SONY

4-425-005-**11**(1)

Digital HD Video Camera Recorder

Operating Guide

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AVCHD Progressive

HDMI HIGH-DEFINITION MULTIMEDIA INTERFACE

NXCAM

MEMORY STICK TM

InfoLITHIUM V SERIES

SD XC CLASS 4

HXR-NX30U/NX30N

Read this first

About language setting

- The on-screen displays in each local language are used for illustrating the operating procedures. Change the screen language before using the camcorder if necessary (p. 19).

On recording

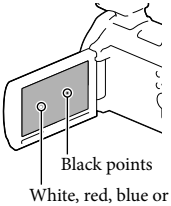
- Before starting to record, test the recording function to make sure the image and sound are recorded without any problems.
- Compensation for the contents of recordings cannot be provided, even if recording or playback is not possible due to a malfunction of the camcorder, recording media, etc.
- TV color systems differ depending on the country/region. To view your recordings on a TV, you need an NTSC system-based TV.
- 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 screen during recording under fluorescent lights. The phenomena can be reduced by adjusting the shutter speed (p. 68).
  – Images on the screen look horizontally divided when a subject is lighted with a flash. The phenomena can be reduced by using a slower shutter speed.

Notes on use

- Do not do any of the following. Otherwise, the recording media may be damaged, recorded images may be impossible to play back or may be lost, or other malfunctions could occur.
  – ejecting the memory card when the access lamp (p. 23) is lit or flashing
  – removing the battery pack or AC Adaptor from the camcorder, or applying mechanical shock or vibration to the camcorder when the (Movie)/ (Photo) lamps (p. 25, 26) or the access lamp (p. 23) are lit or flashing
- When the camcorder is connected to other devices through a USB connection and the power of the camcorder is turned on, do not close the LCD panel. The image data that has been recorded may be lost.
- Use the camcorder in accordance with local regulations.

LCD Panel , viewfinder

- The LCD screen and viewfinder are 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.



About this manual, illustrations and on-screen displays

- The example images used in this manual for illustration purposes are captured using a digital still camera, and therefore may appear different from images and screen indicators that actually appear on your camcorder. And, the illustrations of your camcorder and its screen indication are exaggerated or simplified for understandability.
- Design and specifications of your camcorder and accessories are subject to change without notice.
- In this manual, the internal memory of the camcorder and the memory card are called "recording media."
- In this manual, the DVD disc recorded with high definition image quality (HD) is called AVCHD recording disc.

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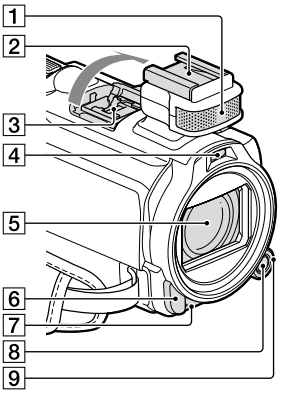
Parts and controls

Figures in ( ) are reference pages.



1 Built-in microphone (41)

2 Accessory Shoe (12)

3 Active Interface Shoe

Active Interface Shoe

4 Flash/Video light

5 Lens (Carl Zeiss lens)

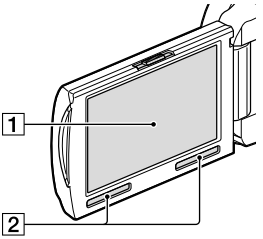
6 Remote sensor/Infrared port

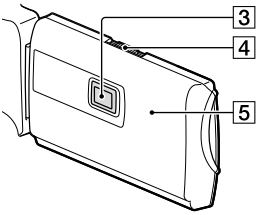
7 Camera recording lamp (85)

The camera recording lamp lights up in red during recording. The lamp flashes when the remaining recording media capacity or battery power is low.

8 MANUAL button (40)

9 MANUAL dial (40)





1 LCD screen/Touch panel (19, 21)

If you rotate the LCD panel 180 degrees, you can close the LCD panel with the LCD screen facing out. This is convenient during playback operations.

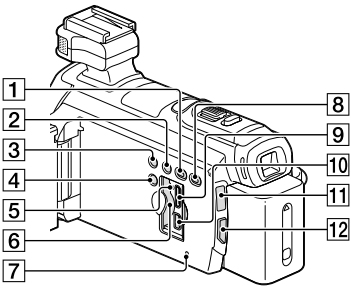
2 Speakers

3 Projector lens (47)

4 PROJECTOR FOCUS lever (47)

5 GPS antenna (44)

A GPS antenna is located in the LCD panel.



1 DISP (DISPLAY) button (21)

2 LIGHT (Video Light) button (37)

3 NIGHTSHOT button (37)

4 POWER button

5 Memory card access lamp (23)
While the lamp is lit or flashing, the camcorder is reading or writing data.

6 Memory card slot (23)

7 RESET button
Press RESET using a pointed object.
Press RESET to initialize all the settings including the clock setting.

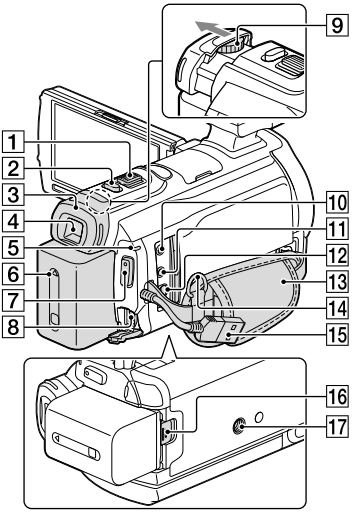
8 PROJECTOR button (47)

9 HDMI OUT jack (46)

10 (USB) jack (53)

11 (Movie)/ (Photo) lamp (25, 26)

12 MODE button (25, 26)



1 Power zoom lever (29)

2 FIXED SHOT/PHOTO button (26)

3 Eyecup

4 Viewfinder (20)

5 CHG (charge) lamp (15)

6 Battery pack (15)

7 START/STOP button (26)

8 DC IN jack (15)

9 Viewfinder lens adjustment lever (20)

10 (microphone) jack (PLUG IN POWER)

11 (headphones) jack

12 A/V Remote Connector (46)

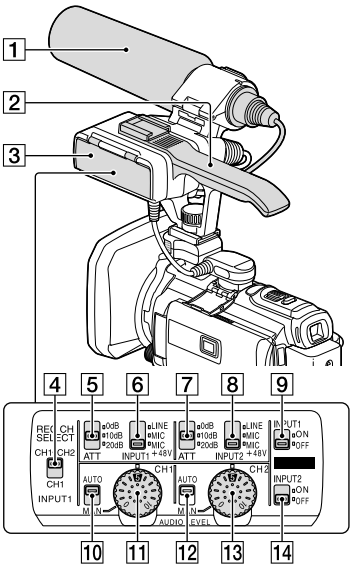
13 Grip belt

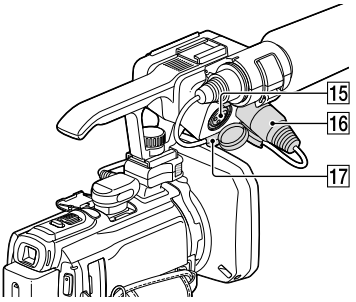
14 Loop for a shoulder belt

15 Built-in USB Cable (16)

16 BATT (battery) release lever (17)

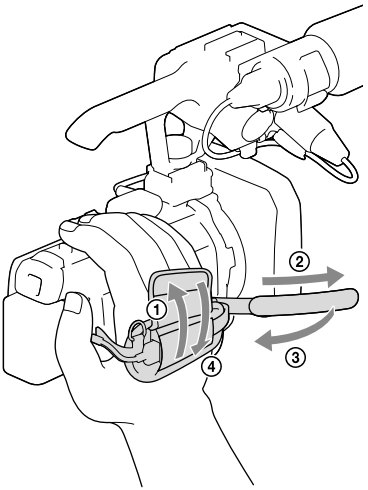
17 Tripod receptacle
Attach a tripod (sold separately: the length of the screw must be less than 5.5 mm (7/32 in.)).



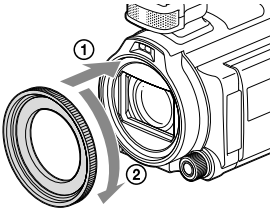


1 Microphone (12)
2 Handgrip
3 XLR Adaptor (12)
4 REC CH SELECT (INPUT1) switch (42)
5 ATT (INPUT1) switch (42)
6 INPUT1 (LINE/MIC/MIC+48V) switch (42)
7 ATT (INPUT2) switch (42)
8 INPUT2 (LINE/MIC/MIC+48V) switch (42)
9 LOW CUT (INPUT1) switch (42)
10 AUTO/MAN (CH1) switch (42)
11 AUDIO LEVEL (CH1) dial (42)
12 AUTO/MAN (CH2) switch (42)
13 AUDIO LEVEL (CH2) dial (42)
14 LOW CUT (INPUT2) switch (42)
15 INPUT2 jack (42)
16 INPUT1 jack (42)
17 Cable holder (13)

To fasten the grip belt



To attach the Step Down Ring

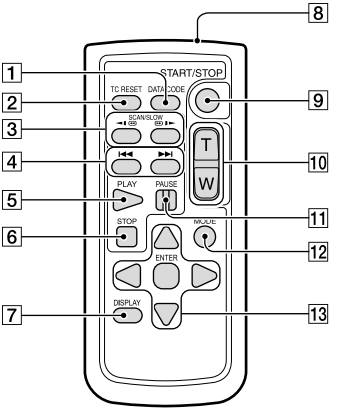


Align the Step Down Ring with the camcorder properly (①), then turn it in the direction of the arrow until the Step Down Ring is locked in place (②).

- You can change to the filter diameter to 37mm (1 1/2 in.) by attaching the Step Down Ring, allowing you to use the recommended conversion lens.
- You cannot attach the wide end conversion lens/filter, if the Step Down Ring is attached.
- To remove Step Down Ring, turn it in the opposite direction from that of the arrow.

Wireless Remote Commander

The wireless remote commander is useful when you use the projector.



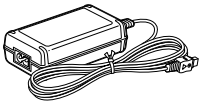
1 DATA CODE button (82)
2 TC RESET button (79)
3 SCAN/SLOW buttons (32)
4 ⏮/⏭ (Previous/Next) buttons (31)
5 PLAY button
6 STOP button
7 DISPLAY button (21)
8 Transmitter
9 START/STOP button (25)
10 Power zoom buttons (29)
11 PAUSE button
12 MODE button (30)
Displays an Index screen during playback.
13 ◀/▶/▲/▼/ENTER buttons
When you press any of these buttons, the light blue frame appears on the LCD screen. Select a desired button or an item with ◀/▶/▲/▼, then press ENTER to enter.

Supplied Items

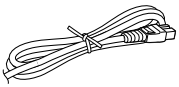
The numbers in ( ) are the supplied quantity.

Camcorder (1)

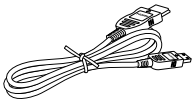
AC Adaptor (1)



Power cord (Mains lead) (1)

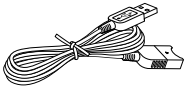


HDMI cable (1)

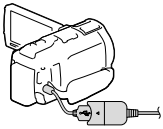


A/V connecting cable (1)

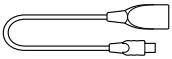
USB connection support cable (1)



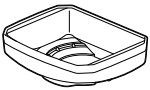
- The USB connection support cable is designed for use with this camcorder only. Use this cable when the Built-in USB Cable of the camcorder (p. 16) is too short for connection.



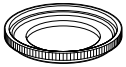
USB Adaptor Cable (1)



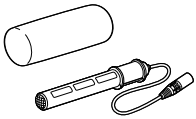
Lens hood (1)



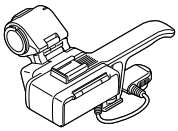
Step Down Ring (1)



Wind Screen (1), Microphone (ECM-XM1) (1)

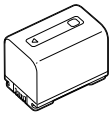


XLR Adaptor (1)



Wireless Remote Commander (1)

Rechargeable battery pack NP-FV70 (1)



CD-ROM "Content Management Utility" (1)

CD-ROM "Manuals for Digital HD Video Camera Recorder" (1)

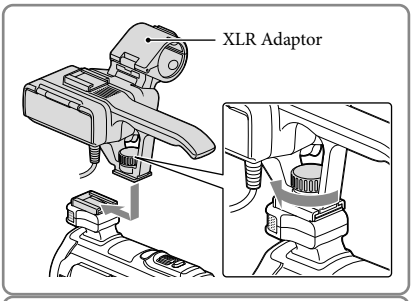
"Operating Guide" (2)

Attaching the supplied microphone and lens hood

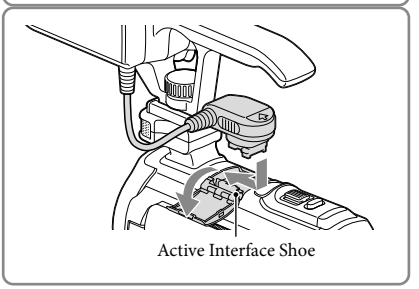
You do not need to attach the XLR Adaptor or microphone when you use the built-in microphone.

Attaching the XLR Adaptor

1 Attach the XLR Adaptor to the accessory shoe on the camcorder and tighten the screw of the XLR Adaptor.



2 Connect the plug of the XLR Adaptor to the Active Interface Shoe of the camcorder.

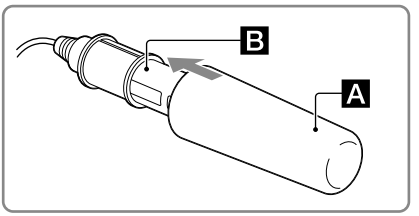


When detaching the XLR Adaptor

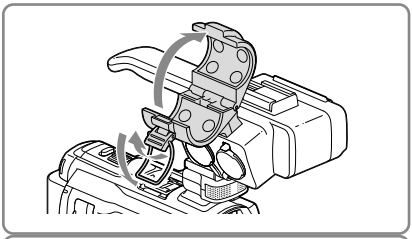
Unplug the connector plug of the XLR Adaptor from the Active Interface Shoe beforehand. Detach the XLR Adaptor after having loosened the screw of the XLR Adaptor.

Attaching the microphone

1 Attach the wind screen **A** to the microphone **B**.

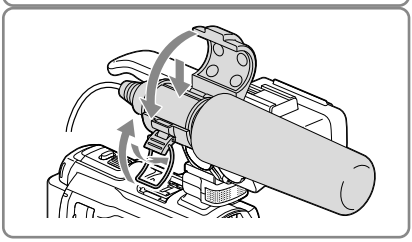


2 Unlock the stopper of the microphone holder and open the cover.

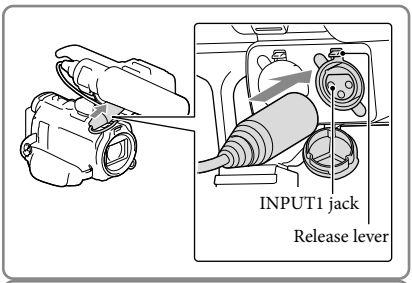


3 Align the convex part of the microphone with the concave part of the holder, and then place the microphone into the holder. Close the cover and lock the stopper securely.

Be sure to place the microphone with the model name (ECM-XM1) facing upward.

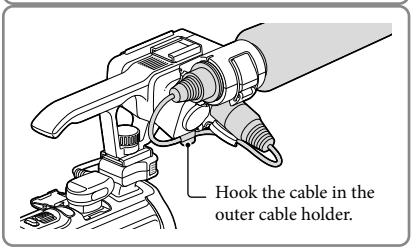


4 Connect the plug of the microphone to the INPUT1 connector of the XLR Adaptor.



5 Put the microphone cable into the cable holder.

See page 41 on the settings for the audio recording.



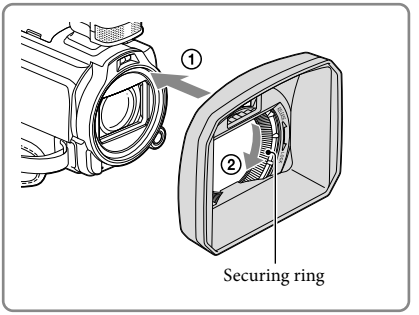
When detaching the microphone cable

1 Detach the microphone from the microphone holder.

2 Unplug the microphone plug while pressing the release lever down.

Attaching the lens hood

1 Align the lens hood with the camcorder properly (①), then turn the securing ring of the lens hood in the direction of the arrow (②).



To remove the lens hood

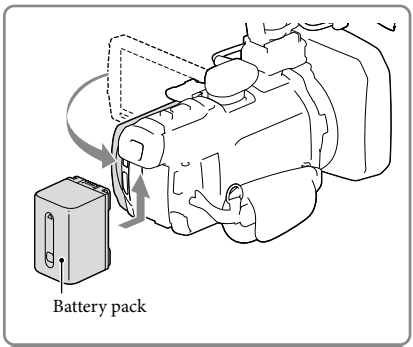
Turn the securing ring of the lens hood in the opposite direction from that of attach.

Notes

- Remove the lens hood when you record movies using the NightShot function. If you do not do so, the shadow of the lens hood will be reflected and recorded in your movies.
- Remove the lens hood when you operate the camcorder with the supplied remote commander.

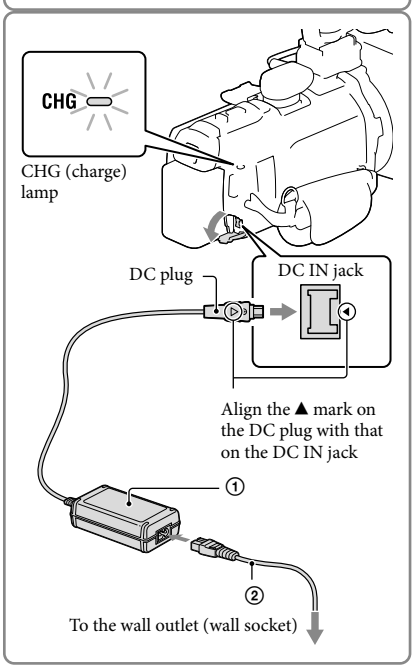
Charging the battery pack

1 Close the LCD screen after replacing the viewfinder and attach the battery pack.



2 Connect the AC Adaptor (①) and the power cord (mains lead) (②) to your camcorder and the wall outlet (wall socket).

- The CHG (charge) lamp turns on.
- The CHG (charge) lamp turns off when the battery pack is fully charged. Disconnect the AC Adaptor from the DC IN jack of your camcorder.

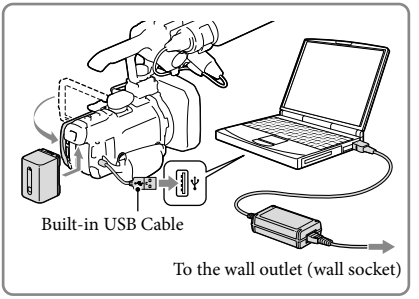


Notes

- You cannot attach any "InfoLITHIUM" battery pack other than the V series to your camcorder.

Charging the battery pack using your computer

Turn off your camcorder and connect the camcorder to a running computer using the Built-in USB Cable.



To charge the battery from a wall outlet (wall socket) using the Built-in USB Cable

You can charge the battery by connecting the Built-in USB Cable to a wall outlet (wall socket) using an AC-UD10 USB charger/AC Adaptor (sold separately). You cannot use a Sony CP-AH2R, CP-AL, or AC-UP100 portable power supply device (sold separately) to charge the camcorder.

Charging time

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

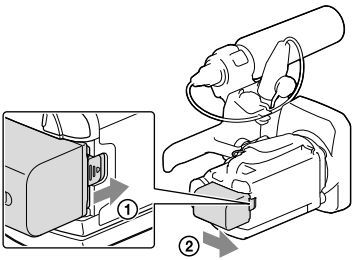
Battery pack	Charging time	
	AC Adaptor	Built-in USB Cable* (when using your computer)
NP-FV50	155	280
NP-FV70 (supplied)	195	545
NP-FV100	390	1,000

- The charging times shown in the table above are measured when charging the camcorder at a temperature of 25 °C (77 °F). It is recommended that you charge the battery in a temperature range of 10 °C to 30 °C (50 °F to 86 °F).

* The charging times are measured without using the USB connection support cable.

To remove the battery pack

Close the LCD screen. Slide the BATT (battery) release lever (①) and remove the battery pack (②).



To use a wall outlet (wall socket) as a power source

Make the same connections as those for charging the battery pack.

Even if the battery pack is attached, the battery pack is not discharged.

Notes on the battery pack

- When you remove the battery pack or disconnect the AC Adaptor, turn the camcorder off and make sure that the (Movie)/ (Photo) lamps (p. 25, 26) and the access lamp (p. 23) are turned off.
- The CHG (charge) lamp flashes during charging under the following conditions:
  – The battery pack is not attached correctly.
  – The battery pack is damaged.
  – The temperature of the battery pack is low.
  Remove the battery pack from your camcorder and put it in a warm place.
  – The temperature of the battery pack is high.
  Remove the battery pack from your camcorder and put it in a cool place.
- When attaching a video light (sold separately), it is recommended that you use an NP-FV70 or NP-FV100 battery pack.
- You cannot use the NP-FV30 “InfoLITHIUM” battery pack with your camcorder.

Notes on the AC Adaptor

- Use the nearby wall outlet (wall socket) when using the AC Adaptor. Disconnect the AC Adaptor from the wall outlet (wall socket) immediately if any malfunction occurs while using your camcorder.
- Do not use the AC Adaptor placed in a narrow space, such as between a wall and furniture.
- Do not short-circuit the DC plug of the AC Adaptor or battery terminal with any metallic objects. This may cause a malfunction.
- Disconnect the AC Adaptor from the camcorder, holding both the camcorder and the DC plug.

☞
- Recording time, Playing time (p. 98)
- Remaining battery indicator (p. 26)
- Charging the battery pack abroad (p. 18)

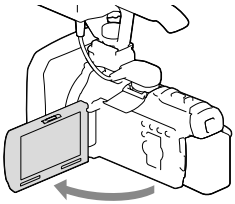
Charging the battery pack abroad

You can charge the battery pack in any countries/regions using the AC Adaptor supplied with your camcorder within the AC 100 V - 240 V, 50 Hz/60 Hz range. Do not use an electronic voltage transformer.

