

## Solid-State Memory Camcorder

### Operating Guide

Table of Contents	
Getting Started	
Recording	
Playback	
Editing	
Using the Menu	
Connecting with another device	
Troubleshooting	
Additional Information	



# Read this first

Before operating this unit, please read this manual thoroughly, and retain it for future reference.

## Notes on use

### Using the camcorder

- Do not hold the camcorder by the following parts, and also do not hold the camcorder by the jack covers.



Lens hood



LCD screen



Microphone



Viewfinder



Panel EVF block



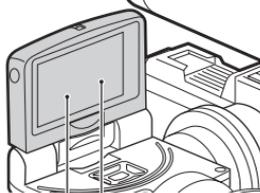
Battery pack

### Notes

- The camcorder is not dustproof, dripproof or waterproof. See "About handling of your camcorder" (p. 100).
- When connecting the camcorder to another device with communication cables, be sure to insert the connector plug in the correct way. Pushing the plug forcibly into the terminal will damage the terminal and may result in a malfunction of the camcorder.
- Use the camcorder in accordance with the regulations of a place where you use it.

### On the LCD screen and lens

- A menu item that is grayed out is not available under the current recording or playback conditions.
- The LCD screen is manufactured using extremely high-precision technology, so over 99.99% of the pixels are operational for effective use. However, there may be some tiny black points and/or bright points (white, red, blue, or green in color) that appear constantly on the LCD screen. These points are normal results of the manufacturing process and do not affect the recording in any way.



White, red, blue or green point  
Black point

### On sunlight

- Do not record the sun or leave the camcorder under the sun for a long time. The internal parts of the camcorder may be damaged. If sunlight is focused on a nearby object, it may cause a fire.
- Do not expose your camcorder's viewfinder, lens, or LCD screen to the sun or strong light source for extended periods. Doing so may cause a malfunction of the camcorder.
- Do not attempt to record the sun directly. Doing so may cause a malfunction of the camcorder.

## On the temperature of your camcorder and battery pack

Your camcorder has a protective function that disables recording or playback if the temperature of your camcorder or battery pack is beyond the safely operable range. In this case, a message appears on the LCD screen or in the viewfinder (p. 89).

## On recording

- In order to stabilize memory card operation, it is recommended that you format the memory card when you use it with your camcorder for the first time. All data recorded on the memory card will be erased by formatting, and cannot be recovered. Save important data on the memory card on other media such as a computer, before formatting the memory card.
- Before starting to record, test the recording function to make sure the picture and sound are recorded without any problems.
- Compensation for the loss of the content of recordings or the loss of recording opportunities cannot be provided, even if recording or playback is not possible due to a malfunction of the camcorder, storage media, etc., or even if images or sounds are distorted due to the limits of the capabilities of the camcorder.
- TV color systems differ depending on the countries/regions. To view your recordings on a TV, a TV of the appropriate color system for the country/region is required.
- Television programs, films, video tapes, and other materials may be copyrighted. Unauthorized recording of such materials may be contrary to the copyright laws.
- Because of the way that the image device (CMOS sensor) reads out image signals, the following phenomena may occur.
  - The subjects passing by the frame rapidly might appear crooked depending on the recording conditions. (This phenomenon may

be notable in displays having high motion resolution.)

- Horizontal lines appear on the LCD screen during recording under fluorescent lights, sodium lamps or mercury lamps. The phenomena can be reduced by adjusting the shutter speed (p. 35).

## Save all your recorded image data

- To prevent your image data from being lost, save all your recorded images on external media periodically. To save images on an external device, see page 79.

## To handle the recorded images on your computer

Download the dedicated application software (p. 16).

## Format the recording media using [MEDIA FORMAT] if images are not recorded or played back properly

If you continue recording and deleting images on recording media for a long period of time, the files on that recording media may be fragmented. As a result, you may not be able to record and save images properly. If this happens, save images on a PC, then format the recording media (p. 59).

## Read this first (Continued)

### About the operation of the camcorder

You can operate the camcorder using the ////SET button (p. 61).

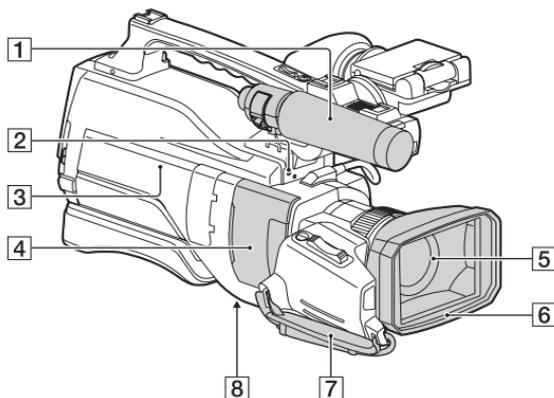
### About this manual

- The on-screen displays in each local language are used for illustrating the operating procedures. Change the screen language before using your camcorder if necessary (p. 77).
- Design and specifications of recording media and other accessories are subject to change without notice.
- The screen displays used in this manual are those of the PAL model.  
See the bottom of the camcorder to confirm whether it is NTSC or PAL system.

# Identifying parts and controls

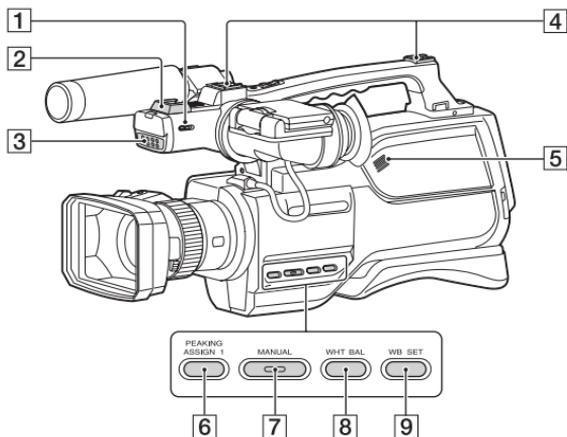
## Body

The numbers in ( ) are reference pages.



- 1** Microphone
- 2** MIC jack (PLUG IN POWER) (70)
- 3**  (N mark)
  - Touch an NFC-enabled smartphone to the mark to establish a connection with the camcorder.
  - Near Field Communication (NFC) is an international standard for short-range wireless communication technology.
- 4** Slide cover (22)
- 5** Lens (G Lens)
- 6** Lens hood
- 7** Grip belt
- 8** Tripod receptacle
  - Attach the tripod (sold separately: the length of the screw must be less than 5.5 mm (7/32 in.)) to the tripod receptacle using a tripod screw.

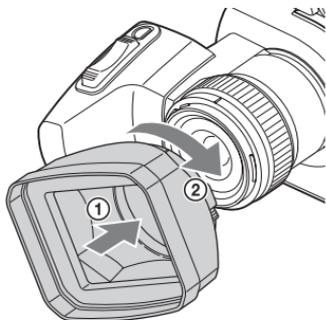
## Identifying parts and controls (Continued)



- 1 Light switch
- 2 Multi Interface shoe (67)
- 3 Video light (38)
- 4 Accessory shoe
- 5 Speaker
- 6 ASSIGN1/PEAKING button (46, 71)
- 7 MANUAL button (28)
- 8 WHT BAL button (36)
- 9 WB SET button (37)

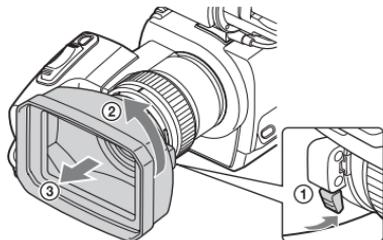
### Attaching the lens hood

Align the marks on the lens hood to those on the camcorder, and turn the lens hood in the direction of the arrow ② until it is locked.



## Removing the lens hood

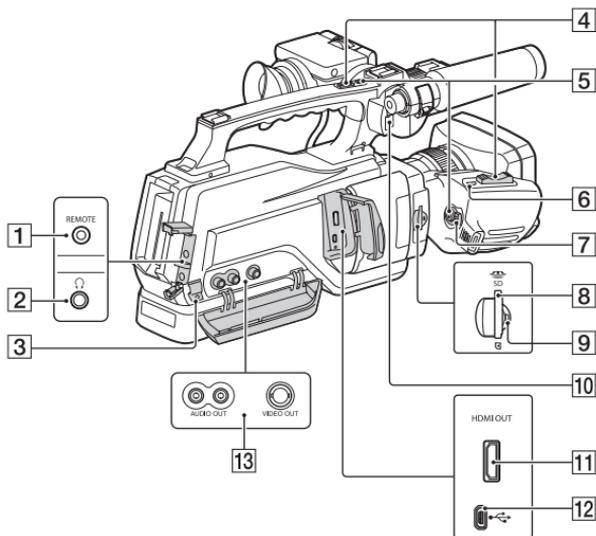
- Turn the lens hood cover in the direction of the arrow as illustrated while pressing the lever on the lens hood cover.



### Tips

- If you attach or remove a 62 mm (2 1/2 in.) PL filter or MC protector, remove the lens hood.

## Identifying parts and controls (Continued)



### 1 REMOTE jack

The REMOTE jack is used for controlling the playback of video devices and peripherals connected to it.

### 2 $\Omega$ (Headphone) jack

### 3 Cable holder

The cable holder is used for fixing the A/V connecting cable, etc.

### 4 Power zoom lever (27)

### 5 REC START/STOP button (23)

### 6 ASSIGN 2/FOCUS MAGNIFIER button (46)

### 7 ON/STANDBY switch (19)

### 8 Memory card slot (22)

### 9 Access lamp (24)

### 10 MIC cable holder

### 11 HDMI OUT jack (Output only) (53)

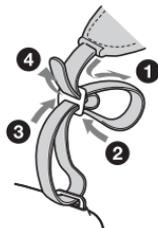
The available video signals are read, and the appropriate output format is selected and output automatically.

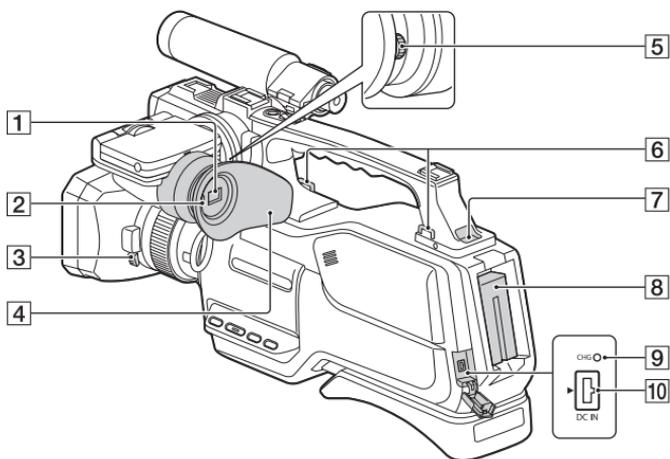
### 12 $\leftrightarrow$ (USB) jack (mini-AB) (Output only)

### 13 AUDIO OUT/VIDEO OUT jack (81)

## To attach a shoulder strap

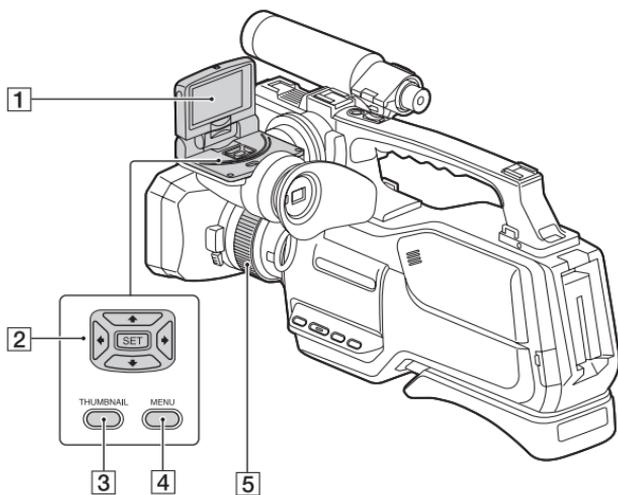
Attach a shoulder strap (sold separately) to the hooks for a shoulder strap.





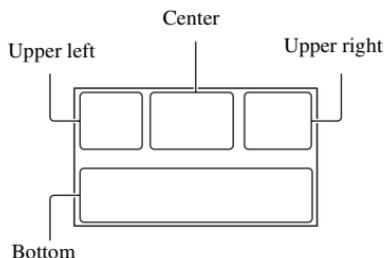
- 1** Viewfinder (21)
- 2** Eye sensor (74)
- 3** Lens hood release lever (7)
- 4** Eyecup (21)
- 5** Viewfinder lens adjustment lever (21)
- 6** Hook for the Shoulder belt  
Attach the Shoulder belt (sold separately).
- 7** BATT (battery) RELEASE button (18)
- 8** Battery pack (17)
- 9** CHG (charge) lamp (17)
- 10** DC IN jack (17)

## Identifying parts and controls (Continued)



- 1** LCD screen (21)
- 2** ↑/↓/←/→/SET buttons
- 3** THUMBNAIL button (48)
- 4** MENU button
- 5** Manual ring (33)

# Screen indicators



## Upper left

Indicator	Meaning
100%	Remaining battery
	INTELLIGENT AUTO (face detection/scene detection/camera-shake detection) (38)
	SCENE SELECTION (39)
	REC FORMAT (31)
	WIDE REC (68)
	Optical zoom
	Clear image zoom
cQ x1.2	Digital zoom
pQ x2.3	
	AIRPLANE MODE (76)
	SIMUL/RELAY REC
	NFC active
100-0001	Playback folder of memory card
	Zoom function is assigned to the Manual ring (27)

## Center

Indicator	Meaning
	Recording media
REC STBY	Recording status (23)
	Warning (89)

Indicator	Meaning
	Playback indicator (48)
	Processing
	Relay recording

## Upper right

Indicator	Meaning
Omin	Estimated remaining recording time
	Recording/playback media
00:00:00:00	Time code (hour:minute:second:frame)

## Bottom

Indicator	Meaning
	Face detection [ON]
PEAKING	PEAKING (71)
	ZEBRA (71)
	STEADYSHOT (66)
	Manual focus (28)
F3.5	Iris (34)
9dB	Gain (34)
100 180°	Shutter speed (35)
	AVCHD AUDIO FORMAT (69)
-2.0EV	AE SHIFT (66)
	Auto setting/manual setting (72)
	White balance (36)
	HISTOGRAM (70)
	AUDIO LEVEL DISPLAY (72)

## Screen indicators (Continued)

Indicator	Meaning
	MI SHOE VIDEO
	LIGHT (67)
	REC LEVEL MODE (69)
	MIC SELECT (70)

### Tips

- Indicators may look different or appear at different positions.

### Data code during recording

The recording date, time and condition are recorded automatically on the recording media. They are not displayed while recording. However, you can check them by selecting  (DISPLAY SET) → [DATA CODE] and choosing the data that you want to display, or by pressing the ASSIGN button to which the DATA CODE function is assigned, during playback (p. 51).

# Table of Contents

Read this first .....	2
Identifying parts and controls .....	5
Body .....	5
Screen indicators .....	11

## Getting Started

Step 1: Checking supplied accessories .....	16
Step 2: Charging the battery pack .....	17
Step 3: Turning on the camcorder and setting the date and time .....	19
Setting the date and time .....	19
Step 4: Adjusting the LCD screen and viewfinder .....	21
Step 5: Preparing the recording media .....	22

## Recording

Recording .....	23
Recording movies .....	23
Changing the setting of the REC START/STOP button and handle REC START/STOP button .....	25
Adjusting the zoom .....	27
Adjusting the focus .....	28
Using the Focus magnifier .....	29
Focusing on a detected face (Face detection) .....	29
Changing the recording setting .....	31
Selecting the recording format .....	31
Setting the DV MODE (DV mode) .....	31
Assigning frequently-used menu items to the Manual ring .....	33
Adjusting the brightness .....	34
Adjusting the iris .....	34
Adjusting the gain .....	34
Adjusting the shutter speed .....	35
Adjusting the exposure .....	36
Adjusting the color tone .....	36
Adjusting the white balance .....	36
Useful functions .....	38
Recording movies in dim places (Video light) .....	38
Using the video light diffuser .....	38
Selecting the suitable setting automatically for the recording situation (AUTO MODE SET) .....	38
What you can do with the Wi-Fi function of the camcorder .....	39
Downloading "Content Browser Mobile" .....	40
Connecting the camcorder to an Android smartphone equipped with the NFC function using One-touch .....	40

## Table of Contents (Continued)

Using a smartphone as a remote controller .....	41
Connecting without using the NFC function (Android).....	42
Connecting without using the NFC function (iPhone/iPad) .....	43
Setting time data .....	44
Reviewing the most recently recorded scene (LAST SCENE REVIEW).....	45
Assigning the functions to the ASSIGN buttons .....	46

### Playback

Playback .....	48
Playing back movies .....	48
Changing/checking the settings in your camcorder .....	51
Changing the screen display .....	51
Displaying recording data (DATA CODE).....	51
Connecting a monitor or a TV .....	53

### Editing

Protecting movies (Protect) .....	56
Dividing a movie .....	57
Deleting movies .....	58
Formatting the recording media .....	59
Deleting all data from the memory card and internal memory .....	59
Repairing the image database file .....	60

### Using the Menu

Operating the menu .....	61
Menu items .....	63
 (CAMERA SET) menu .....	65
Settings to adjust your camcorder to the recording conditions (STEADYSHOT, etc.)	
 (REC/OUT SET) menu .....	68
Recording settings, input and output settings (REC SET/VIDEO OUT, etc.)	
 (AUDIO SET) menu .....	69
Settings for the audio recording (AVCHD AUDIO FORMAT, etc.)	
 (DISPLAY SET) menu .....	70
Display settings (MARKER/DISPLAY OUTPUT, etc.)	
 (TC/UB SET) menu .....	74
Time code settings (TC PRESET/UB PRESET/TC FORMAT, etc.)	

 (NETWORK SET) menu .....	76
Settings for the Wi-Fi function (CTRL W/SMARTPHONE, etc.)	
 (OTHERS) menu .....	77
Settings while recording or other basic settings (AREA SET/BEEP, etc.)	

## Connecting with another device

Saving images on an external media device .....	79
Creating a standard definition image quality (DV) disc with a recorder, etc. .....	81

## Troubleshooting

Troubleshooting .....	83
Warning indicators and messages .....	89

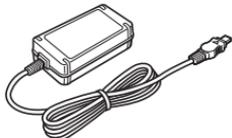
## Additional Information

Recording time of movies .....	93
Using your camcorder abroad .....	95
File/folder structure on the recording media .....	96
Maintenance and precautions .....	97
About the AVCHD format .....	97
About the memory card .....	97
About the "InfoLITHIUM" battery pack .....	98
About handling of your camcorder .....	100
Specifications .....	102
Index .....	107

# Step 1: Checking supplied accessories

Make sure that you have following items supplied with your camcorder. The number in the parentheses indicates the number of that item supplied. Recording media are sold separately.

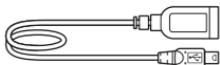
AC Adaptor (AC-L100C) (1) (p. 17)



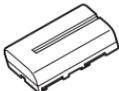
Power cord (mains lead) (1) (p. 17)



USB adaptor cable (1)



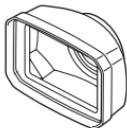
Rechargeable battery pack (NP-F570) (1)



Eyecup (1) (p. 21)



Lens hood (1) (p. 6)



Microphone (1)



Wind screen (1)



Lens cap (1)



Video light diffuser (1)



Shoe cap (1) (attached on the camera)

CD-ROM "Manuals for Solid-State Memory Camcorder" (1)

Operating Guide (2)

## Software Downloads

When the unit is used with a PC connection, download device drivers, plug-ins, and application software, where applicable, from the Sony Professional products web site.

Sony Professional products web site homepage:

U.S.A.	<a href="http://pro.sony.com">http://pro.sony.com</a>
Canada	<a href="http://www.sonybiz.ca">http://www.sonybiz.ca</a>
Latin America	<a href="http://sonypro-latin.com">http://sonypro-latin.com</a>
Europe, Middle East and Africa	<a href="http://www.pro.sony.eu">http://www.pro.sony.eu</a>
Japan	<a href="http://www.sonybsc.com">http://www.sonybsc.com</a>
Asia Pacific	<a href="http://pro.sony-asia.com">http://pro.sony-asia.com</a>
Korea	<a href="http://bp.sony.co.kr">http://bp.sony.co.kr</a>
China	<a href="http://pro.sony.com.cn">http://pro.sony.com.cn</a>

Although the data regarding recorded materials are stored over multiple files and folders, you can easily handle the clips without considering its data and directory structure, by using the dedicated application software.

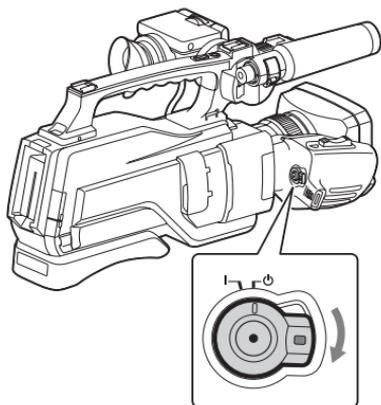
## Step 2: Charging the battery pack

You can charge the “InfoLITHIUM” battery pack (L series) with the supplied AC Adaptor.

### Notes

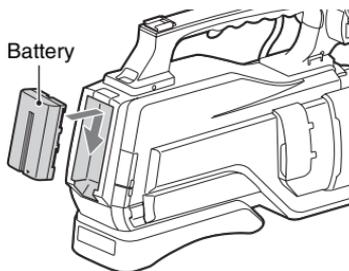
- You can use a large capacity battery pack, NP-970 (sold separately), with your camcorder.

### 1 Slide the ON/STANDBY switch to (STANDBY) (default setting).

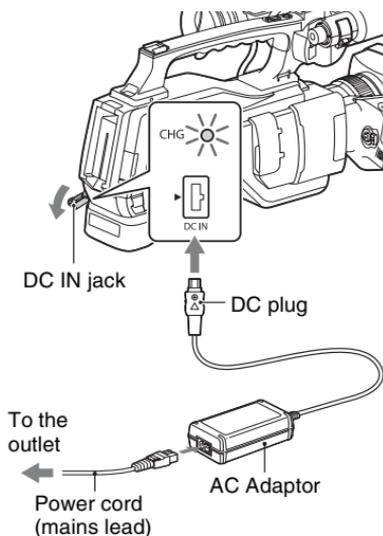


### 2 Attach the battery pack to your camcorder.

Attach the battery pack by sliding it in the direction of the arrow while pressing it until it clicks.



