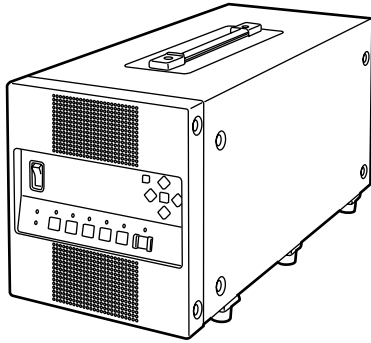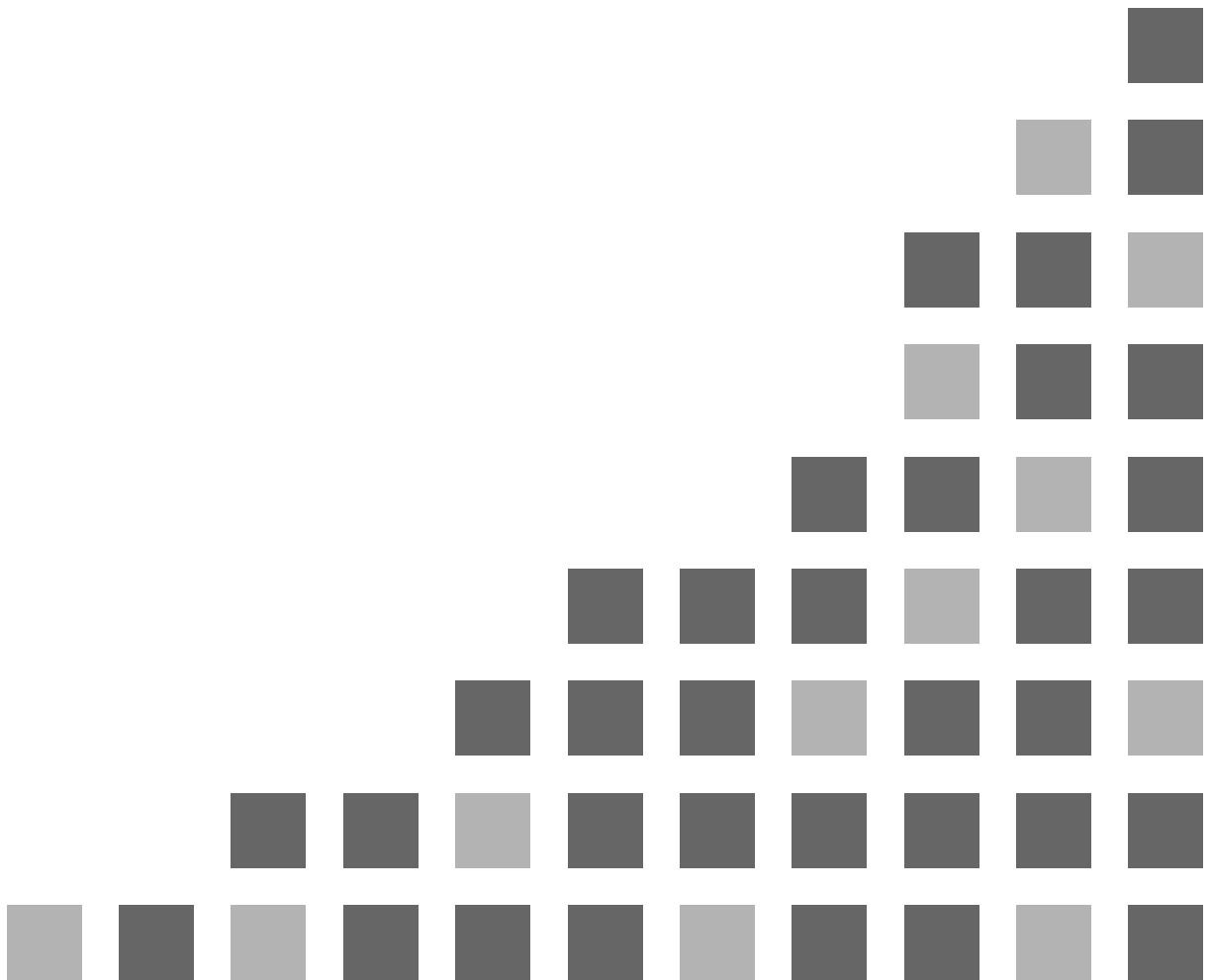# Panasonic

Frame Rate Converter

Operating Instructions

Model No. AJ-FRC27E

DVCPRO HD

Before operating this product, please read the instructions carefully and save this manual for future use.

VQT9737
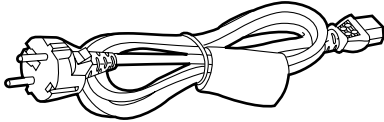
Caution for AC Mains Lead

FOR YOUR SAFETY PLEASE READ THE FOLLOWING TEXT CAREFULLY.

This product is equipped with 2 types of AC mains cable. One is for continental Europe, etc. and the other one is only for U.K.

Appropriate mains cable must be used in each local area, since the other type of mains cable is not suitable.
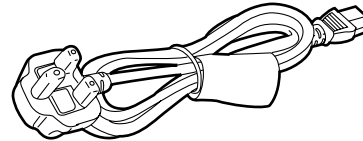

FOR CONTINENTAL EUROPE, ETC.
Not to be used in the U.K.

FOR U.K. ONLY
If the plug supplied is not suitable for your socket outlet, it should be cut off and appropriate one fitted.

FOR U.K. ONLY

This appliance is supplied with a moulded three pin mains plug for your safety and convenience.
A 13 amp fuse is fitted in this plug.
Should the fuse need to be replaced please ensure that the replacement fuse has a rating of 13 amps and that it is approved by ASTA or BSI to BS1362.
Check for the ASTA mark ⬦ or the BSI mark ▽ on the body of the fuse.

If the plug contains a removable fuse cover you must ensure that it is refitted when the fuse is replaced.
If you lose the fuse cover the plug must not be used until a replacement cover is obtained.
A replacement fuse cover can be purchased from your local Panasonic Dealer.

IF THE FITTED MOULDED PLUG IS UNSUITABLE FOR THE SOCKET OUTLET IN YOUR HOME THEN THE FUSE SHOULD BE REMOVED AND THE PLUG CUT OFF AND DISPOSED OF SAFELY. THERE IS A DANGER OF SEVERE ELECTRICAL SHOCK IF THE CUT OFF PLUG IS INSERTED INTO ANY 13 AMP SOCKET.

If a new plug is to be fitted please observe the wiring code as shown below.
If in any doubt please consult a qualified electrician.
WARNING: THIS APPLIANCE MUST BE EARTHED.
**IMPORTANT:** The wires in this mains lead are coloured in accordance with the following code:

Green-and-Yellow:	Earth
Blue:	Neutral
Brown:	Live

As the colours of the wires in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:
• The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked with the letter E or by the Earth symbol ⏚ or coloured GREEN or GREEN-AND-YELLOW.
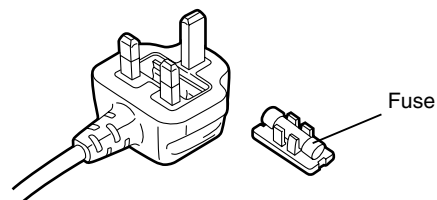• The wire which is coloured BLUE must be connected to the terminal in the plug which is marked with the letter N or coloured BLACK.
• The wire which is coloured BROWN must be connected to the terminal in the plug which is marked with the letter L or coloured RED.

