Panasonic®

Operating Instructions Vol.2
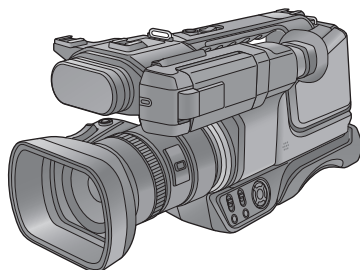
Memory Card Camera-Recorder

Model No. **AG-AC8P**

Register now!!
This product is eligible for the AVCCAM 3 Year Warranty Repair Program.
For details, see operating instructions Vol. 1.

http://panasonic.biz/sav/pass_e/

Vol.2

This document explains in detail how to operate this device. Concerning basic operation, please refer to the enclosed "Operating Instructions Vol.1" (printed document).

Please read these instructions carefully before using this product, and save this manual for future use.

AVCHD™ Progressive   HDMI   SDXC   DOLBY DIGITAL

AVCCAM

ENGLISH

Read this first

■ About the recording format for recording motion pictures

You can record motion pictures with AVCHD recording formats using this unit. (➔ 27, 59)
● AVCHD Progressive (1080/60p) supported.
AVCHD Progressive:
It is possible to record video with highest quality (1080/60p) possible with this unit.

■ Indemnity about recorded content

Panasonic does not accept any responsibility for damages directly or indirectly due to any type of problems that result in loss of recording or edited content, and does not guarantee any content if recording or editing does not work properly. Likewise, the above also applies in a case where any type of repair is made to the unit.

■ About security

Be careful about the possibility of theft or loss of the unit, and be careful not to leave the unit unattended. Please note that Panasonic does not accept any responsibility for the compromise, manipulation, and loss of information caused by these events.

■ About Condensation (When the lens, the viewfinder or LCD Monitor is fogged up)

Condensation occurs when there is a change in temperature or humidity, such as when the unit is taken from outside or a cold room to a warm room. Please be careful, as it may cause the lens, the viewfinder or LCD monitor to become soiled, moldy, or damaged.
When taking the unit to a place which has a different temperature, if the unit is accustomed to the room temperature of the destination for about one hour, condensation can be prevented. (When the difference in temperature is severe, place the unit in a plastic bag or the like, remove air from the bag, and seal the bag.)
When condensation has occurred, remove the battery and/or the AC adapter and leave the unit like that for about one hour. When the unit becomes accustomed to the surrounding temperature, fogginess will disappear naturally.

■ Caution regarding laser beams

The lens may suffer damage if struck by a laser beam. Make sure that laser beams do not strike the lens when shooting in an environment where laser devices are used.

■ Cards that you can use with this unit

SD Memory Card, SDHC Memory Card and SDXC Memory Card

- 4 GB or more Memory Cards that do not have the SDHC logo or 48 GB or more Memory Cards that do not have the SDXC logo are not based on SD Memory Card Specifications.
- Refer to page 16 for more details on SD cards.

■ For the purposes of these operating instructions

- SD Memory Card, SDHC Memory Card and SDXC Memory Card are referred to as the "SD card".
- Function that can be used for Motion Picture Recording Mode: 🎥

  Function that can be used for Still Picture Recording Mode: 📷

- Function that can be used for the Playback Mode: ▶

  Function that can be used for the Playback Mode (motion pictures only): 🎥▶

  Function that can be used for the Playback Mode (still pictures only): 📷▶

- Scene(s) recorded in 1080/60p or 1080/60i: "AVCHD scene(s)"
- Pages for reference are indicated by an arrow, for example: → 00
- The correct value for 60p/60i is 59.94p/59.94i.

Contents

Preparation

Basic

Advanced (Recording)

Advanced (Playback)

Copy/Dubbing

With a PC

Menu

Others

Names and Functions of Main Parts

1 **Shoulder strap fixture**
2 **Handle**
3 **Sub zoom lever [W/T] (→ 35, 99)**
● This lever functions in the same manner as the zoom lever.
4 **Sub recording start/stop button (→ 24, 99)**
● This button functions in the same manner as the recording start/stop button.
5 **Microphone cable holder**
6 **Accessory shoe**
7 **External microphone terminal [EXT MIC] (→ 11)**
● A compatible plug-in powered microphone can be used as an external microphone.
● When the unit is connected with the AC adaptor, sometimes noise may be heard depending on the microphone type. In this case, please switch to the battery for the power supply and the noise will stop.
8 **Photoshot button [◻] (→ 28)**

9 **Zoom lever [W/T] (In Recording Mode) (→ 35)**
   Volume lever [+VOL−]/Thumbnail display switch [🔍 / ▦] (In Playback Mode) (→ 33, 34)
10 **Grip belt (→ 10)**
11 **Status indicator (→ 18)**
12 **Power switch (→ 18)**
13 **Recording start/stop button (→ 13)**
14 **Charging lamp [CHG] (→ 13)**
15 **DC input terminal [DC IN] (→ 13)**
● Do not use any other AC adaptors except the supplied one.
16 **Headphone terminal [🎧] (→ 53)**
17 **USB terminal [HOST]/[USB 2.0] (→ 75)**
18 **USB terminal [DEVICE]/[USB 2.0] (→ 87)**
19 **HDMI terminal [HDMI] (→ 72)**
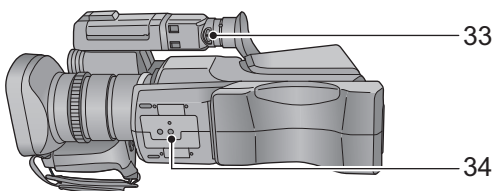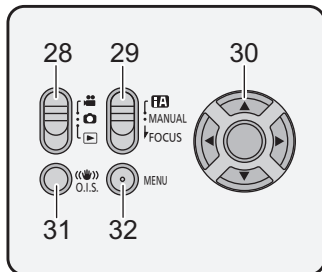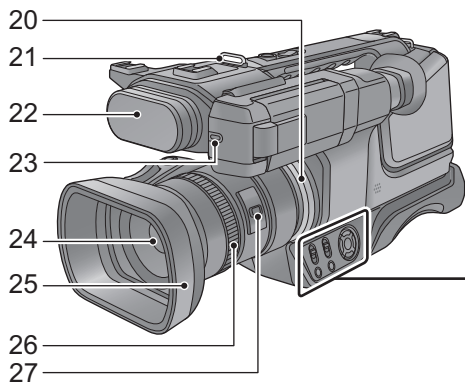
20 **Ring LED** (→ 102)
21 **Shoulder strap fixture**
22 **Internal microphones**
23 **Recording lamp** (→ 102)
24 **Lens** (→ 10)
25 **Lens hood**
26 **Multi manual ring** (→ 38, 42)
27 **Camera function button
   [CAMERA FUNCTION]** (→ 38)
28 **Mode switch** (→ 18)
29 **Intelligent auto/Manual/Manual focus
   switch [iA/MANUAL/FOCUS]** (→ 30)
30 **Cursor button**
31 **Optical Image Stabilizer button
   [(((\u2693))) O.I.S.]** (→ 37)
32 **Menu button [MENU]** (→ 23)
33 **Eyepiece corrector lever** (→ 21)
34 **Tripod receptacle**
● Attaching a tripod with a screw length of
  5.5 mm (0.22 ″) or more may damage the
  unit.
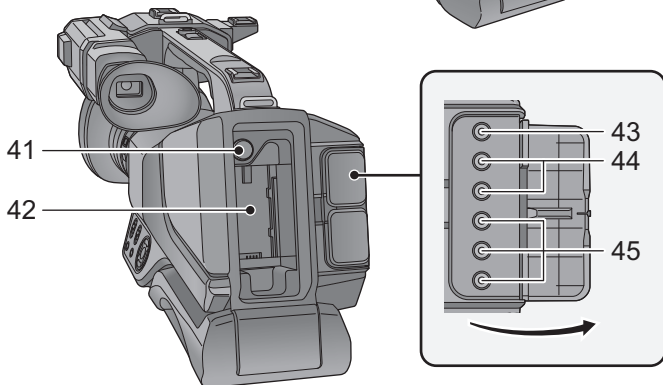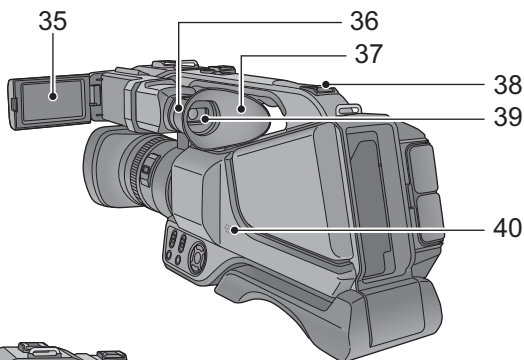
35 LCD monitor (Touch screen) (→ 19)
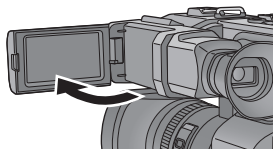
● It can open up to 90°.
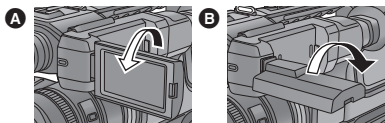
● It can rotate up to 180° Ⓐ towards the lens or 90° Ⓑ towards the opposite direction.

36 Eye cup attachment part (→ 10)
37 Eye cup (→ 10)
38 Accessory shoe

39 Viewfinder (→ 21)

● Extend the viewfinder before use.
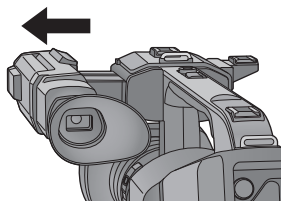
40 Speaker
41 Battery release button [PUSH] (→ 12)
42 Battery holder (→ 12)
43 Video output terminal [VIDEO OUT] (→ 72)
44 Audio output terminal [AUDIO OUT] (→ 72)
45 Component terminal [Y]/[PB/CB]/[PR/CR] (→ 72)
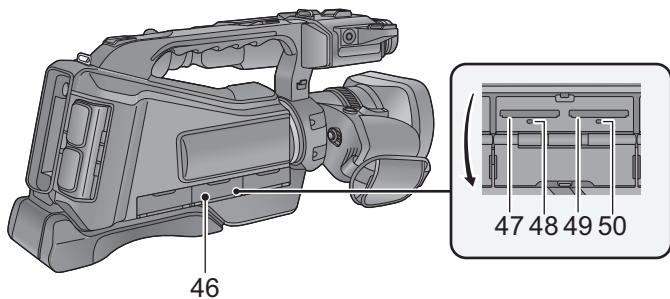
46

46 **SD card cover** (➜ 17)
47 **Card slot 2 (left)** (➜ 17)
48 **Access lamp (card 2)** (➜ 17)
49 **Card slot 1 (right)** (➜ 17)
50 **Access lamp (card 1)** (➜ 17)

■ **Adjust the length of the grip belt so that it fits your hand.**
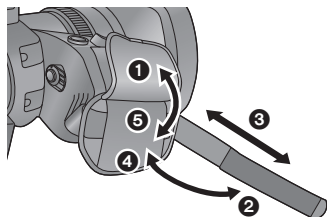
❶, ❷ Flip the belt cover and the belt.
❸ Adjust the length.
❹, ❺ Replace the belt.

■ **Attaching the eye cup**

Attach by aligning the notch of the eye cup attachment part with the protrusion at the inside of the eye cup.
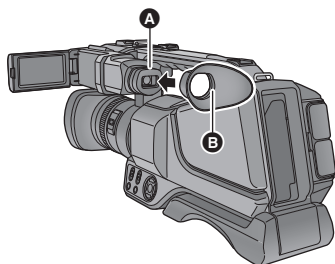
Ⓐ Notch
Ⓑ Protrusion

■ **Attaching the lens cap**

Protect the lens surface with the lens cap while the unit is not used.
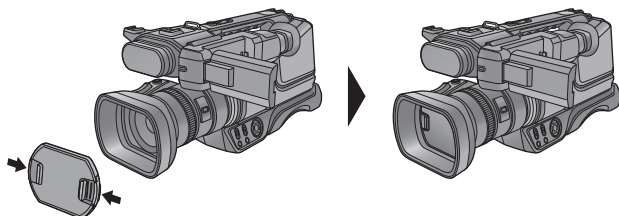
Attach or remove it by pinching on it.

∎ About the external stereo microphone

External stereo microphone
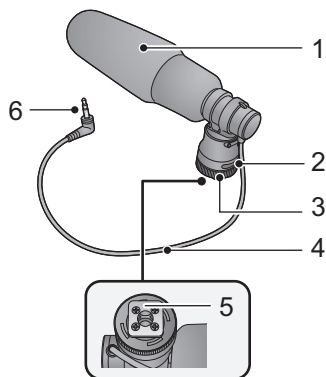
1 **Microphone condenser**
2 **Cable Holder**
3 **Lock ring**
4 **Mini plug and Cable**
5 **Shoe**
6 **Plug section**

Attaching the external stereo microphone to the unit

1 Attach the microphone to the accessory shoe.
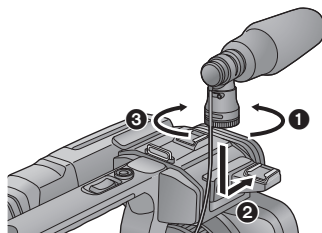
❶ Loosen the lock ring.
❷ Attach the microphone.
❸ Firmly tighten the lock ring.
● Do not apply excessive force on the lock ring.
● Make sure that the microphone is securely attached.

2 Connect the plug to the external microphone terminal.
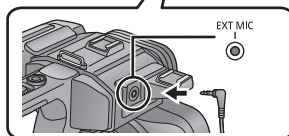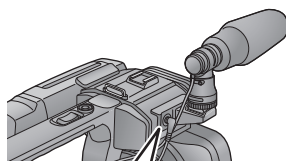
● Check that the unit is turned off. Connecting or removing the microphone while the unit is turned on may cause malfunction.
● You can fasten the excess cable by tucking it into the cable holder.
● When removing the microphone, disconnect the plug, and then remove the microphone in reverse order of attaching.
● Hold the lock ring when mounting or removing the microphone.

Power supply

■ About batteries that you can use with this unit

The battery that can be used with this unit is VW-VBD29/CGA-D54.

It has been found that counterfeit battery packs which look very similar to the genuine product are made available to purchase in some markets. Some of these battery packs are not adequately protected with internal protection to meet the requirements of appropriate safety standards. There is a possibility that these battery packs may lead to fire or explosion. Please be advised that we are not liable for any accident or failure occurring as a result of use of a counterfeit battery pack. To ensure that safe products are used we would recommend that a genuine Panasonic battery pack is used.

Inserting/removing the battery

● Set the power switch to OFF to turn off the unit. (→ 18)

Install the battery by inserting it in the direction shown in the figure.
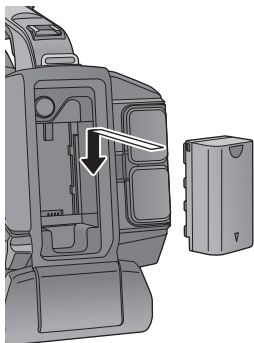
Insert the battery until it clicks and locks.

Removing the battery

Be sure to set the power switch to OFF and the status indicator goes off. Then remove the battery while supporting the unit to prevent it from dropping.

While pressing the battery release button, remove the battery.

PUSH
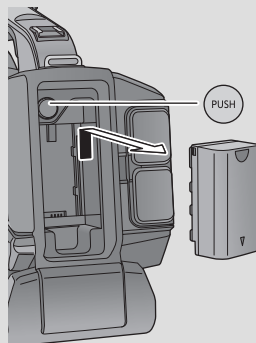
Charging the battery

When this unit is purchased, the battery is not charged. Charge the battery fully before using this unit for the first time.

The unit is in the standby condition when the AC adaptor is connected. The primary circuit is always "live" as long as the AC adaptor is connected to an electrical outlet.

Important:
- **Use the supplied AC adaptor. Do not use the AC adaptor of another device.**
- **Do not use the AC cable with any other equipment as it is designed only for this unit. Also, do not use the AC cable from other equipment with this unit.**
- **The battery can be charged if the unit is turned on.**
- **It is recommended to charge the battery in a temperature between 10 °C and 30 °C (50 °F and 86 °F). (The battery temperature should also be the same.)**
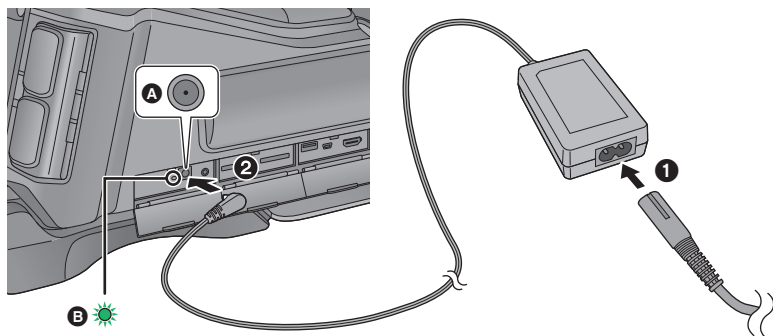
Ⓐ DC input terminal
Ⓑ Charging lamp

1 **Connect the AC cable to the AC adaptor, then the AC outlet.**

2 **Connect the AC adaptor to the DC input terminal.**

- As the charging lamp lights up green, charging starts. It will turn off when the charging is completed.
- When the charging lamp is flashing at approximately 4 second intervals (off for approx. 2 seconds, on for approx. 2 seconds), the battery is over discharged or the temperature of the battery is too high or low. It can be charged, but it may take a few hours to complete the charging normally. When the charging lamp is flashing at approximately 0.5 second intervals (off for approx. 0.25 seconds, on for approx. 0.25 seconds), the battery is not charged. Please refer to page 119.

■ Connecting to the AC outlet

It is possible to use this unit with power supplied from the AC outlet by turning on the unit with the AC adaptor connected.

When recording for a long time, keep the AC adaptor connected and use it together with the battery. This allows you to continue the recording even if a power failure occurs or the AC adaptor is unplugged from the AC outlet by accident.

- We recommend using Panasonic batteries (→ 14).

● If you use other batteries, we cannot guarantee the quality of this product.
● Do not heat or expose to flame.
● Do not leave the battery(ies) in a car exposed to direct sunlight for a long period of time with doors and windows closed.

Charging and recording time

■ Charging/Recording time

● Temperature: 25 °C (77 °F)/humidity: 60%RH
● When using the viewfinder (times in parentheses are when using the LCD monitor)
● These charging times are for when the unit is turned off.

Battery model number [Voltage/Capacity (minimum)]	Charging time	Recording format	Maximum continuous recordable time	Actual recordable time
Supplied battery/ [7.2 V/2900 mAh]	4 h	[PS 1080/60p]	5 h 5 min (4 h 50 min)	3 h 5 min (3 h)
		[PH 1080/60i]	5 h 20 min (5 h 5 min)	3 h 15 min (3 h 5 min)
		[HA 1080/60i]/ [HG 1080/60i]	5 h 20 min (5 h 5 min)	3 h 20 min (3 h 10 min)
		[HE 1080/60i]	5 h 30 min (5 h 15 min)	3 h 25 min (3 h 15 min)
		[PM 720/60p]	5 h 25 min (5 h 5 min)	3 h 20 min (3 h 10 min)
		[SA 480/60i]	5 h 40 min (5 h 20 min)	3 h 30 min (3 h 20 min)
CGA-D54 (optional) [7.2 V/5400 mAh]	7 h	[PS 1080/60p]	9 h 55 min (9 h 30 min)	6 h 10 min (5 h 50 min)
		[PH 1080/60i]	10 h 25 min (9 h 55 min)	6 h 30 min (6 h 10 min)
		[HA 1080/60i]	10 h 30 min (10 h)	6 h 30 min (6 h 10 min)
		[HG 1080/60i]	10 h 35 min (10 h)	6 h 30 min (6 h 10 min)
		[HE 1080/60i]	10 h 50 min (10 h 20 min)	6 h 45 min (6 h 20 min)
		[PM 720/60p]	10 h 35 min (10 h 5 min)	6 h 35 min (6 h 15 min)
		[SA 480/60i]	11 h 10 min (10 h 35 min)	6 h 55 min (6 h 30 min)

● "h" is an abbreviation for hour, "min" for minute.
● These times are approximations.
● **The indicated charging time is for when the battery has been discharged completely. Charging time and recordable time vary depending on the usage conditions such as high/ low temperature.**
● If the unit is turned on, charging will take twice to three times longer than the table above.

- The actual recordable time refers to the recordable time when repeatedly starting/stopping recording, turning the unit on/off, moving the zoom lever etc.
- The batteries heat up after use or charging. This is not a malfunction.

Battery capacity indication

- The display changes as the battery capacity reduces. (▭▭▭▭) → (▭▭▭) → (▭▭) → (▭) → (▭)
  If the battery discharges, then (▭) will flashes red.
- If the unit is charged while it is turned on, (▭) will be displayed on the screen. (▭) will disappear after charging is complete.
- As long as the charging lamp is flashing, charging is not complete even after (▭) has disappeared. For more details, please refer to page 119.

Recording to a card

The unit can record still pictures or motion pictures to an SD card. To record to an SD card, read the following.

Cards that you can use with this unit

Use SD cards conforming to Class 4 or higher of the SD Speed Class Rating* for motion picture recording.

Card type	Capacity
SD Memory Card	512 MB/1 GB/2 GB
SDHC Memory Card	4 GB/6 GB/8 GB/12 GB/16 GB/24 GB/32 GB
SDXC Memory Card	48 GB/64 GB

* SD Speed Class Rating is the speed standard regarding continuous writing. Check via the label on the card, etc.

e.g.:

CLASS④

- **When using an SDHC Memory Card/SDXC Memory Card with other equipment, check the equipment is compatible with these Memory Cards.**
- An Eye-Fi X2 series SD card is required to use functions related to Eye-Fi. (→ 82)
- We do not guarantee the operation of SD cards other than the ones above. Further, SD cards with a capacity of less than 32 MB cannot be used for motion picture recording.
- 4 GB or more Memory Cards that do not have the SDHC logo or 48 GB or more Memory Cards that do not have the SDXC logo are not based on SD Memory Card Specifications.
- When the write-protect switch Ⓐ on SD card is locked, no recording, deletion or editing will be possible on the card.
- Keep the Memory Card out of reach of children to prevent swallowing.