### 3 Connect the AC Adaptor and power cord from the camcorder to an outlet.



- The CHG lamp lights up and charging starts.
- The CHG lamp turns off when the battery is fully charged. Disconnect the AC Adaptor from the DC IN jack.

### Charging time

Approximate time (minute) required when you charge a fully discharged battery pack.

Battery pack	Full charge time
NP-F570	250

## Step 2: Charging the battery pack (Continued)

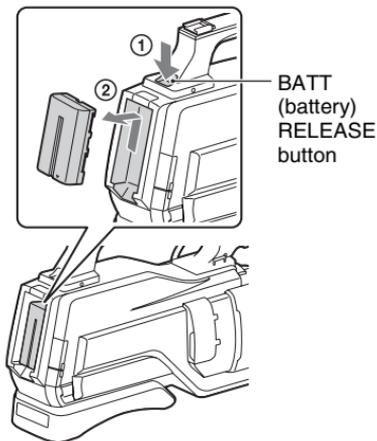
### Using an outside power source

You can use the AC Adaptor to obtain the AC power. While you are using the AC Adaptor, the battery pack will not lose its charge even when it is attached to your camcorder.

Follow the procedure from 1 to 2 as shown in “Step 2: Charging the battery pack” on page 17.

### To remove the battery pack

Slide the ON/STANDBY switch to  $\text{⏻}$  (STANDBY). Push the BATT (battery) RELEASE button (①) and remove the battery pack (②).



### On the battery pack

- Turn the power off before changing the battery pack.
- The CHG lamp flashes during charging under the following conditions.
  - The battery pack is not attached correctly.
  - The battery pack is damaged.
  - The battery pack is worn-out.

### On the AC Adaptor

- Do not short-circuit the DC plug of the AC Adaptor or battery terminal with any metallic objects. This may cause a malfunction.

### To store the battery pack

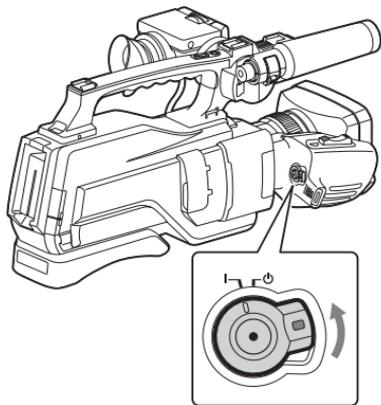
If the battery pack is not in use for a while, run down the battery and store it (p. 99).

# Step 3: Turning on the camcorder and setting the date and time

## Turning on the camcorder

Slide the ON/STANDBY switch to I (ON) while pressing the green button.

When you use your camcorder for the first time, the [CLOCK SET] screen appears.



## To turn off the power

Slide the ON/STANDBY switch to  $\text{⏻}$  (STANDBY).

### Notes

- If warning messages appear on the LCD screen, follow the instructions.

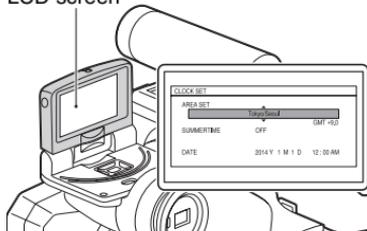
## Setting the date and time

Set the date and time when you use your camcorder for the first time.

### Tips

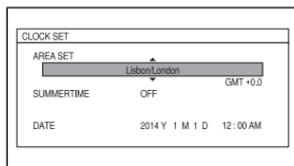
- If you do not use your camcorder for **about 3 months**, the built-in rechargeable battery gets discharged and the date and time settings may be cleared from the memory. In that case, charge the rechargeable battery and then set the date and time again. See “Charging the pre-installed rechargeable battery” (p. 101).

### LCD screen



When you set the date and time again, press the MENU button, and select  $\text{☰}$  (OTHERS) → [CLOCK SET].

- 1 Select your area by pressing the  $\uparrow/\downarrow/\leftarrow/\rightarrow$  button, then press the SET button.



## Step 3: Turning on the camcorder and setting the date and time (Continued)

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- 2** Set [SUMMERTIME], [Y] (year), [M] (month), [D] (day), hour and minute, by pressing the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  button, then press the SET button.



The clock starts.

- Set [SUMMERTIME] to [ON] to move the time forward 1 hour.
- You can set any year up to the year 2037.
- Midnight is indicated as 12:00 AM, and noon as 12:00 PM (NTSC model).

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### Tips

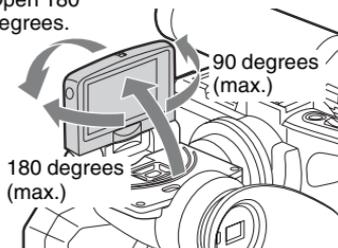
- The date and time are automatically recorded on the selected recording media, and can be displayed during playback (DATA CODE, p. 51).

# Step 4: Adjusting the LCD screen and viewfinder

## Using the LCD screen

The LCD screen can be rotated in the range as illustrated below, allowing a person other than the camera operator to see the image.

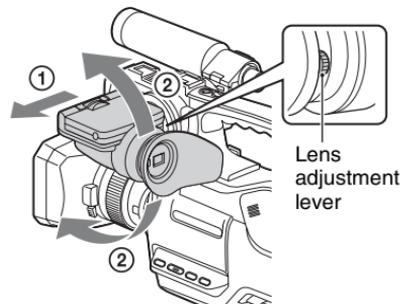
Open 180 degrees.



## Adjusting the viewfinder

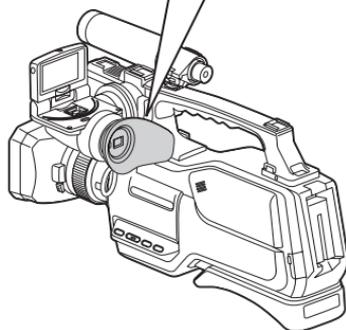
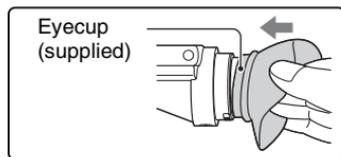
Pull out the LCD panel block to adjust the position (①), and rotate the viewfinder to the best angle (②, maximum of 90 degrees).

If the viewfinder image appears blurred, turn the viewfinder lens adjustment lever at the right of the viewfinder until the image is sharp.



## When the picture in the viewfinder is hard to see

If you cannot see the picture in the viewfinder clearly under bright circumstances, use the supplied eyecup. To attach the eyecup, stretch it slightly and fit it over the groove of the eyecup attached to the camcorder. You can attach the eyecup facing either the right or left side.



## Notes

- Do not remove the pre-attached eyecup.

# Step 5: Preparing the recording media

## Types of memory cards you can use in your camcorder

	Capacity (operation verified)
“Memory Stick PRO Duo” media (Mark2)*1	32 GB
“Memory Stick PRO-HG Duo” media*1	
“Memory Stick XC-HG Duo” media	64 GB
SD memory card*2	
SDHC memory card*2	
SDXC memory card*2	

\*1 Described as “Memory Stick PRO Duo” media in this manual.

\*2 Described as SD card in this manual.

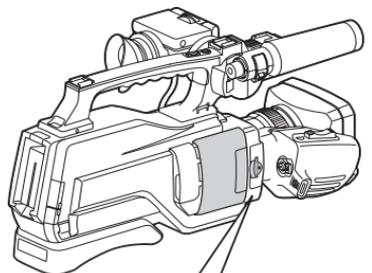
### ⚙ Notes

- Operation with all memory cards is not assured.
- “Memory Stick PRO Duo” media, half the size of “Memory Stick” media, or standard size SD cards can be used for this camcorder.
- Use an SD card of Class 4 or faster. For standard image quality (DV) recording, use an SD card of Class 6 or faster, or an SD card of Class 10 or faster.
- During the standard image quality (DV), images cannot be recorded on “Memory Stick PRO Duo” media.
- Do not attach a label or the like on memory card or memory card adaptor. Doing so may cause a malfunction.
- See page 93 for the recordable time of memory cards.
- Movies recorded on “Memory Stick XC-HG Duo” media or SDXC memory cards can be imported to or played back on other equipment, such as a computer or A/V device, by connecting the camcorder to the equipment with the USB cable. However, the equipment must support the exFAT file system used for “Memory Stick XC-HG Duo” media and SDXC memory cards. Confirm in advance that the connecting equipment is supporting the exFAT file system. If you connect equipment not supporting the exFAT file system and the

format screen appears, do not perform the format. All the data recorded will be lost.

**Open the cover, and insert the memory card with the notched edge in the direction as illustrated until it clicks into place.**

**Close the cover after inserting the memory card.**



Note the direction of the notched corner

- If you insert a memory card into the slot in the wrong direction, the memory card, the memory card slot, or image data may be damaged.

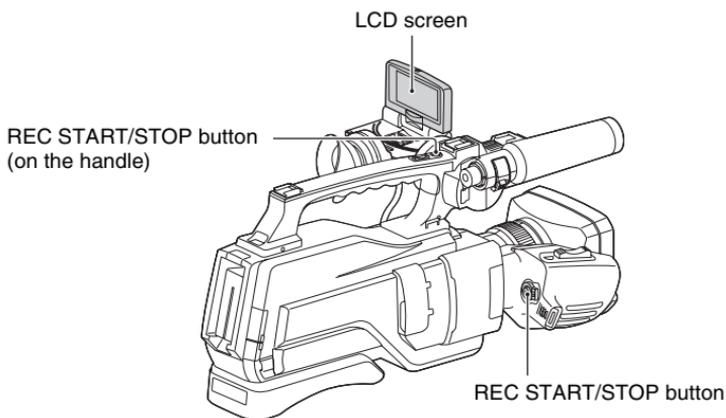
## To eject the memory card

Open the cover and lightly push the memory card in once.

### ⚙ Notes

- If [The image database file is corrupted. The media must be restored to use again.] appears, format the memory card (p. 59).
- When inserting or ejecting the memory card, be careful of the memory card popping out and dropping.
- Do not open the cover during recording.

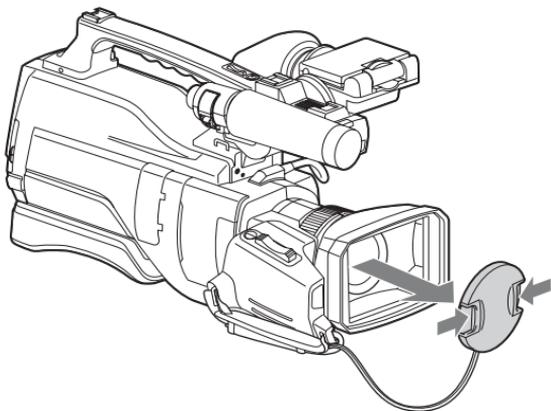
# Recording



## Recording movies

Your camcorder records movies on a memory card and the internal memory. The factory setting of recording movies is AVCHD. Do the following steps to record movies.

- 1 Press the latches on both sides of the lens cap and remove it.**

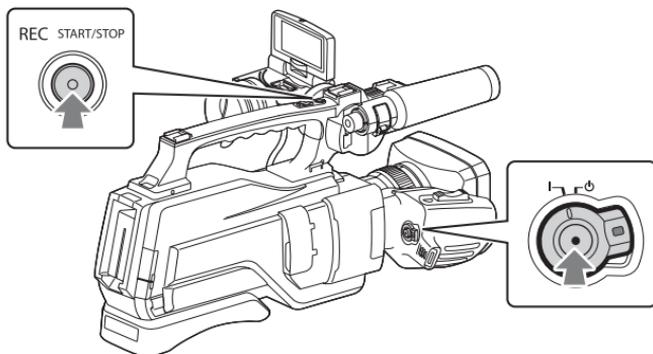


---

**2** Slide the ON/STANDBY switch to I (ON) while pressing the green button.

---

**3** Press either of the REC START/STOP button.



The recording lamps light up during recording.

To stop the movie recording, press the REC START/STOP button again.

---

### **⚡** Notes

- When the access lamp is lit or flashing in red, your camcorder is reading or writing data on recording media. Do not shake or apply strong force to your camcorder, do not turn the power off, and do not remove the recording media, battery pack or the AC Adaptor. The image data may be destroyed.
- See page 93 on the recording time of movies.
- Your camcorder can record a movie for about 13 hours continuously.
- If a movie file size exceeds 2 GB while recording in DV or AVCHD format, the camcorder automatically divides the file and creates a new one.
- The menu settings saved when you turn the camcorder off. The access lamp lights up while the settings are being stored. If you remove the battery pack or the AC Adaptor before turning off the power, the settings may return to the default settings.

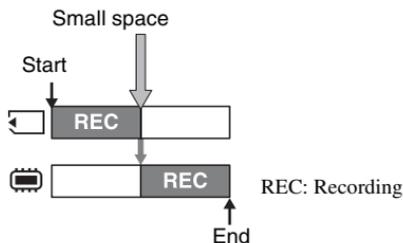
### **💡** Tips

- When recording at a setting other than standard image quality (DV), the aspect ratio is fixed to 16:9. When recording in DV mode, you can switch the aspect ratio to 4:3 ([**DV**] WIDE REC], p. 68).
- You can change the screen display during recording (p. 51).
- Indicators displayed on the LCD screen during recording are shown on page 11.
- The recording lamps can be set to stay off ([REC LAMP], p. 77).

## To continue recording, from a memory card to the internal memory (Relay recording)

Insert a memory card, so the camcorder switches to the internal memory just before space on the memory card runs out, and continues recording in the internal memory automatically without pausing.

Press MENU → Select  (REC/OUT SET) → [REC SET] → [SIMUL/RELAY REC] → [RELAY REC] with the /SET button.



### Notes

- If you start recording in the internal memory, the camcorder does not relay recording. To perform relay recording, start recording in the memory card.
- Seamless playback of relay-recorded movies with this camcorder is not possible.
- You can re-combine relay-recorded movies using the dedicated application software (p. 16).

## To record movies using both the internal memory and memory card (Simultaneous recording)

You can record movies on both of these recording media simultaneously.

Press MENU → select  (REC/OUT SET) → [REC SET] → [SIMUL/RELAY REC] → [SIMULTANEOUS REC] with the /SET button.

## Changing the setting of the REC START/STOP button and handle REC START/STOP button

You can start and stop recording in different recording media at different timing by operating the both REC START/STOP button.

In the default setting, movies are recorded on both the internal memory and memory card at the same time when either record button is pressed.

- REC BUTTON:  
- HANDLE REC BUTTON:  

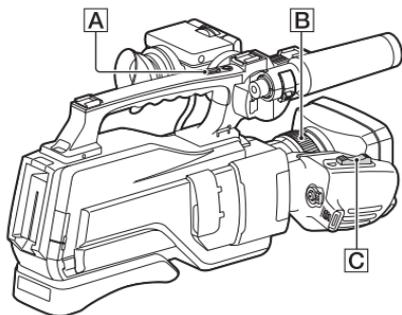
## Recording (Continued)

### To change the setting

Press MENU → select  (REC/OUT SET) → [REC SET] → [REC BUTTON SET] with the  button.

REC BUTTON SET	Button and recording media
REC BUTTON:   HANDLE REC BUTTON:  	Recording in both the memory card and the internal memory starts and stops at the same time when either REC START/STOP button is pressed.
REC BUTTON:  HANDLE REC BUTTON: 	Recording in the internal memory starts and stops when the REC START/STOP button is pressed, and on the memory card when the REC START/STOP button (on the handle) is pressed.
REC BUTTON:  HANDLE REC BUTTON: 	Recording in the memory card starts and stops when the REC START/STOP button is pressed, and on the internal memory when the REC START/STOP button (on the handle) is pressed.

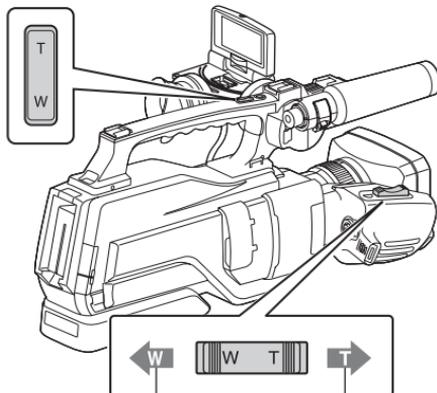
## Adjusting the zoom



### Adjusting the zoom with the power zoom lever

Press the power zoom lever **A** or **C**.  
Press the power zoom lever **C** slightly for a slower zoom. Press it further for a faster zoom.

You cannot change the zoom speed of the power zoom lever **A** on the handle.



**Wide view:**  
(Wide angle)



**Close view:**  
(Telephoto)

### 💡 Tips

- When focusing, the minimum distance required between the camcorder and the subject is about 1 cm (about 13/32 in.) for wide angle and about 80 cm (about 2 5/8 feet) for telephoto.
- The focus may not be adjusted at certain zoom positions if the subject is within 80 cm (about 2 5/8 feet) from your camcorder.
- Be sure to keep your finger on the power zoom lever **A/C**. If you move your finger off the power zoom lever **A/C**, the operation sound of the power zoom lever may also be recorded.

### Adjusting the zoom with the Manual ring

If you set the RING SETTING to ZOOM, you can adjust the zoom by rotating the Manual ring **B** (p. 33).

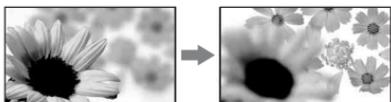
### 🔄 Notes

- Turn the Manual ring **B** at a moderate speed. If you turn it too fast, the zoom speed may lag behind the Manual ring rotation speed, or the operation sound of the zoom may also be recorded.

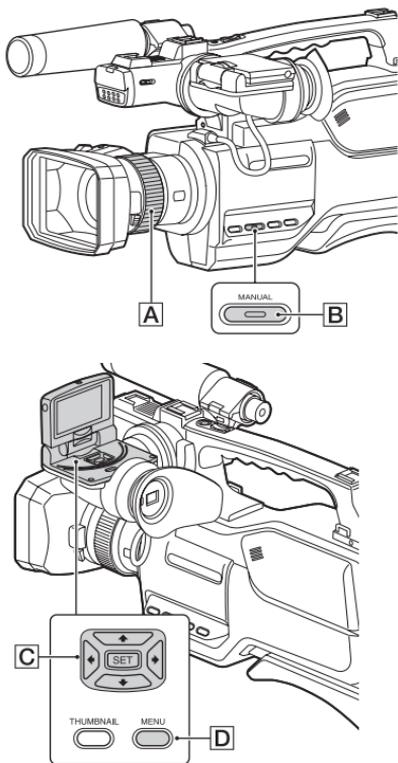
# Adjusting the focus

You can adjust the focus manually for different recording conditions. Use this function in the following cases.

- To record a subject behind a window covered with raindrops.
- To record horizontal stripes.
- To record a subject with little contrast between the subject and its background.
- When you want to focus on a subject in the background.



- To record a stationary subject using a tripod.



---

**1** Assign the focus function to the Manual ring **A** (p. 33).

---

**2** During recording or standby, press the MANUAL button **B** to set the focus to manual.

 appears on the LCD screen.

---

**3** Rotate the Manual ring **A** to focus on.

 changes to  when the focus cannot be adjusted any farther.  changes to  when the focus cannot be adjusted any closer.

---

## To restore automatic adjustment

Press the MANUAL button **B** to set the focus to automatic.

 disappears and the automatic focus adjustment is restored.

### Tips

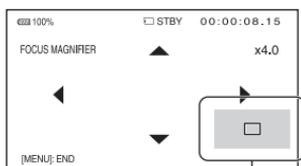
- The focal length information (the distance at which the subject is in focus; for when it is dark and hard to adjust the focus) appears for about 3 seconds in the following cases.
  - When you press the MANUAL button **B** to set the focus to manual and  appears on the LCD screen.
  - When you rotate the Manual ring **A** while  is displayed on the LCD screen.
- You can switch the focal length information between meters and feet ([FOCUS DISPLAY], p. 73).

## Using the Focus magnifier

The selected area on the LCD screen is magnified and displayed. It is easier to confirm the focus setting during manual focusing. [FOCUS MAGNIFIER] is assigned to the ASSIGN 2 button (p. 46).

### Press ASSIGN 2 button.

The center of the screen is magnified. The setting changes with each press of the button.



Enlarged display position

You can adjust the enlarged display position with the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  button on the camcorder. Press the SET button to set the enlarged display position back to the center.

### Notes

- Even though the image appears expanded on the LCD screen, the recorded image is not expanded.

### Tips

- You can change the magnification ratio with [FOCUS MAG RATIO] (p. 72).

## Focusing on a detected face (Face detection)

The camcorder detects the face and focuses on it (The default setting is [OFF]). [FACE DETECTION] is available only with automatic focus.

**1** Press the MENU button  $\square$ .

**2** Select  $\blacktriangleright$  (CAMERA SET)  $\rightarrow$  [FACE DETECTION]  $\rightarrow$  [ON] or [OFF] with the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$ /SET button  $\square$ .

When the faces are detected, frames appear on the LCD screen.

**3** Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  button  $\square$ , move the selection cursor (orange colored frame) to select the priority face, then press the SET button again.

Selection cursor (orange colored frame)



Priority face frame (double frame)

The frame on the priority face changes to a double frame.

### To cancel the priority face

To move the selection cursor (orange colored frame) onto the frame (double frame) on the priority face, press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  buttons, then press the SET button  $\square$ .

### Notes

- Faces may not be detected depending on the recording environment, the condition of the subject or the settings.

## Adjusting the focus (Continued)

- You may not be able to get the proper effect in some recording environments. If this happens, set [FACE DETECTION] to [OFF].

