

SONY

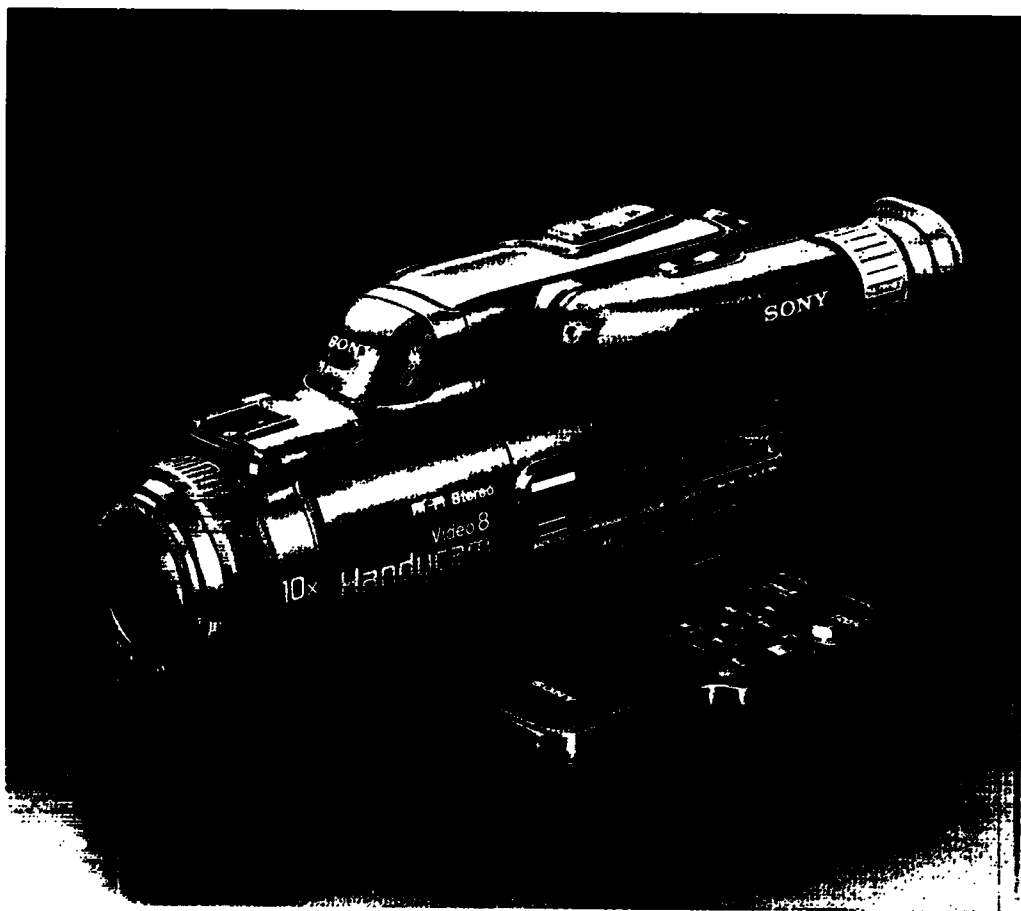
3-755-145-23 (1)

Video Camera Recorder **8**

CCD-FX510

Operation Manual

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



Video 8 Handycam

WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.



CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN



CAUTION TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Information for the customers in the U.S.A.

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the equipment with respect to the receiver
- Move the equipment away from the receiver
- Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems".

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

Notice for the customers in Canada

This apparatus complies with the Class B limits for radio noise emissions set out in Radio Interference Regulations.

Owner's Record

The model and serial numbers are located on the bottom. Record the serial number in the space provided on the right hand. Refer to these numbers whenever you call upon your Sony dealer regarding this product.

Model No. CCD-FX510
Serial No. _____

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Welcome to Video 8

Congratulations on your purchase of this Sony Handycam[®] camcorder. With your Handycam you can capture life's precious moments with superior picture and sound quality. Your Handycam is loaded with advanced features, but at the same time it is very easy to use. You will soon be producing home video that you can enjoy for years to come.

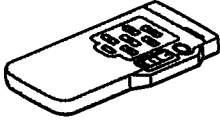
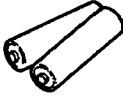
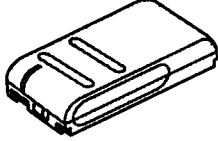
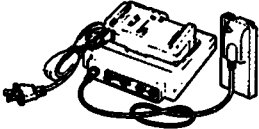





About This Manual

This manual shows you how to operate your camcorder. To get the most out of the features of Handycam, we recommend you read this manual thoroughly before you use your camcorder. But if you want to shoot as soon as possible, please read the chapters, **Getting Started** and **Basic Camera Operation**. Once you are familiar with basic operations, you may want to proceed to the chapter, **Advanced Camera Operation**.

- When you are reading through this manual, buttons and settings on the camcorder are in shown capital letters:
e.g. Set the POWER switch to CAMERA.
- Use "Identifying the Parts" as an index when looking for a function and operation according to the indication printed on the camcorder itself.

Supplied Accessories

Confirm that the following accessories have been supplied with your camcorder.

<ul style="list-style-type: none">• Wireless Remote Commander (1) 	<ul style="list-style-type: none">• Size AA (R6) battery for Remote Commander (2) 	<ul style="list-style-type: none">• Battery pack NP-55H (1) 
<ul style="list-style-type: none">• AC power adaptor AC-V25S (1) 	<ul style="list-style-type: none">• Lithium battery CR2025 (1) 	<ul style="list-style-type: none">• RFU adaptor RFU-90UC (1) 
<ul style="list-style-type: none">• A/V connecting cable (1) 	<ul style="list-style-type: none">• Shoulder strap (1) 	<ul style="list-style-type: none">• Lens cap (1) (attached to the camcorder)• Jack cover (1) (attached to the camcorder) 

Before You Start

Before you can use your camcorder, you need to:

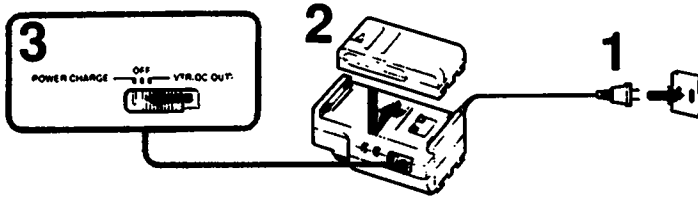
- 1 Charge and install the battery pack.
- 2 Insert a tape.
- 3 Adjust the viewfinder lens to your eyes.
- 4 Set the BEEP switch.
- 5 Install the lithium battery.
- 6 Set the date and time.

This chapter takes you through these procedures step by step.

Charging and Installing the Battery Pack

Before you can use your camcorder, you need to charge and install the battery pack.

Charging the Battery Pack



- 1 Plug the AC power adaptor into a wall outlet.
- 2 Attach the battery pack to the AC power adaptor.
 - Align the side of the battery pack with the white line on the AC power adaptor.
 - Push the battery pack down and slide it in the direction of the arrow.
- 3 Set the CHARGE/VTR switch on the AC adaptor to CHARGE.
When charging is completed, the charge indicator on the AC adaptor goes out.

Required charging time:

Type of battery pack	NP-55H (supplied)	NP-77H/ NP-77HD	NP-77	NP-66H	NP-55
Required charging time	80	160	140	120	70

(approx. time in minutes using AC-V25S)

Important!

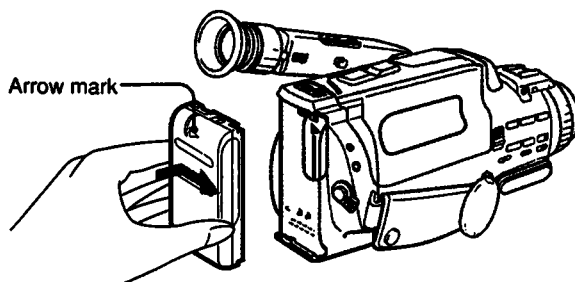
Use the battery completely before charging!

Before you recharge the battery, make sure the battery has been used (discharged) completely to avoid reducing the capacity of the battery caused by excessive charging.

To use up the battery, remove the video cassette and simply slide the POWER switch to CAMERA with the battery attached, and leave the camcorder until the [] indicator appears blinking and a red lamp blinks in the viewfinder.

Installing the Battery Pack

When you have finished charging the battery, install the battery pack as follows:



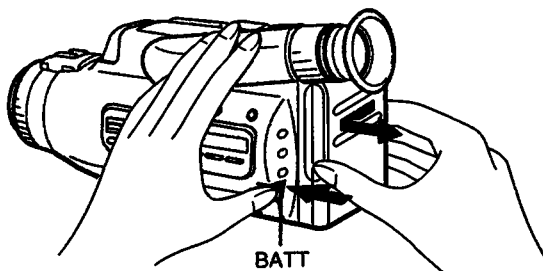
- 1 With the arrow mark on the battery pack up, align the flat side of the battery pack with the white line on the camcorder.
- 2 Push down and slide the battery pack in the direction of the arrow.

Notes

- Make sure the battery is securely installed so that it does not come loose. If the battery is not installed properly, the camcorder does not work.
- You can use the AC power adaptor as a power source when recording indoors (see page 25).

Removing the battery pack

Press the BATT knob in the direction of the arrow, and at the same time, slide out the battery pack to the left.



Charging and Installing the Battery Pack

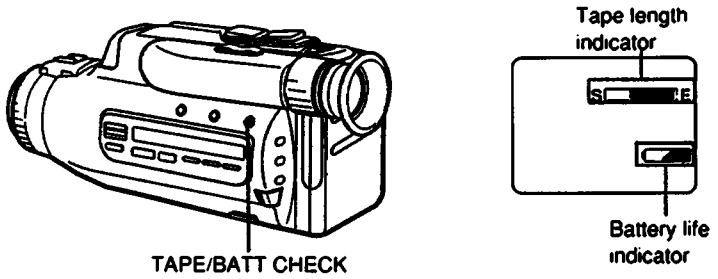
Battery life and remaining capacity


A fully charged battery pack lasts for:

Type of battery pack	NP-55H (supplied)	NP-77H/ NP-77HD	NP-77	NP-66H	NP-55
Battery life	60	110	90	85	50

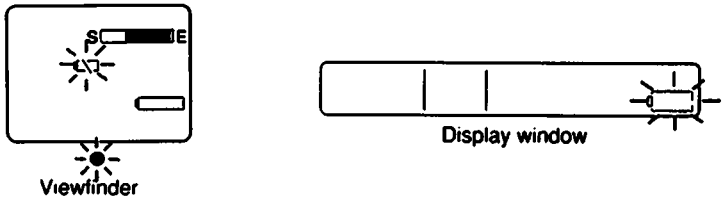
(approx. time in minutes, continuous recording when used indoors)

To check the remaining battery capacity in the viewfinder, press TAPE/BATT CHECK.



The black bar of the battery life indicators in the viewfinder and the display window shows remaining battery power. After the indicator goes out, the  and a red lamp blink in the viewfinder. When they blink rapidly, replace the battery pack.

The battery life indicator in the display window always shows the remaining battery capacity when the POWER switch is set to CAMERA or VTR with a power source attached.

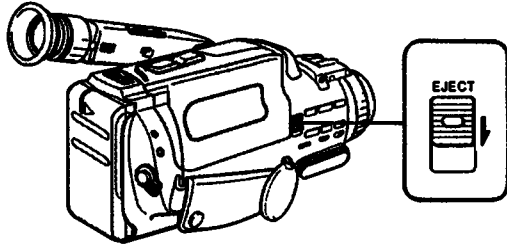


- Notes**
- Charge the battery pack when the black bar of the battery life indicator decreases quickly.
 - The battery life indicator of the camcorder may indicate a different remaining capacity from that of the NP-77HD battery pack.

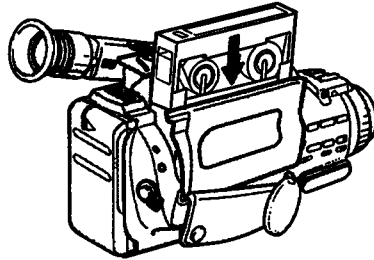
Inserting a Tape

Make sure that the battery pack or other power source is attached.

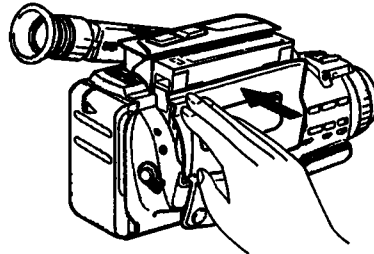
- 1** Press the small blue button on the EJECT knob and simultaneously slide it down.
The cassette compartment automatically lifts up and opens toward you.



- 2** Insert a tape with the window facing out.





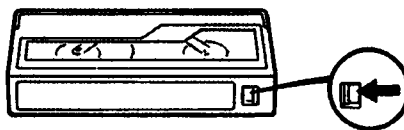
- 3** Close the cassette holder by pressing the area on the cassette holder marked "PUSH".



Preventing Accidental Erasure

To prevent accidental erasure, slide the tab on the cassette to expose the red mark.

To re-record on this tape, slide the tab opening the window.
If you try to record with the red mark exposed, the  and  indicators blink in the viewfinder and the display window and you will hear beep sounds for about five seconds.

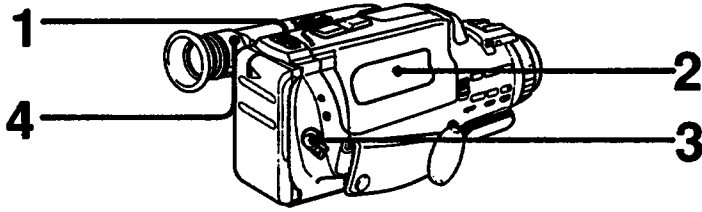


Notes on handling tapes

Do not insert anything in the small holes on the rear of the cassette. These holes are used to sense the type and thickness of tape, or if the red mark is exposed or covered, etc. Store tapes in their cases and keep them in an upright position to protect them from dust and uneven winding.

Adjusting the Viewfinder Lens

Before you use the camcorder for the first time, adjust the viewfinder lens to best fit your eyesight. Make sure that a battery pack or other power source is attached to the camcorder.



- 1** Press the small green button on the POWER switch and set it to CAMERA.

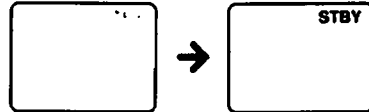
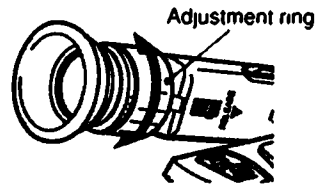


- 2** Insert a tape.
(See page 9.)

- 3** Set the STANDBY switch up.



- 4** Turn the viewfinder adjustment ring until the word "STBY" that appears in the viewfinder screen comes into sharp focus.



Using the viewfinder as a sports finder

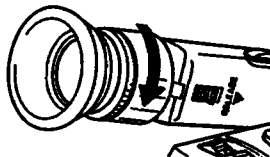
This camcorder is equipped with a Sports Finder. You can use the viewfinder as the sports finder by turning the viewfinder adjustment ring.

What is a sports finder ?

Since this finder has a long focal length, you can monitor the picture while your eye is at a distance from the eyecup. The sports finder is convenient when moving around to shoot scenes.

Setting the viewfinder to the sports finder position

Turn the viewfinder adjustment ring clockwise completely.

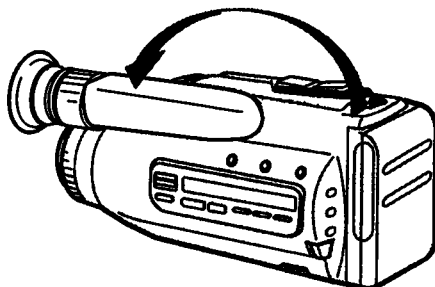


Returning to the normal viewfinder position

Turn the adjustment ring counterclockwise until the word "STBY" that appears in the viewfinder comes into sharp focus.

When storing the camcorder

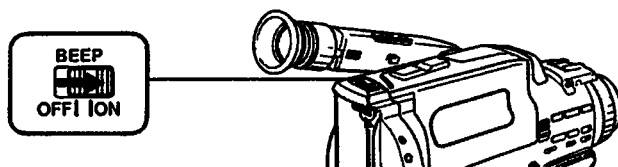
Turn the viewfinder barrel to the front.



Setting the BEEP Switch

This camcorder uses a beep sound to help you confirm when you start and stop recording. When the beep switch is turned on, one beep sounds when a recording is started and two beeps when the recording is stopped.

Several beeps also sound as a warning of any unusual condition of the camcorder. No beep sounds when the beep switch is turned off.



Notes

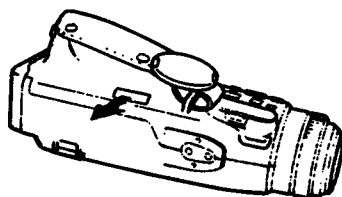
- If the battery has been installed, remove it to set the BEEP switch. Reattach the battery after setting the BEEP ON/OFF switch.
- Beep will not be recorded on the tape.
- For warning beeps, see page 74.

