUMJ ASSY is renewed, "The Model type and Region setting mode screen" is displayed automatically.

Note : If the region No. is once set, it is unable to rewrite it. When it is necessary to change the region No., renew the MAIN ASSY. And it is able to rewrite the once set model type on the EEPROM in the TUMJ ASSY only when the MAIN ASSY is renewed and setting the new region No. on the FLASH ROM.

● How to set the Model type and Region No.

1. Turn the power on.
2. The setting request screen is displayed when the model type and region No. is not set.
   At this time FL displays " MODE SETTING".

```
[ Recorder's Model and Region Setting]
Please pick out any one of the following.

Button No.     Model                          Region
[ 1        : KU_MODEL<North America>   Region 1 ]
[ 2        : LB_MODEL <Taiwan>         Region 3 ]
```

3. Enter the data according to the mode menu by the service remote control unit.
4. The recorder restarts automatically.
5. Set the shipping position. (stop + power off)
   But it is omitted when making the Down Load of the system μ-com is done after this.
6. Turn off the power, then turn on the power again.

● When the FL displays "MODEL MISMATCH" after connecting the AC plug to the outlet.

It displays, connecting the AC plug to the outlet when the setting is mismatched between the software setting of the model type data on the EEPROM and the μ-com hardware pin setting of the model type in the TUMJ ASSY.
At this time, it is unable to turn on the power.

↓

It is considered the TUMJ PCB board fault (model type hardware pin setting fault).

Note : [Tuner control μ-com hardware pin setting of the model type]
Pin 76=Region 1, Pin 77=Region 2, Pin 98=Region 3
Pull up the correspond pin to Vcc(V+3_3M) and pull down other setting pins to GND by 10kΩ resistor.

● When the screen shows the following display after turning on the power

<display 1>

```
< Model and Region don't match >
Model [already memorized on the TUFL-EEPROM] : KU_MODEL
Region [already memorized on the MAIN-CPU-FLASH ROM] : 3

Please take the power-plug off
  the plug socket
```

KU_MODEL → model type information in the TUMJ ASSY
3 → region information memorized in the MAIN ASSY

It displays, exchanging the MAIN ASSY or TUMJ ASSY,etc when the combination of model type and region No. already set is mismatched.
After this, it is unable to operate any functions.

↓

Match the combination between the model type and region No. setting, or renew the ASSY and set the data newly.

● When the screen shows the following display after setting the Model type and Region No.

<display 2>

```
< You can't change and overwrite the Region No. ! >
Region was already memorized on the MAIN-CPU-FLASHROM
 and you can't overwrite the different Region.

Region[already memorized on the MAIN-CPU-FLASHROM] : 3
Model-Region[that you selected just now] : KU_MODEL -1

 Please take the power-plug off
   the plug socket.
```

3 → region information memorized in the MAIN ASSY
KU_MODEL -1 → region information selected by the key input at the setting mode screen

It displays, renewing TUMJ ASSY,etc when setting the different model type from the region No. already set in the FLASH ROM in the MAIN ASSY.

↓

Match the combination between the model type and region No. setting, or renew the MAIN ASSY and set the data newly.

3.1.2 CPRM ID NUMBER AND ID DATA SETTING

■ Use ID DATA DISC [GGV1065] and Service Remote Control Unit [GGF1067]

■ Entering the ID Number and ID Data for DVD Recorder

For the DVD recorder,it is necessary with the recoding/playback of DVD–RW disc to set an individual number (ID number) and ID data to each recorder. If the number and data are not set correctly with the following procedure, operations in the future may not be guaranteed. You will find the ID number to be set on the ID label on the rear panel.

Important: If no ID label is found on the rear panel, write down the specified ID number by checking it according to "How to confirm the ID number" shown below.

■ The Input is Necessary When:

• " CPRM ERR" is displayed on the FL display immediately after the power is turned on or in Stop mode.
• When the MAIN ASSY , RECORDER DRIVE MAIN, CPRM LSI or the FLASH ROM is exchanged.

Note:
Be sure to enter the ID number in Stop mode.
Use the service remote control (GGF1067) for operations. Only opening/closing of the tray are performed from the player.
The ID data disc is swept out automatically after the recorder have read the data from it.

■ How to Input the ID Number and ID Data

① To enter the input mode, press ESC + STEREO in a status with no ID number set, such as after FLASH-ROM downloading.

② As number input is enabled when the unit enters the input mode, input the 9-digit ID number.
(The entered number is also displayed on the FL display.)

```
[Recorder's ID Number Setting]
  ID Number ?
② > - - - - - - - - -

<CLEAR>  Exit


Input ID Number !
```

③ After inputting the number, press SEARCH to register the ID number.

```
[Recorder's ID Number Setting]
  ID Number ?
> 0 0 0 0 0 0 0 0 1   OK ?

<PLAY>      Compare Mode
③ <SEARCH>  Enter

Input ID Number !
```

④ When the ID number has been registered, the unit enters the ID data input mode. (The FL display indicates "INSERT ID DATA.") In this condition, place the ID data disc on the tray and close the tray using the CLOSE key "■/⏏" on the player.

```
[Recorder's ID Data Setting]


<CLEAR>  Exit


④ Insert The ID Data Disc !
```

⑤ While the data are being read, the message shown in the figure at left is displayed on the screen.
(The FL display indicates "LOAD ID DATA.")

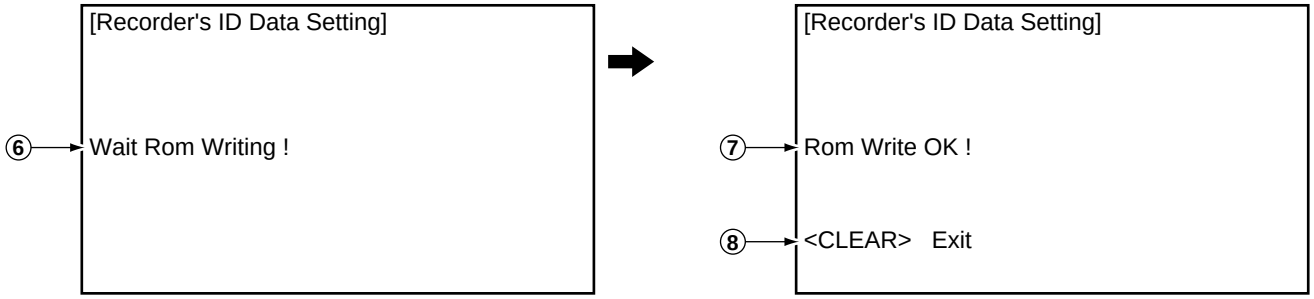
```
[Recorder's ID Data Setting]


⑤ Loading The ID Data Disc !
```

⑥ When the ID data have been read, the data are written to the FLASH-ROM.
(The FL display indicates "WRITE ID DATA.")

⑦ When the ID data have been written to the FLASH-ROM, the message "Rom Write OK" is displayed on the screen.
(The FL display indicates "ID DATA OK.")

⑧ After confirming this message, press CLEAR to exit the input mode.

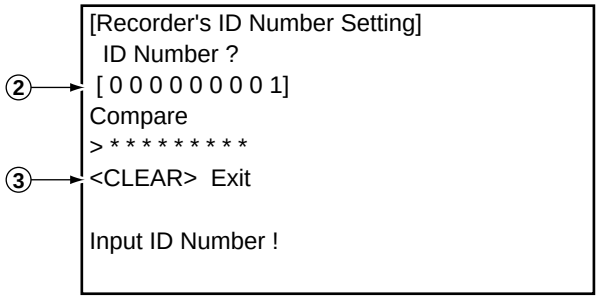


How to Confirm the ID Number

① Press ESC + STEREO with an ID number set, and the unit enters the ID number confirmation mode.

② The set ID number is displayed on the screen (and on the FL display), permitting you to confirm it.

③ To exit this mode, press CLEAR.

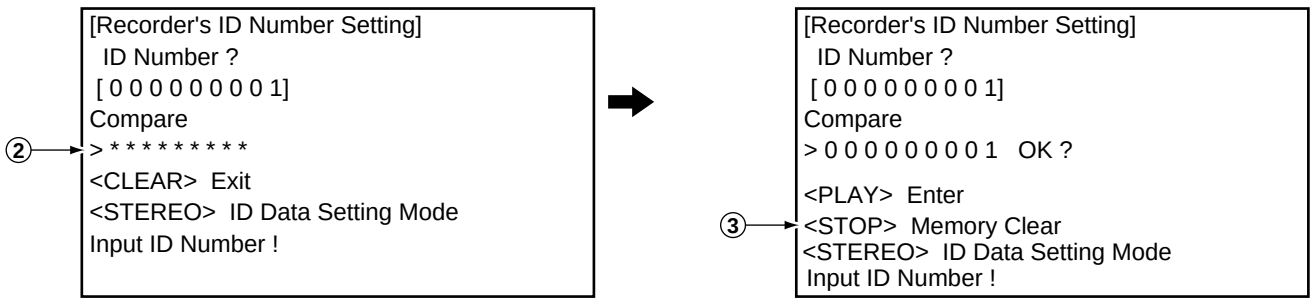


How to Clear the ID Number

① Press ESC + STEREO with an ID number set, and the unit enters the ID number confirmation mode.

② Input the same number as the ID number you have set.

③ After inputting the number, press STOP.
Only when the entered number matches the set ID number, the ID number is cleared and the unit exits this mode.
If the numbers do not match, you must return to step 2.
(STOP is not accepted until 9 digits are entered.)



3.1.3 DEBUGGING MENU

For operation, use the **GGF1067** remote control unit for service.
The Debug menu is a main menu from which to select any of 11 mode menus, classified by rough category, such as recording system and VR playback system. The mode menus also have subscreens if there are many items.
The Debug menu during playback of a DVD-V (including video mode), CD, or VCD is almost the same as that of the DV-737 (see Mode Menu 10).

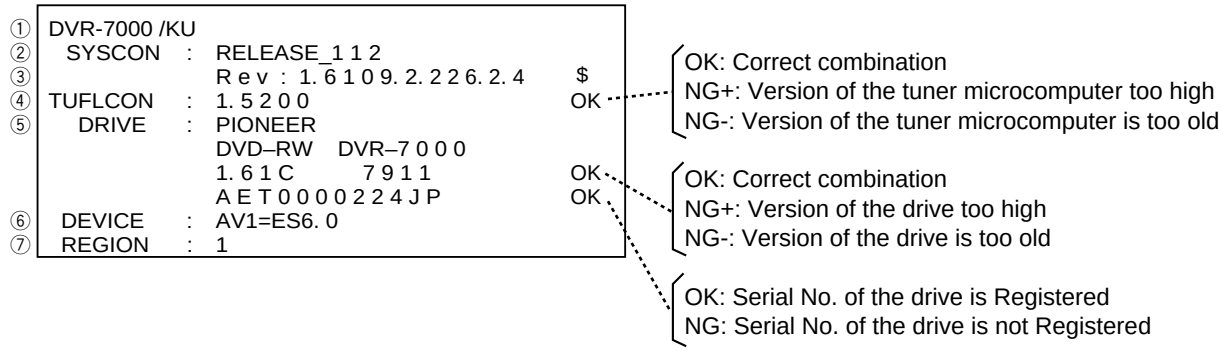
- **How to Enter the Debug Menu** : Press **[ESC] + [DISP]** keys in order while no GUI is displayed.
- **How to Exit the Debug Menu** : Press the **[ESC]** key.
- **How to Advance the Mode Menu** : Press the **[DISP]** key.
- **How to Advance the Subscreen in a Mode Menu** : Press the **[DIG/ANA]** key.

Note 1 : If you press the [DISP] key on the final mode menu, the display will return to Mode Menu 1.
Note 2 : Pressing the [DIG/ANA] key repeatedly will change the subscreens within the same mode cyclically. To change mode menus, press the [DISP] key.