### **Tips**

- You can assign this function to an ASSIGN button (p. 46).
- To make it easy to detect faces, record under the following conditions:
  - Record in a moderately bright place
  - Do not obscure the face with a hat, mask, sunglasses, etc.
  - Face the front of the camera

# Changing the recording setting

## Selecting the recording format

You can select the recording format (bit-rate, image size, frame rate, scanning system). The default setting is as follows:

NTSC model: 1080/60i FX

PAL model: 1080/50i FX

**1** Press the **MENU** button.

**2** Select **↔ (REC/OUT SET) → [REC SET] → [REC FORMAT] → a desired format with the ↕/↔/↕/↔ SET button.**

## Setting value

NTSC model	PAL model
1080/60p PS	1080/50p PS
1080/60i FX	1080/50i FX
1080/60i FH	1080/50i FH
1080/30p FX	1080/25p FX
1080/30p FH	1080/25p FH
1080/24p FX	-
1080/24p FH	-
720/60p FX	720/50p FX
720/60p FH	720/50p FH
720/60p HQ	720/50p HQ

## Setting values

- Bit-rate
  - PS: max. 28 Mbps
  - FX: max. 24 Mbps
  - FH: approx. 17 Mbps (average)
  - HQ: approx. 9 Mbps (average)
- Image size
  - 1080: 1,920×1,080
  - 720: 1,280×720
- Frame rate
  - Either 60, 50, 30, 25, or 24

- Scanning system
  - i: interlace
  - p: progressive

If you select [1080/60i FX] (NTSC model) or [1080/50i FX] (PAL model), for example, movies are recorded with following format.

- 1080: Effective scanning lines
- 60, 50: Frame rate
- i: Scanning system
- FX: Recording mode

## Frame rate displayed (NTSC model)

The frame rate displayed on the LCD screen differs from the actual frame rate.

Frame rate on the LCD screen	Actual frame rate
24	23.98
30	29.97
60	59.94

## Notes

- Movies recorded with the recording mode set to PS or FX on [REC FORMAT] can be saved on an external media device only (p. 79).

## Tips

- The recording format of 720/60i HQ (NTSC model) or 720/50i HQ (PAL model) is automatically selected for the DV recording.

## Setting the DV MODE (DV mode)

You can record/play back in DV mode of standard image quality

**1** Press the **MENU** button.

- 
- 2** Select  (REC/OUT SET) → [REC SET] → [DV MODE] → [YES] with the ///SET button.

The camcorder restarts in DV mode.

---

### Functions not available in DV mode

- Protecting recorded movies (Protect)
  - [PROTECT] is not displayed on the [EDIT] menu.
- Dividing a movie
  - [DIVIDE] is not displayed on the [EDIT] menu.
- Copying movies
  - DV files cannot be copied, including copies onto external media.

### Notes

- When DV mode is selected, the audio format is fixed to LPCM.

### The following items are available only when DV mode is selected:

-  (REC/OUT SET)
  -  WIDE REC
  - CANCEL DV MODE

### Notes

- When you switch from DV mode to another, settings made in DV mode are initialized. If a movie file exceeds 2 GB during recording, the camcorder divides the recording into separate files by creating a new file(s) automatically. However, the divided files are displayed as a single movie on the screen of the camcorder.

### Canceling the DV MODE

- ① Press the MENU button.
- ② Select  (REC/OUT SET) → [REC SET] → [CANCEL DV MODE] → [YES] with the ///SET button.

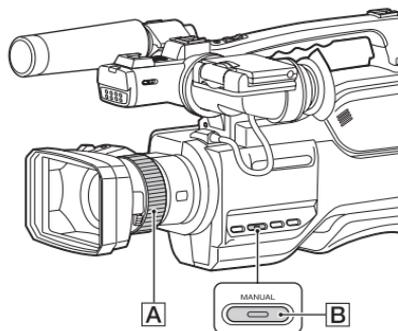
When DV mode is canceled, the following settings return to the default.

- REC FORMAT
- Recording Setting
- SIMUL/RELAY REC
- AVCHD AUDIO FORMAT

# Assigning frequently-used menu items to the Manual ring

It is useful to assign a frequently used menu item to the Manual ring. You can control the item by rotating the Manual ring.

Select [RESET] to reset the items adjusted manually to the default settings.



- 
- 1 Press and hold the MANUAL button **[B]** down for a few seconds.**

The [RING SETTING] screen is displayed.

- 
- 2 Rotate the Manual ring **[A]** and select the item to be assigned.**

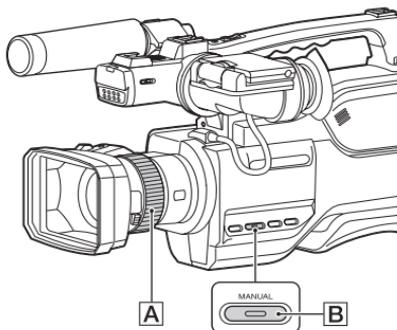
- 
- 3 Press the MANUAL button **[B]**.**
- 

## Items you can control with the Manual ring

- [FOCUS] (p. 28)
- [ZOOM] (p. 27)
- [GAIN] (p. 34)
- [IRIS] (p. 34)
- [SHUTTER SPEED] (p. 35)
- [AE SHIFT] (p. 36)

# Adjusting the brightness

You can adjust the image brightness by adjusting the iris, gain or shutter speed, or by adjusting the light volume. In this section, using the Manual ring for adjusting the brightness manually is mainly described.



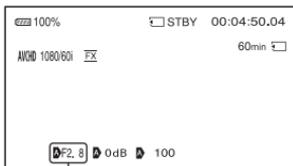
## Adjusting the iris

This is handy for making the background blurred or sharp.

**1 Assign the iris function to the Manual ring [A] (p. 33).**

**2 Press the MANUAL button [B].**

The **A** next to the iris value disappears, and the iris value is highlighted.



Iris value

**3 Rotate the Manual ring [A] to adjust the value.**

The volume of the light increases the more that you open the aperture (decreasing F value). The volume of the light decreases the more that you close the aperture (increasing F value).

**To temporarily adjust the iris automatically**

- ① Assign [IRIS PUSH AUTO] to the ASSIGN 1/ASSIGN 2 button (p. 44).
- ② Hold the ASSIGN 1/ASSIGN 2 button down.

The iris is adjusted automatically for as long as you hold the button down.

**To adjust the iris automatically**

Press the MANUAL button [B] while the iris value is highlighted.

The iris value disappears or **A** appears next to the iris value.

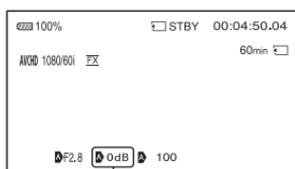
## Adjusting the gain

You can use this if you do not want to increase the value by AGC (automatic gain control).

**1 Assign the gain function to the Manual ring [A] (p. 33).**

**2 Press the MANUAL button [B].**

The **A** next to the gain value disappears, and the gain value is highlighted.



Gain value

### 3 Rotate the Manual ring [A] to adjust the value.

#### To adjust the gain automatically

Press the MANUAL button [B] while the gain value is highlighted.

The gain value disappears, or [A] appears next to the gain value.

#### Adjusting the shutter speed

You can adjust and fix the shutter speed manually. You can make a moving subject look still or emphasize the movement of a subject by adjusting the shutter speed.

### 1 Assign the shutter speed function to the Manual ring [A] (p. 33).

### 2 Press the MANUAL button [B].



Shutter speed value

The [A] next to the shutter speed value disappears, and the shutter speed value is highlighted.

### 3 Turn the Manual ring [A] to adjust the value.

NTSC model: You can select from 1/8 to 1/10000

(1/6 - 1/10000 when shooting with 24p)

PAL model: You can select from 1/6 to 1/10000

The denominator of the set shutter speed appears on the LCD screen. For example, [100] appears on the LCD screen when you set the shutter speed to 1/100 second. The larger the value on the LCD screen is, the faster the shutter speed is.

#### 💡 Tips

- It is difficult to focus automatically at a lower shutter speed. Manual focusing with your camcorder attached to a tripod is recommended.
- When recording under fluorescent lamps, sodium lamps, or mercury lamps, the picture may flicker or change colors, or may have horizontal bands of noise. You may be able to improve the situation by adjusting the shutter speed to 1/50 if the power frequency of your area is 50 Hz, or 1/60 in a 60 Hz area.
- You can switch the shutter speed display between seconds and degrees ([SHUTTER DISPLAY], p. 73).

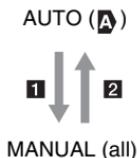
#### To adjust the shutter speed automatically

Press the MANUAL button [B] while the shutter speed value is highlighted.

The shutter speed value disappears, or [A] appears next to the shutter speed value.

## Adjusting the brightness (Continued)

### Adjusting the exposure



**1** When all of iris, gain and shutter speed are set manually.

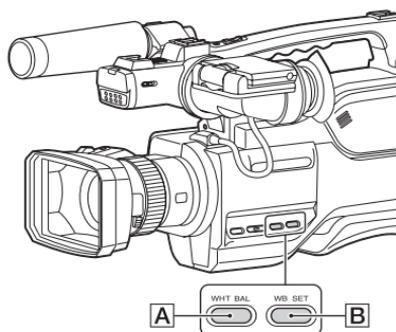
**2** When the last setting of the exposure is set to AUTO, and any item in **1** is set to AUTO.

#### Notes

- When you set [AUTO MODE SET] to other than [AUTO/MANUAL], the exposure returns to [AUTO].

## Adjusting the color tone

### Adjusting the white balance



You can adjust and fix the white balance according to the lighting conditions of recording environment.

You can store white balance values in memory A (A) and memory B (B), respectively. Unless a white balance is readjusted, values will remain even after the power has been turned off.

When you select preset white balance, [OUTDOOR], [INDOOR] or [MANU WB TEMP] is selected, according to which one you previously set with [WB PRESET] in the (CAMERA SET) menu.

#### Tips

- You can assign [WB PRESET] to an ASSIGN button (p. 46).

### 1 Press the WHT BAL button A repeatedly.

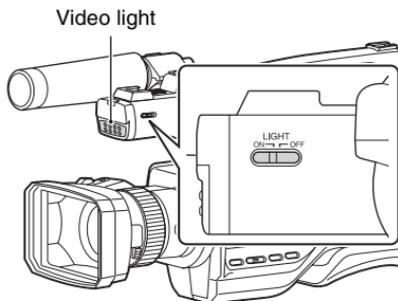
Each time you press the button, the white balance switches as the following and the white balance indicator or color temperature appears on the LCD screen (except when selecting automatic mode).



# Useful functions

## Recording movies in dim places (Video light)

Slide the **LIGHT** switch to **ON**.

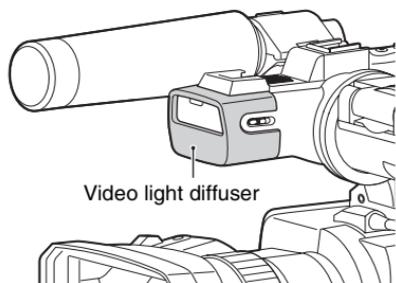


### Notes

- The video light generates strong light. Do not use the video light directly in front of the eyes at close range.
- The battery drains quickly while using the video light.
- When the video light is lit, automatic white balance adjustment may not work properly depending on the recording conditions. In this case, use the white balance function (p. 36).
- It may take several seconds for the video light to turn off after you turn off the power of the camcorder with a remote controller (sold separately) connected to the REMOTE jack.

## Using the video light diffuser

The supplied video light diffuser reduces the glare and softens light.

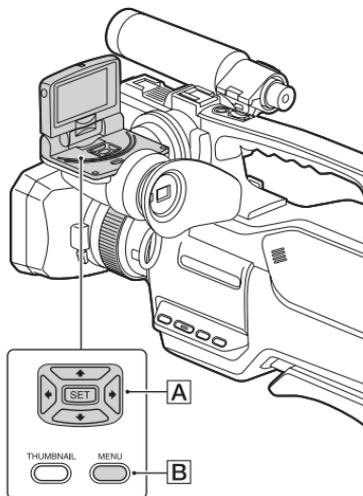


### Notes

- The color temperature varies slightly depending on the temperature of the white LED. Adjust the white balance of the camera manually before recording.

## Selecting the suitable setting automatically for the recording situation (AUTO MODE SET)

You can make optimal recordings in various situations.



**1** Press the **MENU** button **B**.

**2** Select **▶** (CAMERA SET) → [AUTO MODE SET] with the **▲/▼/◀/▶**/SET button **A**.

**3** Press the  $\blacktriangle/\blacktriangleright/\blacktriangleleft/\blacktriangleleft$ /SET button  $\square$  to select [AUTO/MANUAL], [INTELLIGENT AUTO], or [SCENE SELECTION], and press the SET button.

#### Notes

- When you select [INTELLIGENT AUTO], [STEADYSHOT] is set to [ACTIVE], and the angle of view shifts 1.08 times toward the telephoto side.

### Scenes detected by INTELLIGENT AUTO

Face detection:  (Portrait),  (Baby)

Scene detection:  (Backlight),

 (Landscape),  (Night Scene),

 (Spotlight),  (Low Brightness),

 (Macro)

Camera-shake detection:  (Walk),

 (Tripod)

### To use [SCENE SELECTION SET]

- ① Press the MENU button, press the  $\blacktriangle/\blacktriangleright/\blacktriangleleft/\blacktriangleleft$ /SET button and select  (CAMERA SET) → [SCENE SELECTION SET].
- ② Press the  $\blacktriangle/\blacktriangleright/\blacktriangleleft/\blacktriangleleft$  button, select the desired setting, then press the SET button.

Setting	Recording conditions
 Night Scene* ([NIGHT SCENE])	Shoots a night view with a proper exposure, using a tripod (sold separately).
 Sunrise & Sunset* ([SUNRISE& SUNSET])	Shoots the scenes under the glow of sunset/sunrise vividly.

Setting	Recording conditions
 Fireworks* ([FIREWORKS])	Shoots fireworks with optimal exposure.
 Landscape* ([LANDSCAPE])	Shoots distant subjects clearly. This setting also prevents your camcorder from focusing on any glass or mesh in windows between the camcorder and the subject.
 Portrait ([PORTRAIT])	Brings out the subject, such as people or flowers, while creating a soft background.
 Spotlight ([SPOTLIGHT])	Prevents people's faces from appearing excessively white when subjects are lit by strong light.
 Beach ([BEACH])	Takes the vivid blue of the ocean or a lake.

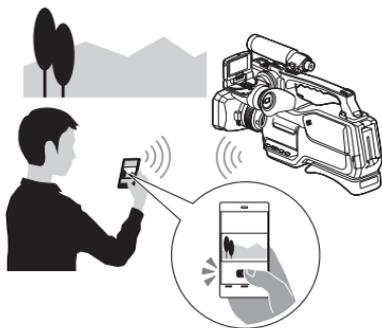
\* Focuses on only distant subjects.

### What you can do with the Wi-Fi function of the camcorder

The Wi-Fi function of the camcorder enables you to operate the camcorder remotely by a smartphone.

## Useful functions (Continued)

### Using a smartphone as a remote controller (One-touch remote (NFC))



### Required equipment/environment

Smartphone or tablet computer

### Downloading “Content Browser Mobile”

To use a smartphone as a remote control for the camcorder, you need to install the dedicated application “Content Browser Mobile” on your smartphone. If “Content Browser Mobile” is already installed on your smartphone, update it to the latest version as necessary.

### Android OS

Search for “Content Browser Mobile” in Google Play, then install it.



- You need Android 4.1 or later when you use the NFC One-touch.
- Google play may not be supported depending on country or region. In this case, search for “Content Browser Mobile” on the internet then install it.

### iOS

Search for “Content Browser Mobile” in the App Store, then install it.



- You need iOS 7.0 or later.
- You cannot use the NFC One-touch when you use iOS.

### Notes

- You need an NFC-compatible smartphone or tablet computer in order to use the NFC One-touch function of the camcorder.
- Proper operation of the Wi-Fi function detailed in this manual is not guaranteed for all smartphones or tablet computers.
- Operations and screen displays of the application may be subject to change without notice by future upgrades.

### Connecting the camcorder to an Android smartphone equipped with the NFC function using One-touch

- 1 Select [Settings] on the smartphone, then select [More...] and place a checkmark next to [NFC].

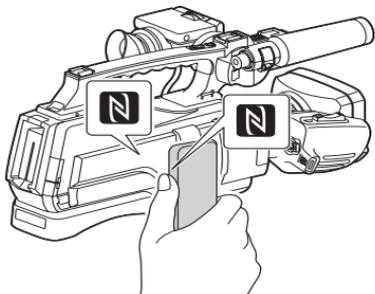


- 2 Set the camcorder to the shooting mode.

You can use the NFC function only when **N** (N-Mark) is displayed on the screen.

### 3 Touch the smartphone on the camcorder.

The smartphone connects to the camcorder, “Content Browser Mobile” is activated and [CTRL W/SMARTPHONE] starts on the camcorder.



#### Notes

- Cancel the sleep mode and screen lock of the smartphone beforehand.
- Continue to touch (1 second-2 seconds) on the camcorder without moving, until “Content Browser Mobile” starts up.
- While [CTRL W/SMARTPHONE] is activated, only the both REC START/STOP buttons are available on the camcorder.
- The smartphone cannot be connected to the camcorder when [AIRPLANE MODE] is set to [ON]. Set [AIRPLANE MODE] to [OFF] (p. 76).

### Using a smartphone as a remote controller

You can control some of the camcorder's movie shooting functions remotely with a smartphone.

To start [CTRL W/SMARTPHONE] using the NFC function, see p. 40.

#### 1 Press the MENU button.

#### 2 Select (NETWORK SET) → [CTRL W/SMARTPHONE] with the /SET button.

#### 3 Connect the smartphone to the camcorder, using the information that appears on the screen when the camcorder is ready to be connected.

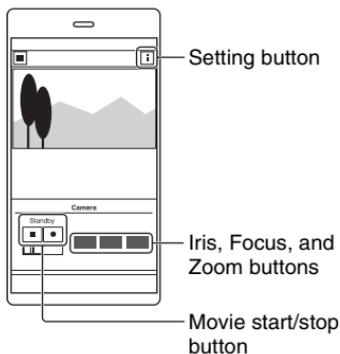
The connection method will depend on the type of smartphone.

Android: See page 42.

iPhone/iPad: See page 43.

X	CTRL W/SMARTPHONE								
<div style="background-color: #ccc; width: 100px; height: 15px; margin: 5px auto;"></div> <div style="background-color: #ccc; width: 80px; height: 15px; margin: 5px auto;"></div>									
<table border="1" style="width: 100%;"> <tr> <td>SSID</td> <td><div style="background-color: #ccc; width: 100%; height: 15px;"></div></td> </tr> <tr> <td>Password</td> <td><div style="background-color: #ccc; width: 100%; height: 15px;"></div></td> </tr> <tr> <td>Device Name</td> <td><div style="background-color: #ccc; width: 100%; height: 15px;"></div></td> </tr> </table>				SSID	<div style="background-color: #ccc; width: 100%; height: 15px;"></div>	Password	<div style="background-color: #ccc; width: 100%; height: 15px;"></div>	Device Name	<div style="background-color: #ccc; width: 100%; height: 15px;"></div>
SSID	<div style="background-color: #ccc; width: 100%; height: 15px;"></div>								
Password	<div style="background-color: #ccc; width: 100%; height: 15px;"></div>								
Device Name	<div style="background-color: #ccc; width: 100%; height: 15px;"></div>								

### 4 Operate the camcorder by the smartphone.



#### ⚡ Notes

- Live view images may not be displayed smoothly, depending on the smartphone performance and/or transmission conditions.
- Movies cannot be recorded on a smartphone.

#### 💡 Tips

- If you assign [SMARTPHONE CONNECT] to an ASSIGN button, you can start [CTRL W/ SMARTPHONE] by pressing that ASSIGN button when the shooting screen is displayed (p. 46).

### Functions operable by [CTRL W/ SMARTPHONE]

- Recording start/stop
- Touch focus  
Available when using manual focus.
- Zoom
- Iris adjustment  
While the smartphone is connected to the camcorder, CLOSE cannot be selected.

#### ⚡ Notes

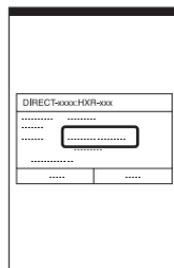
- You cannot perform other operations during touch focus.

### Connecting without using the NFC function (Android)

- 1 Select [Settings] on your smartphone, then select [Wi-Fi] and the SSID (displayed on the camcorder).



- 2 Input the password displayed on the camcorder (first time only).



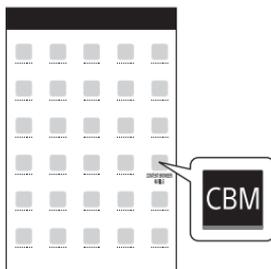
### 3 Confirm connection to the SSID displayed on the camcorder.



#### 💡 Tips

- The next time that you want to connect to the camcorder, select the camcorder in the device list in the Connect menu, and select [Connect].

### 4 Return to the Home screen, then starts “Content Browser Mobile”.



For details on how to operate “Content Browser Mobile” after it starts, refer to the Help section in “Content Browser Mobile”.

## Connecting without using the NFC function (iPhone/iPad)

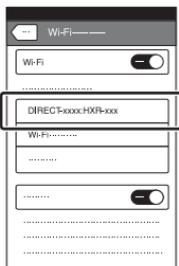
### 1 Select [Settings] on the iPhone or iPad, then select [Wi-Fi] and the SSID (displayed on the camcorder).



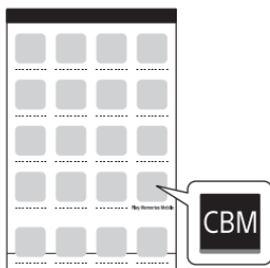
### 2 Input the password displayed on the camcorder (first time only).



### 3 Confirm connection to the SSID displayed on the camcorder.



### 4 Return to the Home screen, then start "Content Browser Mobile."



For details on how to operate "Content Browser Mobile" after it starts, refer to the Help section in "Content Browser Mobile".

## Setting time data

The camcorder records movies accompanied by time data, such as time code and user bit.

### Presetting the time code

- 1 Press the MENU button, press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$ /SET button and select **00:00** (TC/UB SET) → [TC PRESET].

- 2 Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  button, select [PRESET], then press the SET button.

- 3 Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  button, select the first two digits, then press the SET button. You can set the time code within the following range.