Installing the Lithium Battery

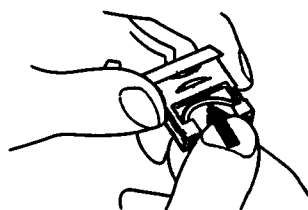
To store birth dates and a title in the camcorder's memory, as well as to activate the clock, a lithium battery must be installed.

Note that the lithium battery has a + (plus) and a - (minus) side as illustrated below. Be sure to install the lithium battery with the correct polarity.

- 1 Remove the lithium battery holder at the bottom of the camcorder.**




- 2 Install the supplied CR2025 lithium battery with the + side facing down.**



- 3 Put the lithium battery holder into the camcorder.**

Lithium battery life

The battery lasts for about 1 year in normal operation.

When the lithium battery becomes weak, the  indicator blinks in the viewfinder screen for about 5 seconds when you set the POWER switch to CAMERA. In this case, replace the battery with a Sony CR2025 or Duracell DL-2025. Use of any other battery may present a risk of fire or explosion.

When replacing the lithium battery, keep the battery pack or other power source attached. Otherwise, resetting of the date, time, and birth dates will be necessary.

Replacing the lithium battery

Remove the lithium battery holder from the camcorder, pull out the lithium battery and insert a new one.

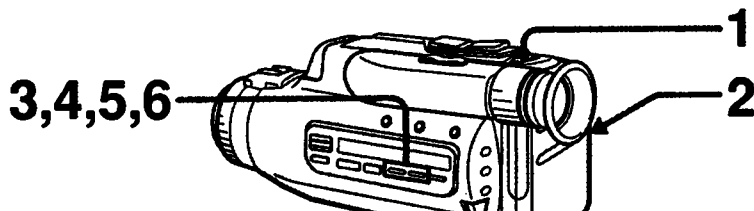
Warning Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

Cautions Keep the lithium battery out of the reach of children.
Should the battery be swallowed, consult a doctor immediately.

Setting the Date and Time

You need to set the camcorder's date and time to be able to superimpose the date and time onto your video.

Make sure that a power source is attached and a lithium battery is installed.



<p>1 Press the small green button on the POWER switch and slide the POWER switch to CAMERA.</p>	
<p>2 Set the STANDBY switch up.</p>	
<p>3 Press DATE (+) and TIME (NEXT) simultaneously for a few seconds until the date indicator appears in the display window. The DATE button now functions as + (to advance numbers) and the TIME button functions as NEXT (to set).</p>	
<p>4 Adjust the flashing digits of the year, month, day, and hour by pressing DATE (+) and press TIME (NEXT).</p> <p>Notes</p> <ul style="list-style-type: none"> When you keep DATE (+) pressed, the digits advance faster. The year starts at (1992) and proceeds as follows: (1992) → (1999) → (2000) → (2020) 	
<p>5 Adjust the flashing minute digits by pressing DATE (+).</p>	
<p>6 Press TIME (NEXT) to set the second digits to "00". The clock starts working.</p>	

Correcting the date and time settings

Repeat steps 3 to 6.

Storing a Birth Date in Your Camcorder

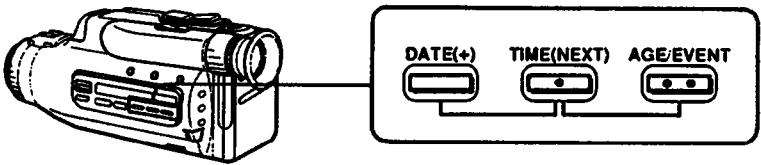
When your child's birth date is preset in the camcorder, you can put your child's age, in years and months, on your tape. You can also preset the date of an event. Once you enter the birth date of your child, the clock inside the camcorder will automatically update the age of your child. You can superimpose the age anytime on your recording. You can preset up to three birth dates or events.

Before you begin

Before you store a birth date in your camcorder, make sure that a power source is connected, that the lithium battery is installed and that the date is correctly set.

Storing birth date

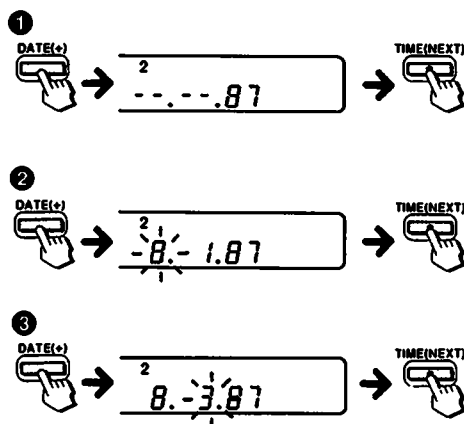
To store a birth date in your camcorder, see the following example and procedure. Example: store "Aug. 3, 1987" in memory 2.



- | | |
|--|--|
| <p>1 Press the small green button on the POWER switch and slide it to CAMERA.</p> | |
| <p>2 Set the STANDBY switch up.</p> | |
| <p>3 Press TIME (NEXT) and AGE/EVENT simultaneously for a few seconds until the "1" indicator appears in the display window.</p> | |
| <p>4 Press DATE (+) to select 2.
Each time you press DATE (+), the indicator in the display window changes as follows:
1 → 2 → 3
In the viewfinder, the indicator changes as follows:
1 BIRTHDAY → 2 BIRTHDAY
3 EVENT*</p> <p>* Although "EVENT" is displayed on 3, you can use it for age as well.
1 and 2 can also be used to record event dates in memory.</p> | |
| <p>5 Press TIME (NEXT).
The "00" indicator blinks.</p> | |

(To be continued)

6 Enter the birth date of your child.
 First adjust the blinking digits by pressing DATE (+), and then press TIME (NEXT).
 The age (year and month) appears when all the items are adjusted.



If you missed the correct number with DATE (+)

Keep pressing DATE (+).
 The indicator changes as follows:

Year: 1900 → 1901 --- → Current year
 ↑
 Current year minus 99 ←

Month: JAN. → FEB. --- → DEC. → ---
 ↑

Day: 1 → 2 --- → 31
 ↑

Correcting and changing the setting

Follow the procedures from step 1 again.

Advancing the digits faster

Keep DATE (+) pressed.

Presetting the year before 1900

- 1 After step 5 on page 15, keep pressing DATE (+) until the current year is displayed.
- 2 Press DATE (+) again.
 The year goes back 99 years.
 (example: 1992 → 1893)
- 3 Go to step 6 above.

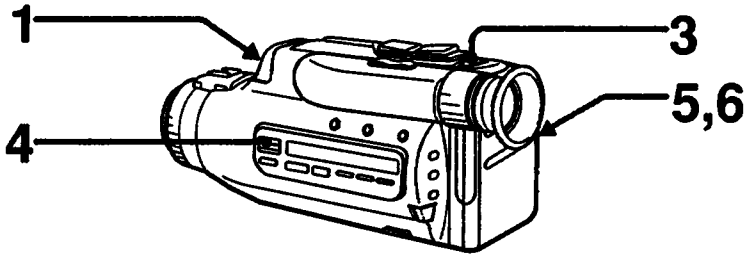
When in 2000

"--- --1901" is displayed in step 3 on page 15. After that, it advances every year as "1902, 1903,

Now it's ready for recording!

How to Record

Keep the lense clean or the focus cannot be adjusted properly.

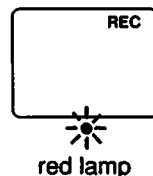


<p>1 Hold the camcorder by putting your hand through the grip strap and adjust its length so that your thumb can easily press the red START/STOP button.</p>	
<p>2 Remove the lens cap and attach it to the grip strap.</p>	
<p>3 Press the small green button on the POWER switch and slide it to CAMERA. This puts the camcorder in the camera recording mode.</p>	
<p>4 Set the AUTO LOCK switch to the green position. This will make every adjustment automatic.</p>	
<p>5 Set the STANDBY switch up. "STBY" appears in the viewfinder. Now, you can see a picture through the viewfinder.</p>	

(To be continued)

6 Press START/STOP (red button) once.

The camera is recording when the word "REC" appears in the viewfinder screen and the red lamp lights up in the viewfinder. You can also confirm the recording start with the beep sound when the BEEP switch is turned on.



In the viewfinder you can see a black and white picture of what you are recording and information that indicates what the camcorder is doing.

Automatic recording

With the AUTO LOCK switch set to the green position, all the camera functions are on automatic (i.e. auto aperture, auto white balance, auto focus) and the shutter speed is set at normal (1/60 second.)

To stop recording momentarily

Press START/STOP again. "STBY" appears in the viewfinder. The camcorder beeps twice when the BEEP switch is turned on.

When you have finished recording

Set the STANDBY switch down and set the POWER switch to OFF.

Ejecting the tape

Make sure that you have attached the battery pack or other power source to the camcorder.

- 1 Press the small blue button on the EJECT switch slide it in the direction of the arrow.
- 2 Take out the tape.
- 3 Close the cassette holder by pressing the area marked "PUSH" on the cassette holder.

When there is no tape, the  indicator appears in the display window and the viewfinder.

Caution!

You can use only 8-mm format video tapes with this camcorder.

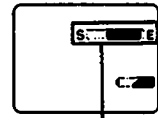
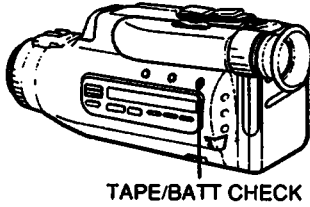
It is not possible to use PCM recording/playback available on some 8 mm recorders. The PCM sound recorded or after-recorded with other recorders cannot be played back with this camcorder.

You will be able to record tapes in SP (standard play) mode only and play back tapes in both SP and LP (long play) modes.

How to Record

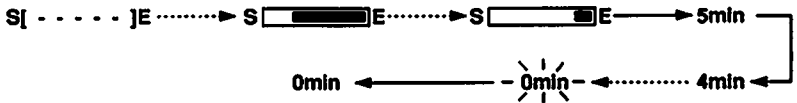
Checking the tape remaining

Press TAPE/BATT CHECK.



Tape length indicator

The tape length indicator which shows the tape remaining time appears in the viewfinder (It may take about 20 seconds to display it.) When the time remaining is less than about 5 minutes, the indicator shows the time remaining in minutes.



When "5 min" lights, the  indicator blinks in the viewfinder.

Note on the tape length indicator

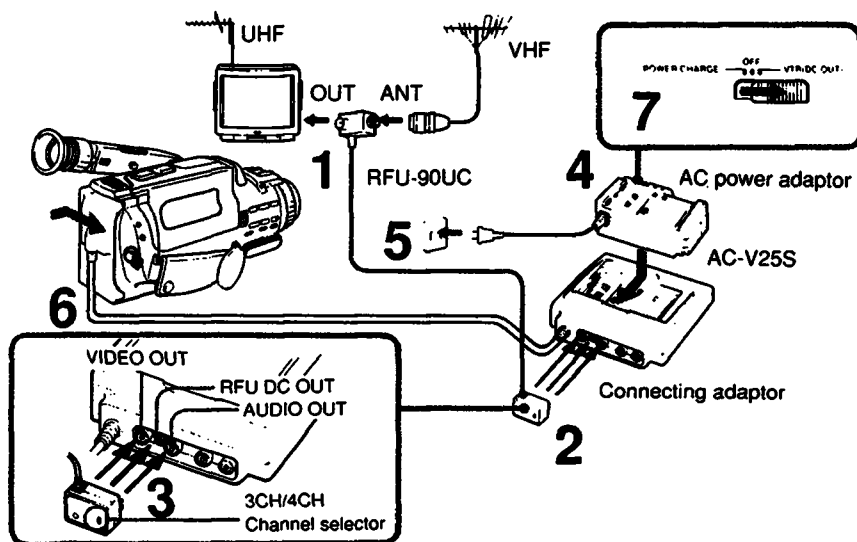
- The camcorder must be in the recording or playback mode when the TAPE BATT CHECK is pressed to find out the time remaining. In the playback mode the indicator does not show the tape remaining time in minutes.
- The tape length indicator does not change while using EDITSEARCH.

Playing Back a Tape

You can use this camcorder as a VCR by connecting it directly to your TV for playback. After you connect this camcorder to your TV, use the Remote Commander for convenient control of the camcorder.

If Your TV Has Only an Antenna Input

There are several ways to connect the camcorder to your TV. If your TV has only an antenna input, use the supplied RFU adaptor and AC power adaptor. Make sure that the TV is turned off to prevent speaker damage before hooking up your camcorder. If your TV has video/audio inputs, see page 50.



To connect your camcorder to your TV that is already connected to a regular TV (VHF) antenna:

Connecting to a TV without Video/Audio Inputs

- 1 Unplug the antenna cable from your TV. Plug in the end of the supplied RFU adaptor marked OUT to the TV. Connect the antenna cable to the other end of the RFU adaptor marked ANT. With this connection, the input video signal to the TV is automatically switched between TV broadcasts and a playback from your camcorder without rewiring.
- 2 Attach the RFU adaptor to the connecting adaptor.
- 3 Set the channel selector on the RFU adaptor to 3CH or 4CH whichever is not being used in your area.
- 4 Attach the AC power adaptor to the connecting adaptor.
Put the AC power adaptor on the connecting adaptor and slide the AC power adaptor in the direction of the arrow.
- 5 Plug in the AC power adaptor to a wall outlet.
- 6 Attach the connecting plate (of the connecting adaptor) to your camcorder.
- 7 Set the CHARGE/VTR switch to VTR.

Note

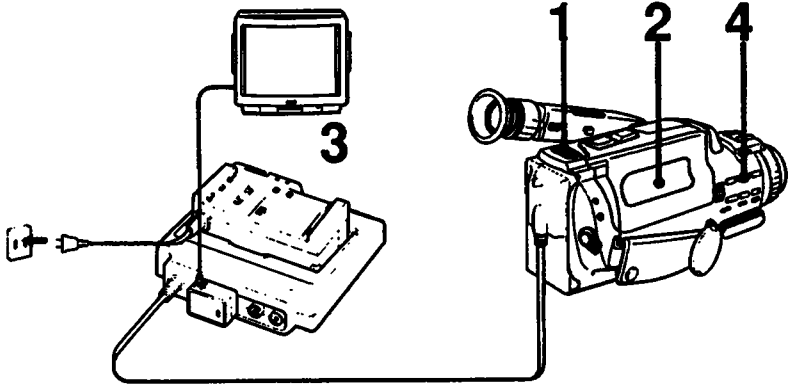
The video and audio jacks on the connecting adaptor are used for outputting video and audio signals only. The camcorder does not use these jacks for recording.

You may want to keep the AC power adaptor connected to your TV once you have established the connection. This way, you can easily connect your camcorder to your TV just by attaching the connecting plate of the AC power adaptor to the camcorder (steps 5 and 6).

When you want to switch to regular TV, set the CHARGE/VTR selector to OFF or turn off the power on the camcorder.

Playing Back a Tape

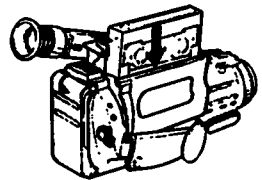
Playing Back a Tape



- 1** Press the small green button on the **POWER** switch and set it to **VTR**.



- 2** Insert a tape.



- 3** Turn on the TV and select the channel (3 CH or 4 CH) set on the RFU adaptor.
If you are connecting with video/audio inputs, set your TV's TV/VIDEO selector to VIDEO.

- 4** Press **▷** (**PLAY**).



To stop playback, press **□** (**STOP**).
To rewind the tape, press **◀◀** (**REW**).
To advance the tape rapidly, press **▶▶** (**FF**).

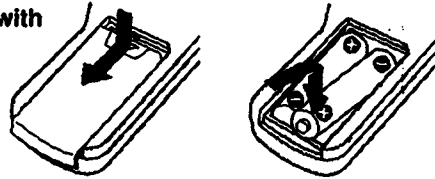
When you have finished playback

- 1 Set the **POWER** switch to **OFF**.
- 2 Set the **CHARGE/VTR** switch on the AC power adaptor to **OFF**.

Using the Remote Commander

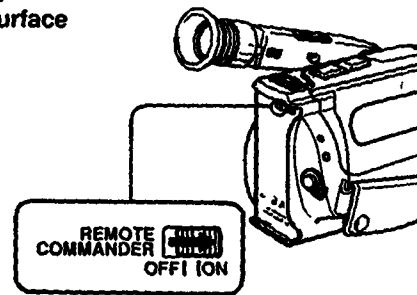
Using the Remote Commander, you can be in the picture with your friends and family while recording, or conveniently control the playback of your tape from a distance.

- 1** Insert two size AA (R6) batteries with correct polarity.



- 2** Set the **REMOTE COMMANDER** switch on the battery mounting surface of the camcorder to ON.