■ Description of Each Mode

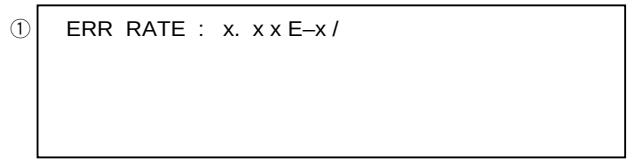
1. Mode Menu 1 [Version information, etc.]

● Subscreen 1



① Model name/destination
② Version of the recorder software
③ Revision No. of the system control computer software
④ Version No. of the tuner microcomputer, result of confirmation on combination between the tuner microcomputer and the system control computer
⑤ Information on the built-in drive (Name of the manufacturer, model name of unit into which the drive is built, version No., CPU model name, serial No., result of confirmation of combination with the system control computer*2
⑥ Version No. of AV1
⑦ Region No.

● Subscreen 2



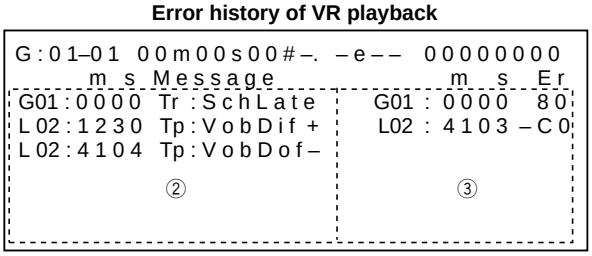
① Error rate during playback in VR mode (Averaging value for last 10VOBUs),
Display the rotation ratio of the drive (/: Normal speed, No display: Double speed)
Note: Be sure to start playback after displaying this screen.

2. Mode Menu 2 [VR playback (related to decoding), debug display]

● **Subscreen 1** (This menu is for design use.)

● **Subscreen 2**

Error history of VR playback



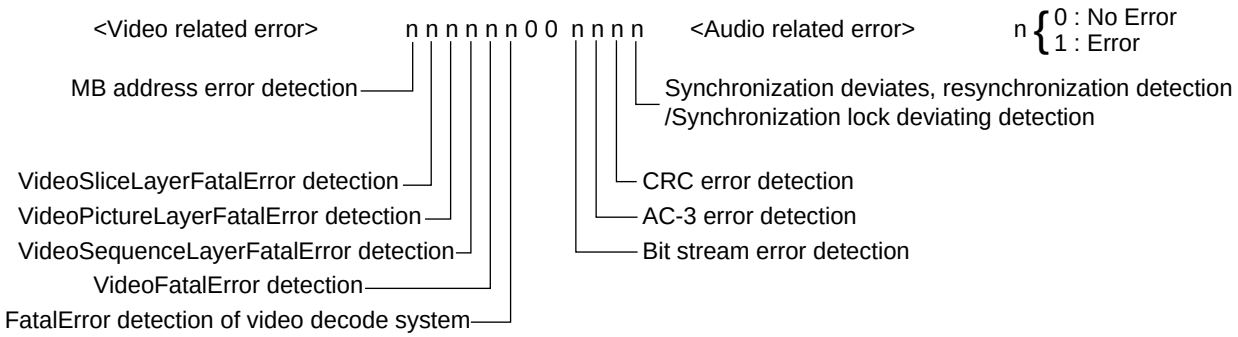
① Information on location of the display
Original (G)/Play List (L), title, chapter [X:XX-XX], time of the display (min, sec, frame) [XXmXXsXX], busy mark of the virtual mechanical control computer [#], error rate of the transfer data [X.XeXX], playback logical address (ID) [XXXXXXXX]

② Error Message history
Original (G)/Play List (L), title, time of occurrence (min, sec) [XXX:XXXX], playback-related error history for the last 8 errors [XX:XXXXXXX]

Note:

- **For details on error information, see Table 7.1 "Description of VR playback-related errors," page 92.**
- *When an error occurs here, expect that there is a problem in data reading from the disc. (The possibility that there is a problem in the drive side is high.)*

③ AV1 error status history
Original (G)/Play List (L), title, time of occurrence (min, sec) [XXX:XXXX], AV1 error status [XXX]. (The details are as follows.)



Note:

- *When there is not an error of ②, and an error of ③ occurs here, there is a problem in the AV side. (The possibility that there is a problem in AV1 tip or DVxcel is high.)*
- *When there is not an error of ② and ③ together, the screen is frozen and a sound breaks off, the possibility that a source itself is such a thing is high, and it is most of not to be trouble.*

● **Subscreen 3** (This menu is for design use.)

3. Mode Menu 3 [iLink-related debug display]

● **Subscreen 1**

```
① [Recorder]   GUID : XXXXXXXXXXXXXXX

② BGC : XXXX   TN : XX   DN : XX   CA : X   ER: X
③ CT : XXXX    CD : XX   CG : XX   OC : X   IC: X
④ PE : XXXX

① [DV]         GUID : XXXXXXXXXXXXXXX
⑤ VN : XXXXXXXXXX  MN : XXXXXXXXXXXXX
⑥ PW : XX   TRM : XX   TRS : XX
```

① GUID Show the Global Unique ID (EUI-64)
② BGC Show the bass reset processing number of times
TN Show the existing i.LINK equipment total number on the same bass. (Include recorder)
DN Show the existing DV equipment total number on the same bass
CA Show whether there are data in the stream buffer of 1394 LINK chip [Y/N]
ER Show whether an error occurred in the driver section.
③ CT Show format of the connection that recorder organized [BROAD/PTOP]
CD Show format of the connection that recorder organized [IN/OUT]
CG Show whether a broadcast-out connection was taken by other equipment
OC Show number of a connection organized to Output Plug
IC Show number of a connection organized to Input Plug
④ PE Show number of the packet error that detected by 1394 LINK chip
⑤ VN Show Vendor Name of DV equipment
MN Show Model Name of DV equipment (There is the case that cannot get by equipment.)
⑥ PW, TRM, TRS
Show the various state that got from DV equipment (Do not get it except DV input selection time.)

4. Mode Menu 4 [DVxcel-related debug display]

● **Subscreen 1, Subscreen 2**

(These menus are for design use.)

5. Mode Menu 5 [Mode-related debug display]

● **Subscreen 1– 7**

(These menus are for design use.)

6. Mode Menu 6 [VR recording-related debug display]

● **Subscreen 1– 3** (These menus are for design use.)

● **Subscreen 4**

Error history of VR recording

```
①  Recording Error History Display
01–06–01 20:05:30 No SysHdr IN
01–06–02 00:22:10 Write Error
```

① Recording-related error history of the last 9 times × 2 pictures
[occurrence time (yr-mo-day hr:min:sec), error information (in simplified description)]

Notes:

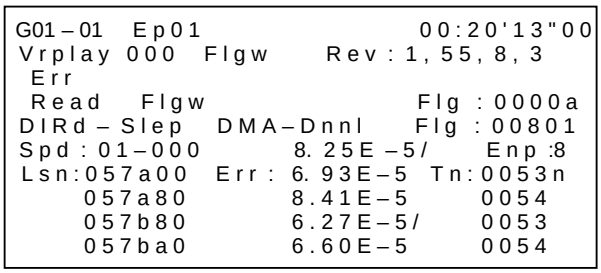
•The two error-history pages can be switched by pressing the [SPEED +] or [SPEED –] keys.

•For details on error information, see Table 7.2 “Description of VR recording-related errors,” page 93.

● **Subscreen 5– 11** (These menus are for design use.)

7. Mode Menu 7 [VR playback-related debug information]

● **Subscreen 1– 3**



① Display position information
Original (G)/Play List (L), title No., cell No. [XXX-XX], chapter (entry point) [EpXX], time of the display (min, sec, frame) [XX:XX'XX"XX]

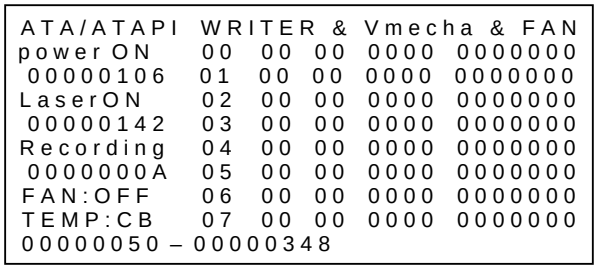
② Error rate information (four histories)
Logical address [Lsn:XXXXXX]
(Inner periphery: 0-100000h, Outer periphery: 180000-230000h)
Error rate [Err:X.XXE-X]
Rotation ratio display of the drive (/: Normal speed, No display: Double speed)
Command execution time ([Tn: XXXXns]
(Normally, double speed playback is 60ms degree in the internal periphery and it is 50ms degree in the outer periphery.)
* *When normal playback and command execution time are long, problem occurs in performance of readout from the disc. (Crack and dirt of the disc, and pickup of the drive is dirty, etc..)*

● **Subscreen 2– 4** (These menus are for design use.)

8. Mode Menu 8 [ATA/ATAPI-related debug display]

● **Subscreen 1– 2** (These menus are for design use.)

● **Subscreen 3**



① Power ON time of the drive (HEX display) [XXXXXXXXhour]
② Laser ON time except during record (playback) (HEX display) [XXXXXXXXhour]
③ Recording time (HEX display) [XXXXXXXXhour]
④ Active state of the Fan for drive (ON/OFF)
⑤ Temperature in the drive [XX] (CB: 45°C, One count: Convert it with ±1.6°C)
⑥ Fan ON time - Fan OFF time (HEX display) [XXXXXXXX-XXXXXXXXsecond]
* ①-③ data is stored even if power turned off.

9. Mode Menu 9 [GUI-related debug display]

● **Subscreen 1– 2** (These menus are for design use.)

10. Mode Menu 10 [DVD VIDEO playback-related debug display]

● **Subscreen 1– 10** (These menus are for design use.)

These subscreens have been exported from the debugging displays of the DV-737. For details on display content, refer to the service manual for DV-737 (Order No. RRV2320).

11. Mode Menu 11 [DVD VIDEO key processing history display]

● **Subscreen 1** (This menu is for design use.)

Error Message	Description
Tr : NullBlk	Transfer task: NULL at the top block (Detecting NG stream made at the DVR-1000 series and starting protection process.)
Tr : ReadErr	Transfer task: ATA read error
Tr : SchLate	Transfer task: ATA search late
Tr : SemTOvr	Transfer task: Timeout for gaining semaphore (no synchronization with the display)
Tr : NaviErr	Transfer task: Inconsistency between NAVI (navigator) of management data and actual NAVI
Tr : OrderEr	Transfer task: Inconsistent order
Mn : Av1Hang	Main task: Detects hang-up of AV decoder and starts recovery
ERR_RCV!	TPP task: Detects hang-up of AV decoder and starts recovery
Tp : VobDif+	TPP task: The decoder STC advances by 1 VOBU hour.
Tp : VobDif-	TPP task: The STC of the management information advances
Tp : midNULL	TPP task: The management information pointer designated was NULL.
Tp : ScanNg	TPP task: Failure to set the TPP memory when scanning was canceled.
Tp : RStepEr	TPP task: Although the reverse step had failed, the operation was forcibly terminated because the top cell was located.
Tp : tppErr	TPP task: Inconsistency occurred.
Rv : 1stTOvr	Reverse playback task: Timeout for waiting for interruption to the top VOBU immediately after starting decoding
Rv : OpnTOvr	Reverse playback task: Timeout for waiting for B-picture of the open GOP immediately after starting decoding
Rv : OplTOvr	Reverse playback task: Timeout for waiting for I-picture of the open GOP immediately after starting decoding
Rv : LnkTOvr	Reverse playback task: Timeout for waiting for link
Rv : LnkFail	Reverse playback task: Starts compensation by detecting link failure
Rv : R2FTOvr	Reverse playback task: Starts retrial after detecting timeout from reverse pause to forward pause
Rv : TopVbEr	Reverse playback task: Forced termination because of a possible error of the top data during reverse normal playback
Rv : OrderEr	Reverse playback task: Inconsistent order
Av : B/CTOvr	AV1: Buffer-clear timeout
Av : StrmOvr	AV1: Timeout for waiting for stream ready
Av : TpmTOvr	AV1: Timeout for TP mode change
Av : SpmTOvr	AV1: Timeout for a step command
CC_OS_ERR	Closed caption task: OS error
DAC_NG	Number of retrial for DAC setting is over.
DAC_Error	Failure to DAC setting