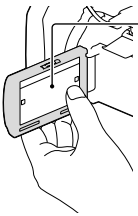
Turning the power on, and setting the date and time

1 Open the LCD screen of your camcorder and turn the power on.

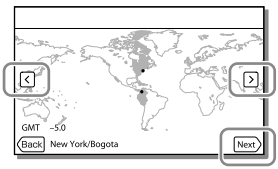
- You can also turn on the camcorder by pressing POWER (p. 8).



2 Select the desired language, then select [Next].

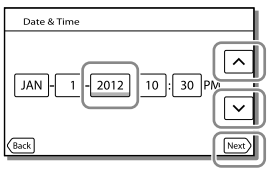


3 Select the desired geographical area with [<]/[>], then select [Next].



4 Set [Daylight Savings] or [Summer Time], select the date format and the date and time.

- If you set [Daylight Savings] or [Summer Time] to [On], the clock advances 1 hour.
- When you select the date and time, select one of the items and adjust the value with [^]/[v].
- When you select [OK], the date and time setting operation is complete.

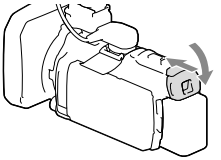


Changing the language setting

You can change the on-screen displays to show messages in a specified language.
Select [MENU] → [Setup] → [General Settings] → [Language Setting] → a desired language.

To turn off the power

Close the LCD screen or press the POWER button (p. 8).
If the viewfinder is pulled out, retract the viewfinder as shown in the illustration on the right.



On turning the camcorder on or off using the LCD screen or the viewfinder

The power of the camcorder is turned on or off depending on the status of the LCD screen or the viewfinder.

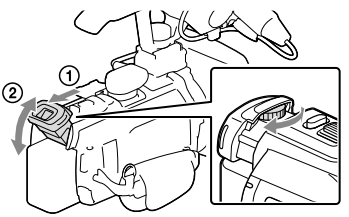
Status		Power of the camcorder
LCD screen	Viewfinder	
Open	Retracted	On
	Pulled out	On
Closed	Retracted	Off
	Pulled out	On

Notes

- Even if the LCD screen is closed, if the viewfinder is pulled out, the camcorder is not turned off. When you turn off the power of the camcorder, make sure that the viewfinder is retracted to the original position.

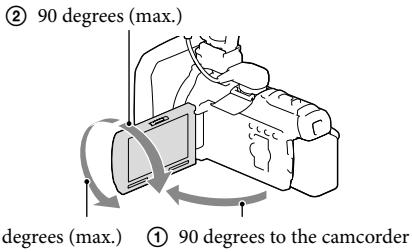
When you make recording with the viewfinder only

Pull out the viewfinder (①) and close the LCD panel and then adjust the angle you want (②). If the indicator on the viewfinder appears blurred, adjust the appearance using the viewfinder lens adjustment lever located on the above of the viewfinder.



To adjust the angle of the LCD panel

First open the LCD panel 90 degrees to the camcorder (①), and then adjust the angle (②).

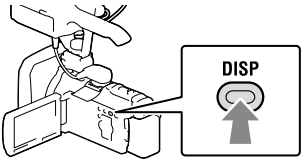


Changing the display on the LCD screen

Press the DISP (DISPLAY) button to cycle the screen display in the following order.

Recording: Detailed display → simple display → nondisplay

Playing: Detailed display → simple display



- In the default setting, the screen display changes to the simple display after about 3 seconds ([Display Setting], p. 84). The display changes to the detailed display when you touch anywhere on the screen except the buttons on the LCD screen so that you can use items.

To turn on the beep sound

Select MENU → [Setup] → [General Settings] → [Beep] → [On].

Notes

- The recording date, time and condition, and coordinates are recorded automatically on the recording media. They are not displayed during recording. However, you can check them as [Data Code] during playback. To display them, select MENU → [Setup] → [Playback Settings] → [Data Code] → the desired item.

- Once the clock is set, the clock time is automatically adjusted with [Auto Clock ADJ] and [Auto Area ADJ] set to [On]. The clock may not be adjusted to the correct time automatically, depending on the country/region selected for your camcorder. In this case, set [Auto Clock ADJ] and [Auto Area ADJ] to [Off].

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- To set the date and time again: [Date & Time Setting] (p. 85)
- To calibrate the touch panel: [Calibration] (p. 110)

Preparing the recording media

The recording media that can be used are displayed on the screen of your camcorder as following icons.

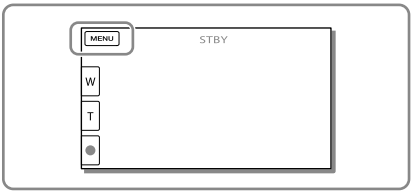
Default recording medium	Alternative recording medium
Memory card	Internal memory

Notes

- You cannot select a different recording medium for movies and for photos.

Selecting a recording medium

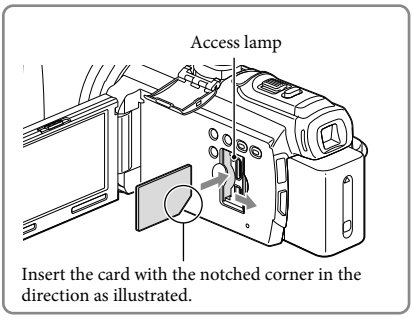
Select MENU → [Rec/Media SET] → [Media Select] → the desired medium.



Inserting a memory card

Open the cover, and insert the memory card until it clicks.

- The [Preparing image database file. Please wait.] screen appears if you insert a new memory card. Wait until the screen disappears.



Insert the card with the notched corner in the direction as illustrated.

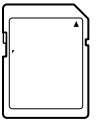
To eject the memory card

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

Notes

- To ensure stable operation of the memory card, it is recommended to format the memory card with your camcorder before the first use (p. 78). Formatting the memory card will erase all the data stored on it and the data will be irrecoverable. Save your important data on your PC, etc.
- If [Failed to create a new Image Database File. It may be possible that there is not enough free space.] is displayed, format the memory card (p. 78).
- Confirm the direction of the memory card. If you forcibly insert the memory card in the wrong direction, the memory card, memory card slot, or image data may be damaged.
- When inserting or ejecting the memory card, be careful so that the memory card does not pop out and drop.

Types of memory card you can use with your camcorder

		SD Speed Class	Capacity (operation verified)	Described in this manual
"Memory Stick PRO Duo" media (Mark2) "Memory Stick PRO-HG Duo" media		—	Up to 32 GB	"Memory Stick PRO Duo" media
SD memory card SDHC memory card SDXC memory card		Class 4 or faster	Up to 64 GB	SD card

- Operation with all memory cards is not assured.

Notes

- A MultiMediaCard cannot be used with this camcorder.
- Movies recorded on SDXC memory cards cannot be imported to or played back on computers or AV devices not supporting the exFAT* file system by connecting the camcorder to these devices with the USB cable. Confirm in advance that the connecting equipment is supporting the exFAT system. If you connect an equipment not supporting the exFAT system and the format screen appears, do not perform the format. All the data recorded will be lost.
  * The exFAT is a file system that is used for SDXC memory cards.

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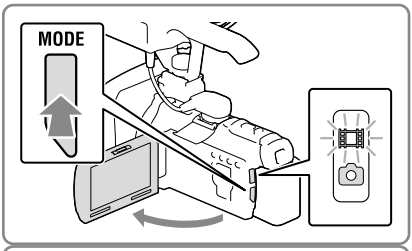
- Recording/playback/editing media: Screen indicators during recording (p. 116)
- Recording time of movies/number of recordable photos (p. 98)

Recording

In the default setting, movies and photos are recorded on the memory card. Movies are recorded with high definition image quality (**HD**).

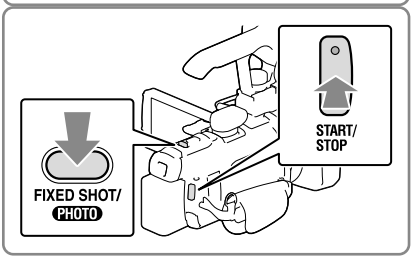
Recording movies

1 Open the LCD screen and press MODE to turn on the 🎞 (Movie) lamp.



2 Press START/STOP to start recording.

- To stop recording, press START/STOP again.



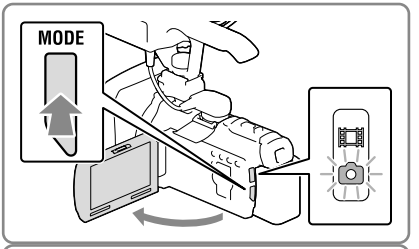
Recording photos while recording a movie (Dual Capture)

Set the [FIXED SHOT/PHOTO] setting to [PHOTO] and then press the FIXED SHOT/PHOTO button.

- If you set the [FIXED SHOT/PHOTO] setting to [FIXED SHOT], you cannot record photos while recording a movie.

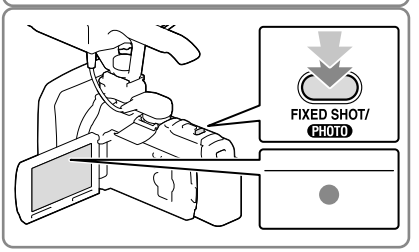
Shooting photos

1 Open the LCD screen and press MODE to turn on the (Photo) lamp.



2 Press FIXED SHOT/PHOTO lightly to adjust the focus, then press it fully.

- When the focus is adjusted properly, AE/AF lock indicator appears on the LCD screen.
- The [FIXED SHOT/PHOTO] setting is set to [PHOTO] in photo recording mode.

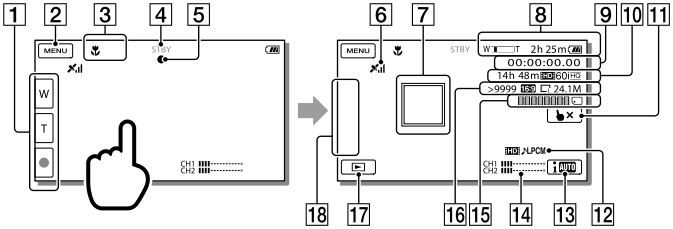


To display items on the LCD screen

Items on the LCD screen disappear if you do not operate the camcorder for a few seconds after you turn the camcorder on or switch between the movie recording and photo shooting modes.
Touch anywhere except the buttons on the LCD screen to display information on icons with functions convenient for recording.

Screen indicators during recording

Described here are icons for both movie recording and photo recording modes. Refer to the page in ( ) for details.



1 Zoom button (W: Wide/T: Telephoto), START/STOP button (in movie recording mode), PHOTO button (in photo recording mode)

2 MENU button (58)

3 Status detected by Intelligent Auto (35)

4 Recording status ([STBY]/[REC])

5 AE/AF (automatic exposure/automatic focus) lock (26)

6 GPS triangulating status (44)

7 Tracking focus (34)

8 Zoom, Remaining battery

9 Time code

10 Estimated recording remaining time, Recording image quality (HD/STD), HD Rec Format (38)

11 Tracking focus cancel button (34)

12 HD Audio Format

13 Intelligent Auto button (35)

14 Audio Level Display (76)

15 Capturing a photo, Recording/playback/editing media (23)

16 Approximate number of recordable photos, Aspect ratio (16:9 or 4:3), Photo size (L/M/S)

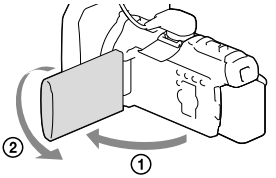
17 View Images button (30)

18 My Button (you can assign your favorite functions to icons displayed in this area) (75)

To record in mirror mode

Open the LCD panel 90 degrees to the camcorder (①), then rotate it 180 degrees to the lens side (②).

A mirror-image of the subject appears on the LCD screen, but the image will be normal when recorded.



If white circular spots appear on photos

This is caused by particles (dust, pollen, etc.) floating close to the lens. When they are accentuated by the camcorder's flash, they appear as white circular spots.
To reduce the white circular spots, light the room and shoot the subject without a flash.

Notes

- If you close the LCD screen while recording movies, the camcorder stops recording.
- The maximum continuous recordable time of movies is about 13 hours.
- When a movie file exceeds 2 GB, the next movie file is created automatically.
- The flash does not work while the (movie) lamp is lit.
- The following states will be indicated if data is still being written onto the recording media after recording has finished. During this time, do not apply shock or vibration to the camcorder, or remove the battery or AC Adaptor.
  – Access lamp (p. 23) is lit or flashing
  – The media icon in the upper right of the LCD screen is flashing
- When [Rec Format] is set to [1080/30p FX], [1080/30p FH], [1080/24p FX] or [1080/24p FH], you cannot record photos while the camcorder is in movie recording mode.
- The LCD screen of your camcorder can display recording images across the entire screen (full pixel display). However, this may cause slight trimming of the top, bottom, right, and left edges of images when played back on a TV which is not compatible with full pixel display. It is recommended you record images with [Guide Frame] set to [On] and using the outer frame of [Guide Frame] (p. 75) as a guide.

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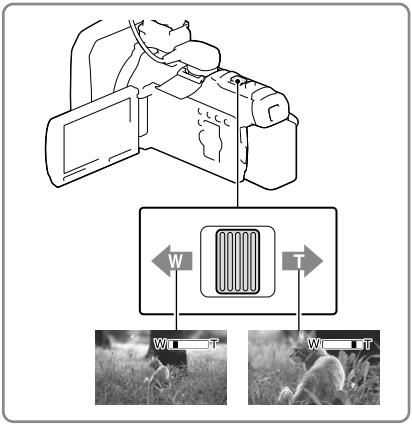
- Recording time, recordable number of photos (p. 98)
- [Media Select] (p. 23)
- [Flash] (p. 73)
- To display items on the LCD screen all the time: [Display Setting] (p. 84)
- To change the image size: [Image Size] (p. 38)
- Recordable time, remaining capacity [Media Info] (p. 77)

Zooming

Move the power zoom lever to magnify or reduce the size of the image.

W (Wide angle): Wider range of view
T (Telephoto): Close view

- You can magnify images up to 17 times (Extended Zoom) the original size with the power zoom lever.
- Move the power zoom lever slightly for a slower zoom. Move it further for a faster zoom.



Notes

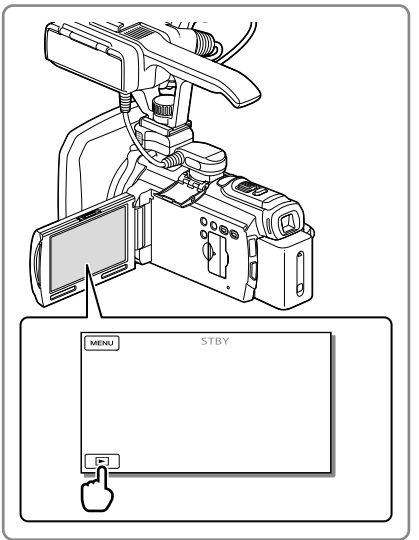
- Be sure to keep your finger on the power zoom lever. If you move your finger off the power zoom lever, the operation sound of the power zoom lever may also be recorded.
- You cannot change the zoom speed with the W/T button on the LCD screen.
- The minimum possible distance between camcorder and subject while maintaining sharp focus is about 1 cm (about 13/32 in.) for wide angle and about 80 cm (about 31 1/2 in.) for telephoto.
- You can magnify images up to 10 times using optical zooming in the following cases:
  – When [SteadyShot] is set to other than [Active]
  – When the (Photo) is lit

☞
- Further zooming: [Digital Zoom] (p. 71)

Playback

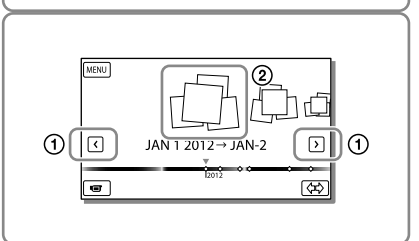
You can search for recorded images by date and time of recording (Event view).

1 Open the LCD screen and press the ▶ button on the LCD screen to enter the playback mode.



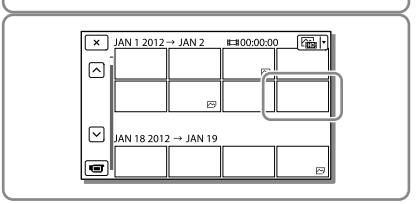
2 Select ‹/› to move the desired event to the center (①) and then select it (②).

- The camcorder displays recorded images as an event automatically, based on the date and time.

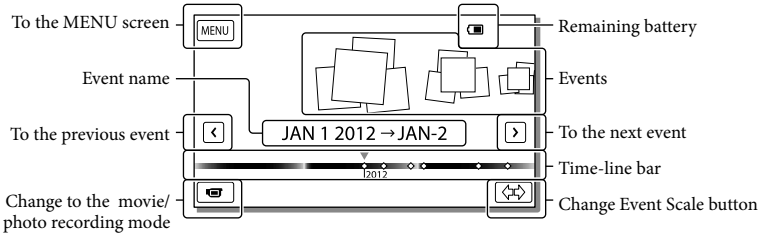


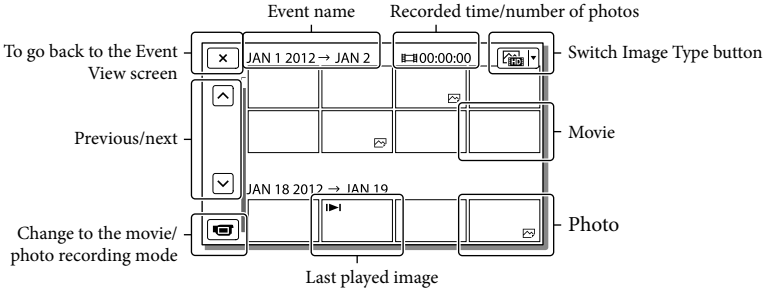
3 Select the image.

- The camcorder plays from the selected image to the last image in the event.



Screen display on the Event View screen





- Reduced-size images which enable you to view many images at the same time on an index screen are called "thumbnails."

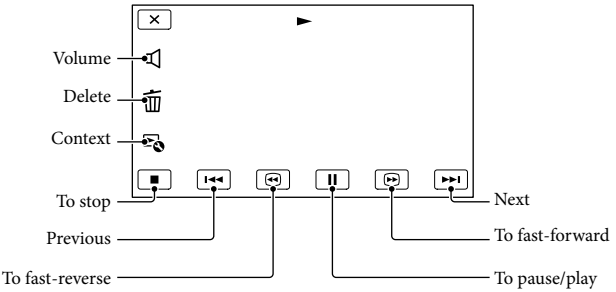
Notes

- To prevent your image data from being lost, save all your recorded images on external media periodically. (p. 51)

Operating buttons while playing

Items on the LCD screen disappear if you do not attempt to operate the camcorder for a few seconds. To display the items again, touch the LCD screen.

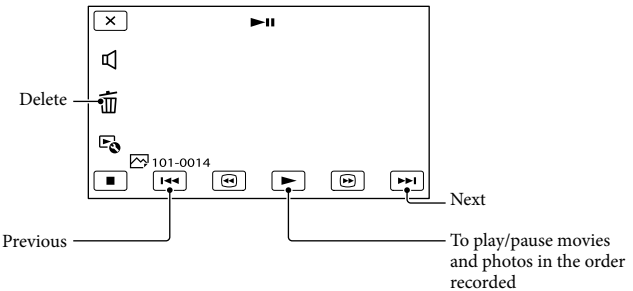
While playing a movie



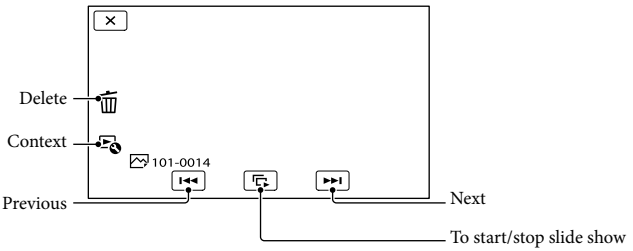
While viewing photos

Operating buttons while viewing photos will be changed depends on the setting of Switch Image Type button (p. 31).

(Movie/photo) (default setting)



(photo)



- As you repeat selecting ⏪/⏩ during playback, movies are played as fast as about 5 times → about 10 times → about 30 times → about 60 times.
- Select ◀II/II▶ during pause to play movies slowly.
- To repeat Slideshow, select → [Slideshow Set].

To play back images with other devices

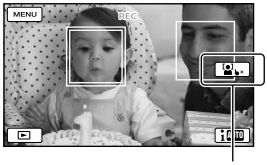
- You may not be able to play back normally images recorded on your camcorder with other devices. Also, you may not be able to play back images recorded on other devices with your camcorder.
- Standard definition image quality (STD) movies recorded on SD memory cards cannot be played on AV equipment of other manufacturers.

Recording people clearly

Recording the selected subject clearly (Face Priority)

Your camcorder can track a face you select and adjust the focus, exposure, and skin tone of the face automatically.

Touch one of the faces targeted.



The double-lined frame is displayed.

Release selection

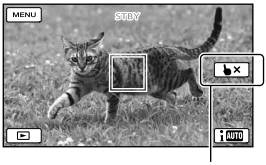
Notes

- The subject you touched may not be detected, depending on the surrounding brightness or hairstyle of the subject.
- Make sure to set the [Face Detection] setting to other than [Off] ([Auto] is the default setting).

To record subjects other than people (Tracking focus)

Touch the subject you want to record.

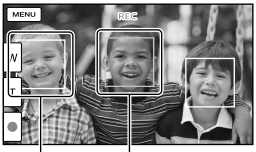
Your camcorder adjusts the focus automatically.



Release selection

Capturing smiles automatically (Smile Shutter)

A photo is recorded automatically when the camcorder detects the smile of a person during movie recording (p. 73). ([Dual Capture] is the default setting.)



The camcorder is detecting a face.

The camcorder is detecting a smile (orange).