Ⓐ
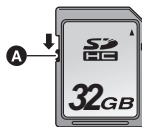
Inserting/removing an SD card

When using an SD card not from Panasonic, or one previously used on other equipment, for the first time on this unit, format the SD card. (→ 25) When the SD card is formatted, all of the recorded data is deleted. Once the data is deleted, it cannot be restored.

Caution:
Check that the access lamp has gone off.
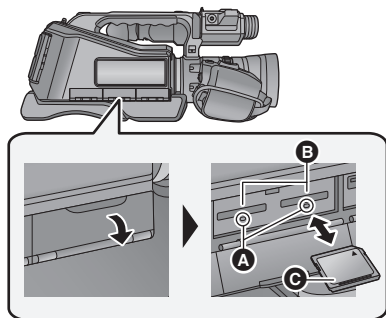
Access lamp Ⓐ
● When this unit is accessing the SD card, the access lamp lights up.

1 Open the SD card cover and insert (remove) the SD card into (from) the card slot Ⓑ.
● One SD card can be inserted into each of the card slot 1 and the card slot 2.
● Face the label side Ⓒ in the direction shown in the illustration and press it straight in as far as it will go.
● Press the center of the SD card and then pull it straight out.

2 Securely close the SD card cover.
● Securely close it until it clicks.

● Do not touch the terminals on the back of the SD card.
● Do not apply strong shocks, bend, or drop the SD card.
● Electrical noise, static electricity or the failure of this unit or the SD card may damage or erase the data stored on the SD card.
● When the card access lamp is lit, do not:
  − Remove the SD card
  − Turn the unit off
  − Insert and remove the USB cable
  − Expose the unit to vibrations or shock
  Performing the above while the lamp is on may result in damage to data/SD card or this unit.
● Do not expose the terminals of the SD card to water, dirt or dust.

● Do not place SD cards in the following areas:
  − In direct sunlight
  − In very dusty or humid areas
  − Near a heater
  − Locations susceptible to significant difference in temperature (condensation can occur.)
  − Where static electricity or electromagnetic waves occur
● To protect SD cards, return them to their cases when you are not using them.
● About disposing of or giving away the SD card. (→ 120)

Turning the unit on/off

Set the power switch to ON while pressing the lock release button Ⓑ to turn on the unit.

Ⓐ

Ⓑ

ON
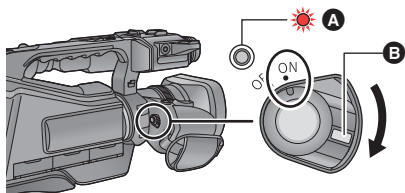
To turn off the unit
Set the power switch to OFF while pressing the lock release button. The status indicator goes off.

Ⓐ The status indicator lights on.

● To turn on the unit again after the [ECONOMY (BATT)] or [ECONOMY (AC)] is activated, set the power switch to OFF once, and then to ON again. (→ 103)

Selecting a mode

Operate the mode switch to change the mode to , or .
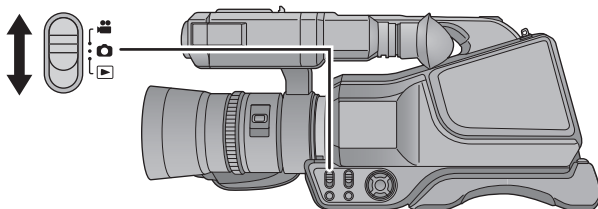
	Motion Picture Recording Mode (→ 27)
	Still Picture Recording Mode (→ 28)
	Playback Mode (→ 32, 67)

Using the LCD monitor/Viewfinder

The viewfinder is turned off and the LCD monitor is turned on when the LCD monitor is opened.
The viewfinder is turned on when the LCD monitor is closed.

How to use the touch screen

You can operate by directly touching the LCD monitor (touch screen) with your finger.
● The unit supports both operations using the cursor buttons and operations using the touch screen. Select the optimal method according to the situation.
● In this operating instructions, the majority of functions are described on the basis of operations using the cursor buttons.

■ Touch

Touch and release the touch screen to select icon or picture.
● Touch the center of the icon.
● Touching the touch screen will not operate while you are touching another part of the touch screen.

■ Slide while touching

Move your finger while pressing on the touch screen.
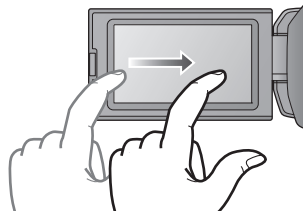
■ About the operation icons

● To operate the following icons using the cursor buttons, select the desired icon using the cursor buttons and then press the button in the center. (Excluding some functions)

▲ / ▼ / ◀ / ▶ :
These icons are used to switch the menu and thumbnail display page, for item selection and setting etc.

↶ :
This icon is used to return to the previous screen such as when setting menus.
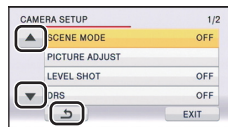
● Do not touch on the LCD monitor with hard pointed tips, such as ball point pens.

LCD monitor adjustment

● These settings will not affect the images actually recorded.

[POWER LCD]

This makes it easier to view the LCD monitor in bright places including outdoors.
Select the menu. (→ 23)

> ◉ MENU **: [SW & DISP SETUP] → [POWER LCD] → desired setting**

[+2]* (Makes even brighter)/ [+1]* (Makes brighter)/ [0]* (Normal)/ [-1]* (Makes less bright)/
[A]* *(Automatic adjustment)

* It is not displayed in the Manual Mode or in the Playback Mode.

● When the AC adaptor is in use, the LCD monitor is set to [+1]* automatically.
● Recordable time with the battery is shortened when the LCD is made brighter.

[LCD SET]

It adjusts brightness and color density on the LCD monitor.
1   Select the menu. (→ 23)

> ◉ MENU **: [SW & DISP SETUP] → [LCD SET]**

2   Select the desired setting items and press the button in the center.

| [BRIGHTNESS]: | Brightness of the LCD monitor |
| [COLOR]: | Color level of the LCD monitor |

3   Adjust settings using the cursor button right or left.

4   Select [ENTER] and press the button in the center.
● Select [EXIT], then press the button in the center or press the MENU button to complete the setting.

Viewfinder adjustment

● These settings will not affect the images actually recorded.

Adjusting the field of view

It adjusts the field of view to show the image on the viewfinder clearly.

1 Adjust the viewfinder to suit your vision so that you can see the display images clearly.
● Be careful not to trap your fingers when moving the viewfinder.
● The viewfinder can be lifted vertically up to approximately 90°.
● Close the LCD monitor and turn on the viewfinder.

2 Adjust the focus by operating the eyepiece corrector lever.
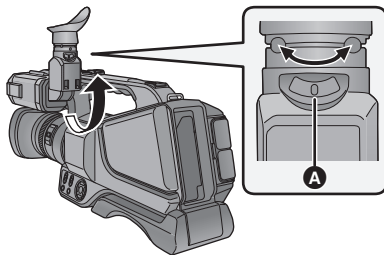
🅐 Eyepiece corrector lever

[EVF SET]

Brightness of the viewfinder can be switched.
Select the menu. (→ 23)

⊙ MENU **: [SW & DISP SETUP] → [EVF SET] → desired setting**

[BRIGHT]/[NORMAL]/[DARK]

Recording yourself

● Change the mode to 🎥 .
Rotate the LCD monitor towards the lens side.
● Displaying during the recording yourself can be switched by setting [SELF SHOOT]. (→ 99)
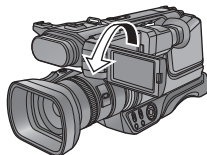
● Only some indications will appear on the screen when the [SELF SHOOT] is set to [MIRROR]. When [!] appears, return the direction of the LCD monitor to normal position and check the warning/alarm indication. (→ 111)

Setting date and time

The clock is not set at the time of purchase. Make sure to set the clock.

1 Select the menu. (→ 23)

⊙ MENU : [OTHER FUNCTION] → [CLOCK SET]

2 Select the date and time to be set using the cursor button right or left, then adjust the desired value using the cursor button up or down.

● The year can be set between 2000 and 2039.

Example: For USA

CLOCK SET

NOV 15 2013 12 : 34

ENTER   EXIT

3 Select [ENTER] using the cursor button right or left, then press the button in the center.

● The screen may switch to the setting screen for the [TIME ZONE]. Using cursor button and set the [TIME ZONE].
● Select [EXIT], then press the button in the center or press the MENU button to complete the setting.

● When the unit is turned on for the first time, a message asking you to set the date and time will appear. Select [YES] and perform Steps 2 to 3 to set the date and time.
● The date and time function is driven by a built-in lithium battery.
● If the time display becomes [- -], the built-in lithium battery needs to be charged. To recharge the built-in lithium battery, connect the AC adaptor or attach the battery to this unit. Leave the unit as it is for approx. 24 hours and the battery will maintain the date and time for approx. 6 months. (The battery is still being recharged even if the unit is off.)
● The way that time is displayed can be changed in the menu settings. (→ 98)
[SW & DISP SETUP] → [DATE/TIME] or [DATE FORMAT]

Time zone

Time difference from the Greenwich Mean Time can be set.

1 Select the menu. (→ 23)

⊙ MENU : [OTHER FUNCTION] → [TIME ZONE]

● If the clock is not set, set the clock to current time first.

2 Select the region to record using the cursor button right or left.

3 Select [ENTER] and press the button in the center.

● Select [EXIT] and press the button in the center to complete the setting.

● When the time zone setting is changed, the date/time setting of the unit also changes automatically.

Using the menu screen

● **You can also perform operations by touch operation. (→ 19)**

1 **Press the MENU button.** ⊙ MENU

2 **Select the desired top menu Ⓐ using the cursor button, then press the cursor button right or press the button in the center.**

Ⓐ

| CAMERA SETUP |
| RECORD SETUP |
| SW & DISP SETUP |
| OTHER FUNCTION |
| EXIT |
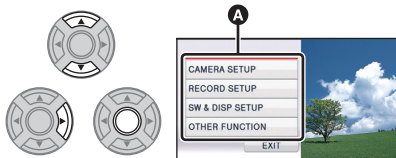
3 **Select the submenu item Ⓑ, then press the cursor button right or press the button in the center.**

Ⓑ

RECORD SETUP	HE
REC FORMAT	PH 1080/60i
2 MEDIA FUNC.	OFF
TIME LAPSE REC	OFF
ASPECT	16:9
EXIT
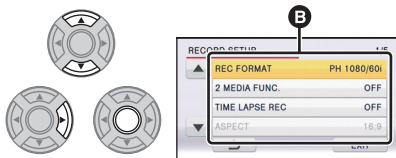
● Next (previous) page can be displayed by using ▲ / ▼ .

4 **Select the desired item, then press the button in the center to enter the setting.**

RECORD SETUP	REC FORMAT	1/5
PS 1080/60p	HE 1080/60i
PH 1080/60i	PM 720/60p
HA 1080/60i	SA 480/60i
HG 1080/60i	
⤺	EXIT
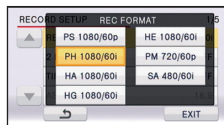
5 **Select [EXIT], then press the button in the center or press the MENU button to exit the menu setting.**

Before recording

■ **Basic camera positioning**

Normal recording

● Place the unit on your right shoulder and hold it firmly with both hands.

Recording from a high position

Low-angle recording

● For easier low-angle recording, the sub recording start/stop button and the sub zoom lever can be used.

- When recording, make sure your footing is stable and there is no danger of colliding with another person or object.
- Hold the eye cup of the viewfinder as close as possible to your right eye.
- Adjust the angle of the LCD monitor according to the position in which the unit is held.
- When you are outdoors, record pictures with the sunlight behind you. If the subject is backlit, it will become dark in the recording.
- Keep your arms near your body and separate your legs for better balance.
- For stable images, it is recommended to use a tripod whenever possible.

Formatting cards

If you use the SD cards for the first time for recording with this unit, format the cards.
Please be aware that if a medium is formatted, then all the data recorded on the medium will be erased and cannot be restored. Back up important data on a PC, DVD disc etc. (➔ 87)

1 Select the menu.

⦿ MENU : [OTHER FUNCTION] → [FORMAT MEDIA]

2 Select [SD CARD 1] or [SD CARD 2] and press the button in the center.

- When formatting is complete, select [EXIT] and press the button in the center to exit the message screen.
- For details on how to format the external drive, please refer to page 77.

- Do not turn this unit off or remove the SD card, while formatting. Do not expose the unit to vibrations or shock.

Use this unit to format media.
Do not format an SD card using any other equipment such as a PC. The card may not be used on this unit.

Basic 🎥 📷

Selecting a media to record

[SD CARD 1] and [SD CARD 2] can be selected separately to record motion pictures or still pictures.

1 **Change the mode to 🎥 or 📷 .**

2 **Select the menu. (→ 23)**

> ⊙ MENU **: [SW & DISP SETUP] → [MEDIA SELECT]**

3 **Select the media you want to record motion pictures or still pictures on by using the cursor button, and press the button in the center.**

● The media is selected separately to motion pictures or still pictures is highlighted in yellow.

MEDIA SELECT
🎥 VIDEO | 📷 PICTURE
SD CARD 1 | SD CARD 1
SD CARD 2 | SD CARD 2
↰ | ENTER
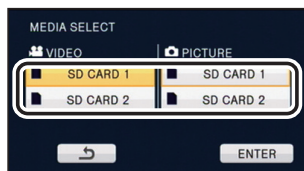
4 **Select [ENTER] and press the button in the center.**

Recording motion pictures

1 **Change the mode to 📹 .**

2 **Open the LCD monitor.**

3 **Press the recording start/stop button Ⓑ to start recording.**

● Recording will stop when you press the recording start/stop button again.

Ⓐ When you begin recording, ❙❙ changes to ●.
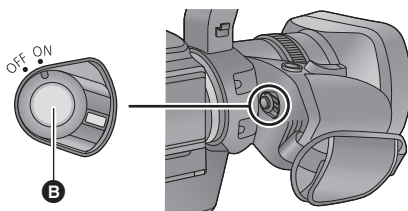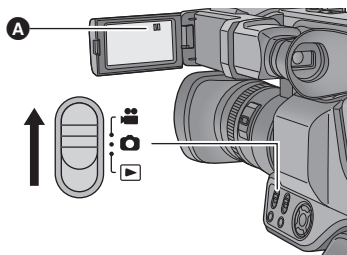
■ **Screen indications in the Motion Picture Recording Mode**

TC 00:00:00:00	Counter display (→ 43)
1 (White)	Media where the motion picture is recorded (→ 26)
R 1h20m	Approximate remaining recordable time ● When the remaining time is less than 1 minute, R 0h00m flashes red.
PH1080	Recording format

● **To change the recording format, change the [REC FORMAT]. (→ 59)**
● **Still pictures can be recorded while recording the motion picture. (→ 29)**
● The images recorded between pressing the recording start/stop button to start recording and pressing it again to pause recording become one scene.
● Maximum number of recordable scenes: Approx. 3900
  Maximum number of different dates: Approx. 900 (→ 69)
  When either of them reaches to the maximum limit, more scenes cannot be recorded.
  (In the case of SD cards it is the maximum number of recordable scenes per card.)
● Please refer to page 122 about approximate recordable time.

Recording still pictures

1 **Change the mode to .**

2 **Open the LCD monitor.**
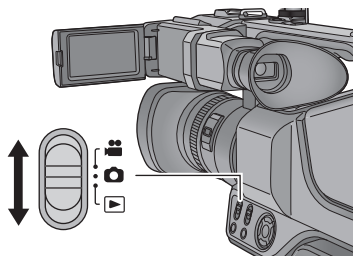
3 **Press the button.**
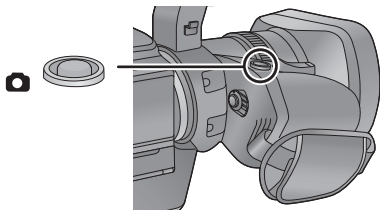
Focus indication:
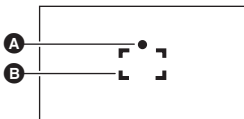
Ⓐ Focus indication:
○ (The white lamp flashes.): Focusing
● (The green lamp lights up.): When in focus
No mark: When focusing is unsuccessful
Ⓑ Focus area (area inside brackets)

● If you set the Optical Image Stabilizer function (➜ 37) to 𝄇₁ ([MODE1]), then the Image Stabilizer function will be more effective. (MEGA (MEGA Optical Image Stabilizer) will be displayed when the button is pressed.)
● Using a tripod is recommended when recording still pictures in dark places because the shutter speed becomes slow.
● The still picture recording time may be long depending on the picture size.
● The focus indication and the focus area may not be displayed depending on the recording conditions or the menu settings.

■ **About the screen indications in Still Picture Recording Mode**

🅾	Still picture operation indicator (→ 108)
1 (White)	Media where the still picture is recorded (→ 26)
R3000	Remaining number of still pictures ● Flashes in red when [0] appears.
《🖐》₁	Optical Image Stabilizer (→ 37)
20.4ᴹ	Size of still pictures (→ 63)
MEGA	MEGA Optical Image Stabilizer (→ 28)

■ **About the focusing area**

When there is a contrasting object ahead or behind the subject in the focus area, the subject may not be focused. If so, move the contrasting object out of the focus area.

Recording still pictures in Motion Picture Recording Mode

◇ **Change the mode to 📹 .**

Press the 🅾 button to take the picture.
● It is possible to record still pictures while recording motion pictures. (Simultaneous recording)
● When photos are being recorded, the remaining recordable number of photos and the photo operation display 🅾 are displayed.
● No shutter sound is emitted when recording still pictures.

● While recording motion pictures or during the PRE-REC operation, image quality is different from ordinary still pictures so that motion picture recording takes preference over still picture recording.
● If simultaneous recording is used while recording a motion picture, the recordable time remaining will shorten. If the unit is turned off or the mode switch operated, the recordable time remaining may lengthen.
● The still picture recording time may be long depending on the picture size.
● Maximum number of recordable pictures that can be displayed is 9999. If the number of recordable pictures exceeds 9999, R 9999+ is displayed. The number will not change when the picture is taken until the number of recordable pictures is 9999 or less.
● The recording time may be long depending on the recording condition.

Intelligent Auto Mode

The following modes (appropriate for the condition) are set just by pointing the unit to what you want to record.
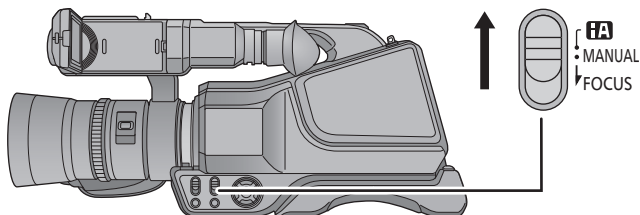
iA/MANUAL/FOCUS switch

Slide the switch to change the Intelligent Auto Mode/Manual Mode/Manual Focus Mode.

Mode		Effect
🏞	**Scenery**	The whole landscape will be recorded vividly without whiting out the background sky, which may be very bright.
👤 *1	**Spotlight**	Very bright object is recorded clearly.
🌙 *1,*3	**Low Light**	It can record very clearly even in a dark room or twilight.
🌷 *2	**Macro**	This allows recording at very close proximity to the object of recording.
🅰 *1 🅰 *2	**Normal** **Normal**	In modes other than those described above, the contrast is adjusted to give a clear picture.

*1   In Motion Picture Recording Mode only
*2   In Still Picture Recording Mode only
*3   When [AUTO SLOW SHTR] (→ 64) is [OFF], Low Light Mode will not be entered.

● Depending on the recording conditions, the unit may not enter the desired mode.

■ Intelligent Auto Mode

When switching to Intelligent Auto Mode, the Automatic White Balance and Auto Focus operate and automatically adjust the color balance and focusing.
Depending on the brightness of the subject etc., the aperture and shutter speed are automatically adjusted for an optimum brightness.
● Color balance and focus may not be adjusted automatically depending on light sources or scenes. If so, manually adjust these settings. (➜ 40, 42)

Automatic White Balance

The illustration shows the range over which Automatic White Balance functions.

1) The effective range of Automatic White Balance adjustment on this unit
2) Blue sky
3) Cloudy sky (rain)
4) Sunlight
5) White fluorescent lamp
6) Halogen light bulb
7) Incandescent light bulb
8) Sunrise or sunset
9) Candlelight
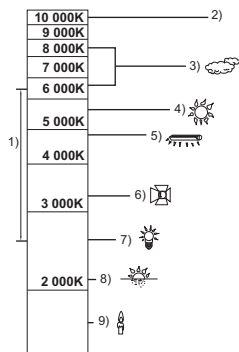
If the Automatic White Balance is not functioning normally, adjust the White Balance manually. (➜ 40)

10 000K	2)
9 000K	
8 000K	
7 000K	3)
6 000K	
5 000K	4)
	5)
4 000K	
3 000K	6)
	7)
2 000K	8)
	9)

Auto Focus

The unit focuses automatically.
● Auto Focus does not work correctly in the following situations.
Record pictures in the Manual Focus Mode. (➜ 42)
  – Recording distant and close-up objects at the same time
  – Recording a subject behind dirty or dusty window
  – Recording a subject that is surrounded by objects with glossy surfaces or by highly reflective objects

Motion picture/Still picture playback

▶

● **You can also perform operations by touch operation. (→ 19)**
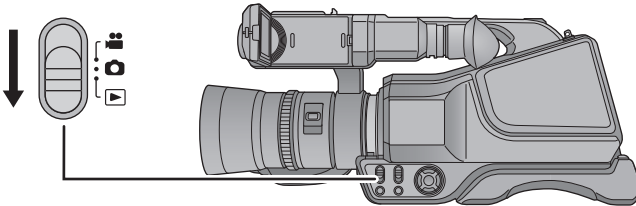
1 **Change the mode to ▶ .**

2 **Select the play mode select icon Ⓐ using the cursor button, then press the button in the center.**
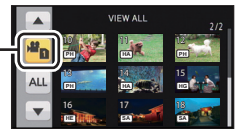
3 **Select the media type Ⓑ and press the button in the center.**

4 **Select the still picture Ⓒ or the recording format of the motion picture Ⓓ you wish to play back and press the button in the center.**
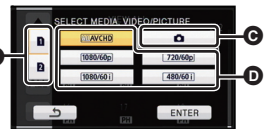
● Select [ENTER] and press the button in the center.