How to replace the fuse
1. Open the fuse compartment with a screwdriver.
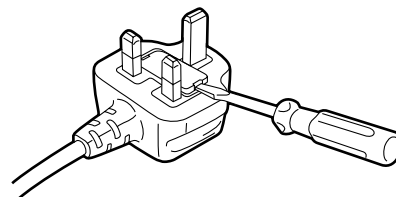
2. Replace the fuse.

Fuse

☐ indicates safety information

■ **DO NOT REMOVE PANEL COVER BY UNSCREWING.**

To reduce the risk of electric shock, do not remove cover. No user serviceable parts inside.
Refer servicing to qualified service personnel.

■ **THIS APPARATUS MUST BE EARTHED**

To ensure safe operation the three-pin plug must be inserted only into a standard three-pin power point which is effectively earthed through the normal house-hold wiring.
Extension cords used with the equipment must be three-core and be correctly wired to provide connection to earth. Wrongly wired extension cords are a major cause of fatalities.
The fact that the equipment operates satisfactorily does not imply that the power point is earthed and that the installation is completely safe. For your safety, if in any doubt about the effective earthing of the power point, consult a qualified electrician.

CAUTION:
TO REDUCE THE RISK OF FIRE OR SHOCK HAZARD, REFER MOUNTING OF THE OPTIONAL INTERFACE BOARD TO AUTHORIZED SERVICE PERSONNEL.

CAUTION:
THE SOCKET SHALL BE INSTALLED NEAR THE EQUIPMENT AND SHALL BE EASILY ACCESSIBLE.

WARNING:
TO REDUCE THE RISK OF FIRE OR SHOCK HAZARD, KEEP THIS EQUIPMENT AWAY FROM ALL LIQUIDS-USE AND STORE ONLY IN LOCATIONS WHICH ARE NOT EXPOSED TO THE RISK OF DRIPPING OR SPLASHING LIQUIDS, AND DO NOT PLACE ANY LIQUID CONTAINERS ON TOP OF THE EQUIPMENT.

CAUTION:
TO REDUCE THE RISK OF FIRE OR SHOCK HAZARD AND ANNOYING INTERFERENCE, USE THE RECOMMENDED ACCESSORIES ONLY.

CAUTION:
Do not install or place this unit in a bookcase, built-in cabinet or any other confined space in order to maintain adequate ventilation. Ensure that curtains and any other materials do not obstruct the ventilation to prevent risk of electric shock or fire hazard due to overheating.

CAUTION:
TO REDUCE THE RISK OF FIRE OR SHOCK HAZARD, REFER INSTALLATION OF HARD- DISK DRIVE TO QUALIFIED SERVICE PERSONNEL.
HARD-DISK DRIVE MUST BE BEARING THE CE-MARKING.

Contents

Operating precautions

- This unit uses a hard disk drive: prior to operation, save some data into a part of the memory that is free or load data from the drive to check that the drive is working properly.
- Since this unit uses a hard disk drive, it should never be used when condensation has formed inside.
- If the unit has not been shut down properly, the data on its hard disk drive may be destroyed or malfunctioning may result.

- Do not set the power switch back to the ON position immediately after it was set to the OFF position. Doing so may cause malfunctioning.
- After operating the unit, ensure that the area around the air intake openings on the front panel is well-ventilated and keep it adequately ventilated.
- The cooling fans at the front and back of the unit are maintenance parts: replace them at regular intervals.

Features

Frame rate conversion function

Using the HD-SDI input signals from a variable frame rate camera (AJ-HDC27F) or DVCPRO HD VTR, this unit converts frame rates by taking out only the effective frames of variable frame rate recorded clips, recording them, and playing them back. It can reproduce the slow or quick speed effects intended during shooting on the spot. Its built-in hard disk drive is capable of recording up to 100 minutes (at 24 fps) and playing back the recordings without the use of a VTR.

Format conversion function and line/down-conversion function

During playback, this unit can select a frame rate of 24, 25, 30 or 60 fps and line-convert to 1080/24p or down-convert to an existing SDTV (480/60i) format. It supports both on-line and off-line editing environments. When frame rate conversion is not needed, the unit can provide EE through conversion where the input signals are converted and output directly.

AUTO REC function

When this unit is connected to a variable frame rate camera (AJ-HDC27F) using the HD-SDI connector, each cut can be automatically recorded in the unit as a separate clip in conjunction with the REC/STOP operation of the camera. Even with editing operations undertaken in the studio, each cut can be automatically turned into a clip by using the START and END marks recorded on the tape in the variable frame rate camera to play back the cuts in a VTR and then record them in this unit. Afterwards, all that the user needs to do is choose the acceptable cuts and play them back.

Simple operation functions

Recording and playback are easily accomplished using the unit's front panel controls. The various settings can be checked or changed using the cursor keys.

External RS-422 control

When a simple remote controller (AJ-A95) is connected to the remote IN connector on the unit's rear panel, the unit can be operated by remote control using simplified remote control functions.

Half rack unit dimensions

This unit is compactly designed with a width equivalent to a half rack unit and a height of 5U. Its carrying handle enables it to be carried around for use on location. Its ability to enable the images shot to be viewed on the spot and the results of its speed effects to be monitored makes it a worthy representative of the new style of digital cinema production.

<Notes>

● This unit is not designed to meet portability (drip-proof, dust-proof) specifications. Bear in mind that operating it outdoors or moving it with its power still on may cause malfunctioning. In particular, take care to protect the hard disk drive from vibration and impact.
● If a problem has occurred with the hard disk drive, the recorded data may be destroyed or the system may not start up. Consult with your dealer, and replace the drive with a new one.