Notes

- When [HD Rec Format] is set to [1080/60p PS], [1080/60i FX] or [720/60p FX], you cannot use the Smile Shutter function while recording movies. Furthermore, when [HD Rec Format] is set to [1080/30p FX], [1080/30p FH], [1080/24p FX] or [1080/24p FH], you cannot use the Smile Shutter function, either.
- Smiles may not be detected depending on recording conditions, subject conditions, and the setting of your camcorder.

☞
- [Smile Sensitivity] (p. 73)

Recording movies in various situations

Selecting the suitable setting automatically for the recording situation (Intelligent Auto)

Your camcorder records movies after selecting the most suitable setting for the subjects or the situation automatically. ([Off] is the default setting.) When the camcorder detects a subject, the icons that correspond to the detected conditions are displayed.

Select [i AUTO] → [On] → [OK] at the right bottom of the recording screen of movies or photos.

Face detection:
The camcorder detects faces, and adjusts the focus, color and exposure.
(Portrait), (Baby)

Scene detection:
The camcorder selects the most effective setting automatically, depending on the scene.
(Backlight), (Landscape), (Night Scene), (Spotlight), (Low light), (Macro)

Camera-shake detection:
The camcorder detects whether camera-shake occurs or not, and makes the optimum compensation.
(Walk), (Tripod)

- To cancel the Intelligent Auto function, select [i AUTO] → [Off].

To record images brighter than those recorded using the Intelligent Auto function

Select MENU → [Camera/Audio] → [Manual Settings] → [Low Lux].

Notes

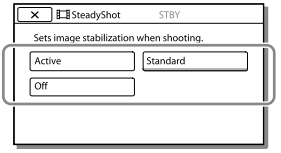
- The camcorder may not detect the expected scene or subject, depending on the recording conditions.

Reducing camera-shake (SteadyShot)

The camcorder has a balanced SteadyShot function that allows you to reduce the camera-shake when shooting with zooming, as well as when shooting with a wide-angle shot. ([Standard] is the default setting.)

1 Select MENU → [Camera/Audio] → [Camera Settings] → [SteadyShot].

2 Select the desired item.



Active:
In addition to the balanced SteadyShot function, the camcorder compensates for camera-shake in the vertical and horizontal directions.

Standard:
The camcorder reduces camera-shake using the balanced SteadyShot function in wide-angle shooting.

Off:
The camcorder does not use the balanced SteadyShot function.

To further reduce camera-shake (FIXED SHOT)

By fixing the composition, you can steady the shot when recording movies.

1 Select MENU → [Camera/Audio] → [Camera Settings] → [FIXED SHOT/PHOTO] → [FIXED SHOT].

2 Press FIXED SHOT/PHOTO button (p. 25).

- To cancel the FIXED SHOT function, press FIXED SHOT/PHOTO button again.
- When you attempt operations such as pan and tilt, turn Off the FIXED SHOT function.

Notes

- The angle of view will be changed after changing the settings of the [SteadyShot] function.
- You can magnify images up to 10 times using optical zooming in the following cases:
  – When [SteadyShot] is set to other than [Active]
  – When the (Photo) is lit

Recording in dark places (NightShot)

You can record images even in total darkness.

Press NIGHTSHOT.

- appears.
- To cancel the NightShot function, press NIGHTSHOT again.

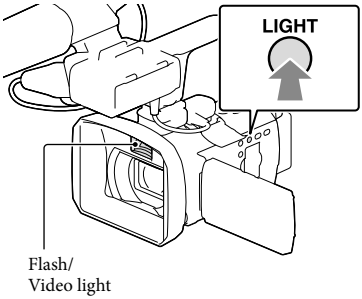
Notes

- Do not cover the infrared port. Infrared rays are required when using NightShot.
- When recording movies using the NightShot function, remove the lens hood (supplied), the Step Down Ring (supplied), and the conversion lens (sold separately).
- Using NightShot in bright places will cause a malfunction of your camcorder.

- [Focus] (p. 67)
- [Low Lux] (p. 69)

Recording movies in dim places (Video Light)

Press LIGHT.



Each time you press the LIGHT button, the indicator changes as follows.
Off (no indicator) → Auto (AUTO) → On ( ) → ...

Notes

- Keep a distance of about 0.3 m to 1.5 m (1 foot to 5 feet) between the camcorder and the subject.
- 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 you shoot photos, the video light turns off and will work as a flash.

- [Light Bright] (p. 76)

Recording images with the selected image quality

Selecting the recording format

You can select the recording format (bit-rate, image size, frame rate, scanning system). In the default setting, [1080/60i FX] is selected.

To change the setting

1 Press MENU → [Rec/Media SET] → [HD Rec Format].

2 Select the desired item.

Setting value	Description
1080/60p PS 1080/60i FX 1080/60i FH 1080/60i HQ 1080/60i LP 1080/30p FX 1080/30p FH 1080/24p FX 1080/24p FH 720/60p FX 720/60p FH	• Bit-rate PS: max. 28 Mbps FX: max. 24 Mbps FH: approx. 17 Mbps (average) HQ: approx. 9 Mbps (average) LP: approx. 5 Mbps (average) • Image size PS: 1920×1080 FX: 1920×1080/1280×720 FH: 1920×1080/1280×720 HQ: 1440×1080 LP: 1440×1080 • Frame rate either 24, 30 or 60 • Scanning system i: interlace p: progressive

Setting value

If you select [1080/24p FX], for example, movies are recorded with following format.

- 1080: Effective scanning lines
- 24: Frame rate
- p: Scanning system
- FX: Recording mode

Frame rate

The frame rates displayed on the LCD screen are different from the actual frame rates.

Displayed frame rate	Actual frame rate
24	23.98
30	29.97
60	59.94

Notes

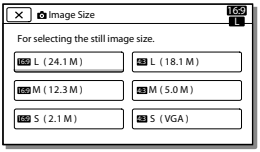
- Movies recorded with the recording mode set to PS or FX on [HD Rec Format] can be saved on an external media device only (p. 53, 55).
- The recording format of [480/60i HQ] is automatically selected for the standard image quality (STD) recording.

Changing the image quality of photos

The number of photos you can shoot differs, depending on the image size selected.

1 Select MENU → [Rec/Media SET] → [Image Size].

2 Select the desired image size.



Notes

- The image size selected with this setting takes effect for photos taken by the Dual Capture function (p. 25).
- Number of recordable photos (p. 99)

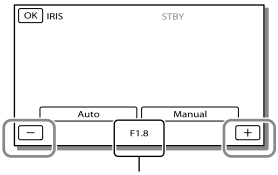
Using the manual adjustment features

Shooting images with the iris priority mode

Changing IRIS parameter changes the range that is in focus.

1 Select MENU → [Camera/Audio] → [Manual Settings] → [IRIS] → [Manual].

2 Select + / − to adjust the iris.



F-value

As the F-value (aperture value) becomes smaller, the iris opens and the background blurs.

To change the atmosphere of image by the IRIS parameter

Smaller F-value (opening the iris) narrows the range that is in focus. Larger F-value (narrowing down the iris) widens the range that is in focus. Open the iris to blur the background, or narrow down the iris to sharpen the whole image.

Notes

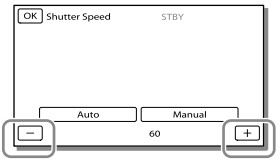
- Even if you open the IRIS wider (a smaller F-value) than F3.4 when you set the zoom lever to the W (Wide angle) side, the IRIS is reset to F3.4 as you move the zoom lever to the T (Telephoto) side.

Shooting images with the Shutter Speed priority mode

You can express the movement of a moving subject in various way by adjusting the shutter speed. When shooting a mountain stream, for example, a splash of water will be captured clearly with high speed shutter, or a trailing image of water with low speed shutter.

1 Select MENU → [Camera/Audio] → [Manual Settings] → [Shutter Speed]→ [Manual].

2 Select + / − to adjust the shutter speed.



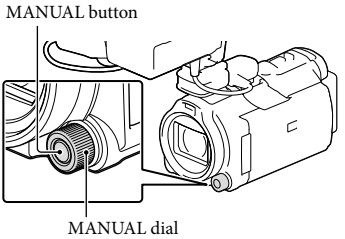
As the value becomes smaller (slower shutter speed), a trailing image of the movement of the subject is captured.

Notes

- When you record images under a fluorescent lamp, sodium lamp, or mercury lamp, horizontal stripes may appear, flicker may occur, or color may change. In this case, change the shutter speed according to the power supply frequency in your region.

Controlling the image settings manually with the MANUAL dial

It is convenient to make manual adjustments using the MANUAL dial, by assigning a menu item ([Focus] in the default setting) to the MANUAL dial.



1 Press MANUAL to switch to the manual operation mode.

Pressing MANUAL switches the operation mode between manual and automatic.

2 Rotate the dial to make adjustment.

Items you can control with the MANUAL dial

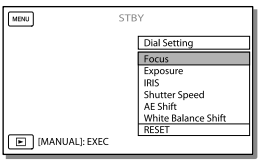
- [Focus] (p. 67)
- [Exposure] (p. 67)
- [IRIS] (p. 68)
- [Shutter Speed] (p. 68)
- [AE Shift] (p. 68)
- [White Balance Shift] (p. 69)

To assign the menu item to the MANUAL dial

1 Press and hold MANUAL down for a few seconds.

[Dial Setting] screen appears.

2 Rotate the MANUAL dial and select the item to be assigned.



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

3 Press MANUAL.

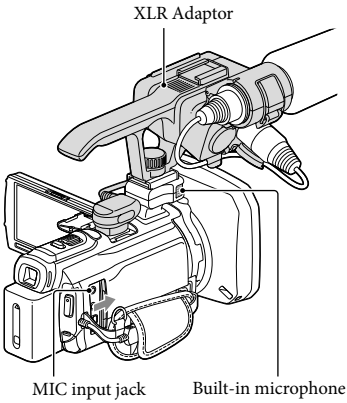
- The camera data that appears on the LCD screen will differ, depending on the recording settings of the camcorder. The settings will be displayed with the following icons.
  – AUTO: Automatic
  – MANUAL: Exposure is set manually.
  – AE A: IRIS priority
  – AE S: Shutter speed priority

Notes

- Manual settings will be retained even if you change the assigned item of the MANUAL dial. However, if you set [Exposure] after setting [AE Shift] manually, [Exposure] will override [AE Shift].
- If you set either one of [Exposure], [IRIS], or [Shutter Speed], the settings of other 2 items are canceled.

☞

- [Data Code] (p. 82)



Select the method for inputting sound

You can select the method for inputting sound on the camcorder from 3 types; built-in microphone, MIC input jack or XLR Adaptor.
Depending on the connection status of MIC input jack and XLR Adaptor, the order of priority to be selected is as follows.
MIC input jack > XLR Adaptor > built-in microphone

Using the built-in microphone

Detach the XLR Adaptor when you use the built-in microphone. You can record stereo sound.

Notes

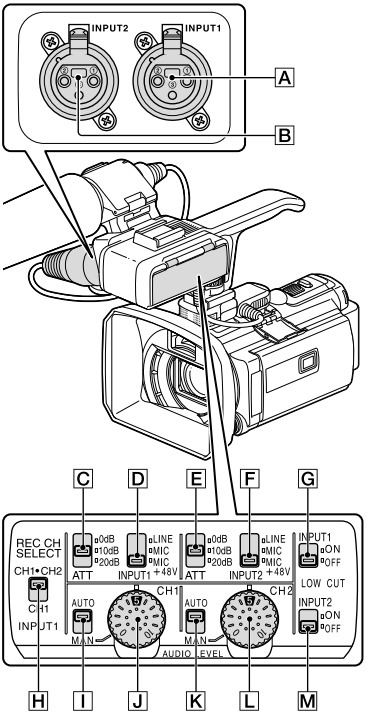
- To reduce wind noise, set [Int. Mic. Wind NR] to [On] (p. 74).

Using an external microphone (sold separately)

When an external microphone is connected to the MIC input jack, sound is switched to that of the external microphone.
Sound is not switched during recording.

Using the supplied microphone

Attach the XLR Adaptor when you use the supplied microphone (ECM-XM1). You can record monaural sound with the super-directional microphone.



Inputting external sound

A INPUT1 jack
B INPUT2 jack

Selecting a sound source

D INPUT1 (LINE/MIC/MIC+48V) switch
F INPUT2 (LINE/MIC/MIC+48V) switch

Selecting a sound source level

C ATT (INPUT1) switch
E ATT (INPUT2) switch

Selecting channel setting for recording

H REC CH SELECT (INPUT1) switch

Selecting the recording level

I AUTO/MAN (CH1) switch
J AUDIO LEVEL (CH1) dial
K AUTO/MAN (CH2) switch
L AUDIO LEVEL (CH2) dial

Switching wind noise reduction to ON/OFF

G LOW CUT (INPUT1) switch
M LOW CUT (INPUT2) switch

1 Attach the XLR Adaptor (p. 12), and connect the supplied microphone to INPUT1 jack A.

2 Set the INPUT1 (LINE/MIC/MIC+48V) switch D to MIC+48V.

3 Set the REC CH SELECT (INPUT1) switch H to CH1·CH2

This setting enables recording on both CH1, CH2. Set the switch to CH1 if you want to record on CH1 only.

Adjusting the recording level

You can adjust the recording level input from the INPUT1 A/INPUT2 B jacks. You cannot adjust the recording level of the built-in microphone and MIC input jack.

1 Set the AUTO/MAN (CH1/CH2) switch of the channel to be adjusted (I or K) to MAN.

2 Turn the AUDIO LEVEL dial J or L to adjust the volume to the proper level.

Confirm that the volume is at the proper level with headphones or Audio Level Display (p. 76).

To restore automatic adjustment

Set the AUTO/MAN (CH1/CH2) switch I or K to AUTO.

Reducing wind noise

You can reduce wind noise input from the INPUT1/INPUT2 jacks A or B.

Set the LOW CUT (INPUT1) switch G or LOW CUT (INPUT2) switch M to ON.

Notes

- You can select [HD Audio Format] from [Linear PCM] or [Dolby Digital] when recording in high definition image quality (HD).
- You can adjust the volume of the headphones or speaker with [Volume] (p. 75).
- You can set [Audio Output Timing] of headphones and audio output jacks (p. 75).

Using an external audio device

Set as follows when you use a microphone other than the supplied microphone or an external audio device (mixer, etc.).

1 Select the sound source to be input.

Set the INPUT1/INPUT2 (LINE/MIC/MIC+48V) switch D or F according to the device to be connected to the INPUT1/INPUT2 jacks A or B.

- External audio device (mixer, etc.): LINE
- Dynamic microphone or microphone with built-in battery: MIC
- Microphone that is 48 V phantom power compliant: MIC+48V

Notes

- If you connect a device that does not support 48 V phantom power, malfunction may result from setting this switch to MIC+48V. Check before connecting the device.
- If noise from the unused jack bothers you, set the INPUT1/INPUT2 (LINE/MIC/MIC+48V) switch of the unused jack (D or F) to LINE.

2 Set the input level of the microphone

When the INPUT1/INPUT2 (LINE/MIC/MIC+48V) switch D or F is set to MIC or MIC+48V, you can set the input level with the ATT (INPUT1/INPUT2) switch C or E. Adjust according to the microphone sensitivity.

- ATT 10dB is recommended when you use the supplied microphone (ECM-XM1).
- The input levels are as follows.
  ATT 0dB: -60dBu
  ATT 10dB: -50dBu
  ATT 20dB: -40dBu

Notes

- When the INPUT1/INPUT2 (LINE/MIC/MIC+48V) switch D or F is set to LINE, the input level is fixed to +4dBu. Even if you reset the ATT switch, the input level does not change.

3 Set the channel to be recorded.

You can select the channel to be recorded with the REC CH SELECT (INPUT1) switch H.

The position of the REC CH SELECT (INPUT1) switch	Audio recorded on CH1, CH2	
CH1·CH2	INPUT1	CH1
		CH2
CH1	INPUT1	CH1
	INPUT2	CH2

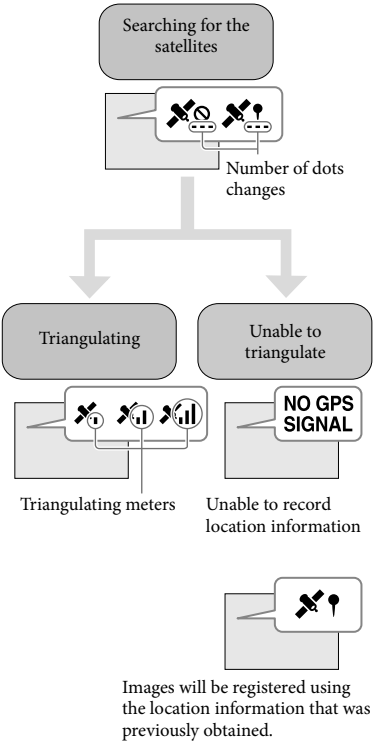
Notes

- To use a stereo microphone with 2 XLR (3PIN) plugs, connect Lch to the INPUT1 jack A and Rch to the INPUT2 jack B, and set the REC CH SELECT (INPUT1) switch H to CH1.

Recording information on your location (GPS)

The camcorder records information on the location when movies or photos are recorded (the default setting).

GPS triangulating status



If you do not want to record location information

Select MENU → [Setup] → [🔧 General Settings] → [GPS Setting] → [Off].

Notes

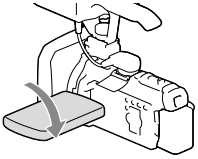
- It may take a while before the camcorder starts triangulating.
- Use the GPS function outdoors and in open areas, as the radio signals can best be received in such areas.

If data on your current location cannot be obtained

A display that allows you to triangulate the location again appears. In this case, follow the instructions that appears on the LCD screen.

Hints for better reception

- Use the GPS function outdoors and in open areas.
  For details on locations or situations where radio signals cannot be received, refer to page 103.
- Rotate the LCD panel to direct the GPS antenna (p. 7) towards the sky. Do not place your hand on the GPS antenna.

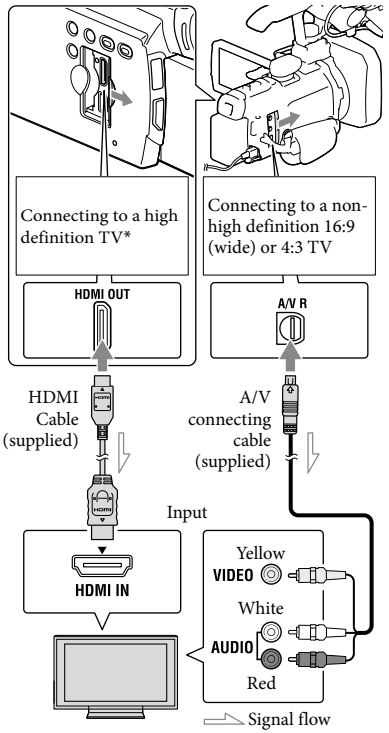


Notes

- In the following situations, the current location of the camcorder shown on the map may be different from the actual location. The margin of error can be as wide as several hundred meters.
  – When the camcorder receives GPS signals that have been reflected off the surrounding buildings
  – When the GPS signal is too weak

Playing images on a TV

Connection methods and the image quality viewed on the TV screen differ depending on what type of TV is connected, and the connectors used.



* If the TV does not have the HDMI input jack, use the A/V connecting cable for connection.

1 Switch the input on the TV to the connected jack.

2 Connect the camcorder to a TV.

3 Play a movie or a photo on the camcorder (p. 30).

Notes

- Refer to the instruction manuals of the TV as well.
- Use the supplied AC Adaptor as the power source (p. 17).
- When movies are recorded with standard definition image quality (STD), they are played back in standard definition image quality (STD) even on a high definition TV.
- When you play back standard definition image quality (STD) movies on a 4:3 TV that is not compatible with the 16:9 signal, set [Wide Mode] to [4:3] to record movies with 4:3 aspect ratio.
- If you connect your camcorder to the TV using more than one type of cable to output images, HDMI output takes priority.
- The camcorder does not support the S-Video output.
- This camcorder is not compatible with "BRAVIA" sync.

On an HDMI cable

- Use an HDMI cable with the HDMI logo.
- Use an HDMI mini connector on one end (for the camcorder), and a plug suitable for connecting your TV on the other end.
- Copyright-protected images are not output from the HDMI OUT jack of your camcorder.
- Some TVs may not function correctly (e.g., no sound or image) with this connection.
- Do not connect the camcorder HDMI OUT jack to an external device HDMI OUT jack, as malfunction may result.
- HDMI (High Definition Multimedia Interface) is an interface to send both video/audio signals. The HDMI OUT jack outputs high quality images and digital audio.

When your TV is monaural (When your TV has only one audio input jack)

Connect the yellow plug of the A/V connecting cable to the video input jack and connect the white (left channel) or red (right channel) plug to the audio input jack of your TV or VCR.

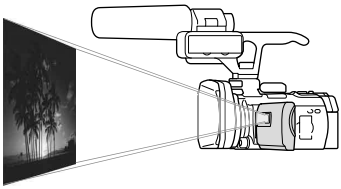
When connecting to your TV via a VCR

Connect your camcorder to the LINE IN input on the VCR using the A/V connecting cable. Set the input selector on the VCR to LINE (VIDEO 1, VIDEO 2, etc.).

☞
- Setting the aspect ratio supported by the TV: [TV Type] (p. 83)

Using the built-in projector

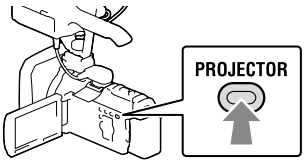
You can use a flat surface such as a wall as a screen to view recorded images using the built-in projector.



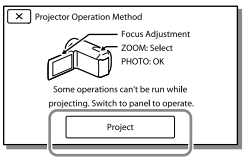
Notes

- The LCD screen turns off while an image is being projected. Use the power zoom lever/FIXED SHOT/PHOTO button or wireless remote commander to operate the camcorder.

1 Face the projector lens towards a surface, such as a wall, and then press PROJECTOR.



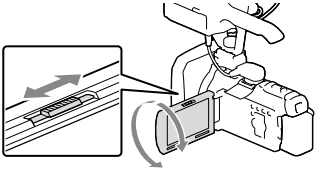
2 When the operating guide screen appears, select [Project].