5 **Select the scene or the still picture to be played back and press the button in the center.**

● The recording format is displayed in the thumbnail display of the motion pictures. (PH , HA , etc.)
● Next (previous) page can be displayed by using ▲ / ▼ .
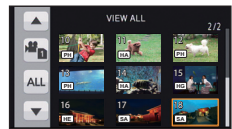
6 **Select the playback operation by selecting the operation icon and press the button in the center.**

Ⓔ Operation icon

● Operation icons and screen display will disappear when no operation is performed for a specific period of time. To display them again, press the cursor button.

Motion picture playback	Still picture playback
▶▶: **Fast forward playback***	▐▐▶: **Plays back the next picture.**
◀◀: **Fast rewind playback***	◀▐▐: **Plays back the previous picture.**
■: **Stops the playback and shows the thumbnails.**	■: **Stops the playback and shows the thumbnails.**
▶/▐▐: **Playback/Pause**	▶/▐▐: **Slide show (playback of the still pictures in numerical order) start/ pause.**

* If ◀◀/▶▶ is selected during fast rewinding/fast forwarding and the center of the cursor button is pressed again, the fast rewind/fast forward speed will increase. (The screen display changes to ◀◀◀ / ▶▶▶ .)

■ Change the thumbnail display

While the thumbnail is displayed, the thumbnail display changes in the following order if the zoom lever or sub zoom lever is operated to 🔍 side or ▦ side.

20 scenes ⟷ 9 scenes ⟷ 1 scene ⟷ Scene information display*

* Detailed information of the scene is displayed when playing back motion pictures. Following information is displayed.
  − START TC
  − START UB
  − DATE
  − TIME ZONE
  − DURATION
  − FORMAT

● 9 scenes display returns if the unit is turned off or the mode is changed.
● By displaying in 1 scene, recording date and time are displayed when playing back motion pictures, and recording date and file number when playing back still pictures.
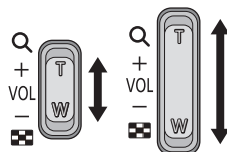
∎ Speaker/Headphone volume adjustment

Operate the volume lever or the sub zoom lever to adjust the speaker/headphone volume during Motion Picture Playback Mode.

Towards "+":	Increases the volume
Towards "−":	Decreases the volume
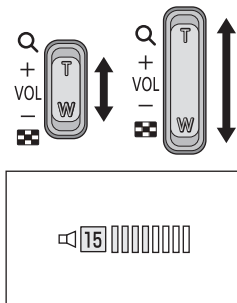
- Sound will be heard only during normal playback.
- If pause play is continued for approx. 5 minutes, the screen returns to the thumbnails.
- When played back with [ALL AVCHD] selected, the screen may become black momentarily at the time the scene switches.
- The speaker of this unit does not output sounds when connected to a TV.

Motion picture compatibility

- This unit is based on AVCHD Progressive/AVCHD format.
- Even if the devices used have compatible standards, when playback of motion pictures recorded using another device is performed using this unit, or when motion pictures recorded using this unit is played back in another device, playback may not proceed normally, or may not be possible. (Please check compatibility in the operating instruction of your device.)

Still picture compatibility

- This unit is compliant with the unified standard DCF (Design rule for Camera File system) established by JEITA (Japan Electronics and Information Technology Industries Association).
- The file formats of still pictures supported by this unit is JPEG. (Not all JPEG formatted files will be played back.)
- This unit may degrade or not play back still pictures recorded or created on other products and other products may degrade or not play back still pictures recorded on this unit.

Using the zoom
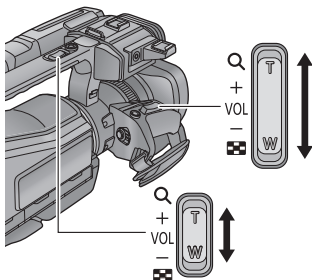
Zoom lever/Sub zoom lever
T side:
Close-up recording (zoom in)
W side:
Wide-angle recording (zoom out)
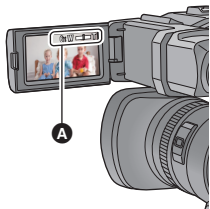
Ⓐ **Zoom bar**
● Maximum zoom ratio for recording motion pictures can be set with [ZOOM MODE]. (→ 62)

■ About the zoom bar

The zoom bar is displayed during the zoom operation.
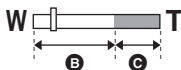
Ⓑ Motion Picture Recording Mode: i.Zoom OFF (White)
Still Picture Recording Mode: Optical Zoom (White)
Ⓒ Motion Picture Recording Mode: i.Zoom/Digital zoom (Blue)
Still Picture Recording Mode: Extra Optical Zoom (Blue)

■ About the zoom speed

● The zoom speed varies depending on the range over which the zoom lever is moved.
● Zoom speed of the sub zoom lever will vary depending on the setting of [SUB ZOOM]. (→ 99)

Ring zoom

📹 📷
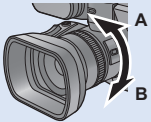
Zoom operation can be done using the multi manual ring.
You can set your preferred rotational directions for the zoom operation in [ZOOM RING].
In Manual Mode, use the CAMERA FUNCTION button to set the ring operation icon to ZOOM.
(→ 95)

		[ZOOM RING]	
Rotational direction of the ring		**[DOWN TELE]**	**[UP TELE]**
A	**A side**	Wide-angle recording (zoom out)	Close-up recording (zoom in)
B	**B side**	Close-up recording (zoom in)	Wide-angle recording (zoom out)

● This function's default setting is [DOWN TELE].
● The zoom speed varies depending on the speed you rotate the ring.

Zoom ratio during the Still Picture Recording Mode

📷

The zoom ratio can be expanded up to 50× without degrading the picture quality for the Still Picture Recording Mode. (Extra Optical Zoom)
● Extra Optical Zoom ratio varies depending on the setting of [PICTURE SIZE] and [ASPECT RATIO]. (→ 63, 64)

● If you take your finger off the zoom lever during zoom operation, the operation sound may be recorded. When returning the zoom lever to the original position, move it quietly.
● When the zoom magnification is at its maximum, the subjects are focused at about 1.5 m (4.9 feet) or more.
● When the zoom magnification is 1×, this unit can focus on a subject approx. 3 cm (1.2 ″) away from the lens.

Image Stabilizer Function

Use the Image Stabilizer to reduce the effects of shake during recording.
This unit is equipped with Hybrid Optical Image Stabilizer.
Hybrid Optical Image Stabilizer is a hybrid of Optical and Electrical Image Stabilizer.
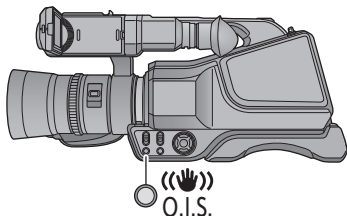
Optical Image Stabilizer button
Press the button to turn Optical Image Stabilizer on/off.
(Motion Picture Recording Mode)
((⛛)) / ((⛛)) → (⛛) (setting canceled)
● When [HYBRID O.I.S.] is [ON], ((⛛)) is displayed. When [OFF], ((⛛)) is displayed.
● When recording with a tripod in Motion Picture Recording Mode, we recommend that you set the Image Stabilizer off.

(Still Picture Recording Mode)
((⛛))₁ / ((⛛))₂ → (⛛) (setting canceled)
● When [O.I.S.] is [MODE1], ((⛛))₁ is displayed.
When [O.I.S.] is [MODE2], ((⛛))₂ is displayed.

■ Changing Image Stabilizer Mode

(Motion Picture Recording Mode)

> ⊙ MENU : **[RECORD SETUP]** → **[HYBRID O.I.S.]** → **[ON] or [OFF]**

When set to [ON], you can further improve image stabilization for recording while walking, or holding the unit and recording a distant subject with zoom.
● This function's default setting is [ON].

(Still Picture Recording Mode)

> ⊙ MENU : **[RECORD SETUP]** → **[O.I.S.]** → **[MODE1] or [MODE2]**

[MODE1]:	The function works all the time.
[MODE2]:	The function works when the ⬤ button is pressed. We recommend using this mode when you are recording yourself or recording with a tripod in Still Picture Recording Mode.

Manual recording

The operation sequence differs for the multi manual ring and manual icons.

● **The Manual Focus, White Balance, Shutter Speed, Brightness (Iris and Gain) settings, Zoom operation are retained when you change between Motion Picture Recording Mode and Still Picture Recording Mode.**

Set the iA/MANUAL/FOCUS switch to manual mode.

● **MNL** is displayed in the Manual Mode.
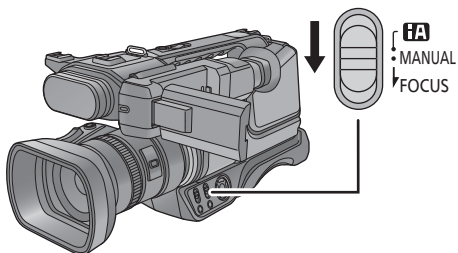
■ When using the multi manual ring

1 Press the CAMERA FUNCTION button to select the desired item.

● Selected item changes whenever the CAMERA FUNCTION button is pressed.
● The selected ring operation icon is displayed in area **Ⓒ**.
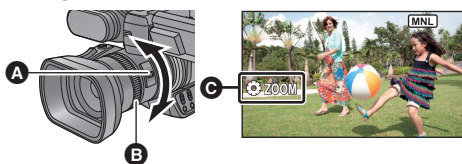
Ⓐ CAMERA FUNCTION button
Ⓑ Multi manual ring

3 Rotate the multi manual ring to select the setting.

● When a manual icon is displayed, operation using the multi manual ring is not possible.

Ⓒ Ring operation icons	
⊛ FOCUS[*1]	Focus (→ 42)
⊛ WB	White Balance (→ 40)
⊛ SHUTTER	Manual Shutter Speed (→ 41)
⊛ IRIS	Iris/Gain Adjustment (→ 41)
⊛ ZOOM[*2]	Zoom (→ 35)

*1 This can be set only in Manual Focus Mode.
*2 This can also be operated in Intelligent Auto Mode.

∎ **When using the manual icons**

1 **Press the cursor button to display the manual icons on the screen.**

2 **Select the desired item to be set and press the button in the center.**

3 **Select an icon on the screen, and adjust the setting to the desired level.**

Ⓐ	Manual icons
FOCUS	Focus (➜ 42)
WB	White Balance (➜ 40)
SHTR	Manual Shutter Speed (➜ 41)
IRIS	Iris/Gain Adjustment (➜ 41)

White Balance

Automatic White Balance function may not reproduce natural colors depending on the scenes or lighting conditions. If so, you can adjust the White Balance manually.

● **Set the iA/MANUAL/FOCUS switch to Manual Mode.**
● **For how to perform the settings when using the manual icons, refer to page 39.**

1 Select [⚙ WB] pressing the CAMERA FUNCTION button.

2 Select white balance mode using the multi manual ring.

Icon	Mode/Recording conditions
AWB	**Automatic White Balance adjustment**
⚙	**Sunny mode:** Outdoors, under a clear sky
☁	**Cloudy mode:** Outdoors, under cloudy sky
⚞1	**Indoor mode 1:** Incandescent light, video lights like in the studio, etc.
⚞2	**Indoor mode 2:** Color fluorescent lamps, sodium lamps in gymnasiums etc.
📷	**Manual adjustment mode:** ● Mercury-vapor lamps, sodium lamps, some fluorescent lights ● Lights used for wedding receptions at hotels, stage spotlights in theaters ● Sunrise, sunset, etc.

● To return to auto setting, set to **AWB** or set the iA/MANUAL/FOCUS switch to Intelligent Auto Mode.

■ To set the White Balance manually

1   Select 📷 using the multi manual ring, fill the screen with a white subject.
2   Pressing and holding the CAMERA FUNCTION button.
● When operating with the cursor button, select the flashing 📷 display and press the button in the center.
● When the screen turns black instantly and the 📷 display stops flashing and then lights constantly, the setting is complete.
● If the 📷 display continues flashing, the White Balance cannot be set. In this case, use other White Balance Modes.
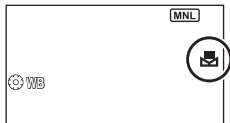
● When the 📷 display flashes, the Manual White Balance previously adjusted is stored. Whenever recording conditions change, re-set the White Balance.
● When setting both the White Balance and the iris/gain, set the White Balance first.

Manual shutter speed/iris adjustment

Shutter Speed:
Adjust it when recording fast-moving subjects.
Iris:
Adjust it when the screen is too bright or too dark.
- Set the iA/MANUAL/FOCUS switch to Manual Mode.
- For how to perform the settings when using the manual icons, refer to page 39.

1 Select [⚙ SHUTTER] or [⚙ IRIS] pressing the CAMERA FUNCTION button.

2 Adjust settings using the multi manual ring.

SHTR : Shutter speed:
1/60 to 1/8000
- If [AUTO SLOW SHTR] is set to [ON], the shutter speed will be set between 1/30 and 1/8000.
- The shutter speed closer to 1/8000 is faster.
- The shutter speed will be set between 1/2 and 1/2000 in Still Picture Recording Mode.

IRIS : Iris/Gain value:
(Motion Picture Recording Mode)
CLOSE ↔ (F12 to F1.9) ↔ OPEN ↔ (0dB to 30dB)
(Still Picture Recording Mode)
CLOSE ↔ (F12 to F1.9) ↔ OPEN ↔ (0dB to 12dB)
- Depending on the brightness of the subject, the screen may appear too bright or blurry. When this occurs, increasing the shutter speed or using an ND filter (optional) will reduce the brightness and the blur.
- Value closer to CLOSE darken the image.
- Value closer to 30dB brighten the image.
- When the iris value is adjusted to brighter than OPEN, it changes to the gain value.
- To return to auto setting, set the iA/MANUAL/FOCUS switch to Intelligent Auto Mode.

- When setting both the shutter speed and the iris/gain value, set the shutter speed and then set the iris/gain value.
- When [⚙ SHUTTER] or [⚙ IRIS] is selected, the selected shutter speed or iris/gain value can be adjusted automatically by pressing and holding the CAMERA FUNCTION button.

Manual shutter speed adjustment
- When the shutter speed is set lower than 1/15 in the Still Picture Recording Mode, using a tripod is recommended. Also, White Balance cannot be set. The shutter speed will be set to 1/30 when the unit is turned on again.
- You may see a band of light around an object that is shining very bright, or highly reflective.
- During normal playback, image movement may not look smooth.
- If you record an extremely bright object or record under indoor lighting, color and screen brightness may change or a horizontal line may appear on the screen. In this case, record in the Intelligent Auto Mode or set the shutter speed to 1/60 in areas where the power supply frequency is 60 Hz, or 1/100 in areas of 50 Hz.
- Brightness of the image displayed on the LCD monitor may be different from brightness of the image actually recorded during the Still Picture Recording Mode. Confirm the image on the playback screen after recording.

Manual iris/gain adjustment
- If the gain value is increased, the noise on the screen increases.
- Depending on the zoom magnification, there are iris values that are not displayed.

Recording with Manual Focus

If auto focusing is difficult due to the conditions, then use Manual Focus.
● **Set the iA/MANUAL/FOCUS switch to manual mode.**

1 **Slide the iA/MANUAL/FOCUS switch to FOCUS to set Manual Focus Mode.**

2 **Select [⚙ FOCUS] pressing the CAMERA FUNCTION button.**

3 **Adjust the focus by using the multi manual ring.**

● To restore Auto Focus, slide the iA/MANUAL/FOCUS switch to FOCUS again or set the iA/MANUAL/FOCUS switch to Intelligent Auto Mode.

■ When using the manual icon

1 **Select [FOCUS] and press the button in the center.**

2 **Select [MF] and press the button in the center to change to Manual Focus.**

● MF appears on the screen.

3 **Adjust the focus by selecting $\underset{+}{MF}$ / $\underset{-}{MF}$ and press the button in the center.**

$\underset{+}{MF}$:	To focus on a close subject
$\underset{-}{MF}$:	To focus on a faraway subject

● To restore Auto Focus, select [AF] and press the button in the center in Step 2 or set the iA/MANUAL/FOCUS switch to Intelligent Auto Mode or slide the iA/MANUAL/FOCUS switch to FOCUS again.

Counter display

[COUNTER DISPLAY]

You can change a counter display that indicates how much time has elapsed during recording or playback.

Select the menu. (→ 23)

> ⊚ MENU : **[RECORD SETUP] → [COUNTER DISPLAY] → desired setting**

[TC]:	**Time Code (→ 44)** TC 00:00:00:00 or TC 00:00:00.00 ● Display will change depending on the setting of the [TC MODE]. (→ 44)
[UB]:	**User Information (→ 46)** UB 00 00 00 00
[COUNTER]:	**Recording Counter (→ 47)** (In Recording Mode) 0:00:00 or SCN 0:00:00 (In Playback Mode) SCN 0:00:00 ● In Recording Mode, display will change depending on the setting of the [REC COUNTER]. (→ 47) ● In Playback Mode, display will return to SCN 0:00:00 for each scene.
[OFF]:	**The counter is not displayed.**

Setting the Time Code

Time code will display the recording time in hours, minutes, seconds, and frames.
TC 00:00:00:00 (hour : minute : second : frame [NDF])
TC 00:00:00.00 (hour : minute : second . frame [DF])

Recording format	Frame
[PS 1080/60p], [PH 1080/60i], [HA 1080/60i], [HG 1080/60i], [HE 1080/60i], [PM 720/60p], [SA 480/60i]	0 to 29

[TC MODE]

Select the compensation mode for the time code.

MENU **: [RECORD SETUP] → [TC MODE] → desired setting**

[DF]:	Time code is compensated in accordance with the actual time. It is mainly used for broadcasting such as TV programs.
[NDF]:	It will not compensate the time code. (There will be a difference from the actual time)

≥ It is automatically set to [NDF] when the Interval Recording is used.

[TCG]

Sets the way the time code will move.

MENU **: [RECORD SETUP] → [TCG] → desired setting**

[FREE RUN]:	It will constantly move.
[REC RUN]:	It will move only when recording.

≥ It is automatically set to [FREE RUN] when it is set to PRE-REC.

≥ The time code will reset when the built-in lithium battery is exhausted when it is set to [FREE RUN].

[TC PRESET]

You can set the initial time code.

1 Select the menu.

> ⊙ MENU : [RECORD SETUP] → [TC PRESET]

2 Select the item to set using the cursor button right or left, then adjust the value using the cursor button up or down.

● "h" is an abbreviation for hour, "m" for minute, "s" for second and "f" for frame.

3 Select [ENTER] using the cursor button right or left, then press the button in the center.

● Select [EXIT] and press the button in the center to complete the setting.

● This unit will adjust the time code in accordance with the frame rate of the recording format. (→ 59) Therefore, it may not be continuous from the previous final time code when the recording format is changed.

Setting the User Information

Eight digit hexadecimal alphanumeric can be entered and displayed as a memo information such as dates, control numbers, etc., into the User Information.
UB 00 00 00 00

[UB PRESET]

You can set the User Information.

1 **Select the menu.**

MENU : **[RECORD SETUP] → [UB PRESET]**

2 **Select the item to set using the cursor button right or left, then adjust the value using the cursor button up or down.**
● You can use numbers from 0 to 9 and letters from A to F.

3 **Select [ENTER] using the cursor button right or left, then press the button in the center.**
● Select [EXIT] and press the button in the center to complete the setting.

Setting the Recording Counter

Recording Counter will display the recording time in seconds.
0:00:00 (hour : minute : second (When [REC COUNTER] is set to [TOTAL]))
SCN 0:00:00 (hour : minute : second (When [REC COUNTER] is set to [SCENE]))

[REC COUNTER]

Select the counting method during the recording.

> (○) MENU **: [SW & DISP SETUP] → [REC COUNTER] → desired setting**

[TOTAL]:	The count continues to increase until the Recording Counter is resetted.
[SCENE]:	Resets the Recording Counter at start of recording. Counts the time of each recording session.

[COUNTER RESET]

The Recording Counter will be set to 0:00:00 while displaying the counter.

> (○) MENU **: [RECORD SETUP] → [COUNTER RESET] → [YES]**

● When [COUNTER DISPLAY] is set to an option other than [COUNTER], this item cannot be set.

Recording functions of operation icons

Select the operation icons to add different effects to the images to be recorded.

1 Press the cursor button to display the operation icons on the screen.

2 Select an operation icon and press the button in the center.

(e.g. Level Gauge)

- **The operation icons that are displayed can be changed.** (**[SELECT OPERATION ICONS]:** → 96)
- To cancel the function, select the operation icon again, and press the button in the center.
  For canceling or using the following functions for the operation icons, refer to each pages.
  – Push AF (→ 50)
  – Guidelines (→ 51)
  – Recording Check (→ 51)
  – Last Scene Delete (→ 51)
- The icon is displayed when the operation icon is set.

Operation icons

FA	Focus Assist	Last	Last Scene Delete*1
⮕	Fade*1	☰	Guidelines*2
🔳	DRS*1	▨	Zebra
PRE-REC	PRE-REC*1	Hist	Histogram
i◑	Intelligent Exposure*2	Mark	Marker
🔆	Backlight Compensation	⟨⟨⟩⟩	Level Gauge
PAF	Push AF	Menu	Menu
RecC	Recording Check*1	🎧 / 🎧🎤	Headphone volume adjustment/ Microphone level adjustment*3

*1 Not displayed in Still Picture Recording Mode.
*2 Not displayed in Motion Picture Recording Mode.
*3 It is displayed only when a headphone is connected to the headphone output terminal. [MIC LEVEL] (→ 66) is set to anything other than [AUTO], 🎧/🎧🎤 is displayed as the operation icon, and adjustment of input level of the microphone is possible.