Table 7.1 Description of VR playback-related errors

[REFERENCE]

STC=System Time Clock , VOBU=Video Object Unit , GOP=Group Of Picture , B-picture= Bidirectionally predictive-picture

I-picture=Intra-picture, P-picture=Predictive-pictute, TP mode change=AV1 term (Trick Play mode change)

Error Message	Description	Error Message	Description
Non Err	Normal	No Video	No video input (not locked)
DRAM NG	Abnormality in access to the DRAM for work	Invalid Param	Invalid parameter
SRAM NG	Abnormality in access to the backup SRAM for work	Protect Src	Source to be recorded is write-protected.
CPRM IC NG	Inappropriate CPRM IC	Now Busy	In the process of the emergency processing
Drive Destroy	The drive was destroyed.	Invalid Disc	The disc cannot be recognized.
MKB REVOKED	Error in gaining data	Invalid UDF	Invalid UDF content
BK BATT Down	Backup RAM data has been erased.	Invalid VMG	Invalid VMG content
BK FSYS Dirty	Backup RAM data has not been written on the file system.	Invalid TMVMG	Invalid TMP_VMGI content
Stream NG	Inappropriate input stream data	Unmatch Stamp	Impossible to modify because of unmatched time stamps
Stm Start NG	Failure to start encoding (reasons not clear)	Virgin DISC	Blank disc
Excel Hang	Dvexcel NG was announced.	Fail Repair	Repair failed.
No SysHdr IN	System packet is not input periodically.	ReadOnly DISC	Because part of data is invalid, data cannot be written.
Strm Start NG	Timeout of system packet input at the beginning	Rzn Rsv NG	R Zone Reserve failed.
IN Encode	Changes cannot be made in the process of encoding.	Rzn Cls NG	R Zone Close failed.
EncModul Hang	Encoder routine is hung up.	Rzn Rpr NG	R Zone Repair failed.
Ourob Strm NG	Inappropriate stream data to the Ouroboros input	Bdr Opn	Open Border failed.
BUF Overflow	Overflow of stream buffer	Bdr Cls	Close Border failed.
Drive Hang	Drive is hung up.	Format NG	Formatting failed.
Write Err	The drive failed to write and could not be recovered.	OPC NG	OPC failed.
Read Err	Reading failed, ECC failed, etc.	PCA Full	PCA has been used up.
Drv Hard Err	Abnormality in the drive hardware or firmware	RMA Full	RMA has been used up.
Mech No Res	No response from the mechanical U-Com	SW Vrec mode	Switching to video recording routine is required.
Drv TimeOut	Timeout for drive operation	SW Vpb mode	Switching to video playback routine is required.
NWA Exhaust	NWA surpassed and impossible to be used	Something	Something is wrong.
MKB Invalid	MKB reading error	Status NG	Abnormality in change of statuses
Drv Err	General error of the drive	Irr Action	Incorrect action
DISC Full	No further data can be written because the disc is full.	Abort	Cancellation
No More Info	No more space in the internal work management area	I am Down	A request to turn off the power was placed.
No Perm	No permission to write to the disc	Repair Exec	Repairing has been executed.
Limit Over	Standard maximum limit was over.	Format Exec	Formatting has been executed.
Rec Pause	No operation permitted during recording pause	BUG	Some bugs

Table 7.2 Description of VR recording-related errors

Note :

** A dark halftone dot meshing part is an error of the MPEG Encoder, and a light halftone dot meshing part is an error of the drive system.*

** When the drive system is errored, there is a problem in crack and dirt of the disc or drive oneself (pickup is dirty).*

[REFERENCE]

ECC=4 Byte code for error correction , NWA=Next Writable Address , MKB= Media Key Block ,
UDF=Universal Disc Format , VMG=Video Manager , TMP_VMGI=Temp Video Manager Information,
PCA= Power Calibration Area , RMA=Recording Management Area , Border=from Lead-in to Lead-out ,
OPC=Optical Power Control

3.1.4 SERVICE MODE

1. Error Rate Measurement

● How to Enter this Mode : Press the **[ESC]** and **[SIDE-B]** buttons sequentially.

Functions : When enter this mode, measure the error rate automatically.

① VR mode record
Record it for 10 seconds and playback the title.
During the playback and stop, display the error rate in FL and OSD.
ERR RATE : *.**E-*

② Video mode record
Record it for 30 seconds and playback the title.
During the playback and stop, display the error rate in FL and OSD.
ER (av):*.*E-* * (Display - during measurements)

③ DVD-VIDEO playback
Playback, and measure the error rate and display it. Stop afterwards.
ER (av):*.*e-* * (Display - during measurements)

④ CD
Trace it from the lead of track 1 and display the error rate.
E. RATE:*.*e-*

● How to Release : Press the **[ESC]** button to release from this mode.

2. Error Rate Measurement During DVD-VIDEO Playback

● How to Enter this Mode : Press the **[ESC]** and **[n]** buttons sequentially during playback. (n: Numeric button)

Functions : When enter this mode, measure the error rate of DVD-VIDEO and display it.
Record it for 10 seconds and playback the title.
ER (av):*.*e-* * (Display - during measurements)

● How to Release: Press the **[ESC]** button to release from this mode.

3. VR Aging Mode

● How to Enter this Mode : Press the **[ESC]** and **[REP.B]** buttons sequentially to enter the aging mode.
Display [AGING] on the left part of FL and display loop count on the right part of FL during this mode.

Functions : When enter this mode, repeat the following operations automatically.

① VR initialization
② Video recording 60 minutes
③ Playback 45 minutes
④ Tray open
⑤ Tray close
Display the following counts in FL during the aging mode.
[AGING 0001]

● How to Release : Press the **[ESC]** button to release from this mode.

Note : Aging Mode stops when an error occurs. Press the **[ESC]** button to release from this mode.
And see the error history with Debugging Mode.

4. Version Display

● How to Enter this Mode : Press the **[ESC]** and **[FRM/TIM]** buttons sequentially to display the version information screen.

● How to Release : Press the **[ESC]** button to release from this mode. (screen disappears)

5. Version Display (for Remote Control Unit of Accessory)

● How to Enter this Mode : Perform highlight display the position of “main unit setting / voice output / digital output / ON”, and press the **[ANGLE]** button of the remote control unit of accessory.

The following display appears at a position of the third layer.

```
SYSCON : RELEASE_112
TUFLCON : 1.5200 *
DRIVE : 1.61C *
DEVICE : AV1=ES6.0
```

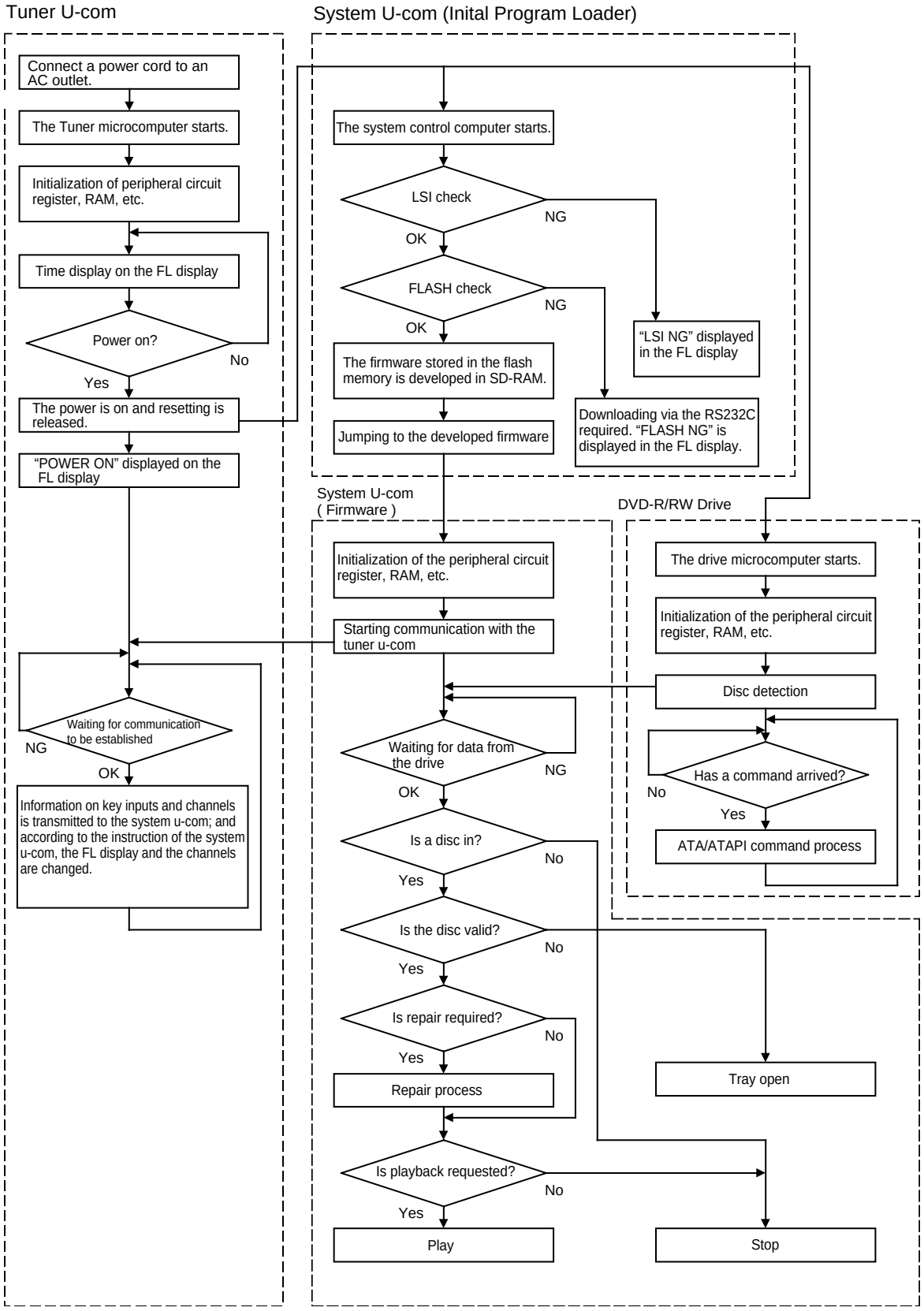
6. FL All Lighting Mode

● How to Enter this Mode : All FL lights when pressing the **[ESC]** and **[TEST]** buttons sequentially.

● How to Release : Press the **[ESC]** button to release from this mode. (Return to normal display.)

Note : Take care not to light all FL Tube for long time.

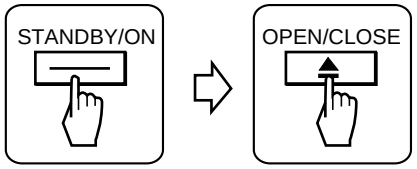
3.1.5 POWER ON SEQUENCE

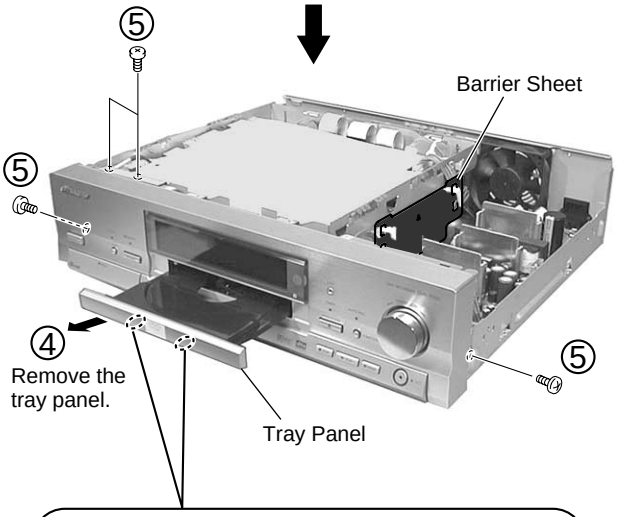


3.1.6 DISASSEMBLY

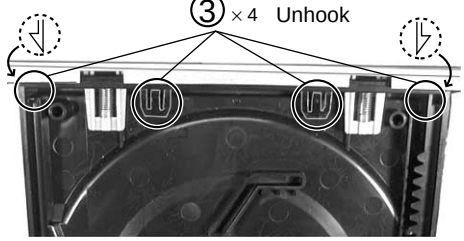
① Remove the bonnet. (Screw ×10)

② Open the tray.