- This screen appears the first time you use the built-in projector.

3 Adjust the focus of the projected image using the PROJECTOR FOCUS lever.

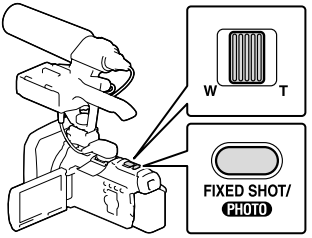
PROJECTOR FOCUS lever



- The projected image is larger when the distance between your camcorder and the reflecting surface increase.
- It is recommended that you place the camcorder about 0.5 m (1.6 feet) or further away from the surface that the images are to be projected onto.

4 Move the power zoom lever to select the image you want to play, then press FIXED SHOT/PHOTO button to begin playback.

Power zoom lever



FIXED SHOT/PHOTO button

- Use the power zoom lever to move the selection frame that appears on the LCD screen and press the FIXED SHOT/PHOTO button to start playing the framed item.
- For details on playback, see page 30.
- When you use the wireless remote commander, use ◀/▶/▲/▼ to move the selection frame and press ENTER to start playing the framed item.
- To turn off the projector, press PROJECTOR.

Notes

- Be careful of the following operations or situations while using the projector.
  – Make sure not to project images towards the eyes.
  – Make sure not to touch the projector lens.
  – The LCD screen and the projector lens become hot while in use.
  – Using the projector shortens battery life.
- The following operations are unavailable while you are using the projector.
  – Operation of the camcorder with the LCD screen closed
  – Several other functions

Editing on your camcorder

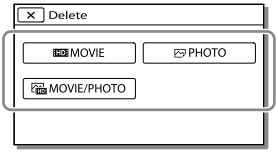
Notes

- You cannot restore images once they are deleted. Save important movies and photos in advance.
- Do not remove the battery pack or the AC Adaptor from your camcorder while deleting or dividing the images. It may damage the recording media.
- Do not eject the memory card while deleting or dividing images from the memory card.

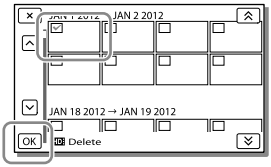
Deleting movies and photos

1 Select MENU → [Edit/Copy] → [Delete].

2 Select [Multiple Images], and then select the type of image you want to delete.



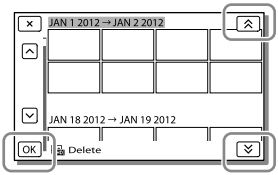
3 Add check marks ✔ to the movies or photos to be deleted and select OK.



To delete all movies/photos in the selected date at one time

1 In step 2, select [All In Event].

2 Select the date you want to delete using ⌃/⌄, and then select OK.



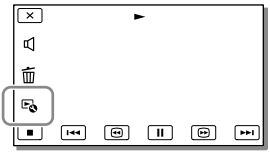
To delete a part of a movie

You can divide a movie and delete it.

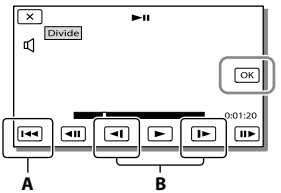
☞
- Release protection: [Protect] (p. 80)
- [Format] (p. 78)

Dividing a movie

1 Select → [Divide] on the movie playback screen.



2 Select the point where you want to divide the movie into scenes using ▶/II, and then select OK.



A: Returns to the beginning of the selected movie
B: Adjusts the dividing point with more precision

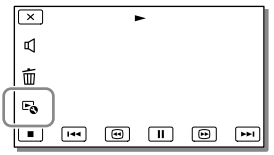
Notes

- A slight difference may occur from the point where you select and the actual dividing point, as your camcorder selects the dividing point based on about half-second increments.
- Some basic editing operations can be done on the camcorder. Use commercially available software for more advanced editing.

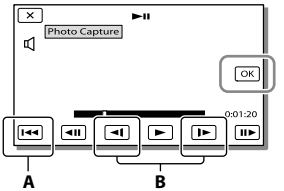
Capturing a photo from a movie

You can capture images from movies recorded in the internal recording medium.

1 Select → [Photo Capture] that appears on the playback screen of a movie.



2 Select the point where you want to capture a photo using ▶/II, and then select OK.



A: Returns to the beginning of the selected movie
B: Adjusts the capturing point with more precision

If the movie was recorded with one of the following image quality levels, the image size will be set as shown below.

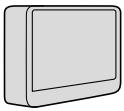
- High definition image quality (HD): 2.1 M (16:9)
- Wide aspect ratio (16:9) with standard definition image quality (STD): 0.2 M (16:9)
- 4:3 aspect ratio with standard definition image quality (STD): 0.3 M (4:3)

On recording date and time of captured photos

- The recording date and time of captured photos are the same as the recording date and time of the movies.
- If the movie you are capturing from has no data code, the recording date and time of the photo will be the date and time you captured from the movie.

Dubbing guide

You can save high definition image quality (HD) movies using an external device. Select the method to be used according to the device.

External devices		Connecting cable	Page
	Hard disk recorder, etc. Saving images on a DVD disc with standard definition image quality (STD).	A/V connecting cable (supplied)	52
	External media device Saving images on an external media device with high definition image quality (HD).	USB Adaptor Cable VMC-UAM1 (supplied)	53

Movies that are recorded with standard definition image quality (STD)

Use the A/V connecting cable to connect the camcorder to an external device in which images are saved.

Notes

- Movies recorded with the recording mode set to PS or FX on [HD Rec Format] can be saved on an external media device only.

The devices on which the created disc can be played back

DVD disc with high definition image quality (HD)

AVCHD format playback devices, such as a Sony Blu-ray disc player or a PlayStation®3

DVD disc with standard definition image quality (STD)

Ordinary DVD playback devices, such as a DVD player.

Notes

- The AVCHD recording disc can be played back only on AVCHD format compatible devices.
- Discs with high definition image quality (HD) images recorded should not be used in DVD players/recorders. Because DVD players/recorders are not compatible with the AVCHD format, DVD players/recorders may fail to eject the disc.
- Always maintain your PlayStation®3 to use the latest version of the PlayStation®3 system software. The PlayStation®3 may not be available in some countries/regions.

Creating a disc with the recorder

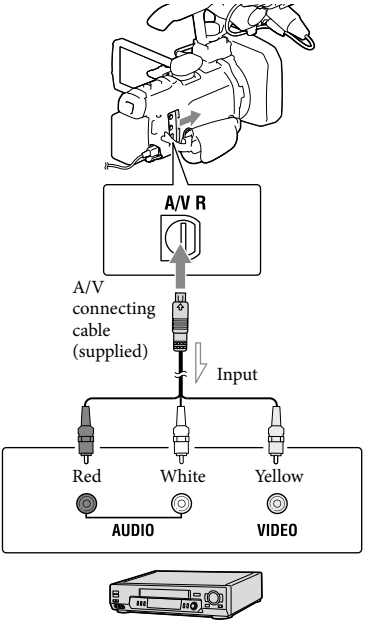
Creating a standard definition image quality (STD) disc with a recorder, etc.

Connect your camcorder to a disc recorder with the A/V connecting cable. You can copy images played back on your camcorder on a disc or video cassette.

1 Insert the recording medium in the recording device (a disc recorder, etc.).

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

2 Connect your camcorder to the recording device with the A/V connecting cable.



Signal flow

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

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

4 When dubbing is finished, stop the recording device, and then your camcorder.

Notes

- Connect your camcorder to the wall outlet (wall socket) using the supplied AC Adaptor for this operation (p. 17)
- Refer to the instruction manual supplied with the device connected.

- You cannot copy images to recorders connected with an HDMI cable.
- Since copying is performed via analog data transfer, the image quality may deteriorate.
- High definition image quality (HD) movies will be copied with standard definition image quality (STD).
- When you connect a monaural device, connect the yellow plug of the A/V connecting cable to the video input jack, and the white (left channel) or the red (right channel) plug to the audio input jack on the device.

☞

- Copying date and time information: [Data Code] (p. 82)
- Using 4:3 screen size display device: [TV Type] (p. 83)

Saving images on an external media device

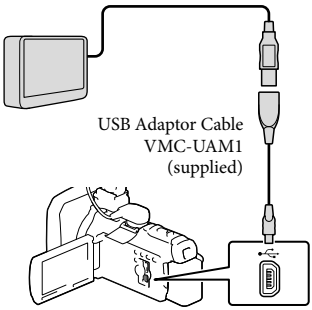
You can save movies and photos on an external media device (USB storage devices), such as an external hard disk drive. The following functions will be available after you have saved your images on an external media device.

- You can connect your camcorder and the external media device, and then play back images stored on the external media device (p. 54).
- You can import images saved on the external media device to your computer by using the supplied software "Content Management Utility."

Notes

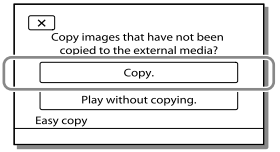
- For this operation, you need the USB Adaptor Cable VMC-UAM1 (supplied).
- Connect the AC Adaptor and the power cord (mains lead) to the DC IN jack of your camcorder and the wall outlet (wall socket).
- Refer to the instruction manual supplied with the external media device.

1 Connect your camcorder and the external media device using the USB Adaptor Cable (supplied).



- Make sure not to disconnect the USB cable while [Preparing image database file. Please wait.] is displayed on the LCD screen.
- If [Repair Img. DB F.] is displayed on the camcorder screen, select OK.

2 Select [Copy.] on the camcorder screen.

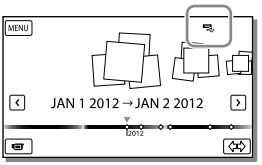


- Movies and photos that are stored on one of the camcorder's recording media selected in [Media Select], and that have not yet been saved on external media device can be saved on the connected media device at this time.
- This operation is available only when there are newly recorded images in your camcorder.
- To disconnect the external media device, select while the camcorder is in the playback standby mode (either Event View or Event Index is displayed).

To play back images in the external media device on the camcorder

Select [Play without copying.] in step 2 and select the image you want to view.

- You can also view images on a TV connected to your camcorder (p. 46).
- When an external media device is connected, will appear on the Event View screen.



To delete images in the external media device

1 Select [Play without copying.] in step 2.

2 Select MENU → [Edit/Copy] → [Delete], and then follow the instructions that appear on the LCD screen to delete images.

To save the desired images in the camcorder to the external media device

1 Select [Play without copying.] in step 2.

2 Select MENU → [Edit/Copy] → [Copy], and then follow the instructions that appear on the LCD screen to save images.

- If you want to copy images that have not yet been copied, select MENU → [Edit/Copy] → [Direct Copy] while your camcorder is connected to the external media device.

Notes

- You cannot use the following devices as an external media device.
  – media devices with a capacity exceeding 2 TB
  – 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
- You may not be able to use external media devices with a code function.
- The FAT file system is available for your camcorder. If the storage medium of the external device was formatted for the NTFS file system, etc., format the external media device using the camcorder 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 using the camcorder.
- 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.
- The number of scenes you can save on the external media device are as follows. However, even if the external media device has free space, you cannot save scenes exceeding the following number.
  – High definition image quality (HD) movies: Max. 3,999
  – Standard definition image quality (STD) movies: Max. 9,999
  – Photos: Max. 40,000
- The number of scenes may be smaller depending on the type of images recorded.
- If your camcorder does not recognize the external media device, try the following operations.
  – Reconnect the USB Adaptor Cable to your camcorder.
  – If the external media device has the AC power cord (mains lead), connect it to the wall outlet (wall socket).
- You cannot copy images from an external media device to the internal recording medium on the camcorder.

Saving images with a computer

Preparing a computer (Windows)

You can perform following operations using "Content Management Utility."
– Importing images to a computer
– Viewing imported images
– Detecting and correcting flash bands

To save movies using a computer, install the software from the supplied CD-ROM "Content Management Utility" beforehand. Use commercially available software to edit images or create discs.

Step 1 Checking the computer system

OS*1
Microsoft Windows XP SP3*2/Windows Vista SP2*3/Windows 7 SP1
CPU
Use an Intel Core 2 Duo 2.80 GHz CPU equivalent or faster to play back videos with high definition image quality (HD) in the highest quality. Videos with high definition image quality (HD) recorded in other than the highest quality may be played back with a slower CPU. Depending on the performance of your video card, videos with high definition image quality (HD) recorded using the highest quality may be played back with a slower CPU than that recommended above. For the following operations, an Intel Pentium III 1 GHz or faster is necessary. – Importing movies to the computer – Processing with standard definition image quality (STD)
Memory
For Windows XP: 512 MB or more (1 GB or more is recommended.) For Windows Vista/Windows 7: 1 GB or more

Hard disk
Disk volume required for installation: Approximately 100 MB Only the NTFS or exFAT file system can be used to import or register videos for viewing to a hard disk.
Display
Minimum 1,024 × 768 dots
Others
USB port (this must be provided as standard, High-Speed USB (USB 2.0 compatible)) (CD-ROM drive is necessary for installation)

*1 Standard installation is required. Operation is not assured if the OS has been upgraded or in a multi-boot environment.

*2 64-bit editions and Starter (Edition) are not supported.

*3 Starter (Edition) is not supported.

Notes

- Operation with all computer environments is not assured.
- The supplied software "Content Management Utility" is not supported by Macintosh computers.

Step 2 Installing the supplied software "Content Management Utility"

Install "Content Management Utility" before connecting your camcorder to a computer.

1 Confirm that your camcorder is not connected to the computer.

2 Turn on the computer.

- Log on as an Administrator for installation.
- Close all applications running on the computer before installing the software.

3 Place the supplied CD-ROM "Content Management Utility" in the disc drive of your computer.

The installation screen appears.

- If the screen does not appear, click [Start] → [Computer] (in Windows XP, [My Computer]), then double-click [SONYCMU(E:)] (CD-ROM).

4 Select the language for the application to be installed, then click [OK].

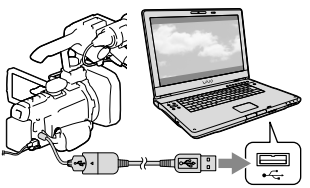
5 When the install wizard screen appears, click [Next].

6 Confirm the license agreement, and if you accept the terms, select [I accept the terms in the license agreement], then click [OK].

7 Select the drive or folder to install the application, then click [Next].

8 Select the option to create the desk-top shortcut, then click [Next].

9 Turn on your camcorder, then connect the camcorder to the computer using the supplied USB cable.



10 Touch [USB Connect] on the camcorder screen.

- If the [USB Connect] screen does not appear, touch [MENU] → [Setup] → [Connection] → [USB Connect].

11 Click [Next].

12 Follow the on-screen instructions to install the software.

- Restart the computer if required to complete the installation.

When the installation is completed, the following icon will appear, depending on the selection in step 8.

13 Remove the CD-ROM from the computer.

To disconnect your camcorder from the computer

① Click the icon at the bottom right of the desktop of the computer → [Safely remove USB Mass Storage Device-Drive].

② Touch [×] → [Yes] on the camcorder screen.

③ Disconnect the USB cable.

To play images recorded on the camcorder, using a computer

See Help of the supplied CD-ROM "Content Management Utility."

Notes

- When importing a long movie or edited image, use the supplied software "Content Management Utility." If you use any other software, images may not be imported properly.
- If file size exceeds 2 GB during a long recording, a new file is created automatically, resulting in the movie being divided into multiple files when you view the recording media directly from your computer after recording.
- If you import images without using supplied "Content Management Utility," files automatically created (due to the 2 GB limit) may not be concatenated. Even if you usually use other editing software, use the supplied software "Content Management Utility" to import images to the computer to ensure files are concatenated and imported to the computer.

Using menus

The camcorder has various menu items under each of 6 menu categories.

Shooting Mode (Items for selecting a shooting mode) → p. 64

Camera/Audio (Items for customized shooting) → p. 66

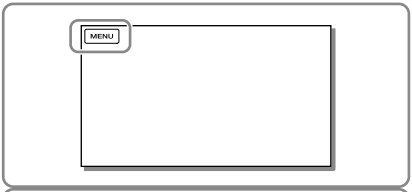
Rec/Media SET (Items for setting up image quality or the recording media) → p. 77

TC/UB (Items for setting up the time code or user bit) → p. 79

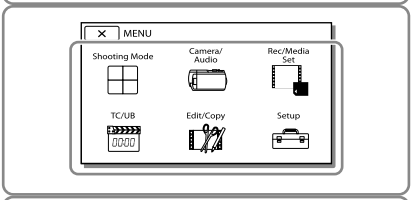
Edit/Copy (Items for editing images such as copy or protect) → p. 80

Setup (Other setup items) → p. 82

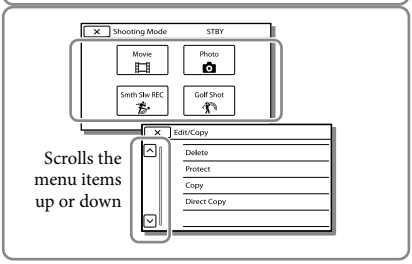
1 Select MENU.



2 Select a category.



3 Select your desired menu item.

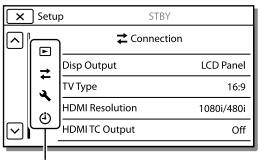


Notes

- Select ✕ to finish setting the menu or to return to the previous menu screen.

To find a menu item quickly

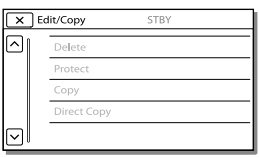
The [Camera/Audio] and [Setup] menus have sub-categories. Select the sub-category icon so that the LCD screen displays the list of menus in the sub-category selected.



Sub-category icons

When you cannot select a menu item

Grayed out menu items or settings are not available.
When you select the grayed out menu item, your camcorder displays the reason why you cannot select the menu item or the instruction of under which condition you can set the menu item.



Menu lists

Shooting Mode

Movie	Records movies.	64
Photo	Shoots photos.	64
Smth Slw REC	Records fast moving subjects in slow-motion.	64
Golf Shot	Divides two seconds of fast movement into frames which are then recorded as a movie and photos.	64

Camera/Audio

Manual Settings

White Balance	Adjusts the color balance to the brightness of the recording environment.	66
Spot Meter/Fcs	Adjusts the brightness and focus for the selected subject simultaneously.	66
Spot Meter	Adjusts the brightness of images to a subject you touch on the screen.	67
Spot Focus	Focuses on a subject you touch on the screen.	67
Exposure	Adjusts the brightness of movies and photos.	67
Focus	Focuses manually.	67
IRIS	Adjusts the iris.	68
Shutter Speed	Adjusts the shutter speed.	68
AGC Limit	Selects the upper limit for the Auto Gain Control (AGC).	68
AE Shift	Adjusts the exposure manually.	68
White Balance Shift	Adjusts the white balance manually.	69
Low Lux	Records bright color images in the dim.	69

Camera Settings

Scene Selection	Selects an appropriate recording setting according to the type of scene, such as night view or beach.	69
Cinematone	Adjusts the color of the movie to resemble the atmosphere of films when recording.	70
Fader	Fades scenes in or out.	70
Self-Timer	Sets the self-timer when your camcorder is in photo recording mode.	70
Tele Macro	Shoots a subject in focus with the background out of focus.	70
SteadyShot	Sets the SteadyShot function when recording movies.	36
SteadyShot	Sets the SteadyShot function when shooting photos.	71
FIXED SHOT/PHOTO	Selects a function to assign to the FIXED SHOT/PHOTO button.	36
Digital Zoom	Sets the maximum zoom level of the digital zoom that exceeds the zoom level of the optical zoom.	71
Conversion Lens	Sets the type of an attached conversion lens (sold separately).	71

Auto Back Light	Adjusts the exposure for backlit subjects automatically.	72
Dial Setting	Assigns a function to the MANUAL dial.	40
NIGHTSHOT Light	Records clearer images when using the NightShot function.	72
Color Bar	Displays color bars on the screen	72
Color Bar Tone	Outputs audio tone signals.	72
Face		
Face Detection	Adjusts the image quality of the face(s) automatically.	72
Smile Shutter	Automatically takes a shot whenever a smile is detected.	73
Smile Sensitivity	Sets the smile detection sensitivity using the smile shutter function.	73
Flash		
Flash	Sets how the flash is activated when shooting photos.	73
Flash Level	Sets the brightness of flash.	74
Red Eye Reduction	Prevents redeye when shooting with flash.	74
Audio		
HD Audio Format	Switches the audio format.	74
Blt-in Zoom Mic	Records movies with vivid sound appropriate to the zoom position.	74
Int. Mic. Wind NR	Reduces the wind noise.	74
Micref Level	Sets the microphone level.	74
Audio Output Timing	You can set echo control when recording.	75
Volume	Adjusts the volume of playback sound.	75
Shooting Assist		
My Button	Registers MENU items on My Buttons.	75
Expanded Focus	Magnifies the image that appears at the center of the screen by about 2.0 times.	75
Guide Frame	Displays the frame to make sure the subject is horizontal or vertical.	75
Zebra	Displays a zebra pattern as a guide for adjusting brightness.	76
Peaking	Displays an image on the screen with its outlines enhanced in order to help you to adjust the focus.	76
Light Bright	Adjusts the brightness of the video light.	76
Audio Level Display	Displays the audio level on the LCD screen.	76

Rec/Media SET

HD / STD Setting	Sets image quality for recording, playback, or editing movies.	77
Media Select	Sets the type of media to be used for recording movies or photos.	23
HD Rec Format	Sets the recording format.	38
Wide Mode	Selects the aspect ratio when recording with standard definition image quality (STD).	77
x.v.Color	Records wider range of colors.	77
Image Size	Sets the photo size.	38
Media Info	Displays information on the recording media, such as free space.	77
Format	Deletes all data on the internal recording media or a memory card.	78
Repair Img. DB F.	Repairs the image database file on the internal recording media or a memory card.	94, 95
File Number	Sets how to assign the file number.	78

TC/UB

TC/UB Disp	Switchs to display the time code and user bit.	79
TC Preset	Sets the time code.	79
UB Preset	Sets the user bit.	79
TC Format	Selects the frame mode of the time code.	79
TC Run	Selects how the time code advances.	79
TC Make	Selects the recording type on the recording media.	80
UB Time Rec	Selects whether or not to save the actual time in the user bit code.	80

Edit/Copy

Delete	Deletes movies or photos.	49
Protect	Protects movies or photos to avoid deleting.	80
Copy	Copies movies or photos.	81
Direct Copy	Copies images stored on the internal recording medium or on a memory card to some type of external media.	81

Setup		
Playback Settings		
Data Code	Sets how to assign the file number.	82
Connection		
Disp Output	Selects where to output the display information, such as time code.	83
TV Type	Converts the signal depending on the TV connected.	83
HDMI Resolution	Selects the output image resolution when connecting your camcorder to a TV with the HDMI cable (supplied).	83
HDMI TC Output	Transfers time code, user bit data to the device connected with the HDMI cable (supplied).	84
USB Connect	Selects which type of media on the camcorder is to be used when the camcorder is connected to an external device via USB.	84
General Settings		
Beep	Sets whether the camcorder sounds operation beeps or not.	84
LCD Brightness	Adjusts the brightness of the LCD screen.	84
Display Setting	Sets the duration that icons or indicators are displayed on the LCD screen.	84
GPS Information	Displays location information.	84
GPS Setting	Sets the GPS.	85
REC Lamp	Sets the recording lamp to light up or not.	85
Remote Ctrl	Sets whether the Wireless Remote Commander is to be used or not.	85
Language Setting	Sets the display language.	85
Calibration	Adjusts the touch panel.	110
Battery Info	Displays the battery information.	85
Clock Settings		
Date & Time Setting	Sets the [Date & Time Format], [Daylight Savings]/[Summer Time], or [Date & Time].	85
Area Setting	Adjusts for a time difference without stopping the clock.	86
Auto Clock ADJ	Maintains accurate time automatically.	86
Auto Area ADJ	Compensates for time differences automatically by acquiring location information from the GPS system.	86

Shooting Mode

(Items for selecting a shooting mode)

See “Using menus” (p. 58) on the operation.