- If you turn off the unit or change the mode to ▶ , Backlight Compensation function is canceled.
- If you turn off the unit, the Fade function is canceled.
- It is possible to set from the menu. (Except for the Push AF, Recording Check, Last Scene Delete, Level gauge, Menu, Headphone volume adjustment.)

FA **Focus Assist**

The in-focus area is displayed in red.

Ⓐ Part displayed in red

- The red display does not appear on the images actually recorded.
- The red display does not appear on TV.

Fade

When you start recording, the image/audio gradually appears. (Fade in)
When you pause recording, the image/audio gradually disappears. (Fade out)
- The Fade setting is canceled when the recording stops.

(Fade in)

■ **To select the color for fade in/out**

ⓞ MENU : [SW & DISP SETUP] → [FADE COLOR] → [WHITE] or [BLACK]

(Fade out)

- The thumbnails of scenes recorded using fade in become black (or white).

DRS

This brightens parts that are in shadow and difficult to see and suppresses white saturation in bright parts at the same time. Both bright and dark parts can be recorded clearly.

- If there are extremely dark or bright parts or the brightness is insufficient, the effect may not be clear.

PRE-REC
This prevents you from missing a shot.

This allows recording of the pictures and sound to start approximately 3 seconds before the recording start/stop button is pressed.

● [PRE-REC] appears on the screen.

● **Aim the unit at the subject beforehand.**
● There is no beep sound.
● PRE-REC is canceled in the following case.
  − After 3 hours have passed
● If you start recording within approximately 3 seconds after performing operations such as setting PRE-REC, turning on the unit or switching the mode, the 3 second-image will not be recorded fully.
● Images displayed on the thumbnail in Playback Mode will differ from the motion pictures displayed at the start of playback.

---

iO   Intelligent Exposure

This brightens dark areas so the image can be recorded clearly.

● If there are extremely dark parts or the brightness is insufficient, the effect may not be clear.

Backlight Compensation

This makes the image brighter to prevent darkening of a backlit subject.

PAF   Push AF

It can be temporary changed to Auto Focus when it is set to Manual Focus. (➜ 42)
1) Press the cursor button to display the operation icons on the screen.
2) Select the Push AF icon and press and hold the button in the center.
● It will be canceled when the button in the center is released.

● The focus position set by the Push AF will be maintained when canceled.

RecC   Recording Check

Approximately 2 seconds at the end of the video recorded last can be played back. It will return to recording screen once the playback is completed.

● Playback operation is not possible during the Recording Check.
● Recording Check is not possible in following cases:
  − When the unit is turned on/off
  − When the mode switch is operated
  − When the setting of [REC FORMAT] is changed
  − When the SD Card is inserted/removed
  − During the Interval Recording
  − Set [2 MEDIA FUNC.] to [BACKUP] (➜ 60)

Last   Last Scene Delete

The motion picture recorded last can be deleted.
Select [YES] and press the button in the center to delete.
● It will return to recording screen without deleting by selecting [NO].
● **Deleted scenes cannot be restored.**

● Last Scene Delete is not possible in following cases:
  − When the unit is turned on/off
  − When the mode switch is operated
  − When the setting of [REC FORMAT] is changed
  − When the SD Card is inserted/removed
  − During the Interval Recording
  − Set [2 MEDIA FUNC.] to [BACKUP]. (➜ 92)

☰   Guidelines

You can check if the image is level while recording motion pictures and still pictures. The function can also be used to estimate the balance of the composition.
It will switch every time the icon is selected.
☰ → ⊞ → ▦ → Setting canceled
● The guidelines do not appear on the images actually recorded.
● In Motion Picture Recording Mode, the guidelines can be set from the menu.

🔲   Zebra

Parts where white saturation (color saturation) is likely to occur (extremely brightly lit or shiny parts) are displayed with diagonal lines (zebra pattern).
● You can record an image with little white saturation if you manually adjust the shutter speed or brightness (Iris/Gain) (➜ 41).
● The zebra pattern does not appear on the images actually recorded.
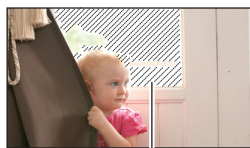
Ⓐ Zebra pattern

Hist **Histogram** 🎥 📷

A graph with brightness as horizontal axis and number of pixels at that brightness as vertical axis is displayed. It is possible to determine the exposure of the whole image by looking at the distribution in the graph.
Adjust the brightness using iris setting. (→ 41)

■ **Example of the display**

Ⓐ Normal
Ⓑ Dark
Ⓒ Bright

Mark **Marker** 🎥 📷
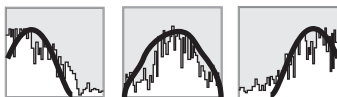
Displays the luminance level of the center of the screen (luminance display frame) in %.
It makes the adjustment of the brightness of the object easier, by checking the luminance level of the object, when recording same object in different surroundings.
Adjust the brightness using iris setting. (→ 41)
● Luminance level is displayed between 0% and 99%. It will be displayed as 99%↑ when it is over 99%.

50%
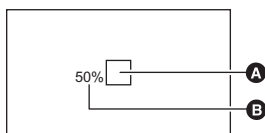
Ⓐ Luminance display frame
Ⓑ Luminance level

This function displays the horizontal/vertical tilt of the unit with the electronic level.

∎ **To correct the tilt**
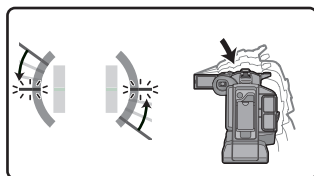
(Horizontal direction)   **(Vertical direction)**
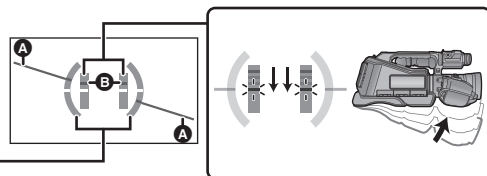
When correcting the leftward tilt   When correcting the downward tilt

● The horizontal tilt display Ⓐ and vertical tilt display Ⓑ appear yellow when there is a tilt, and appear green when there is almost no tilt.
● The maximum tilt display angles are approximately 45 ° in horizontal direction and 10 ° in vertical direction.
● The electronic level does not affect the actual recorded images.

● When [SELF SHOOT] is set to [MIRROR] while you are recording yourself or when the LCD monitor is closed with the screen facing out, this item is not displayed.
● Even when the tilt is in the corrected state, an error may occur.
● In the following cases, the electronic level may not be displayed correctly:
  − When moving this unit
  − When pointing this unit up or down at an angle closer to perpendicular
● When [LEVEL SHOT] is set to [ON], this function cannot be set.

Menu   **Menu**

The menu can be displayed.

🎧   **Headphone volume adjustment**

Adjust the volume of the headphone while recording.

▶ :   Increase the volume
◀ :   Decrease the volume
● Actual volume to be recorded does not change.
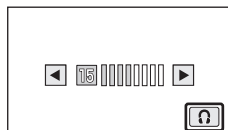
Recording functions of [CAMERA SETUP] menus

[SCENE MODE]

When you record images in different situations, this mode automatically sets optimum shutter speeds and apertures.

● **Switch to Manual Mode. (→ 38)**

MENU **: [CAMERA SETUP] → [SCENE MODE] → desired setting**

[OFF]:	Cancel the setting
Sports:	To make fast moving scenes less shaky with slow playback and pause of playback
Portrait:	To make people stand out against the background
Soft Skin:	To makes skin colors appear softer for a more attractive appearance
Spotlight:	Improved quality when subject is brightly illuminated.
Snow:	Improved image quality when shooting in snowy locations.
Beach:	To make blue in the sea or sky vibrant
Sunset:	To make red in the sunrise or sunset vibrant
Scenery:	For spatial scenery
Fireworks:	To capture the fireworks in the night sky beautifully
Night Scenery:	To capture the evening or night scenery beautifully
Low Light:	For dark scenes, such as at dusk (In Motion Picture Recording Mode only)

● **(Sports/Portrait/Soft Skin/Spotlight/Snow/Beach/Sunset/Scenery)**
   − The shutter speed is 1/8 or more in Still Picture Recording Mode.
● **(Sunset/Low Light)**
   − The shutter speed is 1/30 or more in Motion Picture Recording Mode.
● **(Sunset/Scenery/Fireworks/Night Scenery)**
   − Image may get blurry when close object is recorded.
● **(Sports)**
   − During normal playback, the image movement may not look smooth.
   − Color and screen brightness may change under indoor lighting.
   − If the brightness is insufficient, the Sports Mode does not function. The display flashes.
● **(Portrait)**
   − Color and screen brightness may change under indoor lighting.

- ● **(Soft Skin)**
  - − If the background or anything else in the scene has colors similar to the skin color, they will also be smoothed.
  - − If the brightness is insufficient, the effect may not be clear.
  - − If you record a person in the distance, the face may not be recorded clearly. In this case, cancel Soft Skin Mode or zoom in on the face (close-up) to record.
- ● **(Fireworks)**
  - − The shutter speed is 1/30.
  - − Image may get washed out when recorded in bright surrounding.
- ● **(Night Scenery)**
  - − The shutter speed is 1/2 or more in Still Picture Recording Mode.
  - − Using a tripod is recommended.

[Intelligent Auto Plus]

You can add manually-adjusted brightness and color balance settings to the Intelligent Auto Mode, and record.
Please refer to page 30 for details about the effect of each mode.

(Scenery)/ (Spotlight)[*1]**/ (Low Light)**[*1]**/ (Macro)**[*2]**/ (Normal)**[*1]**/ (Normal)**[*2]

*1 In Motion Picture Recording Mode only
*2 In Still Picture Recording Mode only
- ● **Switch to Intelligent Auto Mode. (→ 30)**

1 Select the menu.

MENU **: [CAMERA SETUP] → [Intelligent Auto Plus] → [SET]**

2 Select the desired setting items and press the button in the center.

[EXPOSURE]:	Adjust the exposure.
[COLOR]:	Adjust the color balance.

- ● (When adjusting the color balance)
  R side: Sets the balance to a reddish tone.
  B side: Sets the balance to a bluish tone.

3 Adjust settings using the cursor button right or left.

4 Select [ENTER] and press the button in the center.
- ● Select [EXIT], then press the button in the center or press the MENU button to complete the setting.

[PICTURE ADJUST]   📹 📷

Adjust the quality of the image while recording.
Adjust by outputting to a TV while adjusting the quality of the image.
- **This setting is retained when you change between Motion Picture Recording Mode and Still Picture Recording Mode.**
- **Switch to Manual Mode. (→ 38)**
1   Select the menu.

◉ MENU : [CAMERA SETUP] → [PICTURE ADJUST]

2   Select the desired setting items and press the button in the center.

[SHARPNESS]:	Sharpness of the edge
[COLOR]:	Depth of the color of the image
[EXPOSURE]:	Brightness of the image
[WB ADJUST]:	Picture color balance

3   Adjust settings using the cursor button right or left.

4   Select [ENTER] and press the button in the center.
- Select [EXIT] and press the button in the center or press the MENU button to complete the settings.
- ⚙ appears on the screen.

[LEVEL SHOT]

This function detects the horizontal tilt of the unit, and automatically corrects it to the level position before recording.
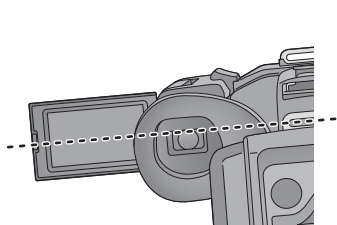

```
──────  :  When this function is set to on.

- - - - - - :  When this function is set to off.
```

⊙ MENU **: [CAMERA SETUP] → [LEVEL SHOT] → [ON]**

- Select [EXIT] and press the button in the center or press the MENU button to complete the settings.
- Icon is displayed in Ⓐ position.
  - When the tilt is corrected: ⊤
  - When the tilt is above the correction range: ◢ / ◣
- When the tilt exceeds the correction range, move the unit to the position where ⊤ is displayed.

- The range that this icon can be displayed correctly the slope is about 45 ° to the vertical direction.
- The image may move while zooming depending on the tilt of this unit.
- To record a level image with a tripod, attach this unit by using "Level Gauge" (→ 53), and then use Level Shot Function.

[COLOR NIGHT REC]

This function allows you to record color images in very low light situations. (Minimum required illumination: approx. 1 lx)
- **Switch to Manual Mode. (→ 38)**

⊙ MENU **: [CAMERA SETUP] → [COLOR NIGHT REC] → [ON]**

- Select [EXIT] and press the button in the center or press the MENU button to complete the settings.

- **Recorded scene is seen as if frames were missed.**
- If set in a bright place, the screen may become washed out for a while.
- Bright dots that are usually invisible may be seen, but this is not a malfunction.
- This function cannot be used when [TIME LAPSE REC] is used.
- Using a tripod is recommended.
- In darker areas, Auto Focus may focus a bit slower. This is normal.

A more impressive image can be obtained by focusing on the object only in close-up and shading off the background.

> ⊙ MENU **: [CAMERA SETUP] → [TELE MACRO] → [ON]**

- Select [EXIT] and press the button in the center or press the MENU button to complete the settings.
- The unit can focus on the subject at a distance of approx. 60 cm (24 ″).
- When the Tele Macro is set with the zoom magnification less than 26× in Motion Picture Recording Mode, it will automatically be set to 26×.
- When the aspect ratio is [4:3], [3:2] during the Still Picture Recording Mode and Tele Macro is set with the zoom magnification less than 21×, the zoom magnification will automatically be set to 21×. When the aspect ratio is [16:9], the zoom magnification will be 26×.

- The Tele Macro function is automatically canceled when the zoom magnification becomes lower than 26× in Motion Picture Recording Mode.
- Tele Macro function is automatically canceled when the zoom magnification becomes lower than the size below in Still Picture Recording Mode:
  - Less than 21× (when the aspect ratio is [4:3] or [3:2])
  - Less than 26× (when the aspect ratio is [16:9])

Recording functions of [RECORD SETUP] menus

[REC FORMAT]

Switch the picture quality and recording format of the motion pictures to record.

> ◎ MENU **: [RECORD SETUP] → [REC FORMAT] → desired setting**

[PS 1080/60p][*]:

Set the recording format to 1080/60p.

Ⓐ ◄————————————————► Ⓑ

[PH 1080/60i]/[HA 1080/60i]/[HG 1080/60i]/[HE 1080/60i]:

Set the recording format to 1080/60i.

[PM 720/60p]:

Set the recording format to 720/60p.

[SA 480/60i]:

Set the recording format to 480/60i.

Ⓐ   Image quality prioritized
Ⓑ   Recording time prioritized
*   This option allows you to record in 1080/60p (1920×1080/60 progressive), which is the highest
     picture quality for this unit.

● [i] and [p] of the frame rate means interlace and progressive respectively.

Interlace (interlacing scanning)
Video signal that divides the effective scanning lines to half and send them alternatively
Progressive (progressive scanning)
High density video signal sending the effective scanning lines simultaneously (It will be higher
quality image than the interlace)

● **Recordable time using the battery (→ 14)**
● This function's default setting is [PH 1080/60i] mode.
● Please refer to page 122 for details about approximate recordable time.
● When the unit is moved a lot or moved quickly, or when a fast-moving subject is recorded
  (particularly when recording in [HE 1080/60i] mode), mosaic-type noise may appear at playback.

[2 MEDIA FUNC.]

You can set the relay recording and backup recording.
● **Insert SD cards to card slot 1 and card slot 2.**

(◎) MENU **: [RECORD SETUP] → [2 MEDIA FUNC.] → desired setting**

[OFF]:	Cancel the setting.
[Relay(AutoSw)]:	Set the relay recording.
[BACKUP]:	Set the backup recording.

■ Relay recording

It is possible to continuously record on the SD card in the other card slot even when the available capacity of the SD card runs out during the recording. Note that there will be a momentary pause in the sound when recording media is switched.

● ➡ is displayed on the media to record the motion picture. ➡ will disappear when the recording media is switched and the relay recording is started.
● Relay recording can only be performed once.
● **Combine the scenes that were relay-recorded using the [RELAY SCENE COMBINE] into the external drive. (→ 80)**
● If [DELETE RELAY SCENE] or [RELAY INFO CANCEL] is performed after [RELAY SCENE COMBINE] is performed, Relay Recording will be available again. If [RELAY SCENE COMBINE] is not performed and [Relay(AutoSw)] in [2 MEDIA FUNC.] is selected, a message will be displayed. You will be able to perform Relay Recording by selecting [YES] and press the button in the center, but you will not be able to perform the [RELAY SCENE COMBINE] after that.
● If an SD card containing the first portion of a relay-recorded scene is inserted into a card slot when [Relay(AutoSw)] is set, a message confirming whether to cancel the relay information is displayed. Selecting [YES] will cancel the relay information from the scene, while selecting [NO] will set [Relay(AutoSw)] to [OFF].

■ Backup recording

Same motion picture can be recorded on two SD cards.

● 🔁🔁 is displayed on the cards the motion pictures is recorded.
● If [SD CARD 1] has been selected as a recording destination for motion pictures in [MEDIA SELECT] (→ 26), the backup will be recorded on [SD CARD 2].
● It is recommended to record on the SD cards that are same speed class and same capacity when performing the backup recording.

(Relay recording)
● After Relay Recording, a recording destination for still pictures will also be switched to the other media.
(Backup recording)
● Backup recording will not be performed for still pictures.
● When performing backup recording, even in the case where an error has occurred in one of the media and recording has stopped, recording can be continued using the other media.
● When one of the media reaches its maximum recording time, the backup recording stops. If free space on the other media is still available, the recording will continue.

[TIME LAPSE REC]

A scene that moves slowly for long period of time is recorded frame by frame with an interval, and is recorded as a short time motion picture.
- A frame is recorded with a set recording interval. 30 frames will make up a motion picture of 1 second.
- **Switch to Manual Mode. (→ 38)**

⊙ MENU : **[RECORD SETUP]** → **[TIME LAPSE REC]** → **desired setting**

[OFF]:
Cancel the setting.
[1 SECOND]/[10 SECONDS]/[30 SECONDS]/[1 MINUTE]/[2 MINUTES]:
Change the recording interval.

- ⟷ appears on the screen.
- After recording, the setting of Interval Recording is canceled.

Setup example	Setup time (recording interval)	Recording time	Recorded time
Sunset	1 s	1 h	2 min
Blooming	30 s	3 h	12 s

- "h" is an abbreviation for hour, "min" for minute and "s" for second.
- These times are approximations.
- Maximum recordable time is 12 hours.

- Audio cannot be recorded.
- [REC FORMAT] is set to [HA 1080/60i].
- [TC MODE] is set to [NDF] and [TCG] is set to [REC RUN]. (→ 44)
- The shortest motion picture recording time is 1 second.
- [TIME LAPSE REC] is canceled in the following cases.
  - If you turn the unit off
  - If you change the mode
- The color balance and focus may not be adjusted automatically depending on the light source or scene. If so, manually adjust those settings. (→ 40, 42)

[ASPECT]

Image aspect ratio for the recording format [SA 480/60i] can be changed.
● **Set [REC FORMAT] to [SA 480/60i]. (→ 59)**

> ◉ MENU **: [RECORD SETUP] → [ASPECT] → desired setting**

[16:9]/[4:3]

● When using the LCD monitor, when the aspect ratio is set to [4:3], black bands are displayed on the left and right of the screen.

[ZOOM MODE]

Set the maximum zoom ratio for the Motion Picture Recording Mode.

> ◉ MENU **: [RECORD SETUP] → [ZOOM MODE] → desired setting**

[i.Zoom OFF]:	Up to 26×
[i.Zoom 50×]:	This zoom function allows you to maintain high-definition picture quality. (Up to 50×)
[D.Zoom 60×]:	Digital zoom (Up to 60×)
[D.Zoom 1500×]:	Digital zoom (Up to 1500×)

● The larger the digital zoom magnification, the more the image quality is degraded.
● This function cannot be used in Still Picture Recording Mode.

[PICTURE SIZE]   🎥 📷

The higher the number of pixels, the higher the clarity of the picture when printing.
● The number of recording pixels that can be set changes depending on selected screen aspect ratio. (→ 64)

■ Picture size and Maximum zoom ratio in Still Picture Recording Mode

● Change the mode to 📷 .

⊙ MENU **: [RECORD SETUP] → [PICTURE SIZE] → desired setting**

Picture size		Aspect ratio	Extra Optical Zoom (→ 36)
15.1M	4480×3360		–*
5.8M	2784×2088	4:3	–*
0.3M	640×480		50×
15.1M	4752×3168		–*
8M	3456×2304	3:2	–*
2M	1728×1152		26.2×
20.4M	6016×3384		26×
9.4M	4096×2304	16:9	26×
2.1M	1920×1080		28.9×

* Extra Optical Zoom cannot be used. The maximum zoom magnification is 21×.

■ Picture size in Motion Picture Recording Mode

● Change the mode to 🎥 .

⊙ MENU **: [RECORD SETUP] → [PICTURE SIZE] → desired setting**

Picture size		Aspect ratio	Recording format
9.4M	4096×2304		[PS 1080/60p]/[PH 1080/60i]/ [HA 1080/60i]/[HG 1080/60i]/ [HE 1080/60i]/[PM 720/60p]
2.1M	1920×1080	16:9	[PS 1080/60p]/[PH 1080/60i]/ [HA 1080/60i]/[HG 1080/60i]/ [HE 1080/60i]/[PM 720/60p]/ [SA 480/60i]
1.4M	1440×1080	4:3	[SA 480/60i]

● This function's default settings are 20.4M in Still Picture Recording Mode and 9.4M in Motion Picture Recording Mode.
● The recording will become longer depending on the recording pixels.
● Please refer to page 123 for details about the number of recordable pictures.

[ASPECT RATIO]

This allows you to select the aspect ratio of the pictures to suit printing or the playback method.

> (◎) MENU **: [RECORD SETUP] → [ASPECT RATIO] → desired setting**

[4:3]:	Aspect ratio of 4:3 television
[3:2]:	Aspect ratio of conventional film camera or prints (such as L-size print)
[16:9]:	Aspect ratio of high-definition television, etc.