System configuration

When recording using the VTR, set the VTR in such a way that regeneration is initiated with the external time code. For further details, contact your dealer.
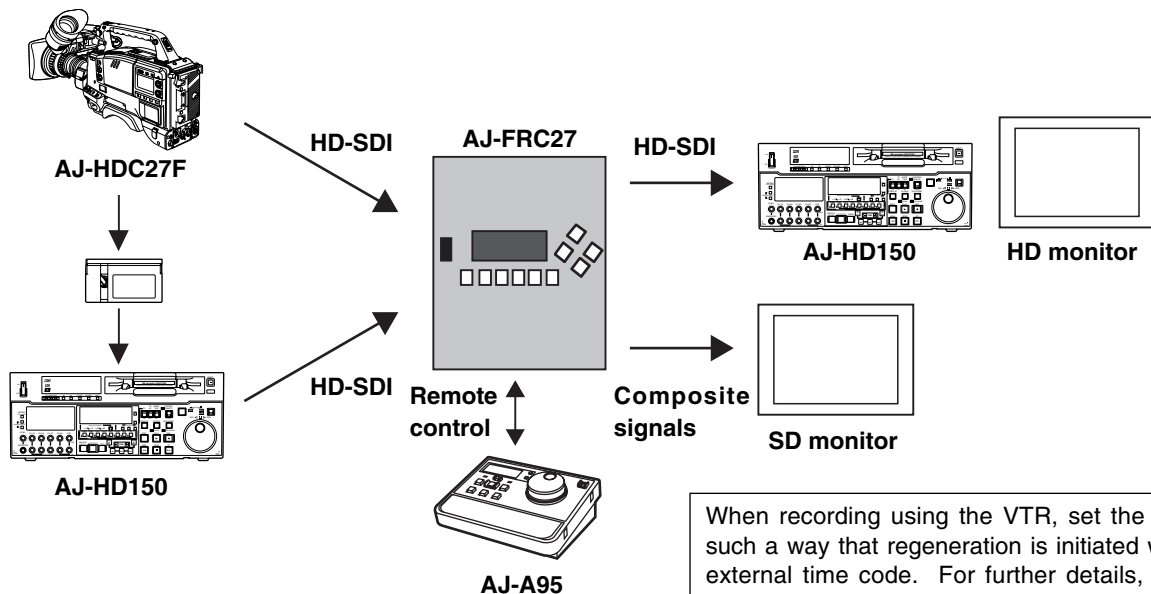
Parts and their functions

Front panel
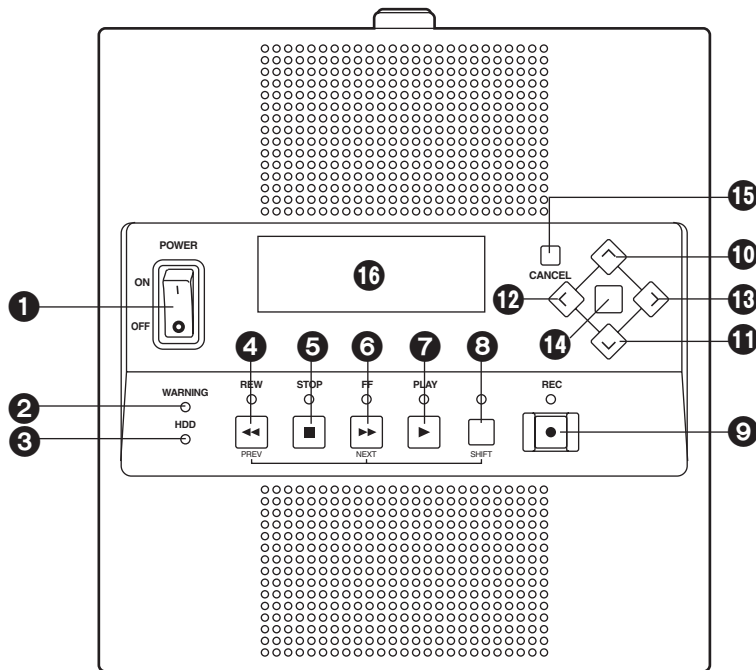
❶ POWER switch

After the unit's operation has been shut down properly, set this switch to the OFF position. If the power is turned off while the unit is operating, the data may be destroyed or the hard disk drive may malfunction.

❷ WARNING lamp

This flashes when an error or warning has occurred. For details, refer to the error table (page 19).

❸ HDD lamp

This lights when the hard disk drive is being accessed.

❹ REW key

Press this to search backward through the recorded data or search for a previous clip. To search for a previous clip, press the REW key and SHIFT key at the same time.

❺ STOP key

Press this to stop the unit's operation.

❻ FF key

Press this to search forward through the recorded data or search for a subsequent clip. To search for a subsequent clip, press the FF key and SHIFT key at the same time.

❼ PLAY key

Press this to play back recorded data, switch to the V-V mode or record new data. To record new data, press the PLAY key and REC key at the same time.

❽ SHIFT key

Press this to search for recorded data. To search for a previous clip, press the REW key and SHIFT key at the same time; to search for a subsequent clip, press the FF key and SHIFT key at the same time.

Keep pressing both the SHIFT key and the [∨] (down) key for more than 2 seconds and a shutdown confirmation message will appear on END screen of this unit.

❾ REC key

Press this to record data or forcibly switch to the E-E mode.

❿ [∧] (up) key

This is used to move the item to be shown on the display panel upward.

⓫ [∨] (down) key

This is used to move the item to be shown on the display panel downward.

⓬ [<] (left) key

This is used to move the cursor or item to be shown on the display panel to the left.

⓭ [>] (right) key

This is used to move the cursor or item to be shown on the display panel to the right.

⓮ SET key

This is used to enter the item shown on the display panel.

⓯ CANCEL key

This is used to restore the screen immediately before the one now shown.

⓰ Display panel

The basic screens and menu screens (page 10) appear on this panel.

Parts and their functions

Rear panel
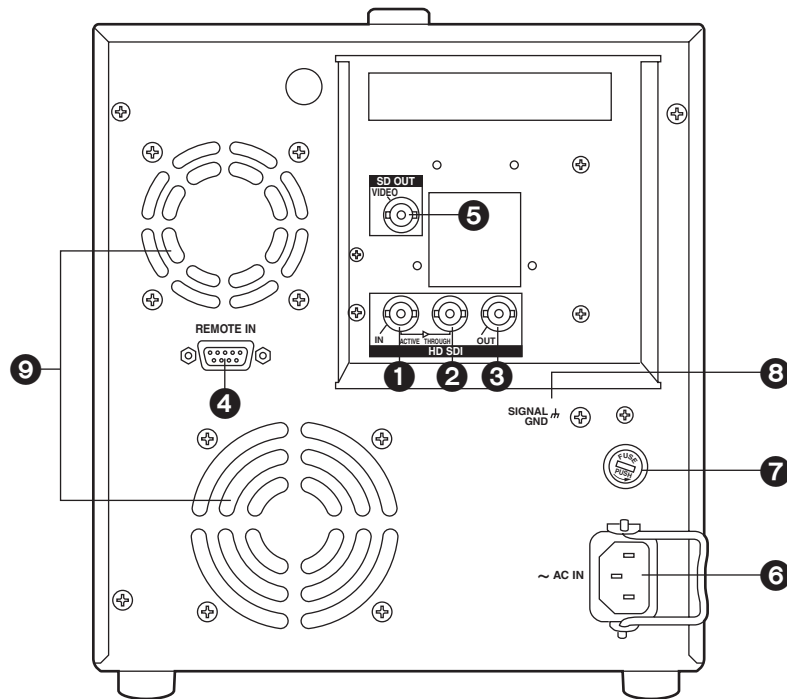
❶ HD SDI IN connector (BNC)
The HD SDI signals are supplied to this connector.

❷ HD SDI through connector (BNC)
The HD SDI input signals are passed straight through the unit and output here.

❸ HD SDI OUT connector (BNC)
The HD SDI signals are output from this connector.