Movie

You can record movies.

Photo

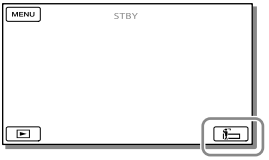
You can shoot photos.

Smth Slw REC (Smooth slow rec)

The camcorder records approximately 3-second-long fast actions or motions as an approximately 12-second-long slow-motion movie.
Press START/STOP on the [Smth Slw REC] screen.
[Recording...] disappears, when recording is finished.

To change the timing at which the camcorder starts recording

Select [ ]/[ ] to make the setting.



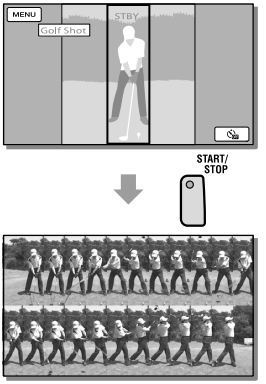
- [3sec After] (default setting)
  The camcorder records a movie of approximately 3 seconds after the START/STOP button is pressed.
- [3sec Before]
  The camcorder records a movie of approximately 3 seconds before the START/STOP button is pressed.

Notes

- You cannot record sound.
- Image quality is not as good as that of normal recording.
- [HD Rec Format] will be set to [1080/60i HQ] automatically.

Golf Shot

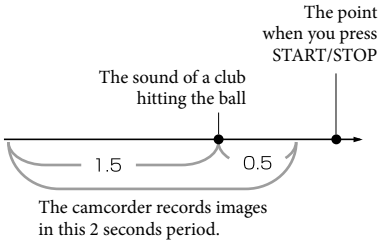
Divides 2 seconds of fast movement into frames which are then recorded as a movie and photos. You can view a series of movement when playing back, which is convenient in cases such as checking golf swing or tennis form.
On the [Golf Shot] screen, frame the subject in the white frame in the center of the screen, then press START/STOP right after the subject has taken a swing.



Timing that the camcorder starts recording

If the moment when the largest sound in one second after the START/STOP button is pressed has been detected, the camcorder assumes the moment as the sound of a club hitting the ball.

When the sound of a club hitting the ball is detected, the recording time period is automatically adjusted according to at that moment.



To check your form using self-timer

Select [⏲]/[⛳] → [On].
The camcorder starts countdown of the timer after you press the START/STOP button.
The point when the count reaches 0 is assumed as the moment of impact and motion before and after 0 is recorded.

Notes

- If the camcorder cannot detect the sound of a club hitting the ball, the camcorder automatically sets the impact point at 0.5 second before the START/STOP button has been pressed, and records a movie in the time period between 1.5 seconds before the impact point to 0.5 second after the impact point.
- The size of photos becomes 1,920 × 1,080.
- You cannot record sound.
- Image quality is not as good as that of normal recording.
- [HD Rec Format] will be set to [1080/60i HQ] automatically.
- Impact sound may be detected by the built-in microphone even when an external microphone or XLR Adaptor is attached.
- The image recorded may be noisy when your camcorder has failed to analyze the shot properly because there may be movement in background of the [Golf Shot] recording screen. It is recommended that you record images under stable conditions (for example, using a tripod).

Camera/Audio

(Items for customized shooting)

See “Using menus” (p. 58) on the operation.
The default settings are marked with ▶.

White Balance

You can adjust the color balance to the recording environment.

▶ Auto (WB AUTO)
The white balance is adjusted automatically. If you have changed the battery pack while [Auto] was selected, or taken your camcorder outdoors after inside use (or vice versa), aim your camcorder at a nearby white object for about 10 seconds for better color balance adjustment.

Outdoor (☀)
The white balance is appropriately adjusted for the following recording conditions:
- Outdoors
- Night views, neon signs and fireworks
- Sunrise or sunset
- Under daylight fluorescent lamps

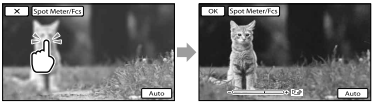
Indoor (💡)
The white balance is appropriately adjusted for the following recording conditions:
- Indoors
- At party scenes or studios where the lighting conditions change quickly
- Under video lamps in a studio, or under sodium lamps or incandescent-like color lamps

One Push (🎨)
The white balance will be adjusted according to the ambient light.
① Select [🎨].
② Keep framing white object such as a piece of paper, to fill the screen under the same lightning conditions as you will shoot the subject.
③ Select [🎨SET].
If the lighting conditions changed by bringing your camcorder outdoors from inside the house, or vice versa, you need to redo the [One Push] procedure to readjust the white balance.

Notes
- Set [White Balance] to [Auto] or adjust the color in [One Push] under white or cool white fluorescent lamps.
- While the camcorder is recording a movie, 🎨SET is grayed out and [One Push] cannot be set.
- If you set [White Balance], [Scene Selection] is set to [Auto].

Spot Meter/Fcs (Spot meter/focus)

Exposure and focus can be adjusted for the selected subject automatically.

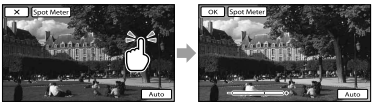


Touch the subject of which you want to adjust the brightness and focus.
To adjust the brightness and focus automatically, touch [Auto].

Notes
- [Exposure] and [Focus] are automatically set to [Manual].

Spot Meter (Flexible spot meter)

Exposure can be adjusted and set for the selected subject automatically. This function is useful when there is strong contrast between the subject and the background, such as subjects in the spotlight on stage.



Touch the subject of which you want to adjust the exposure.
To return the setting to automatic exposure, touch [Auto].

Notes

- [Exposure] is automatically set to [Manual].

Spot Focus

Focus can be adjusted automatically for the subject selected.

Touch the subject of which you want to adjust the focus.
To adjust the focus automatically, touch [Auto].

Notes

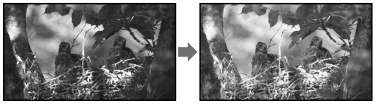
- [Focus] is automatically set to [Manual].

Exposure

You can fix the brightness of a picture manually. Adjust the brightness when the subject is too bright or too dark.

▶ **Auto**
The exposure is adjusted automatically.

Manual
Select [+] if the subject is white or the backlight is bright, or select [−] if the subject is black or the light is dim.



Focus

You can adjust the focus manually. You can select this function also when you want to focus on a certain subject intentionally.

▶ **Auto**
The focus is adjusted automatically.

Manual
Adjust the focus using [←] (nearby subject) or [→] (distant subject).
appears when the focus cannot be adjusted any closer, and appears when the focus cannot be adjusted farther away.

To adjust the focus

It is easier to focus on the subject by moving the power zoom lever towards T (telephoto) to adjust the focus, then towards W (wide angle) to adjust the zoom for recording. When you want to record a subject at close range, move the power zoom lever to W (wide angle), then adjust the focus.

On focal distance information

Your camcorder displays the focal distance information for a few seconds when the focus mode is switched from automatic to manual or when you set the focus manually. You can use this information as a guide when the subject is dark and focus adjustment is difficult. (This information will not appear correctly if a conversion lens (sold separately) is being used.)

Notes

- When you set [Focus] to [Manual], appears.
- The minimum possible distance between the camcorder and subject while maintaining sharp focus is about 1 cm (about 13/32 in.) for wide angle and about 80 cm (about 31 1/2 in.) for telephoto.

IRIS

You can shoot images with the IRIS priority mode. If you adjust the IRIS, you can sharpen the subject with its background blurred or sharpen the whole image.

▶ **Auto**
Adjusts IRIS automatically.

Manual
Adjust the IRIS by selecting [+] to sharpen the whole image (increase the IRIS parameter), and [−] to sharpen the subject with its background blurred (decrease the IRIS parameter)..

Shutter Speed

You can shoot images with the Shutter Speed priority mode. When you shoot a moving subject at a higher shutter speed, it appears as if frozen on the image. At a lower shutter speed, the subject appears as if it is flowing.

▶ **Auto**
Adjusts the shutter speed automatically.

Manual
Adjust the shutter speed using [+] to increase the shutter speed, and [−] to decrease the shutter speed.

AGC Limit

You can select the upper limit for the AGC (Auto Gain Control) to record dim scenes as they look.

▶ **Off**
Adjusts the exposure automatically.

24dB/21dB/18dB/15dB/12dB/9dB/6dB/3dB/0dB (AGC↑)
The gain is automatically adjusted up to the selected limit.

Notes

- The upper limit you can select for the AGC (Auto Gain Control) depends on the status of the camcorder.
  – When the camcorder is set to the movie recording mode, the upper limit is 24 dB.
  – When the camcorder is set to the photo shooting mode, the upper limit is 21 dB.
  – When the camcorder is set to use [Smth Slw REC], the upper limit is 15 dB.
- At a higher gain, the brightness becomes more appropriate in dim scenes, but the noise increases. At a lower gain, the noise decreases, but the shutter speed becomes slower to compensate for the lack of brightness, causing camera-shake or subject blur.

AE Shift

You can adjust the exposure based on the results of the automatic exposure measurement.

▶ Off
Adjusts the exposure automatically.

On (Adjusted number and EV)
Adjust the automatic exposure level using [+] when the subject is white or the background is bright, and [−] when the subject is dark or the light is dim.

White Balance Shift

You can adjust the white balance manually.

▶ Off
Adjusts the white balance automatically.

On (WS and adjusted number)
Adjust the white balance using [+] when the images appear bluish, and [−] when the images appear reddish.

Low Lux

You can record bright color images, even in dim light.

▶ Off
The Low Lux function is not used.

On ( )
The Low Lux function is used.

Scene Selection

You can record images effectively in various situations.

▶ SCN AUTO (Auto)
Adjusts image quality automatically.

(Night Scene)*1
Maintains the darkening atmosphere of the distant surroundings in twilight scenes.

(Night Portrait)
Enables to take photos of people and background using a flash.

(Sunrise&Sunset)*1
Reproduces the atmosphere of scenes such as sunsets or sunrises.

(Fireworks)*1
Takes spectacular shots of fireworks.

(Landscape)*1
Shoots distant subjects clearly. This setting also prevents your camcorder from focusing on glass or metal mesh in windows between the camcorder and the subject.

(Portrait)
Brings out the subject such as people or flowers while creating a soft background.

(Spotlight)*2
Prevents people's faces from appearing excessively white when subjects are lit by strong light.

(Beach)*2
Takes the vivid blue of the ocean or a lake.

(Snow)*2
Takes bright pictures of a white landscape.

*1 Adjusted to focus on subjects farther away only.
*2 Adjusted not to focus on subjects a short distance away.

Notes

- Even if you set [Night Portrait], the setting changes to [Auto] when the (Movie) lamp is lit.
- If you set [Scene Selection], the [White Balance], [IRIS] and [Shutter Speed] settings are canceled.

Cinematone

The camcorder automatically adjusts the image quality of the movie to resemble the atmosphere of film camera images when recording a movie.

▶ Off
Does not use the Cinematone function.

On
Uses the Cinematone function.

Notes

- When you switch the [Cinematone] function on or off, the image will be paused temporarily.

Fader

You can record a transition with the following effects adding to the interval between scenes.
Select the desired effect in [STBY] (to fading in) or [REC] (to fading out) mode.

▶ Off
Does not use an effect.

White Fader ()
Fades in/out with the white effect.

Out In

Black Fader ()
Fades in/out with the black effect.
The thumbnails of movie recorded using [Black Fader] may be difficult to see on Event View or other screens.

Out In

Notes

- When you press START/STOP the setting is cleared.

Self-Timer

Press FIXED SHOT/PHOTO to start the count down. A photo is recorded after about 10 seconds.

▶ Off
Cancels the self-timer.

On ()
Starts the self-timer recording. To cancel the recording, touch [Reset].

Tele Macro

This is useful to shoot small subjects, such as flowers or insects. You can blur out backgrounds and the subject stands out clearer.

▶ Off
Cancels Tele Macro. (Tele Macro is also canceled when you move the zoom lever to the W side.)

On (T)
The zoom (p. 29) moves to the top of the T (telephoto) side automatically and allows recording subjects at close range down to about 32 cm (12 5/8 in.).

Notes

- When recording a distant subject, focusing may be difficult and can take some time.
- Adjust the focus manually ([Focus], p. 67) when it is hard to focus automatically.

SteadyShot

See page 36.

SteadyShot

You can compensate for camera shake. Set [SteadyShot] to [Off] ( ) when using a tripod (sold separately), then the image becomes natural.

▶ On
The SteadyShot function is used.

Off ( )
The SteadyShot function is not used.

FIXED SHOT/PHOTO

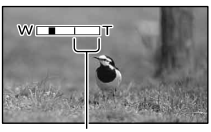
You can assign a function to the FIXED SHOT/PHOTO button (p. 25). This setting is available when the (Movie) lamp is lit.

▶ FIXED SHOT
This function further reduces camera shake.

PHOTO
This function is used when shooting photos.

Digital Zoom

You can select the maximum zoom level. Note that the image quality decreases when you use the digital zoom.



The zooming zone appears when you set [120×].

▶ Off
Digital zoom cannot be used.

120×
Up to 120× zoom is performed digitally.

Conversion Lens

Set this menu item when you want to use a conversion lens (sold separately) that is compatible with your camcorder.
When using a conversion lens (sold separately), use this function to record using the optimum compensation for camera shake and focus for the lens.

▶ Off
Select this when you do not use a conversion lens.

Wide Conversion (W)
Select this when you use a wide end conversion lens.

Tele Conversion (T)
Select this when you use a tele-conversion lens.

Notes

- If you select [Wide Conversion], the SteadyShot function will be canceled.

Auto Back Light

Your camcorder adjusts the exposure for backlit subjects automatically.

▶ On
Adjusts the exposure for backlit subjects automatically.

Off
Does not adjust the exposure for backlit subjects.

Dial Setting

See page 40.

NIGHTSHOT Light

When using the NightShot function (p. 37), you can record clearer images by activating [NIGHTSHOT Light], which emits infrared light (invisible).

▶ On
Emits infrared light.

Off
Does not emit infrared light.

Notes

- Do not cover the infrared port (p. 37) with your fingers or other objects.
- Remove the lens hood or the Step Down Ring (supplied) before using [NIGHTSHOT Light], because the lens hood or the Step Down Ring may prevent the infrared function from working properly.
- Remove the conversion lens (sold separately).
- The maximum shooting distance using [NIGHTSHOT Light] is about 3 m (10 feet).

Color Bar

You can display or record color bars in the movie recording mode. This function helps you to adjust colors when you view movies recorded with your camcorder on a TV or a monitor.

▶ Off
Does not display color bars.

On
Displays color bars.

Notes

- This function is automatically set to [Off] when you switch your camcorder to the photo recording, playback mode, or turn off the camcorder.
- You cannot change the setting during recording or expanded focus operation.

Color Bar Tone

Outputs audio tone signals (1 kHz: full bit -20 dB) when you set [Color Bar] and [Color Bar Tone] to [On].

▶ Off
Does not output audio tone signals.

On
Outputs audio tone signals.

Face Detection

You can set the camcorder to detect a face automatically.
Your camcorder adjusts the focus/color/exposure automatically for the face of the selected subject.

▶ Auto
Detects faces without distinction between adults and children.

Child Priority ( )
Gives faces of children priority.

Adult Priority ( )
Gives faces of adults priority.

Off ( )
Does not detect faces.

Recording conditions for better face detection performance

– Shoot in a sufficiently bright place.
– The subject is not wearing glasses, a hat or mask.
– The subject faces directly towards the camera.

Notes

- Faces may not be detected depending on recording conditions, subject conditions, and the setting of your camcorder.

☞
- Recording the selected subject clearly (Face Priority) (p. 34)
- [Smile Shutter] (p. 73)

Smile Shutter

The shutter is released automatically when the camcorder detects a smile.
If you do not want to take photos automatically, select [Off].

▶ Dual Capture
Only during movie recording, the shutter is released automatically, when the camcorder detects a smile.

Always On
The shutter is released when the camcorder detects a smile whenever the camcorder is in recording mode.

Off ( )
Smiles are not detected, so photos are not recorded automatically.

Notes

- Smiles may not be detected depending on recording conditions, subject conditions, and the setting of your camcorder.

Smile Sensitivity

Sets the smile detection sensitivity for using the Smile Shutter function.

Big Smile
Detects a big smile.

▶ Normal Smile
Detects a normal smile.

Slight Smile
Detects even a slight smile.

Flash

You can select the flash setting when you record photos using the built-in flash, or an external flash (sold separately) that is compatible with your camcorder.

▶ Auto
Automatically flashes when there is insufficient ambient light.

On ( )
Always uses the flash regardless of the surrounding brightness.

Off ( )
Records without flash.

Notes

- The recommended distance to the subject when using the built-in flash is approximately 0.3 m to 1.5 m (1 foot to 5 feet).
- Remove any dust from the surface of the flash before using it. Flash effect may be impaired if heat discoloration or dust obscures the lamp.
- The flash does not flash while the (Movie) lamp is lit.
- A shadow may be produced on photos if you use the flash when you take photos with the conversion lens (sold separately) attached.

Flash Level

You can select the brightness of the flash light.
You can set this function when you record photos using the built-in flash, or an external flash (sold separately) that is compatible with your camcorder.

High (+)
Makes the flash level higher.

▶ Normal ()
Normal flash level

Low (−)
Makes the flash level lower.

Red Eye Reduction

You can prevent redeye by activating the pre-flash before the flash flashes.
You can set this function when you record photos using the built-in flash, or an external flash (sold separately) that is compatible with your camcorder.

▶ Off
Does not use Red Eye Reduction to prevent redeye.

On ()
Uses Red Eye Reduction to prevent redeye.

Notes

- The redeye reduction may not produce the desired effect due to individual differences and other conditions.
- The redeye function does not work with automatic recording by [Smile Shutter].

HD Audio Format

You can set the audio format for high definition image quality (HD) recording.

▶ Linear PCM (LPCM)
Records in Linear PCM system.

Dolby Digital (DolbyD)
Records in Dolby Digital system.

Notes

- Audio format is fixed to [Dolby Digital] with the standard definition image quality (STD) recording.

Blt-in Zoom Mic

You can record a movie with vivid sound appropriate to the zoom position.

▶ Off
The microphone does not record sound following zooming in or out.

On ()
The microphone records sound following zooming in or out.

Int. Mic. Wind NR

Your camcorder records a movie with less wind noise input from the built-in microphone.

▶ Off
Disables wind noise reduction.

On ()
Enables wind noise reduction.

Micref Level (Microphone reference level)

You can select the microphone level for recording sound.

▶ Normal
Records various ambient sounds, converting them into the appropriate level.

Low ( )
Records ambient sound faithfully. Select [Low] when you want to record an exciting and powerful sound in a concert hall, etc. (This setting is not suitable for recording conversations.)

Audio Output Timing

You can set the audio output timing during recording.

▶ Live
Remove echo caused from the difference between the actual sound heard during recording and that heard through headphones.

Lip Sync
Resolves sync issues between picture and sound.

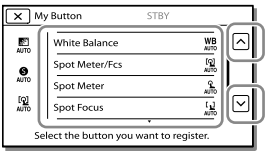
Volume

You can adjust the volume of playback sound by touching [−]/[+].

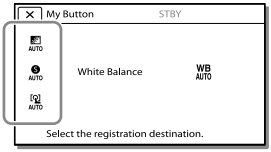
My Button

You can assign functions that you frequently use when recording to one of the My Buttons.

① After selecting [My Button], select the menu item that you want to assign to a My Button using [^]/[v].



② Select one of the My Buttons to which the menu item will be assigned.



③ Select [OK].

Expanded Focus

You can magnify an image that appears at the center of the LCD screen by about 2.0 times to confirm the sharpness of the focus.

▶ Off
Does not magnify images.

On
Magnify images.

Notes

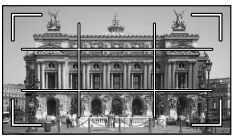
- Even though the images has been magnifyed on the camcorder, the recorded image is not magnified.
- The image that is output to an external device is not magnified.

Guide Frame

You can display the frame and check that the subject is horizontal or vertical. Positioning the subject at the cross point of the guide frame makes a balanced composition. The frame is not recorded.