- This function's default setting is [16:9].
- When the aspect ratio is set to [4:3] or [3:2], black bands may appear on the left and right of the screen.
- The edges of still pictures recorded on this unit with a [16:9] aspect ratio may be cut at printing. Check the printer or photo studio before printing.

[AUTO SLOW SHTR]

You can record bright pictures even in dark places by slowing the shutter speed.

> (◎) MENU **: [RECORD SETUP] → [AUTO SLOW SHTR] → [ON]**

- The shutter speed is set to 1/30 or more depending on the surrounding brightness.

- This function cannot be used in Still Picture Recording Mode.
- When the shutter speed becomes 1/30, the screen may be seen as if frames are missed and afterimages may appear.

[Wind Noise Canceler]

This will reduce the wind noise coming into the built-in microphones while maintaining the realism.
● **Switch to Manual Mode. (→ 38)**

> ⦿ MENU **: [RECORD SETUP] → [Wind Noise Canceler] → desired setting**

[Strong]:	When a strong wind is detected, this option effectively reduces the wind noise by minimising the low-pitched sound.
[Normal]:	This option extracts and reduces only the wind noise without deteriorating the sound quality.
[OFF]:	Cancel the setting.

● When [Normal] is set, ⩙ will be displayed on the screen. When [Strong] is set, ⩙| will be displayed on the screen.

● This function's default setting is [Normal].
● When switching to Intelligent Auto Mode, [Wind Noise Canceler] is set to [Strong], and the setting cannot be changed.
● You may not see the full effect depending on the recording conditions.
● This function cannot be set when using an external microphone.

[MIC SETUP]

Recording setting of the built-in microphone can be adjusted.

> ⦿ MENU **: [RECORD SETUP] → [MIC SETUP] → desired setting**

[STEREO MIC]:	Records sound from two forward directions.
[ZOOM MIC]:	Sound is recorded with changing the directionality in conjunction with the zoom operation. Sounds near the front of the unit are recorded more clearly if you zoom in (close-up) and surrounding sounds are recorded more realistically if you zoom out (wide angle).

[MIC LEVEL]

When recording, the input level from the built-in microphones and the external microphone terminal can be adjusted.

1 Select the menu.

⊙ MENU : **[RECORD SETUP] → [MIC LEVEL] → desired setting**

[AUTO]:	ALC is activated, and the recording level is adjusted automatically.
[SET ⁺ᴬᴸᶜ_ON]:	The desired recording level can be set. ALC is activated, and sound distortions are reduced.
[SET ⁺ᴬᴸᶜ_OFF]:	The desired recording level can be set. Sounds are recorded in natural quality.

2 (When [SET ⁺ᴬᴸᶜ_ON]/[SET ⁺ᴬᴸᶜ_OFF] is selected)
Adjust the microphone input level using the cursor button right or left.

● Adjust the microphone input level so that the last 2 bars of the gain value are not red. (Otherwise, the sound is distorted.) Select a lower setting for microphone input level.

3 Select [ENTER] and press the button in the center.

● Select [EXIT] and press the button in the center to complete the setting.
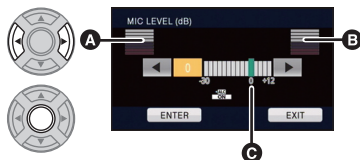
Ⓐ Left
Ⓑ Right
Ⓒ Microphone input level

● When [MIC SETUP] is [ZOOM MIC], the volume will be different depending on the zoom rate.
● The microphone input level meter shows the larger of the inputs from the 2 built-in microphones.
● You cannot record with the audio completely muted.

[LOWCUT]

This function reduces the low-pitched sound when using an external microphone.
● **Switch to Manual Mode. (→ 38)**

⊙ MENU : **[RECORD SETUP] → [LOWCUT] → [ON]**

● This function can be set only when using an external microphone.

Playback Operations

Motion picture playback using operation icon

For details on the basic playback operations, refer to page 32.

Playback operation	Playback display	Operating steps
Skip playback (to the start of a scene)	**During Playback** ▶▶ ◀◀ ■ ▶/❚❚	1) Open the LCD monitor. 2) Touch the LCD monitor and slide from right to left (from left to right) during playback. (This operation can be performed only by touch operation.)
Slow-motion Playback	**During Pause** ❚▶ ◀❚	**With the playback paused, select ❚▶ and continue pressing the button in the center. (◀❚ is for slow rewind playback)** Playback is slow while pressing the button in the center. ● Normal playback is restored when you select ▶/❚❚ and press the button in the center. ● When Slow-motion pictures are played back in reverse, they will be shown continuously at approximately 2/3rd the speed of normal playback (intervals of 0.5 seconds).
Frame-by-frame Playback	■ ▶/❚❚	**With the playback paused, select ❚▶ and press the button in the center. (Select ◀❚ and press the button in the center to advance the frames one at a time in the reverse direction.)** ● Normal playback is restored when you select ▶/❚❚ and press the button in the center. ● When the frames are advanced one at a time in the reverse direction, they will be shown in intervals of 0.5 seconds.

Playback operation	Playback display	Operating steps
Direct playback	**During Playback**	1) Open the LCD monitor. 2) Touch the direct playback bar or slide it while touching. (This operation can be performed only by touch operation.) ● The playback pauses temporarily and skips to the position touched or slid to while touching. ● Playback will start by releasing your touching or sliding finger.

Creating still picture from motion picture

A single frame from the recorded motion picture can be saved as a still picture.
Picture size of the still picture to be created will differ depending on the recording mode of the recorded motion picture.

Recording format	Aspect ratio	Picture size after creating still picture	
[PS 1080/60p]/ [PH 1080/60i]/ [HA 1080/60i]/ [HG 1080/60i]/ [HE 1080/60i]	16:9	2.1M	1920×1080
[PM 720/60p]	16:9	0.9M	1280×720
[SA 480/60i]	16:9	0.2M	640×360
	4:3	0.3M	640×480

Press the 📷 button at the location to be saved as a still picture during playback.

● It is convenient to use Pause, Slow-motion Playback and Frame-by-frame Playback.
● Date the motion picture was recorded will be registered as date of the still picture.
● Quality will be different from the normal still picture.

Repeat Playback

Playback of the first scene starts after playback of the last scene finishes.

> ⊚ MENU : **[VIDEO SETUP]** → **[REPEAT PLAY]** → **[ON]**

The ⟳ indication appears on the full screen views.
● All the scenes are played back repeatedly. (When playing back motion pictures by date, all the scenes on the selected date are played back repeatedly.)

Resuming the previous playback

If playback of a scene was stopped halfway, the playback can be resumed from where it was stopped.

MENU : **[VIDEO SETUP]** → **[RESUME PLAY]** → **[ON]**

If playback of a motion picture is stopped, ▷▷ appears on the thumbnail view of the stopped scene.

● The memorized resume position is cleared if you turn off the unit or change the mode. (The setting of [RESUME PLAY] does not change.)

Playing back motion pictures/still pictures by date

The scenes or the still pictures recorded on the same day can be played back in succession.

1 Select the date select icon and press the button in the center.
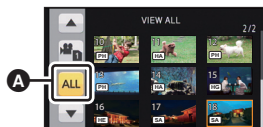
Ⓐ Date select icon

2 Select the playback date and press the button in the center.
The scenes or the still pictures recorded on the date selected are displayed as thumbnails.

3 Select the scene or the still picture to be played back and press the button in the center.

● Playing back of all the scenes or the still pictures returns if the unit is turned off or the mode is changed.
● In cases such as those described below, scenes and still pictures are grouped separately on the date list, and –1, –2… may be added after the date:
  – When the number of scenes exceeds 99
  – When the number of still pictures exceeds 999
  – When [REC FORMAT] is changed
  – When [TIME LAPSE REC] is used
  – When [ASPECT] is changed
  – When [NUMBER RESET] is performed
● The following scenes and still pictures are grouped separately on the date list, and icons are displayed according to the category:
  – Still pictures created from motion pictures: ⬇

Deleting scenes/still pictures

Deleted scenes/still pictures cannot be restored, so perform appropriate confirmation of
the contents before proceeding with deletion.

◇ **Change the mode to** ▶ **.**

■ To delete the scene or still picture being played back

Select 🗑 and press the button in the center while
scenes or still pictures to be deleted are being
played back.
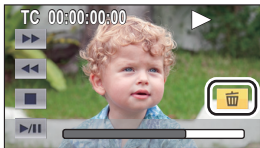
■ To delete scenes or still pictures from the thumbnail display

1 Select the menu.

⊙ MENU **: [VIDEO SETUP] or [PICT. SETUP] → [DELETE] → [ALL SCENES], [MULTI] or [SINGLE]**

● All the scenes or still pictures displayed as thumbnails will be deleted by selecting [ALL
SCENES].
(In case of playing back scenes or still pictures by date, all the scenes or still pictures on the
selected date will be deleted.)
● Protected scenes/still pictures cannot be deleted.

2 (When [MULTI] is selected in Step 1)
Select the scene/still picture to be deleted and press the button in the center.

● When the button in the center is pressed, the scene/still picture is selected (indicated by 🗑 on
the thumbnail).
To cancel the operation, select the scene/still picture and press the button in the center again.
● Up to 99 scenes can be selected to be deleted.

(When [SINGLE] is selected in Step 1)
Select the scene/still picture to be deleted and press the button in the center.

3 (When [MULTI] is selected in Step 1)
Select [Delete] and press the button in the center.

● To continuously delete other scenes/still pictures, repeat Steps 2-3.

- 70 -

When you stop deleting halfway:
Select [CANCEL] and press the button in the center while deleting.
- The scenes or still pictures that have already been deleted when the deletion is canceled cannot be restored.

To complete editing:
Select [Return] and press the button in the center.

- Scenes that cannot be played back (the thumbnails are displayed as [!]) cannot be deleted.
- In case of [ALL SCENES], the deletion may take time if there are many scenes or still pictures.
- If you delete scenes recorded on other products or still pictures conforming to DCF standard with this unit, all the data related to the scenes/still pictures may be deleted.
- When still pictures recorded on an SD card by other products are deleted, a still picture (other than JPEG) that cannot be played back on this unit, may be erased.

Protecting scenes/still pictures

▶

Scenes/still pictures can be protected so that they are not deleted by mistake.
(Even if you protect some scenes/still pictures, formatting the media will delete them.)
- **Change the mode to ▶ .**

1 Select the menu.

◎ MENU : **[VIDEO SETUP] or [PICT. SETUP] → [SCENE PROTECT]***

* If an Eye-Fi card that has been set on the computer as a card used for transferring selected files is in the unit when [PICT. SETUP] is selected, [TRANSFER/PROTECT] is displayed.

2 Select the scene/still picture to be protected and press the button in the center.

- When the button in the center is pressed, the scene/still picture is selected (indicated by O⊓ on the thumbnail).
  To cancel the operation, select the scene/still picture and press the button in the center again.
- Select [Return] and press the button in the center to complete the settings.

Watching Video/Pictures on your TV

▶

Confirm the terminals on your TV and use a cable compatible with the terminals. Image quality may vary with the connected terminals.

Ⓐ High quality
❶ HDMI terminal
❷ Component terminal
❸ Video terminal
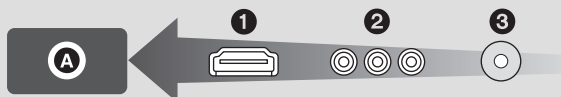
- Use the AV cable (supplied) or HDMI cable (commercially-available) and check the output settings.
- HDMI is the interface for digital devices. If you connect this unit to a HDMI compatible high-definition TV and then play back the recorded high-definition images, you can enjoy them in high resolution with high quality sound.

1 Connect this unit to a TV.
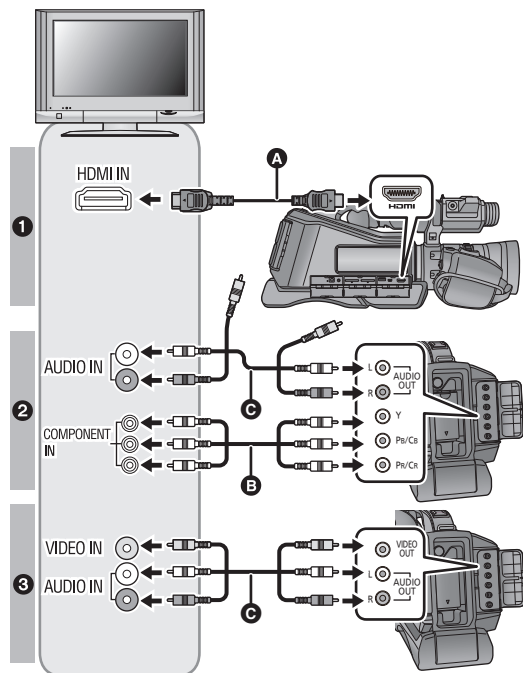
Ⓐ HDMI cable (commercially-available)
- Be sure to connect to the HDMI terminal.
- Connecting with a HDMI cable (→ 74)
Ⓑ Component cable (commercially-available)
Ⓒ AV cable (supplied)

Picture quality
❶ High-definition images when connecting to HDMI terminal
❷ High definition images when connecting to component terminal compatible with 1080i
Standard images when connecting to component terminal compatible with 480i
❸ Standard images when connecting to video terminal

- Check that the plugs are inserted as far as they go.
- Please use "High Speed HDMI Cables" that have the HDMI logo (as shown on the cover). Cables not conforming to the HDMI standard will not work. Panasonic HDMI cable is recommended.
  Part No.: RP-CHE15 (1.5 m (4.9 feet))
- When connecting to the component terminal of the TV, the yellow plug of the AV cable is not required.
- Do not use any other AV cables except the supplied one.

2 Select the video input on the TV.

- Example:
  Select the [HDMI] channel with a HDMI cable.
  Select the [COMPONENT] channel with a component cable.
  Select the [Video 2] channel with an AV cable.
  (The name of the channel may differ depending on the connected TV.)
- Check the input setting (input switch) and the audio input setting on the TV. (For more information, please read the operating instructions for the TV.)

3 Change the mode to ▶ to play back.

- When connected to the TV, sound in Playback Mode is not output from this unit. Also, since the volume cannot be adjusted with this unit, adjust the volume of the TV.

■ To watch images on a regular TV (4:3) or when both sides of the images do not appear on the screen

Change the menu setting to display the images correctly. (Check the TV setting.)

⊙ MENU : [OTHER FUNCTION] →
[TV ASPECT] → [4:3]
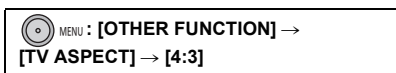
- If you set the option to [4:3] and connect this unit and the TV with the AV cable, images may be displayed in a reduced size.

Example of images with a [16:9] aspect ratio on a regular TV (4:3)

[TV ASPECT] setting	
[16:9]	**[4:3]**
	*

* The screen is displayed this way when [TV ASPECT] is set to [4:3] and [DOWN CONV.] is set to [LETTERBOX]. (→ 104)
- If a wide-screen TV is connected, adjust the aspect setting on the TV. (Refer to the operating instructions of the TV for details.)

- When [4:3] is set, the aspect ratio of an image displayed on the TV can be changed through the [DOWN CONV.] setting.
- When [DOWN CONV.] is set to [SIDE CROP], the sides of an image will be cut off, causing some icons on the TV to be hidden from the TV screen.

■ To display the on-screen information on the TV

When the menu setting is changed, the information displayed on the screen (operation icon and Counter display etc.) can be displayed/not displayed on the TV.

⊙ MENU : [SW & DISP SETUP] →
[VIDEO OUT OSD] → [ON] or [OFF]
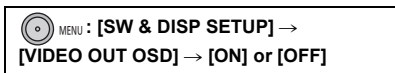
Connecting with a HDMI cable

Select the desired method of HDMI output.

⊙ MENU **: [OTHER FUNCTION] → [HDMI RESOLUTION] → desired setting**

[AUTO]/[1080p]/[1080i]/[720p]*/[480p]

* This is displayed only in Playback Mode.
- [AUTO] determines the output resolution automatically based on information from the connected TV.
  If the images are not output on the TV when the setting is [AUTO], switch to the method [1080p], [1080i], [720p] or [480p] which enables the images to be displayed on your TV. (Please read the operating instructions for the TV.)
- Images may not be displayed on the television for several seconds in some cases, such as when changing between scenes.
- When [HDMI RESOLUTION] is set to [AUTO], an image being recorded in [PM 720/60p] will be output to the TV in [1080p].
- When a scene recorded in [PM 720/60p] is played back on the TV, even if [HDMI RESOLUTION] is set to [1080p], the scene will be output in [720p].

Connecting with the component cable

Component output setting can be changed.

⊙ MENU **: [OTHER FUNCTION] → [COMPONENT OUT] → desired setting**

[480i]:	When connecting to the component terminal on the TV compatible with 480i. (Playback is in standard quality.)
[1080i]:	When connecting to the component terminal on the TV compatible with 1080i. (Playback is in high definition quality.)

Copying/playing back with an external drive

▶

If you connect an external drive (commercially-available) to this unit, you can copy motion pictures and still pictures recorded on this unit to an external drive.
It can also play back the scenes and still pictures copied to the external drive.
- You can copy scenes and still pictures recorded with this unit while maintaining the image quality.
- You can supply power to the external drive from this unit.
- A USB HDD or USB Flash Drive can be used as an external drive.
- Please read the operating instructions of the external drive for how to use it.

Preparing for copying/playing back

- In the following cases, an external drive cannot be used by connecting it to this unit:
    − An external drive with a capacity of below 512 MB or above 2 TB
    − When an external drive has two or more partitions
    − If an external drive is in a format other than FAT32
    − When connected by using a USB hub

> When an external drive that requires formatting is connected, a message is displayed. Follow the instructions on the screen to format it.
> IMPORTANT: Formatting the external drive will erase all data/content previously stored on the external drive and cannot be recovered. Back up important data on your computer before formatting the external drive. Panasonic will not be liable for lost data/content.
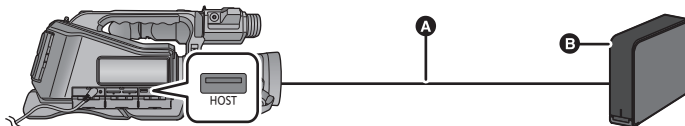
Ⓐ USB Connection Cable (supplied with recommended external drive)
Ⓑ Recommended external drive (commercially-available)

1 Connect this unit to the AC adaptor and change the mode to ▶ .
- When the AC adaptor is not connected to this unit, the external drive cannot be used.

2 Set [USB MODE] to [HOST]. (→ 99)

3 Connect this unit to the external drive with the USB Connection Cable (supplied with external drive).
- Connect the USB Connection Cable to the HOST slot of this unit's USB terminal.
- It may take several minutes until the connection is completed.

4 **Select the desired item and press the button in the center.**

[Simple copy]:	Copies all scenes and still pictures recorded with this unit that have not been copied yet. (→ 77)
[Copy selected files]:	Allows you to select desired scenes/still pictures, and then copy. (→ 78)
[Playback from External Drive]:	Plays back scenes and still pictures stored in an external drive on this unit. (→ 79)
[Safe Removal]:	Allows you to safely remove this unit and an external drive.

● Following can be performed by connecting the external drive with the scenes and still pictures copied from this unit to other devices.
  – Playback on Panasonic TV with a USB terminal
  – Dub onto the Panasonic Blu-ray disc recorder with a USB terminal

When the external drive is connected to other devices such as Blu-ray disc recorder, a message prompting to format the external drive may display. All the scenes and still pictures recorded on the external drive will be erased if formatted. Do not format as important data will get erased and it will be impossible to restore.

∎ **Points to check before copying**

● **When using an external drive for the first time, or using an external drive that has been used with other devices, a message is displayed. Follow the on-screen instructions to format the external drive.**
● Before copying, go to [MEDIA STATUS] to check the amount of free space on the external drive.
● In the following cases, copying may take longer:
  – There are lots of scenes
  – The temperature of this unit is high
● If you copy protected scenes or still pictures, the protection setting of the copied scenes or still pictures are canceled.
● The order in which the scenes were copied cannot be changed.

Before you delete the data on the media after copying is complete, be sure to play back the external drive to check that they have been copied to correctly. (→ 79)

∎ Formatting

This is for initializing the external drive.

● **Please be aware that if a media is formatted then all the data recorded on the media is erased and cannot be recovered. Back up important data on a PC etc.**
● **Connect this unit to the external drive and select [Playback from External Drive] and press the button in the center.**

(⊙) MENU **: [OTHER FUNCTION] → [FORMAT MEDIA] → [EXTERNAL]**

● When formatting is complete, select [EXIT] and press the button in the center to exit the message screen.
● Connect this unit and the external drive to format.
  You may no longer be able to use the external drive if you format them on another device such as a PC etc.

∎ Displaying media information

The used space of the external drive can be checked.

● **Connect this unit to the external drive and select [Playback from External Drive] and press the button in the center.**

(⊙) MENU **: [OTHER FUNCTION] → [MEDIA STATUS]**

● If you select [CHANGE MEDIA] and press the button in the center, you can switch the display between the SD card 1, SD card 2 and external drive.

Simple copy

1 **Connect this unit to the external drive to prepare for copying. (→ 75)**

2 **Select [Simple copy] and press the button in the center.**

● When [Copy selected files] or [Playback from External Drive] is selected, terminate the connection with the external drive (→ 79), and then perform the operation of Step 1.

3 **Select the media you want to copy and press the button in the center.**

4 **Select [YES] and press the button in the center.**

5 **Select [EXIT] and press the button in the center when the copy complete message is displayed.**

● The thumbnail view of the copy destination is indicated.

When you stop copying halfway:
Select [CANCEL] and press the button in the center while copying.

Copy selected files

1 **Connect this unit to the external drive to prepare for copying. (→ 75)**

2 **Select [Copy selected files] and press the button in the center.**

● You can also copy scenes or still pictures by pressing ⊙ MENU, selecting [COPY] → [Copy selected files].

3 **Select the media you want to copy and press the button in the center.**

[1 ➡ 🖴]:	When copying from the SD card 1 to the external drive.
[2 ➡ 🖴]:	When copying from the SD card 2 to the external drive.

