

SONY

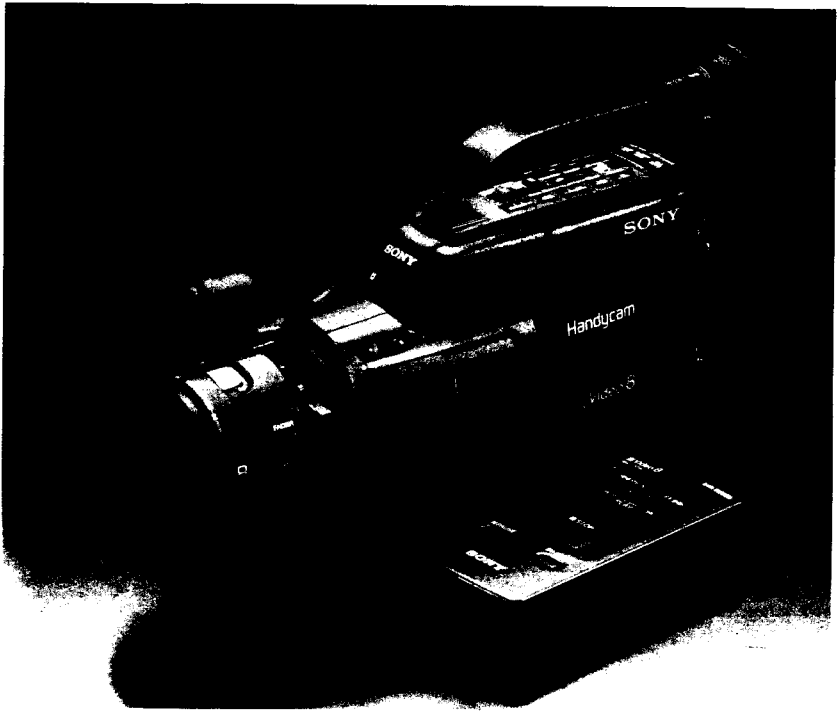
3-752-959-21 (1)

Video Camera Recorder **8**

CCD-F301

Operating Instructions

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



Video 8 Handycam

© 1991 by Sony Corporation


Owner's Record


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

Model No. CCD F301 Serial No. _____

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 REMOVE 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 dangerous moving and hot surfaces. Read the 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 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, if interference does occur, you may need to take the following corrective measures:

- Reorient the receiving antenna.
 - Move 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 a qualified radio/television technician for additional suggestions. This booklet contains 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 20407. Stock No. 504-100-00345-4.

For the customers in Canada

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

Table of Contents

Getting Started	
Introduction	4
Identifying the parts	5
Preparing your camcorder	11
Connecting the power sources	12
Setting the date and time	18
Inserting tapes	20
Adjusting the viewfinder lens	21
Operating the Camera Section	
Recording a picture using automatic adjustments	22
To record the date and time	24
Playing back the picture instantly	27
Recording a picture using manual adjustments	28
Setting automatic/manual adjustment:	29
Manual focusing	30
Adjusting the white balance	31
Setting shutter speed	33
Shooting with backlighting	34
Zooming	35
Close-ups (Auto-focusing in macro)	36
Face and lock on	38
Recording the age of your child	38
Operating the VCR Section	
Connections for playback	43
Erasing back a tape	45
Erasing a VCR	46
Recording from another VCR or a TV	48
Insert recording	50
Using the tape counter	51
Others	
Hints for better shooting	52
Noises and precautions	54
Using your camcorder abroad	56
Specifications	57
Trouble check	58
Indications inside the viewfinder	back cover
List of beeps	back cover

Introduction

How the Manual is Organized

The first section of the manual explains the preliminary steps necessary to prepare for shooting and playing back.

Other sections include shooting procedures that show how to use the features and functions of your camcorder. If you are a beginner, start with "Recording a picture using automatic."

Adjustments: If you are very familiar with video cameras, try to shoot your picture with manual settings and automatic adjustment. If you want to record right away, see pages 11, 22, and 28.

The manual also includes how to play back a picture on a TV, how to edit your original 8mm tape onto another video tape, and how to record a picture from another video tape or TV.

If you have any problems during operation, see the "Trouble check" section.

How this Manual Works

Use the information below to help you follow the instructions in this manual.

- Controls and settings on the camcorder are shown in capital letters.
- The letter **C** refers to **CAMERA**.
- The letter in an illustration corresponds to the letter in the text.
ex. (A-1) or (B)
- The step number in an illustration corresponds to the step number in the text.
- Notes and cautions are enclosed with lines:
ex. **Note on battery life**

Battery will not last as long in cold places.

Supplied Accessories

This camcorder is packed together with the following accessories. Check to see that everything is contained in the package.

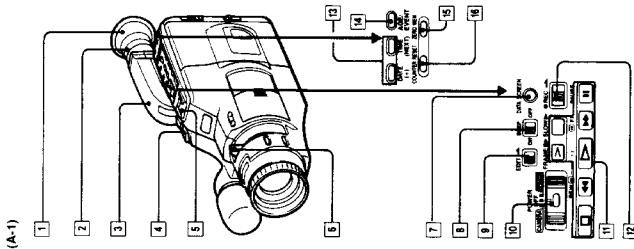
- Remote Commander RMT 506 (1)
- Size AA (R6) battery for Remote Commander (2)
- Battery pack NP-68H (1)
- Lens cap (1)
- Lithium adapter ES-90C (1)
- REFU adaptor REFU-90UC (1)
- Lens cap (1)*
- Shoulder strap (1)

*Attached to the camcorder.

Identifying the Parts

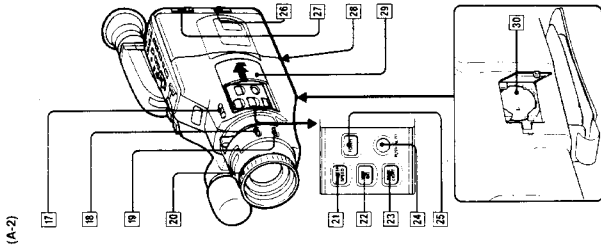
For details on the use of each part, refer to the pages indicated in the circle.

- (A-1)** 1 **Eyecup**
- 2 **Viewfinder lens adjustment ring** ②
- 3 **Viewfinder (back cover)**
The picture being recorded or played back can be monitored in black and white here. The letters which shows caution and function mode appear here.
- 4 **Power zoom button** ④
- 5 **Accessory shoe**
Attach a video light, external microphone, etc. (not supplied).
- 6 **Zoom lever** ⑥
- 7 **DATA SCREEN button** ⑦
- 8 **BEEP switch** ⑧ ⑨
Normally set to "ON" to activate the recording start/stop and warning beep. To deactivate the beep, set the switch to "OFF".
- 9 **EDIT switch** ⑩
- 10 **POWER switch**
CAMERA: for camera recording
VTR: for playing back or editing tapes
OFF: power off
- 11 **These transport buttons** ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱
▶ **▶▶ FRAME** (forward 1/2 frame by frame in forward direction)
▶ **SLOW**
L (stop)
◀ **◀◀ REW** (rewind)
◀ (playback)
▶ (fast forward)
⏸ **PAUSE**
- ⑲ **REC switch** ⑲
- ⑳ **DATE (+) and TIME (NEXT) buttons** ⑳
- ㉑ **AGE EVENT button** ㉑
- ㉒ **ZERO MEM (zero memory) button** ㉒
- ㉓ **COUNTER RESET button** ㉓