▶ Off
Does not display the guide frame.

On
Displays the guide frame.



Notes
- The outer frame of [Guide Frame] shows the display area of a TV which is not compatible with full pixel display.

Zebra

You can display a zebra pattern as a guide for adjusting brightness. The zebra pattern will not be recorded with the image.

▶ Off
Does not display the zebra pattern.

70 (70)
Displays the zebra pattern over the part of an image that exceeds the brightness level of about 70 IRE*.

100 (100)
Displays the zebra pattern over the part of an image that exceeds the brightness level of about 100 IRE*.

* IRE (Institute of Radio Engineers) is a measure of the video signal level that is used as the bases of brightness; the reference level (pedestal level) is set to 0 (%) and the maximum level (completely white level) is set to 100 (%).

Notes
- With a subject that exceeds a brightness level of 100 IRE, the image may become overexposed.

Peaking

You can display an image on the screen with its outlines enhanced with colors. This function helps you to adjust the focus. The enhanced outlines will not be recorded on the image.

▶ Off
Does not display the enhanced outlines.

PEAK W (White)
Displays the enhanced outlines in white.

PEAK R (Red)
Displays the enhanced outlines in red.

PEAK Y (Yellow)
Displays the enhanced outlines in yellow.

Notes
- The enhanced outlines may not appear in a dark location.

Light Bright

You can set the brightness of the video light.

▶ Standard
Standard brightness.

Bright
Select this mode when you find the video light is not bright enough.

Audio Level Display

You can select whether or not to display the audio level meter.

▶ On
Displays the audio level meter.

Off
Does not display the audio level meter.

Rec/Media SET

(Items for setting up image quality or the recording media)

See "Using menus" (p. 58) on the operation.
The default settings are marked with ▶.

HD/STD Setting

You can select the image quality of movies.

▶ HD HD Quality
Records movies in High definition image quality (HD).

STD STD Quality
Records movies in standard definition image quality (STD). This setting is highly compatible with other playback devices.

Notes

- When you play or edit movies, only movies with the selected image quality will be displayed on your camcorder.

Media Select

See page 23.

HD Rec Format

See page 38.

Wide Mode

When recording standard definition image quality (STD) movies, you can select the horizontal to vertical ratio.

▶ 16:9 WIDE
Records movies to the full screen on a 16:9 (wide) TV screen.

4:3 (4:3)
Records movies to the full screen on a 4:3 TV screen.

Notes

- For details on the holizontal/vertical ratio of the TV that will be connected, refer to the instruction manuals of the TV.

☞
- [TV Type] (p. 83)

x.v.Color

You can capture wider range of colors. Various colors such as the brilliant color of flowers and turquoise blue of the sea can be more faithfully reproduced. Refer to the instruction manuals of the TV.

▶ Off
Records in ordinary color range.

On ((COLOR))
Select this setting if the recorded movies will be played back on an x.v.Color-compliant TV.

Notes

- If the movie recorded with this function [On] is played back on a non-x.v.Color-compliant TV, the color may not be reproduced correctly.

Image Size

See page 38.

Media Info

You can check the remaining recordable time for movies and the approximate free and used media space of the recording media.

Note

- Since there is a management file area, the used space is not displayed as 0 % even if you perform [Format]. (p. 78)

☞
- Selecting a recording medium (p. 23)

Format

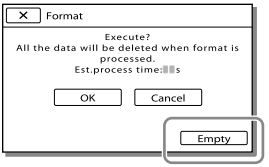
Formatting deletes all the movies and photos to recover recordable free space. Select the recording medium that you want to format, and then select OK.

Notes

- Connect your camcorder to the wall outlet (wall socket) using the supplied AC Adaptor for this operation (p. 15).
- To avoid the loss of important images, you should save them before formatting the recording media.
- Protected movies and photos will also be deleted.
- Make sure not to do the following while [Executing...] is displayed.
  – Open/Close the LCD screen.
  – Operate buttons on the camcorder.
  – Eject the memory card from your camcorder.
  – Disconnect the AC Adaptor.

To prevent data on the internal memory from being recovered

When you dispose of or transfer the camcorder, it is recommended that you perform [Empty] to prevent the leakage of your personal data.
When the internal memory is selected on the [Format] screen, select [Empty].



- You cannot perform [Empty] unless you connect the AC Adaptor to the wall outlet (wall socket).
- To avoid the loss of important images, they should be saved on a computer or other devices before performing [Empty].
- Disconnect all cables except the AC Adaptor. Do not disconnect the AC Adaptor during the operation.
- While deleting data, do not apply any vibrations or shocks to your camcorder.
- You can check the time that the camcorder will take to delete data on the LCD screen.
- If you stop performing [Empty] while [Executing...] appears, be sure to complete the operation by performing [Format] or [Empty] when you use the camcorder next time.

Repair Img. DB F.

See page 94, 95.

File Number

You can select the way to assign file number of photos.

▶ **Series**
Assigns file numbers of photos in sequence. The file number becomes larger each time you record a photo.
Even if the memory card is replaced with another one, the file number is assigned in sequence.

Reset
Assigns file numbers in sequence, following the largest file number existing on the recording medium.
When the memory card is replaced with another one, the file number is assigned for each memory card.

TC/UB

(Items for setting up the time code or user bit)

See “Using menus” (p. 58) on the operation.
The default settings are marked with ▶.

TC/UB Disp

You can toggle between the time code and user bit displays.

▶ TC
Displays the time code.

U-Bit
Displays the user bit.

TC Preset

You can preset the time code.

① Select the 2 digits you want to set, then set the value with [^]/[v].

- You can set the time code between 00:00:00.00 and 23:59:59.29.
- In the case of 24p setting, you can set the last 2 digits to a frame number in multiples of 4 between 0 and 23.

② Set other digits by repeating step ① and touch [OK].

To reset the time code

Select [Reset] on the [TC Preset] display or press the TC RESET button on the Wireless Remote Commander.

UB Preset

You can preset the user bit.

① Select the 2 digits you want to set, then set the value with [^]/[v].

② Set other digits by repeating step ① and touch [OK].

To reset the user bit

Select [Reset] on the [UB Preset] display.

TC Format

You can select the frame mode.

▶ DF
Sets the frame mode to the drop frame mode.

NDF
Sets the frame mode to the non-drop frame mode.

Notes

- When [HD Rec Format] is set to [1080/24p FX] or [1080/24p FH], the frame mode is fixed to [NDF].
- Although 30 frames are considered as 1 second in time code processing, the actual frame frequency of an NTSC image signal is 29.97 frames/sec. As a result, the time code gradually lags behind real time as the recording gets longer. The drop frame function adjusts the time code to real time. In the drop frame process, the first 2 frames of each second are not recorded except in every tenth minute. Recording without the drop frame process is called non-drop frame recording.

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 continuous 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].

Edit/Copy
(Items for editing)

See “Using menus” (p. 58) on the operation.

Delete

See page 49.

Protect

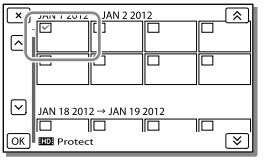
Protect movies and photos to avoid deleting them by mistake.
🔑 will be displayed on the protected images.

■ Multiple Images

You can select one or more images and “protect” them.

① Select the type of image you want to protect.

② Add check marks ✔ to the desired images.



- You can select multiple images.
- Select the image with ✔ so that the ✔ mark disappears and you can remove the protection.

③ Select OK → OK.

■ Set All In Event

You can protect all images in the selected date at one time.

① Select the date you want to protect using ⌃/⌄.

- You cannot select multiple dates.

② Select OK → OK.

■ Remove All In Event

You can remove the protection from all images in the selected date at one time.

① select the date you want to remove the protection using [⌃]/[⌄].

- You cannot select multiple dates.

② Select [OK] → [OK].

Copy

You can copy images recorded on the internal recording medium of your camcorder to the memory card. The original copy of the image will not be deleted after the copy operation has been completed.

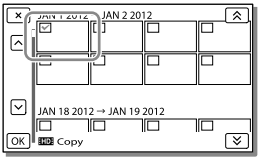
Select the source and the destination for the images to be copied after you select [Copy].

■ Multiple Images

You can select and copy one or more images.

① Select the type of image you want to copy.

② Add check marks ✔ to the desired images.



- You can select multiple images.

③ Select [OK] → [OK].

■ All In Event

You can copy all images in the selected date at one time.

① Select the type of image you want to copy.

② Select the date you want to copy using [⌃]/[⌄].

- You cannot select multiple dates.

③ Select [OK] → [OK].

Notes

- [Copy] can be selected when the camcorder is set to playback mode. Press [▶] (View Images) and select [MENU] → [Edit/Copy] → [Copy].
- When you record an image on the memory card for the first time, create the image database file by selecting [MENU] → [Rec/Media SET] → [Repair Img. DB F.] → [Memory Card].
- Connect your camcorder to the wall outlet (wall socket) using the supplied AC Adaptor to prevent your camcorder from running out of power during copy.

☞

- Checking the image copied: [Media Select] (p. 23)
- Saving images on an external media device easily (p. 53)

Direct Copy

You can save images on an external media device (USB storage device) manually while the device is connected to your camcorder. You can perform this operation while the camcorder is displaying the event view of the external device connected.

See page 53.

Setup
(Other setup items)

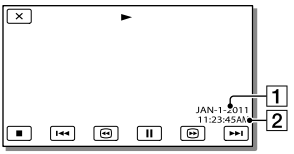
See “Using menus” (p. 58) on the operation.
The default settings are marked with ▶.

Data Code

During playback, your camcorder displays the information recorded automatically at the time of recording. You can check the following information.

▶ Off
Data code is not displayed.

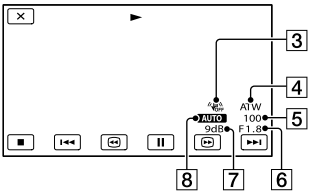
Date/Time



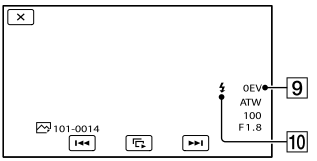
1 Date
2 Time

Camera Data

Movie

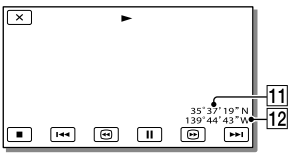


Photo



3 SteadyShot off
4 White Balance
5 Shutter Speed
6 IRIS (Aperture value)
7 Gain
8 Brightness
9 Exposure
10 Flash

Coordinates



11 Latitude
12 Longitude

Notes

- The data code is displayed on the TV screen if you connect your camcorder to a TV.
- Depending on the recording media condition, bars [-- -- --] appear.

Disp Output

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

▶ **LCD Panel**
Outputs the information to the LCD screen and viewfinder.

V-Out/Panel
Outputs the information to the TV screen, viewfinder, and LCD screen.

TV Type

You need to convert the signal depending on the TV connected when playing back movies and photos. The recorded movies and photos are played back as following illustrations.

▶ **16:9**
Select this to view your movies on a 16:9 (wide) TV.

Movies and photos recorded in 16:9 (wide) mode

Movies and photos recorded in 4:3 mode

4:3
Select this to view your movies and photos on a 4:3 standard TV.

Movies and photos recorded in 16:9 (wide) mode

Movies and photos recorded in 4:3 mode

Notes

- Horizontal to vertical ratio of high definition image quality (HD) movies is 16:9.

HDMI Resolution

Select the output image resolution when connecting your camcorder to a TV with an HDMI cable.

1080p/480p
Outputs high definition image quality (HD) movies with a 1080p signal and standard image quality (STD) movies with a 480p signal.
Select this setting when you watch movies that have been recorded with [HD Rec Format] set to [1080/60p PS], on the 60p compliant TV.

▶ **1080i/480i**
Outputs high definition image quality (HD) movies with a 1080i signal and standard image quality (STD) movies with a 480i signal.

720p/480p
Outputs high definition image quality (HD) movies with a 720p signal and standard image quality (STD) movies with a 480p signal.

480p
Outputs the 480p signal.

480i
Outputs the 480i signal.

Notes

- When [HD Rec Format] is set to [1080/60p PS] and [HDMI Resolution] is set to [720p/480p] or [480p], HDMI signals cannot be output during recording.

HDMI TC Output

You can transfer time code, user bit data to the device connected with the HDMI cable.

▶ **Off**
Does not output time code, user bit code.

On
Outputs time code, user bit code.

USB Connect

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

Beep

▶ **Off**
Cancels the melody.

On
A melody sounds when you start/stop recording, or operate the touch panel.

LCD Brightness

You can adjust the brightness of the LCD screen.

▶ **Normal**
Normal setting (normal brightness).

Bright
Select this when the LCD screen is not bright enough.
This adjustment does not affect the recorded images in any way.

Display Setting

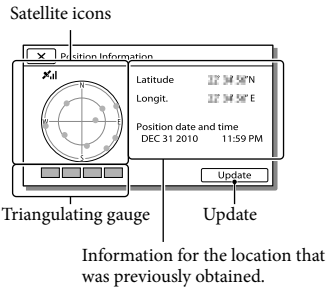
You can set the duration of displaying the icons or indicators on the LCD screen.

▶ **Auto**
Displays for about 3 seconds. The rec & zoom buttons on the LCD screen are displayed.

On
Always displays. The rec & zoom buttons on the LCD screen are not displayed.

GPS Information

The camcorder can display location information.



How to check the triangulating information

Color of the satellites/ triangulating gauge	Status
●/■ (black)	No signal, but orbit information for the satellite is available.
●/■ (gray)	33 % of the satellite orbit information has been obtained.
●/■ (brown)	66 % of the satellite orbit information has been obtained.
○/□ (ocher)	99 % of the satellite orbit information has been obtained.
○/□ (green)	Triangulating is completed and the satellite is currently being used.

If data on your current information cannot be obtained

The camcorder starts the triangulating priority mode. As the camcorder turns other functions off to search for satellites, obtaining triangulating information can take priority.

To update the location information

Select [Update].

To close the triangulating information screen

Select [×].

GPS Setting

You can select whether the camcorder receives or does not receive GPS signals.

▶ On
Receives GPS signals.
The location information will not be recorded until triangulating is finished successfully.

Off
Does not receive GPS signals.
The location information that has previously been recorded will be invalid.

REC Lamp

You can make the camera recording lamp on the front of your camcorder not to turn on. (Default: [On])

Remote Ctrl (Remote control)

▶ On
Select this when you use the supplied Wireless Remote Commander (p. 10).

Off
Select this when you do not use the supplied Wireless Remote Commander.

Language Setting

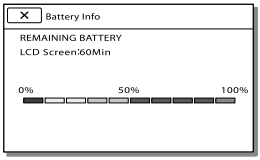
You can select the language to be used on the LCD screen.
The camcorder offers [ENG[SIMP]] (simplified English) for when you cannot find your native tongue among the options.

Calibration

See page 110.

Battery Info

You can check the estimated remaining capacity of the battery.



Date & Time Setting

■ Date & Time Format

You can select one from 4 types of date and time formats.

■ Daylight Savings/Summer Time

You can change this setting without stopping the clock.

▶ Off

Does not set the summertime.

On

Sets the summertime. The clock is set to move the time forward 1 hour.

■ Date & Time

See page 19.

Area Setting

You can adjust time difference without stopping the clock. Select your local area when using the camcorder in other time zones. Refer to the world time difference information on page 102.

Auto Clock ADJ

The camcorder can maintain accurate time automatically by acquiring time information from the GPS system.

▶ On

Maintains accurate time automatically.

Off

Does not maintain accurate time using the GPS system.

Notes

- You must set the date and time on your camcorder before use (p. 19).
- There may be discrepancies of a few seconds even if [Auto Clock ADJ] is activated.
- This function automatically adjusts the clock when the camcorder receives GPS signals and finishes triangulating successfully while the power is on. Once the clock is adjusted, it will not be adjusted until the next time you turn the camcorder on again.
- The clock may not be adjusted to the correct time automatically using the GPS system, depending on the country/region selected for your camcorder. In this case, set [Auto Clock ADJ] to [Off].

Auto Area ADJ

The camcorder can compensate for time differences automatically by acquiring location information from the GPS system.

▶ On

Compensates for time differences automatically.

Off

Does not compensate for time differences automatically.

Notes

- You must set the date and time on your camcorder before use (p. 19).
- The camcorder may not compensate for the time difference automatically, depending on the country/region selected for your camcorder. In this case, set [Auto Area ADJ] to [Off].

Troubleshooting

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

① Check the list (p. 87 to 93), and inspect your camcorder.

② Disconnect the power source, attach the power source again after about 1 minute, and turn the camcorder on.

③ Press RESET (p. 8) using a pointed object, and turn the camcorder on. If you press RESET, all settings, including the clock setting, are reset.

④ Contact your Sony dealer or local authorized Sony service facility.

- Your camcorder may be required to initialize or change the current internal memory of your camcorder, depending on the problem. In the event of this, the data stored on the internal memory will be deleted. Be sure to save the data on the internal memory on other media (backup) before sending your camcorder for repair. We will not compensate you for any loss of internal memory data.
- During repair, we may check a minimum amount of data stored on the internal memory in order to investigate the problem. However, your Sony dealer will neither copy nor retain your data.

- Overall operations/Wireless Remote Commander ..... p. 87
- Batteries/power sources ..... p. 88
- LCD screen/viewfinder ..... p. 89
- Memory card ..... p. 89
- Recording ..... p. 90
- Playback ..... p. 92
- Playing back images stored on memory card on other devices ..... p. 92
- Editing movies/photos on your camcorder ..... p. 92
- Playback on the TV ..... p. 93
- Copying/Connecting to other devices ..... p. 93
- Connecting to a computer ..... p. 93

Overall operations/Wireless Remote Commander

The power does not turn on.

- Attach a charged battery pack to the camcorder (p. 15).
- The plug of the AC Adaptor has been disconnected from the wall outlet (wall socket). Connect it to the wall outlet (wall socket) (p. 15).

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

- It takes a few seconds for your camcorder to be ready to shoot after the power is turned on. This is not a malfunction.
- Disconnect the AC Adaptor from the wall outlet (wall socket) or remove the battery pack, then reconnect it after about 1 minute. If the functions still do not work, press RESET (p. 8) using a thin object. (If you press RESET, all settings, including the clock setting, are reset.)
- 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. Leave your camcorder with the power of your camcorder on. If you still cannot operate your camcorder, turn off your camcorder and take it to a warm place. Leave the camcorder there for a while, then turn on your camcorder.

The menu settings have been changed automatically.

- While Intelligent Auto is active, some menu settings related to image quality will be changed automatically.

- The following menu items return to the default settings when you switch among movie recording, photo recording and playback modes.
  – [Fader]
  – [Self-Timer]
  – [Tele Macro]

Your camcorder gets warm.

- Your camcorder may become warm during operation. This is not a malfunction.

A rattling noise can be heard when you shake the camcorder.

- If no noise is heard when the camcorder is turned on and is in the movie/photo recording mode, the noise is produced by the movement of the internal lens. This is not a malfunction.

Intelligent Auto is canceled.

- The Intelligent Auto setting is canceled if you change the following settings:
  – [Smth Slw REC]
  – [Golf Shot]
  – [White Balance]
  – [Spot Meter/Fcs]
  – [Spot Meter]
  – [Spot Focus]
  – [Exposure]
  – [Focus]
  – [IRIS]
  – [Shutter Speed]
  – [AGC Limit]
  – [AE Shift]
  – [White Balance Shift]
  – [Low Lux]
  – [Scene Selection]
  – [Cinematone]
  – [Tele Macro]
  – [SteadyShot]
  – [SteadyShot]
  – [Auto Back Light]
  – [Face Detection]

The supplied Wireless Remote Commander does not function.

- Set [Remote Ctrl] to [On] (p. 85).
- Insert a battery into the battery holder with the +/– polarities correctly matching the +/– marks (p. 109).
- Remove any obstructions between the Wireless Remote Commander and the remote sensor.
- Point the remote sensor away from strong light sources such as direct sunlight or overhead lighting. Otherwise, the Wireless Remote Commander may not function properly.

Another DVD device malfunctions when you use the supplied Wireless Remote Commander.

- Select a commander mode other than DVD 2 for your DVD device, or cover the sensor of your DVD device with black paper.

Batteries/power sources

The power abruptly turns off.

- Use the AC Adaptor.
- Charge the battery pack (p. 15).

The CHG (charge) lamp does not light while the battery pack is being charged.

- Close the LCD screen (p. 15).
- Attach the battery pack to the camcorder correctly (p. 15).
- Connect the power cord (mains lead) to the wall outlet (wall socket) properly.
- The battery charge is completed (p. 15).

The CHG (charge) lamp flashes while the battery pack is being charged.

- When the battery is being charged using the Built-in USB Cable, disconnect the Built-in USB Cable and connect it again.

- If the temperature of the battery pack is too high or too low, you may not be able to charge it (p. 15).
- Attach the battery pack to the camcorder correctly (p. 15). If the problem persists, disconnect the AC Adaptor from the wall outlet (wall socket) and contact your Sony dealer. The battery pack may be damaged.

The remaining battery time indicator does not indicate the correct time.

- The ambient temperature is too high or too low. This is not a malfunction.
- The battery pack has not been charged enough. Fully charge the battery again. If the problem persists, replace the battery pack with a new one (p. 106).
- The indicated time may not be correct depending on the environment of use.

The battery pack is quickly discharged.

- The ambient temperature is too high or low. This is not a malfunction.
- The battery pack has not been charged enough. Fully charge the battery again. If the problem persists, replace the battery pack with a new one (p. 106).

LCD screen/viewfinder

Menu items are grayed out.

- You cannot select grayed items in the current recording/playback situation.
- There are some functions you cannot activate simultaneously.

The buttons do not appear on the touch panel.

- Touch the LCD screen lightly.
- Press the DISP button (p.21).
- Press DISPLAY on the Wireless Remote Commander (p. 10).

The buttons on the touch panel do not work correctly or do not work at all.

- Adjust the touch panel ([Calibration]) (p. 110).

The buttons on the touch panel quickly disappear.

- Set [Display Setting] to [On] (p. 84).