❹ REMOTE IN (RS-422) connector
The remote controller is connected to this connector. The only commands supported in the remote control mode are FF, REW, STOP, PLAY, REC and SHTL.
<Note>
Functions that cannot be used when an external control unit is used
● Clip location function initiated by pressing the SHIFT key and FF or REW key at the same time
● Eject control function initiated by pressing the SHIFT key and REW key on the remote controller (AJ-A95)

❺ SD OUT VIDEO connector
The down-converted signals are output from this connector.

❻ AC IN socket
The power cord is connected to this socket.

❼ FUSE holder
This contains a 3.15A fuse.

❽ SIGNAL GND
To minimize noise, this is connected to the signal ground on the component connected. It is not a safety ground.

❾ Fan motors
These are used to cool down the unit.

Basic operations

Startup

1. Set the power switch to the ON position.

2. The following message appears on the display panel.

```
Panasonic  AJ-FRC27

  Now  Booting/✷✷✷...
```

3. When startup is completed normally, the following display appears on the display panel.

```
05141501   00:00:00:00

720/60P    STOP       >
```

Recording

There are two recording mode settings: AUTO REC ON where data is recorded automatically in accordance with the variable frame rate camera, and AUTO REC OFF where data is recorded manually.
When new data is recorded, it is always recorded under a new clip name. The clip name is shown on the display panel in the form of a date and time.
Example:
The name of the clip whose recording started on May 14 (2002) at 15 hr 01 min 30 sec appears as "05141501."

If the remaining memory is reduced to under one minute (equivalent to 60p) during recording when ON has been selected as the ALARM setting on the setup menu, the "DISK FULL" message is displayed, and the alarm sounds. When there is no more free memory remaining, recording is stopped.
<Note>
When the variable frame rate camera's frame rate has been switched from 23P to 24P or from 25P to 24P, the screen may be subject to an instantaneous disturbance as an E-E output. Bear this in mind when switching the frame rate during recording if the unit's output signals are recorded on an external VTR.

■ When AUTO REC is set to ON

1. Check that the HD SDI signals are being input from the variable frame rate camera.
2. Select ON as the AUTO REC setting on the setup menu.
3. Return to the basic screen, and press the REC key to set the unit to the recording standby mode (both the REC and STOP lamps now light).
   The data recording is now automatically controlled by the AUTO REC flag set in the HD SDI signals. (While recording is in progress, both the REC and PLAY lamps light.)

Control flow when AUTO REC is set to ON
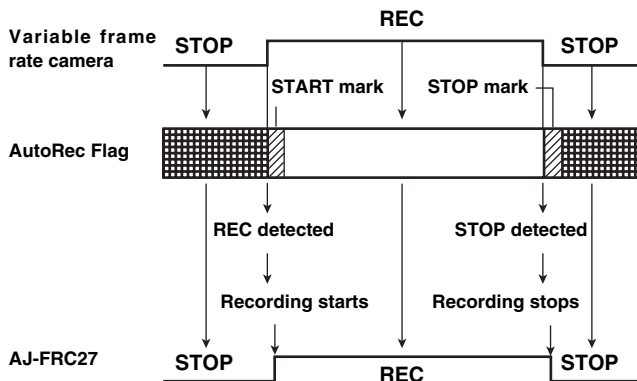
● Variable frame rate camera in REC mode:
  When the unit detects the REC START signal, recording starts automatically.
● Variable frame rate camera in STOP mode:
  When the unit detects the STOP signal, recording stops automatically.

7 (E)

Basic operations

Recording (continued)

■ **When AUTO REC is set to OFF**

1. Check that the HD SDI signals are being input from the variable frame rate camera.
2. To start recording data, press the REC and PLAY keys. (Both the REC and PLAY lamps light.)
3. To stop the data recording, press the STOP key. (Only the STOP lamp lights.)

Mode Operation/control data	Auto Rec=ON		Auto Rec=OFF	
	Operation	**Display**	**Operation**	**Display**
REC+PLAY	Forced recording (released when AUTO REC mode is established)	REC+PLAY lamps light	Forced recording	REC+PLAY lamps light
REC	Recording standby mode	REC+STOP lamps light	EE mode	STOP lamp lights
Start Flag	Recording starts	REC+PLAY lamps light	No opera-tion	No change
Stop Flag	Recording stops	REC+STOP lamps light	No opera-tion	No change
STOP	Stop (released when AUTO REC mode is established)	Only STOP lamp lights	Stop	Only STOP lamp lights

Basic operations

Playback

■ To play back a clip immediately after startup

When the PLAY key is pressed, the selected clip is played back.
<Note>
In the playback mode established immediately after startup, the first clip recorded in the unit is selected. No clips are selected immediately after all the clips have been cleared.
- When the SHIFT key and FF key are pressed at the same time, the next clip is selected.
- When the SHIFT key and REW key are pressed at the same time, the previous clip is selected.

■ To play back a clip after it was recorded

Immediately after a clip has been recorded, the unit is at the final recording position of that clip.
To return to the beginning of the currently selected clip, press the REW key and SHIFT key at the same time.

■ To play back a different clip after clip playback and recording

Select the clip to be played back.
- When the SHIFT key and FF key are pressed at the same time, the next clip is selected.
- When the SHIFT key and REW key are pressed at the same time, the previous clip is selected.

■ Loop playback mode and normal playback mode

There are two playback modes: the loop playback mode (LOOP PB=ON) and the normal playback mode (LOOP PB=OFF). Set the mode on the setup menu.
- **Loop playback mode (LOOP PB=ON)**
  All the clips are played back continuously in sequence starting with the currently selected clip.
  To stop clip playback press the STOP, REW or FF key.
- **Normal playback mode (LOOP PB=OFF)**
  In this mode, playback of the selected clips starts from the current position to the end, after which playback stops.

Forward and Backward searches

Press the FF key or REW key.
The frames are played back in line with the speed which was set on the setup menu (FF or REW SPEED).

Setup

1. Press the [>] (right) key in any mode except REC, and set the unit to the MENU mode.

2. Press the [>] (right) key to move the cursor to SETUP and then press the SET key.

3. Press the SET key again.

4. Select the parameter item to be set using the [∧] (up) key or [∨] (down) key.

5. After changing the selected parameter item, keep pressing the SET key until the "COMPLETE" display appears. The changed parameter item is now saved.
<Note>
The parameter will not be changed if the screen is transferred from the setup screen to another screen without first saving the changes to the parameter item.