NTSC model:

00:00:00:00 - 23:59:59:29

- When setting 24p, you can set the last 2 time code digits of the frames in multiples of 4, between 0 and 23.

PAL model:

00:00:00:00 - 23:59:59:24

- 4 Set other digits by repeating step 3.
- 5 Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  button, select [OK], then press the SET button.

### To reset the time code

You can reset the time code (00:00:00:00). Select [RESET] in step 2 of "Presetting the time code."

### Presetting the user bit

- 1 Press the MENU button, press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$ /SET button and select **00:00** (TC/UB SET) → [UB PRESET], then press the SET button.
- 2 Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  button, select [PRESET], then press the SET button.
- 3 Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  button, select the first two digits, then press the SET button.
- 4 Set other digits by repeating step 3.
- 5 Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  button, select [OK], then press the SET button.

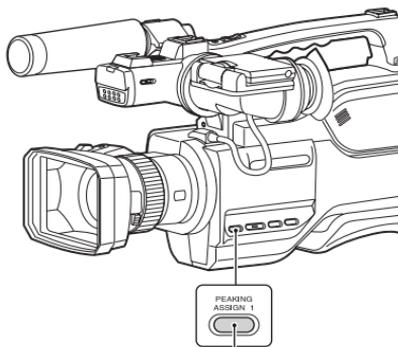
### To reset the user bit

You can reset the user bit (00 00 00 00). Select [RESET] in step 2 of "Presetting the user bit."

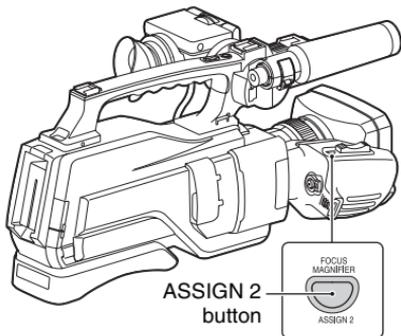
## Reviewing the most recently recorded scene (LAST SCENE REVIEW)

You can review the most recently recorded scene on the LCD screen.

### 1 Assign [LAST SCENE REVIEW] to an ASSIGN button. (p. 46)



ASSIGN 1 button



ASSIGN 2 button

### 2 Right after you stop recording, press the ASSIGN button you assigned in step 1.

The camcorder plays from the top to the end of the most recently recorded scene, then returns to standby mode.

### To stop reviewing the last scene

Press the ASSIGN button during playback. The camcorder returns to standby mode.

#### Notes

- If you edit the movie or remove the recording media after you stop recording, the LAST SCENE REVIEW function may not work correctly.

# Assigning the functions to the ASSIGN buttons

Some functions can be assigned to the ASSIGN buttons for use. You can assign a single function to any one of the ASSIGN 1 to 2 buttons.

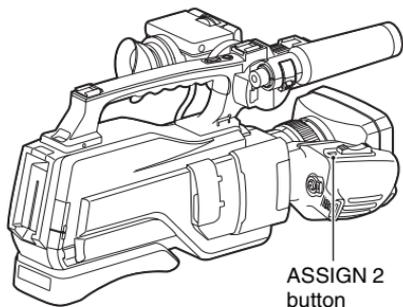
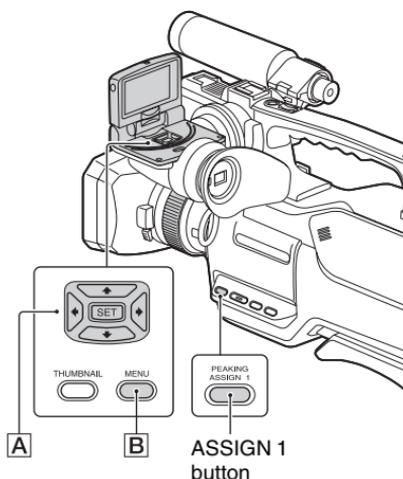
See “Menu items” (p. 63) on the function of each item.

## Default function of each ASSIGN button

- ASSIGN1: PEAKING (p. 71)
- ASSIGN2: FOCUS MAGNIFIER (p. 29)

## Functions you can assign to the ASSIGN buttons

- - (no function)
- FOCUS MAGNIFIER (p. 29)
- LAST SCENE REVIEW (p. 45)
- WB PRESET (p. 37)
- STEADYSHOT (p. 66)
- AUTO MODE SET (p. 38)
- SCENE SELECTION SET (p. 38)
- IRIS PUSH AUTO (p. 34)
- FACE DETECTION (p. 29)
- COLOR BAR (p. 67)
- VOLUME (p. 69)
- HISTOGRAM (p. 70)
- ZEBRA (p. 71)
- PEAKING (p. 71)
- MARKER (p. 71)
- CAMERA DATA DISPLAY (p. 72)
- AUDIO LEVEL DISPLAY (p. 72)
- DATA CODE (p. 73)
- TC/UB DISPLAY (p. 74)
- DISPLAY (p. 51)
- SMARTPHONE CONNECT (p. 40)
- REC LAMP (p. 77)
- THUMBNAIL (p. 49)

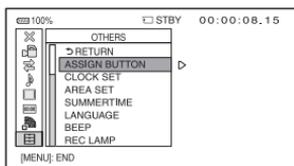


---

**1** Press the MENU button **[B]**.

---

**2** Select **[OTHERS]** → [ASSIGN BUTTON] with the **↑/↓/←/→/SET** button **[A]**.



---

**3** Press the **↑/↓/←/→/SET** button **[A]**, select the ASSIGN button that you want to set, then press the SET button.

---

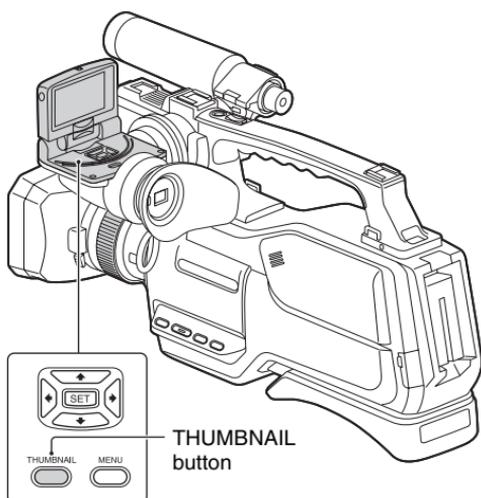
**4** Press the **↑/↓/←/→** button **[A]**, select the function that you want to assign, then press the SET button.

---

**5** Press the **↑/↓/←/→** button **[A]** to select [OK], then press the SET button.

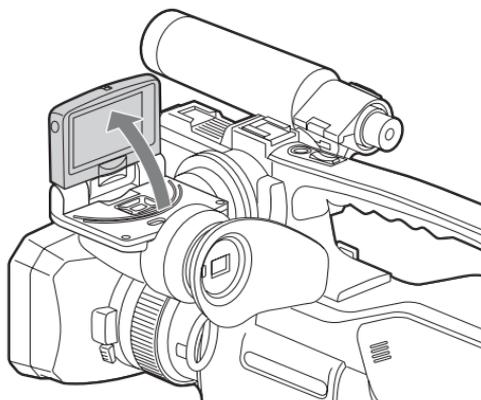
---

# Playback



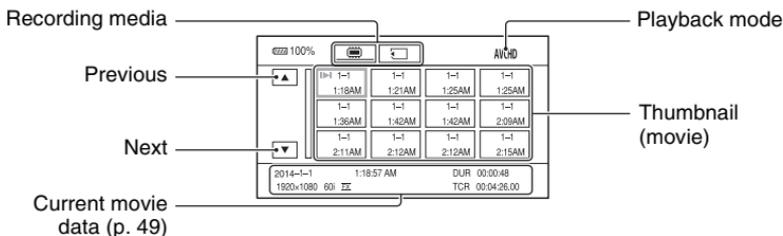
## Playing back movies

- 1 Open the LCD panel.



## 2 Press the THUMBNAIL button.

The thumbnail screen appears after a few seconds.



- When you assign [DISPLAY] to the ASSIGN 1/ ASSIGN 2 button, you can turn on or off the date and time display on the thumbnails by pressing the ASSIGN button you set.

## 3 Play back movies.

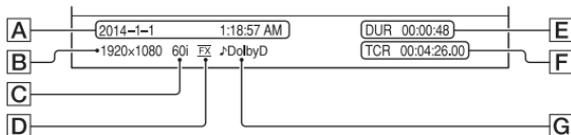
- 1 Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$ /SET buttons to select the recording media you want to play back.

: Internal memory

: Memory card

- 2 Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  buttons to select the movie you want to play back.

Pressing the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  buttons will show the information on the movie at the lower part of the LCD screen.



**A** Date and time of recording started

**B** Resolution

**C** Frame rate

**D** Recording mode

**E** Duration

**F** Time code of recording started

Time code will not be displayed correctly when you play back recording media with no time code, or recording media with time code that your camcorder does not support.

**G** DOLBY DIGITAL recording

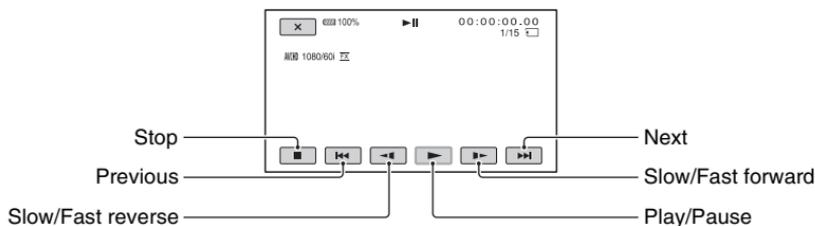
Appears when audio is recorded in DOLBY DIGITAL.

- appears with the movie that has been most recently played back or recorded. If you start playing back the movie with , you can continue playback from the previous time.

- 3 Press the SET button.

Your camcorder starts playing the selected movie.

## Playback (Continued)



### Notes

- Movie files recorded in DV mode can only be played back when the camcorder is set to DV mode.

### Tips

- When playback from the selected movie reaches the last movie, the screen returns to the thumbnail screen.
- Press the  $\blacktriangleleft/\blacktriangleright/\blacktriangleleft/\blacktriangleright$  buttons to select  $\blacktriangleleft/\blacktriangleright$  during pause and press the SET button to play back movies slowly.
- As you repeat pressing the SET button during fast forward/fast rewind, movies are played back as fast as about 5 times  $\rightarrow$  about 10 times  $\rightarrow$  about 30 times  $\rightarrow$  about 60 times.
- In DV mode,  $\blacktriangleleft$  and  $\blacktriangleright$  are disabled.
- In DV mode, fast forward and fast reverse during playback are 5 times faster than normal playback speed.
- When you play back a DV file recorded with a camcorder other than this camcorder, the F value may not be displayed correctly.

### To adjust the volume

Press the MENU button and select  $\text{♪}$  (AUDIO SET)  $\rightarrow$  [VOLUME] to adjust the volume.

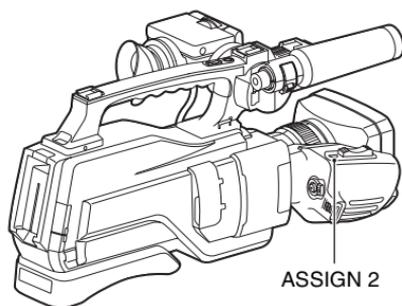
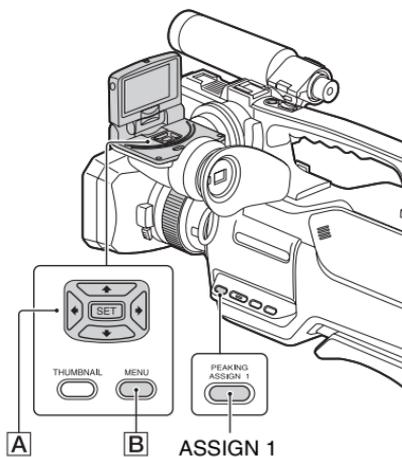
### To return to the recording mode

Press the THUMBNAIL button.

### On playing back movies

- Movies recorded using this camcorder may not be played back normally on devices other than this camcorder. Also, movies recorded on other devices may not play back properly on this camcorder.
- DV movies recorded on SD memory cards cannot be played on A/V devices of other manufacturers.

# Changing/checking the settings in your camcorder



## Changing the screen display

You can display information such as time code, etc., on the image.

- 1 Assign [DISPLAY] to the ASSIGN 1/ASSIGN 2 button (p. 46).

- 2 Press the ASSIGN button you've assigned this function.

The screen indicators turn on (displayed) and off (not displayed) as you press the button.

In the recording mode, the screen changes in the order, detailed display → simple display → no display with each press of the button.

## 💡 Tips

- You can display the screen indicators during playback on a TV. Press the MENU button and press the  $\blacktriangle/\blacktriangleright/\blacktriangleleft/\blacktriangleleft$ /SET button to select [DISPLAY SET] - [DISPLAY OUTPUT] - [ALL OUTPUT] (p. 74).

## Displaying recording data (DATA CODE)

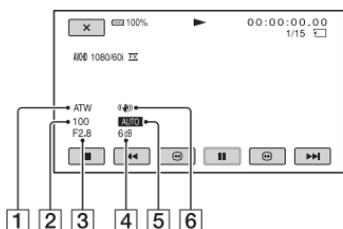
You can display information, including date, time and camera data automatically stored during recording on the screen during playback.

- 1 Press the MENU button **B** while playing back a movie.

- 2 Press the  $\blacktriangle/\blacktriangleright/\blacktriangleleft/\blacktriangleleft$  buttons to select **■** (DISPLAY SET) → [DATA CODE] and choose the data that you want to display, or press the ASSIGN 1/ASSIGN 2 button to which the DATA CODE function is assigned (p. 46), during playback or pause.

The screen changes in the order, date and time display → camera data display → no display with each press of the button.

## Changing/checking the settings in your camcorder (Continued)



### 1 White balance

**PWB** will appear during the playback of movies recorded with [MANU WB TEMP].

### 2 Shutter speed

### 3 Iris

### 4 Gain

### 5 Exposure

**AUTO** appears during playback of the movie recorded with the iris, gain or shutter speed automatically adjusted.

**MANUAL** appears during playback of the movie recorded with the iris, gain or shutter speed manually adjusted.

### 6 SteadyShot

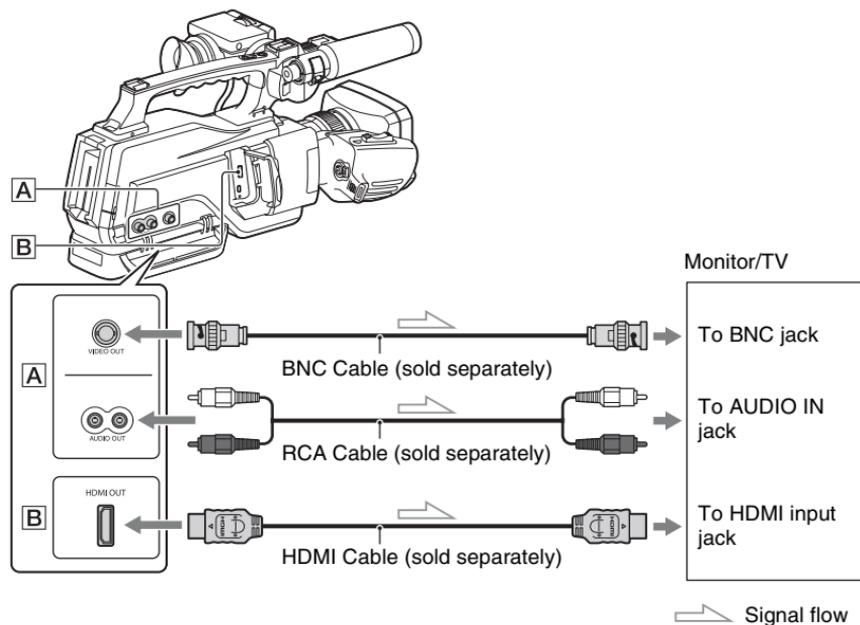
---

## Notes

- When you play back the memory card on other devices, the camera data may be displayed incorrectly. Confirm the correct camera data on your camcorder.

# Connecting a monitor or a TV

Playback image quality depends on the type of monitor or TV, or the jacks used to make the connection.



## Connecting a monitor or a TV (Continued)

### Output resolution

Output resolution depends on the settings of [HDMI RESOLUTION].

#### NTSC model

HD/DV	[HDMI] setting	Output resolution	
		HDMI OUT	VIDEO OUT
HD	1080p/480i	1080p	No output
	720p/480i	720p	No output
	1080i/480i	1080i	No output
	480p	480p	No output
	480i	480i	No output
DV	1080p/480i	480i	No output
	720p/480i	480i	No output
	1080i/480i	480i	No output
	480p	480p	No output
	480i	480i	No output

#### PAL model

HD/DV	[HDMI] setting	Output resolution	
		HDMI OUT	VIDEO OUT
HD	1080p/576i	1080p	No output
	720p/576i	720p	No output
	1080i/576i	1080i	No output
	576p	576p	No output
	576i	576i	No output
DV	1080p/576i	576i	No output
	720p/576i	576i	No output
	1080i/576i	576i	No output
	576p	576p	No output
	576i	576i	No output

#### 🔊 Notes

- It is recommended that you use an authorized cable with HDMI logo or a Sony HDMI cable.
- Images are not output from the HDMI OUT jack of your camcorder, if copyright protection signals are recorded in the movies.
- Images and sounds may not be reproduced correctly on some monitors or TVs.
- Do not connect the output jacks of the camcorder with the output jacks of the monitor or TV. A malfunction may be caused.
- When the frame rate in [REC FORMAT] is set to 24p or 30p (NTSC model) or 25p (PAL model), the output signal is converted to interlace or progressive through pull-down conversion.
- If you display the edit screen while outputting signals to a monitor or TV, the menu may not be displayed correctly.

- This camcorder is not compatible with “BRAVIA” sync.

#### **Tips**

- HDMI (High-Definition Multimedia Interface) is an interface for transferring uncompressed digital audio and video signals between a TV and a connected device. By connecting a cable from the camcorder’s HDMI OUT jack to your TV, you can enjoy high image quality video and digital audio.

# Protecting movies (Protect)

Protect movies to avoid deleting them by mistake.

## Notes

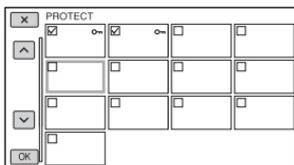
- You cannot protect standard image quality (DV) movies.

**1** Press the MENU button when the thumbnail screen is displayed.

**2** Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$ /SET buttons to select  (EDIT) → [PROTECT].

**3** Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  buttons to select a movie to be protected, then press the SET button.

✓ is displayed on the selected thumbnail.



- To protect another movie, repeat step 2.
- You can select up to 100 movies at one time.
- Press the REC START/STOP button to preview the selected movie. To return to the thumbnail screen, press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  buttons to select  and press the SET button.

**4** Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$ /SET buttons to select [OK] → [OK] → [OK].

## To undo the protection of movies

Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  buttons to select a movie to be undone and press the SET button in step 3.

✓ disappears.

# Dividing a movie

You can divide a movie at a designated point.

- Movies recorded in standard image quality (DV) cannot be divided.

- 1 Press the **MENU** button while playing back a movie.
- 2 Press the **↑/↓/←/→/SET** buttons to select  (**EDIT**) → [**DIVIDE**].
- 3 Press the **↑/↓/←/→** buttons to select **II** at the point where you want to divide, then press the **SET** button.

After you select the point with **II**, make fine adjustment with these buttons.



Returns to the beginning of the selected movie.

- 4 Press the **↑/↓/←/→/SET** buttons to select [**OK**] → [**OK**].

## Notes

- You cannot restore movies once they are divided.
- Do not remove the battery pack, the AC Adaptor or the recording media that contains the movies from your camcorder during the operation. It may damage the recording media.
- A slight difference may occur from the point where you select **II** and the actual dividing point, as your camcorder selects the dividing point based in about half-second increments.

# Deleting movies

You can free media space by deleting movies from recording media.

## Notes

- You cannot restore images once they are deleted.
- Do not remove the battery pack, the AC Adaptor or the recording media that contains the movies from your camcorder during the operation. It may damage the recording media.
- You cannot delete protected movies. Undo the protection of the movies before you try to delete them (p. 56).
- Save important movies in advance.

## Tips

- To delete all data recorded on the recording media and recover all the recordable space of the media, format the media (p. 59).

---

**1** Press the MENU button when the thumbnail screen is displayed.

---

**2** Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$ /SET buttons to select  (EDIT) → [DELETE].

---

**3** Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  buttons to select a movie to be deleted, then press the SET button.

✓ is displayed on the selected thumbnail.



- You can select up to 100 movies at one time.

- Press the REC START/STOP button to preview the selected movie. To return to the thumbnail screen, press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  buttons to select  and press the SET button.
-  appears at the upper right corner on the thumbnail of protected movies.
- No check box appears on the thumbnail of protected images.

---

**4** Press the  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$ /SET buttons to select [OK] → [OK] → [OK].

---

## Formatting the recording media

Formatting deletes all data from the recording media to recover recordable free space.

### 🔊 Notes

- Connect your camcorder to the wall outlet (wall socket) using the supplied AC Adaptor to prevent your camcorder from running out of power during the operation.
- To avoid the loss of important images, you should save them before formatting the recording media.
- Protected movies are also deleted.

---

**1 Press the MENU button.**

---

**2 Press the  $\uparrow/\downarrow/\leftarrow/\rightarrow$ /SET buttons to select  (OTHERS) → [MEDIA FORMAT].**

---

**3 Press the  $\uparrow/\downarrow/\leftarrow/\rightarrow$ /SET buttons to select the recording media to be formatted.**

---

**4 Press the  $\uparrow/\downarrow/\leftarrow/\rightarrow$ /SET buttons to select [OK] → [OK].**

---

### 🔊 Notes

- While [Executing...] is displayed, do not turn off the camcorder, do not operate any buttons on the camcorder, disconnect the AC Adaptor, or remove the recording media from your camcorder. (The access lamp is lit or flashing while formatting recording media.)

## Deleting all data from the memory card and internal memory

If a memory card and the internal memory is used repeatedly, garbage data accumulate which may prevent the image data from being written at the fixed speed. In this case, recording may stop suddenly. If this happens, empty the memory card and internal memory to avoid the writing error. Emptying the memory card and internal memory can erase more data than ordinary formatting.