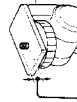
Identifying the Parts

- (A-2)
- 17 EDITSEARCH (and RE) recording review button RE
 - 18 FADER button F
 - 19 MACRO AF (Auto-focusing in macro)
Press to record close-ups with automatic focusing.
 - 20 Lens hood (Focus ring) L
 - 21 SHUTTER SPEED button S
 - 22 WHT BAL (white balance) button W
 - 23 BACK LIGHT button B
 - 24 PUSH AUTO button A
 - 25 FOCUS button F
 - 26 BATT (battery eject) knob B
 - 27 EJECT (cassette eject) knob E
 - 28 Tripod receptacle (bottom)
 - 29 AUTO LOCK cover L
To adjust the control such as focus, white balance, back light, or shutter speed manually, slide open this cover so that the buttons inside can be seen.
 - 30 Lithium battery compartment (bottom) B



(A-2)

Note on attaching a tripod (A-3)
When attaching a tripod other than Sony's, make sure that the height of the camera mounting screw is less than 6.5 mm (0.25 inches). Otherwise, the screw may damage the outer parts of the camcorder.



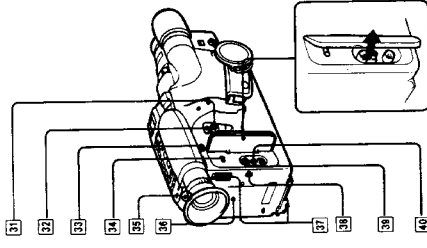
Less than 6.5 mm (0.25 inches)

(A-3)

Identifying the Parts

- (A-4)
- 31 START STOP button S
Press to start and stop camera recording.
 - 32 STANDBY switch S
Slide up to set the camcorder to the recording standby mode.
 - 33 PUSH/SLIDE button (for adjusting the viewfinder)
Slide the viewfinder to a suitable position.
 - 34 IN/OUT (video and audio input/output) selector I/O
Select the function of the VIDEO-AUDIO IN/OUT jacks, input or output.
 - 35 Camera recording battery lamp
Lights up during recording and blinks when the battery becomes weak.
 - 36 Battery mounting surface B
 - 37 Hooks for shoulder strap
 - 38 REMOTE COMMANDER ON/OFF switch R
Set to "ON" when using the supplied wireless Remote Commander. When you do not use the Commander, set to "OFF" to keep the unit from being operated incorrectly by another Commander etc.
 - 39 VIDEO-AUDIO IN/OUT (input/output) jacks (phone jacks) I/O
 - 40 REFU DC OUT (REFU selector DC output) jack (special minijack)

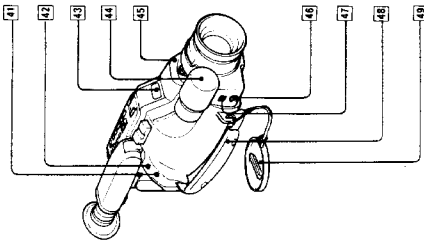
(A-4)



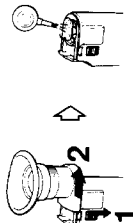
Identifying the Parts

(A-5)

- 1 Earphone jack (mini) jack
- 2 REMOTE control connector (stereo mini-mini) jack
Connect a wired remote control unit or a editing controller, etc. here.
- 3 Remote sensor
- 4 Built-in microphone (monaural)
- 5 Camera recording/battery lamp
Lights up during recording and blinks when the battery becomes weak.
- 6 REC START/STOP button (for low-position shooting)
Use this button for easier low position recording.
- 7 BUILT-IN MIC (microphone) switch
Set to "WIND" when recording in a strong wind.
- 8 Grip strap
- 9 Lens cap



(A-6)



To remove dust from inside the viewfinder (A-6)
Detach the eyecup as illustrated and clean the surface of the screen with a blower.

Identifying the Parts

Wireless Remote Commander

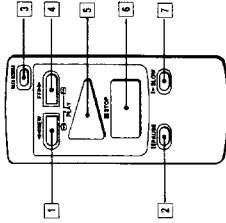
You can play back a tape from a distance. The buttons on the Commander with the same name or mark as those on the camcorder have the same function.

When you use the Commander

Be sure to set the **REMOTE COMMANDER ON/OFF** switch on the camcorder to "ON" and then start operation of the camcorder with the Commander pointing towards the remote sensor. (See page 10).

(A-7)

- 1 REW (rewind) button
- 2 PAUSE button
- 3 DATA SCREEN button
- 4 FF (fast forward) button
- 5 PLAY button
- 6 STOP button
- 7 SLOW button



(A-7)

Identifying the Parts

(A-8)

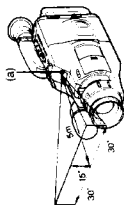


Inserting batteries

(A-9)

Insert two size AA (R6) batteries with polarity positioned correctly.

(A-9)



Remotely controllable area

Point the Commander towards the remote sensor (a).

Note on batteries

When the batteries are removed, they will last for about six months. However, if the commander will not be used for a long period, remove the batteries to avoid possible damage from battery leakage.

Note on the Remote Commander

- Keep the remote sensor away from the strong light source such as direct sunlight or illumination. Remote control with the Commander may not be effective.
- Be sure that there is no obstacle between the remote sensor and the remote sensor of the Commander.
- The command mode of the Commander is VTR2. Avoid to use the Sony VCRs with the same command mode at the same time.
- Be sure to set the remote control to COMMANDER ON/OFF mode in the camcorder to OFF when you connect the remote of a remote control kit (not supplied) to the REMOTE control connector.

10

Preparing the Camcorder

Before recording, prepare your camcorder following the steps below.

1. Connect a power source. → see page 12
2. Set the date and time. → see page 18
3. Insert a tape. → see page 20
4. Adjust the viewfinder lens. → see page 21
5. Adjust the length of the grip strap. (B-1)
6. Take off the lens cap and attach it to the grip strap. (B-2)
7. Close the AUTO LOCK cover. (B-3)
The focus, white balance, back light, and shutter speed will be set automatically. You may want to adjust them manually, see page 28.

Using the BEEP switch

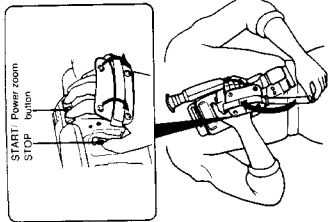
Normally, the BEEP switch should be set to ON. BEEP will sound when you start and stop recording, and if any difficulty should arise during operation. If you want to deactivate the beep, set the BEEP switch to OFF. (B-4)

Note

- Beeps are not recorded on the tape.
- For warning beep, see page 36.

When you have completed these preparations, go to page 22.

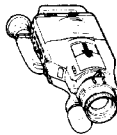
(B-1)



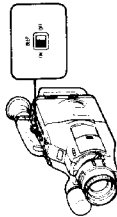
(B-2)



(B-3)



(B-4)



11

Preparing your camcorder

Connecting the Power Sources

First, Choose the Power Sources

Place	Power source	Accessory to be used
Outdoors	Battery pack	Battery pack, NP-65H (supplied), NP-77H, NP-77, or NP-55
Indoors	Alkaline Batteries	Battery case EPF-55
House	AC power adaptor	AC-V50
Car	DC power adaptor	DC-VP8
In the car	12 V or 24 V car battery	DC-VP8 or AC-V55 and car battery cord DCC-16AW

Note on power sources
Disconnecting the power source or removing the battery pack during recording or playback may damage the inspired tape. If disconnected, supply the power again immediately.