4 **Following the instructions on the screen, select the desired items and press the button in the center.**

● It will return to the previous step by selecting ↰ and press the button in the center.
● (When [SELECT SCENES] is selected)
  When pressed the button in the center, the scene/still picture is selected and the 🗂 indication appears on the thumbnail. Select the scene/still picture and press the button in the center again to cancel the operation.
● (When [SELECT DATE] is selected)
  When pressed the button in the center, the date is selected and surrounded by red. Select the date and press the button in the center again to cancel the operation.
● Up to 99 scenes/ 99 dates can be selected continuously.
● When the selected scenes include a scene recorded as the first portion of relay-recording, a message is displayed. Selecting [NEXT] and pressing the button in the center will recombine the relayed portions into one scene and copy it to the external drive. If the other media has no second portion of the relay-recorded scene, only the first portion will be copied. Regardless of the presence of the second portion, the relay information will not be canceled. To relay-record a new scene, perform [RELAY INFO CANCEL] (→ 80).

5 **Select [EXIT] and press the button in the center when the copy complete message is displayed.**

● The thumbnail view of the copy destination is indicated.

When you stop copying halfway
Select [CANCEL] and press the button in the center while copying.

Playing back the external drive

● Only motion picture/still picture that have been copied by connecting this unit to the external drive can be played back.
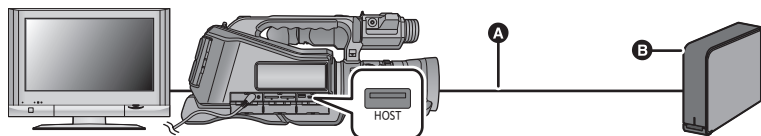
Ⓐ USB Connection Cable (supplied with recommended external drive)
Ⓑ Recommended external drive (commercially-available)

1 Connect this unit to the external drive to prepare for playback. (→ 75)

● When playing back on a TV, connect this unit to the TV. (→ 72)

2 Select [Playback from External Drive] and press the button in the center.

3 Select the scene or still picture to be played back and press the button in the center, then play it back.

● The playback operation is performed the same as when playing back motion pictures or still pictures. (→ 32, 67)

To terminate the connection between this unit and the external drive
1 Select the play mode select icon and press the button in the center.
2 Select 🛒 and press the button in the center.
● Disconnect the USB Connection Cable from this unit.

● It is also possible to switch the media to play back by selecting the play mode select icon and press the button in the center.
When the external drive is connected, the 🥞 (external drive) can be selected from the displayed media types. (→ 32)
● Deleting scenes and still pictures on the external drive may take time.
● You cannot set the following items during playback of 🥞 (external drive).
  − [SCENE PROTECT]
  − [RELAY INFO CANCEL]
  − [USB MODE]

Relay scene combining

When a scene is relay-recorded (→ 60) from either of the SD cards to the other, the divided pieces can be recombined into one scene in an external drive.

Relay-recorded scene	Relay scene combining
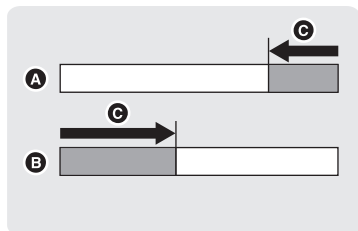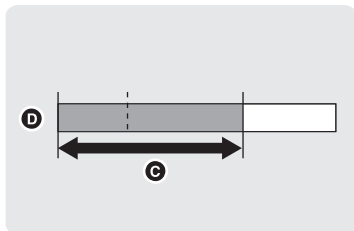
Ⓐ First media of relay-recording
Ⓑ Second media of relay-recording
Ⓒ Range of Relay Recording
Ⓓ External drive

1 **Insert SD cards containing relay-recorded scenes into card slot 1 and card slot 2.**

2 **Connect this unit to the external drive to prepare for playback (→ 75).**

3 **Select [Playback from External Drive] and press the button in the center.**

4 **Select the menu.**

⦿ MENU **: [COPY] → [RELAY SCENE COMBINE]**

5 **When the confirmation message appears, select [YES] and press the button in the center.**

6 **When the relayed scene combining operation is complete, a screen asking you to select [DELETE RELAY SCENE], [RELAY INFO CANCEL], or [EXIT] appears.**

[DELETE RELAY SCENE]:	The relay-recorded scene is deleted.
[RELAY INFO CANCEL]:	Relay information is deleted from the relay-recorded scene.
[EXIT]:	Select this item to exit the relayed scene combining operation and return to the thumbnail screen.

● The thumbnail view of the external drive is indicated.

Combining of the relay scene cannot be performed if the available space on the external drive is less than the volume of the relayed scene.
Use an external drive with sufficient free space.

Dubbing

Dubbing with a Blu-ray disc recorder

● In this manual, "Blu-ray disc recorder" is referred to as "BD recorder".

Insert a memory card containing video shot in AVCHD mode using the camera into a BD recorder manufactured by Panasonic to save the contents in a Blu-ray Disc, DVD, or HDD.

● Use a BD recorder that supports AVCHD. However, dubbing may not be performed even when AVCHD is supported. For details on how to perform dubbing onto a Blu-ray Disc, read the operating instructions of the BD recorder.

● When dubbing of videos shot with the camera is performed on a Blu-ray Disc (BD-RE, BD-R), HDD,or DVD, metadata information supported by the camera will be lost.

---

1 **Remove the memory card from the camera after shooting.**

Turn the power of the camera off before removing the memory card.

2 **Insert the memory card into the memory card slot of the BD/DVD recorder.**

For details on how to perform dubbing onto a Blu-ray Disc, read the operating instructions of the BD/DVD recorder.

Using the Eye-Fi card

By using an Eye-Fi card (commercially-available), you can record motion pictures and still pictures on the card, and save them on a PC or upload them on a file-sharing website via a wireless network.

- The functions of the Eye-Fi card (including wireless transmission) are not guaranteed to work on this product. In the case of a malfunction of the card, please contact the card manufacturer.
- To use the Eye-Fi transfer feature, a broadband wireless LAN environment is required.
- To use the Eye-Fi card, permission from the national or regional government is required. Do not use if you have not obtained permission. If you are unsure as to whether use is permitted, please check with the card manufacturer.
- To prevent the interception of communications, misuses, identity thefts, etc., we strongly recommend you configure the appropriate security settings (encryption settings). For details, refer to the manuals of your Eye-Fi card and access point.
- **Install the software supplied with the Eye-Fi card in advance on your PC, and configure the Eye-Fi settings. (For settings methods etc., please read the card operating instructions or consult the card manufacturer)**

- **Insert an Eye-Fi card (commercially available) into card slot 2 of the unit.**
- (When using in the Motion Picture Recording Mode or Still Picture Recording Mode)
  Set the [SD CARD 2] to be used as the recording media. (→ 26)
  (When using in the Playback Mode)
  Select the play mode select icon from the thumbnail screen, and set the media to [SD CARD 2]. (→ 32)

Select the menu.

⊙ MENU : **[SW & DISP SETUP] → [Eye-Fi TRANSFER] → [ON]**

- When [Eye-Fi TRANSFER] is set to [ON], the transferable files will be transferred automatically.
- To cancel the transferring of a file, turn off the unit or set [Eye-Fi TRANSFER] to [OFF].
- The setting at the time of purchase is [OFF]. Every time the Eye-Fi card is removed from the unit, this setting is set to [OFF].
- Eye-Fi transfers are not available during motion picture recording.
- You can check the file transfer status on the thumbnail screen.

📶	File has been transferred
📶	File waiting for transfer
📶	File cannot be transferred

■ Using Eye-Fi direct mode

The files can be transferred directly from the Eye-Fi card to a smartphone without going through the wireless access point when necessary setting is performed in a PC in advance.

● **Install the software supplied with the Eye-Fi card on your PC, and configure the Eye-Fi direct mode settings.**

Select the menu.

(◎) MENU : **[SW & DISP SETUP]** → **[Eye-Fi DIRECT]**

● This mode is displayed only when [Eye-Fi TRANSFER] is set to [ON].
● The mode will be canceled using the following steps.
  − When the unit is turned off
  − If you start recording motion picture
  In addition to the steps above, the mode may also be canceled by the Eye-Fi card.
● When connected via Eye-Fi direct mode, [ECONOMY (BATT)]/[ECONOMY (AC)] are disabled.

■ Selecting files to transfer

If you perform the required settings in advance on your PC, you can transfer selected files alone.
For settings methods etc., please read the card operating instructions or consult the card manufacturer.

● **Install the software supplied with the Eye-Fi card on your PC, and configure the selection transfer settings.**
● **Change the mode to ▶ .**

Select the menu.

(◎) MENU : **[PICT. SETUP]** → **[TRANSFER/PROTECT]**

● The setting method is the same as that for the scene protect settings. (→ 71)
● If the selected transfer setting is not configured on the computer, [SCENE PROTECT] is displayed and the selected transfer setting cannot be configured.
● When the write protect switch on the Eye-Fi card is on the LOCK side, [SCENE PROTECT] is displayed and selected transfer setting is disabled. Please unlock the write protect switch.
● The protect setting is also applied to the files for which [TRANSFER/PROTECT] is set. To delete a file, first cancel [TRANSFER/PROTECT] and then perform the operation.

■ Using the [Eye-Fi FILE SIZE] function

You can select the maximum file size recorded on the Eye-Fi Card.

● **Change the mode to ▶ .**

Select the menu.

(◎) MENU : **[SW & DISP SETUP]** → **[Eye-Fi FILE SIZE]** → **desired settings**

[4GB]:	The file is created with the maximum size of 4 GB. Set 2 GB since video files over 2 GB cannot be transferred.
[2GB]:	The file is created with the maximum size of 2 GB.

● When using the Eye-Fi card for recording, the maximum size of a file that can be recorded on other media also follows the setting of this menu.

∎ Using the [Eye-Fi Power Management] function

Set the power source for Eye-Fi transfers.
● **Change the mode to ▶ .**
Select the menu.

◎ MENU **: [SW & DISP SETUP] → [Eye-Fi Power Management] → desired settings**

| **[BOTH]:** | Eye-Fi transfers are possible with either the AC adaptor or the battery. |
| **[AC]:** | Eye-Fi transfers are possible only when the AC adaptor is in use. |

● The Eye-Fi menu only appears when an Eye-Fi card is used.
● The Eye-Fi transfer feature cannot be guaranteed to continue to operate in the future due to changes to the card specification etc.
● Update the firmware of the Eye-Fi card to the latest one using the software supplied with the Eye-Fi card before use.
● When the endless memory function of the Eye-Fi card is set to on, the files transferred from the card may be deleted automatically.
● The Eye-Fi card may heat up as a result of the files being transferred. Note that the use of an Eye-Fi card accelerates the battery drain, so we recommend you use the card in Playback Mode.
● The Eye-Fi setting can be checked while pausing the recording.

Displayed icons	**Eye-Fi setting**
📶	**[Eye-Fi TRANSFER] is set to [OFF]**
📶(White)/ 📶*(White)	**[Eye-Fi TRANSFER] is set to [ON] and the unit is not connected to the network.**
📶(Green)/ 📶*(Green)	**[Eye-Fi TRANSFER] is set to [ON] and the unit is connected to the network or is transferring a file.**
📶 / 📶*	**[Eye-Fi TRANSFER] is set to [ON] and a file transfer has been interrupted.**

* These are displayed only when [Eye-Fi DIRECT] is used.
● If the Eye-Fi card is removed and then reinserted into the unit, set functions related to Eye-Fi again from the menu.
● When using the Eye-Fi card, please be sure to unlock the write-protect switch. (→ 16)
● Before deleting the files, please confirm they have been transferred to your PC and uploaded to the sharing site.
● Do not use the Eye-Fi card in locations where the use of wireless devices is forbidden, such as inside aircraft etc.
● Depending on network conditions, the transfer may take some time. Also, if network conditions deteriorate, the transfer may be suspended.

Connecting to a PC (File transfer/nonlinear editing)

When this device and a computer for editing are connected using a USB Connection Cable, image data in the SD card can be transferred.

● Concerning non-linear editing, refer to the instruction manual of your editing software.
● It is impossible to write data to the SD card on this unit from a PC

Operating environment (mass storage)

■ If using Windows

PC	IBM PC/AT compatible PC
OS	Windows 8 (32 bit/64 bit) Windows 7 (32 bit/64 bit) or SP1 Windows Vista (32 bit) (SP2)
CPU	1 GHz or higher 32-bit (x86) or 64-bit (x64) processor (including compatible CPU)
RAM	Windows 8/Windows 7: 1 GB or more (32 bit)/2 GB or more (64 bit) Windows Vista Home Basic: 512 MB or more Windows Vista Home Premium/Business/Ultimate/Enterprise: 1 GB or more
Interface	USB port
Other requirements	Mouse or equivalent pointing device

● Even if the system requirements mentioned in these operating instructions are fulfilled, some PCs cannot be used.
● Operation is not guaranteed in the following cases.
   − When 2 or more USB devices are connected to a PC, or when devices are connected through USB hubs or by using extension cables.
   − Operation on an upgraded OS.
   − Operation on an OS other than the one pre-installed.
● This software is not compatible with Microsoft Windows 3.1, Windows 95, Windows 98, Windows 98SE, Windows Me, Windows NT and Windows 2000.
● This software is not guaranteed on Microsoft Windows XP.
● The USB equipment operates with the driver installed as standard in the OS.

∎ If using Mac

PC	Mac
OS	Mac OS X 10.8.4
CPU	Intel Core 2 Duo or better
RAM	2 GB or more
Interface	USB port
Other requirements	Mouse or equivalent pointing device

● Even if the system requirements mentioned in these operating instructions are fulfilled, some PCs cannot be used.
● The USB equipment operates with the driver installed as standard in the OS.

Connecting to a PC
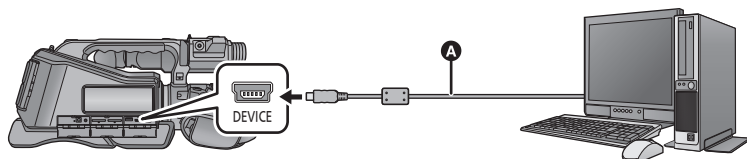
Ⓐ USB cable (supplied)
● Insert the plugs as far as they will go.

1 Connect this unit to the AC adaptor.
● Use the AC adaptor to free you from worrying about the battery running down.

2 Turn on the unit.

3 Set [USB MODE] to [DEVICE]. (➝ 99)

4 Connect this unit to a PC.
● The USB function selection screen will appear.

5 Select [PC] on the screen of this unit and press the button in the center.
● This unit is automatically recognized as an external drive of the PC. (➝ 89)
● When you select an option other than [PC], reconnect the USB cable.
● When using the battery, the LCD monitor turns off after about 5 seconds. Press the cursor button to turn the LCD monitor on.

● Do not use any other USB cables except the supplied one. (Operation is not guaranteed with any other USB cables.)
● When performing reading/writing between a PC and an SD card, be aware that some SD card slots built into PCs and some SD card readers are not compatible with the SDHC Memory Card or SDXC Memory Card.
● If you are using an SDXC Memory Card, some PC may not recognize the data. Make sure your PC supports SDXC cards.

■ To disconnect USB cable safely

(If using Windows)

Select the ⬛ icon in task tray displayed on the PC, and then click [Eject AVCCAM Handheld].

● Depending on your PC's settings, this icon may not be displayed.

(If using Mac)

Drag [CAM_SD] disk icon to the [Trash], and then disconnect the USB cable.

About the screen indication of the unit

● Do not disconnect the USB cable, battery, or AC adaptor while the access lamp is on or card access icon (⬛) appears on the unit screen.

● If the screen does not change when the unit is operated while connected to a PC, disconnect the battery and/or AC adaptor, wait approximately 1 minute, reconnect the battery and/or AC adaptor, wait approximately 1 minute again, and then turn the unit back on. (Data may be destroyed when above operation is performed while accessing the SD card.)

About the PC display

When the unit is connected to a PC, it is recognized as an external drive.
● Removable disk (Example: CAM_SD (F:)) is displayed in [Computer].

Data recorded using AVCHD format has excellent compatibility with computers, due to its file form; however, it contains not just image and sound data, but also various important information, and it is associated using a folder structure which is like a figure. If even part of this information is changed or erased, faults may occur; for example, it may not be possible for the data to be recognized as AVCHD data, or it may no longer be possible for the SD card to be used in an AVCHD device.
Data from a computer cannot be written to the SD card of this device.

Example folder structure of an SD card:
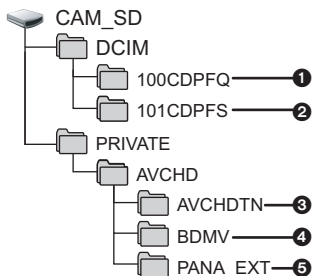
The following data will be recorded.
❶ **JPEG format still pictures (up to 999 still pictures can be recorded. ([11000001.JPG], etc.))**
❷ **JPEG format still pictures created from the motion picture**
❸ **The motion picture thumbnails**
❹ **AVCHD format motion picture files ([00000.MTS] etc.)**
❺ **For management**

● Do not delete the SD card's folders. Doing so may make the SD card unusable in this unit.
● When data not supported by this unit has been recorded on a PC, it will not be recognized by this unit.
● Always use this unit to format SD cards.

CAM_SD
  DCIM
    100CDPFQ ────── ❶
    101CDPFS ────── ❷
  PRIVATE
    AVCHD
      AVCHDTN ─── ❸
      BDMV ────── ❹
      PANA_EXT ─❺

Using the Menu

Refer to page 23 for how to set up the Menu.
All default settings are indicated with underlined text.

Camera Setup

Menu items displayed are different depending on the position or setting of the mode switch.

⊚ MENU **: [CAMERA SETUP] → desired setting**

[SCENE MODE]

When you record images in different situations, this mode automatically sets optimum shutter speeds and apertures. (→ 54)
● Switch to Manual Mode. (→ 38)

[OFF]/ 🏃 / 🦋 / 😊 / 🎇 / 🐟 / 🌅 / ⛄ / 🏔 / ❄ / 🌃 / 🕯

[Intelligent Auto Plus]

You can add manually-adjusted brightness and color balance settings to the Intelligent Auto Mode, and record. (→ 55)
● Switch to Intelligent Auto Mode. (→ 30)

[SET]/[OFF]

[PICTURE ADJUST]

Adjust the quality of the image while recording. (→ 56)
● Switch to Manual Mode. (→ 38)

[LEVEL SHOT]

This function detects the horizontal tilt of the unit, and automatically corrects it to the level position before recording. (→ 57)

[ON]/[OFF]

- 90 -

[DRS]

This brightens parts that are in shadow and difficult to see and suppresses white saturation in bright parts at the same time. Both bright and dark parts can be recorded clearly. (➜ 49)
● Switch to Manual Mode. (➜ 38)

[ON]/[OFF]

[I.EXPOSURE]

This brightens dark areas so the image can be recorded clearly. (➜ 50)
● Switch to Manual Mode. (➜ 38)

[ON]/[OFF]

[COLOR NIGHT REC]

This function allows you to record color images in very low light situations. (Minimum required illumination: approx. 1 lx) (➜ 57)
● Switch to Manual Mode. (➜ 38)

[ON]/[OFF]

[TELE MACRO]

A more impressive image can be obtained by focusing on the object only in close-up and shading off the background. (➜ 58)

[ON]/[OFF]

[BACKLIGHT COMPENS.]

This makes the image brighter to prevent darkening of a backlit subject. (➜ 50)

[ON]/[OFF]

Recording Setup

Menu items displayed are different depending on the position or setting of the mode switch.

> ⊙ MENU **: [RECORD SETUP] → desired setting**

[REC FORMAT]

Switch the picture quality and recording format of the motion pictures to record. (→ 59)

[PS 1080/60p]/[PH 1080/60i]/[HA 1080/60i]/[HG 1080/60i]/[HE 1080/60i]/[PM 720/60p]/
[SA 480/60i]

[2 MEDIA FUNC.]

You can set the relay recording and backup recording. (→ 60)

[OFF]/[Relay(AutoSw)]/[BACKUP]

[TIME LAPSE REC]

A scene that moves slowly for long period of time is recorded frame by frame with an interval, and is recorded as a short time motion picture. (→ 61)
● Switch to Manual Mode. (→ 38)

[OFF]/[1 SECOND]/[10 SECONDS]/[30 SECONDS]/[1 MINUTE]/[2 MINUTES]

[ASPECT]

Image aspect ratio for the recording format [SA 480/60i] can be changed. (→ 62)

[16:9]/[4:3]

[ZOOM MODE]

Set the maximum zoom ratio for the Motion Picture Recording Mode. (→ 62)

[i.Zoom OFF]/[i.Zoom 50×]/[D.Zoom 60×]/[D.Zoom 1500×]

[TC MODE]

Select the compensation mode for the time code. (→ 44)

[DF]/[NDF]

[TCG] 🎥

Sets the way the time code will move. (→ 44)

[FREE RUN]/[REC RUN]

[TC PRESET] 🎥

Initial value of the time code can be set. (→ 45)

[UB PRESET] 🎥

User Information can be set. (→ 46)

[COUNTER DISPLAY] 🎥

You can change a counter display that indicates how much time has elapsed during recording or playback. (→ 43)

[TC]/[UB]/[COUNTER]/[OFF]

[COUNTER RESET] 🎥

Set the Recording Counter to 0:00:00. (→ 47)

[PRE-REC] 🎥

This allows recording of the pictures and sound to start approximately 3 seconds before the recording start/stop button is pressed. (→ 50)

[ON]/[OFF]

[O.I.S.] 📷

You can select the Optical Image Stabilizer setting. (→ 37)

[MODE1]/[MODE2]

[PICTURE SIZE] 🎥 📷

The higher the number of pixels, the higher the clarity of the picture when printing. (→ 63)

(Motion Picture Recording Mode)
9.4м / 2.1м / 1.4м
(Still Picture Recording Mode)
15.1м / 5.8м / 0.3м / 15.1м / 8м / 2м / 20.4м / 9.4м / 2.1м

[ASPECT RATIO] 📷

This allows you to select the aspect ratio of the pictures to suit printing or the playback method.
(→ 64)

[4:3]/[3:2]/[16:9]

[HYBRID O.I.S.] 🎥

You can set the Hybrid Optical Image Stabilizer. (→ 37)

[ON]/[OFF]

[AUTO SLOW SHTR] 🎥

You can record bright pictures even in dark places by slowing the shutter speed. (→ 64)

[ON]/[OFF]

[Wind Noise Canceler] 🎥

This will reduce the wind noise coming into the built-in microphones while maintaining the realism.
(→ 65)
● Switch to Manual Mode. (→ 38)

[Strong]/[Normal]/[OFF]

● **This item is not displayed when an external microphone is connected.**

[MIC SETUP] 🎥

Recording setting of the built-in microphone can be adjusted. (→ 65)

[STEREO MIC]/[ZOOM MIC]

[MIC LEVEL] 🎥

When recording, the input level from the built-in microphones and the external microphone terminal
can be adjusted. (→ 66)

[AUTO]/[SET 🔼ALC ON]/[SET 🔼ALC OFF]

[LOWCUT] 🎥

This function reduces the low-pitched sound when using an external microphone. (→ 66)
● Switch to Manual Mode. (→ 38)

[ON]/[OFF]

Switch and display setting

Menu items displayed are different depending on the position or setting of the mode switch.