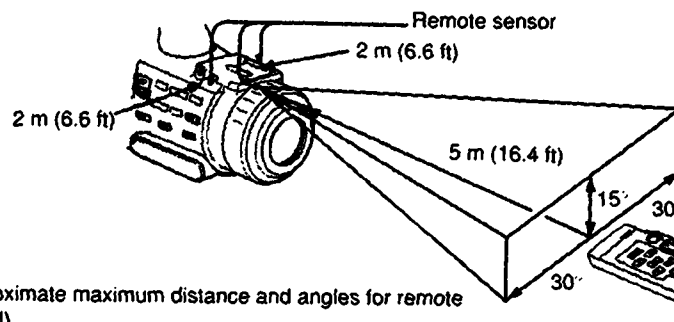
If the battery is attached, remove it. Reattach the battery after setting the REMOTE COMMANDER switch.



- 3** Set the **POWER** switch on the camcorder as follows:

- When camera recording, 1) press the small green button on the POWER switch and slide it to CAMERA, 2) set the STANDBY switch up.
- When playing back, set the POWER switch to VTR.

- 4** Aim the Remote Commander at the remote sensor of the camcorder and press the appropriate button on the Commander.

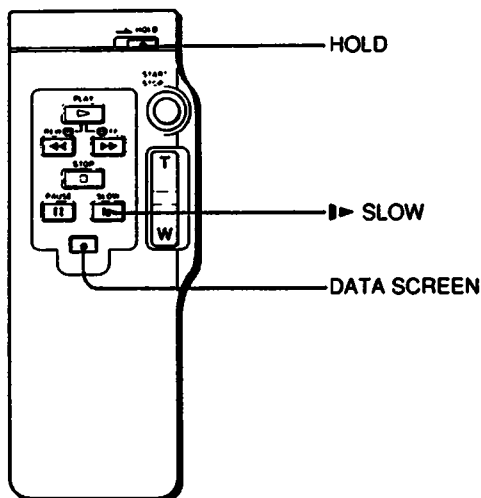


Notes on the Remote Commander

- Do not use the remote sensor in a strongly lighted room, since it may not work properly under such condition.
- The command mode of the Commander is VTR2. Avoid using a Sony VCR with the same command mode at the same time.

Using the Remote Commander

Getting familiar with some buttons



HOLD switch

When you slide the switch in the direction of the arrow, all the buttons will become inoperable to prevent any misoperation if you accidentally press them.

▶ SLOW and DATA SCREEN buttons

You can use the functions of these buttons only with the Commander.

Battery life

In normal operation, batteries last up to six months. If the camcorder does not operate properly, the batteries might be exhausted. Replace both batteries with new ones.

To avoid damage from possible battery leakage

Remove the batteries when you will not use the Commander for a long time.

When you connect the receiver of a remote control kit

When you connect the receiver of a remote control kit (not supplied) to the REMOTE control connector, be sure to set the REMOTE COMMANDER switch on the battery mounting surface of the camcorder to OFF.

Getting the Most out of Your Battery Pack

Preparing the Rechargeable Battery Pack

Have sufficient battery pack power to do 2 to 3 times as much recording than you have planned

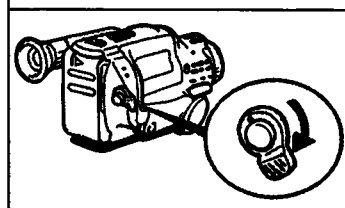
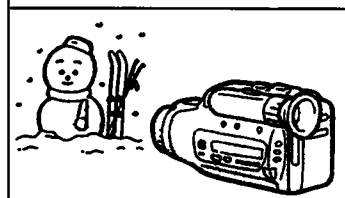
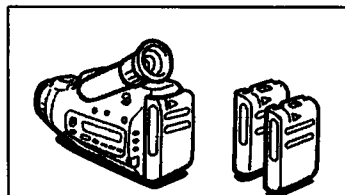
"Battery life" indicated in this manual is measured by the continuous recording time of the camcorder, at room temperature using a fully charged battery.

Battery life is shorter in cold climates

Battery efficiency is decreased and the battery will be used up more quickly.

Turn STANDBY of the camcorder down when not recording to save battery power

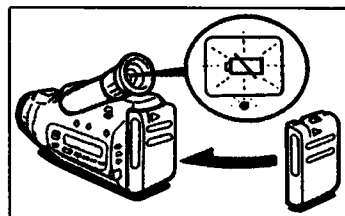
A smooth transition between scenes can be made even if recording is stopped and started again. While positioning the subject or selecting an angle, or looking through the viewfinder lens, the lens moves automatically inside the camcorder and the battery is used. The battery is also used when a tape is inserted or removed.



When the Rechargeable Battery Pack Should Be Replaced

When the  indicator and red lamp in the viewfinder, and the  indicator in the display window change from slow blinking to rapid blinking while you are recording

Turn off the power switch of the camcorder and replace the battery pack. Leave the tape in the camcorder to obtain a smooth transition between scenes after the battery pack is replaced.





Notes on Charging

Before using the battery pack, charge it sufficiently

A new battery pack is not charged.

Make sure you use up the battery before recharging

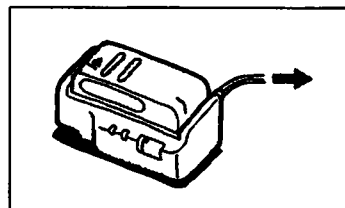
- If recording is completed before the  indicator appears in the viewfinder, you should remove the tape, set the POWER switch to CAMERA, set the STANDBY switch up, and leave the camcorder until the  indicator blinks rapidly.
- When you use the AC-S10 AC power adaptor, the DC-S10 car battery charger or BC-S10 portable battery charger, you can discharge the battery with their discharging function.
- Repeated charging without using up the battery may lower battery capacity. However, the original battery capacity can be recovered if you fully discharge (use up) and then charge the battery again.

Recharge the battery pack after long storage

If the battery pack is charged fully but then not used for a long time (about 1 year), it becomes discharged.

Charge it again but in this case the battery life will be shorter than normal.

After several charging and discharging cycles, the battery life will recover its original capacity.

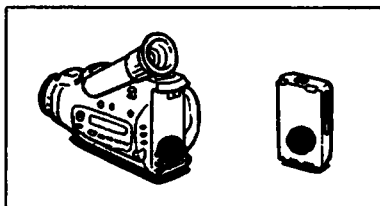


Getting the Most out of Your Battery Pack

Keep the Terminals Clean

If the terminals (metal parts on the back) are not clean, the battery duration will be shortened

When the terminals are not clean or when the battery pack has not been used for a long time, install and remove the battery pack from time to time. This will improve the contact condition. Also, wipe the + and - terminals with a soft cloth or paper.



Notes on the Rechargeable Battery Pack

Why does the battery pack heat up?

During charging or recording, the battery pack heats up. This is caused by energy that has been generated and chemical change has occurred inside the battery pack, and this is not cause for concern.



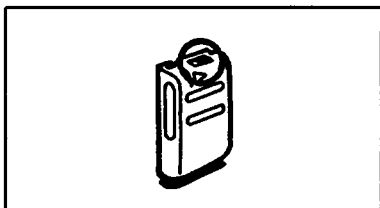
Caring for the battery pack

- Remove the battery pack from the camcorder after using it, and keep it in a cool place. When the battery pack is in the camcorder, a small amount of current flows to the camcorder even if power is turned off. This causes overdischarging and shortens battery life.
- A charged battery pack always discharges even when it is not in use after charging.

Thus, it is recommended that you charge the battery right before using.


Using the switch on the battery pack

This switch is provided so that you can remember the charge condition. Set the switch to the "no mark" position when charging is completed. Set the switch to the "red mark" position when the battery is used up.



How many times can the battery pack be recharged?

The battery pack can be fully charged and discharged about 500 times under normal temperatures.

If the  indicator blinks rapidly just after turning the camcorder on with a fully charged battery pack, the battery pack should be replaced with a new fully charged one.

Recommended temperatures during charging

Charging under temperatures ranging from 10°C to 30°C (50°F to 85°F) is recommended. Lower temperatures require a longer charging time.

Be sure to observe the following.

- To prevent an accident caused by a short circuit, do not allow metal objects such as a necklace to touch the battery terminals. Carry the battery pack attaching to the terminal cover.
- Keep the battery pack away from fire.
- Keep the battery pack dry.
- Do not open nor convert the battery pack.
- Do not expose the battery pack to any mechanical shock.

Connecting Alternative Power Sources

You can choose any of the following power sources for your camcorder: battery pack (see page 7), household current, and 12/24 V car batteries.

The appropriate power source for you to choose depends on the place where you want to use your camcorder.

Place	Power source	Accessory to be used
Outdoors	Battery pack	Battery pack NP-55H (supplied), NP-77H/77HD, NP-77, NP-66H or NP-55
Indoors	Household current	AC power adaptor AC-V25S (supplied), AC-V30 or AC-S10
In the car	12 V or 24 V car battery	DC pack DCP-77

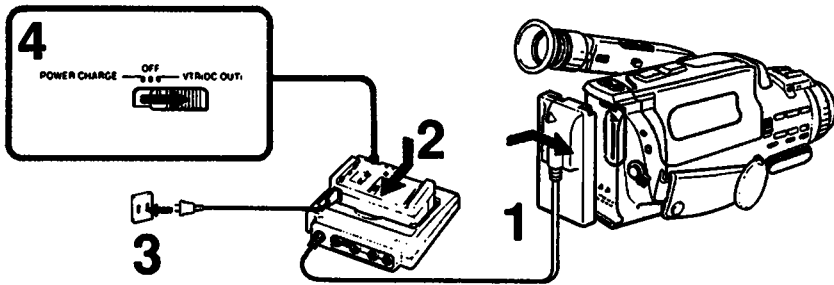
Note on power sources

Disconnecting the power source or removing the battery pack during recording or playback may damage the inserted tape. If the power is disconnected, connect it again immediately.

Using Household Current

The supplied AC-V25S AC power adaptor is required. There are two ways of connecting the AC power adaptor.

With the connecting adaptor



- 1** Align the flat side of the connecting adaptor's connecting plate with the white line on the camcorder, and then push and slide it in the direction of the arrow.
- 2** Attach the AC power adaptor to the connecting adaptor.
- 3** Plug the AC power adaptor into a wall outlet.
- 4** Set the CHARGE/VTR switch on the AC power adaptor to VTR.

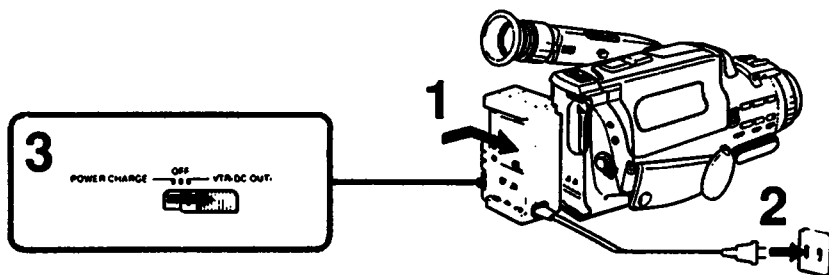
Removing the connecting plate

The connecting plate is removed in the same way as the battery pack. See page 7.

Connecting Alternative Power Sources

AC power adaptor only

—(When using the camcorder with the AC power adaptor while on a trip, etc.)



- 1** Align the flat side of the AC power adaptor with the white line of the camcorder, and then push down and slide it in the direction of the arrow.
- 2** Plug the AC power adaptor into a wall outlet.
- 3** Set the CHARGE/VTR switch on the AC power adaptor to VTR.

Removing the AC power adaptor

The AC power adaptor is removed in the same way as the battery pack. See page 7.

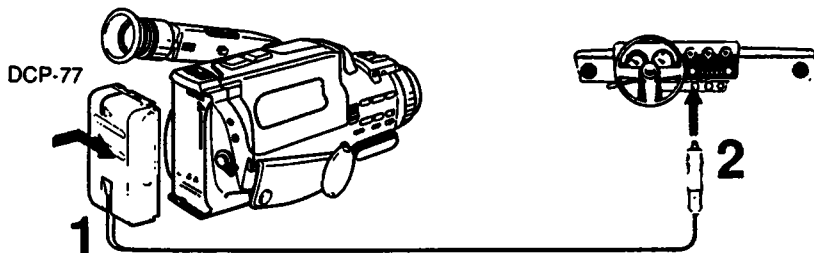
Option

AC-S10 AC power adaptor:

You can charge a battery, as well as discharge it to get the optimum battery condition.

Using a Car Battery

The DCP-77 DC pack (not supplied) is required.



- 1** Align the flat side of the DC pack with the white line on the camcorder, and then push down and slide it in the direction of the arrow.
- 2** Connect the cord of the DC pack to the cigarette lighter socket of a car (12 V or 24 V).

Removing the DC pack

The connecting pack is removed in the same way as the battery pack.

Options

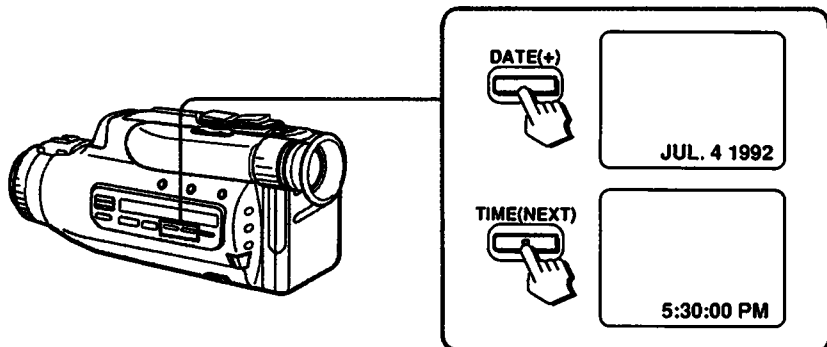
- BC-77. BC-S10 portable battery charger:
You can charge a battery pack on 100 – 240 V AC. The BC-S10 has a discharging function, so you can charge a battery pack whether it is used up or not.
- DC-S10 car battery charger with discharging function:
You can charge a battery pack through the cigarette lighter socket.

Recording with the Camera

In the previous chapter, "Basic Camera Operation", you learned the basic recording operations. This section shows you how to record the date or time, record an age, re-record a picture and more.

Recording the Date or Time

The date and/or time can be superimposed on your recording.



During camera recording, or when in standby mode, press DATE for date indicator or TIME for the time indicator.

The date or time displayed in the viewfinder is recorded with the picture.

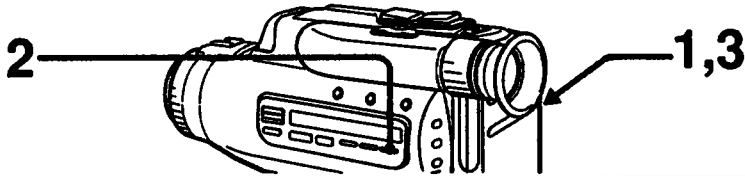
To stop recording the date or time

Press DATE or TIME again.

The picture recording continues.

Putting an Age on Your Tape

Here's how to put the age of your children in your video while recording. Make sure that birth dates have been stored in your camcorder. See page 14.



- 1** During recording, press **START/STOP** at the point you want to insert the age of a person or the elapsed time.

This puts the camcorder in the Standby mode.



- 2** Press **AGE/EVENT** to select the indicator you want to record.

Each time you press **AGE/EVENT**, the indicator in the viewfinder changes as follows:

1 The first age → 2 The second age

↑ 3 The third event ←

In the display window as follows:

1 → 2
↑ ✓
3

An item with no presetting is skipped. The 1, 2, or 3 indicator goes out after one second.



- 3** Press **START/STOP**.

Recording starts again.

The indicator in the viewfinder is recorded with the picture.



Note You cannot add the age later during playing back or editing.

To stop recording the age

Press **AGE/EVENT** until the indicator goes out.

To change the display while recording

Press **AGE/EVENT** until the indicator you want to record is displayed. Recording of the indicator you select starts when the indicator numbers 1, 2, or 3 go out.

To cancel a stored birth date

- 1 Perform steps 1 to 4 in "Storing a Birth Date in Your Camcorder" on page 14, to select the memory number to be canceled.
- 2 Press TIME (NEXT) twice. The month indicator blinks.
- 3 Press DATE (+) until "... .." appears.
- 4 Press TIME (NEXT).

The birth date is deleted from the memory and is not displayed when you press AGE/ EVENT.

About memory back-up

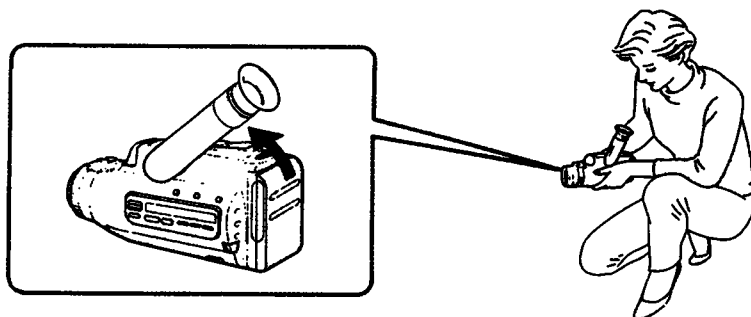
The camcorder uses a lithium battery to keep the birth date and a title in memory. The life of the lithium battery is about 1 year.