### 🔊 Notes

- If you perform this operation, all stored data are deleted. To avoid the loss of important images, you should save them before the operation.
- You cannot perform this operation unless you connect the AC Adaptor to the wall outlet (wall socket).
- Disconnect all cables except the AC Adaptor. Do not disconnect the AC Adaptor during the operation.
- Do not apply any vibrations or shocks to your camcorder during this operation.

---

**1 Connect your camcorder to the wall outlet (wall socket) using the AC Adaptor AC-L100C (supplied) (p. 18).**

---

**2 Press the MENU button.**

---

**3 Press the  $\uparrow/\downarrow/\leftarrow/\rightarrow$ /SET buttons to select  (OTHERS) → [MEDIA FORMAT].**

---

**4 Select the recording media to be formatted.**

The format screen appears.

## Deleting all data from the memory card and internal memory (Continued)

---

### 5 Press the SET button to select [OK] → [OK].

---

#### Notes

- It may take from several minutes to several hours to empty recording media, depending on the capacity. You can check the actual time required on the LCD screen.
- If you stop the operation while [Executing...] is displayed, be sure to complete the operation by performing [MEDIA FORMAT] or emptying before you use the recording media next time.

#### Tips

- To prevent a data write error from occurring on the recording media, empty the media data from the camcorder before you start recording. By deleting all data using the [Empty] operation instead of the ordinary [MEDIA FORMAT] operation, you can minimize potential media write errors that might occur when recording.

## Repairing the image database file

This function checks the database information and the consistency of movies on the recording media, and repairs if any inconsistencies found.

#### Notes

- Connect your camcorder to the wall outlet (wall socket) using the supplied AC Adaptor to prevent your camcorder from running out of power during the operation.

### 1 Press the MENU button.

---

### 2 Press the ////SET buttons to select (OTHERS) → [REPAIR IMAGE DB FILE].

---

### 3 Press the ////SET buttons to select the recording media you want to check the database file.

The confirmation screen appears.

---

### 4 Press the ////SET buttons to select [OK].

The database file check starts. Press the ////SET buttons to select [OK] and quit the database file check if no inconsistency is found.

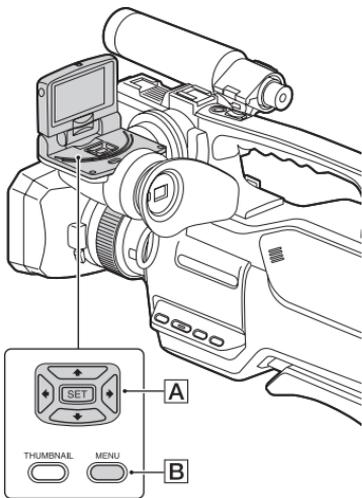
---

#### Notes

- If you stop the operation while [Repairing the image database file.] is displayed, be sure to complete the operation as described above before you use the recording media next time.

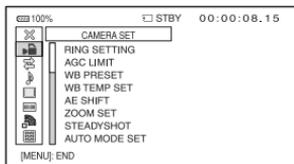
# Operating the menu

You can change various settings or make detailed adjustments using the menu items displayed on the LCD screen.



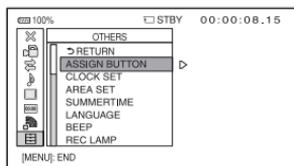
## 1 Press the MENU button [B].

The menu screen appears.

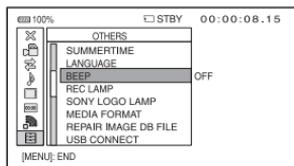


## 2 Press the $\uparrow/\downarrow/\leftarrow/\rightarrow$ /SET buttons [A] to select the desired menu.

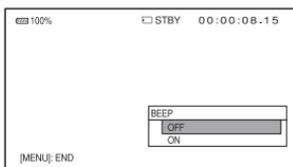
- CAMERA SET (p. 65)
- REC/OUT SET (p. 68)
- AUDIO SET (p. 69)
- DISPLAY SET (p. 70)
- TC/UB SET (p. 74)
- NETWORK SET (p. 76)
- OTHERS (p. 77)
- EDIT (p. 56)



## 3 Press the $\uparrow/\downarrow/\leftarrow/\rightarrow$ /SET buttons [A] to select the item that you want to set.



- 4** Press the **↑/↓/←/→** buttons to select the desired setting, then press the **SET** button.



- 5** Press the **MENU** button to hide the menu screen.

To return to the previous screen, select [**↩** RETURN].

---

### **🔍** Notes

- The available menu items vary depending on the context of your camcorder during recording or playback.
- Items and setting values not available due to other settings, are grayed out.

# Menu items

The function and setting value of each menu item are as follows.  
The default settings are marked with ▶.

## (CAMERA SET) (p. 65)

RING SETTING	▶FOCUS, ZOOM, GAIN, IRIS, SHUTTER SPEED, AE SHIFT
AGC LIMIT	▶OFF, 24dB - 0dB
WB PRESET	▶OUTDOOR, INDOOR, MANU WB TEMP
WB TEMP SET	2300K - 15000K (▶6500K)
AE SHIFT	ON/OFF ▶OFF, ON
	LEVEL -2.0EV - +2.0EV (▶0EV)
ZOOM SET	ZOOM TYPE ▶OPTICAL ZOOM ONLY, ON[CLEAR IMAGE ZOOM], ON[DIGITAL ZOOM]
STEADYSHOT	▶STANDARD, ACTIVE, OFF
AUTO MODE SET	▶AUTO/MANUAL, INTELLIGENT AUTO, SCENE SELECTION
SCENE SELECTION SET	NIGHT SCENE, SUNRISE&SUNSET, FIREWORKS, LANDSCAPE, ▶PORTRAIT, SPOTLIGHT, BEACH
AUTO BACK LIGHT	▶OFF, ON
FACE DETECTION	▶OFF, ON
MI SHOE VIDEO LIGHT	▶POWER LINK, REC LINK, REC LINK+STBY, AUTO
COLOR BAR	ON/OFF ▶OFF, ON
	TONE ▶OFF, ON

## (REC/OUT SET) (p. 68)

REC SET	REC FORMAT AVCHD <b>NTSC model</b> 1080/60p PS, ▶1080/60i FX, 1080/60i FH, 1080/30p FX, 1080/30p FH, 1080/24p FX, 1080/24p FH, 720/60p FX, 720/60p FH, 720/60p HQ <b>PAL model</b> 1080/50p PS, 1080/50i FX, ▶1080/50i FH, 1080/25p FX, 1080/25p FH, 720/50p FX, 720/50p FH, 720/50p HQ
	SIMUL/RELAY REC ▶OFF, SIMULTANEOUS REC, RELAY REC
	REC BUTTON SETTING ▶REC BUTTON:  /  HANDLE REC BUTTON:   / REC BUTTON:  HANDLE REC BUTTON:  / REC BUTTON:  HANDLE REC BUTTON: 
	DV MODE <del>DV</del> WIDE REC ▶OFF, ON
	CANCEL DV MODE

## Menu items (Continued)

MEDIA SELECT	▶INTERNAL MEMORY, MEMORY CARD
VIDEO OUT	HDMI RESOLUTION <b>NTSC model</b> 1080p/480i, 720p/ 480i, ▶1080i/480i, 480p, 480i <b>PAL model</b> ▶1080p/576i, 720p/ 576i, 1080i/576i, 576p, 576i DOWN CONVERT TYPE ▶SQUEEZE, LETTER BOX(16:9), EDGE CROP  WIDE CONVERT ▶SQUEEZE, LETTER BOX(16:9), EDGE CROP HDMI TC OUTPUT ▶OFF, ON

### (AUDIO SET) (p. 69)

VOLUME	
AVCHD AUDIO FORMAT	▶LINEAR PCM, DOLBY DIGITAL
AUDIO REC LEVEL	REC LEVEL MODE ▶NORMAL, HIGH, MANUAL MANUAL REC LEVEL 1 - 31 (▶21)
MIC SELECT	▶STEREO MINI MIC, MI SHOE MIC
AUDIO OUTPUT TIMING	▶LIVE, LIP SYNC

### (DISPLAY SET) (p. 70)

HISTOGRAM	▶OFF, ON, ON[ZEBRA POINT]
ZEBRA	ON/OFF ▶OFF, ON LEVEL 70 - 100, 100+ (▶70)

PEAKING	ON/OFF ▶OFF, ON COLOR ▶WHITE, RED, YELLOW LEVEL HIGH, ▶MIDDLE, LOW
MARKER	ON/OFF ▶OFF, ON CENTER ▶ON, OFF ASPECT ▶OFF, 4:3, 13:9, 14:9, 15:9, 1.66:1, 1.85:1, 2.35:1 SAFETY ZONE ▶OFF, 80%, 90% GUIDEFAME ▶OFF, ON

FOCUS MAG RATIO x4.0, x8.0, ▶x4.0/x8.0

CAMERA DATA DISPLAY	OFF, ▶ON
AUDIO LEVEL DISPLAY	▶ON, OFF
ZOOM DISPLAY	▶BAR, NUMBER
FOCUS DISPLAY	▶METER, FEET
SHUTTER DISPLAY	▶SECOND, DEGREE
DATA CODE	▶OFF, DATE/TIME, CAMERA DATA
LCD BRIGHT	▶NORMAL, BRIGHT
VF COLOR TEMP.	
VF/LCD PANEL	▶LCD PANEL, AUTO
DISPLAY OUTPUT	▶LCD PANEL, ALL OUTPUT

### (TC/UB SET) (p. 74)

TC/UB DISPLAY	▶TC, U-BIT
TC PRESET	PRESET, RESET
UB PRESET	PRESET, RESET
TC FORMAT	▶DF, NDF
TC RUN	▶REC RUN, FREE RUN
TC MAKE	▶PRESET, REGENERATE

UB TIME REC	▶OFF, ON
-------------	----------

## (NETWORK SET) (p. 76)

CTRL W/ SMARTPHONE	
AIRPLANE MODE	▶OFF, ON
EDIT DEVICE NAME	
DISP MAC ADDRESS	
SSID/PW RESET	

## (OTHERS) (p. 77)

ASSIGN BUTTON	ASSIGN1, ASSIGN2
CLOCK SET	
AREA SET	
SUMMERTIME	▶OFF, ON
LANGUAGE	
BEEP	▶OFF, ON
REC LAMP	▶ON, OFF
SONY LOGO LAMP	▶ON, OFF
MEDIA FORMAT	INTERNAL MEMORY, MEMORY CARD
REPAIR IMAGE DB FILE	INTERNAL MEMORY, MEMORY CARD, EXTERNAL MEDIA
USB CONNECT	
USB LUN SET	▶MULTI, SINGLE
OPERATION TIME	
VERSION DISPLAY	
INITIALIZE	

## (EDIT)

PROTECT	
DIVIDE	
DELETE	
DIRECT COPY	

### Tips

- You can display the [EDIT] menu by pressing the MENU button when the THUMBNAIL or playback screen is displayed.

# (CAMERA SET) menu

Settings to adjust your camcorder to the recording conditions (STEADYSHOT, etc.)

The default settings are marked with ▶. See page 61 for details on selecting menu items.

Press the MENU button → select  (CAMERA SET) with the ////SET buttons.

## RING SETTING

You can assign the functions to the ring (p. 33).

### ▶ FOCUS

ZOOM

GAIN

IRIS

SHUTTER SPEED

AE SHIFT

## AGC LIMIT

You can select the upper limit for the Auto Gain Control (AGC).

▶ OFF, 24dB - 0dB (3dB increments)

### Notes

- This function is not effective while you adjust the gain manually.

## WB PRESET

You can use the preset white balance. For more details, see page 37.

## WB TEMP SET

You can set the color temperature when you set [WB PRESET] to [MANU WB TEMP].

2300K - ▶6500K - 15000K (100K increments)

Press the MENU button → select  (CAMERA SET) with the /SET button.

## AE SHIFT

### ■ ON/OFF

#### ▶ OFF

Does not use the AE SHIFT function.

#### ON

Uses the AE SHIFT function. The selected value (-2.0EV for example) appears on the LCD screen.

### ■ LEVEL

You can set an offset value to adjust the automatic exposure adjustment value with the /SET button.

**-2.0EV - ▶0EV - +2.0EV**  
(dark - standard - bright)

### 🔊 Notes

- This function is not effective while you adjust the iris, shutter speed, gain all manually.

## ZOOM SET

### ■ ZOOM TYPE

#### ▶ OPTICAL ZOOM ONLY

Uses only optical zoom. You can zoom up to 12×.

#### ON[CLEAR IMAGE ZOOM]

You can use the clear image zoom in addition to the optical zoom.

You can zoom up to 24×, which includes 12× optical zoom.

#### ON[DIGITAL ZOOM]

You can use the digital zoom in addition to the optical zoom and clear image zoom.

You can zoom up to 200× but the image quality deteriorates within the range where  is displayed.

### 💡 Tips

- Clear image zoom maintains an image quality that is close to the original.
- The face detection function will not be effective while using the digital zoom.

## STEADYSHOT

You can set the camera shake reduction when shooting.

### ▶ STANDARD ( )

Uses the camera shake reduction when shooting under relatively stable conditions.

### ACTIVE ( )

Uses the camera shake reduction with more powerful effect.

### OFF ( )

Does not use the camera shake reduction.

This setting is recommended when you use a tripod.

### 🔊 Notes

- When [ACTIVE] is selected, the angle of view shifts 1.08 times toward the telephoto side.

### 💡 Tips

- You can assign this function to an ASSIGN button (p. 46).

## AUTO MODE SET

See page 38.

## SCENE SELECTION SET

See page 39.

## AUTO BACK LIGHT

You can automatically correct for backlighting.

### ▶ OFF

Does not correct for backlighting.

### ON

Automatically corrects for backlighting.

## FACE DETECTION

See page 29.

## MI SHOE VIDEO LIGHT

You can set how the video light operates (sold separately).

### ▶ POWER LINK

The video light turns on/off when the camcorder is turned on/off.

### REC LINK

The video light turns on/off when the camcorder starts/stops recording.

### REC LINK+STBY

The video light turns on/enters standby when the camcorder starts/stops recording.

### AUTO

The video light automatically turns on when in a dark place.

## COLOR BAR

### ■ ON/OFF

#### ▶ OFF

Does not display color bars.

#### ON

Displays color bars on the LCD screen, records them on recording media, and outputs audio tone signals.

This function helps you to adjust colors when you view movies recorded with your camcorder on a TV or a monitor.

### Notes

- This function is automatically set to [OFF] when you switch the format, perform the function by the MENU button, or turn off the camcorder.
- You cannot change the setting during recording or the focus magnifier operation.

### ■ TONE

#### ▶ OFF

Does not output audio tone signals.

#### ON

Outputs audio tone signals (1 kHz: full bit -20dB (NTSC model), -18dB (PAL model)).

Set [ON/OFF] to [ON], too.

### Tips

- You can assign [ON/OFF] to an ASSIGN button (p. 46).
- If you record color bars with [TONE] set to [OFF], the camcorder records sound from the microphone.

# ⇌ (REC/OUT SET) menu

Recording settings, input and output settings (REC SET/VIDEO OUT, etc.)

The default settings are marked with ►.

See page 61 for details on selecting menu items.

Press the MENU button → select  
⇌ (REC/OUT SET) with the ▲/▼/◀/▶/  
SET buttons.

## REC SET

### ■ REC FORMAT

See page 31.

### ■ SIMUL/RELAY REC

See page 25.

### ■ REC BUTTON SETTING

See page 25.

### ■ DV MODE

See page 31.

### ■ WIDE REC

You can set the aspect ratio when recording in DV.

#### ► OFF (4:3)

Records in 4:3.

#### ON

Records in 16:9.

### Notes

- When recording at a setting other than DV, the aspect ratio is fixed to 16:9, and the 4:3 aspect ratio is not available.

### ■ CANCEL DV MODE

See page 32.

## MEDIA SELECT

You can select the recording media.

### ► INTERNAL MEMORY, MEMORY CARD

## VIDEO OUT

### ■ HDMI RESOLUTION

You can select the resolution of the output signal from the HDMI jacks.

#### NTSC model:

1080p/480i

720p/480i

#### ► 1080i/480i

480p

480i

#### PAL model:

1080p/576i

720p/576i

#### ► 1080i/576i

576p

576i

### Tips

- See page 54 on the output resolution of the signal for each connecting cable.

### ■ DOWN CONVERT TYPE

You can select a down convert type when you down-convert video signal.

Use this function for outputting movies and still images recorded in 16:9.

#### ► SQUEEZE

Outputs a horizontally compressed image while maintaining its original height.

#### LETTER BOX(16:9)

Outputs a vertically compressed image while maintaining its original aspect ratio.

#### EDGE CROP

Outputs the central portion of the original image by cropping its right and left edges.

## ■ [DV] WIDE CONVERT

You can select a down convert type when you down-convert video signal. Use this function for outputting DV movies recorded with [ [DV] WIDE REC ] set to [ON].

### ▶ SQUEEZE

Outputs a horizontally compressed image while maintaining its original height.

### LETTER BOX(16:9)

Outputs a vertically compressed image while maintaining its original aspect ratio.

### EDGE CROP

Outputs the central portion of the original image by cropping its right and left edges.

## 🔊 Notes

- When you view a movie recorded in DV with [ [DV] WIDE REC ] set to [ON] on a standard 4:3 TV, images may appear horizontally compressed while maintaining its original height. In such a case, select [LETTER BOX(16:9)] or [EDGE CROP].
- If you change the setting from [SQUEEZE] to another option, or from another option to [SQUEEZE], the screen will go out momentarily, and the image and sound will be intermitted.

## ■ HDMI TC OUTPUT

You can set whether to output time code to other professional-use devices, using HDMI.

### ▶ OFF

Does not overlap the time code information on HDMI output signal.

### ON

Overlaps the time code information on HDMI output signal\*. The data is transmitted as digital data, not as a projected image, and the connected device identifies the time data by referencing the transmitted digital data.

\* If the frame rate is 24p, 2-3 pulldown is performed and the converted information is automatically added and transmitted.

## 🎵 (AUDIO SET) menu

Settings for the audio recording (AVCHD AUDIO FORMAT, etc.)

The default settings are marked with ▶. See page 61 for details on selecting menu items.

Press the MENU button → select 🎵 (AUDIO SET) with the ⬆/⬇/⬅/➡/SET buttons.

## VOLUME

You can adjust the volume.

## 💡 Tips

- You can assign this function to an ASSIGN button (p. 46).

## AVCHD AUDIO FORMAT

You can set the audio format for AVCHD recording.

### ▶ LINEAR PCM (LPCM)

Records in Linear PCM format.

### DOLBY DIGITAL (DolbyD)

Records in Dolby Digital format.

## 🔊 Notes

- Audio format is fixed to LPCM with the DV recording.

## AUDIO REC LEVEL

### ■ REC LEVEL MODE

You can set the recording sensitivity.

#### ▶ NORMAL

Sensitivity generally used for professional-use devices.

#### HIGH

Sensitivity generally used for consumer-use devices.

#### MANUAL

In [MANUAL REC LEVEL], you can set the desired sensitivity level between 1 and 31.

Press the MENU button → select  (AUDIO SET) with the /SET buttons.

### 🔊 Notes

- When using a shoe microphone, the setting is NORMAL.

### ■ MANUAL REC LEVEL

You can set the recording sensitivity when the [REC LEVEL MODE] is [MANUAL].

1 - 31 (▶21)

## MIC SELECT

You can select the microphone to use for recording audio.

### ▶ STEREO MINI MIC ()

You can record audio using a microphone connected to a MIC jack (PLUG IN POWER) (p. 5).

### MI SHOE MIC ()

You can record audio using a Multi Interface Shoe compatible microphone. You can also record audio using an XLR microphone, by attaching the XLR handle.

## AUDIO OUTPUT TIMING

You can set the timing of the audio output when recording.

### ▶ LIVE

When recording, audio is output without any delay.

### LIP SYNC

When recording, audio is synchronized with video before output.

## (DISPLAY SET) menu

Display settings (MARKER/DISPLAY OUTPUT, etc.)

The default settings are marked with ▶.

See page 61 for details on selecting menu items.

Press the MENU button → select  (DISPLAY SET) with the /SET buttons.

## HISTOGRAM

The histogram displays the luminance distribution that shows how many pixels of a particular brightness exist in the image.

### ▶ OFF

Does not display the histogram.

### ON

Displays a histogram. A line appears at the 100% position, and the color of the zone above the line changes.



Histogram

### ON[ZEBRA POINT]

The histogram shows the point where the zebra pattern appears. A line is displayed at the brightness level set with [ZEBRA].

### 💡 Tips

- You can assign this function to an ASSIGN button (p. 46).

## ZEBRA

You can display a zebra pattern as a guide for adjusting brightness.

### ■ ON/OFF

#### ▶ OFF

Does not display the zebra pattern.

#### ON ( and the brightness level)

The zebra pattern is not recorded with the image.

### ■ LEVEL

You can select the brightness level.

▶ **70, 75, 80, 85, 90, 95, 100, 100+**

### 💡 Tips

- The zebra pattern is a stripe pattern that appears in areas of brightness equal to or exceeding the brightness level you have set.
- You can assign [ON/OFF] to an ASSIGN button (p. 46).

## PEAKING

### ■ ON/OFF

#### ▶ OFF

Does not display the peaking.

#### ON (PEAKING)

You can display an image on the LCD screen with its outlines enhanced. This function helps you to adjust the focus.

### ■ COLOR

You can select peaking color.

▶ **WHITE, RED, YELLOW**

### ■ LEVEL

You can select a peaking sensitivity.

**HIGH, ▶ MIDDLE, LOW**

### 🔊 Notes

- The enhanced outlines will not be recorded on the recording media.

### 💡 Tips

- You can focus more easily using this function in combination with the expanded focus function (p. 29).
- You can assign [ON/OFF] to an ASSIGN button (p. 46).

## MARKER

### ■ ON/OFF

#### ▶ OFF

Does not display markers.

#### ON

Displays markers. Markers are not recorded on the recording media.