⊙ MENU : **[SW & DISP SETUP]** → **desired setting**

[MEDIA SELECT]   🎥 📷

[SD CARD 1] and [SD CARD 2] can be selected separately to record motion pictures or still pictures. (→ 26)

[ZOOM RING]   🎥 📷

Sets the rotation direction and zoom operation of the multi manual ring. (→ 36)

[DOWN TELE]:	Close-up images can be recorded when it is turned toward B.
[UP TELE]:	Close-up images can be recorded when it is turned toward A.

[SHUTTER RING]   🎥 📷

Sets the rotation direction and shutter speed control of the multi manual ring. (→ 41)

[DOWN SLOW]:	Shutter speed will be slow when it is turned toward B.
[UP SLOW]:	Shutter speed will be slow when it is turned toward A.

[IRIS RING]   🎥 📷

Sets the rotation direction and iris control of the multi manual ring. (→ 41)

[DOWN OPEN]:	Iris will open when it is turned toward B.
[UP OPEN]:	Iris will open when it is turned toward A.

[SELECT OPERATION ICONS]　　　　　　　🎥 📷

You can change the operation icons (→ 48) to display on the screen.
Register 4 favorite operation icons.
● The default settings are, FA (Focus Assist), 🖼 (DRS), 🔲 (Level Gauge) and Menu (Menu) for Motion Picture Recording Mode, and FA (Focus Assist), 🌓 (Intelligent Exposure), 🔲 (Level Gauge) and Menu (Menu) for Still Picture Recording Mode.

1　**Select [SELECT OPERATION ICONS] and press the button in the center.**
2　**Select the operation icon you would like to change to cancel the setting.**
3　**Select the operation icon to be set.**
● To cancel, select the operation icon again.
4　**Select [ENTER] and press the button in the center.**

[ZEBRA]　　　　　　　🎥 📷

Selects the brightness level of the left-leaning zebra patterns on the screen. (→ 51)

[ON]/[OFF]

[MARKER]　　　　　　　🎥 📷

Displaying of the luminance level display marker can be switched. (→ 52)

[ON]/[OFF]

[FADE]　　　　　　　🎥

When you start recording, the image/audio gradually appears. (Fade in)
When you pause recording, the image/audio gradually disappears. (Fade out)
Please refer to page 49.

[ON]/[OFF]

[FADE COLOR]　　　　　　　🎥

You can select the color for fade in/out. (→ 49)

[WHITE]/[BLACK]

[GUIDE LINES]　　　　　　　🎥 📷

You can check if the image is level while recording or playing back motion pictures and still pictures. The function can also be used to estimate the balance of the composition. (→ 51)

[OFF]/☰/⊞/▦

[HISTOGRAM] 🎥 📷

A graph with brightness as horizontal axis and number of pixels at that brightness as vertical axis is displayed. It is possible to determine the exposure of the whole image by looking at the distribution in the graph. (➔ 52)

[ON]/[OFF]

[FOCUS ASSIST] 🎥 📷

The in-focus area is displayed in red. (➔ 49)

[ON]/[OFF]

[SAFETY ZONE] 🎥

Display of the range that can be displayed with the common household TV (safety zone) can be switched.

Aspect ratio	Safety zone
[16:9]	[16:9 90%]/[4:3 100%]/[4:3 90%]/[OFF]
[4:3]	[4:3 90%]/[OFF]

● The safety zone is not displayed on the images that is actually recorded.

[REC COUNTER] 🎥

Select the counting method during the recording. (➔ 47)

[TOTAL]/[SCENE]

[VIDEO OUT OSD] 🎥 📷 ▶

When the menu setting is changed, the information displayed on the screen (operation icon and Counter display etc.) can be displayed/not displayed on the TV. (➔ 73)

[ON]/[OFF]

[DATE/TIME]   📹 📷 ▶

It is possible to change the date and time display mode.

[OFF]/[TIME]/[DATE]/[DATE&TIME]

[DATE FORMAT]   📹 📷 ▶

It is possible to change the date format.

[Y/M/D]/[M/D/Y]/[D/M/Y]

[LEVEL METER]   📹 ▶

Select to display the audio level meter.

[ON]/[OFF]

● **This item is not displayed when a still picture is selected in Playback Mode.**

[LENS STATUS]   📹 📷

Display relating to lens can be switched. (Zoom Display, Optical Image Stabilizer, Focus Display, White Balance, Iris, Gain, Auto Iris, Shutter Speed, Level Shot Function)

[ON]/[OFF]

[MEDIA & BATTERY]   📹 📷 ▶

Display can be switched between the remaining recordable time of the SD card and the remaining battery capacity indication.

[ON]/[OFF]

[OTHER DISPLAY]   📹 📷 ▶

Display which remains displayed even when [SELECT OPERATION ICONS], [GUIDE LINES], [SAFETY ZONE], [DATE/TIME], [LEVEL METER], [LENS STATUS] and [MEDIA & BATTERY] are set to [OFF] can be switched.

[ON]/[OFF]

[POWER LCD]   📹 📷 ▶

This makes it easier to view the LCD monitor in bright places including outdoors. (→ 20)

🔆₂/🔆₁/🔆₀/🔆₋₁/🔆ᴀ *

* It is not displayed in the Manual Mode or in the Playback Mode.

[LCD SET]　　　　　　　　　　　　　　　🎥　📷　▶

It adjusts brightness and color density on the LCD monitor. (➜ 20)

[EVF SET]　　　　　　　　　　　　　　　🎥　📷　▶

Brightness of the viewfinder can be switched. (➜ 21)

[BRIGHT]/[<u>NORMAL</u>]/[DARK]

[SELF SHOOT]　　　　　　　　　　　　　　🎥　📷

Switches the mirror function of the LCD monitor when recording yourself. (➜ 21)
The image on the LCD monitor is displayed mirrored horizontally during recording of yourself when it is set to [MIRROR].

[<u>MIRROR</u>]/[NORMAL]

[SUB REC BUTTON]　　　　　　　　　　　　🎥　📷

Enable/disable of the sub recording start/stop button on the handle can be switched.

[<u>ON</u>]:	The sub recording start/stop button is enabled.
[OFF]:	The sub recording start/stop button is disabled.

[SUB ZOOM]　　　　　　　　　　　　　　🎥　📷

Enable/disable of the sub zoom lever on the handle can be switched. Zoom speed will be different depending on the setting.

[OFF]:	Sub zoom lever is disabled.
[LOW]:	Sub zoom lever is enabled. (Zoom speed: Slow)
[<u>MID</u>]:	Sub zoom lever is enabled. (Zoom speed: Standard)
[HIGH]:	Sub zoom lever is enabled. (Zoom speed: Fast)

[USB MODE]　　　　　　　　　　　　　　　　▶

The unit's USB terminal to which a USB cable will be connected can be switched.
Switch the terminal according to the shape of the USB cable's plug you intend to connect to the unit.

[<u>DEVICE</u>]:	For connecting to the USB terminal (Type mini B) of the unit
[HOST]:	For connecting to the USB terminal (Type A) of the unit

[Eye-Fi TRANSFER] 🎥 📷 ▶

This item is displayed only when an Eye-Fi card is inserted.
Please refer to page 82.

[ON]/[<u>OFF</u>]

[Eye-Fi DIRECT] 🎥 📷 ▶

This item is displayed only when an Eye-Fi card is inserted.
Please refer to page 83.

[Eye-Fi FILE SIZE] 🎥 📷

This item is displayed only when an Eye-Fi card is inserted.
Please refer to page 83.

[4GB]/[<u>2GB</u>]

[Eye-Fi Power Management] 🎥 📷

This item is displayed only when an Eye-Fi card is inserted.
Please refer to page 84.

[<u>BOTH</u>]/[AC]

Other Functions

Menu items displayed are different depending on the position or setting of the mode switch.

⊙ MENU **: [OTHER FUNCTION] → desired setting**

[FORMAT MEDIA]   🎥 📷 ▶

The SD cards or external drive can be formatted.
● Please be aware that if a medium is formatted, then all the data recorded on the medium will be erased and cannot be restored. Back up important data on a PC, DVD disc etc. (➜ 85)

[SD CARD 1]/[SD CARD 2]/[EXTERNAL]*

* Displayed when connecting an external drive. (➜ 75)

● When formatting is complete, select [EXIT] and press the button in the center to exit the message screen.
● Perform a physical formatting of the SD card when the SD card is to be disposed/ transferred. (➜ 120)

● Do not turn this unit off or remove the SD card, while formatting. Do not expose the unit to vibrations or shock.

Use this unit to format media.
Do not format an SD card using any other equipment such as a PC. The card may not be used on this unit.

[MEDIA STATUS]   🎥 📷 ▶

The used space and remaining recordable time of the SD card can be checked.

● Selecting [CHANGE MEDIA] and pressing the button in the center switches the unit between the display for the SD card 1 and the display for the SD card 2.
● When the mode switch is set to 🎥 , remaining recordable time for the selected recording format is displayed.
● Select [EXIT] and press the button in the center to close the indication.

● The SD card requires some space to store information and manage system files, so the actual usable space is slightly less than the indicated value. The usable SD card space is generally calculated as 1 GB=1,000,000,000 bytes. The capacities of this unit, PCs and software are expressed as 1 GB=1,024×1,024×1,024=1,073,741,824 bytes. Therefore, the indicated value of the capacity appears to be smaller.

[REC LAMP]

The recording lamp lights up during recording.
When this is set to [OFF], it does not light during recording.

[ON]/[OFF]

[RING LED (BLUE)]

The ring LED lights up blue in Motion Picture Recording Mode or Still Picture Recording Mode.

[ON]/[5 SECONDS]/[OFF]

- When [5 SECONDS] is set, the ring LED lights up for 5 seconds after the unit is turned on or the recording mode is switched.
- When [RING LED (RED)] is set to [ON], the ring LED does not light up blue during recording.

[RING LED (RED)]

The ring LED lights up red during recording.

[ON]/[OFF]

- When the [REC LAMP] is set to [OFF], this item cannot be set.

[CLOCK SET]

Please refer to page 22.

[TIME ZONE]

Time difference from the Greenwich Mean Time can be set. (→ 22)

[ALERT SOUND]

Touch screen operation, starting and stopping of recording and unit on/off can be confirmed with this sound.
When [OFF] is selected, the sound is not output at the start/end of recording, etc.

◁)) :	**Volume low**
◁))) :	**Volume high**
[OFF]:	**Cancel the setting.**

2 Beeps for 4 times
When an error occurs, follow the instructions displayed on the screen. (→ 111)

[SHTR SOUND]

You can add a shutter sound when recording still pictures.

♪ :	Volume low
♪))) :	Volume high
[OFF]:	**Cancel the setting.**

● No shutter sound is emitted in Motion Picture Recording Mode.

[ECONOMY (BATT)]

When about 5 minutes have passed without any operation, this unit automatically turns off to save battery life.

[ON]/[OFF]

● This unit will not automatically turn off even if [ECONOMY (BATT)] is set to [ON] in following cases:
  − Using the AC adaptor*
  − Using the USB cable for PC etc.
  − PRE-REC is used
* When [ECONOMY (AC)] is activated, this unit automatically turns off.

[ECONOMY (AC)]

When about 30 minutes have passed without any operation while connecting AC adaptor with this unit, this unit automatically turns off.

[ON]/[OFF]

● This unit will not automatically turn off even if [ECONOMY (AC)] is set to [ON] in following cases:
  − Using the USB cable for PC etc.
  − PRE-REC is used

[QUICK POWER ON]

The unit is put into recording pause approx. 1 second when the unit is turned on with the mode set to 🎥 or 📷 .

[ON]/[OFF]

● Depending on the recording conditions, start time may be longer than 1 second.
● In the Quick Power On Mode, the zoom magnification becomes approx. 1×.

[TV ASPECT]   🎥 📷 ▶

Please refer to page 73.

[16:9]/[4:3]

[DOWN CONV.]   🎥 📷 ▶

This function allows you to select how to display images with a 16:9 aspect ratio on a TV with a 4:3 aspect ratio.

[SIDE CROP]/[LETTERBOX]/[SQUEEZE]

[HDMI RESOLUTION]   🎥 📷 ▶

Select the desired method of HDMI output. (→ 74)

[AUTO]/[1080p]/[1080i]/[720p]*/[480p]

* This is displayed only in Playback Mode.

[COMPONENT OUT]   🎥 📷 ▶

Component output setting can be changed. (→ 74)

[480i]/[1080i]

[INITIAL SET]   🎥 📷

Set to [YES] for changing the menu settings back to the default condition.
● Settings for [REC FORMAT], [MEDIA SELECT], [CLOCK SET] and [LANGUAGE] will not be changed.

[NUMBER RESET]   🎥 📷 ▶

Set the file number of the still picture recorded next to 0001.
● Folder number is updated and file number will start from 0001. (→ 89)
● To reset the folder number, format the SD card, and then perform [NUMBER RESET].

[SYSTEM INFO]   🎥 📷 ▶

The version of the firmware of this device is displayed.

[UPDATE]   📹 📷 ▶️

The firmware of this device is updated. (→ 116)

[OPERATION TIME]   📹 📷 ▶️

The accumulated operating time of this device is displayed.

[H/PHONE MODE]   📹 📷

Selects the sound heard through the headphones.

[LIVE]:	The sound which has been input from the microphone is output as is. This setting is selected when delays in the sound are annoying.
[RECORDING]:	The sound in the status which is to be recorded (the sound synchronized with the images) is output.

● When this unit is connected to a TV using the HDMI cable (optional), audio at the time of the [RECORDING] setting is output even if this setting is set to [LIVE].

[LANGUAGE]   📹 📷 ▶️

You can select the language on the screen display and the menu screen.

[English]/[Français]/[Español]

Video Setup

● **Change the mode to** ▶ **and select the play mode select icon. (→ 32)**

⊙ MENU **: [VIDEO SETUP] → desired setting**

[REPEAT PLAY]

Playback of the first scene starts after playback of the last scene finishes when set to [ON]. (→ 68)

[ON]/[OFF]

[RESUME PLAY]

If playback of a scene was stopped halfway, the playback can be resumed from where it was stopped when set to [ON]. (→ 69)

[ON]/[OFF]

[SCENE PROTECT]

Scenes can be protected so that they are not deleted by mistake.
(Even if you protect some scenes, formatting the SD card will delete them.) (→ 71)

[DELETE]

Deletes a scene. (→ 70)

[RELAY INFO CANCEL]

To cancel relay information
● When the relay information is canceled, combining of the relayed scenes will not be possible anymore.

Picture Setup

▶

● **Change the mode to** ▶ **and select the play mode select icon. (➔ 32)**

⦿ MENU **: [PICT. SETUP] → desired setting**

[SCENE PROTECT]

▣▶

Still pictures can be protected so that they are not deleted by mistake.
(Even if you protect some still pictures, formatting the SD card will delete them.) (➔ 71)

[DELETE]

▣▶

Deletes a still picture. (➔ 70)

Copy

▶

● **Change the mode to** ▶ **. (➔ 18)**

⦿ MENU **: [COPY] → desired setting**

[Simple copy]

🎞▶ ▣▶

Copies all scenes and still pictures recorded with this unit that have not been copied yet. (➔ 77)

[Copy selected files]

🎞▶ ▣▶

Allows you to select desired scenes/still pictures, and then copy. (➔ 78)

[RELAY SCENE COMBINE]

🎞▶

When a scene is relay-recorded (➔ 60) from either of the SD cards to the other, the divided pieces can be recombined into one scene in an external drive. (➔ 80)

Indications

■ **Recording indications**

Example: For USA

Motion Picture Recording Mode	Still Picture Recording Mode

TC 00:00:00:00   PRE-REC   ❙❙ MNL ▭   **Ⓐ**
1 R 1h20m ➡
2 R 1h20m   MF
PH 1080   AWB
🔲 ☀   99%↑   1/100   **Ⓑ**
⚙ ZOOM   OPEN
                 0dB
ALC 🔇 🎙 ... ⊕ ⓘ B 🌙   12:34:56   **Ⓒ**
⊡D 📊   NOV 15 2013

1 R 3000   ◎ MNL ▭
2 R 3000   🔲 MF
20.4M   MEGA AWB
🔲 ☀   ●   1/100
             OPEN
             0dB
... ⊕ ⓘ ▷   12:34:56
            NOV 15 2013

Ⓐ

🅘🅐 / 🅘🅐 / 🅘🅐 / 🅘◎ / 🅘👤 / 🅘🌷
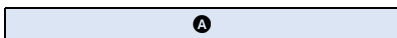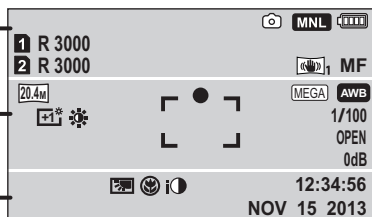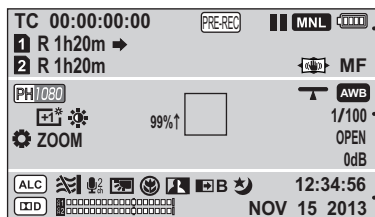
Intelligent Auto Mode (➜ 30)

🅘🅐⁺ / 🅘🅐⁺ / 🅘🅐⁺ / 🅘◎⁺ / 🅘👤⁺ / 🅘🌷⁺

Intelligent Auto Plus Mode (➜ 55)

🎆 / 🏃 / 😊 / 👤 / 🐛 / ≈ / ⛷ / 🏔 / ❄ /
🌄 / 🕯

Scene Mode (➜ 54)

MNL	Manual Mode (➜ 38)
●/❙❙ **(Red)**	Recording
❙❙ **(Green)**	Recording pause
TC 00:00:00:00	Counter display (➜ 43)
▭	Remaining battery power (➜ 15)
🔋	Battery charging icon
1 / **2** **(White)**	Card recording possible status
1 / **2** **(Green)**	Recognizing the card
R 1h20m	Remaining time for motion picture recording (➜ 27)

("h" is an abbreviation for hour, "m" for minute.)

➡	Relay Recording (➜ 60)
🔁🔁	Backup recording (➜ 60)

◎ **(White)**	Still picture recording icon
⬤ **(Red)**	Recording still picture
R3000	Remaining number of still pictures (➜ 29)
PRE-REC	PRE-REC (➜ 50)
↤	Time Lapse Recording (➜ 61)

◀🔲▶ / 🔲 / 🔲₁ / 🔲₂

Image Stabilizer (➜ 37)

MF	Manual Focus (➜ 42)
AF	Auto Focus (➜ 31)

B

⊞ᴬ / ⊞₂ / ⊞₁ / ⊟₁

Power LCD (➜ 20)

☀	Picture Adjustment (➜ 56)
▼	Level Shot Function (➜ 57)
1/100	Shutter Speed (➜ 41)
OPEN/F2.0	Iris value (➜ 41)
0dB	Gain value (➜ 41)

○ **(White)/● (Green)**

Focus indication (➜ 28)

📶 / 📶 / 📶 / 📶 / 📶

Eye-Fi transfer (➜ 84)

PS1080 / **PH**1080 / **HA**1080 / **HG**1080 / **HE**1080 / **PM**720 / **SA**

Motion Picture Recording Mode (➜ 59)

15.1ᴍ / 5.8ᴍ / 0.3ᴍ / 15.1ᴍ / 8ᴍ / 2ᴍ / 20.4ᴍ / 9.4ᴍ / 2.1ᴍ

Number of recording pixels for still pictures (➜ 29, 63, 68)

In Playback Mode, the picture size is not displayed for still pictures recorded with other products that have different picture sizes from the sizes shown above.

MEGA	MEGA OIS (➜ 28)
99%↑	Marker (➜ 52)

AWB / ☼ / ☁ / 🔆 / 💡 / 📷
White Balance (➜ 40)

⚙ FOCUS/⚙ WB/⚙ SHUTTER/⚙ IRIS/
⚙ ZOOM

Ring operation icons

C

☀	Backlight Compensation (➜ 50)
⚘	Tele Macro (➜ 58)
🔲	DRS (➜ 49)

Microphone Level (➜ 66)

➡W / ➡B	Fade (White), Fade (Black) (➜ 49)
★	Color Night View function (➜ 57)
i○	Intelligent Exposure (➜ 50)

(For USA)

NOV 15 2013	Date indication (➜ 22)
12:34:56	Time indication (➜ 22)

(For others)

11 15 2013	Date indication (➜ 22)
12:34:56	Time indication (➜ 22)
🎤ZOOM	Zoom Microphone (➜ 65)
🎤2ch	Stereo Microphone (➜ 65)
≋ / ≋ǀ	Wind Noise Canceller (➜ 65)
ALC	2 ch Microphone ALC (➜ 66)
🔲	Audio recording format (Dolby Digital) (➜ 65)

- 109 -

■ Playback indications

▶/❙❙/▶▶/▶▶▶/◀◀/◀◀◀/▶❙/◀❙/▶▶❙/❙◀◀/
▶❙/◀❙/❙❙▶/◀❙❙

Display during playback (→ 33, 67)

TC 00:00:00:00	Counter display (→ 43)
No.10	Scene Number
⟳	Repeat Playback (→ 68)
▷▷	Resume Playback (→ 69)
100-0001	Still picture folder/file name
Oᴛᴛ	Transfer/Protected motion pictures/still pictures (→ 71, 83)

PS / PH / HA / HG / HE / PM / SA

Recording format (→ 32)

📶/📶/📶	Eye-Fi transfer status (→ 82)

■ Indication of connection to external Drive

📀	External Drive Playback (→ 79)

■ Indication of connection to other devices

↤	Accessing the card (→ 88)

■ Confirmatory indications

–– (Time display)	The built-in battery is low. (→ 22)
⚠	Warning for recording of yourself (→ 21)
⬛	SD card is not inserted or is incompatible.
🅿	SD card is write-protected.
🆇	SD card is non-compatible.
🅵	SD card is full.
🅾	Playback-only SD card

Messages

Major confirmation/error messages to be indicated on the screen in text.