When you connect the camcorder to a TV during recording

If you do not use the data-screen function by the Remote Commander (see page 53), the age indicator will appear on the TV screen when the **1**, **2**, or **3** indicator goes out in the viewfinder and recording starts.

Recording in Low Positions

You can also record from low positions to get an interesting recording angle.



Set the viewfinder to the sports finder position (page 10) and turn it for the recording in low position. (It can be turned 180 degrees.)

Recording with the Camera

Rec Review Using EDITSEARCH

Using EDITSEARCH, you can check the last portion of a scene you just recorded in CAMERA mode. This is convenient for quick, on-the-spot checks.

- 1** Set the camcorder in the recording standby mode by pressing the START/STOP button.

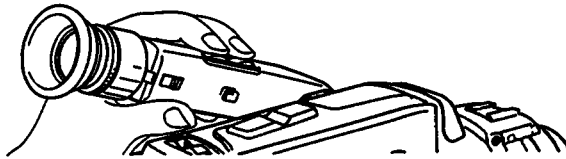


- 2** Press the - ⊕ side of EDITSEARCH momentarily.
The last few seconds of the recorded portion are played back in the viewfinder. Then the camcorder goes back to the standby mode, ready for the next recording.



Note on using EDITSEARCH

When you raise the viewfinder and use EDITSEARCH, hold the viewfinder with your thumb to prevent movement.



Hints for Recording

If the tape approaches its end during recording

The ⊕ indicator in the display window and the viewfinder, and the red lamp in the viewfinder, as well as the camera recording/battery lamp on the camcorder, blink slowly. When the tape reaches its end, blinking becomes rapid and beeps sound for about five seconds (if BEEP is set to ON).

Notes on recording

- To record from the beginning of a tape, run the beginning of the tape for about 15 seconds before recording. This will prevent missing the starting point when the tape is played back.
- When moving from indoors to outdoors, or vice versa, set the STANDBY switch up and point the camcorder at a white object for about 10 seconds so that the white balance is properly adjusted.

Note on standby mode

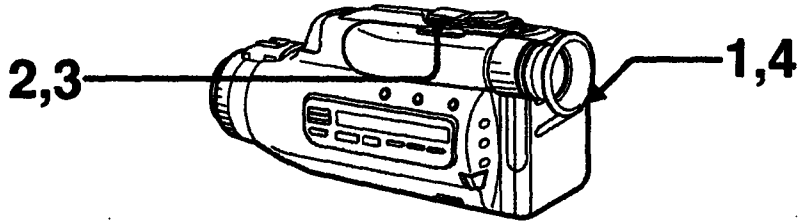
If you leave the camcorder in the standby mode for 5 minutes or more, the camcorder will automatically turn off. To resume the standby mode, set the STANDBY switch down and then turn it up again. To start recording, press START/STOP directly.

Note on light sources

If you are shooting a subject in bright conditions just after shooting in a dark place, the picture may not appear in the viewfinder. In this case, point the camcorder in the other direction.

Re-recording over a Previously Recorded Portion (EDITSEARCH)

You can re-shoot a scene over the last recorded portion using EDITSEARCH. The previously recorded portion will be erased.



1 Set the **STANDBY** switch up.



2 Look in the viewfinder and find the point where you want to begin recording:

Keep pressing the + side of **EDITSEARCH** continuously to advance the picture at a normal playback speed, or the - side to reverse the picture.



3 At the desired point, release **EDITSEARCH**.

4 Press **START/STOP**.

Recording begins from the point where you released **EDITSEARCH**.

A smooth transition between scenes can be made after the pre-recorded portion even if the **STANDBY** switch is turned down and turned up, or even if the power is turned off and on again, provided that the tape is not removed.



To pause recording

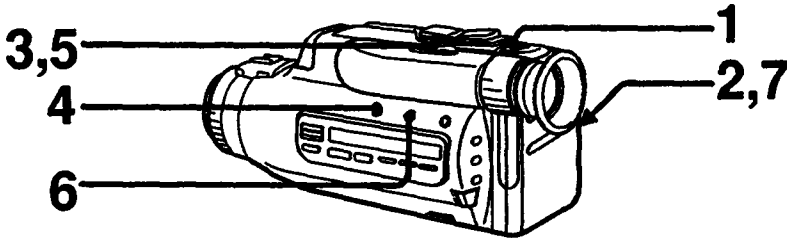
Press **START/STOP** again.

To stop recording

Set the **STANDBY** switch down.

Inserting a Scene in the Middle of a Recorded Tape

You can insert a scene in the middle of a recorded tape by setting the starting point and ending point. A previously recorded portion will be erased.



<p>1 Press the small green button and slide the POWER switch to CAMERA.</p>	
<p>2 Set the STANDBY switch up.</p>	
<p>3 While looking in the viewfinder, keep pressing the + or - side of EDITSEARCH and release the button where you want to end the insertion. The camcorder enters the standby mode again.</p>	
<p>4 Press COUNTER RESET. The counter is reset to zero.</p>	
<p>5 While looking in the viewfinder, keep pressing the - side of EDITSEARCH and release the button at the point where you want to start the insertion.</p>	
<p>6 Press ZERO MEM. The insert ending point is stored in memory.</p>	

7 Press START/STOP.

Insert recording begins. The insert recording stops automatically at the counter zero point.



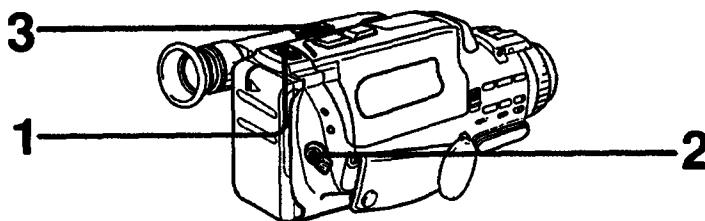
To cancel the ZERO MEM

Press ZERO MEM.

Note The picture may be distorted at the ending point when played back.

Checking the Recording in the Viewfinder (EDITSEARCH)

You can check the recorded picture in the viewfinder using EDITSEARCH. Sound cannot be monitored.



1 Slide the POWER switch to CAMERA.



2 Set the STANDBY switch up.



3 Keep pressing the + or - side of EDITSEARCH to view the playback picture:

- + side for the playback picture
- side for the playback picture in reverse.



To stop playback

Release EDITSEARCH.

To monitor the sound while viewing the playback picture in the viewfinder

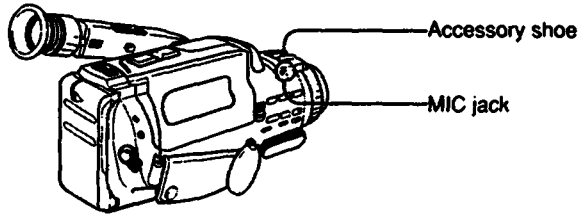
- 1 Connect headphones to the Ⓜ (headphone) jack.
- 2 Press the small green button and slide the POWER switch to VTR.
- 3 Press ⏮ to rewind the tape and press ⏸ where you want to stop.
- 4 Press ⏪ to start playback.

Recording with the Camera

Recording with an External Microphone

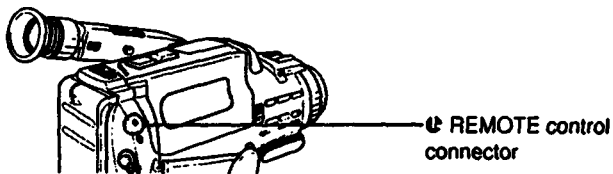
You can connect an external stereo microphone (not supplied) to the MIC jack. This jack also accepts a "plug-in-power" microphone. The power of this type of microphones is supplied from the camcorder through this jack.

Attach the microphone to the accessory shoe of the camcorder.



Connecting a Wired Remote Control Unit

When you connect a wired remote control unit or editing controller (not supplied) to the $\text{\textcircled{L}}$ REMOTE control connector, you can operate your camcorder from a distance.



About $\text{\textcircled{L}}$ (LANC)

$\text{\textcircled{L}}$ stands for Local Application Control Bus System. The $\text{\textcircled{L}}$ connector is used for controlling the tape transport of video equipment and peripherals connected to it. This connector has the same function as the connectors indicated as CONTROL L or REMOTE.

The camcorder's automatic functions offer you worry-free operation under most shooting conditions. But in some circumstances, manual adjustment is better for effective recording. You can manually adjust focus and back light compensation with this camcorder. Some shooting situations may call for using some items manually, while others call for using them automatically.

As long as you do not remove the battery, even if you set POWER to OFF, the previous manual settings are retained.

Focusing Manually

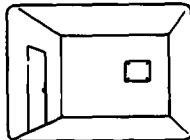
When to use manual focus

In the following cases you would obtain better results by adjusting the focus manually.

Too much brightness behind the subject



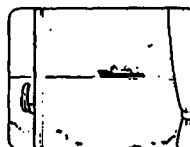
Subjects with little contrast-wall, sky, etc.



Horizontal stripes



Subject through frosted glass



You should also focus manually in the following situations:

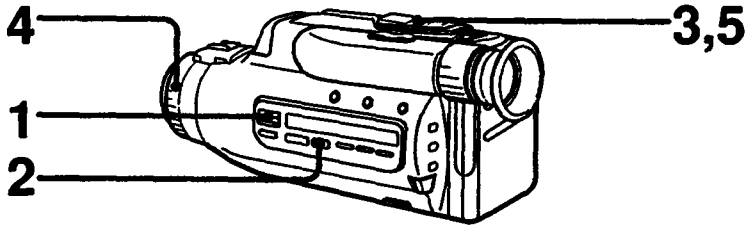
- Insufficient light
- One subject is close; the other is in the center, but at a distance
- Subjects beyond nets, etc., or another subject passes in front of the camcorder
- Bright subject or subject reflecting light
- High contrast behind the subject (the background may be in focus)
- When shooting a stationary subject using a tripod
- When you want to save battery power
- Autofocusing does not function momentarily when:
 - The setting of the shutter speed is changed.
 - Exposure is adjusted manually.
 - Lighting conditions change quickly.
 - Zooming is done from wide-range to telephoto.


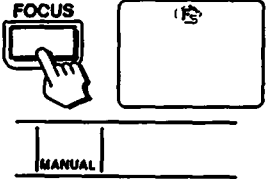

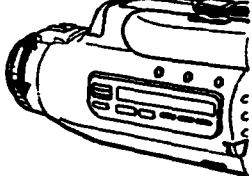

This camcorder keeps in focus by referring to the picture contrast, which is weak in the above situations.

Making Manual Adjustments

Focusing manually

When adjusting the focus manually, the best way is to first adjust at the telephoto position before recording, then set the desired zoom angle. Let's go through this step by step.



1 Set the AUTO LOCK switch down.	
2 Press FOCUS. ☉ appears in the viewfinder, and MANUAL appears in the display window.	
3 Keep pressing the T side (telephoto) of the power zoom button until the zooming stops. The power zoom indicator appears in the viewfinder.	
4 Turn the focus ring to achieve sharp focus. Note The focus ring does not have a stop position.	
5 Set the desired focal length by pressing the power zoom button.	

Resetting autofocus

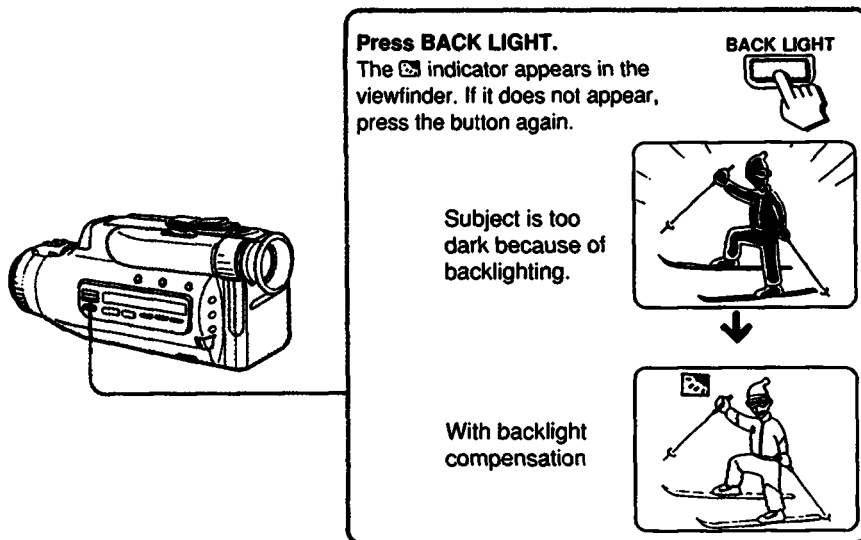
Press FOCUS until ☉ in the viewfinder disappears. "MANUAL" disappears and "AUTO" appears in the display window.

Shooting in relatively dark places


When shooting in relatively dark places such as indoors, the depth of field in proper focus is very shallow. For best results, shoot at wide angles after focusing in telephoto.

Compensating for Backlighting

This camcorder automatically controls the exposure. However, when shooting a subject that is backlit, that is, if the light source is coming in from in back of the subject, use the BACK LIGHT button to get natural exposure.



After shooting




Be sure to cancel this adjustment by pressing BACK LIGHT again.
(The  indicator goes out.)

Otherwise, the picture will be too bright under normal lighting conditions.


Using Program AE

When you use the PROGRAM AE (Auto Exposure) function, you can create a "portrait" effect (shallow depth of field) or capture high-speed action with the "sports" mode or "high-speed shutter" mode.

What is PROGRAM AE (Auto Exposure)?

Program AE automatically selects just the right combination of shutter and aperture settings and gives you creative control of depth over field (range of that will be in sharp focus). There are four preprogrammed modes: Normal (no indicator), Portrait , Sports , and High-speed shutter . (See pages 38 to 42.)

Portrait Mode

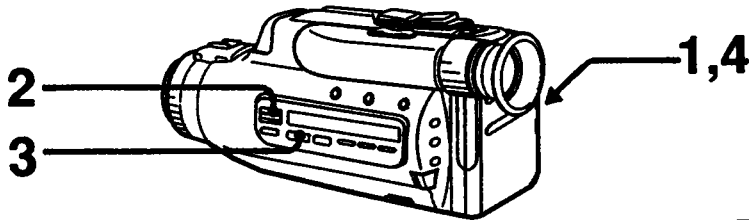
 In Portrait mode, the object is in focus and the background is out of focus. Therefore, you can use this mode to highlight the subject. The aperture is controlled to open by automatically selecting the shutter speed (between 1/60 to 1/1850 that matches the shooting situation) to maintain the appropriate exposure. Portrait mode is most effective when used outdoors.



You may want to use Portrait mode in the following situations:

- a still subject such as a person or a flower
- zooming in on a subject
- when there is something between the camera and the subject, such as a chain link fence

Setting Portrait mode




1 Set the **STANDBY** switch up.



2 Set the **AUTO LOCK** switch to the lower position.



3 Press **PROGRAM AE** until  appears in the display window and the viewfinder.



4 Press START/STOP.
Recording in Portrait mode starts.



Resuming Automatic mode

Set the AUTO LOCK switch to the green position.

Note When recording under fluorescent, sodium, or mercury lamps, the brightness of the recorded picture may vary, or the color of the recorded picture may become unnatural.

Sports Mode



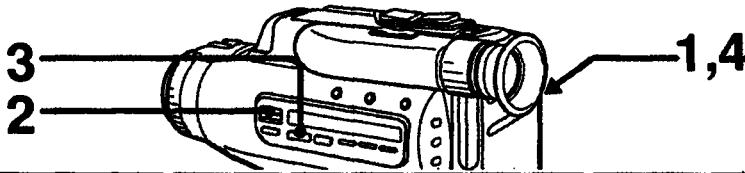
In Sports mode, you can clearly record subjects moving at high speed, providing a high-quality picture with a minimum of blur in the slow and still playback modes. The fastest shutter speed that matches the shooting situation (between 1/60 and 1/500) is selected to maintain the appropriate exposure. Sports mode provides more effective recording than you can achieve in the high-speed shutter mode.



You may want to use Sports mode when recording the following subjects:

- outdoor sports scenes such as football or tennis
- a landscape from a moving car

Setting to Sports mode



<p>1 Set the STANDBY switch up.</p>	
<p>2 Set the AUTO LOCK to the lower position.</p>	
<p>3 Press PROGRAM AE until appears in the display window and the viewfinder.</p>	

Using Program AE

- 4** Press **START/STOP**.
Recording in Sports mode starts.



Resuming Automatic mode

Set the PROGRAM AE switch to the green position.

Hints for effective camera work

When shooting sports events from a distance, such as a football game, you would typically zoom from the wide to the telephoto position to catch the one-time events. Even under these circumstances, by using Sports mode, you can get a sharp picture when played back later in the slow or still mode.