Shutdown

1. In the MENU mode, press the [>] (right) key to move the cursor to END (shutdown).

2. Press the SET key.

3. The following message now appears.
Select YES.
<Note>
Keep pressing both the SHIFT key and the [∨] (down) key for more than 2 seconds and a shutdown confirmation message will appear on END screen of this unit.

```
[ E N D ]

            > Y E S    N O
```

4. Press the SET key.

5. The following message now appears.
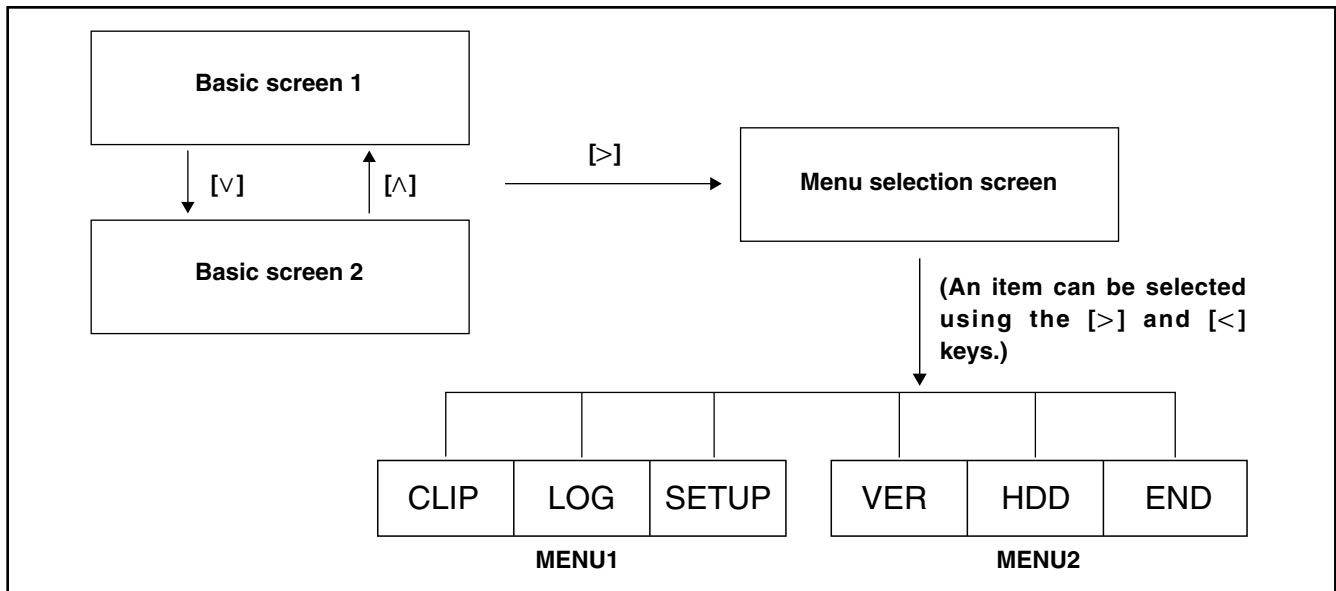
```
[ E N D ]              3 9

    Wait a moment......
```

6. Upon completion of shutdown, the following message appears.

```
Please turn off

Power switch!
```

7. Set the power switch to OFF.

Menu selection

```
┌─────────────────────┐                              ┌───────────────────────┐
│   Basic screen 1    │           [>]                │ Menu selection screen │
└─────────────────────┘  ──────────────────────→     └───────────────────────┘
    │ [∨]    ↑ [∧]
    ↓                                                    (An item can be selected
┌─────────────────────┐                                  using the [>] and [<]
│   Basic screen 2    │                                  keys.)
└─────────────────────┘                                           ↓
```

CLIP	LOG	SETUP		VER	HDD	END

MENU1   **MENU2**
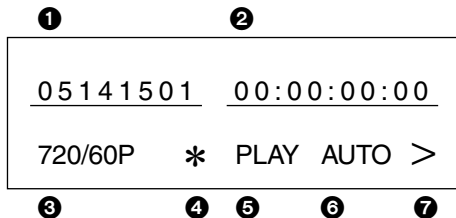
Basic screens 1 and 2

Basic screens 1 and 2 show the information required for normal operations. They appear on the display panel after the unit has been started up.

The menu selection screen is selected by pressing the [>] (right) key. Select a menu using the [<](left), [>](right), [∨](down) and [∧](up) keys, and press the SET key to establish the menu.

```
  ❶                    ❷

  05141501      00:00:00:00

  720/60P    ✳  PLAY  AUTO  >
  ❸            ❹   ❺    ❻    ❼
```

❶ CLIP ID display

The name of the clip currently being output appears here.

❷ Time code display

The current time code value appears here.

During recording, the value of original time code which has been input is displayed; during playback, the value corresponding to the TC REGEN setting on the setup menu is output.

CONV: The time code that results when the head of the selected clip is converted as a time code of 00:00:00:00.

ORG: The time code during recording for each selected clip

TC REGEN settings

Output location	TC REGEN	
	CONV	**ORG**
Display panel	CONV	ORG
RS-422 connector	CONV	ORG
SD OUT connector	CONV	CONV
HD SDI OUT connector	CONV	CONV

❸ Output format/remaining hard disk drive memory display

The output format of the currently selected clip appears here. For details on the formats which can be output, refer to page 17.

The remaining memory appears when basic screen 2 is displayed.

The remaining memory is displayed as the 24P or 60P equivalent.

Use the [∨] and [∧] keys to switch between 24P and 60P.

❹ Output format warning display

An asterisk (✳) appears here (when LOCK has been selected as the INCOME LOCK setting in the V-V mode) if the actual output format is at variance from the output format which was set on the setup menu.

❺ Mode display

The current control mode (STOP, FF, REW, PLAY or REC) appears here.

❻ Auto Rec mode display

"AUTO" appears when AUTO REC is ON; no display appears when AUTO REC is OFF.
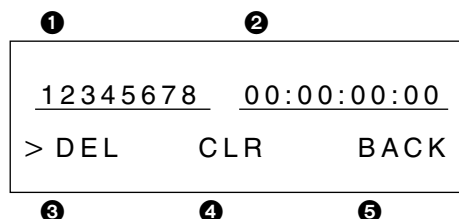
❼ Menu key display

The [>] (right) key is displayed here.

The [<] (left) or [>] (right) key is pressed to switch the menu screen which is to appear on the display panel.

Menu selection

CLIP screen

Names of the recorded clips and their durations appear on this screen. The clip deletion method is selected on the screen.

```
    ❶              ❷

  12345678    00:00:00:00

 > DEL     CLR        BACK

    ❸         ❹         ❺
```

❶ **CLIP ID**
The CLIP ID display is changed by the [∧] (up) or [∨] (down) keys.

❷ **DUR**
The duration of the clip whose CLIP ID is displayed appears here.

❸ **DEL**
The CLIP ID displayed will be deleted.

❹ **CLR**
All the CLIP IDs will be cleared.

❺ **BACK**
Operation will return to the menu selection screen.

Use the [>] (right) or [<] (left) keys to move the cursor and select DEL, CLR or BACK.

LOG screen

Errors and warnings are displayed on this screen.

```
    ❶            ❷

  11:11:11   TEMP ERR

              SILNT > BEEP

               ❸         ❹
```

❶ **Time occurred**
The time at which the error occurred appears here.

❷ **Error name**
The name of the error appears here.
<Note>
For details, refer to the error table (page 19).

❸ **SILNT**
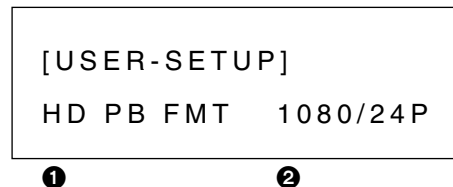This is set when the alarm beep is to be muted when an error has occurred.