CHECK CARD.

This card is not compatible or it cannot be recognized by the unit.
If this message appears even though motion pictures and still pictures are recorded on an SD card, the card may be unstable. Reinsert the SD card, then turn the unit off and then on again.

THIS EXTERNAL DRIVE CANNOT BE USED./
PLEASE CHECK THE EXTERNAL DRIVE.

The external drive that this unit cannot recognize is connected. Check if the external drive can be connected and used with this unit and try to reconnect. (➔ 75)

INVALID/CANNOT SET.

Since there is a condition to use the function, it is required to cancel/change other settings.

About recovery

If faulty management information is found, the messages may appear and a repair is performed. (Repairing may take time depending on the error.)
● │ ! │ is displayed when abnormal management information is detected when the scenes are displayed in thumbnail.

■ AVCCAM Restorer

Restoration can be performed using AVCCAM Restorer.
It can be downloaded from the website. See the following web site and click the "Service and Support" tab.

   http://pro-av.panasonic.net/en/

● For details on usage, please read the AVCCAM Restorer Operating Instructions (PDF file).

● Use a sufficiently charged battery or the AC adaptor.
● Depending on the condition of the data, it may not be possible to completely repair the data.
● If recovery fails, it will not be possible to play back scenes recorded before the unit turned off.
● When data recorded on another device is recovered, it may not be possible to play back the data on this unit or the other device.
● If recovery fails, turn the unit off and on again after waiting awhile. If recovery fails repeatedly, format a media on the unit. Please be aware that if a media is formatted, then all the data recorded on the media will be erased.
● If the thumbnail information is recovered, displaying the thumbnails may become slower.

Troubleshooting

■ It is not a malfunction in following cases

A clicking sound is heard when the unit is shaken.	● This is the sound of the lens moving and is not a defect. This sound will no longer be heard when the unit is turned on and change the mode to 🎥 or 📷 .
Object seems to be warped.	● Object seems to be warped slightly when the object moves across the image very fast, but this is because the unit is using MOS for the image sensor. This is not a malfunction.
The lens or LCD monitor fog up.	● This is due to condensation. It is not a malfunction. Please refer to page 2.

Power	
Problem	**Check points**
This unit cannot be turned on. **This unit does not stay on long enough.** **Battery runs down quickly.**	● Charge the battery again to ensure it is sufficiently charged. (→ 13) ● In cold places, the battery using time becomes shorter. ● The battery has a limited life. If the operating time is still too short even after the battery is fully charged, the battery has worn out and needs to be replaced.
This unit cannot be operated though it is turned on. **This unit does not operate normally.**	● Remove the battery or AC adaptor, wait about 1 minute and then reconnect the battery or AC adaptor. Then about 1 minute later, turn on the unit again. (Conducting the above operation while the media is being accessed may damage the data on the media.) ● If normal operation is still not restored, detach the power connected, and consult the dealer who you purchased this unit from.
"ERROR OCCURRED. PLEASE TURN UNIT OFF, THEN TURN ON AGAIN." is displayed.	● The unit has automatically detected an error. Restart the unit by turning the unit off and on. ● The unit will be turned off in about 1 minute if the unit is not turned off and on. ● Repair is needed if it is repeatedly displayed even if it is restarted. Detach the power connected, and consult the dealer who you purchased this unit from. Do not attempt to repair the unit by yourself.

Indication	
Problem	**Check points**
Function display (Remaining Display, Counter Display, etc.) is not displayed	● [MEDIA & BATTERY] or [OTHER DISPLAY] of the [SW & DISP SETUP] is [OFF]. (→ 98)

Recording	
Problem	**Check points**
The unit arbitrarily stops recording.	● Use an SD card that can be used for motion picture recording. (→ 16) ● The recordable time may have shortened due to the deterioration of the data writing speed or repeated recording and deletion. Using the unit, format the SD card. (→ 101)
Auto Focus function does not work.	● Switch to Intelligent Auto Mode or Intelligent Auto Plus Mode. ● If you are trying to record a scene which is hard to bring into focus in Auto Focus Mode, use the Manual Focus Mode to adjust the focus. (→ 31, 42)
Color balance of images is strange when recording in a place such as a gymnasium.	● In a place with multiple light sources, such as a gymnasium or a hall, set the White Balance setting to 🔅2 (Indoor mode 2). If you cannot record clearly with the 🔅2 (Indoor mode 2), set it to 🖐 (Manual adjustment mode). (→ 40)
Color or brightness of the image changes, or you may see horizontal bars in the image. **The LCD monitor flickers indoors.**	● Color or brightness of the image may change, or you may see horizontal bars in the image when the object is recorded under fluorescent light, mercury light or sodium light, etc., but this is not a malfunction. ● In Motion Picture Recording Mode, record in Intelligent Auto Mode or set the shutter speed to 1/60 in areas where the power supply frequency is 60 Hz, or 1/100 in areas of 50 Hz. ● In Still Picture Recording Mode, this will not affect the recorded image.

Playback	
Problem	**Check points**
Scenes/still pictures cannot be played back.	● Any scenes/still pictures where the thumbnails are displayed as ☐ ! ☐ cannot be played back.
Scenes cannot be deleted.	● Release the protect setting. (➜ 71) ● Any scenes/still pictures where the thumbnails are displayed as ☐ ! ☐ cannot be deleted. If the scenes/still pictures are unnecessary, format the media to erase the data. (➜ 101) Please be aware that if a media is formatted then all the data recorded on the media is erased and cannot be recovered. Back up important data on a PC, disc etc.

With other products	
Problem	**Check points**
Although this unit is correctly connected to a TV, images or sounds cannot be seen. **The images are squeezed horizontally.**	● Please read the operating instructions of your TV and select the channel that matches the input used for the connection. ● Change the [TV ASPECT] setting to match the aspect ratio of the TV. (➜ 73) ● The audio during playback mode is not output from this unit when connected to a TV. Sound levels cannot be adjusted using this unit, so adjust the sound on the TV.
If the SD card is inserted in another device, it is not recognized.	● Check that the device is compatible with the capacity or type of SD card (SD Memory Card/SDHC Memory Card/SDXC Memory Card) that you inserted. Refer to the operating instructions of the device for details.
When connected by the USB cable, this unit is not detected by the other devices.	● When connected to other devices using only the battery, reconnect using the AC adaptor.
Cannot copy scenes on the SD card by connecting to other equipment with the USB cable.	● Other equipment might have not recognized the SD card. Unplug the USB cable once, and reconnect it.

With a PC	
Problem	**Check points**
When connected by the USB cable, this unit is not detected by the PC.	● After re-inserting the SD card into the unit, reconnect the supplied USB cable. ● Select another USB terminal on the PC. ● Check the operating environment. (→ 85, 86) ● Connect the supplied USB cable again after restarting the PC and turning on this unit again.
When the USB cable is disconnected, an error message will appear on the PC.	● To disconnect the USB cable safely, double-click the icon in the task tray and follow the instructions on the screen.

Others	
Problem	**Check points**
If the SD card is inserted in this unit, it is not recognized.	● If the SD card is formatted on a PC, it may not be recognized by this unit. Use this unit to format SD cards. (→ 25)

∎ If AVCHD scenes do not change smoothly when played back on another device

The images may be still for several seconds at the joins between the scenes if the following operations are performed when multiple scenes have been continuously played back using another unit.

● Just how smoothly the scenes will be played back depends on the playback unit. Depending on the unit used, the images may stop moving and become still for a moment even when none of the following conditions are applicable.
● A continuous recording of motion picture data that exceeds 4 GB may momentarily stop at every 4 GB of data when played back with another device.

Principal reasons for not playing back smoothly
● **When [REC FORMAT] is changed**
● **When the scenes were recorded on different dates**
● **When scenes lasting under 3 seconds have been recorded**
● **When PRE-REC was used for recording**
● **When the Time Lapse Recording is used**
● **When deleting scenes**
● **When scenes recorded more than 99 scenes on the same date**

Updating the firmware incorporated into the unit

To check the latest information on the firmware and update methods, see the following web site and click the "Service and Support" tab.
http://pro-av.panasonic.net/en/

Cautions for use

About this unit

> The unit and the SD card become warm during use. This is not a malfunction.

Keep this unit as far away as possible from electromagnetic equipment (such as microwave ovens, TVs, video games etc.).
- If you use this unit on top of or near a TV, the pictures and/or sound on this unit may be disrupted by electromagnetic wave radiation.
- Do not use this unit near cell phones because doing so may result in noise adversely affecting the pictures and/or sound.
- Recorded data may be damaged, or pictures may be distorted, by strong magnetic fields created by speakers or large motors.
- Electromagnetic wave radiation generated by microprocessors may adversely affect this unit, disturbing the pictures and/or sound.
- If this unit is adversely affected by electromagnetic equipment and stops functioning properly, turn this unit off and remove the battery or disconnect AC adaptor. Then reinsert the battery or reconnect AC adaptor and turn this unit on.

Do not use this unit near radio transmitters or high-voltage lines.
- If you record near radio transmitters or high-voltage lines, the recorded pictures and/or sound may be adversely affected.

Make sure to use the supplied cords and cables. If you use optional accessories, use the cords and the cables supplied with them.
Do not extend the cords and the cables.

Do not spray insecticides or volatile chemicals onto the unit.
- If the unit is sprayed with such chemicals, its body may be marred and the surface finish may peel off.
- Do not leave rubber or plastic products in contact with the unit for a long time.

When you use the unit in a sandy or dusty place such as a beach, do not let sand or fine dust get into the body and terminals of the unit.
Also, keep the unit away from sea water.
- Sand or dust may damage the unit. (Care should be taken when inserting and removing a card.)
- If sea water splashes onto the unit, wipe off the water with a well wrung cloth. Then wipe the unit again with a dry cloth.

When carrying the unit, do not drop or bump it.
- A strong impact can break the unit's casing, causing it to malfunction.
- When carrying this unit, please hold the hand strap or shoulder strap firmly and treat it with care.

Cleaning
- Before cleaning, detach the battery or pull the AC cable from the AC outlet, and then wipe the unit with a soft, dry cloth.
- If the unit is very dirty, dip a cloth in water and squeeze firmly, and then wipe the unit with the damp cloth. Next, dry the unit with a dry cloth.
- Use of benzine, paint thinner, alcohol, or dishwashing liquid may alter the camera body or peel the surface finish. Do not use these solvents.
- When using a chemical dust cloth, follow the instructions that came with the cloth.

Do not use the unit for surveillance purposes or other business uses.
- This unit was designed for consumer intermittent use. It was not intended for continuous use, or for any industrial or commercial application resulting in prolonged use.
- In certain situations, continuous use could cause the unit to overheat and cause a malfunction. Such use is strongly discouraged.

When you are not going to use the unit for an extended time

- When storing the unit in a cupboard or cabinet, it is recommended that you place a desiccant (silica gel) in with it.

Do not lift up this unit by the handle with the tripod still attached
- When the tripod is attached, its weight will also affect the unit's handle, possibly causing the handle to break and hurting the user.
- To carry the unit while the tripod is attached, take hold of the tripod.

Do not swing the unit around, shake it by, or allow it hang from the handle
- Do not jar, swing, or shake the unit by its handle. Any strong jolt to the handle may damage the unit or result in personal injury.

Do not allow the cord to drag on the ground or pull a connected cord along the passage
- The cord will be damaged, causing fire or electrical shock, when the cord gets caught by the feet, excite will also cause personal injury.

About the battery

The battery used in this unit is a rechargeable lithium-ion battery. It is susceptible to humidity and temperature and the effect increases the more the temperature rises or falls. In cold areas, the full charge indication may not appear or the low battery indication may appear about 5 minutes after starting use. At high temperatures, the protection function may be triggered, making it impossible to use the unit.

Be sure to detach the battery after use.
- If the battery is left attached, a minute amount of current continues to flow even if the unit is off. Keeping the unit in this state may result in over discharge of the battery. This may result in you not being able to use the battery even after it is charged.
- The battery should be stored in the vinyl bag so metal does not come into contact with the terminals.
- The battery should be stored in a cool place free from humidity, with as constant temperature as possible. (Recommended temperature: 15 °C to 25 °C (59 °F to 77 °F), Recommended humidity: 40%RH to 60%RH)
- Extremely high temperatures or low temperatures will shorten the life of the battery.
- If the battery is kept in high-temperature, high-humidity, or oily-smoky places, the terminals may rust and cause malfunctions.
- To store the battery for a long period of time, we recommend you charge it once every year and store it again after you have completely used up the charged capacity.
- Dust and other matter attached to the battery terminals should be removed.

Prepare spare batteries when going out for recording.
- Prepare batteries enough to last for 3 to 4 times the period you are planning to record for. Cold places such as a ski resort can shorten recording time.

If you drop the battery accidentally, check to see if the terminals are damaged.
● Inserting a battery with damaged terminals can damage the unit.

Do not throw an old battery into fire.
● Heating a battery or throwing it into a fire may result in an explosion.

If the operating time is very short even after the battery has been recharged, the battery has worn out. Please purchase a new battery.

About the AC adaptor

● If the temperature of the battery is extremely high or extremely low, charging may take time or the battery may not be charged.
● If you use the AC adaptor near a radio, radio reception may be disturbed. Keep the AC adaptor 1 m (3.3 feet) or more away from the radio.
● When using the AC adaptor, it may generate whirring sounds. However, this is normal.
● After use, be sure to disconnect the AC adaptor. (If it is left connected, a minute amount of current is consumed.)
● Always keep the electrodes of the AC adaptor and battery clean.

About charging lamp during charging

When the charging lamp is flashing, the following should be considered.

Flashing with approx. 4 second period (off for approx. 2 seconds, on for approx. 2 seconds):
● When the battery is over discharged or the temperature of the battery is too high or low. It can be charged, but it may take a few hours to complete the charging normally.
● Once normal charging starts, the charging lamp lights up green. However, depending on the conditions of use, even when normal charging is taking place, the charging lamp may keep flashing in approx. 4 second intervals until charging is completed.

Flashing with approx. 0.5 second period (off for approx. 0.25 second, on for approx. 0.25 second):
● The battery is not charged. Remove the battery from the unit, and try charging again.
● Check that the terminals of the unit or battery are not dirty or covered with a foreign object, and connect the battery correctly once again. If a foreign object or dirt is present, turn off the unit before removing.
● The battery or environment is at an extremely high or low temperature. Wait until the temperature has returned to an appropriate level and try charging again. If you are still unable to charge, there may be a fault in the unit, battery or AC adaptor.

Off:
● Charging has finished.
● If the status indicator stays off despite the charging being unfinished, there may be a fault in the unit, battery or AC adaptor. Refer to page 118 for details on the battery.

About the SD card

When disposing of or giving away the SD card, note that:
- Formatting and deletion of data on this unit or computer only changes the file management information and does not completely delete the data in the SD card.
- It is recommended that the SD card is physically destroyed or the SD card is physically formatted using this unit when disposing of or giving away the SD card.
  To physically format the SD card, connect the unit via the AC adaptor, select [OTHER FUNCTION] → [FORMAT MEDIA] → [SD CARD 1] or [SD CARD 2] from the menu, and then press and hold the recording start/stop button or sub recording start/stop button on the screen below for about 3 seconds. When the SD card data deletion screen appears, select [YES], and then follow the on-screen instructions.
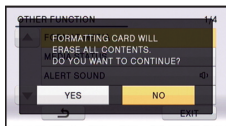
LCD monitor/viewfinder

- When the LCD screen is dirty or condensation has occurred, please wipe it using a soft cloth such as eyeglass cleaner.
- Do not touch the LCD monitor with your fingernails, or rub or press with strong force.
- It may become hard to see or hard to recognize the touch when the LCD protection sheet is affixed.
- When the unit has become very cold, for example due to storage in a cold area, its LCD monitor will be slightly darker than usual immediately after the unit is turned on. The normal brightness will be restored when the unit's internal temperature rises.

Extremely high precision technology is employed to produce the LCD Monitor screen. The result is more than 99.99% effective dots with a mere 0.01% of the dots inactive or always lit. However, this is not a malfunction and does not affect the recorded picture.

Extremely high precision technology is employed to produce the viewfinder screen. The result is more than 99.99% effective dots with a mere 0.01% of the dots inactive or always lit. However, this is not a malfunction and does not affect the recorded picture.

About copyright

■ Carefully observe copyright laws

IMPORTANT

"Unauthorized recording of copyrighted television programs, video tapes and other materials may infringe the right of copyright owners and be contrary to copyright laws."

■ Licenses

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- "Eye-Fi" is a trademark of Eye-Fi, Inc.

- Other names of systems and products mentioned in these instructions are usually the registered trademarks or trademarks of the manufacturers who developed the system or product concerned.

This product is licensed under the AVC patent portfolio license for the personal and non-commercial use of a consumer to (i) encode video in compliance with the AVC Standard ("AVC Video") and/or (ii) decode AVC Video that was encoded by a consumer engaged in a personal and non-commercial activity and/or was obtained from a video provider licensed to provide AVC Video. No license is granted or shall be implied for any other use. Additional information may be obtained from MPEG LA, LLC.
See http://www.mpegla.com.

- Separate license contracts must be obtained from MPEG LA where SD Memory Cards containing information recorded with this product are to be distributed to end users for commercial purposes. "End user" refers to persons or organizations handling such contents for personal use.

Recording formats/approximate recordable time

● SD cards are only mentioned with their main memory size. The stated times are the approximate recordable times for continuous recording.

Recording format		[PS 1080/60p]	[PH 1080/60i]	[HA 1080/60i]	[HG 1080/60i]	[HE 1080/60i]
Picture size/ Frame rate		1920×1080/ 60p	1920×1080/ 60i	1920×1080/ 60i	1920×1080/ 60i	1440×1080/ 60i
SD card	4 GB	19 min	21 min	30 min	40 min	1 h 30 min
	16 GB	1 h 20 min	1 h 30 min	2 h	2 h 40 min	6 h 40 min
	64 GB	5 h 20 min	6 h	8 h 30 min	11 h	27 h 30 min

Ⓐ Favors image quality
Ⓑ Favors Recording time

Recording format		[PM 720/60p]	[SA 480/60i]
Picture size/ Frame rate		1280×720/ 60p	720×480/ 60i
SD card	4 GB	1 h 10 min	1 h
	16 GB	4 h 40 min	4 h
	64 GB	19 h	16 h 30 min

● "h" is an abbreviation for hour, "min" for minute.
● If recording for long periods, prepare batteries for 3 or 4 times the period you wish to record for. (→ 14)
● The default setting is [PH 1080/60i].
● Maximum continuously recordable time for one scene: 6 hours
● The recording is paused once when the recording time for one scene exceeds 6 hours, and the recording will automatically resume after a few seconds.
● The recordable time may be reduced if recording with a lot of action is recorded or recording of short scene is repeated.
● Use time in the row of 4 GB in above table as a guideline for the time that can be copied onto one DVD disc (4.7 GB).

Approximate number of recordable pictures

- SD cards are only mentioned with their main memory size. The stated number is the approximate number of recordable pictures.

Picture size		20.4M 6016×3384	9.4M 4096×2304	2.1M 1920×1080
Aspect ratio		16:9		
SD card	**4 GB**	300	650	3200
	16 GB	1300	2700	12500
	64 GB	5000	10500	52000

Picture size		15.1M 4480×3360	5.8M 2784×2088	0.3M 640×480
Aspect ratio		4:3		
SD card	**4 GB**	400	1000	28000
	16 GB	1700	4100	117000
	64 GB	7000	16500	475000

Picture size		15.1M 4752×3168	8M 3456×2304	2M 1728×1152
Aspect ratio		3:2		
SD card	**4 GB**	400	750	2200
	16 GB	1700	3100	8500
	64 GB	7000	12500	36000

- **The number of recordable pictures depends on the subject being recorded.**
- Maximum number of recordable pictures that can be displayed is 9999. If the number of recordable pictures exceeds 9999, R 9999+ is displayed. The number will not change when the picture is taken until the number of recordable pictures is 9999 or less.
- The memory capacity indicated on the label of an SD card is the total of the capacity for copyright protection and management and the capacity which can be used on the unit, a PC etc.

Optional accessories

Attaching the Wide Conversion Lens/Filter Kit

Attach the Wide Conversion Lens (VW-W4907H: optional) ND filter or MC protector of the Filter Kit (VW-LF49N: optional) in front of the lens.

● It is not possible to attach it to the front of the lens hood.

Be careful about the following.
When 2 lens accessories, such as the ND filter and Wide Conversion Lens, are fitted and the zoom lever is pressed toward the W side, the 4 corners of an image will be darkened. (Vignetting)

Attaching the lens cap of the Filter Kit (VW-LF49N: optional)

● When the Filter Kit (VW-LF49N: optional) is used, protect the lens surface while the unit is not used with the lens cap supplied with the Filter Kit.

Attaching the optional accessories on the accessory shoe

You can attach a variety of optional accessories to the accessory shoe. For information on how to attach and use those accessories, refer to their manuals.