There are dots in the shape of a grid on the screen.

- These points are a normal result of the manufacturing process of the screen and do not affect the recording in any way.

The image in the viewfinder is not clear.

- Move the viewfinder lens adjustment lever until the image appears clearly (p. 20).

The image in the viewfinder has disappeared.

- Close the LCD panel. Even if the viewfinder is pulled out, no image is displayed in the viewfinder when the LCD panel is open (p. 20).

Memory card

Operations using the memory card cannot be performed.

- If you use the memory card formatted on a computer, format it again on your camcorder (p. 78).

Images stored on the memory card cannot be deleted.

- The maximum number of images that you can delete on the index screen at one time is 100.
- You cannot delete the protected images.

The data file name is not indicated correctly or flashes.

- The file is damaged.
- The file format is not supported by your camcorder (p. 78).

Recording

Refer also to “Memory card” (p. 89).

Pressing START/STOP or FIXED SHOT/ PHOTO does not record images.

- The playback screen is displayed. Press MODE to turn on the (Movie) or (Photo) lamp (p. 25, 26).
- Your camcorder is recording the image you have just shot on the recording media. You cannot make new recording during this period.
- The recording media is full. Delete unnecessary images (p. 49).
- Total number of movie scenes or photos exceeds the recordable capacity of your camcorder. Delete unnecessary images (p. 49).
- 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 take it to a warm place. Leave the camcorder there for a while, then turn on the camcorder.

Photos cannot be recorded.

- You cannot record photos together with:
  – [Smth Slw REC]
  – [Golf Shot]
  – [Fader]
- The camcorder cannot shoot photos while it is in the movie recording mode, depending on the setting of [HD Rec Format].

The access lamp remains lit or flashing even if 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 flash does not work.

- You cannot record with the built-in flash while:
  – the (Movie) lamp is on
  – [Conversion Lens] is set to other than [Off]
- Even if auto flash or Auto redeye reduction is selected, you cannot use the flash with:
  – NightShot
  – manually-set [IRIS] or [Shutter Speed] (when either one of them has been assigned to the MANUAL dial)
  – [Spot Meter/Fcs]
  – [Spot Meter]
  – [Manual] in [Exposure]
  – [Night Scene], [Sunrise&Sunset], [Fireworks], [Landscape], [Spotlight], [Beach] or [Snow] in [Scene Selection]

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

- Depending on the recording conditions, the time available for recording may be shorter (p. 98), for example when recording a fast moving object, etc.

The camcorder stops operating.

- 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 take it to a warm place. Leave the camcorder there for a while, then turn on the camcorder.
- If you keep applying vibration on the camcorder, recording may stop.

There is a time difference between the point when START/STOP 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 START/STOP and the actual point that recording movie starts/stops. This is not a malfunction.

The horizontal to vertical ratio of the movie (16:9 (wide)/4:3) cannot be changed.

- The horizontal to vertical ratio of high definition image quality (HD) movies is 16:9 (wide).

The auto focus does not function.

- Set [Focus] to [Auto] (p. 67).
- The recording conditions are not suitable for auto focus. Adjust the focus manually (p. 67).

SteadyShot does not function.

- Set [SteadyShot] to [Active] or [Standard] (p. 36), [SteadyShot] to [On] (p. 71).
- Even if [SteadyShot] is set to [Active] or [Standard], [SteadyShot] to [On], your camcorder may not be able to compensate for excessive vibrations.
- Set [Conversion Lens] to [Off] (p. 71).

Images cannot be recorded or played back correctly.

- If you record and delete images repeatedly for a long time, the files on the recording media may become fragmented and images cannot be recorded or played back correctly. After backing up the images on other media, format the recording media on your camcorder (p. 78).

The subjects passing by the screen very fast appear crooked.

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

The color of the image is not correctly displayed.

- Press NIGHTSHOT to cancel the NightShot function (p. 37).

The screen image is bright, and the subject does not appear on the screen.

- Press NIGHTSHOT to cancel the NightShot function (p. 37).

Horizontal stripes appear on the images.

- This occurs when recording images under a fluorescent lamp, sodium lamp, or mercury lamp. This is not a malfunction.

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

- Set [SteadyShot] to an option except for [Active] (p. 36).

[LCD Brightness] cannot be adjusted.

- You cannot adjust [LCD Brightness] when:
  - The LCD panel is closed on your camcorder with the LCD screen facing out.
  - The power is supplied from the AC Adaptor.

Sound is not recorded correctly.

- Connect the microphone again in the same way as when you start recording movies.

Photos are recorded automatically.

- In the default setting, photos are recorded automatically when the camcorder detects a smile ([Smile Shutter]) (p. 73).

The time code is not recorded in sequence.

- The time code may not be recorded sequentially if you change the settings of [HD/STD Setting] or [HD Rec Format].

Playback

Images cannot be played back.

- Select the type of recording media you want to play back (p. 23).
- Select the image quality of the movie you want to play back (p. 38).
- Images recorded on other devices may not be played back. This is not a malfunction.

Photos cannot be played back.

- Photos cannot be played back if you have modified files or folders, or have edited the data on a computer. (The file name flashes in that case.) This is not a malfunction.

The movie freezes.

- Photos which were recorded while recording a movie are played back. In the default setting, movies and photos are played back continuously. When you set the Switch Image Type button to [Movie], you can play movies only.

? is indicated on a thumbnail.

- This may appear on an image recorded on other devices, edited on a computer, etc.
- You removed the AC Adaptor or the battery pack while the recording media icon at the top right corner of the screen flashes, or before the access lamp is turned off after recording. This may damage your image data and ? is displayed.

is indicated on a thumbnail.

- The image database file may be damaged. Check the database file by touching MENU → [Rec/Media SET] → [Repair Img. DB F.] → the recording medium. If it still appears, delete the image with (p. 49).

No sound or only a quiet sound is heard during playback.

- Turn up the volume (p. 75).
- When you record sound with [Micref Level] (p. 74) set to [Low], the recorded sound may be difficult to hear.
- Sounds cannot be recorded while shooting with [Smth Slw REC] or [Golf Shot].

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.

Playing back images stored on memory card on other devices

Images cannot be played back or the memory card is not recognized.

- The playback device does not support playing back memory cards (p. 33).

Editing movies/photos on your camcorder

Unable to edit.

- Unable to edit because of the condition of the image.

A movie cannot be divided.

- A movie that is too short cannot be divided.
- Release the protection, and then divide.

A photo cannot be captured from a movie.

- The recording media where you want to save photos is full.

Playback on the TV

Neither image nor sound is played on the connected TV.

- Images are not output from the HDMI OUT jack, if copyright protection signals are recorded in the images.

The top, bottom, right, and left edges of images are trimmed slightly on a connected TV.

- The LCD screen of your camcorder can display recording images across the entire screen (full pixel display). However, this may cause slight trimming of the top, bottom, right, and left edges of images when played back on a TV which is not compatible with full pixel display.
- It is recommended you record images using the outer frame of [Guide Frame] (p. 75) as a guide.

The image appears distorted on the 4:3 TV.

- This happens when viewing an image recorded in the 16:9 (wide) mode on a 4:3 TV. Set [TV Type] correctly (p. 83) and play back the image.

Black bands appear at the top and bottom of the screen of the 4:3 TV.

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

Copying/Connecting to other devices

Images are not copied correctly.

- You cannot copy images using the HDMI cable.
- The A/V connecting cable is not connected properly. Make sure to connect the cable to the input jack of another device (p. 52).

Connecting to a computer

The computer does not recognize the camcorder.

- Disconnect devices from the USB jack of the computer other than the keyboard, mouse, and your camcorder.
- Disconnect the Built-in USB Cable from the computer, and restart the computer, then connect the computer and your camcorder again in the correct order.
- When both the Built-in USB Cable and the USB jack of the camcorder are connected to the external devices at the same time, disconnect one that is not connected to a computer.

Movies cannot be viewed or copied to a computer.

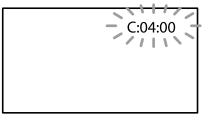
- Disconnect the Built-in USB Cable from the computer, and turn on your camcorder, then connect the cable again.
- You need to install the supplied “Content Management Utility” to copy movies from your camcorder to your computer (p. 56).

The computer freezes.

- Disconnect the Built-in USB Cable from the computer, and restart the computer, then connect the computer and your camcorder again in the correct order.

Self-diagnosis display/Warning indicators

When an error occurs, a warning indicator appears on the LCD screen.
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. In this case, when you contact them, give them all the numbers of the error code beginning with C or E.



- You may hear a melody when some warning indicators appear on the screen.

C:(or E:) □□:□□ (Self-diagnosis display)

C:04:□□
- The battery pack is not an "InfoLITHIUM" battery pack (V series). Use an "InfoLITHIUM" battery pack (V series) (p. 105).
- Connect the DC plug of the AC Adaptor to the DC IN jack of your camcorder securely (p. 15).

C:06:□□
- The battery pack temperature is high. Change the battery pack or place it in a cool place.

C:13:□□ / C:32:□□
- Remove the power source. Reconnect it and operate your camcorder again.

E:□□:□□
- Follow the steps from ② on page 87.

(Battery level warning)

- The battery pack is nearly used up.
- Depending on the operating environment or battery conditions, may flash, even if there are about 20 minutes remaining.

(Warning indicator pertaining to battery pack temperature)

- The battery pack temperature is high. Change the battery pack or place it in a cool place.

(Warning indicator pertaining to memory card)

Slow flashing
- Free spaces for recording images are running out. For the type of memory card you can use with your camcorder, see page 24.
- No memory card is inserted (p. 23).

Fast flashing
- There are not enough free spaces for recording images. After storing the images on other media (p. 51), delete unnecessary images, or format the memory card (p. 78).
- The image database file may be damaged. Check the database file by touching MENU → [Rec/Media SET] → [Repair Img. DB F.] → the recording medium.
- The memory card is damaged.

(Warning indicator pertaining to memory card formatting)

- The memory card is damaged.
- The memory card is not formatted correctly (p. 78).

(Warning indicator pertaining to incompatible memory card)

- Incompatible memory card is inserted (p. 24).

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

- The memory card is write-protected.
- Access to the memory card was restricted on another device.

(Warning indicator pertaining to the external media device)

- The image database file may be damaged. Check the database file by touching MENU → [Rec/Media SET] → [Repair Img. DB F.] → the recording medium.
- The external media device is damaged.

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

- The external media device is damaged.
- The external media device is not formatted correctly.

(Warning indicator pertaining to the flash)
Fast flashing

- There is something wrong with the flash.

(Warning indicator pertaining to camera-shake warning)

- The amount of lights is not sufficient, so camera-shake easily occurs. Use the flash.
- The camcorder is unsteady, so camera-shake easily occurs. Hold the camcorder steadily with both hands and record the image. However, note that the camera-shake warning indicator does not disappear.

(Warning indicator pertaining to photo recording)

- The recording media is full.
- Photos cannot be recorded during processing. Wait for a while, then record.
- When [HD Rec Format] is set to [1080/60p PS], [1080/60i FX] or [720/60p FX], you cannot capture photos while recording movies. Furthermore, if [HD Rec Format] is set to [1080/30p FX], [1080/30p FH], [1080/24p FX] or [1080/24p FH], you cannot record photos while the camcorder is in movie recording standby mode.

Description of warning messages

If messages appear on the screen, follow the instructions.

Recording media

Cannot recognize the internal memory. Format and use again.

- The internal recording medium of the camcorder is set differently from the default format. Performing [Format] (p. 78) may enable you to use your camcorder. This will delete all data in the internal recording medium.

Data error.

- An error occurred during reading or writing the internal recording media of the camcorder.
- If the message is preceded by a GPS indicator, there may be some trouble with the GPS receiver. Turn on your camcorder again.
- This may occur when you keep applying shock on the camcorder.
- Movies recorded on other devices may not be played back.

The Image Database File is damaged. Do you want to create a new file?
HD movie management information is damaged. Create new information?

- The management file is damaged. When you select OK, a new management file is created.

There is no Image Database File Movies cannot be recorded or played Create a new file?

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

There is no HD movie management information. Create new information?

- You cannot record or play back movies because no high definition image quality (HD) movie management information exists. If you select [Yes], new management information is created and you can record or play back movies with high definition image quality (HD).
- You can record standard definition image quality (STD) movies or photos.

Inconsistencies found in image database file. Do you want to repair the image database file?
The Image Database File is damaged. 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?

- The management file is damaged. When you select [OK], a new management file is created.

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 high definition image quality (HD) movie management information is damaged. If you select [OK], new management information is created by backing up a high definition image quality (HD) movie. The backed up movies cannot be recognized. If you connect to a computer that has been installed with the supplied software "Content Management Utility," you can copy the backed up high definition image quality (HD) 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 format the memory card on the camcorder (p. 78).
- The size of the inserted memory card is not sufficient for copying the movie(s). Use the recommended memory card (p. 24).

Recovering data.

- 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. 78). Note that if you format the memory card, all the recorded movies and photos are deleted.

Still picture folder is full. Cannot record still pictures.

- You cannot create folders exceeding 999MSDCF. You cannot create or delete created folders using your camcorder.
- Format the memory card (p. 78), or delete folders using your computer.

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

- Use a memory card recommended for your camcorder (p. 24).

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

- Use a memory card recommended for your camcorder (p. 24).
- Contact your Sony dealer.

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

- Reinsert the memory card.

External media cannot execute functions.

- Check the data base file by touching MENU → [Rec/Media SET] → [Repair Img. DB F.] → the recording medium.
- If even then the indicator flashes, reconnect the external media device, and then perform the format. Note that if you format the external media device, all the recorded movies and photos in it are deleted.
- If you cannot perform the format, the external media may not be supported by the camcorder, or it may be damaged. Try with another external media.

Unable to access external media.

- Use the external media device in stable condition (the environment such as no vibration and room temperature, etc.).
- Make sure to the power source of the external media device is connected.

Other

Maximum number of images already selected.

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

Data protected.

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

Recording time of movies/number of recordable photos

"HD" stands for high definition image quality, and "STD" stands for standard definition image quality.

Expected time of recording and playback with each battery pack

Recording time

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

(unit: minute)

Battery pack	Continuous recording time		Typical recording time	
Image quality	HD	STD	HD	STD
NP-FV50	90	95	45	45
	95	100	45	50
NP-FV70 (supplied)	185	205	90	100
	195	210	95	105
NP-FV100	375	405	185	200
	395	415	190	205

- Top: When the LCD screen is opened
  Bottom: When recording with the viewfinder without opening the LCD screen
- Each recording time is measured in the following conditions.
  – When recording high definition image quality (HD) with [HD Rec Format] set to [1080/60i FX].
  – When the XLR Adaptor and supplied microphone are attached.
- Typical recording time shows the time when you repeat recording start/stop, switching the MODE lamp, and zooming.
- Times measured when using the camcorder at 25 °C (77 °F). 10 °C to 30 °C (50 °F to 86 °F) is recommended.
- The recording and playback time will be shorter when you use your camcorder in low temperatures.
- The recording and playback time will be shorter depending on the conditions under which you use your camcorder.

Playing time

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

(unit: minute)

Battery pack		
Image quality	HD	STD
NP-FV50	190	215
	200	225
NP-FV70 (supplied)	395	440
	415	465
NP-FV100	785	870
	830	925

- Top: When the LCD screen is opened
  Bottom: When playing with the viewfinder without opening the LCD screen

Expected recording time of movies

Internal memory

High definition image quality (HD) in h (hour) and min (minute)

Recording mode	Recording time
PS	7 h 30 min (7 h 30 min)
	7 h 55 min (7 h 55 min)
FX	8 h 45 min (8 h 45 min)
	9 h 20 min (9 h 20 min)
FH	11 h 40 min (11 h 40 min)
	12 h 50 min (12 h 50 min)
HQ	19 h 25 min (15 h 15 min)
	22 h 45 min (17 h 15 min)
LP	30 h 45 min (26 h 30 min)
	39 h 55 min (32 h 35 min)

- Top: When [HD Audio Format] is set to [Linear PCM]
  Bottom: When [HD Audio Format] is set to [Dolby Digital]

Standard definition image quality (STD) in h (hour) and min (minute)

Recording mode	Recording time
HQ	23 h 50 min (21 h 50 min)

- 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 (STD).
- 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.

Notes

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

Memory card

High definition image quality (HD)

(unit: minute)

	2 GB	4 GB	8 GB	16 GB	32 GB
PS	8 (8)	15 (15)	35 (35)	70 (70)	145 (145)
	9 (9)	15 (15)	35 (35)	75 (75)	150 (150)
FX	9 (9)	20 (20)	40 (40)	80 (80)	170 (170)
	10 (10)	20 (20)	40 (40)	90 (90)	180 (180)
FH	10 (10)	25 (25)	55 (55)	110 (110)	225 (225)
	10 (10)	25 (25)	60 (60)	120 (120)	245 (245)
HQ	20 (15)	45 (35)	90 (70)	185 (145)	375 (290)
	25 (15)	50 (40)	105 (80)	215 (165)	440 (330)
LP	30 (30)	70 (60)	145 (125)	295 (250)	590 (510)
	45 (35)	90 (75)	185 (155)	380 (310)	770 (630)

- Top: When [HD Audio Format] is set to [Linear PCM]
  Bottom: When [HD Audio Format] is set to [Dolby Digital]

Standard definition image quality (STD)

(unit: minute)

	2 GB	4 GB	8 GB	16 GB	32 GB
HQ	25 (25)	55 (50)	110 (100)	225 (210)	460 (420)

- When using a Sony memory card.

Notes

- The recordable time may vary depending on the recording and subject conditions and [HD Rec Format] (p. 38).
- The number in ( ) is the minimum recordable time.

Expected number of recordable photos

Internal memory

You can record the maximum 40,000 photos.

Memory card

	16:9 24.1M
2 GB	200
4 GB	400
8 GB	810
16 GB	1600
32 GB	3250

- When using a Sony memory card.
- The number of recordable photos of memory card shown is for the maximum image size of your camcorder. The actual number of recordable photos is displayed on the LCD screen during recording (p. 116).
- The number of recordable photos of memory card may vary depending on the recording conditions.

Notes

- The unique pixel array of Sony's ClearVid and the image processing system allow still image resolution equivalent to the sizes described.

On bit-rate and recording pixels

- The bit-rate, pixels and aspect ratio of each recording mode for movies (movie + audio, etc.)
  – High definition image quality (HD):
    PS: Max. 28 Mbps 1,920 × 1,080 pixels/16:9
    FX: Max. 24 Mbps 1,920 × 1,080 pixels/16:9, 1,280 × 720 pixels/16:9
    FH: Approx. 17 Mbps (average) 1,920 × 1,080 pixels/16:9, 1,280 × 720 pixels/16:9
    HQ: Approx. 9 Mbps (average) 1,440 × 1,080 pixels/16:9
    LP: Approx. 5 Mbps (average) 1,440 × 1,080 pixels/16:9
  – Standard definition image quality (STD):
    HQ: Approx. 9 Mbps (average) 720 × 480 pixels/16:9, 4:3
- The photo recording pixels and the aspect ratio.
  – Photo recording mode, Dual capture:
    6,544 × 3,680 dots/16:9
    4,912 × 3,680 dots/4:3
    4,672 × 2,628 dots/16:9
    2,592 × 1,944 dots/4:3
    1,920 × 1,080 dots/16:9
    640 × 480 dots/4:3
  – Capturing a photo from a movie:
    1,920 × 1,080 dots/16:9
    640 × 360 dots/16:9
    640 × 480 dots/4:3

Using your camcorder abroad

Power supply

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

Viewing high definition image quality (HD) movies

In countries/regions where 1080/60i is supported, you can view the movies with the same high definition image quality (HD) as that of the recorded movies. You need an NTSC-system-based and 1080/60i compatible TV (or monitor) with HDMI input jacks. The HDMI cable (supplied) must be connected.

Viewing standard definition image quality (STD) movies

To view standard definition image quality (STD) movies, you need an NTSC-system-based TV with AUDIO/VIDEO input jacks. An A/V connecting cable must be connected.

On TV color systems

Your camcorder is an NTSC-system-based camcorder.

System	Used in
NTSC	Bahama Islands, Bolivia, Canada, Central America, Chile, Colombia, Ecuador, Guyana, Jamaica, Japan, Korea, Mexico, Peru, Surinam, Taiwan, the Philippines, the USA, Venezuela, etc.
PAL	Australia, Austria, Belgium, China, Czech Republic, Denmark, Finland, Germany, Holland, Hong Kong, Hungary, Italy, Kuwait, Malaysia, New Zealand, Norway, Poland, Portugal, Singapore, Slovak Republic, Spain, Sweden, Switzerland, Thailand, United Kingdom, etc.
PAL-M	Brazil
PAL-N	Argentina, Paraguay, Uruguay
SECAM	Bulgaria, France, Guiana, Iran, Iraq, Monaco, Russia, Ukraine, etc.

Setting to the local time

You can easily set the clock to the local time by setting a time difference when using your camcorder abroad. Select MENU → [Setup] → [Clock Settings] → [Date & Time Setting] → [Daylight Savings] or [Summer Time] (p. 85), and MENU → [Setup] → [Clock Settings] → [Area Setting] (p. 86).
When [Auto Clock ADJ] (p. 86) and [Auto Area ADJ] (p. 86) are set to [On], the clock is set to the local time automatically by the GPS function.

World time difference

Time-zone differences	Area setting
GMT	Lisbon, London
+01:00	Berlin, Paris
+02:00	Helsinki, Cairo, Istanbul
+03:00	Nairobi
+03:30	Tehran
+04:00	Moscow, Abu Dhabi, Baku
+04:30	Kabul
+05:00	Karachi, Islamabad
+05:30	Calcutta, New Delhi
+06:00	Almaty, Dhaka
+06:30	Yangon
+07:00	Bangkok, Jakarta
+08:00	Hong Kong, Singapore, Beijing
+09:00	Seoul, Tokyo
+09:30	Adelaide, Darwin
+10:00	Melbourne, Sydney
+11:00	Solomon Is
+12:00	Fiji, Wellington, Eniwetok, Kwajalein
–11:00	Samoa
–10:00	Hawaii
–09:00	Alaska
–08:00	Los Angeles, Tijuana
–07:00	Denver, Arizona
–06:00	Chicago, Mexico City
–05:00	New York, Bogota
–04:00	Santiago
–03:30	St. John's
–03:00	Brasilia, Montevideo
–02:00	Fernando de Noronha
–01:00	Azores, Cape Verde Is.