### ■ CENTER

#### ▶ ON

Displays a marker at the center of the LCD screen.

#### OFF

Does not display a center maker.



### ■ ASPECT

#### ▶ OFF

Does not display the aspect ratio.

**4:3, 13:9, 14:9, 15:9, 1.66:1, 1.85:1, 2.35:1**

Displays markers at boundaries of display area defined by the aspect ratio.



### ■ SAFETY ZONE

#### ▶ OFF

Does not display the safety zone.

**80%, 90%**

If you select either one, you can display markers at boundaries of display area that regular home TVs can display.

Press the MENU button → select  (DISPLAY SET) with the /SET button.



## GUIDEFAME

### ▶ OFF

Does not display the guide frame.

### ON

Displays the guide frame.

You can check the horizontal and vertical aspect of a subject.



## Notes

- Only the time code is output to an external device via external output jacks when [MARKER] is set to [ON], even if [DISPLAY OUTPUT] is set to [ALL OUTPUT].
- You cannot display markers during [FOCUS MAGNIFIER].
- You cannot output markers on an external device.

## Tips

- You can display all types of markers at the same time.
- You can obtain a balanced composition by positioning the subject at the cross points of the guideframe marker.
- You can assign [ON/OFF] to an ASSIGN button (p. 46).

## FOCUS MAG RATIO

You can set the magnification of expanded focus.

×4.0

×8.0

### ▶ ×4.0/×8.0

The setting changes in the order [×4.0] → [×8.0] → [OFF] with each press of the ASSIGN 2 button/FOCUS MAGNIFIER button.

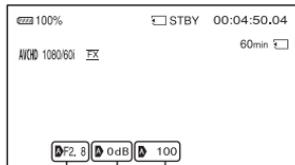
## CAMERA DATA DISPLAY

### OFF

Does not display the iris, gain and shutter speed settings.

### ▶ ON

Constantly displays the iris, gain and shutter speed settings on the LCD screen.



Iris value

Gain value

Shutter speed value

## Tips

- The settings appear on the LCD screen during the manual adjustment regardless of the settings of this function.
-  indicates that the settings are automatically adjusted values.
- The displayed settings are different from the settings that will be displayed when you press the ASSIGN button to which [DATA CODE] is assigned (p. 51).
- You can assign this function to an ASSIGN button (p. 46).

## AUDIO LEVEL DISPLAY

### ▶ ON

Displays the audio level meters on the LCD screen.



Audio level meters

## OFF

Does not display the audio level meters.

### Tips

- You can assign this function to an ASSIGN button (p. 46).

## ZOOM DISPLAY

### ► BAR

Displays a bar that indicates the zoom position.

### NUMBER

Displays a number that indicates the zoom position.

## FOCUS DISPLAY

### ► METER

Displays the focal length in meters.

### FEET

Displays the focal length in feet.

## SHUTTER DISPLAY

### ► SECOND

Displays the shutter display in seconds.

### DEGREE

Displays the shutter display in degrees.

The shutter speed equal to the period that your camcorder reads image data from the image sensor is defined as 360 degrees. The degree is calculated based on this definition and displayed.

- NTSC model
  - With a frame rate of 60 selected in [REC FORMAT], when the shutter speed is 1/60, the shutter angle is 360 degrees.
  - With a frame rate of 30 selected in [REC FORMAT], when the shutter speed is 1/30, the shutter angle is 360 degrees.
  - With a frame rate of 24 selected in [REC FORMAT], when the shutter speed is 1/24, the shutter angle is 360 degrees.
- PAL model

– With a frame rate of 50 selected in [REC FORMAT], when the shutter speed is 1/50, the shutter angle is 360 degrees.

– With a frame rate of 25 selected in [REC FORMAT], when the shutter speed is 1/25, the shutter angle is 360 degrees.

See page 31 for details on [REC FORMAT] setting.

### Notes

- When you press the ASSIGN button to which [DATA CODE] is assigned, the shutter speed is displayed in seconds regardless of this setting.

### Tips

- If the shutter speed is more than 360 degrees, it is displayed as an integral multiple of 360 degrees (360° × 2, etc.).

## DATA CODE

You can select the information that is displayed during playback.

### ► OFF

No information is displayed.

### DATE/TIME

The date and time are displayed.

### CAMERA DATA

Camera data is displayed.

### Tips

- You can assign this function to an ASSIGN button (p. 46).

## LCD BRIGHT

You can adjust the brightness of the LCD screen. Changes in the LCD brightness are not affect the brightness of recording images.

### ► NORMAL

### BRIGHT

Press the MENU button → select  (DISPLAY SET) with the /↓/←/↑/SET buttons.

## VF COLOR TEMP.

You can change the color temperature of the viewfinder.

Low color temperature makes the viewfinder appear reddish, and high color temperature makes it appear bluish.

## VF/LCD PANEL

The camcorder detects the condition and switches the display between the viewfinder and LCD screen.

### ▶ LCD PANEL

The screen is displayed on the LCD screen when the panel is opened.

### AUTO

The camcorder automatically switches the display between the viewfinder and the LCD screen using eye sensor control.

### Notes

- If the eye sensor does not work even though your eye moves close to the viewfinder, the screen will be displayed on the LCD screen, even though [VF/LCD PANEL] is set to [AUTO].

## DISPLAY OUTPUT

You can select where to output the display information, such as time code.

### ▶ LCD PANEL

Outputs the information to the LCD screen.

### ALL OUTPUT

Outputs information to the HDMI OUT and VIDEO OUT jacks, and the LCD screen. Zebra, peaking and the frame on the face are also output.

### Notes

- Only the time code, zebra, peaking and the frame on the face are output when [MARKER] is set to [ON] and a marker is displayed on the LCD screen.

## (TC/UB SET) menu

Time code settings (TC PRESET/UB PRESET/TC FORMAT, etc.)

The default settings are marked with ▶. See page 61 for details on selecting menu items.

Press the MENU button → select  (TC/UB SET) with the /↓/←/↑/SET buttons.

## TC/UB DISPLAY

You can select whether to display the time code or the user bit code.

### ▶ TC

Displays the time code.

### U-BIT

Displays the user bit code.

### Tips

- You can assign this function to an ASSIGN button (p. 46).

## TC PRESET

See page 44.

## UB PRESET

See page 44.

## TC FORMAT (NTSC model only)

You can select the time code recording method (NTSC model only). For the PAL model, this setting is fixed to [NDF].

### ▶ DF

Records the time code in drop frame.

### NDF

Records the time code in non-drop frame.

### Notes

- This setting is fixed to [NDF] when the frame rate in [REC FORMAT] is set to 24.

## Tips

Drop frame

Time code is based on 30 frames per second; however, gaps in the actual time occur during extended periods of recording as the actual frame frequency of NTSC image signal is 29.97 frames per second. Drop frame corrects this gap to make time code and actual time equal. In drop frame, the first 2 frame numbers are removed every minute except in every tenth minute. Time code without this correction is called non-drop frame.

## TC RUN

You can select how the time code advances.

### ► REC RUN

Advances the time code only during recording.

Select this setting to record the time code sequentially from the last time code of the previous recording.

### FREE RUN

Advances the time code regardless of operation of your camcorder.

## Notes

- Even if the time code advances in the [REC RUN] mode, the time code may not be recorded sequentially in the following cases:
  - When the recording format is changed.
  - When the recording media is removed.

## TC MAKE

### ► PRESET

Records the newly set time code on the recording media.

### REGENERATE

Reads the last time code of the previous recording from the recording media and records the new time code consecutively from the last time code during the backspace editing.

The time code runs in [REC RUN] mode regardless of the setting of [TC RUN].

## UB TIME REC

### ► OFF

Does not save the actual time in the user bit code.

### ON

Saves the actual time in the user bit code.

## Notes

- The last 2 digits are fixed to 00 when it is set to [ON].

# (NETWORK SET) menu

Settings for the Wi-Fi function (CTRL W/  
SMARTPHONE, etc.)

The default settings are marked with ►.

See page 61 for details on selecting  
menu items.

Press the MENU button → select  
 (NETWORK SET) with the ////  
SET buttons.

## CTRL W/SMARTPHONE

See page 41.

## AIRPLANE MODE

Wi-Fi-related settings can be disabled  
(when boarding a plane, etc.).

### ► OFF

Airplane mode is turned off.

### ON ( )

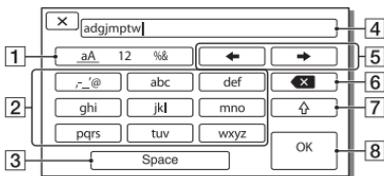
Airplane mode is turned on.

 will be displayed on the screen.

## EDIT DEVICE NAME

You can change the name of a Wi-Fi Direct  
device, etc.

## How to use the keyboard



Screen items	Functions
<b>1</b> Switch character type	Characters switch between alphabetical letters, numerals and symbols.
<b>2</b> Keyboard	Characters are displayed in the order you press the SET button.
<b>3</b> Space	Enters a space.
<b>4</b> Input box	Entered characters are displayed.
<b>5</b> Move cursor	Moves the cursor in the input box to the left or right.
<b>6</b> Delete	Deletes the character preceding the cursor.
<b>7</b> 	Switches between uppercase and lowercase alphabetical letters.
<b>8</b> OK	Confirms an input operation.

To cancel character input midway, press the /// buttons to select  and press the SET button.

## DISP MAC ADDRESS

You can display the camcorder's MAC  
address.

## SSID/PW RESET

The connection information that you  
registered in order to use [CTRL W/  
SMARTPHONE] can be reset.

### Notes

- If the connection information has been reset, it will be necessary to set up the smartphone again, in order to connect it to the camcorder.

## (OTHERS) menu

Settings while recording or other basic settings (AREA SET/BEEP, etc.)

The default settings are marked with ►. See page 61 for details on selecting menu items.

Press the MENU button → select  (OTHERS) with the ////SET buttons.

### ASSIGN BUTTON

See page 46.

### CLOCK SET

See page 19.

### AREA SET

You can adjust a time difference without stopping the clock. When you use your camcorder abroad, you can adjust the clock to the local time.

### SUMMERTIME

You can change this setting without stopping the clock. Set to [ON] to move the time forward 1 hour.

#### ► OFF

Does not set the summertime.

#### ON

Sets the summertime.

### LANGUAGE

You can select the language to be used on the LCD screen.

### BEEP

#### ► OFF

Cancels the melody.

#### ON

Activates a melody when you start/stop recording, or when you are warned with warning indicators, etc.

### REC LAMP

#### ► ON

Turns on the recording lamp.

#### OFF

Turns off the recording lamp.

#### Tips

- You can assign this function to an ASSIGN button (p. 46).

### SONY LOGO LAMP

#### ► ON

Turns on the SONY logo lamp.

#### OFF

Turns off the SONY logo lamp.

### MEDIA FORMAT

See page 59.

### REPAIR IMAGE DB FILE

See page 60.

### USB CONNECT

Select this item when [USB CONNECT] does not appear on the LCD screen by connecting the camcorder to another device with the USB cable.

Press the MENU button → select  (OTHERS) with the ////SET buttons.

## USB LUN SET

You can improve compatibility with external devices by limiting the functions of the USB connection.

### ► MULTI

Set to [MULTI] in normal conditions.

### SINGLE

Set to [SINGLE] if you are unable to connect using the [MULTI] setting.

## OPERATION TIME

Displays the total hours of operation in 10-hour increments.

## VERSION DISPLAY

Displays the current version of your camcorder. Be sure to check for firmware updates.

### Notes

- To perform an update, use the AC Adaptor.

## INITIALIZE

You can reset all settings, including the clock setting, to their default values.

### Notes

- The picture profile settings are not reset.

# Saving images on an external media device

You can save images on an external media device (USB storage devices), such as an external hard disk drive. You can also play back images on the camcorder or another playback device.

## 🔊 Notes

- Refer also to the instruction manuals supplied with the external media device.
- This function is not available with movies recorded in standard image quality (DV).

## 💡 Tips

- You can import images saved on the external media device to your computer by using the dedicated application software (p. 16).

## Functions available after saving images on an external media device

- playback of images through the camcorder (p. 80)
- importing images to a computer

## Devices that cannot be used as an external media device

You cannot use the following devices as an external media device.

- ordinary disc drive such as CD or DVD drive
- media devices connected via a USB hub
- media devices with built-in USB hub
- card reader

## 🔊 Notes

- You may not be able to use external media devices with a code function.
- Your camcorder works with both FAT and NTFS file systems. External media formatted on another device needs to be formatted by a computer, etc., before use. The format screen appears when an external media device is connected to your camcorder. Make sure that important data has not previously been saved on the external media device before you format it.
- Operation is not assured with every device satisfying requirements for operating.
- For details on available external media devices, go to the Sony support website in your country/region.

---

**1** Connect your camcorder to the wall outlet (wall socket) using the AC Adaptor AC-L100C (supplied) (p. 18).

---

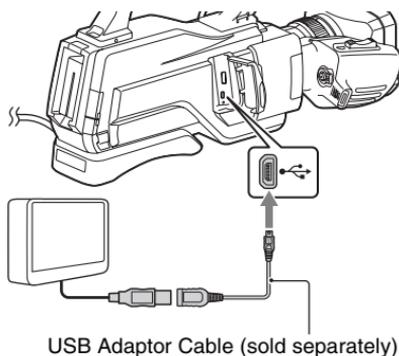
**2** If the external media device has the AC power cable, connect it to the wall outlet (wall socket).

---

**3** Connect the USB Adaptor Cable (sold separately) to the external media device.

---

**4** Turn on your camcorder, and connect the USB Adaptor Cable (sold separately) to the  (USB) jack of your camcorder.



---

**5** Press the /// buttons to select [Copy.] then press the SET button.

---

### 6 Select [INTERNAL MEMORY] or [MEMORY CARD] that contains the images you want to save.

Images that have not yet been saved on an external media device are saved on the connected media device at this time.

- This operation is available only when there are newly recorded images.

You can make menu settings of the external media device such as deleting images. Press the MENU button and select the  (EDIT) menu.

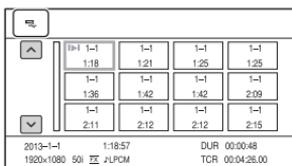
### 7 After the operation is completed, select [OK].

#### Notes

- The number of scenes you can save on the external media device are as follows. Even if the external media device has free space, you cannot save scenes exceeding the following number. The number of scenes may be smaller depending on the camcorder setting and the type of images recorded.
  - High definition image quality (HD) movies:  
Max. 3,999

## Playing back images in the external media device on the camcorder

When the camcorder is connected to the external media device, the images saved in the external media device are displayed on the LCD screen of the camcorder. The recording media icon on the thumbnail screen changes as follows.

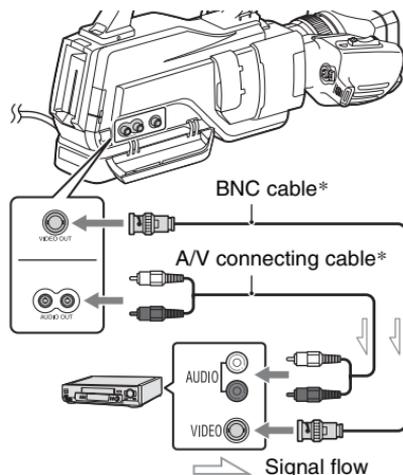


# Creating a standard definition image quality (DV) disc with a recorder, etc.

You can copy images on your camcorder onto a disc or video cassette, by connecting your camcorder to a disc recorder with the A/V connecting cable (sold separately). Refer also to the instruction manuals supplied with the devices to be connected.

## 🔌 Notes

- High definition image quality (HD) movies will be copied with standard definition image quality (DV).



**1** Connect your camcorder to the wall outlet (wall socket) using the AC Adaptor AC-L100C (supplied) (p. 18).

**2** Insert the recording media in the recording device.

If your recording device has an input selector, set it to the input mode.

**3** Connect your camcorder to the recording device (a disc recorder, etc.) with the A/V connecting cable (sold separately).

Connect your camcorder to the input jacks of the recording device.

**4** Start playback on your camcorder, and record it on the recording device.

For details, refer to the instruction manuals supplied with the device to be connected.

**5** When copy is finished, stop the recording device, and then your camcorder.

## 🔌 Notes

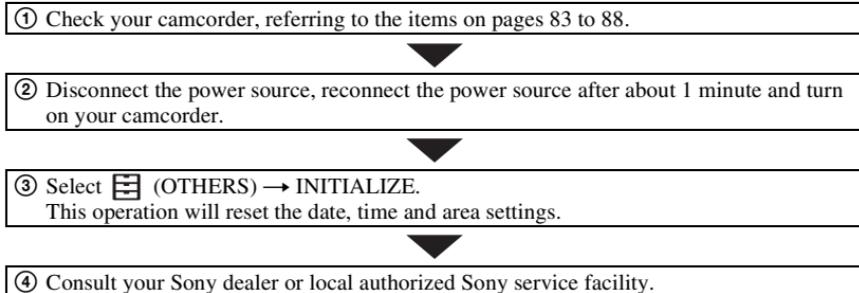
- Since copying is performed via analog data transfer, the image quality may deteriorate.
- You cannot copy images to recorders connected with an HDMI cable.
- When you do not want to display the counter, etc. on the screen of the recording device, press the MENU button, and select  (DISPLAY SET) → [DISPLAY OUTPUT] → [LCD PANEL].
- To copy date/time information and camera data, press the ASSIGN button to which [DATA CODE] is assigned and make the desired setting. In addition, press the MENU button, select  (DISPLAY SET) → [DISPLAY OUTPUT] → [ALL OUTPUT].
- When the screen size of display devices (TV, etc.) is 4:3, set [DOWN CONVERT TYPE] (p. 68).
- When you connect a monaural device, connect the yellow plug of the A/V connecting cable (sold separately) to the video input jack, and the white (left channel) or the red (right channel) plug to the audio input jack on the device.

## **Creating a standard definition image quality (DV) disc with a recorder, etc. (Continued)**

- If the recorder has PIN jacks, a BNC to PIN adapter is required.

# Troubleshooting

If you run into any problems using your camcorder, follow the flow chart below.



- Power sources/LCD screen...p. 83
- Internal memory/Memory card...p. 84
- Recording...p. 84
- Playback...p. 86
- Connecting to TV...p. 87
- Copying/Editing/Connecting to other devices...p. 87
- Connecting to a computer...p. 88

## Power sources/LCD screen

### The power does not turn on or abruptly turns off.

- Attach a charged battery pack to the camcorder (p. 17).
- Use the AC Adaptor to connect the camcorder to a wall outlet (wall socket) (p. 17).

### The camcorder does not operate even when the power is set to on.

- Disconnect the power source (battery or AC Adaptor), then reconnect it after about 1 minute.
- Select [OTHERS] (OTHERS) → INITIALIZE.

### The camcorder gets warm.

- The camcorder may get warmer while you use it. This is not a malfunction.

### The remaining battery indicator does not indicate the correct figure.

- Ambient temperature is too high or too low, or the battery pack has not been charged enough. This is not a malfunction.
- Fully charge the battery again. If the problem persists, the battery may be worn-out. Replace it with a new one (p. 17, 98).
- The indicated figure may not be correct in certain circumstances. For example, when you open or close the LCD screen, it takes about 1 minute to display the correct remaining battery.

### **The battery pack discharges too quickly.**

- Ambient temperature is too high or low, or the battery pack has not been charged enough. This is not a malfunction.
  - Fully charge the battery again. If the problem persists, the battery may be worn-out. Replace it with a new one (p. 17, 98).
- 

### **The image on the viewfinder is not clear.**

- Move the viewfinder lens adjustment lever until the image appears clearly (p. 21).
- 

## **Internal memory/Memory card**

### **The camcorder does not operate with the memory card inserted.**

- The memory card was formatted on a computer. Format it on this camcorder (p. 59).
- 

### **The data file name is incorrect, or flashing.**

- The file is damaged.
  - Use a file format supported by your camcorder (p. 96).
- 

### **The recording media indicator is flashing.**

- Something wrong happened to recording media. Stop recording of all recording media, and repair the database file (p. 60).
- 

### **Images on the recording media cannot be deleted.**

- You can select no more than 100 images to be deleted on the edit screen.
  - The images are protected. Unprotect the images (p. 56).
- 

## **Recording**

### **The recording does not start when you press the REC START/STOP button.**

- The playback screen is displayed. Finish playback operation (p. 50).
  - There is no empty space on the recording media. Replace the recording media with a new one, delete unnecessary images (p. 58) or format the recording media (p. 59).
  - Total number of movie scenes exceeds the recordable capacity of your camcorder (p. 94). Delete unnecessary images (p. 58).
  - The temperature of your camcorder is extremely high. Turn off your camcorder and leave it for a while in a cool place.
  - The temperature of your camcorder is extremely low. Turn off your camcorder and leave it for a while in a warm place.
  - Something wrong happened to one of recording media. Stop recording of all recording media, and repair the database file.
- 

### **The access lamp remains lit even after recording was stopped.**

- Your camcorder is recording the scene you have just shot on the memory card.

---

### The imaging field looks different.

- The imaging field may look different depending on the condition of your camcorder. This is not a malfunction.

---

### The actual recording time for movies is less than the estimated recording time of the recording media.

- Depending on the recording conditions, the time available for recording may be shorter, for example when recording a fast moving object, etc. (p. 93).

---

### The camcorder does not keep the setting changes.

- Some menu items return to the default setting when the power is turned off.
- The [FOCUS MAGNIFIER] setting is not stored.
- The battery pack or AC Adaptor was disconnected while the power was turned on. Before disconnecting the battery pack or AC Adaptor, turn off the power and make sure that the access lamp is turned off.

---

### There is a time difference between the point when the REC START/STOP button is pressed and the point that the recording movie is started or stopped actually.

- On your camcorder, there may be a slight time difference between the point where you press the REC START/STOP button and the actual point that recording movie starts/stops. This is not a malfunction.

---

### The aspect ratio (16:9 (wide)/4:3) cannot be changed.

- When recording at a setting other than DV, the aspect ratio of the movie cannot be changed.

---

### Automatic focus does not function.

- Set the focus to the automatic focus (p. 28).
- Adjust the focus manually if the automatic focus does not work properly (p. 28).