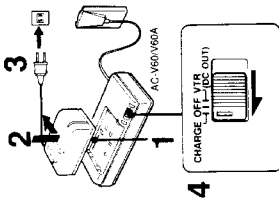
Using the Battery Pack

Step 1

Charge the battery pack, (C-1)

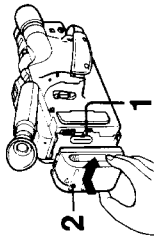
- 1 Align the right side of the battery pack with the line on the AC power adaptor.
- 2 Slide in the battery pack in the direction of the arrow.
- 3 Connect the AC power adaptor to a wall outlet.

(C-1)



4

(C-2)



(C-3)



(C-4)



Preparing your camcorder

Connecting the Power Sources

Step 2

Mount the battery pack on the camcorder. (C-2)

- 1 Align the right side of the battery pack with the line on the camcorder.

- 2 Slide in the battery pack to the right.

- Notes**
- Make sure the battery fits completely on the marking surface of the camcorder. Imperfect fit may damage the projections on the camcorder.
 - If your nose touches the battery pack, adjust the position of the viewfinder by sliding it while pressing PUSH SLIDE.

Battery life

A fully charged battery pack lasts for:

Battery life	NP-65H (supplied)	NP-77H (optional)	NP-77 (optional)	NP-55 (optional)
	85	110	90	50

(approx. minutes, continuous recording when used indoors)

When the battery becomes weak, the CVT indication and red lamp blink in the viewfinder. (C-3)
If the camera recording battery lamps on the camcorder blink
Replace the battery with a fully charged one

To remove the battery pack (C-4)

While sliding BATT up, slide out the battery pack to the left.

Other options for charging

- AC-V55 AC power adaptor
- AC-V55 AC power adaptor, battery packs simultaneously
- BC-55, BC-77 portable battery charger
You can charge a battery pack on 100 - 240V AC
- DC-VP8 car battery charger
You can charge a battery pack by connecting the car battery charger to the cigarette lighter socket.

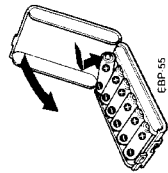
If you have an NP-6000

You can use it for long outdoor recording.

Connecting the Power Sources

Using Alkaline Batteries

- (C-5)
The EBP-55 battery case is required (not supplied).
- 1 Insert the size AA (R6) alkaline batteries into the battery case.
 - 2 Attach the case in the same way as the battery pack.

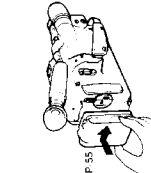


EBP-55

- Battery life** (When using Sony alkaline batteries): approx. 45 minutes (continuous recording when used indoors)
- To remove the battery case**
Proceed in the same way as the battery pack. See page 13.

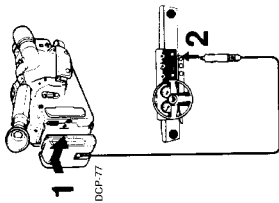
Notes on battery life

- Batteries will not last as long in cold places
- No indication appears in the viewfinder to warn of a weak battery.



EBP-55

(C-7)



DCP-77

Connecting the Power Sources

Using Car Battery

- (C-7)
The DCP-77 DC pack is required (not supplied).
- 1 Align the right side of the DC pack with the line on the camcorder, and slide it in to the right.
 - 2 Connect the cord to the cigarette lighter socket of a car (12 V or 24 V).
- To remove the DC pack**
While pressing the BATT knob on the camcorder, slide the DC pack to the left and pull out.
- Other notes**
- The AC-V55 AC power adaptor and the DCC-16AW car battery cord can also be used to operate this camcorder on a 12 V or 24 V car battery.
 - The DCP-59/DC pack cannot be used to operate this camcorder on a 12 V or 24 V car battery.

© 1997 Sony Electronics Inc.

Using House Current

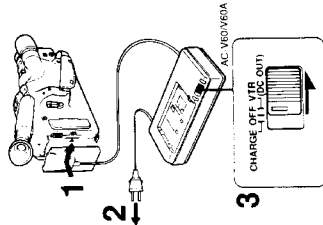
- (C-6)
The supplied AC-V60/V60A AC power adaptor is required.
- 1 Align the right side of the connecting plate with the line on the camcorder, and slide it in to the right.
 - 2 Connect the AC power adaptor to a wall outlet.
 - 3 Set the CHARGE/VTR selector to VTR (DC OUT).

See the instruction manual of the AC power adaptor for details.

- To remove the connecting plate**
Proceed in the same way as the battery pack. See page 13.

The AC-V30 or AC-V55 AC power adaptor can also be used.

(C-6)



AC-V60/V60A

CHARGE OFF VTR (DC OUT)

Connecting the Power Sources

Using the Best of Battery Pack

How to prepare the rechargeable battery packs

Have a sufficient battery pack power to perform 2 or 3 times as much recording as you have planned.

But, if you are placed in the instruction manual or catalogue of the camcorder, measured by the continuous recording time of the camcorder, placed at a room temperature using a full-charged battery.



Battery life is shorter in a cold climate.
Battery efficiency is decreased and the battery will be used up more quickly.



Turn the **STANDBY** switch of the camcorder off when not recording to save battery power.

Recording can be made even if recording is stopped and started again.

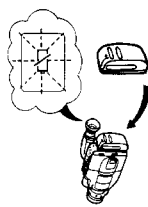
While positioning the subject, selecting an angle, or looking through the viewfinder, the lens moves automatically and the battery is used. The battery is also used when a tape is inserted or removed.



When the rechargeable battery pack should be replaced

When the **△** mark in the viewfinder changes 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. Turn the power switch on recording after the battery pack is replaced.



Notes on charging

Before using the battery pack, charge it sufficiently. A brand new battery pack is not charged.

Recharge the battery pack when it is exhausted.

- If recording is completed before the **△** mark appears in the viewfinder, it is recommended to charge the battery pack. Turn the **POWER TO CAMERA** slide up into **STANDBY**, and leave the camcorder until the **△** mark blinks rapidly.
- **Repeated charging while some capacity remains causes a lowering of battery capacity.** However, the original battery capacity can be recovered if you fully discharge and fully charge the battery again.



Recharge the battery pack before using.

If the battery pack is charged fully but 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 times of full charging, the battery life will recover its original capacity.

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 a battery pack has not been used for a long time, clean the terminals of 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 the battery pack heats up

During charging or recording, the battery pack heats up. This means energy has been generated and a chemical change has occurred inside the battery pack, but this is not dangerous.

How to care for the battery pack

- Before using the battery pack, charge the camcorder after using it, and keep it in a cool place.
- When the battery pack is attached to the camcorder, a small amount of current flows to the camcorder even if the **POWER** switch is turned off. It causes the camcorder to be recharging and will shorten battery life.
- The battery pack is always discharging even when it is not in use after charging. Thus, it is recommended you charge the battery before using.

How to use the switch on the battery pack

When you use the battery pack, please remember the charging 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

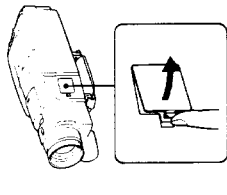
Fully charged and discharged about 500 times under normal temperatures. If the **△** mark blinks rapidly just after turning on the camcorder with a fully charged battery pack, the battery pack should be replaced with a new fully charged one.