- Notes**
- Sports mode is effective under sufficient lighting, such as under sunlight. When used under extremely dark conditions, the shutter speed may not be shifted to high speeds.
 - When recording under fluorescent, sodium, or mercury lamps, the brightness of the recorded picture may vary, or the color of the recorded picture may become unnatural.

High-Speed Shutter Mode



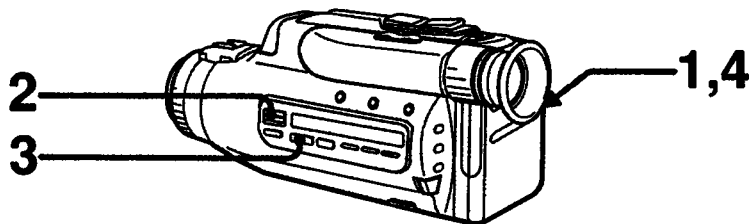
In High-Speed Shutter mode, the shutter speed is set to 1/4000. Subjects moving at high speed can be recorded and the picture can be observed more clearly with less picture shaking in the still or slow modes compared to slower shutter speeds. Remember that you need enough lighting to use the high-speed shutter mode since the aperture is fixed.




You may want to use the high-speed shutter mode when:

- Shooting a golf swing or a tennis match to capture the tennis ball clearly.
- You wish to play back certain scenes with high-speed movements in a clear, sharp picture.

Setting to High-Speed Shutter mode



<p>1 Set the STANDBY switch up.</p>	
<p>2 Set the AUTO LOCK switch to the lower position.</p>	
<p>3 Press PROGRAM AE until  appears in the display window and the viewfinder.</p>	
<p>4 Press START/STOP. Recording in the high speed shutter mode starts.</p>	

Resuming the normal shutter speed

Set the PROGRAM AE switch to the green position.

- Notes**
- In High-Speed Shutter mode, record in sunlight or use a video light.
 - When you record a TV screen with High-Speed Shutter mode, the brightness of the recorded picture may vary.
 - When you shoot a very bright subject with High-Speed Shutter mode, a light vertical, belt-like line ("smear") may appear on the screen.
 - When you record with High-Speed Shutter mode under a light discharged tube, such as a fluorescent lamp, sodium lamp or mercury lamp, the brightness of the recorded picture may vary.

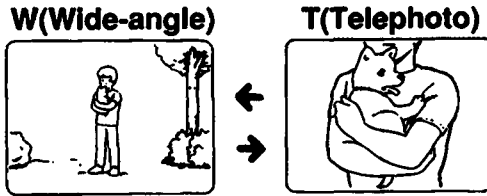
Using Special Effects

You can get a professional-looking home video using these special effects: zoom, close-up, fade-in and fade-out.

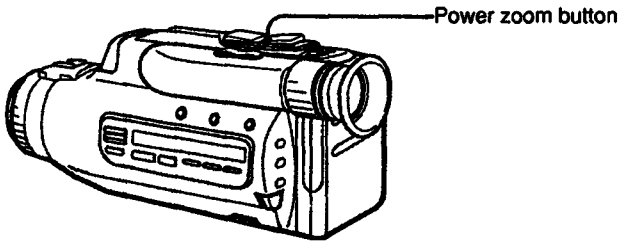
Zooming

By zooming, you can change the size of the subject in the scene. Use zooming to focus manually or to decide the shooting angle. Also use "zoom-in (Telephoto)" for dramatic close-ups. Use "zoom-out (Wide-angle)" for panoramic long shots.

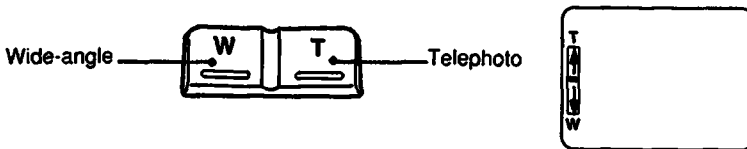
A common mistake, however, is using zoom-in or zoom-out too often during recording. For natural recording, you may want to set the zoom first and then start recording.



To zoom



Press the T side of the power zoom button for telephoto (subject appears closer) and the W side for wide-angle (subject appears farther away).

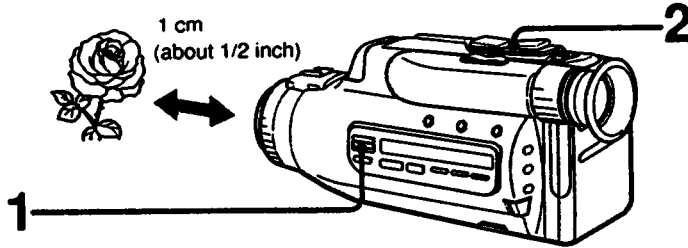


The camcorder's power zoom button offers variable speed zooming; press it firmly for high speed zooming and softly for normal speed zooming. The variable speed zoom cannot be operated with the power zoom button on the Commander.

Using Special Effects

Close-up (Macro)

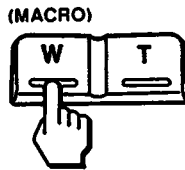
You can shoot subjects that are at least 1 cm (about 1/2 inch) away from the lens surface.



- 1 Set the AUTO LOCK switch to the green position.



- 2 Press the W side of the power zoom button until the indicator inside the viewfinder stops at the W end.



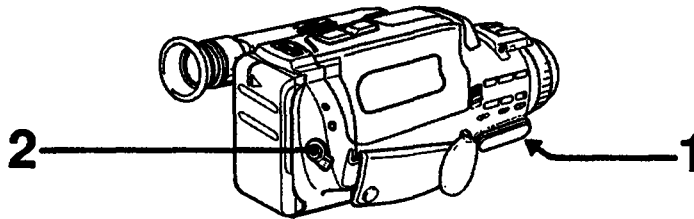
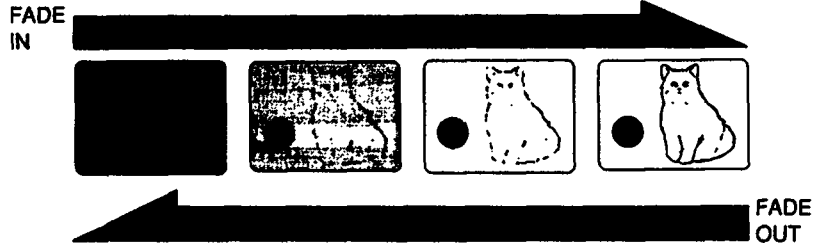
Manual adjustment

You can shoot with manual focus while doing close ups. For details, see page 36.

Note When doing close ups, the depth of field (range the subject will be in sharp focus) is very shallow, so pay attention to focusing. To keep the subject in focus, use a tripod.

Fade-in and Fade-out

You can fade-in or fade-out to give your recording a professional appearance. When fading-in, the picture will gradually appear from black. The sound will also gradually increase. When fading-out, the picture will gradually fade to black. The sound will decrease.



- 1 Select the type of fade by pressing FADER as follows:**
 - When fading-in**
Press it after setting the STANDBY switch up to put the camcorder into the standby mode.
The Fade indicator starts flashing.
 - When fading-out**
Press it while recording. The fade indicator starts flashing.



- 2 Press START/STOP.**
 - When fading-in**
The fade indicator stops flashing and the recording starts fading in.
 - When fading-out**
The fade indicator stops flashing and the picture fades out and then the recording stops.



To cancel the fade-in/out function

Before pressing START/STOP, press FADER again.

Using the fade-in/out function repeatedly

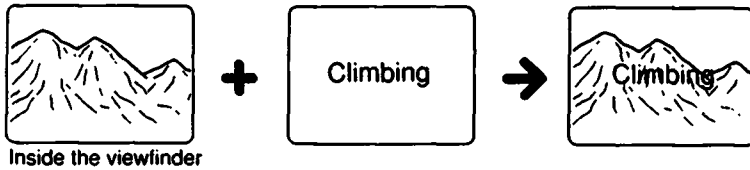
Start from step 1 each time.

When the date/time (page 27), or age (page 28) is displayed

The date/time, or age does not fade-in or fade-out.

Superimposing Text

This section shows you how to superimpose your own hand written message (title) or graphics over the scene.



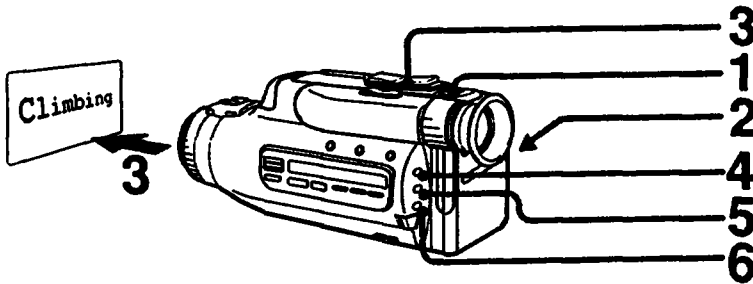
Before recording, store the title or graphics.

Storing a Title

You can store one title at a time.

Before you store the title, make a card. Use a plain, white card and write a title in a dark-colored marker using wide strokes. You can also use the available graphics or a sign if they are thick enough and have contrast.

Before you begin, make sure that the lithium battery is installed.



- 1** While pressing the small green button on the POWER switch, slide it to CAMERA.



- 2** Set the STANDBY switch up to put the camcorder into the standby mode.



- 3** Aim the camcorder at the title card and adjust the focus using the macro position (see page 44).



4 Press MEMORY to store the title.

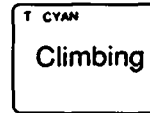
MEMORY



5 Press COLOR/MODE and select the title color.

Each time you press the button, the indicator changes as follows:

WHT (white) → BLUE → GRN (green) → CYAN
↑ ↓
BLK (black) ← YEL (yellow) ← VIO (violet) ← RED



COLOR/MODE



6 Press SUPERIMPOSE ON/OFF to turn off the title.

Now, a title is stored in memory.

SUPERIMPOSE
ON/OFF



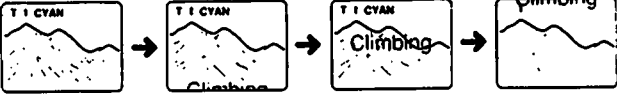
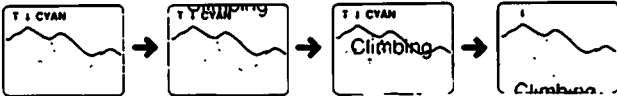
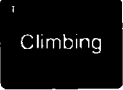

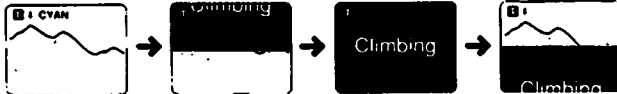
Checking the title

Press SUPERIMPOSE ON/OFF in standby mode.
To turn off the title, press the button again.

Superimposing Text

Selecting the display mode of a title

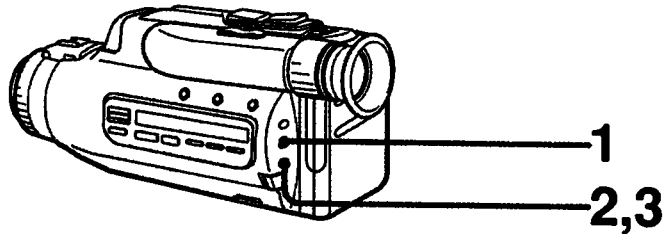
You can scroll your title up and down like scrolling credits in a movie. Also, you can reverse the title.







Display mode	Indicator in the viewfinder
<p>Scrolling the title up The title scrolls up and stops at the center.</p> 	↑
<p>Scrolling the title down The title scrolls down and stops at the center.</p> 	↓
<p>Reversing the title with the picture</p> 	⏮
<p>Scrolling the reversed title up</p> 	⏮↑
<p>Scrolling the reversed title down</p> 	⏮↓
<p>Normal display mode</p>	No indicator

Superimposing a Title on Your Tape

The following example shows you how to superimpose a title with the scrolling up effect. The color name and the display mode indicators inside the viewfinder will not be recorded.

Before superimposing the title, store it in the camcorder.



1 In standby mode, press COLOR/MODE to select the display mode of the title. (For display modes of the title, see page 48.)	 COLOR/MODE	
2 In standby mode or during recording press SUPERIMPOSE ON/OFF at the point you want to insert the title. The title appears.	 SUPERIMPOSE ON/OFF	
3 At the point you want to turn off the title, press SUPERIMPOSE ON/OFF again. The title goes out.	 SUPERIMPOSE ON/OFF	

Function of the COLOR/MODE button

This button has a double function: one is to select the title color and the other is to select the title display mode.

If the title is displayed, this button acts as the color selection button, but if it is not, it acts as the mode select button.

Superimposing a title at the beginning

- 1 Set the camcorder in the standby mode.
- 2 Press **SUPERIMPOSE ON/OFF**.
- 3 Start recording with the title displayed inside the viewfinder.
- 4 At the point you want to turn off the title, press **SUPERIMPOSE ON/OFF** again.

Playing Back

In the "Basic Camera Operation" section (page 19), the basic connections to your TV are explained.

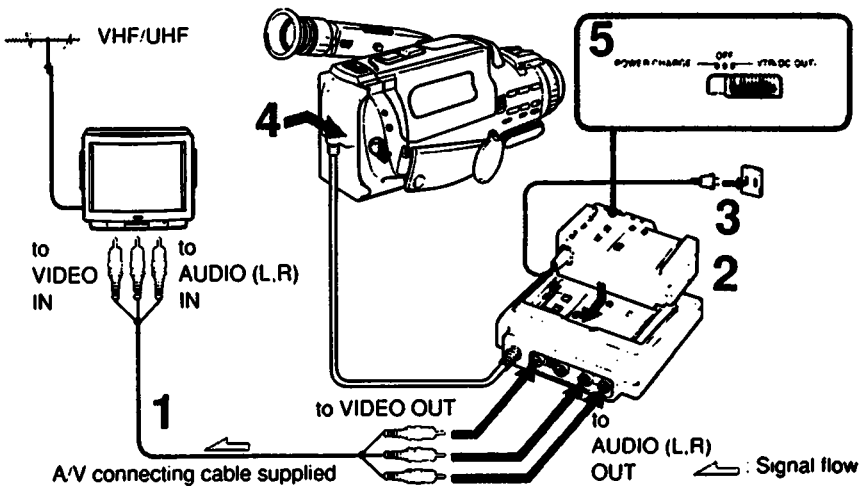
In this section, several other ways of connecting your camcorder to a TV are explained, depending on the type of TV you have.

You can properly connect the camcorder to the TV by using the supplied AC-V25S AC power adaptor.

Connecting to a TV with Video/Audio Inputs

Use the supplied AC-V25S AC power adaptor and A/V connecting cable to connect to the TV. Make sure that the TV is turned off to prevent damage to the speaker. There are two ways of connecting.

With the connecting adaptor



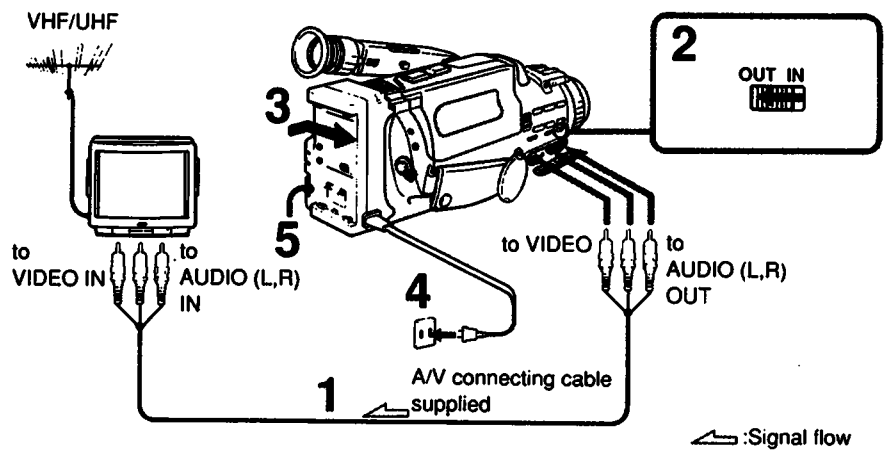
- 1 Connect the Video and Audio jacks of the TV and the connecting adaptor with the A/V cable. If your TV is a monaural type, use the supplied AV connecting cable.
- 2 Connect the AC power adaptor to the connecting adaptor.
— Push the AC power adaptor against the connecting adaptor and then slide the AC power adaptor in the direction of the arrow.
- 3 Connect the AC power adaptor to a wall outlet.
- 4 Attach the connecting plate of the connecting adaptor to your camcorder.
- 5 Set the CHARGE/VTR switch to VTR.

When disconnecting your camcorder, detach the connecting plate of the connecting adaptor from the camcorder. You may keep the connection between the TV and the AC power adaptor.