---

### Menu items are grayed out or do not work.

- You cannot select grayed out display items in the current recording/playback situation.
- There are some functions you cannot activate simultaneously. The following list shows examples of unworkable combinations of functions and menu items.

Cannot use	Situation
[ON/OFF] of [AE SHIFT]	All of iris, gain and shutter speed are set manually.
[ZEBRA], [PEAKING]	[COLOR BAR] is set to [ON].
[ON/OFF] of [MARKER]	[FOCUS MAGNIFIER] is set to [ON].
[TC PRESET]	[TC MAKE] is set to [REGENERATE].
[COLOR BAR]	Movies are being recorded. [FOCUS MAGNIFIER] is set to [ON].

---

### **Tiny spots in white, red, blue, or green appear on the LCD screen.**

- This phenomenon appears when using a slow shutter speed (p. 35). This is not a malfunction.
- 

### **The subjects passing by the frame very fast appear crooked.**

- This is called the focal plane phenomenon. This is not a malfunction. Because of the way that the image device (CMOS sensor) reads out image signals, the subjects passing by the frame rapidly might appear crooked depending on the recording conditions.
- 

### **Horizontal stripes appear on the image.**

- This occurs when recording pictures under a fluorescent lamp, sodium lamp, or mercury lamp. This is not a malfunction. This can be improved by changing the shutter speed (p. 35).
- 

### **Black bands appear when you record a TV screen or computer screen.**

- This can be improved by adjusting the shutter speed (p. 35).
- 

### **The time code is not recorded in sequence.**

- The time code may not be recorded sequentially if you change the settings of [REC FORMAT].
- 

## Playback

Refer also to the “Internal memory/Memory card” section (p. 84).

---

### **The desired images cannot be found.**

#### **Images cannot be played back.**

- Select the recording media and image quality of the image you want to play back on the thumbnail screen (p. 48).
  - Image data cannot be played back if you have modified file names or folders, or have edited the data on a computer. This is not a malfunction.
  - Images recorded on other devices may not be played back, or displayed in incorrect size. This is not a malfunction.
  - Display the thumbnail screen, select the thumbnail with  $\blacktriangle/\blacktriangledown/\blacktriangleleft/\blacktriangleright$  buttons and press the SET button (p. 49).
- 

### **The data file name is displayed incorrectly, or flashing.**

- The file is damaged.
  - The file format is not supported on your camcorder (p. 96).
  - Only the file name is displayed, if the folder structure does not conform to the universal standard.
- 

### **No sound or only a low sound is heard.**

- Turn up the volume (p. 50).

---

**“---” is displayed on the LCD screen.**

- Bars will be displayed for the camera data of the movies recorded with [COLOR BAR] set to [ON].

---

**Multi ch appears on the LCD screen.**

- This appears when you play back movies recorded with 5.1ch surround sound. 5.1ch surround sound is down-mixed to 2ch stereo and played back on your camcorder.

## Connecting to TV

**Neither image nor sound is played back on the TV connected with the HDMI cable.**

- Images are not output from the HDMI OUT jack, if copyright protection signals are recorded in the images.
- Signals are not output from the HDMI OUT jack when the USB jack is connected.

---

**Neither image nor sound is played back on the TV, projector, or AV amplifier connected with the HDMI cable.**

- If you cannot view images or hear sound on the TV, projector, or AV amplifier connected with the HDMI cable, try disconnecting and connecting the HDMI cable, or turn on your camcorder again.

---

**The image appears distorted on the 4:3 TV.**

- This happens when viewing a movie recorded in the 16:9 (wide) mode on a 4:3 TV. Select  (REC/OUT SET) → [VIDEO OUT] → [DOWN CONVERT TYPE] → the appropriate down conversion type (p. 68).

---

**Black zone appears at top and bottom of a 4:3 TV screen.**

- This happens when viewing a movie recorded in the 16:9 (wide) mode on a 4:3 TV. This is not a malfunction.

## Copying/Editing/Connecting to other devices

**Time code and other information appear on the display of the connected device.**

- Set [DISPLAY OUTPUT] to [LCD PANEL] when you connect a device with the A/V connecting cable (sold separately) (p. 74).

---

**Copy cannot be done correctly using the A/V connecting cable (sold separately).**

- The A/V connecting cable (sold separately) is not connected properly. Make sure that the A/V connecting cable (sold separately) is connected to the input jack of the device.

### **Sound cannot be added to the recording media after recording.**

- You cannot add sound to the recording media after recording in your camcorder.
- 

### **Copy cannot be done correctly using the HDMI cable.**

- You cannot copy movies using the HDMI cable.
- 

## **Connecting to a computer**

### **The computer does not recognize the camcorder.**

- Disconnect the cable from the computer, then connect it again securely.
  - Disconnect the cable from your computer and camcorder. Reboot your computer, and connect your computer and camcorder following the steps in the correct order.
- 

### **Movies cannot be viewed or copied to the computer.**

- Disconnect the cable from the computer, then connect it again.
- You need to install the dedicated application software (p. 16) to copy movies from your camcorder to your computer.

# Warning indicators and messages

## Self-diagnosis display/Warning indicators

When an error occurs, a warning indicator appears on the LCD screen or in the viewfinder.

You can fix some problems associated with the symptoms yourself. If the problem persists even after you have tried a couple of times, contact your Sony dealer or local authorized Sony service facility.

---

### C:04:□□

- The battery pack is not an “InfoLITHIUM” battery pack. Use an “InfoLITHIUM” battery pack (p. 98).

---

### C:06:□□

- The battery pack is too hot. Replace the battery pack, or remove the battery pack and put it in a cool place.

---

### C:13:□□

- Remove the recording media. After installing them again, operate your camcorder.

---

### C:32:□□

- Remove the power source. Reconnect it and operate your camcorder again.

---

### E:□□:□□

- Try the steps ② to ④ on page 83.

---

### (Battery level warning)

- The battery pack is nearly used up.
- Depending on the operation, environment, or battery conditions,  may flash, even if around 10% is displayed as the battery remaining figure.

---

### (Warning indicator pertaining to battery pack temperature)

- The battery pack is too hot. Replace the battery pack, or remove the battery pack and put it in a cool place.

---

### (Warning indicator pertaining to battery level of video light)

- The remaining battery level is low.

---

### (Warning indicator pertaining to memory cards)

#### Slow flashing

- Free spaces for recording images are running out. For the type of memory cards you can use with your camcorder, see page 22.
- No memory card is inserted (p. 22).

#### Fast flashing

- There is not enough free space for recording images. Delete unnecessary images (p. 58), or format the memory card (p. 59) after you save the images to your computer or another device.
- The image database file may be damaged (p. 60).

---

### (Warning indicator pertaining to memory card formatting)\*

- The memory card is damaged.
- The memory card is not formatted correctly (p. 59).

---

### (Warning indicator pertaining to incompatible memory cards)\*

- Incompatible memory card is inserted (p. 22).

---

 **(Warning indicator pertaining to the write-protect of the memory card)\***

- The write-protect switch is set to lock position on the memory card.
- Access to the memory card was restricted on another device.

---

 **(Warning indicator pertaining to internal memory)**

**Slow flashing**

- Free spaces for recording images are running out.

**Fast flashing**

- There are not enough free spaces for recording images. Delete unnecessary images (p. 58), or format the internal memory (p. 59) after storing the images on other media (p. 79).
- The image database file may be damaged (p. 60).

---

 **(Warning indicator pertaining to the free space for recording in the internal memory and memory card)**

**Pre-end caution (slow flashing)**

When [SIMUL/RELAY REC] is set to [RELAY REC] and in either of the following cases.

- When recording in the memory card, and total free space of the internal memory and memory card for recording is less than 5 minutes.
- When recording in the internal memory, the memory card is full and free space of the internal memory is less than 5 minutes.

**Media full caution (fast flashing)**

- When the internal memory and memory card are full.

---

 **(Warning indicator pertaining to memory card formatting)\***

- The memory card is damaged.
- The memory card is not formatted correctly (p. 59).

---

 **(Warning indicator pertaining to the external media device)**

- The image database file may be damaged (p. 60).
- The external media device is damaged.

---

 **(Warning indicator pertaining to formatting of the external media device)**

- The external media device is damaged.
- Disconnect the external media device once, and format it on a computer. Note that if you format the external media device, all the recorded movies and still images are deleted.
- If the same warning message is displayed after formatting the external media device, the device may be incompatible with your camcorder, or damaged. Replace it with a new one.

---

\* When [BEEP] is set to [ON] (p. 77), you hear a melody when the warning indicators appear on the LCD screen.

## Description of warning messages

If messages appear on the LCD screen or in the viewfinder, follow the instructions.

### Recording media

---

**Inconsistencies found in image database file. Do you want to repair the image database file?**

**Inconsistencies found in image database file. Cannot record or play HD movies. Do you want to repair the image database file?**

- You cannot record or play back movies because no movie management information exists. If you select [OK], new management information is created and you can record or play back movies.

**Inconsistencies found in the image database file. Back up and recover. Recover, then import using the included PC software.**

- Inconsistencies occur in the image database file because movie management information is damaged. If you select [OK] management information is created by backing up a movie. The backed up movies cannot be recognized. If you connect to a computer that has been installed with the software "Content Browser," you can copy the backed up movies.

---

**Buffer overflow. Writing to the media was not completed in time.**

- You have performed recording and erasing operations repeatedly, or a memory card that has been formatted by other device is used. Copy and take data backup to other device (such as a computer), and then [Empty] the memory card on the camcorder (p. 59).
- The size of the inserted memory card is not sufficient for copying the movie(s). Use the recommended memory card (p. 22).

---

**Recovering data. Please wait.**

- Your camcorder tries to recover data automatically if the data writing was not performed properly.

---

**Cannot recover data.**

- Writing data onto the media of the camcorder has failed. Attempts were made to recover the data, but they were unsuccessful.

---

 **Reinsert the memory card.**

- Reinsert the memory card a few times. If even then the indicator flashes, the memory card could be damaged. Try with another memory card.

---

 **Cannot recognize this memory card. Format and use again.**

- Format the memory card (p. 59). Note that if you format the memory card, all the recorded movies and photos are deleted.

---

**This memory card may not be able to record or play movies.**

- Use a memory card recommended for your camcorder (p. 22).

---

### This memory card may not be able to record or play images correctly.

- Use a memory card recommended for your camcorder (p. 22).
- Contact your Sony dealer.

---

### Do not eject the memory card during writing. Data may be damaged.

- Reinsert the memory card, and follow the instructions on the LCD screen.

---

### External media cannot execute functions.

- Check the data base file by pressing the MENU button, then selecting  (OTHERS) → [REPAIR IMAGE DB FILE] → the desired recording media.
- If the warning message persists, disconnect the device once, then format it on a computer, etc. Note that if you format the external media device, all the recorded movies and photos in it are deleted.
- If the same warning message is displayed after formatting the external media device, the device may be incompatible with your camcorder, or damaged. Replace it with a new one.

---

### Unable to access external media.

- Use the external media in a stable condition (vibration-free, at room temperature, etc.)
  - Confirm that the external media is not switched off.
- 

### Other

---

### Maximum number of images already selected.

- You can select only 100 images at one time for:
  - Deleting movies
  - Protecting movies, or releasing the protection
  - Copying movies

---

### Protected file. Cannot delete.

- You tried to delete protected data. Release the protection of the data.
-

# Recording time of movies

## Estimated time of recording and playback with each battery pack

Approximate time available when you use a fully charged battery pack.

### Recording time

(unit: minute)

Battery pack	Continuous recording time	Typical recording time
NP-F570	285	140

#### Notes

- Recording format  
NTSC model: 1080/60i FX  
PAL model: 1080/50i FX
- Typical recording time shows the time when you repeat recording start/stop, turning on/off, and so on.
- Times measured when using the camcorder at 25 °C (77 °F).
- Both recording and playback time will be shorter when you use your camcorder in low temperatures. It is recommended that you use the camcorder from 10 °C to 30 °C (50 °F to 86 °F).
- The recording and playback time will be shorter depending on the conditions under which you use your camcorder.

### Playing time

(unit: minute)

Battery pack	
NP-F570	455

## Estimated recording time of movies

### Internal memory

#### High definition image quality (HD)

- When [AVCHD AUDIO FORMAT] is set to [LINEAR PCM]

(unit: minute)

Recording mode	Recording time
<u>PS</u>	145 (145)
<u>FX</u>	170 (170)
<u>FH</u>	225 (225)
<u>HQ</u>	380 (295)

- When [AVCHD AUDIO FORMAT] is set to [DOLBY DIGITAL]

(unit: minute)

Recording mode	Recording time
<u>PS</u>	155 (155)
<u>FX</u>	180 (180)
<u>FH</u>	250 (250)
<u>HQ</u>	445 (335)

#### Standard definition image quality (DV)

(unit: minute)

Recording mode	Recording time
<u>HQ</u>	140 (140)

#### Notes

- The number in ( ) is the minimum recordable time.

## Recording time of movies (Continued)

### Tips

- You can record movies of a maximum of 3,999 scenes with high definition image quality (HD), and 9,999 scenes with standard definition image quality (DV).
- The maximum continuous recording time of movies is approximately 13 hours.
- Your camcorder uses the VBR (Variable Bit Rate) format to automatically adjust image quality to suit the recording scene. This technology causes fluctuations in the recording time of the media. Movies containing quickly moving and complex images are recorded at a higher bit-rate, and this reduces the overall recording time.

## Memory card

### High definition image quality (HD)

#### ■ When [AVCHD AUDIO FORMAT] is set to [LINEAR PCM]

(unit: minute)

	PS	FX	FH	HQ
16 GB	70 (70)	80 (80)	110 (110)	185 (145)
32 GB	145 (145)	170 (170)	225 (225)	375 (290)
64 GB	290 (290)	340 (340)	450 (450)	750 (590)

#### ■ When [AVCHD AUDIO FORMAT] is set to [DOLBY DIGITAL]

(unit: minute)

	PS	FX	FH	HQ
16 GB	75 (75)	90 (90)	120 (120)	215 (165)
32 GB	150 (150)	180 (180)	245 (245)	440 (330)
64 GB	305 (305)	360 (360)	495 (495)	880 (665)

### Standard definition image quality (DV)

(unit: minute)

	HQ
16 GB	70 (70)
32 GB	140 (140)
64 GB	280 (280)

- When using Sony memory card.

### Notes

- The recordable time may vary depending on the recording conditions, subjects, and [REC SET] (p. 68).
- The number in ( ) is the minimum recordable time.

### Tips

- The maximum number of movie scenes that can be recorded is 3,999 in AVCHD, and 9,999 in DV.
- The maximum continuous recording time for a movie is approximately 13 hours.
- Your camcorder uses the VBR (Variable Bit Rate) format to automatically adjust image quality to suit the recording scene. This technology causes fluctuations in the recording time of the media. Movies containing quickly moving and complex images are recorded at a higher bit-rate, and this reduces the overall recording time.
- Bit-rate (movie + audio, etc.), number of pixels, and aspect ratio of each recording mode of movies are as follows.
  - High definition image quality (HD)
    - PS: max. 28 Mbps 1,920 × 1,080/16:9
    - FX: max. 24 Mbps 1,920 × 1,080/16:9, 1,280 × 720/16:9
    - FH: approx. 17 Mbps (ave.) 1,920 × 1,080/16:9, 1,280 × 720/16:9
    - HQ: approx. 9 Mbps (ave.) 1,280 × 720/16:9
  - Standard definition image quality (DV)
    - approx. 29 Mbps (ave.) 720 × 480 (NTSC model), 720 × 576 (PAL model)/16:9, 4:3

# Using your camcorder abroad

## Power supply

You can use your camcorder in any country/region using the AC Adaptor supplied with your camcorder within the AC 100 V to 240 V, 50 Hz/60 Hz range.

## Viewing on TV

Countries /regions that require NTSC color system

Bahama Islands, Bolivia, Canada, Central America, Chile, Colombia, Ecuador, Guyana, Jamaica, Japan, Korea, Mexico, Peru, Surinam, Taiwan, the Philippines, the U.S.A., Venezuela, etc.

Countries /regions that require PAL color system

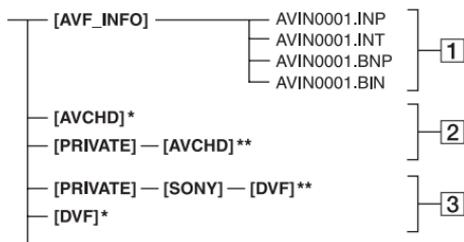
Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, China, Czech Republic, Denmark, Finland, France, Germany, Guiana, Holland, Hong Kong, Hungary, Iran, Iraq, Italy, Kuwait, Malaysia, Monaco, New Zealand, Norway, Paraguay, Poland, Portugal, Russia, Singapore, Slovak Republic, Spain, Sweden, Switzerland, Thailand, Ukraine, United Kingdom, Uruguay, etc.

## Simple setting of the clock by time difference

When you are abroad, you can easily adjust the clock to the local time by setting the time difference. Select [AREA SET], then set the time difference (p. 77).

# File/folder structure on the recording media

The file/folder structure is shown below. You do not usually need to acknowledge the file/folder structure, when recording/playing back movies and still images on the camcorder.



\* "Memory Stick PRO Duo" media

\*\*SD memory card, SDHC memory card, SDXC memory card

## 1 Image management files

When you delete the files, you cannot record/play back the images correctly. The files are defaulted as hidden files and not usually displayed.

## 2 HD movie management information folder

This folder contains recording data of AVCHD movies. Do not try to open this folder or access the contents of this folder from a computer. Doing so might damage image files, or prevent image files from being played back.

## 3 DV movie management information folder

This folder contains recording data of DV movie. Do not try to open this folder or access the contents of this folder from a computer. Doing so might damage image files, or prevent image files from being played back.

- Do not modify the files or folders on the camcorder from the computer. The image files may be destroyed or may not be played back. Operation is not guaranteed, if you perform this operation.
- When you delete image files, follow the steps on page 58. Do not delete the image files on the camcorder directly from the computer.
- Do not format the recording media in the camcorder using a computer. The camcorder may not operate correctly.
- Do not copy the files on the recording media from a computer. Operation is not guaranteed.

- Use the dedicated application software (p. 16) to import data from the recording media to a computer.

# Maintenance and precautions

## About the AVCHD format

### What is the AVCHD format?

The AVCHD format is a high definition digital video camera format used to record an HD (high definition) signal, using efficient data compression coding technology. The MPEG-4 AVC/H.264 format is adopted to compress video data, and the Dolby Digital or Linear PCM system is used to compress audio data. The MPEG-4 AVC/H.264 format is capable of compressing images at higher efficiency than that of the conventional image compressing format.

- Because the AVCHD format uses a data compression system, images may be distorted in scenes where the image, angle, or brightness changes drastically. This is not a malfunction.

### Recording and playback on your camcorder

Based on the AVCHD format, your camcorder records with the HD (high definition) image quality.

Video signal\*: MPEG-4 AVC/H.264

- NTSC model  
1920 × 1080/60p, 1920 × 1080/60i,  
1920 × 1080/24p, 1280 × 720/60p,  
1440 × 1080/60i

- PAL model  
1920 × 1080/50p, 1920 × 1080/50i,  
1280 × 720/50p, 1440 × 1080/50i

Audio signal: Dolby Digital 2ch, Linear PCM 2 ch

Recording media: memory card (sold separately)

- \* Data recorded in AVCHD format other than the above mentioned cannot be played back on your camcorder.

## About the memory card

- A memory card formatted by a computer (Windows OS/Mac OS) does not have guaranteed compatibility with your camcorder.
- Data read/write speed may vary depending on the combination of the memory card and memory card compliant product you use.
- Damaged or lost image data will not be compensated for, and may occur in the following cases:
  - If you eject the memory card, turn the power off on your camcorder, or remove the battery pack for replacement while your camcorder is reading or writing image files on the memory card (while the access lamp is lit or flashing).
  - If you use the memory card near magnets or magnetic fields.
- It is recommended to make a back-up of important data on the hard disk of a computer.
- Do not attach a label or the like on memory card.
- Do not touch, or allow metallic objects to come into contact with the terminals.
- Do not bend, drop or apply strong force to the memory card.
- Do not disassemble or modify the memory card.
- Do not let the memory card get wet.
- Be careful to keep memory card out of the reach of small children. There is danger that a child might swallow it.
- Do not insert anything other than the compliant size of memory card into the memory card slot. Doing so may cause a malfunction.
- Do not use or keep the memory card in the following locations:
  - Places subject to extremely high temperature, such as a car parked outside in the summer
  - Places under direct sunlight
  - Places with extremely high humidity or subject to corrosive gases

### ■ On the memory card adaptor

When inserting memory card into a memory card adaptor, make sure the memory card is inserted facing in the correct direction, then insert it all the way in. Note that improper use may cause a malfunction and operation is not guaranteed when using a card adaptor.

### About the “Memory Stick” media

Types of “Memory Stick” media	Recording /Playback
“Memory Stick Duo” media (with MagicGate)	–
“Memory Stick XC-HG Duo” media	✓
“Memory Stick PRO Duo” media (Mark2)	✓
“Memory Stick PRO-HG Duo” media	✓

- This product supports parallel data transfer. However, the transfer speed may differ, depending on the type of media you use.
- This product cannot record or play data that uses “MagicGate” technology. “MagicGate” is a copyright protection technology that records and transfers the contents in an encrypted format.

### About the “InfoLITHIUM” battery pack

Your camcorder operates only with an “InfoLITHIUM” L series battery pack of a large capacity, such as NP-F570. “InfoLITHIUM” L series battery packs have the  mark.

### What is an “InfoLITHIUM” battery pack?

An “InfoLITHIUM” battery pack is a lithium-ion battery pack that has functions for communicating information related to operating conditions between your camcorder and a supplied AC Adaptor. The “InfoLITHIUM” battery pack displays the remaining battery time in % according to the operating situations of your camcorder.

### To charge the battery pack

- Be sure to charge the battery pack before you start using your camcorder.
- We recommend charging the battery pack in an ambient temperature of from 10 °C to 30 °C (50 °F to 86 °F) until the charge lamp of the camcorder turns off. If you charge the battery pack outside of this temperature range, you may not be able to charge it efficiently.