Temperature during charging

Leave the battery pack in a cool place during charging time. Charging under temperatures ranging from 10 C to 30 C is recommended.

Setting the Date and Time

(D-1)

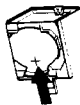


- 1 Open the cover of the lithium battery compartment on the bottom of the camcorder.
- 2 Install the supplied CR2025 lithium battery with the + side facing out.
- 3 Close the cover.

To remove the lithium battery (D-2)

Press the side of the battery in the direction as indicated for installation.

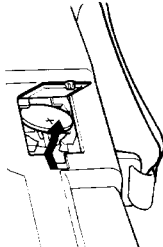
2



Note on lithium battery life

The battery will last for approximately 1 year in normal operation.
 When the lithium battery has been used for about 1 year, the battery indicator on the viewfinder screen for about 5 seconds (when POWER is set to CAMERA) (D-3). In this case, replace the battery with a Sony CR2025 or a Duracell DL2025 lithium battery. Use of a Duracell DL2025 lithium battery may cause a battery explosion. When replacing the lithium battery, keep the battery pack or other power source was not attached while replacing, readjustments of the date, time, birthdays, and anniversary are necessary.

(D-2)



(D-3)



Caution

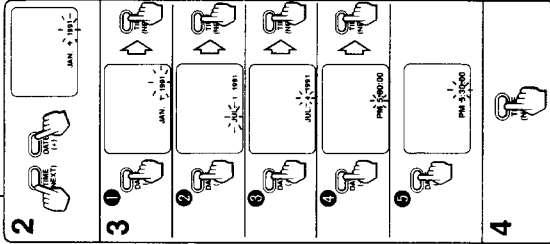
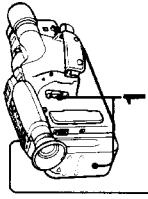
- Keep the lithium battery out of the reach of children.
- Should the battery be swallowed, immediately consult a doctor.
- Wipe the battery with a dry cloth to assure a good contact.
- Be sure to observe the correct polarity when installing the battery.
- Do not touch the battery with metallic tweezers, otherwise a short circuit may occur.

WARNING

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

18

(D-4)



Setting the Date and Time

(D-4)

- 1 Make sure that a power source is connected, set POWER to CAMERA, and slide STANDBY up.
 - 2 Press DATE (+) and TIME (NEXT) simultaneously for more than 1.5 seconds until the date indication blinks in the viewfinder screen.
 DATE now functions as + (to advance numbers) and TIME functions as NEXT (to recede) the number you wanted, keep + pressed. The digit will return to the original one.
 - 3 Adjust the year, month, day, hour, and minute, in that order.
 First adjust the blinking digits with +, and then press NEXT.
 - 4 Press NEXT to set the second to '00'.
 The clock starts operating.
 To correct date and time setting
 Repeat steps 2 to 4.
 To advance the digits faster
 Keep + pressed.
- To check the preset date and time
 Press DATE (+) and TIME (NEXT). When you press the same button again, the indication goes off.

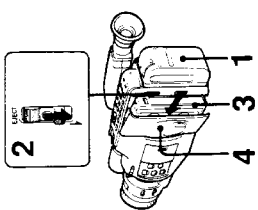
Setting the Date and Time

19

Preparing your camcorder
Inserting Tapes

(E-1)

- 1 Make sure a power source is connected.
- 2 While pressing the small button, slide EJECT. The cassette holder will automatically open. Do not pull the cassette holder forcibly when it is moving.
- 3 Insert a tape with the window facing outside.
- 4 Press the PUSH mark to close the cassette holder.



(E-1)

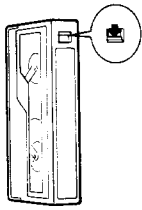
Ejecting the Tape

- 1 Make sure that a power source is connected.
- 2 While pressing the small button, slide EJECT.
- 3 The cassette holder will automatically open.
- 4 Push the small button across the PUSH mark to close the cassette holder.

(E-2)

Preventing Accidental Erasure

(E-2) Slide the tab in excess of the red mark on the cassette. This will prevent recording. To re-record on this tape, slide the tab back out covering the red mark.
If you intend to start camera recording with the red mark exposed, the **REC** and **▶** indications blink in the viewfinder and beeps sound for about 5 seconds.



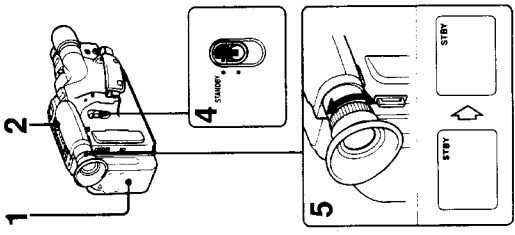
(E-2)

Preparing your camcorder
Adjusting the Viewfinder Lens

The position of the viewfinder lens for optimum vision varies depending on the person. Adjust it when using the camcorder for the first time, or when using it after someone else. (F)

- 1 Make sure a power is connected.
- 2 While pressing the green button, set POWER to CAMERA.
- 3 Insert a tape. (page 20)
- 4 Slide STANDBY up.
- 5 Turn the viewfinder lens adjustment ring so that the "STBY" displayed in the viewfinder screen comes into sharp focus.

(F)



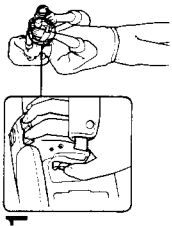
Recording a Picture Using Automatic Adjustment

Make sure the preparations on page 11 are complete before recording.

Start Recording

(G-1)

Before recording, zoom only, adjust, we strongly recommend making a trial recording and checking that everything is working perfectly. Make sure BEEP is set to ON. Beep will sound when you start and stop recording.



1 Hold the camcorder as in the figure.

Put your hand through the grip strap and make sure that your thumb can easily touch START/STOP.

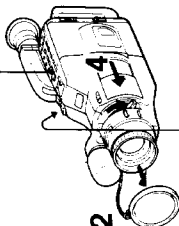
2 Remove the lens cap and attach it to the grip strap.

3 While pressing the green button, set POWER to CAMERA.

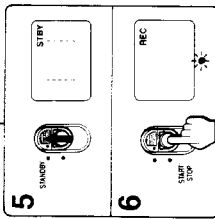


4 Close the AUTO LOCK cover and turn the zoom lever downwards.

5 Slide STANDBY up.
STBY appears in the viewfinder. The camcorder is now in the standby mode, and focus is adjusted automatically inside the dotted frame in the illustration (auto-focus adjusting range). Do not turn or stop the focus ring abruptly.
The dotted frame is not displayed in the viewfinder.



6 Press START/STOP.
A beep sounds. REC appears and the red lamp lights up in the viewfinder and the camera recording battery lamp lights on the camcorder. The camcorder is now recording.



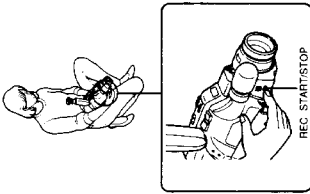
To pause (to stop momentarily)

Press START/STOP again. STBY appears in the viewfinder and REC appears in standby mode again.

To stop

Slide STANDBY down and set POWER to OFF.