❹ **BEEP**
The alarm sounds when an error occurs.
When the SET key is pressed, operation returns to the menu selection screen.

SETUP screen

The setup menu settings are performed on this screen.

```
 [USER-SETUP]

 HD PB FMT    1080/24P

    ❶              ❷
```

USER: The parameters are set.
❶ **Menu item**
The menu item display is changed using the [∧] (up) or [∨] (down) key.
❷ **Parameter**
The settings in the parameters can be selected using the [>] (right) or [<] (left) key.
If the SET key is pressed until "COMPLETE" appears after a setting has been selected, the setting will be saved.
<Note>
For details, refer to the setup menu on page 13.

CLOCK: The unit's internal PC clock is set. Use the [>] (right) or [<] (left) key to move the item to be changed, and change the numerical value using the [∧] (up) or [∨] (down) key.
Operation is returned to the SETUP screen by the CANCEL key.

```
 [CLOCK]

 <02/04/11 00:00:00>
```
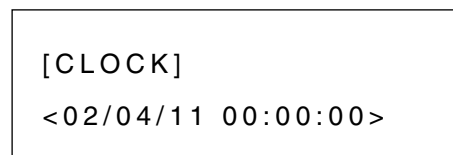
BACK: Operation returns to the menu selection screen.

VER screen

The version of the software program used appears on this screen.

```
 [VERSION]

 APP     Ver.1.02
```
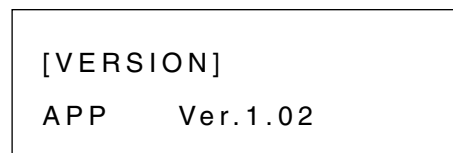
APP   Ver.x.xx   Application
FRNT   Ver.x.xx   Front panel (FPGA)
PCII   Ver.x.xx   PCI I/F (FPGA)
UPCN   Ver.x.xx   Format converter (FPGA)
DVCC   Ver.x.xx   DVC control (FPGA)
DWNC   Ver.x.xx   Down-conversion

Menu selection

HDD screen

On this screen, some data is saved into a part of the hard disk drive's memory that is free and then loaded to check that the drive is working properly.

```
 HDD Verify START OK?

           >YES  NO
```

<Note>
When no clips have been recorded, it takes about 80 minutes to check that the hard disk drive is working properly.

END screen

All the unit's operations are shut down on this screen.

1. In the MENU mode, press the [>](right) key to move the cursor to END (shutdown).

2. Press the SET key.

3. The following message now appears.
Select YES.
<Note>
Keep pressing both the SHIFT key and the [∨] (down) key for more than 2 seconds and a shutdown confirmation message will appear on END screen of this unit.

```
 [END]

               > YES   NO
```

4. Press the SET key.

5. The following message now appears.

```
 [END]              39

     Wait a moment......
```

6. Upon completion of shutdown, the following message appears.

```
 Please turn off

 Power switch!
```

7. Set the power switch to OFF.

Setup menu

Menu item	Parameter	Description
HD PB FMT	1080/23psf 1080/24psf (Default) 1080/25psf 1080/50i 1080/59i 1080/60i 720/59p 720/60p	For selecting the output format. **<Notes>** ● 23psf = 23.98psf, 59i = 59.94i ● Bear in mind that if the systems for the reference frequency at the camera side and for the unit's output frequency are at variance when LOCK has been selected as the INCOME LOCK setting, the playback output will be synchronized to the basic frequency at the camera side. Example: If the camera's frequency is 59.94 Hz, the 720/59p format will apply for the playback output when the 720/60p parameter setting has been selected. ● The value which was last selected will be used as the setting when the unit is started up.
HD PB RATE	24 (Default) 25 30 60	For setting the number of active frames per second when 720 has been selected as the HD PB FMT setting.
ACTIVE FRAME	ON (Default) OFF	**ON:** Only those frames for which the Active Flag has been set are recorded on the hard disk drive. During playback, the 2:3 pull-down mode is used for output. **OFF:** All the frames which are input are recorded. **<Note>** The value which was last selected will be used as the setting when the unit is started up.
AUTO REC	ON OFF (Default)	**ON:** Auto recording is initiated or stopped in accordance with the Rec Flag of the input signals from the variable frame rate camera or VTR. **OFF:** Recording is started by pressing the REC key on the front panel or the REC and PLAY keys on the remote controller, and it is stopped by pressing the STOP key. **<Notes>** ● If the RecStart signal is detected from the variable frame rate camera or VTR during FF or REW, the unit may be set to the recording mode. Select OFF as the Auto Rec setting during FF or REW. ● The Auto Rec setting is not saved so it should be changed as required.
FF/REW SPEED	1 2 4 8 (Default) 16 32	This is the playback speed when FF or REW is selected. **<Note>** The value which was last selected will be used as the setting when the unit is started up.
LOOP PB	ON (Default) OFF	For setting whether all the clips are to be played back continuously. **ON:** Playback starts from the current position, and all the clips are played back continuously. **OFF:** Playback starts from the current position, and the selected clips are played back to the end, after which playback stops.
INCOME LOCK	LOCK FREE (Default)	For setting whether the playback output signals are to be synchronized with the input signals. **LOCK:** If input signals are supplied, the output signals are synchronized with them. If no input signals are supplied, they are not synchronized. **FREE:** The output signals are not synchronized. **<Note>** The value which was last selected will be used as the setting when the unit is started up.
PREROLL(SEC)	0 (Default) 2 4 6 8 10	For inserting the prescribed signals between clips for the specified period of time when clips are continuously played back. **<Note>** The value which was last selected will be used as the setting when the unit is started up.

"Default" denotes the factory settings.

13 (E)

Setup menu

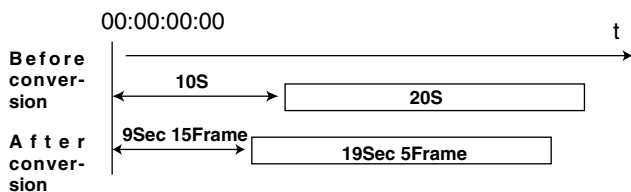| Menu item	Parameter	Description
TC REGEN	CONV (Default) ORG	For selecting the time code which is to be output from the display panel or RS-422 connector. **CONV:** Time code resulting from the conversion of the head or synchronization point as 00:00:00:00. **ORG:** Time code during recording. **\<Note\>** The value which was last selected will be used as the setting when the unit is started up.
REGEN MODE	NORMAL (Default) 24PSync	For selecting the time code conversion method. **NORMAL:** Conversion with no synchronization point (head = 00:00:00:00). **24PSync:** With the 25 p output, conversion with the designated synchronization point serving as the basic point. Conditions under which 24PSync TC conversion operates normally: Output format: 1080/25P, 720/25P over 59.94P/60P Time code: CONV **\<Note\>** The value which was last selected will be used as the setting when the unit is started up.
AUDIO MUTE	ON OFF (Default)	For selecting the setting at which the sound is to be muted in the E-E mode. **ON:** The sound is muted. **OFF:** The sound is not muted.
SD SUPER	OFF TC (Default) TC/UB	For selecting whether the TC and/or UB display is to be superimposed onto signals to the SD OUT connector. **OFF:** No display. **TC:** The time code is displayed. **TC/UB:** The time code and user's bit are displayed. **\<Note\>** The value which was last selected will be used as the setting when the unit is started up.
COMP SETUP	OFF ON (Default)	For selecting whether to set the setup level addition function for the SD OUT connector. **OFF:** The setup is not added. **ON:** The setup is added. **\<Note\>** The value which was last selected will be used as the setting when the unit is started up.
DOWN CONV	525i (Default) 625i	For setting the SD OUT connector. Depending on the HD output, it may not be possible to select a setting for this item. **\<Note\>** The value which was last selected will be used as the setting when the unit is started up.
ALARM MSG	OFF ON (Default)	For setting whether to display the alarm screen (see page 19) when an error has occurred. **OFF:** The alarm screen is not displayed. **ON:** The alarm screen is displayed. **\<Note\>** The value which was last selected will be used as the setting when the unit is started up.