### To use the battery pack effectively

- Battery pack performance decreases when the ambient temperature is 10 °C (50 °F) or below, and the length of time you can use the battery pack becomes shorter. In that case, do one of the following to use the battery pack for a longer time.
  - Put the battery pack in a pocket to warm it up, and install it in your camcorder right before you start taking shots.

- Make sure to turn off the camcorder when you are not recording or playing back. The battery pack is also consumed when your camcorder is in recording standby or playback pause.
- Have spare battery packs ready for 2 or 3 times the expected recording time, and make trial recordings before making the actual recording.
- Do not expose the battery pack to water. The battery pack is not water resistant.

## About the remaining battery indicator

- Check the level with the following indicators and % displayed on the LCD screen.

Battery remaining indicator	%
	81% to 100%
	51% to 80%
	21% to 50%
	1% to 20%
	-

- The displayed level may not be correct under certain circumstances.
- When the power goes off even though the remaining battery time indicator indicates that the battery pack has enough power to operate, charge the battery pack fully again. Remaining battery time will be indicated correctly. Note, however, that the battery indication will not be restored if it is used in high temperatures for a long time, or if left in a fully charged state, or when the battery pack is frequently used. Use the remaining battery time indication as a rough guide only.

## About storage of the battery pack

- If the battery pack is not used for a long time, fully charge the battery pack and use it up on your camcorder once a year to maintain proper function. To store the battery pack, remove it from your camcorder and put it in a dry, cool place.
- To discharge the battery pack on your camcorder completely, leave your camcorder in recording standby until the power goes off.

## About battery life

- Battery capacity decreases over time and through repeated use. If decreased usage time between charges becomes significant, it is probably time to replace it with a new one.
- Each battery's life is governed by storage, operating and environmental conditions.

## About charging the battery pack

- Use the AC Adaptor (supplied) to charge the designated batteries only. If you charge other types of batteries, those batteries may leak, heat up, burst, or give an electric shock, resulting in burns or injury.
- Remove the charged battery from the AC Adaptor.
- The CHARGE lamp of the supplied AC Adaptor flashes in 2 patterns as follows:
  - Fast-flashing...Turns on and off rapidly at about 0.15-second intervals.
  - Slow-flashing...Turns on and off alternately for about 1.5 seconds, and turns off completely for about 1.5 seconds. The lamp repeats this sequence.
- If the CHARGE lamp is fast-flashing, remove the battery that is being charged, and then re-attach the same battery again firmly. If the CHARGE lamp continues fast-flashing, the cause could be that the battery is damaged, or the battery is not a designated type. Check the battery to confirm whether it is a designated type or not. If it is a designated type, remove the battery first, and then attach a brand-new battery or another known-to-be-good battery to see if the AC Adaptor is working correctly. If the AC Adaptor is working correctly, the cause could be that the battery is damaged.
- If the CHARGE lamp is slow-flashing, the AC Adaptor is in standby mode and charging is suspended. When the ambient temperature is out of the appropriate temperature range for charging, the AC Adaptor suspends charging automatically and enters standby mode. When the ambient temperature returns to an appropriate temperature, the AC Adaptor restarts charging and the CHARGE lamp lights up. We recommend charging the battery pack in an ambient temperature of from 10 °C to 30 °C (50 °F to 86 °F).

### About handling of your camcorder

#### On use and care

- Do not use or store the camcorder and accessories in the following locations.
  - Anywhere extremely hot or cold. Never leave them exposed to temperatures above 60 °C (140 °F), such as under direct sunlight, near heaters or in a car parked in the sun. They may malfunction or become deformed.
  - Near strong magnetic fields or mechanical vibration. The camcorder may malfunction.
  - Near strong radio waves or radiation. The camcorder may not be able to record properly.
  - Near AM receivers and video equipment. Noise may occur.
  - On a sandy beach or anywhere dusty. If sand or dust gets in your camcorder, the camcorder may malfunction. Sometimes this malfunction cannot be repaired.
  - Near windows or outdoors, where the LCD screen, the viewfinder, or the lens may be exposed to direct sunlight. This damages the inside of the viewfinder or the LCD screen.
  - Anywhere very humid.
- Operate your camcorder on DC 7.2 V (battery pack) or DC 8.4 V (AC Adaptor).
- For DC or AC operation, use the accessories recommended in these operating instructions.
- Do not let your camcorder get wet, for example, from rain or sea water. If your camcorder gets wet, it may malfunction. Sometimes this malfunction cannot be repaired.
- If any solid object or liquid gets inside the casing, unplug your camcorder and have it checked by a Sony dealer before operating it any further.
- Avoid rough handling, disassembling, modifying, physical shock, or impact such as hammering, dropping or stepping on the product. Be particularly careful of the lens.
- Do not use a deformed or damaged battery pack.
- Keep the ON/STANDBY switch to  (STANDBY) when you are not using your camcorder.
- Do not wrap your camcorder with a towel, for example, and operate it. Doing so might cause heat to build up inside.

- When disconnecting the power cord (mains lead), pull it by the plug and not the lead.
- Do not damage the power cord (mains lead) such as by placing anything heavy on it.
- Keep metal contacts clean.
- Keep the Wireless Remote Commander and button-type battery out of children's reach. If the battery is accidentally swallowed, consult a doctor immediately.
- If the battery electrolytic liquid has leaked,
  - consult your local authorized Sony service facility.
  - wash off any liquid that may have contacted your skin.
  - if any liquid gets in your eyes, wash with plenty of water and consult a doctor.

#### ■ When not using your camcorder for a long time

- Turn on the camcorder and record and play back images about once a month to keep it in an optimum state for a long time.
- Use up the battery pack completely before storing it.

#### Moisture condensation

If your camcorder is brought directly from a cold place to a warm place, moisture may condense inside your camcorder and cause a malfunction of your camcorder.

#### ■ If moisture condensation has occurred

Leave your camcorder for about 1 hour without turning it on.

#### ■ Note on moisture condensation

Moisture may condense when you bring your camcorder from a cold place into a warm place (or vice versa) or when you use your camcorder in a humid place as shown below.

- When you bring your camcorder from a ski slope into a place warmed up by a heating device.
- When you bring your camcorder from an air conditioned car or room into a hot place outside.
- When you use your camcorder after a squall or a shower.
- When you use your camcorder in a hot and humid place.

### ■ How to avoid moisture condensation

When you bring your camcorder from a cold place into a warm place, put your camcorder in a plastic bag and seal it tightly. Remove the bag when the air temperature inside the plastic bag has reached the ambient temperature (after about 1 hour).

### LCD screen

- Do not exert excessive pressure on the LCD screen, as it may cause damage.
- If your camcorder is used in a cold place, a residual image may appear on the LCD screen. This is not a malfunction.
- While using your camcorder, the back of the LCD screen may heat up. This is not a malfunction.

### ■ To clean the LCD screen

The LCD screen is covered with a coating. The coating may be peeled off by scratching or rubbing. Maintain the LCD screen as follows.

- Wipe fingerprints or hand cream off the LCD screen as soon as possible, as they may cause the coating to peel off.
- If you rub the LCD screen hard, even with a tissue, the coating may be damaged.
- Before wiping the LCD screen, blow dust or sand off with a dust blower, etc.
- Wipe dirt off the LCD screen with a clean, soft cloth, such as an eye glass cleaning cloth, etc.

### ■ OLED panel display

The OLED panel may experience issues such as screen burn-in or loss of brightness with normal use over time. This is not a malfunction.

### Casing

- If the casing is soiled, clean the camcorder body with a soft cloth lightly moistened with water, and then wipe the casing with a dry soft cloth.
- Avoid the following to prevent damage to the finish.
  - Using chemicals such as thinner, benzene, alcohol, chemical cloths, repellent, insecticide and sunscreen.
  - Handling with above substances on your hands.
  - Leaving the casing in contact with rubber or vinyl objects for a long period of time.

### Care and storage of the lens

- Wipe the surface of the lens clean with a soft cloth in the following instances:
  - When there are fingerprints on the lens surface.
  - In hot or humid locations
  - When the lens is exposed to salty air such as at the seaside.
- Store in a well-ventilated location subject to little dirt or dust.
- To prevent mold, periodically clean the lens as described above.

### Charging the pre-installed rechargeable battery

Your camcorder has a pre-installed rechargeable battery to retain the date, time, and other settings even when the ON/STANDBY switch is set to  (STANDBY). The pre-installed rechargeable battery is always charged while your camcorder is connected to the wall outlet (wall socket) via the AC Adaptor or while the battery pack is attached. The rechargeable battery will be fully discharged in about **3 months** if you do not use your camcorder at all without the AC Adaptor connected or the battery pack attached. Use your camcorder after charging the pre-installed rechargeable battery.

However, even if the pre-installed rechargeable battery is not charged, the camcorder operation will not be affected as long as you are not recording the date.

### ■ Procedure

Connect your camcorder to a wall outlet (wall socket) using the supplied AC Adaptor, and leave it with the power turned off for more than 24 hours.

### Note on disposal/transfer of the camcorder

Even if you perform [DELETE] or [MEDIA FORMAT], data on the internal recording media may not be completely erased. When you transfer the camcorder, it is recommended that you perform [Empty] (p. 59) to prevent the recovery of your data. Also, when you dispose of the camcorder, it is recommended that you destroy the actual body of the camcorder.

### Note on disposal/transfer of the memory card

Even if you delete data in the memory card or format the memory card on your camcorder or a computer, you may not delete data from the memory card completely. When you give the memory card to somebody, it is recommended that you delete data completely using data deletion software on a computer. Also, when you dispose of the memory card, it is recommended that you destroy the actual body of the memory card.

Operation is not guaranteed when using a card adaptor.

### System

#### Video signal

NTSC color, EIA standards  
HDTV 1080/60i, 1080/60p, 720/60p specification (models with the NTSC color system)  
PAL color, CCIR standards  
HDTV 1080/50i, 1080/50p, 720/50p specification (models with the PAL color system)

#### Video recording system

HD image quality: MPEG-4 AVC/  
H.264 AVCHD format Ver. 2.0  
compatible  
SD image quality: DV standard  
compatible

#### Audio recording system\*1

Linear PCM 2ch (48 kHz 16-bit)  
Dolby Digital 2ch (48 kHz 16-bit)  
Dolby Digital Stereo Creator employed

\*1 Only Linear PCM 2ch (48 kHz 16-bit) in DV mode.

#### Recording media (movies)

Memory Stick PRO Duo™ and SD card  
Internal memory: 32 GB

When measuring media capacity, 1 GB equals 1 billion bytes, a portion of which is used for system management and/or application files.

The capacity that a user can use is approximately 31.1 GB.

#### Image device

4.6 mm (1/3.95 type) CMOS sensor  
Gross: Approx. 6 590 000 pixels  
Effective (movie, 16:9 mode):  
Approx. 6 140 000 pixels  
Effective (movie, 4:3 mode):  
Approx. 4 600 000 pixels

**Lens**

Lens Mount: Fixed  
 Zoom Ratio: 12x (optical), servo/manual  
 Focal Length:  $f=2.9 - 34.8$  mm  
 equivalent to  $f=26.8 - 321.6$  mm on 35 mm lens(16:9)  
 equivalent to  $f=32.8 - 393.6$  mm on 35 mm lens(4:3)  
 Iris: F1.8 - F3.4  
 auto/manual selectable  
 Focus: AF/MF selectable, 10 mm to  $\infty$  (Wide), 800 mm to  $\infty$  (Tele)  
 Image Stabilizer: ON (STANDARD/ACTIVE)/OFF selectable, shift lens  
 Filter Diameter: M37 mm

**Color temperature**

[AUTO]  
 A/B  
 [INDOOR] (3 200K)  
 [OUTDOOR] (5 600K)

**Minimum illumination**

1.6 lux (MANUAL setting: Shutter Speed 1/30, Iris F1.8, Gain 33 dB)  
 0.8 lux (MANUAL setting: Shutter Speed 1/15, Iris F1.8, Gain 33 dB) (NTSC model)  
 1.4 lux (MANUAL setting: Shutter Speed 1/25, Iris F1.8, Gain 33 dB)  
 0.7 lux (MANUAL setting: Shutter Speed 1/12, Iris F1.8, Gain 33 dB) (PAL model)

**Video light**

Maximum illumination:  
 Approx. 800 lx (lux) (0.5 m)  
 Approx. 200 lx (lux) (1.0 m)  
 Irradiation angle (wide angle distribution): Approx. 30°  
 Color temperature: Approx. 5 500 K

**Input/output connectors****VIDEO OUT jack**

BNC connector  
 1 Vp-p, 75  $\Omega$  (ohms) unbalanced, sync negative

**AUDIO OUT jacks**

Pin connectors  
 -10 dBu (at load impedance 47 k $\Omega$  (kilohms)), Output impedance with less than 2.2 k $\Omega$  (kilohms)  
 (0 dBu = 0.775 Vrms)

**REMOTE jack**

Stereo mini-minijack ( $\varnothing$  2.5 mm)

**HDMI OUT jack**

HDMI Connector (Type A)

**USB jack**

mini-AB

**🎧 (headphones) jack**

Stereo minijack ( $\varnothing$  3.5 mm)

**MIC jack (PLUG IN POWER) (×1)****Multi Interface Shoe (×1)****Screen****LCD screen**

7.5 cm (3.0 type)  
 Approx. 921K dots

**Viewfinder**

1.0 cm (0.39 type) OLED  
 Approx. 1.44M dots

**General****Power requirements**

DC 7.2 V (battery pack)  
 DC 8.4 V (AC Adaptor)

**Average power consumption**

Approx. 3.3 W

**Operating temperature**

0 °C to 40 °C (32 °F to 104 °F)

**Storage temperature**

-20 °C to +60 °C (-4 °F to +140 °F)

## Specifications (Continued)

### Dimensions (approx.)

Camcorder body only, including the projecting parts:  
265.0 mm × 235.0 mm × 455.0 mm  
(10 1/2 in. × 9 3/8 in. × 18 in.) (w/h/d)  
With the accessories (lens hood, lens cap, microphone, eyecup), excluding the grip belt and including the projecting parts:  
265.0 mm × 240.0 mm × 460.0 mm  
(10 1/2 in. × 9 1/2 in. × 18 1/8 in.) (w/h/d)

### Mass (approx.)

Camcorder body only:  
2.80 kg (6 lb 2.8 oz)  
With lens hood, lens cap, microphone, eyecup, shoe cap, NP-F570 battery:  
3.10 kg (6 lb 13.3 oz)

### AC Adaptor AC-L100C

#### Power requirements

AC 100 V - 240 V, 50 Hz/60 Hz

#### Power consumption

18 W

#### Output voltage\*

DC 8.4 V

#### Operating temperature

0 °C to 40 °C (32 °F to 104 °F)

#### Storage temperature

-20 °C to +60 °C (-4 °F to +140 °F)

### Dimensions (approx.)

48 mm × 29 mm × 81 mm  
(1 15/16 in. × 1 3/16 in. × 3 1/4 in.)  
(w/h/d) excluding the projecting parts

### Mass (approx.)

170 g (6.0 oz) excluding the power cord  
(mains lead)

\* See the label on the AC Adaptor for other specifications.

### Wireless LAN

#### Supported standard

IEEE 802.11 b/g/n

#### Frequency

2.4 GHz

#### Supported security protocols

WEP/WPA-PSK/WPA2-PSK

#### NFC

NFC Forum Type 3 Tag compliant

### Rechargeable battery pack NP-F570

#### Maximum output voltage

DC 8.4 V

#### Output voltage

DC 7.2 V

#### Capacity

Typical: 15.8 Wh (2 200 mAh)

Minimum: 15 Wh (2 100 mAh)

#### Type

Li-ion

Design and specifications of your camcorder and accessories are subject to change without notice.

- Manufactured under license from Dolby Laboratories.

## On trademarks

- “AVCHD Progressive” and “AVCHD Progressive” logotype are trademarks of Panasonic Corporation and Sony Corporation.
- “Memory Stick,”  “Memory Stick Duo,” “**MEMORY STICK DUO**,” “Memory Stick PRO Duo,” “**MEMORY STICK PRO DUO**,” “Memory Stick PRO-HG Duo,” “**MEMORY STICK PRO-HG DUO**,” “Memory Stick XC-HG Duo,” “**MEMORY STICK XC-HG DUO**,” “MagicGate,” “**MAGIC GATE**,” “MagicGate Memory Stick,” “MagicGate Memory Stick Duo” “Content Browser Mobile” and “Content Browser Mobile” logo are trademarks of Sony Corporation.
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- Mac and Mac OS are registered trademarks of Apple Inc. in the U.S. and other countries.
- iPhone and iPad are trademarks of Apple Inc., registered in the U.S. and other countries.
- iOS is a registered trademark or trademark of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries
- The terms HDMI and HDMI High-Definition Multimedia Interface, and the HDMI Logo are trademarks or registered trademarks of HDMI Licensing LLC in the United States and other countries.
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## Specifications (Continued)

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SEE <[HTTP://WWW.MPEGLA.COM](http://WWW.MPEGLA.COM)>

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### On GNU GPL/LGPL applied software

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This informs you that you have a right to have access to, modify, and redistribute source code for these software programs under the conditions of the supplied GPL/LGPL.

Source code is provided on the web. Use the following URL to download it. When downloading the source code, select HXR-MC2500 as the model for your camcorder.

<http://www.sony.net/Products/Linux/>

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# Index

- A**
- AC Adaptor.....17
  - AE SHIFT.....66, 85
  - AGC LIMIT.....65
  - AIRPLANE MODE.....76
  - AREA SET.....77
  - ASPECT.....71
  - ASSIGN BUTTON.....46
  - AUDIO LEVEL DISPLAY.....72
  - AUDIO SET menu.....69
  - AUTO BACK LIGHT.....66
  - AUTO MODE SET.....38
  - AVCHD AUDIO FORMAT.....69
- B**
- Battery.....17
  - BEEP.....77
- C**
- CAMERA DATA DISPLAY.....72
  - CAMERA SET menu.....65
  - CENTER.....71
  - Charging time.....17
  - CHG lamp.....17
  - CLOCK SET.....19
  - COLOR BAR.....67, 85
  - Connect
    - External media device.....79
    - Recorder.....81
    - TV.....53
  - CTRL W/SMARTPHONE.....41
- D**
- DATA CODE.....51, 73
  - Date and time.....19
  - DELETE.....58
  - DISP MAC ADDRESS.....76
  - DISPLAY OUTPUT.....74
  - DISPLAY SET menu.....70
  - DIVIDE.....57
  - DOWN CONVERT TYPE.....68
  - DV MODE.....31
  - DV WIDE CONVERT.....69
  - DV WIDE REC.....68
- E**
- EDIT DEVICE NAME.....76
  - Eyecup.....21
- F**
- FACE DETECTION.....29
  - Focus.....28
  - FOCUS DISPLAY.....73
  - FOCUS MAG RATIO.....72
  - Focus magnifier.....29
  - FREE RUN.....75
- G**
- Gain.....34
  - GUIDEFRAAME.....72
- H**
- Handle record button.....25
  - HDMI.....68
  - HDMI TC OUTPUT.....69
  - HISTOGRAM.....70
- I**
- Image database file.....60
  - “InfoLITHIUM” battery pack.....98
  - INITIALIZE.....78
  - IRIS.....34
  - Items.....63
- L**
- LANGUAGE.....77
  - Last Scene Review.....45
  - LCD BRIGHT.....73
  - Lens.....5, 101
- M**
- Manual ring.....33
  - MARKER.....71, 85
  - MEDIA FORMAT.....59
  - MEDIA SELECT.....68
  - Memory card.....22, 97
  - “Memory Stick” media.....98
  - “Memory Stick PRO Duo” media.....98
  - Menu.....63
    - AUDIO SET menu.....69
    - CAMERA SET menu.....65
    - DISPLAY SET menu.....70
    - Items.....63
    - NETWORK SET menu.....76
    - OTHERS menu.....77
    - REC/OUT SET menu.....68
    - TC/UB SET menu.....74
    - Using.....61
  - MI SHOE VIDEO LIGHT.....67
  - Moisture condensation.....100
  - Movie.....23
- N**
- NETWORK SET menu.....76
  - NFC.....40
- O**
- OPERATION TIME.....78
  - OTHERS menu.....77
  - Output resolution.....54
  - Outside power source.....18

## P

PEAKING .....	71, 85
Playback .....	48
Power zoom lever .....	27
Pre-installed rechargeable battery .....	101
PROTECT .....	56

## R

REC BUTTON SET .....	25
REC FORMAT .....	31
REC LAMP .....	77
REC RUN .....	75
REC SET .....	68
REC/OUT SET menu .....	68
Record button .....	25
Recording .....	23
Recording format .....	31
Recording time .....	93
Relay recording .....	25
REPAIR IMAGE DB FILE .....	60

## S

SAFETY ZONE .....	71
SCENE SELECTION SET .....	39
Screen indicators .....	11
Self-diagnosis display .....	89
Shoulder strap .....	8
SHUTTER DISPLAY .....	73
Shutter speed .....	35
SIMUL/RELAY REC .....	25
Simultaneous recording .....	25
SONY LOGO LAMP .....	77
Specifications .....	102
SSID/PW RESET .....	76
STEADY SHOT .....	66
SUMMERTIME .....	77
Supplied accessories .....	16

## T

TC FORMAT .....	74
TC MAKE .....	75
TC PRESET .....	44, 85
TC RUN .....	75
TC/UB DISPLAY .....	74
TC/UB SET menu .....	74
Telephoto .....	27
TOPE .....	67
Trademark .....	105
Troubleshooting .....	83
TV .....	53

## U

UB PRESET .....	44
UB TIME REC .....	75
USB CONNECT .....	77
USB LUN SET .....	78
Using your camcorder abroad .....	95

## V

VERSION DISPLAY .....	78
VF COLOR TEMP .....	74
VF/LCD PANEL .....	74
VIDEO OUT .....	68
Viewfinder .....	21
VOLUME .....	50, 69

## W

Warning indicators .....	89
WB PRESET .....	37
WB TEMP SET .....	65
White balance .....	36
Wide angle .....	27
Wi-Fi .....	39

## Z

ZEBRA .....	71, 85
Zoom .....	27
ZOOM DISPLAY .....	73

ZOOM SET .....	66
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