(G-2)



Recording a Picture Using Automatic Adjustment

For low position shooting (G-2)

The viewfinder can be turned up 90 degrees. Use the REC START/STOP button on the front right of the camcorder.

- 1 Press REC START/STOP to start recording.
- 2 Press it again to stop recording.

If the tape reaches near the end during recording
The red indicator in the viewfinder and the camera recording battery lamp on the camcorder blink slowly. When the tape reaches near the end, a beep and a beep sound for about 5 seconds if the BEEP switch is set to ON.

- Notes on recording**
- To avoid from the beginning of the tape, run the tape for about 15 seconds before recording. This will avoid missing the starting point when the tape is played back.
 - When the CAMCORDER is moved during recording, the tape will stop.
 - When moving from indoors to outdoors, or vice versa, slide STANDBY up and point the camcorder at a white object for about 15 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 be automatically STANDBY down once and slide it up again. To start recording, press START/STOP directly.

Note on light sources

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

Recording mode

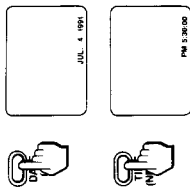
This camcorder records in the SP (approximately 1:43 consecutive) and can play back in the SP mode (approximately 1:43 consecutive).
The quality of the playback picture in the LP mode, however, will not be as good as that in the SP mode.

Notes on PCM recording and playback

PCM recording or playback is not possible with this camcorder.
The PCM sound recorded or after-recorded with another video recorder cannot be played back with this camcorder.

Recording a Picture Using Automatic Adjustment

(G-3)



To Record Date and Time
(G-3)
Press **DATE** for the date indication or **TIME** for the time indication during camera recording or when in recording pause mode.
The date or time displayed in the viewfinder is recorded with the picture.

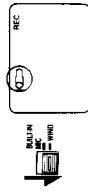
To stop recording date or time
Press **DATE** or **TIME** again.
The picture recording continues.

When There is a Strong Wind

(G-4)

Set BUILT-IN MIC to WIND
Set the noise from the wind will be reduced.
After recording, set it to the upper position (green mark).

(G-4)

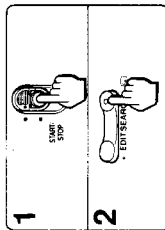


To Check the Last Portion of the Previous Recording

(G-5)

- 1 Set the camcorder in the recording pause mode by pressing the **START/STOP** button.
- 2 Press — side of **EDIT/SEARCH** (Ⓜ) momentarily.
The last few seconds of the recorded portion are rewound and then the recorded picture appears in the viewfinder. After a few seconds of playback, the camcorder goes back to recording pause mode.

(G-5)



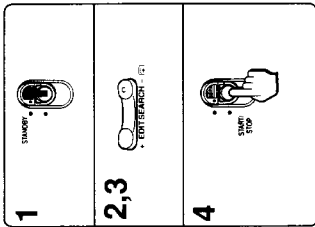
If the picture has not been recorded

The video heads may be contaminated. Clean the video heads with the video head cleaning cassette or equivalent.

24

Recording a Picture Using Automatic Adjustment

(G-6)



To Re-record a Previously Recorded Portion

1 Slide **STANDBY** up to set the camcorder to the standby mode.

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

Keep pressing the + side of **EDIT/SEARCH** to advance the picture at a normal playback speed, or the — side to reverse the picture

3 At the desired point, release **EDIT-SEARCH**.

4 Press **START/STOP**.

A beep sounds and the recording begins

To pause

Press **START/STOP** again.

To stop

Slide **STANDBY** down.

The picture is connected smoothly after the pre-recorded portion ends. The picture is rewound or even if the power is turned off and on again, provided that the tape is not removed.

25

Recording a Picture Using Automatic Adjustment

(G-7)

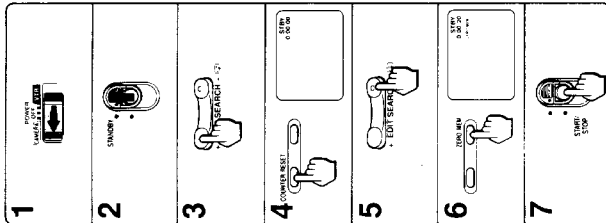
To re-record a picture in the middle of a Recorded Tape (Insert Recording)

- 1 While pressing the green button, set POWER to CAMERA.
- 2 Slide STANDBY up to set the camcorder to standby mode.
- 3 While looking in the viewfinder, keep pressing the green button and EDITSEARCH and release the button where you want to re-record. The camcorder is set to standby mode again.
- 4 Press COUNTER RESET. The counter is reset to zero.
- 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.
- 6 Press ZERO MEM. The insert ending point is stored in memory.
- 7 Press START/STOP. After 5 seconds, insert recording begins. Then the recording stops automatically near the counter zero point.

To cancel the ZERO MEM Press ZERO MEM.

Note

The picture may be distorted at the end of the inserted portion when it is played back.



26

Recording a Picture Using Automatic Adjustment

(G-8)

Playing Back the Picture Instantly

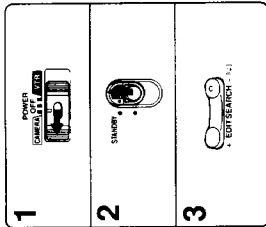
(G-8)
You can check the recorded picture in the viewfinder. Sound is not heard.

- 1 While pressing the green button, set POWER to CAMERA.
- 2 Slide STANDBY up.
- 3 Keep pressing the + or - side of EDITSEARCH to play back the picture.
 - + side: to view the playback picture
 - side: to view the playback picture in reverse

To stop playback Release EDITSEARCH

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

- 1 Connect an earphone to the ϕ jack.
- 2 Press \leftarrow to turn the sound ON and POWER to VTR.
- 3 Press \leftarrow to rewind the tape and press \leftarrow where you want to stop.
- 3 Press \leftarrow to start playback.

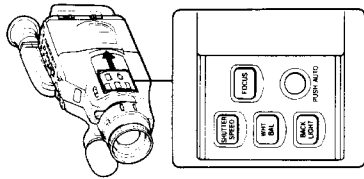


27

Selecting the Automatic/Manual Adjustment

When you close the AUTO LOCK cover, the focus, white balance, and iris are adjusted automatically, and the shutter speed is set to 1/60 operation under most shooting conditions. But the automatic function offers you worry-free operation under most shooting conditions. But if you are shooting in a situation where manual adjustment is better for achieving the desired adjustment, open the AUTO LOCK cover and select an appropriate setting.

Looking Over Each Button (H-1)



(H-1)

Manual Focusing

When you close the AUTO LOCK cover, the autofocus functions and you can easily get a focused picture under most shooting conditions. But manual focusing is recommended in the following cases:

[a] to [f] correspond to the illustrations: (H-1)

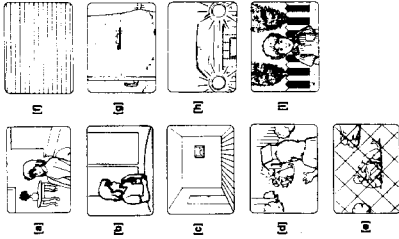
- [a] Insufficient light
- [b] Too much brightness behind the subject
- [c] Subjects with little contrast - wall, sky, etc.
- [d] One subject is close, the other is in the background
- [e] Subject is in front of the camcorder
- [f] Horizontal stripes
- [g] Subject through frosted glass
- [h] Bright subject or subject reflecting light
- [i] High contrast behind the subject (The background may be focused)
- [j] When using optical viewfinders
 - When using optical viewfinders or reflect filters
 - When shooting a stationary subject using a tripod
 - To save battery wear

Autofocusing does not function momentarily when:

- Back light is adjusted manually.
- Light comes from the side.
- Camera is close from wide angle to telephoto.