- Disconnect the AC power adaptor from the wall outlet when it will be used for a long time.
- You can connect the charged battery pack to the connecting adaptor instead of the AC power adaptor in step 2.
- The Video and Audio jacks on the connecting adaptor are used only for output video and audio signals. The camcorder does not record through these jacks.

Note Perform only steps 4 and 5 when playing back a tape. You can keep the AC power adaptor and the connecting adaptor connected to the TV when playing back a tape.

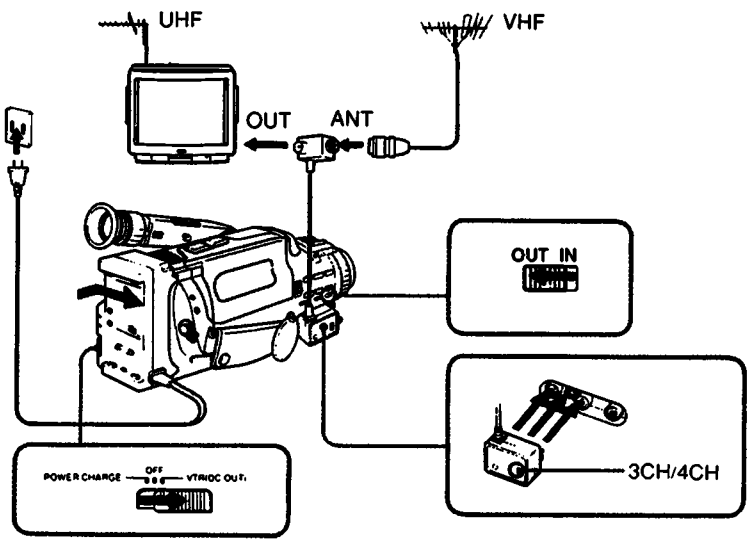
Without connecting adaptor



- 1 Connect the Video and Audio jacks on the TV and your camcorder with the AV cable. If your TV is a monaural type, use the supplied AV connecting cable.
 - 2 Set the IN/OUT selector on your camcorder to OUT.
 - 3 Attach the AC power adaptor to the camcorder (in the same way as attaching a battery pack).
 - 4 Connect the AC power adaptor to a wall outlet.
 - 5 Set the CHARGE/VTR switch on the AC power adaptor to VTR.
- You can use a charged battery pack instead of the AC power adaptor in step 3.

Connecting to a TV using the RFU adaptor

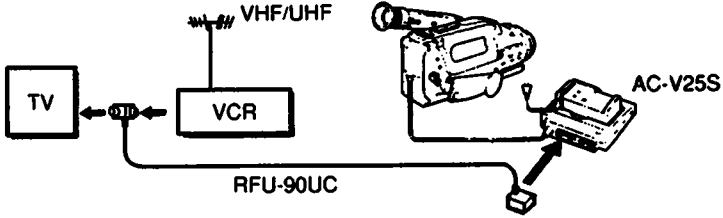
Put the RFU adaptor between the TV and VHF antenna cable. Attach the AC power adaptor and the RFU adaptor directly to the camcorder.



Connecting to a TV via a VCR

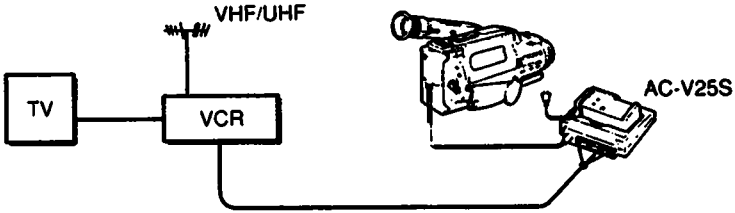
If your TV has no VIDEO/AUDIO input jacks

Disconnect the antenna connection between the TV and the VCR, and connect the RFU adaptor to the VHF/UHF input of the TV and VHF/UHF output of the VCR.



If your TV has VIDEO/AUDIO input jacks

Connect Video and Audio from the AC power adaptor to the VCR instead of to the TV. Set the input selector of the VCR to LINE, if available.



Playing Back a Tape at Various Speeds

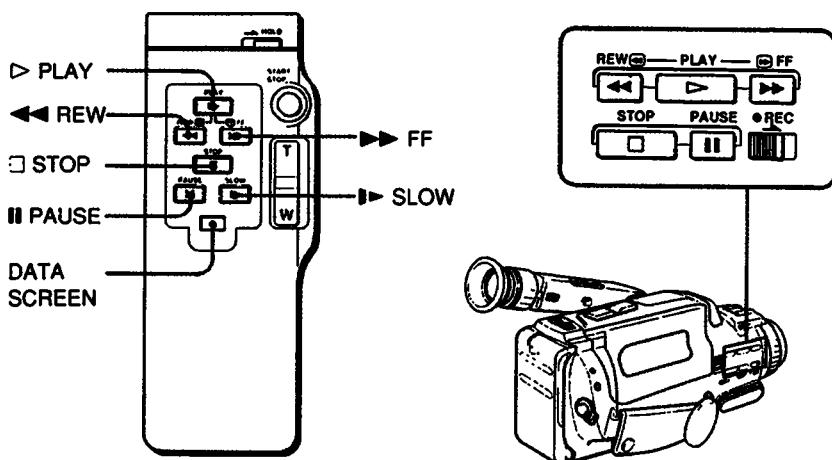
The supplied wireless Remote Commander is useful to control the camcorder from a distance. Before using it, be sure to set the **REMOTE COMMANDER** switch to ON. (See page 21.)

Making the same display appear in the viewfinder on the TV (only on the Commander)

Press **DATA SCREEN**.

To turn the display off, press it again.

This **DATA SCREEN** on the TV will tell you which playback mode you are using.



Viewing a still picture (playback pause)

Press **||** during playback.

|| appears in the viewfinder.

To resume normal playback, press **▷** or **||**.

Note When the still picture mode lasts for 5 minutes or more, the camcorder automatically enters the stop mode.

Viewing a picture at 1/5 speed (slow playback) (only on the Commander)

Press **▶|** during playback.

▶| appears in the viewfinder.

Note To resume normal playback, press **▷**.
After about one minute of slow playback, it shifts automatically to normal playback speed.

Playing Back

Locating the desired scene (picture search)

Keep pressing ◀◀ or ▶▶ during playback or in Still picture mode. ⏮ or ⏭ appears in the viewfinder.

To resume normal playback, release the button.

Locating the desired scene quickly (skip scan)

Press ◀◀ during rewind or ▶▶ during fast forward. ⏮ or ⏭ appears in the viewfinder.

To resume normal playback, press ▷.

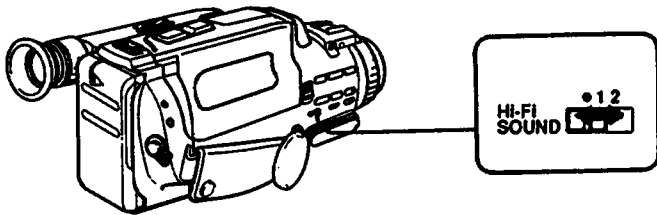
About the playback picture

During various playback modes, streaks appear on the screen.

Playing Back a Tape with Dual Sound Tracks

Normally set the Hi-Fi SOUND switch to ● position.

When the tape with dual sound tracks is played back, set the Hi-Fi SOUND switch to the desired sound, 1 or 2.



Note When you connect to a TV using the RFU adaptor, or when the TV or VCR is a monaural type, set the Hi-Fi SOUND switch to 1 or 2.

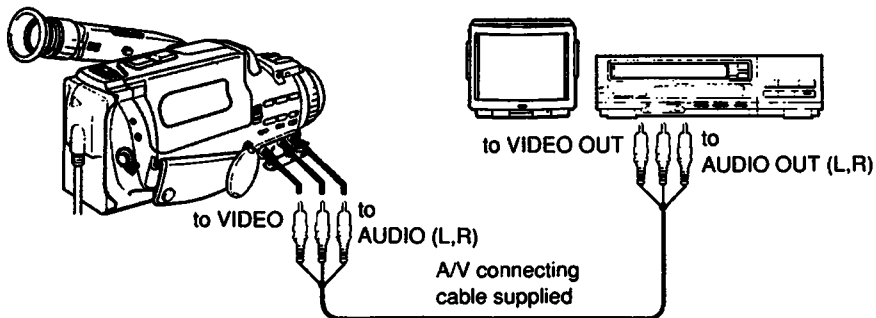
Recording

Recording from a VCR or TV

You can record a tape from another VCR or a TV program from a TV, both of which are equipped with video/audio outputs.

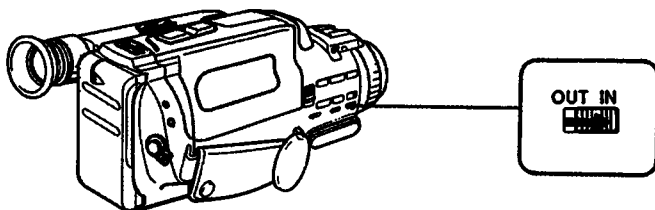
Connecting the camcorder

Disconnect the RFU adaptor from the AC power adaptor if it is connected. Make the connection using the supplied A/V cable.



Recording

- 1** Set the IN/OUT selector on the camcorder to IN.



- | |
|--|
| 2 Turn on the VCR or TV. |
| 3 Play back the tape or select the TV channel to be recorded. |
| 4 Set the POWER switch of the camcorder to VTR. |
| 5 Insert a tape and slide ● REC.
Recording starts. You can monitor the picture being recorded in the viewfinder. |

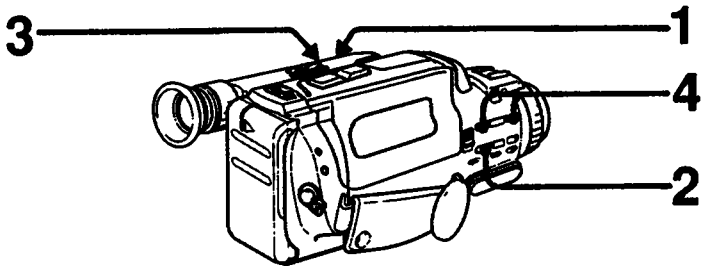
Using the Tape Counter












During recording or playback, the digits on the counter indicate the actual recording or playback time.

Counting the whole tape

Press COUNTER RESET at the beginning of the tape so that the counter in the display window displays "0:00:00". Check the counter reading at a particular point so that you can easily find that point later by referring to the tape counter.

Returning to a pre-registered position.



<p>1 During playback, press COUNTER RESET at the point you later want to locate. The counter shows "0:00:00".</p>	<p>COUNTER RESET</p>  
<p>2 Press  when playback has finished, as usual.</p>	<p>STOP</p> 
<p>3 Press ZERO MEM. The "ZERO MEM" indicator blinks in the display window. Be sure to press ZERO MEM after you stop the tape. It does not function during recording or playback.</p>	<p>ZERO MEM</p>  
<p>4 Press  or .</p> <p>The tape rewinds or advances and stops automatically when the counter reaches approximately zero.</p>	<p>REW  </p> 

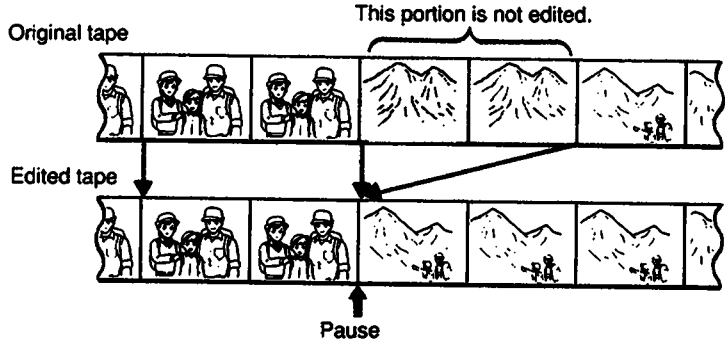
Notes on the tape counter and the ZERO MEM button

- Something must be recorded on the tape in order for the tape counter to function. The tape counter will not work on a blank tape.
- The counter reading and the point on the tape may not correspond exactly. Use the counter as a guide. There will be a time lag of several seconds especially when you repeat fast-forward* running/rewinding and play back a tape recorded in both LP and SP modes mixed.
- ZERO MEM is cancelled automatically once the tape is rewound or sent forward to the preset point.

Editing

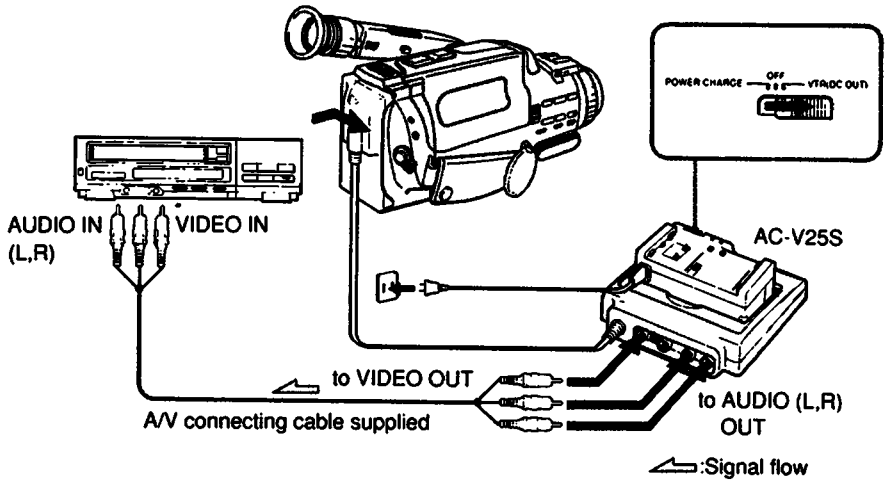
Editing Tapes with a VCR

You can edit a tape if you have an additional 8mm, Betamax or VHS VHS format VCR



Connecting the camcorder

Make connections using the supplied A/V cable and set the CHARGE/VTR selector on the AC power adaptor to VTR. Set the input selector of the VCR to LINE, if available.

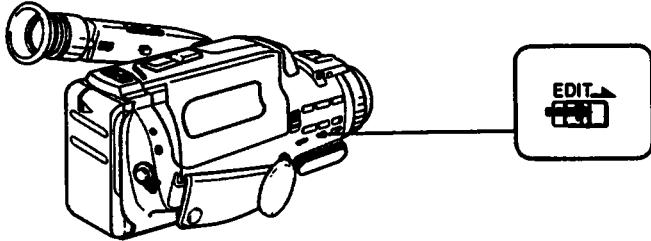


The Video and Audio jacks on the connecting adaptor are used for output video and audio signals only. The camcorder does not record through these jacks.

Editing a tape

1 Insert a tape to be recorded on into the recording VCR.

2 Slide the EDIT switch on the camcorder in the direction of the arrow shown below.



3 Set the POWER switch on the camcorder to VTR, and then insert the recorded tape into it.

4 Play back a tape on the camcorder until you locate the point where you want to start editing, and then set the camcorder to the playback pause mode.

5 On the recording VCR, locate the recording starting point and set the VCR to the Recording Pause mode.

6 Press II PAUSE on the camcorder and VCR simultaneously to start editing.

Editing more scenes

Repeat steps 4 to 6.

To stop editing momentarily

Press II (PAUSE) on the recording VCR.

To stop editing

Press ■ (STOP) on both VCRs.

If you use the DATA SCREEN function

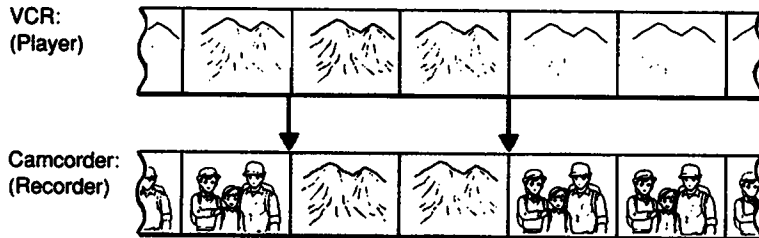
The indicators displayed on the TV screen will also be recorded.

Use of the EDIT switch

When you set EDIT in the direction of the arrow (EDIT ON), you can minimize the picture deterioration that results from editing. Avoid using the edited tape for multiple generations of editing. After editing, be sure to set this switch in the opposite direction of the arrow (EDIT OFF).

Replacing Recordings on a Tape (Insert Editing)

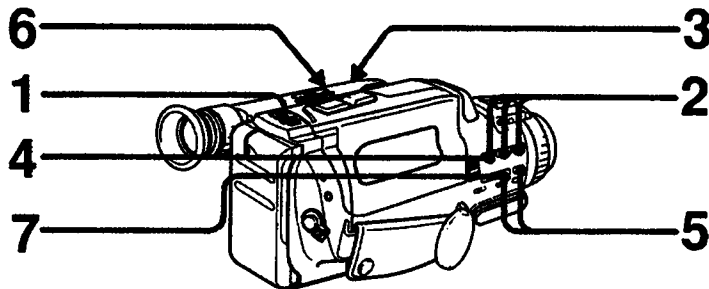
You can insert a new scene from a VCR on your originally recorded tape by setting the starting point and ending point.