"Default" denotes the factory settings.
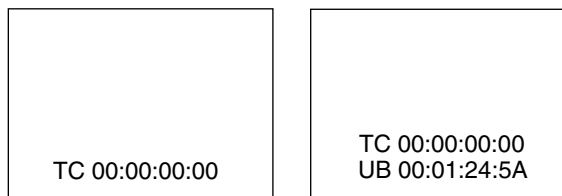
14 (E)

Time code (TC) and user's bit (UB)

24P synchronized playback

- Recorded clips shot at the 24P frame rate setting must be used. If any other clips are used, the value of the time code which is output will be adversely affected.
- Output formats: 1080/25P, 720/25P over 59.94P/60P
- Clips: Recording frame rate of 24P
- Clips cannot be used in the E-E mode.
- Whether a clip has been shot at the 24P frame rate setting cannot be ascertained from the operations on the front panel. For synchronized playback, record at the 24P setting only.
  Change the REGEN MODE setting selected on the setup menu to 24PSync, and then record.
- "00:00:00:00" is always used as the synchronization point for conversion.
- If a recorded clip shot at the 24P setting is played back at the 25P frame rate setting, it will run ahead slightly. The time code is converted into a value which is slightly ahead of the time code value of the recorded clip shot at the original 24P setting.

Diagram showing 24P/25P synchronized time code conversion

```
                    00:00:00:00                              t
Before          |————————————————————————————————————————→
conver-         |
sion            |  ←——— 10S ———→ ┌─────────────────────────┐
                |                │           20S           │
                |                └─────────────────────────┘
After           | ←9Sec 15Frame→ ┌────────────────────────┐
conver-         |                │      19Sec 5Frame      │
sion            |                └────────────────────────┘
```

TC/UB display at the SD OUT connector

```
┌───────────────────┐     ┌───────────────────┐
│                   │     │                   │
│                   │     │                   │
│                   │     │   TC 00:00:00:00  │
│  TC 00:00:00:00   │     │   UB 00:01:24:5A  │
└───────────────────┘     └───────────────────┘
```

Time code (TC) display

The same time code value as the one which is embedded in the HD SDI output signals is displayed. Therefore, this serves as the input TC during recording, and the TC that conforms with the format which has been set is output during playback.

User's bit (UB) display

The same user's bit as the one in the HD SDI output signals is displayed. Therefore, this serves as the input TC during recording, and the TC that conforms with the format which has been set is output during playback.

During recording
FF : FF : II : RG

FF:FF	Number of frames recorded in applicable clip. If this number exceeds 9999, the display remains at 9999, and recording continues.
II	Number of effective frames (4 to 60) in input HD SDI signals
R	Input reference frequency 5: 59.94 Hz, 6: 60.00 Hz
G	Higher 2 bits: Auto Rec Flag Lower 2 bits: Active Frame Flag

During playback
TT : TT : 00 : RG

TT:TT	Original time code value (HH:MM)
00	Number of output frames (see table below)
R	Input reference frequency 5: 59.94 Hz, 6: 60.00 Hz
G	Higher 2 bits: Auto Rec Flag Lower 2 bits: Active Frame Flag

Number of output frames during playback

Output format	1080						720/Xp[*1]-59.94/60			
	23.98	24	25	50	59.94	60	24	25	30	60
Number of output frames	24	24	25	25	24	24	24	25	30	60

[*1] Xp=HD PB RATE

Time code (TC) and user's bit (UB)

When CONV is selected as the TC REGEN setting, the values of the time code which are output to the display panel, remote controller, SD OUT connector and HD SDI OUT connector may not be the same values in all locations. (See table below)

Time code values which are output for 1 second for each output format

Output format	Display panel	Remote controller	SD OUT connector/525i	SD OUT connector/625i	HD SDI OUT connector
1080/23	00~23	00~23	00~29		00~23
1080/24	00~23	00~23	00~29		00~23
1080/25	00~24	00~24		00~24	00~24
1080/50	00~24	00~24		00~24	00~24
1080/59	00~29	00~29	00~29		00~29
1080/60	00~29	00~29	00~29		00~29
720/59	00~29	00~29	00~29		00~29
720/60	00~29	00~29	00~29		00~29

Example: When 1080/23 serves as the format, and the SD OUT connector/525 serves as the output location
The position where the time code value is 00 matches. The time code is displayed in such a way that its value deviates little by little in the course of one second.

	1F	2F	3F	4F	5F	• • • • • • • • • • • • • • • • •	25F	26F	27F	28F	29F	30F
SD OUT connector/525i	00	01	02	03	04	· · · · · · · · · · · · · · · · · · ·	24	25	26	27	28	29
1080/23	00	01	02	03		· ·	20	21	22	23

Input/output formats

E-E mode (when the same signals as the input signals are output)
- Only format conversion is possible with E-E mode outputs.
- The output in the E-E mode is synchronized with the input. This means that, when the input is 60p, the output will always be set to the output format with a frequency whose decimal places have been rounded up. For example, if the input is 59.94p and the output is 23.98p, the input will be set to 60p and the output will be set to 24p.
  Also, an asterisk (✳) on the basic screen 1 appears on the display panel if the actual output format is at variance from the output format which was set on the setup menu "HD PB FMT".
- The output is normal only when the input frame rate and output frame rate are identical. Bear in mind that with any other combination, the output will not be normal.
- Bear in mind that the E-E output is synchronized with the reference frequency of the input signal and this may be at variance from the output setting.

○: Combination that enables the input to be converted in the pull-up mode and then output with normal frames

Input / Output		720/59.94p,720/60p							Down-converted output	
		4-23	24	25	26-29	30	31-59	60	525i	625i
1080	**23.98psf**		○*2						○	
	24psf		○*3						○	
	25psf			○*3						○
	50i			○*3						○
	59.94i		○*1*2					○*1	○	
	60i		○*1*3					○*1	○	
720/59.94p✳² **720/60p**✳³	**24psf**		○						○	
	25psf			○					○	
	30psf					○			○	
	60psf							○	○	

✳1: Output based on 2:3 pull-down mode
✳2: Output based on 720/59.94p input
✳3: Output based on 720/60p input

V-V mode (when the recorded clip signals have been output)
In the V-V mode, both rates and formats can be converted. Bear in mind that the reference frequency which is output when LOCK has been selected as the INCOME LOCK setting and the reference frequency which is output when FREE has been selected will be at variance.