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

(H-1)



(H-1)

When you close the AUTO LOCK cover, the focus, white balance, and iris are adjusted automatically, and the shutter speed is set to 1/60 operation under most shooting conditions. But the automatic function offers you worry-free operation under most shooting conditions. But if you are shooting in a situation where manual adjustment is better for achieving the desired adjustment, open the AUTO LOCK cover and select an appropriate setting.

Looking Over Each Button (H-1)

FOCUS:
Press to set the camcorder in the manual focusing mode. Once the focus is adjusted, the setting is 'locked' (See page 29.)

PUSH AUTO:
Keep pressing to achieve autofocus temporarily in the manual focusing mode. (See page 30.)

WHITE BAL:
Press to lock the white balance in the • (outdoors), • (indoors), or • (OLD mode). The tone of the picture changes in accordance with the lighting condition. (See page 31.)

SHUTTER SPEED:
Press to increase the shutter speed to record a fast moving subject, such as golf or tennis swing, clearly. (See page 33.)

BACK LIGHT:
Press when a subject appears dark against a bright background. (See page 34.)

Even if you open the AUTO LOCK cover
The setting of each function is the same as the automatic adjustment until you change it.

Notes

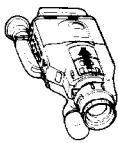
- Even when you set POWER to OFF, previous settings are retained. They are cancelled if the power source is disconnected for more than 5 minutes.
- If you close the AUTO LOCK cover after you have selected a setting, the previous settings for manual adjustment will be recalled.

28

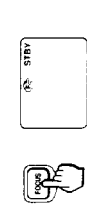
29

Manual Focusing

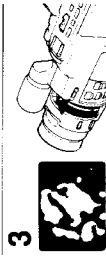
(I-2)



1



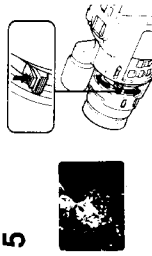
2



3

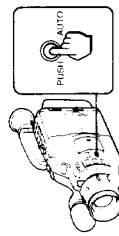


4



5

(I-3)



30

(J-1)



(a)



(b)

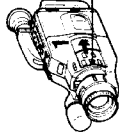


(c)



(d)

(J-2)



2

Adjusting the White Balance

When you close the AUTO LOCK cover, the auto white balance function of this camcorder adjusts the picture to natural colors under most shooting conditions. However, in the conditions listed below, adjust the white balance manually.

(a) to (f) correspond to the illustrations. (J-1)

	Conditions	Indication in the viewfinder
(a)	Lighting conditions change quickly, such as in photograph studios.	△
(b)	Monochromatic subject or background	
(c)	Under a sodium lamp	HOLD
(d)	Under a compact fluorescent lamp, a mercury lamp, or a neon sign	△
(e)	Recording outdoors, scenes after sunset or before sunrise	
(f)	Recording outdoors, scenes after sunset or before sunrise	

Adjusting the White Balance Manually

(J-2)

- Slide open the AUTO LOCK cover.
- Select the desired white balance mode by pressing WHT BAL. Each time you press the button, the indication changes as follows.

No indication (auto) → HOLD → • → *

Note on manual adjustment: When shooting outdoors, or side versa, close the AUTO LOCK cover and open it again.

31

Adjusting the White Balance

What is the HOLD mode?

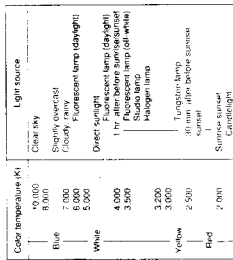
In the HOLD mode, the camcorder automatically adjusts to the color temperature of the subject's light source and keeps that temperature during recording. When using the HOLD mode, you can set a color temperature. You can achieve a recording with natural colors without being affected by the surroundings.

To set into the HOLD mode

1. Close the AUTO LOCK cover, and set the white balance to the automatic mode.
2. Point at and record a white, flat object such as a white wall or paper.
3. Open the AUTO LOCK cover.
4. Press WHT BAL to display the HOLD mark in the viewfinder.

When you change the battery pack or when the light source is changed, follow this procedure again.

(J-3)



Color Temperature and White Balance

(J-2)

The color temperature indicates a property of light and is measured in K (kelvin). It increases as the light source gets bluer and decreases as the light source gets redder. It has no direct relationship with brightness. The camcorder automatically adjusts the white balance within the range shown below.

Setting Shutter Speed

When a fast moving subject is recorded at normal shutter speed, it may not be seen clearly when played back in the pause mode (still picture). This can be improved by increasing the shutter speed. Shutter speed is the speed of the shutter (recording speed). 1/100, 1/250, 1/1000, 1/2000, or 1/4000.

When recording at a high-speed shutter setting, record in a brighter place than usual.

Also, the depth of field in proper focus becomes shallow. Be careful not to miss the subject in sharp focus and the surroundings out of focus.

Recommended setting for your situation

Choose an appropriate shutter speed according to the situation, referring to the chart below for examples.

Example use	Recommended shutter speed
<ul style="list-style-type: none"> • On clear days, recording golf or tennis, etc. (for subjects that are clearly in the still picture mode, set to 1/4000) 	1/4000 or 1/2000
<ul style="list-style-type: none"> • Recording skiers • On overcast days, recording a moving merry-go-round or roller coaster 	1/1000 or 1/250
<ul style="list-style-type: none"> • Recording outdoors from inside a vehicle for stable shooting 	1/1000 or 1/250
<ul style="list-style-type: none"> • Instead of the ND7 filter (To reduce the exposure level to about a half) • Recording indoor sports (for stable shooting) 	1/100

When playing back the picture recorded at certain speeds

Use the still picture equipment with the clean still function to obtain the noiseless still picture.

(K-1)



Setting Shutter Speed

Selecting the Shutter Speed (K-2)

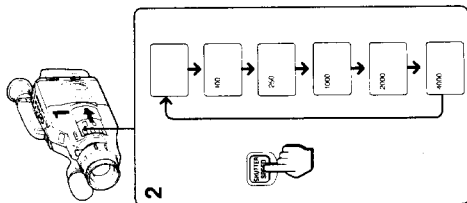
- Slide open the **AUTO LOCK** cover.
 - Press **SHUTTER SPEED** repeatedly until the desired shutter speed indication appears.
- Each time you press the button, the indication changes as follows.

1/5000 (1/5000) → 1/2000 (1/2000) → 1/1000 (1/1000) → 1/500 (1/500) → 1/250 (1/250) → 1/125 (1/125) → 1/60 (1/60) → 1/30 (1/30) → 1/15 (1/15) → 1/8 (1/8) → 1/4 (1/4) → 1/2 (1/2) → 1 (1) → 2 (2) → 4 (4) → 8 (8) → 15 (15) → 30 (30) → 60 (60) → 125 (125) → 250 (250) → 500 (500) → 1000 (1000) → 2000 (2000) → 4000 (4000) → 1/5000 (1/5000)

Notes

- When you select shutter speed 1/2500 or faster, record under sunlight or use a video light.
- When you record a TV screen with certain shutter speeds, the brightness of the recorded picture may vary.
- When you shoot a very bright subject at a faster shutter speed, a light vertical, bolt-like line (solar) may appear on the screen.
- When you record in certain shutter speeds, such as 1/5000, 1/2000, 1/1000, 1/500, 1/250, under a sodium lamp, or mercury lamp, the brightness of the recorded picture may vary.