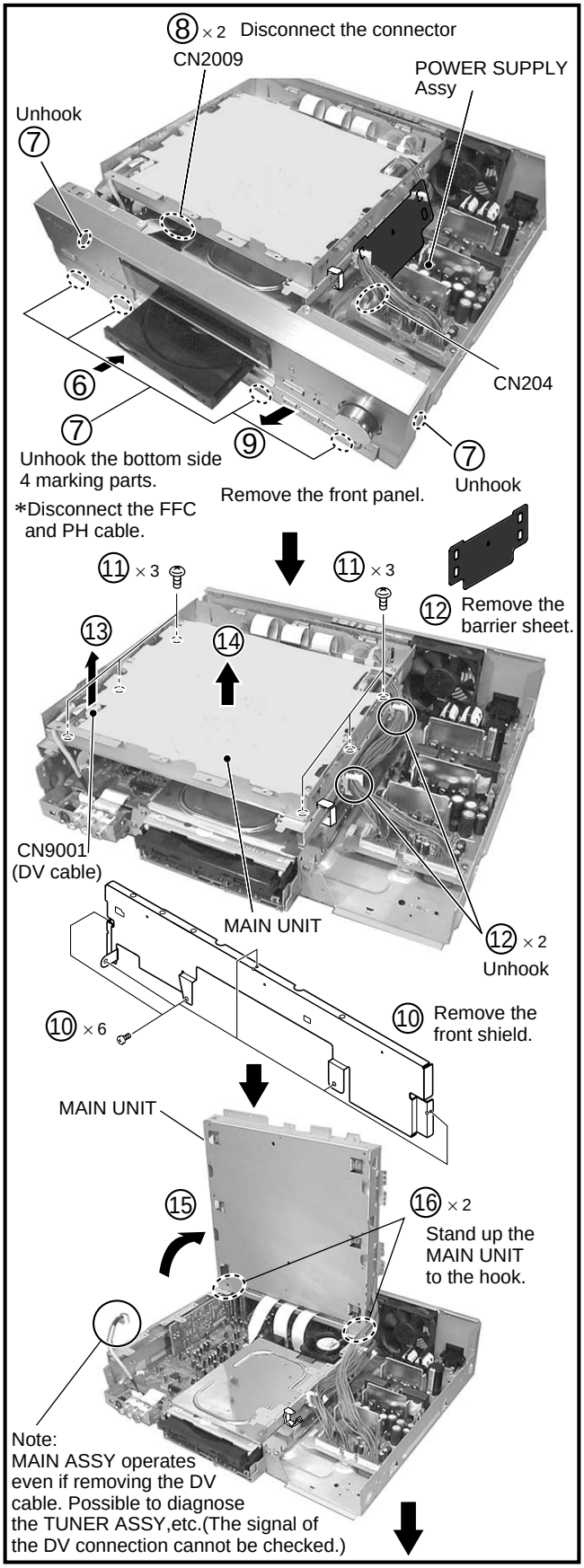




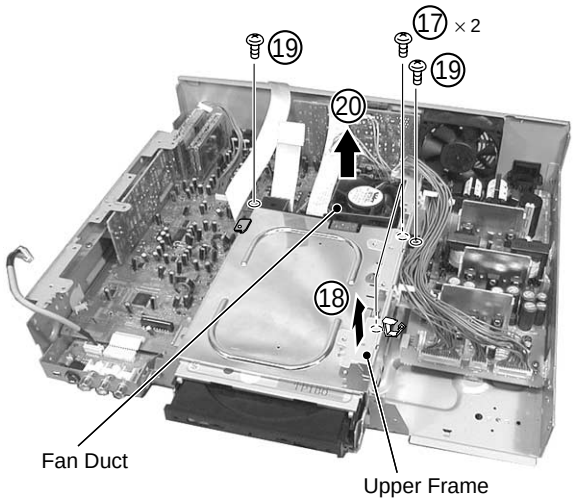
●Rear side of the tray

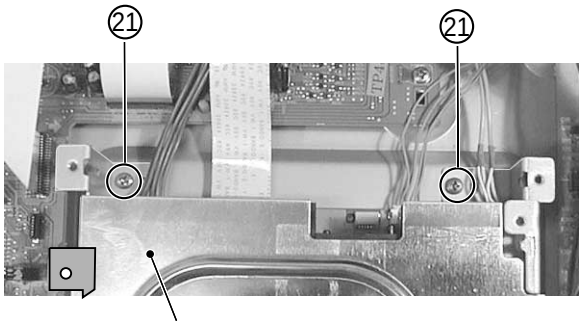


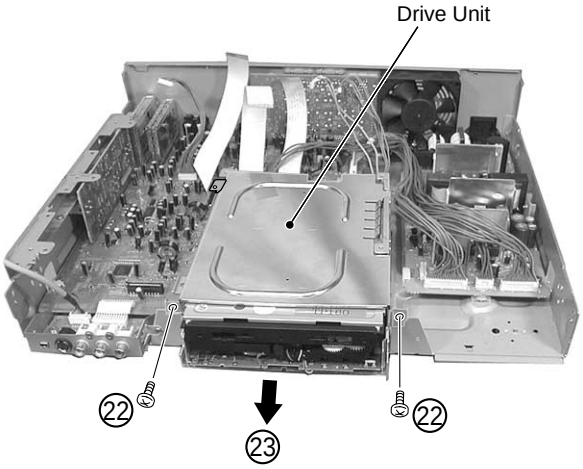
●When opening the tray by manual operation



⑯ Disconnect all connectors on the MAIN ASSY. (×7)

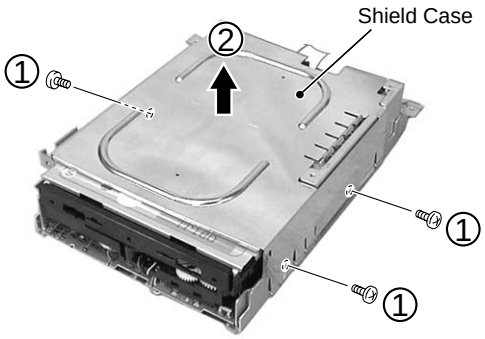


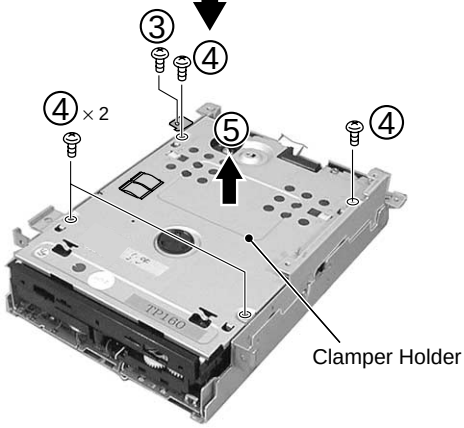


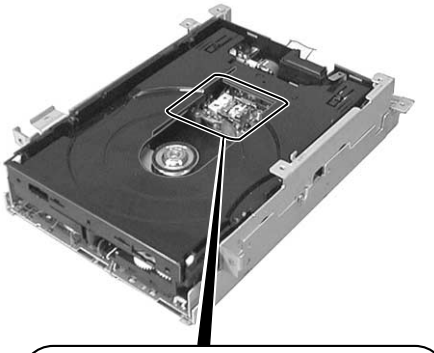


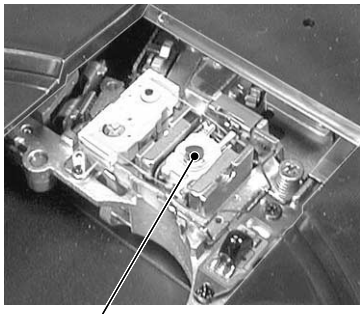
Remove the Drive Unit.

■DRIVE UNIT



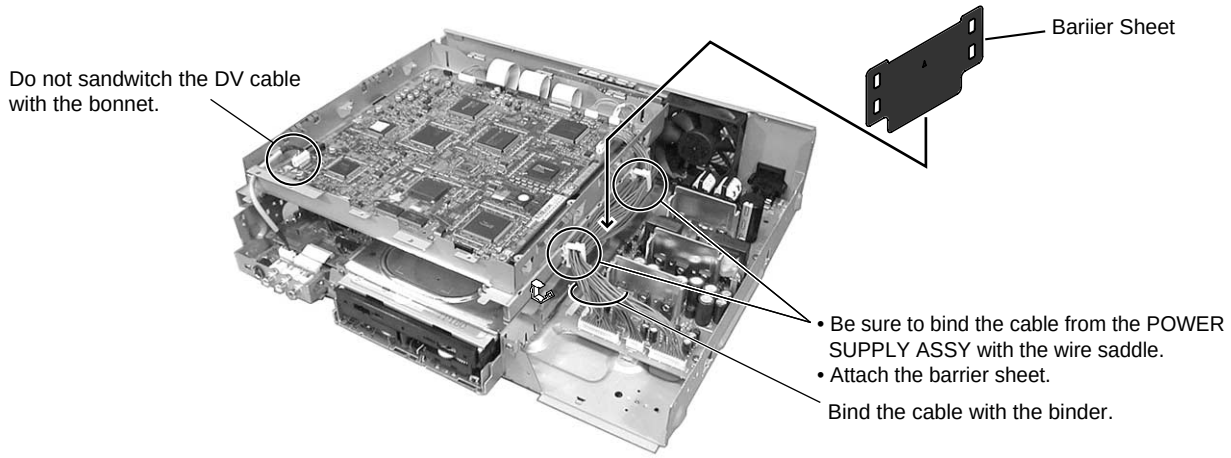




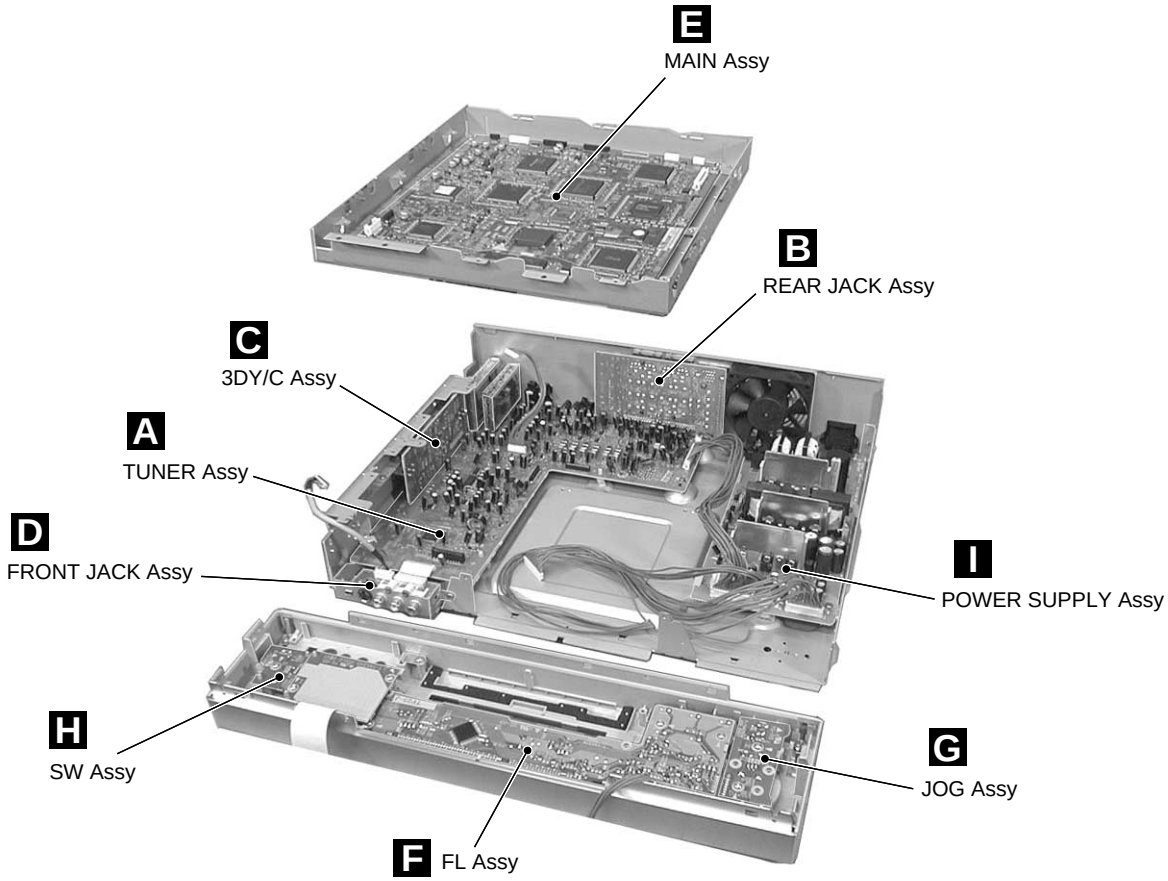


⑥ Make clean the pick-up lens.