Connecting the camcorder

Connections are the same as in "Recording from a VCR or TV (page 55)." Before you begin to replace recordings, set the VCR to the playback pause mode at the beginning of the scene to be recorded. Set the CHARGE/VTR selector on the AC power adaptor to VTR.

Replacing recordings



- 1 Press the small green button on the **POWER** switch and slide it to **VTR**.
The counter appears in the viewfinder.



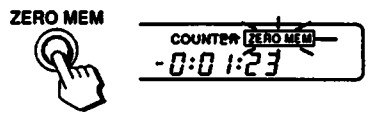



- 2 Locate the end point where the insert should end by pressing **◀◀** or **▶▶** during playback.



- 3 At the end point, press **COUNTER RESET**.
The counter is reset to "0:00:00".



<p>4 By pressing ◀◀, locate the start point where the insert should begin.</p>	
<p>5 At the start point, set the camcorder into recording pause mode. Slide REC in the direction of the arrow with PAUSE pressed.</p>	
<p>6 Press ZERO MEM. The end point of the insert is stored in memory.</p>	
<p>7 Press II PAUSE on both units to start insert editing. You can monitor the picture being inserted in the viewfinder screen.</p>	

The insert recording will stop automatically near the zero point on the counter.

Changing the end point

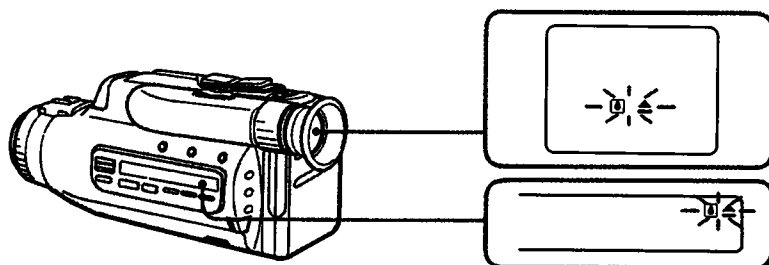
Press ZERO MEM so that the ZERO MEM indicator disappears, and repeat again from step 2.

Maintenance Information



Moisture Condensation

If the camcorder is brought directly from a cold place to a warm place, moisture may condense inside the camcorder, on the surface of the tape or on the lens. In this condition, the tape may stick to the head drum and be damaged or the unit may not operate correctly. To prevent possible damage under these circumstances, the camcorder is furnished with moisture sensors. However, take the following precautions.

If moisture condenses inside the unit



Moisture is present inside the camcorder when:

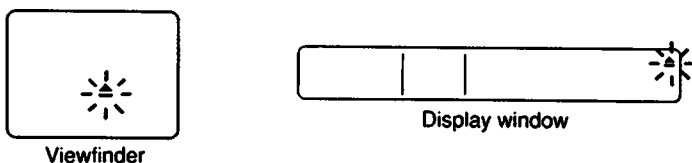
- The  indicator in the viewfinder and the display window blinks.
- When a tape is inserted, the  indicator also blinks.
- Several beeps sound continuously for five seconds when the BEEP switch is set to ON and a tape is inserted.

In such cases, no functions, except for tape ejection, work.


Eject the tape, turn off the camcorder and leave it with the cassette holder open for at least 1 hour.

The camcorder can be used again if the  indicator does not appear when the power is turned on again.

If moisture condenses on the surface of the tape




Moisture is present on the surface of a tape when:

- The  indicator blinks inside the viewfinder and the display window when a tape is inserted and a tape transport button (▶, ◀, etc.) is pressed.
- Several beeps sound continuously for about five seconds when the BEEP switch is set to ON.

In such cases, no functions, except for tape ejection, work.

Eject the tape and let the camcorder and the tape sit for at least 1 hour.

The tape can be used again if the  indicator does not appear when the tape is inserted and a tape transport button is pressed.

If moisture condenses on the lens

No caution indicators will appear, but the picture becomes dim.

Turn off the power and do not use the camcorder for at least 1 hour.

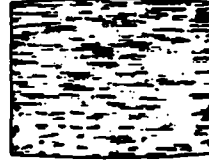
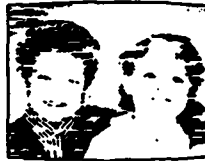
Maintenance Information

How to prevent moisture condensation

When bringing the camcorder from a cold place to a warm place, put the camcorder in a plastic bag and allow it to adapt to room conditions over a period of time.

- 1 Be sure to tightly seal the plastic bag containing the camcorder.
- 2 Remove the bag when the air temperature inside it has reached the temperature surrounding it (after about one hour).

Video Head Cleaning



Slight contamination  Critical contamination

To ensure a clear picture, clean the video heads periodically

When playback pictures become noisy or barely visible, the video heads may be contaminated. In such cases:

- 1 Clean the video heads with the Sony V8-25CLH cleaning cassette (not supplied), referring to its instructions.
- 2 After cleaning, check to see if the picture is clear by recording on or playing back an ordinary tape.
- 3 If the picture is still noisy, repeat cleaning. (Do not repeat cleaning more than 5 times.)

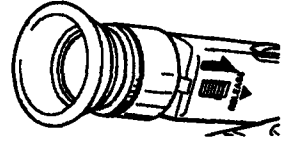
Caution Do not use a commercially available wet-type cleaning cassette. It may damage the video heads.

Note If the V8-25CLH cleaning cassette is not available in your area, consult your Sony service facility.

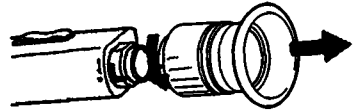
Viewfinder Cleaning

Cleaning the viewfinder

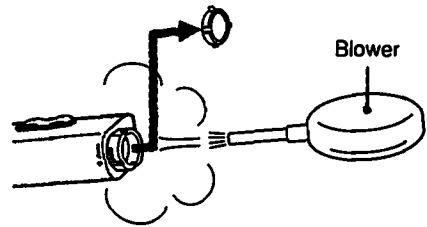
- 1** Push down the switch on the viewfinder barrel.



- 2** Turn the eyecup in the direction of the arrow and detach it.

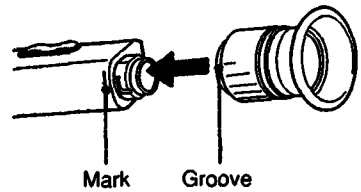


- 3** Clean the surface of the screen with a commercially available blower.

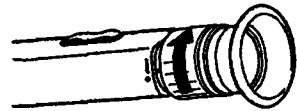


Reattaching the eyecup

- 1** Align the groove on the eyecup with the ● mark on the barrel.



- 2** Turn the eyecup in the opposite direction of the arrow.



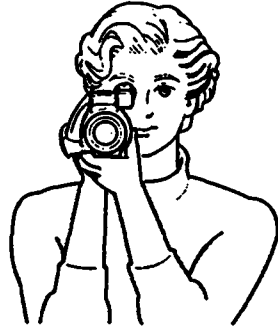
Tips for Better Camera Recording

Achieving a Better Camera Recording

Assume a good posture for shooting

For hand-held shots, it is important to hold the camcorder properly.

- Hold the camcorder firmly and secure it with the grip strap so that you can easily operate the camcorder with your thumb.
- Place your right elbow firmly against your side.
- Place your left hand under the camcorder to support it. When adjusting the focus manually, make sure the camcorder does not move.
- Face the subject and assume a comfortable stance.
- Place your eye firmly against the viewfinder eyecup.



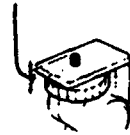
Use a tripod

If you have a tripod for a still camera, you can also use it with the camcorder. If a tripod is not available, try placing the camcorder on a tabletop or any other flat surface of suitable height.

Caution

When attaching a tripod not manufactured by Sony, make sure that the length of the camera mounting screw is less than 6.5 mm. Otherwise the screw may damage the camcorder.

Less than 6.5 mm ($\frac{1}{2}$ inches)



Keep the horizontal plane level

You can easily determine the horizontal plane by using the viewfinder frame as a reference.



Plan ahead

If you are going to edit the tape after recording, shoot the scene a little longer to make the editing easier.

Lighting

Shoot with the sun behind you.

When the light source is behind the subject, or in the following situations, the subject will be recorded too dark and the background too light.

- The subject is indoors and there is a window behind the subject.
- Bright sources such as fluorescent or incandescent lamps are included in the scene.
- You are shooting a person wearing white or shiny clothes in front of a white background. In this case, the face will be recorded too dark.

Use video light in the dark

To get the best colors, you must maintain a sufficient light level.

Photography lamps or halogen lamps are recommended. For best results, use Sony video lights; their weight and low heat output levels allow safe and direct connection to the camcorder.

Do not point the light at the camcorder. The high heat from the light may warp the casing of the camcorder.

Brightness levels

Using the following chart as a reference, take a few minutes to familiarize yourself with brightness levels to improve your recording technique.

Situation	Brightness	Condition
Snow-covered mountains Snow fields Sandy beach, clear day in summer	Unit: lx	ND filter recommended
Clear day, mid day (100,000 lx) Clear day, mid-afternoon (35,000) Overcast day, mid-day (32,000)	100,000	Normal recording
Overcast day, one hour after sunrise (2,000) Office lit by fluorescent lamps, near window (1,000)	10,000	
Clear day, one hour before sunset (1,000) Department store counter (500 – 700) Station wicket (650) Office lit by fluorescent lamps (400 – 500)	1,000	
Room lit by two 30 W fluorescent lamps (300) Subway station platform (300)	500 300	
Arcade at night (150 – 200)	100	
Theater lobby (15 – 35) Candlelight (10 – 15)	10	
		Video light recommended

Using Your Camcorder Abroad

Each country has its own electricity system and TV color system. Before using your camcorder abroad, check the following points.

Power Sources

You can use your camcorder in any country with the supplied AC power adaptor where the electricity is 110 V to 240 V AC, 50/60 Hz.

Difference in Color Systems

This camcorder is an NTSC system based camcorder. If you want to view the playback picture on a TV, it must be an NTSC system based TV or a PAL-M system based TV with NTSC/PAL-M transcoder. Check the following alphabetical list.

NTSC system countries

Bahama Islands, Bolivia, Canada, Central America, Chile, Colombia, Ecuador, Jamaica, Japan, Korea, Mexico, Peru, Surinam, Taiwan, The Philippines, U.S.A., Venezuela, and others.

PAL system countries

Australia, Austria, Belgium, China, Denmark, Finland, Germany (former West Germany), Great Britain, Holland, Hong Kong, Italy, Kuwait, Malaysia, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, and others.

PAL M system country

Brazil

PAL N system countries

Argentina, Paraguay, Uruguay

SECAM system countries

Bulgaria, France, Guiana, Hungary, Iran, Iraq, Monaco, Poland, former Soviet Union, and others.

Precautions

On operation

- Operate the camcorder on 6.0 V (battery pack) or 7.5 V (AC power adaptor).
- For DC or AC operation, use the accessories recommended in this manual.
- Should any solid object or liquid fall into the casing, unplug the camcorder and have it checked by qualified personnel before operating it any further.
- Do not hold the camcorder by the viewfinder or the microphone.
- Avoid rough handling or hitting the unit. Be particularly careful of the lens.
- Keep the lens cap on the lens when not using the camera.
- Do not wrap up the camcorder and operate it since heat may build up internally.
- Keep the camcorder away from strong magnetic fields or mechanical vibration.
- **Do not let sand get into the camcorder.**
When you use the camcorder on a beach or dusty place, protect it from the sand or dust. Sand or dust may cause the camcorder to malfunction and sometimes the malfunction cannot be eliminated.
- **Do not let the camcorder get wet.**
Keep the camcorder from rain or sea water. Water may cause a malfunction and sometimes the malfunction cannot be eliminated.

On care

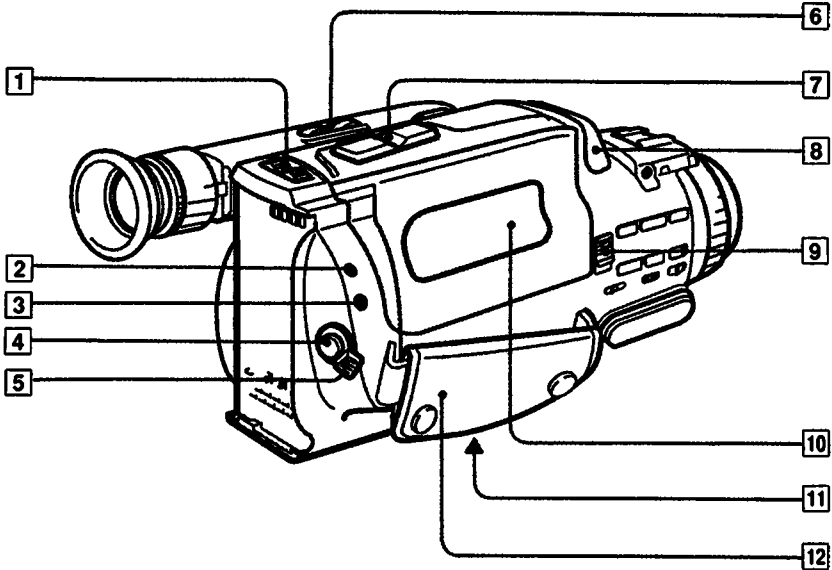
- When the unit will not be used for a long time, disconnect the power source and remove the tape. Periodically turn on the power, operate the camera section and player section and play back a tape for about 3 minutes.
- Clean the lens with a soft brush to remove dust. If there are fingerprints on it, remove them with a soft cloth. Clean the camcorder body with a dry, soft cloth, or a soft cloth lightly moistened with a mild detergent solution. Do not use any type of solvent which may damage the finish.

Note on copyright

Television programs, films, video tapes and other materials may be copyrighted. Unauthorized recording of such materials may be contrary to provisions of the copyright laws.

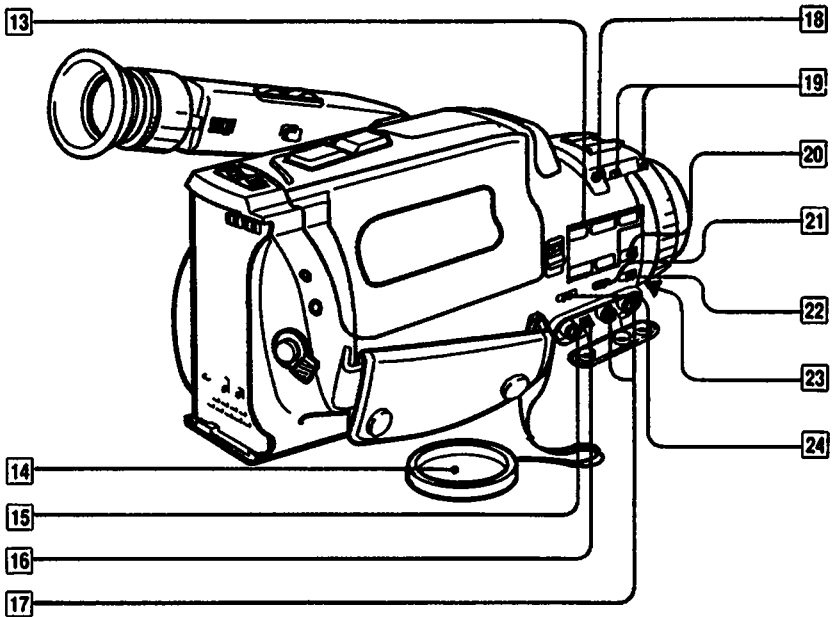
Identifying the Parts

For details on the use of each part, refer to the pages indicated in the circle.