(K-2)



Zooming

The size of the subject in the screen can be changed. Use "zoom in" for dramatic close ups. Use "zoom-out" for panoramic long shots. Also use zooming to focus manually or to decide the shooting angle. (M-1)

Power Zooming

- for smooth and constant zooming (M-2) press the **Z** side of the power zoom lever. When the **Z** side is pressed, the **W** side for wide angle (subject appears farther away).

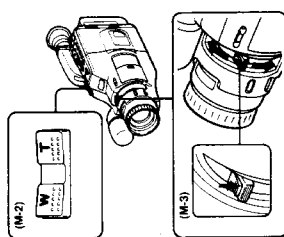
Zooming Manually

- for creating a dramatic effect (M-3) Turn the manual zoom lever upward for telephoto and downward for wide-angle. Be sure to keep pressing the button on the lever when turning it downward.

Focal length of this camcorder

The focal length is 8.5 mm to 68 mm (1/3 to 2 2/3 inches). The lens is equivalent to that of a 35 mm camera with 14.4 inches converted into the focal length of a 35 mm camera.

(M-1)



Shooting with Backlighting

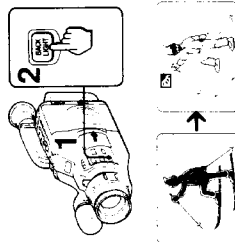
In this camcorder, the iris is automatically controlled. However, when shooting a subject that is backlit, that is, if the light source is coming in from behind the subject, use the **BACK LIGHT** button. (L)

- Slide open the **AUTO LOCK** cover.
- Press **BACK LIGHT**. The **BL** indication appears.

After shooting

Be sure to release this adjustment setting by pressing **BACK LIGHT** again. (The **BL** indication goes out.) Otherwise, the recorded picture will be too bright.

(L)



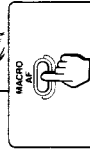
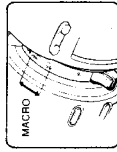
34

Close-up (Auto-focusing in Macro)

(N-1)

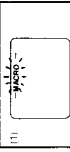
Even tiny subjects, such as flowers, insects, photographs, can literally fill the screen with auto-focusing in macro.

- 1 Bring the camcorder as close as necessary to obtain the desired subject size. The subject can be as close as a minimum of 10 mm (13/32 inches) from the lens surface.



2

- 2 Press **MACRO AF**. (1) The **MACRO** indication blinks in the viewfinder and the zoom lever turns automatically to the **MACRO** range. (2) The **MACRO** indication lights steadily and the **AF** indication appears when sharp focus is achieved automatically.



(1)



(2)

To release this adjustment setting

Press the **T** side of the power zoom button or turn the zoom lever, to return the lever to the ordinary range. (N-2)

If the **MACRO** indication lights steadily before

the subject is in sharp focus, the **MACRO** indication lights steadily if sharp focus cannot be achieved within 30 seconds. In this case, press **MACRO AF** again to re-function auto-focusing in macro.

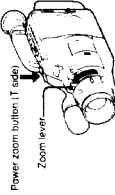
If you still do not get a sharp focus, manual focusing is recommended (page 37). Adjust it after the **MACRO** indication lights steadily.

To keep autofocus functioning

Keep **MACRO AF** pressed.

Contrary to the normal auto-focusing (page 22), auto-focusing in macro is released each time the sharp focus is achieved.

(N-2)



36

Close-up (Auto-focusing in Macro)

Notes

- This function has no connection with the **AUTO LOCK** cover. You can use auto-focusing in macro even with the **AUTO LOCK** cover attached.
- Do not press the power zoom button while the zoom lever is moving for auto-focusing in macro. Otherwise auto-focusing is released.

Manual focusing in macro

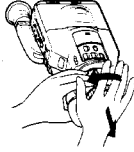
- 1 Turn the zoom lever to the **MACRO** range without pressing the button on **L**.
- 2 The **MACRO** indication lights up in the viewfinder when the zoom lever within the **MACRO** range to focus sharply.

If the lens hood touches the subject

Remove the lens hood, hold the focus ring, and turn the zoom lever to the **MACRO** range. Do this same when attaching/removing a filter or conversion lens (not supplied).

Recommended accessory

When using the depth of field is very shallow, so pay attention to focusing. To keep the subject in focus, use a tripod.



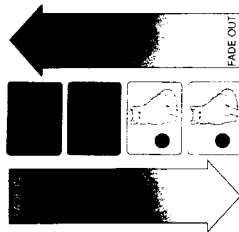
(N-3)

37

Fade-in and Fade-out

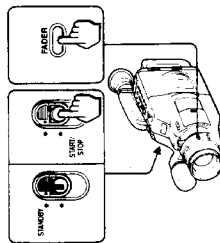
When fading in, the picture will gradually appear from a black screen. The sound will also gradually increase. (O-1)
 When fading out, the picture will gradually disappear to a black screen. The sound will also gradually decrease. (O-2)
 This function will give your recording a professional appearance.

(O-1)

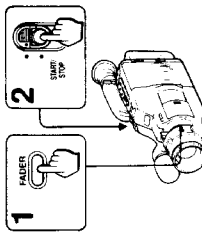


FADE OUT

(O-3)



(O-4)



To Fade-in

- (O-3)
- 1 Slide **STANDBY** up to set the camcorder in the standby mode.
 - 2 Press **FADER**.
 - 3 Press **START/STOP**.
Fade-in is performed and recording will start.

To Fade-out

- (O-4)
- 1 While recording, press **FADER**.
 - 2 Press **START/STOP** to stop the recording.
Fade-out is performed and then recording stops.

To cancel the fade-in/fade-out function before it is performed
 Press **FADER** again before pressing **START/STOP**.

If you want to use the fade-in/fade-out function
 Start from step 1 each time.

When the date/time (page 24) or age (page 41) is
 set, the date/time or age does not fade in or fade out.

Recording the Age of Your Child

You can record the age (in years and months) of your child, by presetting his/her birth date. Once you preset your child's date of birth, your child's current age can be displayed. You can also make a record of your child's development. Besides age, you can also preset the date of a specific event, and record how many years and months have passed since then. You can record up to three ages or events.

Presetting the Birth Date Event Date

- Preparations**
- 1 Turn on the power source.
 - 2 Slide **POWER** to **CAMERA** while pressing the green button and slide **STANDBY** up.
You can see the display in the viewfinder.
Make sure that the date and time are set correctly. (page 19)
- Otherwise, the birth date/event date cannot be preset correctly.

Operation (P-1)
Example: Preset: AUG. 3 1987 as the birth date of the second person.