■ CAUTION FOR CABLE STYLING



■ PCB BOARD LOCATION



3.2 OUTLINE OF THE PRODUCT

3.2.1 DVD-RW Standard

The DVD-RW disc is a phase-change type, rewritable disc, as are CD-RW and DVD-RAM discs. In playback of a phase-change type disc, signals that are obtained through the change in reflectivity between crystalline and amorphous states of the recording layer can be read by the optical system employed in playback-only players. Fig. 1 shows the structure of a DVD-RW disc. On a 0.6-mm-thick polycarbonate molded substrate, an Ag-In-Sb-Te-alloy recording layer, a protective layer, and a reflective layer are deposited.

DVD-RW uses CLV-type groove-recording format, and employs the wobble groove & land pre-pit system, as does DVD-R, for rotation control and address information during recording.

For this, so-called LPPs (Land Pre-Pits) are provided on certain locations in the land areas, and the groove has a minutely undulating structure called "wobble." The wobble is mainly used for rotation control of the disc, and the frequency of the wobble signal is 8 times that of the sync frame (8 cycles in one sync frame). LPPs are located from the first to the third bits of the sync frame at the maximum oscillation of the wobble, and these three bits and one ECC (error correction code) comprise preaddress information.

Table 1 shows the basic specifications of DVD-RW. The specifications, such as the form of the disc, 4.7 GB/side recording capacity, 0.4 µm minimum pit length, 0.74 µm track pitch, modulation method, and error-correcting code, are the same as those of DVD-ROM. The recording and playback wavelengths are both 635/650 nm.

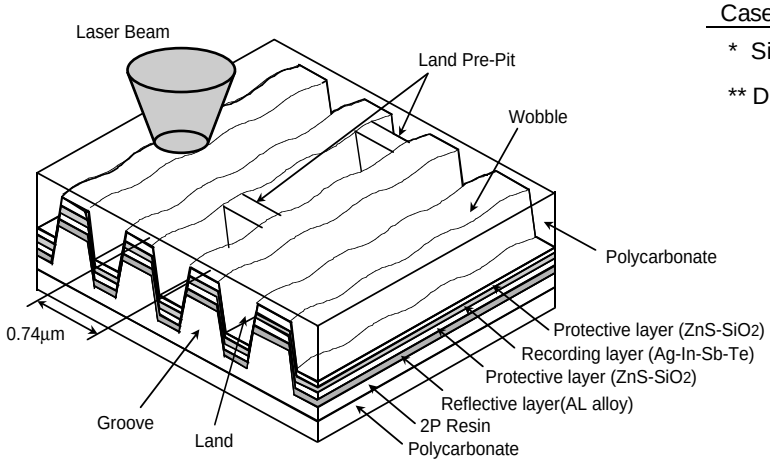


Fig. 1 Structure of DVD-RW disc

As to the characteristics after recording, the reflectivity is within the standard value of a dual-type DVD-ROM, and the specifications for modulation and jitter are the same as those of DVD-ROM format. Moreover, as the tracking system during playback, phase-difference tracking is employed, analogous to DVD-ROM.

Table 1 Basic Specifications of DVD-RW

Item	Specifications of DVD-RW	Specifications of DVD-ROM
Media Type	Phase Change Re-writable	Read Only
Diameter	120/80mm	←
Pre-format	Wobble & LPP	--------
Spindle Control	CLV	←
User Data Capacity	4.7G/1.46Gbytes	8.54Gbytes **
Recording Rate	11.08Mbps	←
Record Wave Length	635/650nm	--------
Playback Wave Length	635/650nm	←
Write Power	– 15mW	--------
Track Pitch	0.74 µm	←
Minimum Pit Length	0.4 µm	←
Data Modulation	8-16 Modulation	←
Reflectivity	18 – 30%	45-85%* 18-30%**
Case or Cartridge	Option	--------

* Single Layer Disc

** Dual Layer Disc

3.2.2 Video Recording Format

The DVD Forum created the DVD-Video format as an application format. As this format was created mainly for the authoring systems for a PC environment and intended to reduce the burden on playback-only players, its data structure is not suitable for real-time recording. As the DVD-Video format was for ROM discs, which do not require addition of descriptions or edition by users, its fairly complex structure posed little trouble for authoring systems. Therefore, the format contained various items that allowed content producers to use various functions, such as multiangle, multistory, various menus, multilanguage, commands, and high picture/sound quality.

In comparison, in considering the use for general users' recording/playback use, such as VCR, Camcorder, and MD, the Video Recording format was defined to respond to the following requests:

1. Real-time recording
2. Easy to edit/operate
3. High picture quality
4. Efficient usage of available area on a disc

Table 2 shows the outline of Video Recording format data.

Table 2 General Specifications of Presentation Data

Data Systems	MPEG-2 system stream / program stream Maximum program_mux_rate = 10.08Mbps				
Video	number of stream	: 1			
	compression	: Complies with MPEG-2 or MPEG-1			
	bit rate MPEG-2	: 9.80 Mbps or less			
	bit rate MPEG-1	: 1.856 Mbps or less			
Audio	number of streams	: 2 max			
	coding mode	: Linear PCM / Dolby AC-3 / MPEG			
		Linear PCM	Dolby AC-3	MPEG-1	MPEG-2
	sampling frequency	48kHz	48kHz	48kHz	48kHz
	bits per sample	16bits	compressed	compressed	compressed
	bit rate (max.)	1.536Mbps	448 kbps	384kbps	912kbps
	number of channels	2 max.	5.1 max.	2 max.	7.1 max.
Sub-picture	number of streams	: 1 max.			
	data type	: Run-length coded bitmap , 2-bit/pixel			
	data size of a picture	: 52KB max.			
	display area	: a rectangular in a frame			
	TV system with 525 / 60	: 720(H) × 478(V) max.			
	TV system with 625 / 50	: 720(H) × 537(V) max.			
	colors	: 16 colors palette for each VOB			

Fig. 2 shows a recorded content model. The original represents an image of a group of titles previously recorded on a VCR and now actually recorded on a disc. Up to 99 titles can be recorded on a disc. A title may be actually recorded on noncontinuous areas, but for users, it appears to be recorded continuously.

The play list is a program created from time information of actual original titles, and a virtual title is composed only of management information.

Any portions of titles can be selected in any order with accuracy to one video frame in a play list. Up to 99 play lists can be created. Both original titles and play lists can contain chapters.

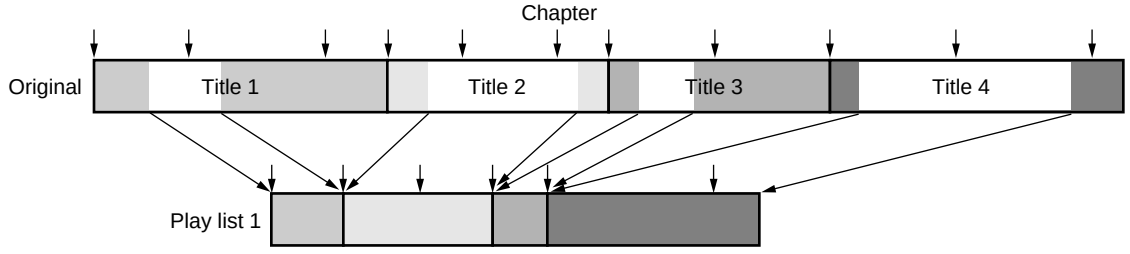


Fig. 2 Recorded content model

3.2.3 Main Newly Developed Features

3.2.3.1 Pickup

In addition to DVD-R/RW recording and DVD-ROM playback, the newly developed pickup can play back CD media. The laser diodes are provided separately for DVD and CD, but one lens is used for both.

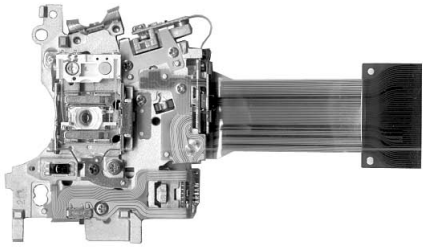


Fig. 3 Pickup

3.2.3.2 LSI for Process of Recording Signals

The conventional structure of 3 chips and a discrete circuit has been integrated into 2 chips, realizing performance stabilization and cost reduction.

RECORDER DRIVE
MAIN
IC109 PM0025AF

RECORDER DRIVE
MAIN
IC602 PE5131A

Fig. 4 A2-Chip R3-Chip

3.2.3.3 Video Decoder LSI

A video decoder LSI for high-quality conversion of analog video signals to digital signals has been newly developed. By mounting a 10-bit/27-MHz video ADC, higher accuracy and better stabilized reproduction of luminance and color have been realized.

MAIN Assy
IC8008 PD0272A

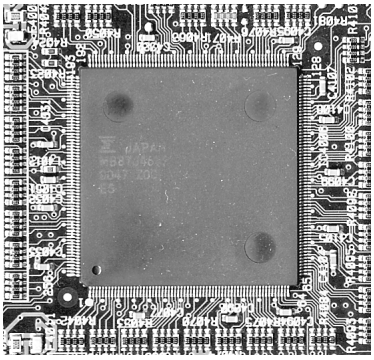
Fig. 5 George

3.2.3.4 MPEG Video Encoder LSI

A new MPEG video encoder LSI, which enables recording in 3/4-D1 and 2/3-D1 resolutions in addition to conventional full-D1 and 1/2-D1 resolutions available with the conventional MPEG-2 encoders, has been developed. This offers more options of resolutions suited to length of recording, and enables higher picture quality even with longer recording. It also reduces load on the host CPU by substituting multiplexed processing of video and audio data for it, and contributes to cost reduction by assuming the DV codec function.

3.2.3.5 Graphics Engine LSI

An LSI for graphics processing, such as full-resolution GUI and the reduced-size-moving-picture-capture function, has been newly developed for easier operation and an easy-to-understand user interface. This can dramatically improve UI expression. This LSI also has high-quality picture features, such as frame TBC (Time Base Corrector) and 3DNR (Digital Noise Reduction).



MAIN Assy
IC4006 PD6342A

Fig. 4 Vaikilt

3.2.3.6 Drive Interface LSI

Conventionally, SCSI was employed as a drive interface, and was controlled by a dedicated LSI and CPU. Transfer of data was managed by the host CPU.
Now, ATAPI has been employed as the drive interface, and a new LSI has been developed. By transferring management of data transfer to the LSI, drive-control functions have been converged to the LSI, thus reducing load on the host CPU and contributing to cost reduction.

MAIN Assy
IC3003 PE5219A

Fig. 7 Slalom

3.2.3.7 LPCM Audio Recording

The DDCE (Dolby Digital Consumer Encoder) has been conventionally employed for audio encoding, and now LPCM (Linear PCM) audio recording has been created as an algorithm for AV encoding, enabling audio recording more faithful to the original sound.