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 a high definition (HD) 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.

- As the AVCHD format uses a compression coding technology, the picture may be disturbed in scenes where picture, field angles or brightness, etc. change drastically, but this is not a malfunction.

Recording and playback on your camcorder

Based on the AVCHD format, your camcorder records with the high definition image quality (HD).
In addition to high definition image quality (HD), your camcorder is capable of recording a standard definition (STD) signal in the conventional MPEG-2 format.

Video signal*: MPEG-4 AVC/H.264
1920 × 1080/60p, 1920 × 1080/60i, 1440 × 1080/60i, 1920 × 1080/24p, 1280 × 720/60p
Audio signal: Linear PCM 2ch/Dolby Digital 2ch
Recording media:
Internal memory, memory card

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

About GPS

The GPS (Global Positioning System) is a system that calculates geographical location from highly accurate US space satellites. This system allows you to pinpoint your exact location on the earth. The GPS satellites are located in 6 orbits, 20,000 km above the earth. The GPS system consists of 24 or more GPS satellites. A GPS receiver receives radio signals from the satellites, and calculates the current location of the receiver based on the orbital information (almanac data) and travel time of the signals, etc.
Determining a location is called "triangulating." A GPS receiver can determine the location's latitude and longitude by receiving signals from 3 or more satellites.

- As the positions of GPS satellites vary constantly, it may take longer to determine the location or the receiver may not be able to determine the location at all, depending on the location and time you use the camcorder.
- "GPS" is a system for determining geographic location by triangulating radio signals from GPS satellites. Avoid using the camcorder in places where radio signals are blocked or reflected, such as a shadowy place surrounded by buildings or trees, etc. Use the camcorder in open sky environments.
- You may not be able to record location information at locations or in situations where radio signals from the GPS satellites do not reach the camcorder as follows.
  – In tunnels, indoors or under the shade of buildings.
  – Between tall buildings or at narrow streets surrounded by buildings.
  – In underground locations, locations surrounded by dense trees, under an elevated bridge, or in locations where magnetic fields are generated, such as near high voltage cables.
  – Near devices that generate radio signals of the same frequency band as the camcorder: near 1.5 GHz band mobile telephones, etc.

On triangulating errors

- If you move to another location right after turning the power switch to ON, it may take a longer time for the camcorder to start triangulating, compared to when you stay in the same place.
- Error caused by the position of GPS satellites
  The camcorder automatically triangulates your current location when the camcorder receives radio signals from 3 or more GPS satellites. The triangulating error allowed by the GPS satellites is about 10 m (33 feet). Depending on the environment of the location, the triangulating error can be greater. In this case, your actual location may not match the location on the map based on the GPS information. Meanwhile, the GPS satellites are controlled by the United States Department of Defense, and the degree of accuracy may be changed intentionally.
- Error during the triangulating process
  The camcorder acquires location information periodically during triangulating. There is a slight time difference between when the location information is acquired and when the location information is recorded on an image, therefore, the actual recording location may not match exactly the location on the map based on the GPS information.

On the restriction of use of GPS

- Use GPS in accordance with the regulations of the situation, the countries/regions of use.

On the geographic coordinate system

- The "WGS-84" geographic coordinate system is used.

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 data may occur in the following cases (the data will not be compensated for):
  – If you eject the memory card, or turn off your camcorder 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 that you 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 or memory card adaptor.
- 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.
- Keep the 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 using memory card with memory card compliant device inserting memory card into memory card adaptor, make sure the memory card is inserted facing in the correct direction. Note that improper use may cause a malfunction.

On image data compatibility

- Image data files recorded on memory card by your camcorder conform to the "Design rule for Camera File system" universal standard established by the JEITA (Japan Electronics and Information Technology Industries Association).
- On your camcorder, you cannot play back photos recorded on other devices (DCR-TRV900 or DSC-D700/D770) that do not conform to the universal standard. (These models are not sold in some regions.)
- If you cannot use memory cards that have been used with another device, format it with your camcorder (p. 78). Note that formatting erases all information on the memory card.
- You may not be able to play back images with your camcorder:
  – When playing back image data modified on your computer
  – When playing back image data recorded with other devices

About the "Memory Stick" media

Types of "Memory Stick" media	Recording/Playback
"Memory Stick Duo" media (with MagicGate)	—
"Memory Stick PRO Duo" media (Mark2)	✓
"Memory Stick PRO-HG Duo" media	✓

- This product does not support 8-bit parallel data transfer but it supports 4-bit parallel data transfer the same as with "Memory Stick PRO Duo" media.
- 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" V series battery packs. "InfoLITHIUM" V series battery packs have the InfoLITHIUM V SERIES 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 an AC Adaptor/charger (sold separately).
- The "InfoLITHIUM" battery pack calculates the power consumption according to the operating conditions of your camcorder, and displays the remaining battery time in minutes.
- The battery pack NP-FV70 is compatible with "ActiFORCE."
  "ActiFORCE" is a new generation power system. Battery capacity, boost charge, and the speed and accuracy of battery time remaining calculations have been improved when compared with current "InfoLITHIUM" P-series battery.

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 CHG (charge) lamp 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 on your camcorder right before you start taking shots.
  – Use a large capacity battery pack: NP-FV100 (sold separately).
- Frequent use of the LCD screen or a frequent playback, fast forward or reverse operation wears out the battery pack faster. We recommend using a large capacity battery pack: NP-FV100 (sold separately).
- Be sure to close the LCD screen when not recording or playing back on your camcorder. 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 time indicator

- 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.
- The ⌂ mark that indicates low battery flashes even if there are still 20 minutes of battery time remaining, depending on the operating conditions or ambient temperature.

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.

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 x.v.Color

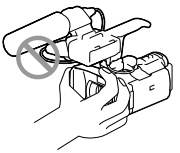
- x.v.Color is a more familiar term for the xvYCC standard proposed by Sony, and is a trademark of Sony.
- xvYCC is an international standard for color space in video. This standard can express a wider color range than the currently used broadcast standard.

About handling of your camcorder

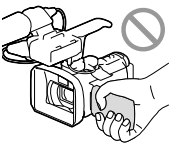
On use and care

- The camcorder is not dustproofed, dripproofed or waterproofed.
- Do not hold the camcorder by the following parts, and also do not hold the camcorder by the jack covers.

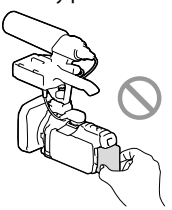
Lens hood



LCD Screen

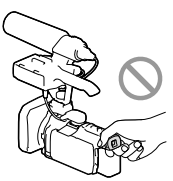


Battery pack

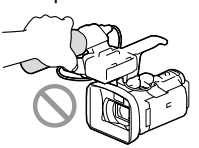


Built-in USB Cable

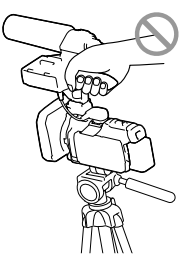
Viewfinder



Microphone



XLR Adaptor when a tripod is attached to the camcorder



- Do not aim at the sun. Doing so might cause your camcorder to malfunction. Take images of the sun only in low light conditions, such as at dusk.
- Use the camcorder in accordance with local regulations.
- Do not use or store the camcorder and accessories in the following locations:
  - Anywhere extremely hot, cold or humid. 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 tuner devices such as TVs or radio. Noise may occur.
  - On a sandy beach or anywhere dusty. If sand or dust gets in your camcorder, it 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.
- Operate your camcorder on DC 6.8 V/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.
- Keep the LCD screen and the viewfinder closed 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 cord.
- Do not damage the power cord (mains lead) such as by placing anything heavy on it.
- Do not use a deformed or damaged battery pack.
- Keep metal contacts clean.
- 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

- To keep your camcorder in optimum state for a long time, turn it on and let it run by recording and playing back images about once a month.
- Use up the battery pack completely before storing it.

Note on the camcorder/battery pack temperature

- When the temperature of the camcorder or battery pack becomes extremely high or extremely low, you may not be able to record or play back on the camcorder, due to the protection features of the camcorder being activated in such situations. In this case, an indicator appears on the LCD screen or the viewfinder (p. 94).

Notes on charging through the USB cable

- Operation with all computers is not assured.

- If you connect the camcorder to a laptop computer that is not connected to a power source, the battery of the laptop computer will continue to use up its charge. Do not leave the camcorder connected to a computer in this manner.
- Charging with a personally assembled computer, with a converted computer, or through a USB hub are not guaranteed.
  The camcorder may not function correctly depending on the USB device which is used with the computer.

Moisture condensation

If your camcorder is brought directly from a cold place to a warm place, moisture may condense inside your camcorder. This may cause a malfunction to 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 follows:
  – You bring your camcorder from a ski slope into a place warmed up by a heating device.
  – You bring your camcorder from an air conditioned car or room into a hot place outside.
  – You use your camcorder after a squall or a rain.
  – You use your camcorder in a hot and humid place.
- How to prevent 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 surrounding temperature (after about 1 hour).

When the camcorder is connected to a computer or accessories

- Do not try to format the recording media of the camcorder using a computer. If you do so, your camcorder may not operate correctly.
- 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
- When the camcorder is connected to other devices through a USB connection and the power of the camcorder is turned on, do not close the LCD panel. The image data that has been recorded may be lost.

Notes on optional accessories

- We recommend using genuine Sony accessories.
- Genuine Sony accessories may not be available in some countries/regions.

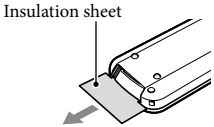
Active Interface Shoe

- The Active Interface Shoe supplies power to accessories such as a video light, a flash, or a microphone (sold separately). The accessory can be turned on or off as you open or close the LCD screen, and the viewfinder of your camcorder. Refer to the operating instructions supplied with your accessory for details.
- The Active Interface Shoe has a safety device for fixing the installed accessory securely. To connect an accessory, press down and push it to the end, and then tighten the screw. To remove an accessory, loosen the screw, and then press down and pull out the accessory.
- When you are recording movies with an external flash (sold separately) connected to the accessory shoe, turn off the power of the external flash to prevent charging noise being recorded.

- You cannot use an external flash (sold separately) and the built-in flash at the same time.
- When an external microphone (sold separately) is connected, it takes precedence over the built-in microphone.

On Wireless Remote Commander

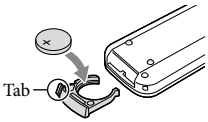
- Remove the insulation sheet before using the Wireless Remote Commander.



- Point the Wireless Remote Commander towards the remote sensor to operate your camcorder (p. 7).
- When no commands have been sent from the Wireless Remote Commander within a certain period, the light blue frame disappears. When you press any of ◀/▶/▲/▼, or ENTER again, the frame appears at the position where it was displayed last.
- You cannot select some buttons on the LCD screen, or the viewfinder using ◀/▶/▲/▼.

To change the battery of the Wireless Remote Commander

① While pressing on the tab, inset your fingernail into the slit to pull out the battery case.
② Place a new battery with the + side facing up.
③ Insert the battery case back into the Wireless Remote Commander until it clicks.



WARNING
Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

- When the lithium battery becomes weak, the operating distance of the Wireless Remote Commander may shorten, or the Wireless Remote Commander may not function properly. In this case, replace the battery with a Sony CR2025 lithium battery. Use of another battery may present a risk of fire or explosion.

LCD screen

- Do not apply excessive pressure on the LCD screen, as it may cause uneven color and other 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.

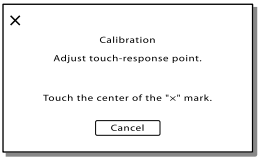
To clean the LCD screen

- The surface of the LCD screen is coated. If you scratch the surface, the coating may be come off. Mind the following points when cleaning and handling it.
  – Use a soft cloth (a cloth for glasses, etc.) gently to clean the dirt.
  – Remove the dust or sand with a blower, etc. before wiping the dirt.
  – The coating may be scratched if you wipe the screen with a tissue, etc.
  – If hand grease or hand cream remains on the screen, the coating comes off more easily. Wipe it early.

On adjustment of the touch panel ([Calibration])

The buttons on the touch panel may not work correctly. If this happens, follow the procedure below. It is recommended that you connect your camcorder to the wall outlet (wall socket) using the supplied AC Adaptor during the operation.

① Touch MENU → [Setup] → [General Settings] → [Calibration].



② Touch "×" displayed on the screen with the corner of memory card or the like 3 times. Touch [Cancel] to cancel calibration.

Notes

- If you did not press the right spot, try the calibration again.
- Do not use a sharp-pointed object for calibration. Doing so may damage the LCD screen.
- You cannot calibrate the LCD screen if it is rotated, or closed with the screen facing out.

On handling the 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 avoid damage to the finish:
  – Using chemicals such as thinner, benzine, alcohol, chemical cloths, repellent, insecticide and sunscreen
  – Handling the camcorder with above substances on your hands
  – Leaving the casing in contact with rubber or vinyl objects for a long period of time

On handing the LCD screen and the light-emitting part of flash

If fingerprints or dust make dirty, it is recommended that you use a soft cloth to clean it.

About the Carl Zeiss lens

Your camcorder is equipped with a Carl Zeiss lens, which was developed jointly by Carl Zeiss, in Germany, and Sony Corporation, and produces superior images. It adopts the MTF measurement system for video cameras and offers a quality typical of a Carl Zeiss lens. Also, the lens for your camcorder is T∗-coated to suppress unwanted reflections and faithfully reproduce colors.
MTF= Modulation Transfer Function. The number value indicates the amount of light from a subject coming into the lens.

About 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.

To clean the projector lens

- Wipe the lens gently with a soft cloth such as a cleaning cloth or glass cleaning cloth.
- Stubborn stains may be removed with a soft cloth such as a cleaning cloth or glass cleaning cloth lightly dampened with water.
- Never use a solvent such as alcohol, benzene or thinner; acid, alkaline or abrasive detergent; or a chemical cleaning cloth, as they will damage the lens surface.

On 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 LCD screen is closed. 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. 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.

How to charge the pre-installed rechargeable battery

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

Note on disposal/transfer of the camcorder

Even if you delete all movies and still images, or perform [Format] (p. 78), data on the internal memory may not be completely erased. When you transfer the camcorder, it is recommended that you select MENU → [Rec/Media SET] → [Format] → [Empty] 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.

Specifications

System

Signal format: NTSC color, EIA standards
HDTV 1080/60i, 1080/60p, 720/60p specification

Movie recording format:
HD: MPEG-4 AVC/H.264 AVCHD format Ver.2.0 compatible
STD: MPEG2-PS

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

Photo file format:
DCF Ver.2.0 Compatible
Exif Ver.2.3 Compatible
MPF Baseline Compatible

Recording media (Movie/Photo):
Internal memory: 96 GB
"Memory Stick PRO Duo" media
SD card (Class 4 or faster)
The capacity that a user can use
Approx. 95.6 GB

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

Viewfinder:
Electronic viewfinder (color)
Picture: 0.5 cm (0.2 type, aspect ratio 4:3)
Total dot number: 201 600 dots equivalent

Image device:
6.3 mm (1/2.88 type) CMOS Sensor
Recording pixels (photo, 16:9):
Max. 24.1 mega (6 544 × 3 680) pixels*1
Gross: Approx. 6 650 000 pixels
Effective (movie, 16:9)*2:
Approx. 6 140 000 pixels
Effective (photo, 16:9):
Approx. 6 140 000 pixels
Effective (photo, 4:3):
Approx. 4 600 000 pixels

Lens:
Carl Zeiss Vario-Sonnar T*
10 × (Optical)*2, 17 × (Extended, while recording movies)*3, 120 × (Digital)
Filter diameter: 52 mm (2 1/8 in.)
37 mm (1 1/2 in.) (When attaching the Step Down Ring)
F1.8 - F3.4
Focal length:
f= 3.8 mm - 38.0 mm (5/32 in. ~ 1 1/2 in.)
When converted to a 35 mm still camera
For movies*2: 26.0 mm - 260 mm (1 1/16 in. ~ 10 1/4 in.) (16:9)
For photos: 26.0 mm - 260 mm (1 1/16 in. ~ 10 1/4 in.) (16:9)

Color temperature: [Auto], [One Push], [Indoor] (3 200 K), [Outdoor] (5 800 K)

Minimum illumination:
6 lx (lux) (in default setting, shutter speed 1/60 second)
3 lx (lux) ([Low Lux] is set to [On], shutter speed 1/30 second)
0 lx (lux) (NIGHTSHOT is set to [On])

*1 The unique pixel array of Sony's ClearVid and the image processing system allow still image resolution equivalent to the sizes described.
*2 [SteadyShot] is set to [Standard] or [Off].
*3 [SteadyShot] is set to [Active].

Input/Output connectors

A/V Remote Connector: Video and audio output jack

HDMI OUT jack: HDMI mini connector

USB jack: mini-AB/Type A (Built-in USB) (output only)

Headphone jack: Stereo minijack (ϕ 3.5 mm)

MIC input jack: Stereo minijack (ϕ 3.5 mm)

INPUT1/INPUT2 jack: XLR3-pin, female
MIC: -60 dBu /-50 dBu /-40 dBu, 3 kΩ (kilohms)
LINE: +4 dBu, 10 kΩ (kilohms)
(0 dBu=0.775 Vrms)

LCD screen

Picture: 7.5 cm (3.0 type, aspect ratio 16:9)

Total number of pixels:
921 600 (1 920 × 480)

Projector

Projection type: DLP

Light source: LED (R/G/B)

Focus: Manual

Throw Distance: 0.5 m (1.6 feet) or over

Contrast ratio: 1500:1

Resolution (output): nHD (640 × 360)

Continuous projection time (when using the supplied battery pack):
Approx. 3 h 25 min.

General

Power requirements: DC 6.8 V/7.2 V (battery pack) DC 8.4 V (AC Adaptor)

USB Charging: DC 5 V 500 mA/1.5 A

Average power consumption:
During camera recording using the microphone (ECM-XM1), the viewfinder at normal brightness:
HD: 3.9 W STD: 3.7 W
During camera recording using the microphone (ECM-XM1), the LCD screen at normal brightness:
HD: 4.1 W STD: 3.8 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)

Dimensions (approx.):
71.5 mm × 94.5 mm × 137.5 mm (2 7/8 in. × 3 3/4 in. × 5 1/2 in.) (w/h/d) including the projecting parts
135.5 mm × 181.5 mm × 310.5 mm (5 3/8 in. × 7 1/4 in. × 12 1/4 in.) (w/h/d) including the projecting parts, the supplied lens hood, battery (NP-FV70), XLR Adaptor, and the microphone (ECM-XM1)

Mass (approx.)
615 g (1 lb 5 oz) main unit only
1 100 g (2 lb 6 oz) including the supplied lens hood, battery (NP-FV70), XLR Adaptor, and the microphone (ECM-XM1)

AC Adaptor AC-L200C/AC-L200D

Power requirements: AC 100 V - 240 V, 50 Hz/60 Hz

Current consumption: 0.35 A - 0.18 A

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.

Rechargeable battery pack NP-FV70

Maximum output voltage: DC 8.4 V

Output voltage: DC 6.8 V

Maximum charge voltage: DC 8.4 V

Maximum charge current: 3.0 A

Capacity
Typical: 14.0 Wh (2 060 mAh)
Minimum: 13.0 Wh (1 960 mAh)

Type: Li-ion

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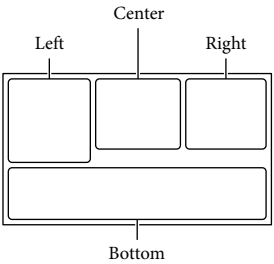
Screen indicators

The following indicators appear when you change the settings. See pages 26 and 31 also for the indicators that appear during recording or playing.



Left

Indicator	Meaning
MENU	MENU button (58)
	Self-timer recording (70)
	GPS triangulating status (44)
	Video light
4:3	Wide Mode (77)
	Fader (70)
OFF	[Face Detection] set to [Off] (72)
OFF	[Smile Shutter] set to [Off] (73)
	Manual focus (67)
	Scene Selection (69)
	White Balance (66)
OFF	SteadyShot off (36, 71)
FIXED	FIXED SHOT(36)
WS	White Balance Shift (69)
T	Tele Macro (70)
(COLOR)	x.v.Color (77)
	Conversion Lens (71)
70 100	Zebra (76)
PEAK W PEAK R PEAK W	Peaking (76)
CINEMA	Cinematone
	Intelligent Auto (face detection/scene detection/ camera-shake detection/ sound detection) (35)

Center

Indicator	Meaning
	Slideshow Set
	NightShot (37)
	Warning (94)
	Playback mode (31)

Right

Indicator	Meaning
HD 1080/60i FX	HD / STD Setting (77) HD Rec Format (38)
60min	Remaining battery
00:00:00.00	Time code (hour:minute: second.frame)/user bit (79)
	Recording/playback/ editing media (23)
00Min	Estimated recording remaining time
16:9 L 24.1M	Photo size (38)
9999 9999	Approximate number of recordable photos and photo size
101	Playback folder
100/112	Current playing movie or photo/Number of total recorded movies or photos
	Connection to the external media device (54)

Bottom

Indicator	Meaning
HD ♪LPCM	HD Audio Format (74)
AUTO	Intelligent Auto (35)
	[Micref Level] low (74)
	[Int. Mic. Wind NR] (74)
	Low Lux (69)
AGC	AGC Limit (68)
	Spot Meter/Fcs (66)/Spot Meter (67)/ Exposure (67)
EV	AE Shift (68)
10000	Shutter Speed (40, 68)
F1.8	IRIS (39, 68)
101-0005	Data file name
	Protect (80)
	Flash (73)/Red Eye Reduction (74)

- Indicators and their positions are approximate and may differ from what you actually see.
- Some indicators may not appear, depending on your camcorder model.

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