○ B/W: Output based on B/W mode

Input / Output		720/59.94p		720/60p		Down-converted output	
		Lock	Free	Lock	Free	525i	625i
1080	**23.98psf**	○	○		○	○	
	24psf		○	○	○	○ B/W	
	25psf		○	○	○		○
	50i		○	○	○		○
	59.94i	○	○		○	○	
	60i		○	○	○	○ B/W	
720/59.94p	**24p**	○	○		○	○	
	25p	○	○		○	○	
	30p	○	○		○	○	
	60p	○	○		○	○	
720/60p	**24p**		○	○	○	○ B/W	
	25p		○	○	○	○ B/W	
	30p		○	○	○	○ B/W	
	60p		○	○	○	○ B/W	

Troubleshooting

| Indication	Action to be taken
Unit fails to start up normally. No operating displays appear even after 5 minutes.	Check that the AC power cable is connected to the AC input socket and that AC power is supplied. If there are no problems in this respect, contact your dealer.
Data is not recorded properly. When the unit is set to the recording mode with the power on, a problem occurs with the E-E output during recording.	● Check that the internal cooling fans are running properly. ● Stop the recording, and shut down the unit. Continue cooling for 10 minutes with the power off, restart the unit, and check whether it operates properly.
Data is not played back properly. When the unit is operating with the power on, a problem occurs with the playback output.	● Check that the internal cooling fans are running properly. ● Stop the playback, and shut down the unit. Continue cooling for 10 minutes with the power off, restart the unit, and check whether it operates properly.
The WARNING lamp is lighted.	Act in accordance with the error message on the display panel. FAN: Replace the fan. TEMP: Turn off the unit's power and move the unit to a cool place.
The front panel displays have gone off.	Press any key, and if "Communication error" appears, it means that a problem has occurred in the application. Consult with your dealer.
Recording starts but stops immediately.	Check how much free memory remains. If there is no free memory, delete the files which are no longer needed. If free memory is available, contact your dealer.
Data playback is normal in some formats but not in others.	Check the input signal and format settings. If the data cannot be played back even when a check of the input signal and format settings reveals no problems, contact your dealer.
The images do not always move smoothly with E-E mode output.	The images may not move smoothly when identical frame rates (for instance, when the rates for both the camera and FRC are set to 24p) are not used in the E-E mode. This will arise when identical frame rates have not been set, but is not indicative of malfunctioning.
When data is recorded immediately after playback, block noise interferes with the start of the recorded images.	Several seconds are required for switching between input and output. Refrain from recording immediately after playback.
The user wants to change the signal for preroll use.	The standard signal is the black signal. To change to any other signal, consult with your dealer.

<Note>
If the unit fails to resume normal operation even after the above action has been taken, contact your dealer.

18 (E)

Error displays

ALARM screen

When ALARM MSG on the setup menu is set to ON, the ALARM screen is displayed when an error has occurred. This screen displays the errors and warnings. The same error details appear on both the alarm screen and log screen.
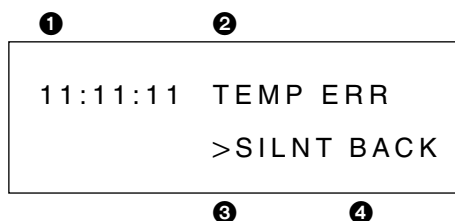
❶　　　　　❷

```
11:11:11  TEMP ERR

          >SILNT BACK
```

❸　　　　❹

❶ **Time occurred**
The time at which the error occurred appears here.
❷ **Error name**
The name of the error appears here.
<Note>
For details, refer to the error table.

❸ **SILNT**
This is set when the alarm beep is to be muted when an error has occurred.
❹ **BACK**
Select this to stop the alarm beep.
Select it also to return to the menu selection screen.

Error table

Type of error	Cause and remedial action
STOP ERROR	This appears when the unit could not be stopped properly when the STOP request was received. It occurs when recording is stopped while no input signals are supplied or when the recording of signals without the Active Flag has been stopped when Active Flag is ON. Check the Active Flag setting on the setup menu.
RECORD ERROR	This appears when data could not be recorded properly when a recording request was processed. Restart the unit.
PLAY ERROR	This appears when data could not be played back properly when a playback request was processed. Check that clips have been recorded.
SHUTTLE ERROR	This appears when a shuttle operation could not be performed properly when the shuttle request was processed. Check that clips have been recorded.
SEEK ERROR	This appears when a designated clip could not be located. It occurs when the playback, recording or other control instruction was received in the "No Clip" status. Check that clips have been recorded.
FAN1 ERROR	This appears when a problem has occurred in the fan at the top of the front panel. Contact your dealer.
FAN2 ERROR	This appears when a problem has occurred in the fan at the bottom of the front panel. Contact your dealer.
FAN3 ERROR	This appears when trouble has occurred in the rear panel fan. Contact your dealer.
TEMPERATURE ERROR	This appears when the temperature sensor on the front circuit board has exceeded the temperature setting (approx. 36 to 39 degrees Celsius). Operation continues even when this error has occurred but no guarantees can be made for the performance of the hard disk drive. Therefore, the unit should be moved immediately to a cool place.
DISK FULL	This appears when there is less than the equivalent of 1 minute (60P conversion) free memory space on the hard disk drive. Delete any files which are no longer needed.
BOOT ERROR	This appears when the unit cannot be started up properly for some reason at startup. Contact your dealer.

19 (E)

Specifications

Operating temperature:
  5 to 35 ˚C
Storage temperature:
  −10 to 50 ˚C
Operating humidity:
  10% to 80%
Storage humidity:
  5% to 90%
Weight:
  15 kg
Dimensions:(W×H×D)
  210×222×492 mm
Recording time:
  Min. 40 min. (100 min. with 24P conversion)
Compression system:
  DVCPRO HD (720/60P)
Input signal (recording signal) connectors:
  HD SDI connector
  (SMPTE 292M standard complied with)
  IN (DIGITAL) connector×1 (BNC)
  THROUGH OUT (DIGITAL) connectors×3 (BNC)
Output signal connectors:
  HD SDI connector
  (SMPTE 292M standard complied with)
  OUT (DIGITAL) connector×1 (BNC)
Playback output formats:
  1080
    23.98psf, 24psf, 25psf, 50i, 59.94i, 60i
  720/60P, 59.94P
    24P, 25P, 30P, 60P
Standard down-conversion output connector:
  Analog composite signal connector×1
  TC/UB superimposing ON/OFF function provided (with
  SETUP)
Control connector:
  RS-422 connector×1
Interface connectors:
  HD SDI IN/THROUGH
    HD SDI IN (DIGITAL) BNC connector×1
    HD SDI THROUGH (DIGITAL) BNC connector×1
  HD SDI OUT
    HD SDI OUT (DIGITAL) BNC connector×1
  SD composite output
    VIDEO (analog) BNC connector×1

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