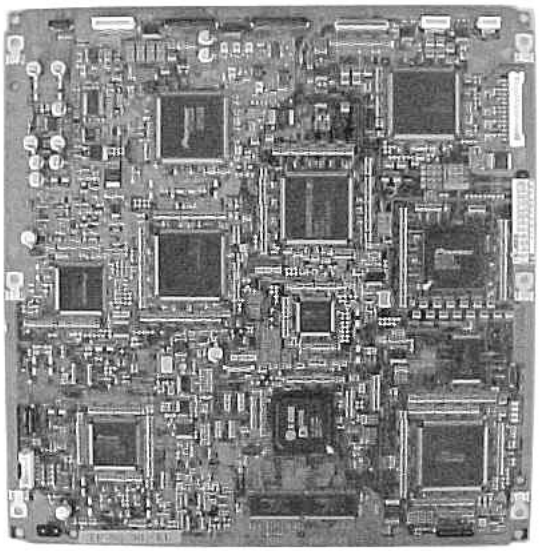


Fig. 8 MAIN Assy

3.2.4 System Control Structure

Fig. 9 shows a system block diagram of the DVR-7000. The system is roughly divided into two blocks: the writer block (which writes in and reads out data to and from a disc), and the recorder block (which encodes/decodes video and audio signals and generally controls the whole system, including UI).

3.2.4.1 Structure of the Control System

Although the DVR-2000 contained 6 CPUs, including the one controlling DV, the DVR-7000 contains the following 3 CPUs (see Fig. 10):

(1) Recorder Main CPU
For control of the whole system, such as recording and playback operations, including control of each CPU, and user interface

(2) Read/Write Control CPU
For control of read out/write in from/to a disc.

(3) Tuner/FL Control CPU
For control of the tuner, FL, 3-D Y/C, and keys of the main unit, and for management of time and timer setting

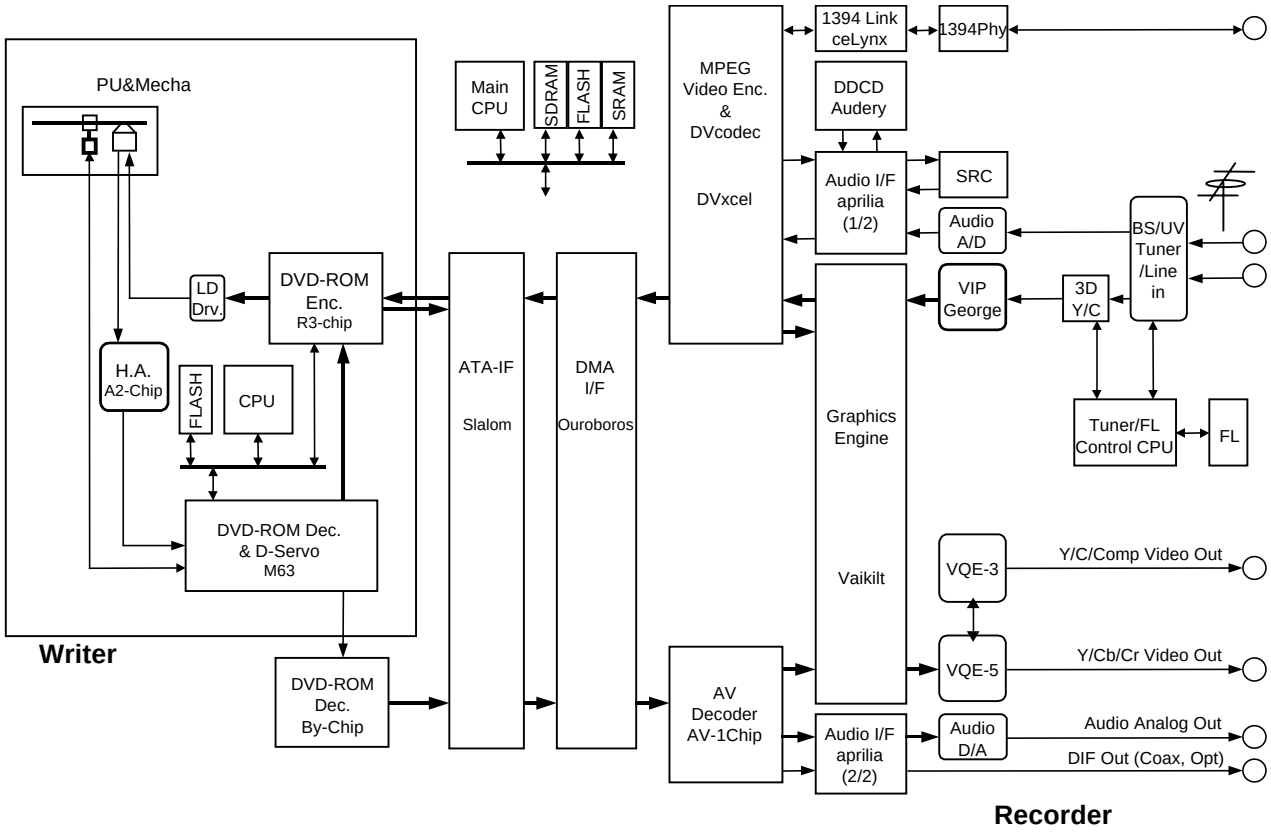


Fig. 9 System block diagram

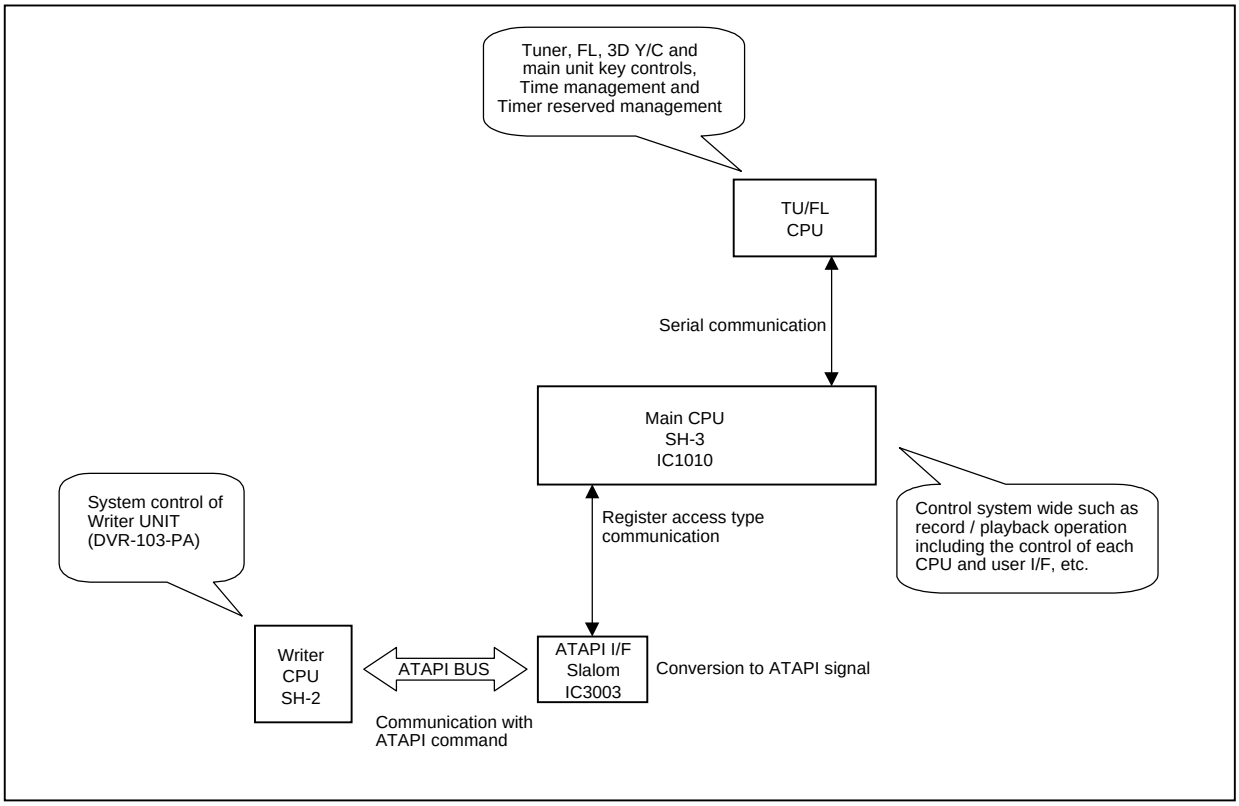


Fig. 10 CPU control share

3.2.4.2 Recording System

The basic flow of data with the DVR-7000 is similar to that with the DVR-2000. Recordable media are DVD-R (Ver. 2.0) and DVD-RW (Ver. 1.0/1.1), and recording application formats are Video Recording Format (DVD-VR) and Video Mode Recording Format. Only Video Mode Recording is possible with DVD-R discs, and DVD-VR recording is possible with DVD-RW discs (Video Mode Recording is also possible with Ver. 1.1 DVD-RW discs). The available recording speed to discs is normal speed.

In DVD-VR recording, analog video and audio line input signals or analog video and audio signals detected by the tuner are AD-converted, input to the Graphics Engine LSI, processed with the frame TBC and 3DNR, then encoded and multimplexed in real time. In the video and audio encoding block, based on the set recording length or recording bit rate, the most suitable encoding parameter is determined, and MPEG video encoding is made by variable bit rate (VBR). Compressed video stream and audio stream compressed by DDCE (Dolby Digital Consumer Encoder) are then packed and multiplexed, and are formed into a basic VOB (video object) conforming to the Video Recording Format. In the video stream, necessary information stipulated in the Video Recording Format, such as RDI (Real-time Data Information) in a VOB, is described. Everything up to this process is done by the MPEG Encoder LSI. A stream sent from this MPEG Encoder LSI is temporarily stored in the SDRAM (stream buffer) of the ATAPI interface LSI. The main CPU controls transfer so that the downstream will not overflow, and the temporarily stored stream is then transferred to the writer block via the ATAPI bus. As actual recording to a disc is done intermittently, a write command is issued when data reach certain amount, and a mass of data are transferred simultaneously.

The data is formatted into the DVD physical format in the DVD-ROM encoder of the writer block, then actually recorded on a disc with the most suitable emission power of the laser diode and the strategy. On the disc, data are recorded intermittently in blocks, and these data blocks are linked with no linking loss.

In actual operation, one title is created by one sequence of a user's starting recording through stopping recording. If recording is paused, a chapter will be created. If the disc is removed from the unit, the management information (file system and VR_MANGR.IFO, etc.), which is managed by the main CPU and which is necessary to play back the recorded video and audio signals, will be recorded on the disc. Editing can be made on the originals and play lists. For editing of a play list, only management information is updated and rewritten, and VOBs are not rewritten. Thus, nondestructive editing is possible.

3.2.5 Playback System

3.2.5.1 DVD Playback

The path for transferring AV decoder data in the DVR-7000 has largely been modified from that of the DVR-2000.

The path of DVD-video playback is the same as that of conventional DVD-video playback: The RF signal read out from a disc is converted into NRZI (non return to zero inverse) signal after passing through the preamplifier, then is sent to the recorder block; There, the DVD physical format is decoded. Then in the AV decoder, the signal is decoded into digital video and audio data. This is basically the same path as that the DVD-video player uses to play back a DVD-video disc. The playback speed is normal speed.

During playback of a DVD-VR, the data-transfer path from the writer block is the same as that in recording (via the ATAPI bus).

The RF signal read out from a disc is processed up to DVD physical formatting in the writer block, transferred via the ATAPI bus, and is temporarily stored in the SDRAM (stream buffer) of the ATAPI interface LSI. Then, the data are transferred to the AV decoder and decoded to video and audio digital data. Thus, for DVD-VR, the same path is used for recording and playback during data transfer from the recorder to the writer blocks. The playback speed of DVD-VR is double normal speed (only for DVD-VR).