- 1** **POWER** switch
CAMERA: for camera recording
VTR: for playing back or editing tapes
OFF: power off
- 2** **REMOTE** control connector (stereo mini-minijack) **39**
- 3** **(headphone) jack** (minijack)
- 4** **START/STOP** button
- 5** **STANDBY** switch
- 6** **EDITSEARCH** (and **RECORDING REVIEW**) button **30** **31** **32** **33**
- 7** **Power zoom (MACRO)** button **43** **44**
- 8** **Stereo built-in microphone**
- 9** **EJECT** (cassette eject) knob **9**
- 10** **Cassette holder**
- 11** **Lithium battery holder**
- 12** **Grip strap** **16**

Identifying the Parts



13 Tape transport buttons ⑤④

- ▷ PLAY (playback)
- ▶▶ FF (fast-forward)
- ◀◀ REW (rewind)
- STOP (stop)
- || PAUSE (pause)

14 Lens cap

15 VIDEO input/output jack (phono jack) ⑤

16 RFU DC OUT (RFU adaptor DC output) jack (special minijack)

17 AUDIO (L, R) input/output jacks (phono jack) ⑤

18 MIC jack (PLUG IN POWER) (stereo mini-jack)

19 Remote control sensor ④

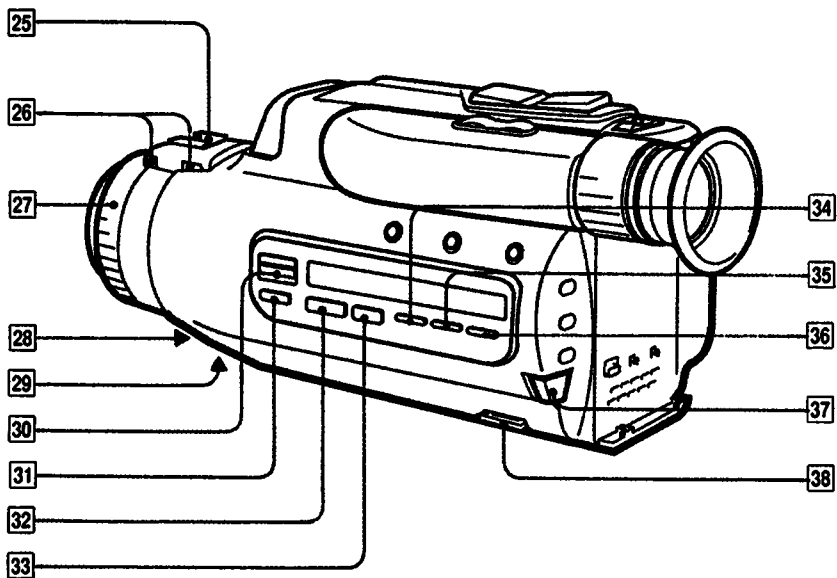
20 ● REC (recording) switch ⑤

21 EDIT switch ⑤

22 IN/OUT (video and audio input/output) selector ⑤

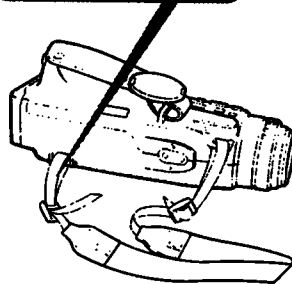
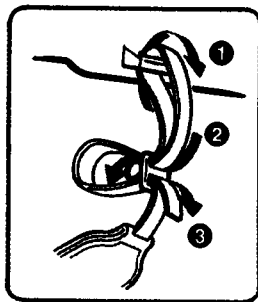
23 Shoulder strap hook

24 HiFi SOUND switch ⑤

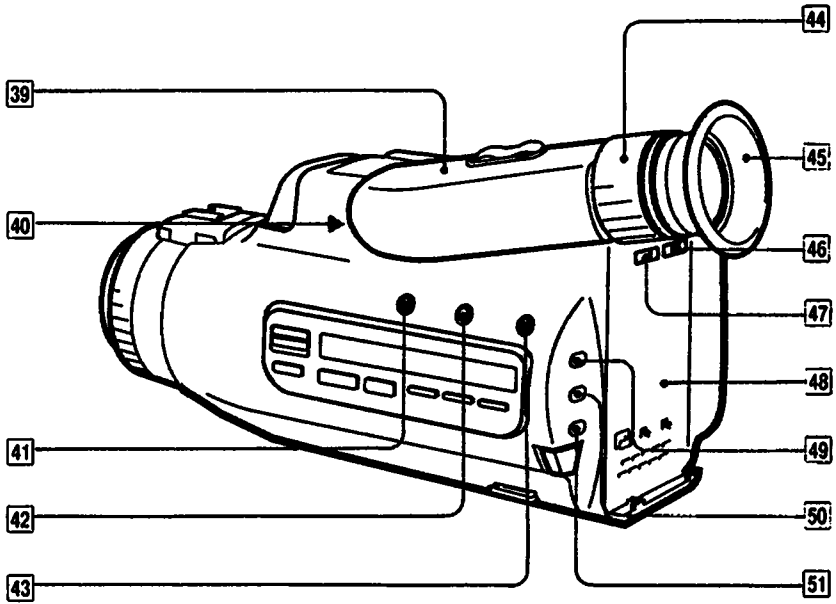


- 25** Accessory shoe
- 26** Remote control sensor ①
- 27** Focus ring
- 28** FADER button ④⑤
- 29** Tripod receptacle (bottom)
- 30** AUTO LOCK switch ①⑥ ③⑧ ③⑨ ④①
- 31** BACK LIGHT button ③⑦
- 32** PROGRAM AE switch ③⑧ ③⑨ ④①
- 33** FOCUS button ③⑥
- 34** DATE (+) button ①③ ①④ ①⑤ ②⑦
- 35** TIME (NEXT) button ①③ ①④ ②⑦
- 36** AGE/EVENT button ①④ ②⑥
- 37** BATT (battery eject) knob ⑦
- 38** Shoulder strap

Attaching the shoulder strap

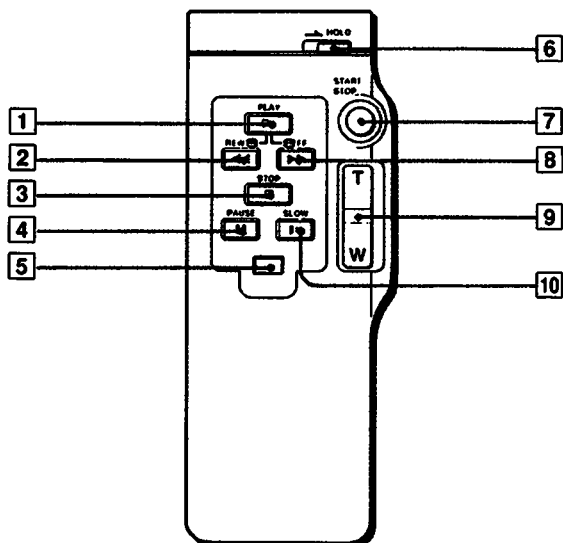


Identifying the Parts



- 39** Viewfinder
- 40** Camera recording/battery lamp 73
- 41** COUNTER RESET button 32 59
- 42** ZERO MEM button 32 55 60
- 43** TAPE/BATT CHECK button 8 18
- 44** Viewfinder adjustment ring 10
- 45** Eyecup
- 46** BEEP ON/OFF switch 11
- 47** REMOTE COMMANDER switch 21
- 48** Battery mounting surface
- 49** MEMORY button 47
- 50** COLOR/MODE button 47
- 51** SUPERIMPOSE ON/OFF button 47

Wireless Remote Commander



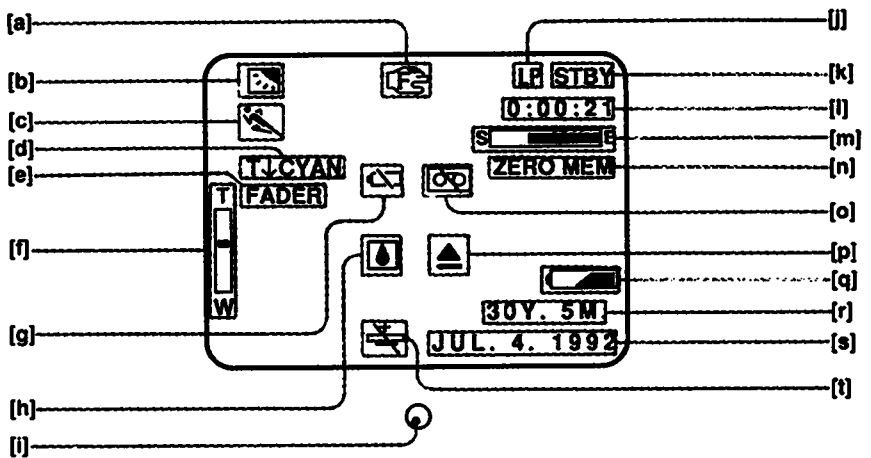
- 1 ▷ PLAY (play back) button 53
- 2 ◀◀ REW (rewind) button 54
- 3 ◻ STOP button
- 4 || PAUSE button 53
- 5 DATA SCREEN button* 53
- 6 HOLD switch* 22
- 7 START/STOP button
- 8 FF ▶▶ (fast forward) button 54
- 9 Power zoom button
- 10 ▶| SLOW (slow playback) button* 53

Note

The * indicates the functions which are operable only with the Commander.

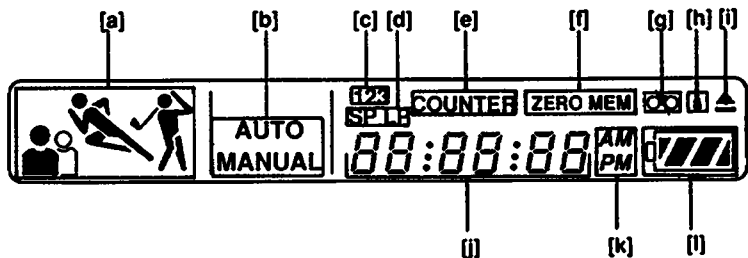
Indicators inside the Viewfinder and the Display Window

Inside the Viewfinder



- | | |
|--|---|
| [a] Manual focusing (☞) | [k] Tape transport mode |
| [b] BACK LIGHT is pressed. (☒) | [l] Tape counter |
| [c] PROGRAM AE setting (♂, ♀, ♂) | [m] Remaining time of tape |
| [d] Title mode and color | [n] ZERO MEM is pressed. |
| [e] FADER is pressed. | [o] "Replace tape or no tape inside." (☒) |
| [f] Power zoom indicator | [p] "Trouble has occurred" (♂) |
| [g] "Replace battery." (☒) | [q] "Clean video heads." (♂) |
| [h] Moisture has condensed. (☒) | [r] Remaining capacity of a battery |
| [i] Lights up during recording.
When blinking: "Replace battery or tape." | [s] Age |
| [j] Playback mode (LP) | [t] Date or Time |
| | [u] "Replace lithium battery" (♂) |

Inside the Display Window



- | | |
|-----------------------------|---|
| [a] PROGRAM AE setting | [g] "Replace the tape or no tape inside." |
| [b] Focus mode | [h] Moisture has condensed. |
| [c] AGE/EVENT memory number | [i] "Trouble has occurred" |
| [d] Tape speed mode | [j] Counter or time/date/age indicator |
| [e] Appears in counter mode | [k] AM/PM indicator |
| [f] ZERO MEM is pressed. | [l] Remaining capacity of battery |

Troubleshooting

If you run into any problems using the camcorder, use the following table to troubleshoot the problem. Should the difficulty persist, unplug the unit and contact your Sony dealer or local authorized Sony service facility.

Symptom	Cause	Corrective actions
The power does not turn on.	The battery is not attached.	Attach the battery.
	The battery is used up.	Use a charged battery.
	The AC power adaptor is not connected to a wall outlet.	Connect the adaptor to a wall outlet.
The power turns off.	While being operated in CAMERA mode, the camcorder has been in Pause mode for more than 5 minutes.	Turn down the STANDBY switch, and turn it up again.
	The battery is used up.	Use a charged battery.
The battery pack is quickly discharged.	The ambient temperature is too low.	—
	The battery pack has not been charged fully.	Charge the battery pack again.
The START/STOP button does not operate.	The tape is stuck to the drum.	Eject the tape.
	The tape is at its end.	Rewind the tape or use a new one.
	The POWER switch is set to VTR.	Set it to CAMERA.
	The tab on the tape is out (red).	Use a new tape or slide the tab.
The tape cannot be removed from the compartment.	The battery is used up.	Use a charged battery or the AC power adaptor.
No function except for tape ejection works.	Moisture condensation has occurred. (See page 61.)	Remove the tape and do not use the camcorder for at least an hour.
The tape does not move when a tape transport button is pressed.	The POWER switch is set to CAMERA or OFF.	Set it to VTR.
	The tape is at its end.	Rewind the tape or use a new one.
The autofocusing function does not work.	FOCUS was not set to AUTO when recording.	Set FOCUS to AUTO.
	Shooting conditions are not suitable for autofocusing operation. (See page 35.)	Set FOCUS to MANUAL to adjust the focus manually.
The image on the viewfinder screen is not clear.	The viewfinder lens is not adjusted.	Adjust the viewfinder lens.
A vertical band appears when a subject such as lights or a candle flame is shot against a dark background.	The contrast between the subject and background is too high; the camera is not malfunctioning.	—
The playback picture is not clear.	EDIT is set in the direction of the arrow.	Set EDIT in the opposite direction of the arrow.
	The channel or input for the camcorder is not selected on the TV.	Select correctly.
The picture is noisy.	The video heads may be contaminated.	Clean the heads using the Sony V8-25CLH (see page 62) cleaning cassette.
When the TV is connected to the camcorder using the VIDEO/AUDIO jacks, the picture on the TV is not clear or moves vertically.	The IN/OUT selector is set to OUT.	Set it to IN.

Troubleshooting

If an indicator blinks in the viewfinder screen and the display window or a caution lamp on the main unit blinks, check the following table.



slow blinking



fast blinking

	Symptom		Cause	Corrective actions
	Viewfinder	Display window		
Camera or VTR operation			The battery is weak.	Prepare a charged one.
	Battery lamp			
Camera or VTR operation			The battery is used up.	Use a charged battery
	Battery lamp			
Camera operation	*	*	The tape is at its end.	Use a new tape.
	* Battery lamp		The tape is near its end.	Prepare a new one.
	Battery lamp		No tape is inserted.	Insert a tape.
Camera or VTR operation	*	*	Moisture condensation has occurred.	Remove the tape and leave the camcorder for at least an hour.
		—	The gap of the head is clogged.	Clean the head using the Sony V8-25CLH video head cleaning tape.
	Caution lamp			
	*	*	Other troubles may occur.	Consult your nearest Sony dealer.
	* Caution lamp			
	—	The lithium battery is not installed. The lithium battery is exhausted. The lithium battery is weak.	Install a lithium battery with the battery pack or other power source attached. Otherwise, you must readjust the date, time and birth dates.	

* In these cases the displayed indicator is accompanied by a series of beeps when the BEEP switch is turned on.

Specifications

System

Video recording system

Rotary two heads, Helical scanning FM system

Audio recording system

Rotary head, FM system

Video signal NTSC color, EIA standards

Cassette type 8 mm video format cassette

Tape speed SP mode: Approx. 1.43 cm (¹⁹/₃₂ inch)/sec.

LP mode: Approx. 0.72 cm (⁹/₁₆ inch)/sec. (playback only)

Recording time SP mode: 2 hours (P6-120)

Playback time SP mode: 2 hours (P6-120)

LP mode: 4 hours (P6-120)

Fast forward/rewind time

Approx. 6 min. 30 sec. (P6-120)

Image device CCD (Charge Coupled Device)

Viewfinder Electronic viewfinder

(black and white)

Lens Combined 10 × power zoom lens

f=6.1 to 61 mm (¹/₄ to 2¹/₂ inches)

Approx. 44 to 440 mm (¹/₄ to 17³/₈ inches) converted into the focal length of a 35-mm still camera.

F 1.6 with macro

Filter diameter: 37 mm (1¹/₂ inches)

TTL autofocus system inner focus wide macro system

Color temperature AUTO

Minimum illumination 1 lx

Illumination range 1 lx to 100,000 lx (0.2 to 9294 footcandles)

Recommended illumination

More than 100 lx (9 footcandles)

Aperture correction Automatic

With backlight adjustment

Input and output connector

Video input/output Phono jack, 1 Vp-p, 75 ohms unbalanced sync negative

Audio input/output Phono jack (L, R)
Input: -7.5 dBs, input impedance more than 47 kilohms
Output: -7.5 dBs, (at output impedance 47 kilohms) impedance less than 1 kilohm

RFU DC OUT Special minijack, 5V DC
Headphone jack Minijack, 8-ohm impedance
Remote Ⓜ jack Stereo mini-minijack
MIC jack Stereo minijack, -66 dBs, low impedance with 2.5 to 3 V DC output, impedance 6.8 kilohms
Microphone power output jack Special minijack, 5 V DC

General

Power requirements

On battery mounting surface

6.0 V (battery pack)

7.5 V (AC power adaptor)

Power consumption

6.0 W (camera recording) including the viewfinder

Installation

Vertically, horizontally

Operating temperature

0°C to 40°C (32°F to 104°F)

Storage temperature

-20°C to +60°C

(-4°F to +140°F)

Dimensions

Approx. 118 × 108 × 265 mm (w/h/d) (4³/₄ × 4³/₈ × 10¹/₂ in.)

Weight

Approx. 850 g (1 lb 14 oz) excluding the battery pack, lithium battery, cassette, lens cap, jack cover and shoulder strap

Approx. 1070 g (2 lb 9 oz)

including the battery pack

NP-55H, lithium battery

CR2025, cassette P6-120, lens cap, jack cover and shoulder strap

Microphone

Electret condenser microphone, uni-directional, stereo type

Wireless Remote Commander

Remote control system

Infrared control

Command mode VTR 2

Power requirements

3 V DC, 2 size AA (R6) batteries

Dimensions

Approx. 48 × 19 × 130 mm (w/h/d) (1¹⁵/₁₆ × 3³/₄ × 5¹/₈ inches)

Weight

Approx. 50 g (1.8 oz) (excluding batteries)

Design and specifications are subject to change without notice.

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If you have any question about this product, you may call:

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