The AV-decoded data pass through the same path regardless of the applications used. The digital video signal enters the Graphics Engine LSI, where the overlay process with the GUI & OSD takes place. If a disc-navigation display is called by the user, video capture and multiscreen display processes are executed for the designated frame (random designation possible) of each title. Then, the digital video signal is processed with 3DNR in the NTSC Encode LSI to be output as an analog video signal.

As to the audio signal, audio digital data to be output as an analog signal are decoded in the AV decoder, and audio digital data to be output as a digital signal are DIF-modulated after being decoded in the AV decoder, then either signal goes to the AUDIO interface LSI, where the signal to be output as a digital signal undergoes a switching process, and for the signal to be output as an analog signal, data are gathered for the level meter and switching process is executed. The signal is then output through the DAC.

3.2.5.2 CD/Video-CD Playback

Playback of CD media is newly added for the DVR-7000. The basic data flow is similar to that of a DVD-video player. Playback speed of CD media is 4 times normal speed in CAV.

As to CD-DA playback, the RF signal read out from a disc is EFM-demodulated in the writer block. Then the signal to be output as an analog signal is sent to the recorder block as a 3-line serial signal of IEC60958 format, and the signal to be output as a digital signal is DIF-modulated in the writer block and then is sent to the recorder block.

The signal to be output as an analog signal via the Audio interface LSI enters the SRC, where the sampling rate is converted from 44.1 kHz to 48 kHz. Then, the signal enters the Audio interface LSI again, and is finally output through the DAC. The signal to be output as a digital signal also undergoes a switching process in the Audio interface LSI, and then is output as DIF.

As to Video-CD playback, as with CD-DA playback, the RF signal read out from a disc is EFM-demodulated in the writer block. Then the CD-ROM data for Video-CD is then sent to the recorder block as a 3-line serial signal of IEC60958 format, as with the signal to be output as an analog signal. In the recorder block, the data are first decoded then sent to the AV decoder, where the data are decoded into video and audio digital data. Then, the data pass and are processed in the same way as with DVD playback and are then output.

3.2.6 Newly Added Functions and Specifications

The following functions and specifications are newly added to the DVR-7000, compared with the DVR-2000.

3.2.6.1 CD/Video-CD Playback

As mentioned before, the newly developed pickup for DVD-R/RW recording, responding to two wavelengths, makes it possible to play back CD media. The basic functions are the same as those of DVD-Video players.

3.2.6.2 Progressive Output

For the video output stage, the same chip set as that for the DV-S737 is employed, and the D2 terminal is mounted to respond to the progressive output. Therefore, the same functions as with the DV-S737, such as 2-3 pull-down progressive scan and movement-adaptable-type interpolation processing functions, are provided, and the 10-bit/54-MHz video DAC is included. It also has functions such as component-frame DNR and quantum noise reduction.

3.2.6.3 Picture Creation

The Picture Creation function, which integrally controls LSIs for video input and output and settings of various NRs and which realizes the highest recording and playback picture quality by making picture-quality settings to best suit the video content, is provided. The most suitable picture-quality setting is possible with a simple operation.

3.2.6.4 Recording in 3/4-D1 and 2/3-D1 Resolution

As mentioned before, a newly developed MPEG video encoder LSI enables recording in 3/4-D1 and 2/3-D1 resolutions in addition to the conventional full-D1 and 1/2-D1 resolutions available with the conventional MPEG-2 encoders. This offers more options of resolutions suited for length of recording, and enables higher picture quality even with longer recording.

3.2.6.5 LPCM Recording

In addition to the conventionally used DDCE, LPCM recording is provided to the DVD-recorder. This enables audio recording more faithful to the original sound. LPCM recording is possible only with MN32 recording rate.

3.2.6.6 Full-resolution GUI

The newly developed Graphics Engine LSI with full-resolution GUI functions dramatically improves the power of expression. In combination with the reduced-size-moving-picture-capture function, an easy-to-operate and high-quality User Interface has been realized.

3.2.6.7 Special Playback

To improve the operability and performance as an editing machine, various special playback functions and performance are provided. Besides frame-by-frame playback in forward and reverse, special playback functions, such as 1/2-, 1/4-, 1/8-, and 1/16-time playback in forward and reverse, and reverse playback at normal speed in full resolution are possible.

3.2.7 Other Features and Specifications

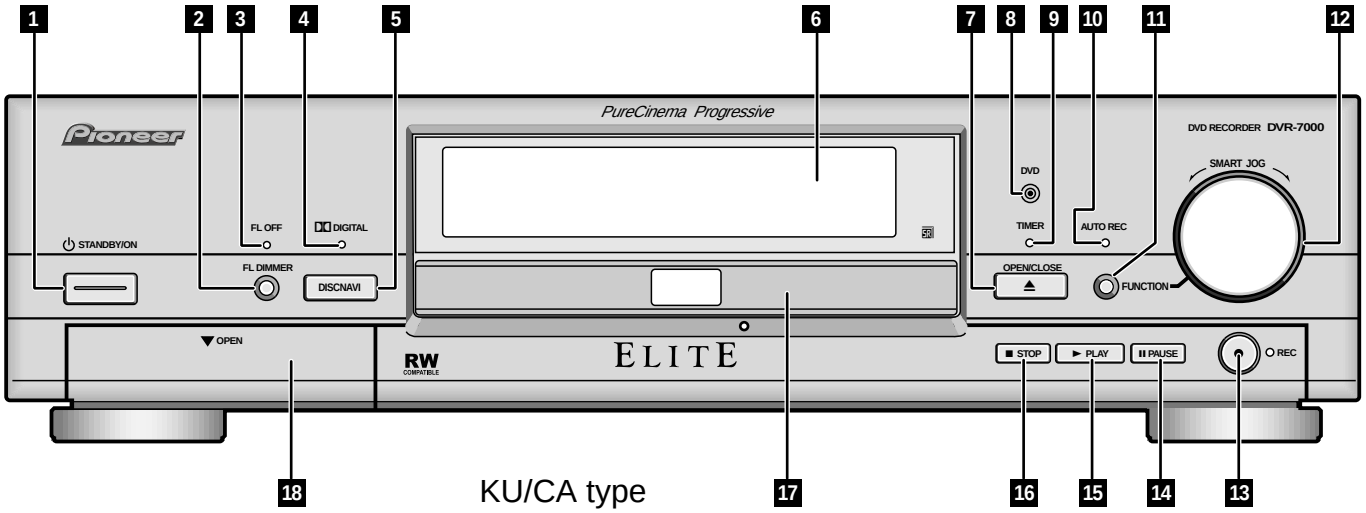
Other conventional features and specifications are as follows:

- 96-kHz/24-bit DAC
- 48-kHz/20-bit ADC
- 3-Dimensional Y/C-separation circuit
- Frame TBC
- Responding to the DV (iLink) input/output
- Built-in BS tuner
- Disc Navigator
- Disc timer
- Commercial skip

4. PANEL FACILITIES AND SPECIFICATIONS

4.1 PANEL FACILITIES

■ FRONT PANEL



KU/CA type

1 ⏻ STANDBY/ON button

2 FL DIMMER button
Press to change the display brightness

3 FL OFF indicator
Lights when the display is switched off using the FL DIMMER button

4 DOLBY DIGITAL indicator
Lights when a Dolby Digital soundtrack is playing

5 DISCNAVI button
Press to display the Discnavi screen

6 Display

7 OPEN/CLOSE ⏏ button
Press to open/close the disc tray

8 DVD indictor
Lights when a DVD disc is loaded

9 TIMER indicator
Lights when the record timer is set and the power is in standby

10 AUTO REC indicator
Lights when the recorder has been set for automatic recording

11 FUNCTION button
Press to switch the function of the SMART JOG

12 SMART JOG control
Turn to change the parameter selected with the FUNCTION button

13 REC button/indicator
Press to start recording

14 ❚❚ PAUSE button
Press to pause playback or recording

15 ► PLAY button
Press to start or restart playback

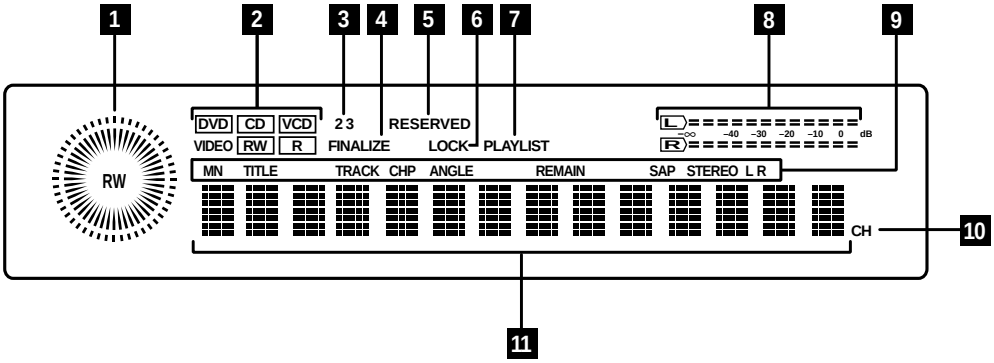
16 ■ STOP button
Press to stop playback or recording

17 Disc tray

18 Front panel jacks
Analog and digital input/output jacks for connecting a camcorder or other external equipment

RW
COMPATIBLE
This indicates a product feature that is capable of playing DVD-RW discs recorded with Video Recording format.

■ DISPLAY



1 Play/record indicator
Outer (white) ring indicates the playback speed and direction. Inner (red) ring indicates elapsed playback/recording time

The center RW indicator lights when a VR mode disc is loaded

2 DVD CD VCD VIDEO RW R
Shows the type of disc loaded

3 2 3
Shows the remote control mode (if nothing is displayed, the remote control mode is 1)

4 FINALIZE
Lights when a finalized disc is loaded

5 RESERVED
Lights when a disc containing a disc timer program is loaded

6 LOCK
Lights when the child lock is active

7 PLAYLIST
Lights when a VR mode disc is loaded and the recorder is in Playlist mode

8 Audio level indicators
Monitors the ouput audio level during playback and the input audio level during recording

9 MN
Display shows the manual rate recording level

TITLE
Display shows the current title number of the DVD disc playing

TRACK
Display shows the current track number of the CD or Video CD disc playing

CHP
Display shows the current chapter number of the DVD disc playing

ANGLE
Lights when a multiangle scene on a DVD disc is playing, indicating that you can switch angles

REMAIN
Display shows the amount of recording time available on the disc loaded

SAP
Lights when the currently selected TV channel has a Secondary Audio Program channel

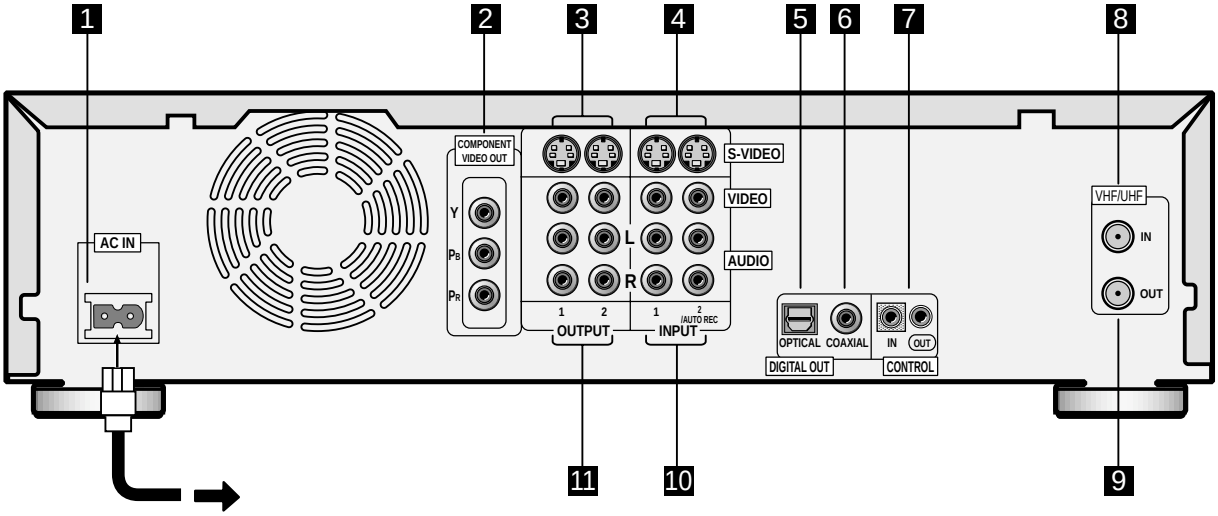
STEREO
Lights when the incoming TV signal is stereo

L R
Indicates which channels are recorded/played back when Dual Mono is selected.

10 CH
Channel indicator for the built-in TV tuner

11 Character display

■ REAR PANEL



1 AC IN – Power inlet

2 COMPONENT VIDEO OUT
For connecting to a TV or monitor that has component video input

3 S-VIDEO OUTPUT 1, 2
For connecting to a TV, monitor, AV receiver or other equipment with S-Video input

4 S-VIDEO INPUT 1, 2
For recording from a camcorder, VCR or other equipment with S-Video output

5 DIGITAL OUT OPTICAL
For connecting to an AV receiver, Dolby Digital/ DTS decoder or other equipment with optical digital inpu

6 DIGITAL OUT COAXIAL
For connecting to an AV receiver, Dolby Digital/ DTS decoder or other equipment with coaxial digital input

7 CONTROL IN / OUT
Use for connecting to other Pioneer components bearing the Pioneer mark. Connect the CONTROL OUT of one component to the CONTROL IN of another using a mini-plug cord. The device at the beginning of the chain acts as the remote control sensor for everything in the chain.

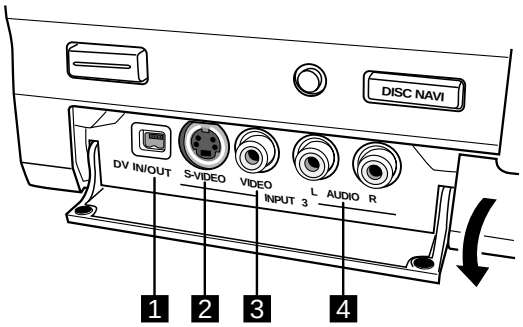
8 VHF/UHF IN
Connect the TV antenna here

9 VHF/UHF OUT
Passes the signal from the VHF/UHF IN to your TV/monitor

10 AUDIO/VIDEO INPUT 1, 2/AUTO REC
For recording from a camcorder, VCR, satellite receiver or other equipment

11 AUDIO/VIDEO OUTPUT 1, 2
For connecting to the audio and video inputs of a TV, monitor, AV receiver or other equipment

■ FRONT TERMINAL



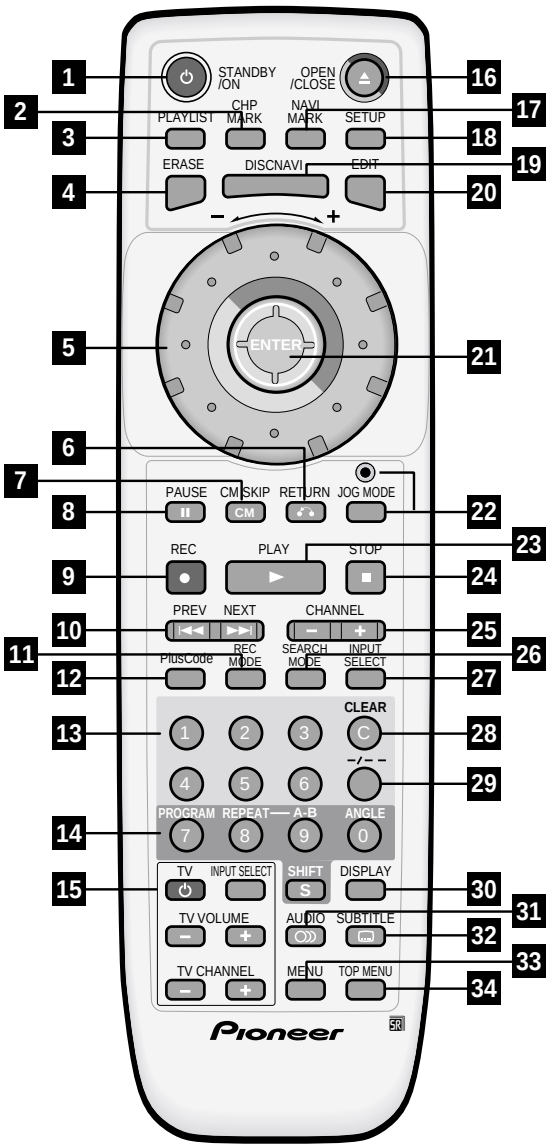
1 DV IN/OUT jack
A combined input and output jack for connecting a digital camcorder. See page 19 for details.

2 S-VIDEO input (INPUT 3)
Connect to an S-Video output of an external component.

3 VIDEO input (INPUT 3)
Connect to a composite (standard) video output of an external component.

4 AUDIO L/R (INPUT 3)
Connect to a stereo pair of audio outputs of an external component.

■ REMOTE CONTROL



1 ⏻ STANDBY/ON
Switches the recorder on/into standby

2 CHP MARK
Inserts a chapter marker when playing/recording a VR mode DVD-RW disc

3 PLAYLIST
Switches beween Original and Playlist

4 ERASE
Shortcut to the erase function in the Discnavi or Title List screen

5 Jog dial
Controls scanning/slow motion speed and direction, and frame advance/reverse

6 RETURN
Returns to the previously displayed on-screen display

7 CM SKIP
Skips 30 seconds forward on the disc (about the length of a typical TV commercial)

8 ❚❚ PAUSE
Pauses playback or recording

9 ● REC
Starts recording. Press repeatedly to set the recording time

10 I◄◄ PREV
Track or chapter skip/displays the previous page of a menu

►►I NEXT
Track or chapter skip/displays the next page of a menu

11 REC MODE
Switches the recording mode between SP to MN for a VR mode disc, or between V1 and V2 for a Video mode disc

12 PlusCode (G-code for LB type)
Press, then use the number buttons to enter a PlusCode(G-code for LB type) programming number for timer recording

13 Number buttons

14 PROGRAM (Press SHIFT first to access)
Displays the program play screen

REPEAT (Press SHIFT first to access)
Selects the repeat play mode

A-B (Press SHIFT first to access)
Marks a loop for looped playback

ANGLE (Press SHIFT first to access)
Switches camera angles on discs with multi-angle scenes

SHIFT
Press first to access the above functions

15 TV controls
Use this remote to control your TV

16 ⏏ OPEN/CLOSE
Opens/closes the disc tray

17 NAVI MARK
Selects a thumbnail picture for the current title for use in the Discnavi screen

18 SETUP
Displays the Setup menu

19 DISCNAVI
Displays the Discnavi screen

20 EDIT
Shortcut to the editing functions within the Discnavi or Title List screen

21 Joystick / ENTER
Use the joystick to navigate all on-screen displays. Press ENTER to select the currently highlighted option.

22 JOG MODE button and indicator
Switches the Jog dial between scanning and frame advance mode

23 ► PLAY
Starts playback

24 ■ STOP
Stops playback/recording

25 CHANNEL –/+
Changes the channel of the built-in TV tuner

26 SEARCH MODE
Allows searching of the disc by title, chapter, track, time, etc.

27 INPUT SELECT
Changes the input to use for recording

28 CLEAR
Clears the current setting, etc.

29 –/—
Press, then use the number button to enter a two-digit channel number

30 DISPLAY
Displays/changes the on-screen information displays

31 AUDIO
Changes the audio language or channel

32 SUBTITLE
Displays/changes the subtitles included in multilingual DVD-Video discs

33 MENU
Displays the disc menu of DVD-Video discs or the Title List screen of Video mode DVD-R/RW discs

34 TOP MENU
Displays the disc ‘top’ menu of DVD-Video discs or the Title List screen of Video mode DVD-R/RW discs

4.2 SPECIFICATIONS

General

System ..... DVD-Video, DVD-R/RW, Video-CD, CD
Power requirements ..... 120 V, 60 Hz(for KU/CA type)
Power requirements ..... 110 V, 60 Hz(for LB type)
Power consumption ..... 65 W
Power consumption in standby mode ..... 1.5 W (FL off)
Weight ..... 7.0 kg
Dimensions ..... 420 (W) x 107 (H) x 373.5 (D) mm
Operating temperature ..... +5°C to +35°C
Operating humidity ..... 5% to 85% (no condensation)
TV format ..... NTSC

Recording

Recording format ..... DVD VideoRecording
DVD-VIDEO
Recordable discs ..... DVD-ReRecordable
DVD-Recordable
Video recording format
Sampling frequency 13.5MHz
Compression format ..... MPEG
Audio recording format
Sampling frequency 48kHz
Compression format ..... Dolby Digital or Linear PCM
(uncompressed)
Recording time
DVD-RW (VR mode)
Standard (SP) ..... Approx. 2 hours
Manual rate (MN) ..... Approx. 1–6 hours
DVD-R/RW (Video mode)
V1 ..... Approx. 1 hour
V2 ..... Approx. 2 hours

Tuner

Receivable channels
VHF 1–13ch
UHF 14–69ch
CATV C1–C125ch

Timer

Programs ..... 1 month/8 programs
Clock ..... Quartz lock (12-hour digital display)
Power off memory ..... Approx. 48 hours

Input/Output

VHF/UHF antanna input/output terminal ..... VHF/UHF set
75 Ω (F-shape connector)
Video input ..... Input 1,2 (rear), 3 (front)
Input level ..... 1 Vp-p (75 Ω)
Jacks ..... RCA jack
Video output ..... Output 1,2
Output level ..... 1 Vp-p (75 Ω)
Jacks ..... RCA jack
S-Video input ..... Input 1,2 (rear), 3 (front)
Y (luminance) - Input level ..... 1 Vp-p (75 Ω)
C (color) - Input level ..... 286 mVp-p (75 Ω)
Jacks ..... 4 pin mini DIN
S-Video output ..... Output 1,2
Y (luminance) - Output level ..... 1 Vp-p (75 Ω)
C (color) - Output level ..... 286 mVp-p (75 Ω)
Jacks ..... 4 pin mini DIN
Component video output
Output level ..... Y: 1.0 Vp-p (75 Ω)
P_B, P_R: 0.7 Vp-p (75 Ω)
Jacks ..... RCA jacks
Audio input ..... Input 1,2 (rear), 3 (front) L/R
Input level
During audio input ..... 2V rms
(Input impedence: more than 22kΩ)
Jacks ..... RCA jacks
Audio output ..... Output 1,2 L/R
During audio output ..... 2V rms
(Output impedence: less than 1.5kΩ)
Jacks ..... RCA jacks
Control input/output ..... Mini jack 1 each
DV input/output ..... 4 pin (i.LINK/IEEE 1394 standard)

Supplied accessories

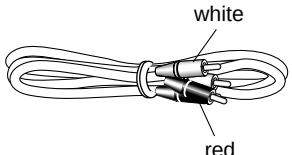
Remote control 1
Dry cell batteries (AA/R6P) 2
Stereo audio cable (red/white) 1
Video cable (yellow) 1
RF antenna cable 1
Power cable 1
DVD-RW disc (KU/CA type only) 1
Operating Instructions (for KU/CA type) 1
Operating Instructions (for LB type) 2
Warranty card (KU/CA type only) 1

Note: The specifications and design of this product are subject to change without notice, due to improvement.

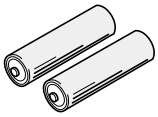
ACCESSORIES

Remote Control
(VXX2763 for KU/CA type)
(VXX2777 for LB type)

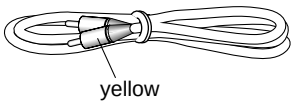
Stereo audio cable(L=1.5m)
(VDE1033)



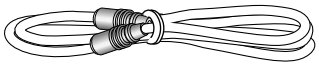
Dry cell Batteries
(R6P,AA)



Video cable(L=1.5m)
(VDE1034)



RF antenna cable(L=1.5m)
(VDE1025)



AC power cord
(ADG7021)