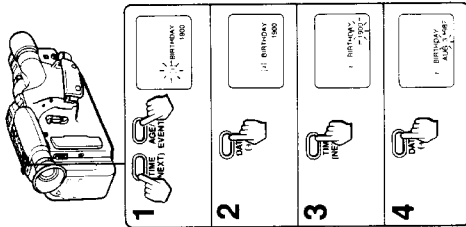
- 1 Press **AGE EVENT** and **TIME (NEXT)** simultaneously for more than 1.5 seconds until the **DATE** (year, month, day) appears and **DATE** blinks in the viewfinder.
- 2 Press **DATE (+)** to select **[]**.
Each time you press **DATE (+)**, the display changes as follows:

[] BIRTHDAY → [] BIRTHDAY
 [] EVENT → [] EVENT

Although "EVENT" is displayed on [] you can use it for age as well. [] and [] can also be used for event.

- 3 Press **TIME (NEXT)**.
This "1987" indication blinks.
- 4 Adjust the year, month, and day.
First adjust the blinking digits with **DATE (+)**, and then press **TIME (NEXT)**.
The age is displayed when all the items are adjusted.

(P-1)



Recording the Age of Your Child

If you missed the desired number with

DATE (+)

Keep pressing DATE (+). The number changes

as follows:

year: 1900 → 1901
 current year - 1999 → current year
 month: JAN → FEB
 → → DEC

day: 1 → 2
 → → 31

To correct/change the setting

Follow the procedure from step 1 again.

To advance the digits faster

Keep DATE (+) pressed.

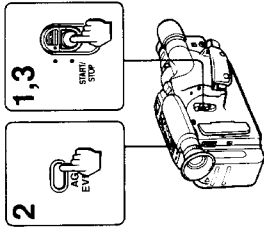
To preset the year before 1900

- 1 Press DATE (+) until the current year is displayed.
- 2 Press DATE (+) again. The year goes back 99 years (example: 1991 → 1892).
- 3 Go to step 4.

When in 2000

..... 0071 is displayed in step 3 on page 39. After that, it advances every year as: 1902, 1903,

(P-2)



Recording the Age of Your Child

Recording the Age

1 Press START/STOP at the point where you want to insert the age indication.

The camcorder is set in the standby mode.

2 Press AGE EVENT to select the indication you want to record.

Each time you press AGE EVENT, the indication changes as follows.

- No indication → [1] The first age
 - [2] Anniversary → [3] The second age
- An item with no presetting is shipped. The [1], [2], or [3] indication goes out.

3 Press START/STOP.

Recording starts again. The age displayed in the viewfinder is recorded with the picture.

To stop recording the age
 Press AGE EVENT until the indication goes out.

To change the display while recording

Press AGE EVENT until the indication you want to record is displayed. Recording of the indication you selected starts when [1], [2], or [3] goes out.

To cancel the stored birth statement date

- 1 Press step 1 and 2 of "Presetting the Birth Date/Event Date" and select the item you want to cancel.
 - "Month" blinks.
- 2 Press TIME (NEXT) twice.
- 3 Press DATE (+) to display ".....".
- 4 Press TIME (NEXT). The "Month" blinks is deleted from the memory and is not displayed when you press AGE EVENT.

Recording the Age of Your Child

If you do not record the age while recording, you cannot use the date and time information while recording.

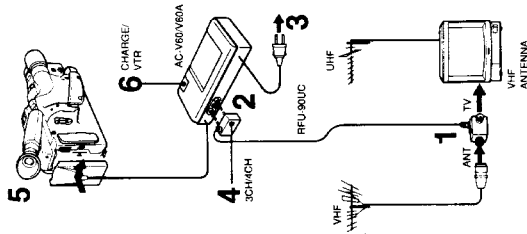
About memory back-up

The camcorder uses the lithium battery on the bottom to keep the birth date event date in memory. On lithium battery life, see page 18.

When you connect the camcorder to a TV

If you do not use the GALLS screen function, the age indication will appear on the TV screen when the [1], [2], or [3] indication goes out in the viewfinder and recording starts.

(Q-1)



Connections for Playback

You can easily make a proper connection of the camcorder and TV by using the supplied AC V60/V6A AC power adaptor.

Check the type of your TV, and go to the appropriate section.

You can also connect the camcorder directly to the TV, using the VIDEO AUDIO (and RFU DC OUT) jacks. In this case, set the IN/OUT selector to OUT.

Connecting a TV without Video Audio Jacks (Q-1)

Connecting the AC power adaptor and a TV

The supplied RFU-90JC RFU adaptor and AC power adaptor are required.

Make sure that the TV is turned off to prevent the speaker being damaged.

- 1 Connect the antenna and TV to the RFU adaptor.
 - 2 Connect the RFU adaptor to the AC power adaptor.
 - 3 Connect the AC power adaptor to a wall outlet.
 - 4 If you have connected your TV using only the antenna socket, set the channel selector on the RFU adaptor to SC or AGH at the VHF channel, whichever is not active in your area.
 - One of the TV channels will be adjusted to receive the camcorder's playback signal.
- Usually keep the AC power adaptor and the TV connected.
- Whenever playing back a tape**
- Proceed only the following two steps.
- 5 Attach the connecting plate of the AC power adaptor to the camcorder.
 - 6 Set the CHARGE/VTR selector on the AC power adaptor to VTR (DC OUT).

When you watch a TV program

Set the CHARGE/VTR selector on the AC power adaptor to OFF or turn off the power of the camcorder.

Connections for Playback

(Q-2) If your TV is connected with a VCR (Q-2), disconnect the antenna connection of the TV and the VCR, and insert the RFU adaptor between them.

Connecting a TV with Video Audio Input Jacks (Q-3)

The supplied AC-V60/V60A AC power adaptor is required. Make sure that the TV is turned off to prevent the speaker being damaged.

1 Connect the AC power adaptor to the TV.
Use a commercially available audio/video cable to connect the camcorder to a monochrome TV, or VMC-910MS/920MS for stereo TV.

2 Connect the AC power adaptor to a wall outlet.

Usually keep the AC power adaptor and the TV connected.

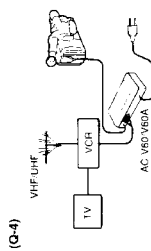
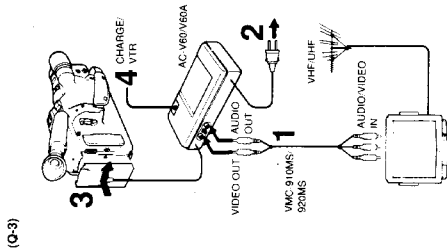
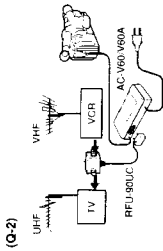
Whenever playing back a tape

Proceed only the following two steps.

3 Attach the connecting plate of the AC power adaptor to the camcorder.

4 Set the CHARGE VTR selector on the AC power adaptor to VTR (DC OUT).

If your TV is connected with a VCR (Q-4) connect the AC power adaptor to the VCR instead of the TV.



Playing Back a Tape

The supplied wireless Remote Commander is used to control the camcorder and the VCR. When using the REMOTE COMMANDER, set the switch to ON.

(R-1)
1 Set CHARGE VTR on the AC power adaptor to VTR.

2 Set POWER to VTR while pressing the green button.

3 Insert a tape.

4 Turn on the TV (or the VCR).
For a TV with video/audio input jacks: Set the TV/VIDEO selector to VIDEO.
For a TV without video/audio input jacks: Select the channel for playing back the camcorder.

5 Press \square .
Playback begins.
You can also use \square on the camcorder.

To stop playback, press \square .

To rewind the tape, press \leftarrow .

To advance the tape rapidly, press \rightarrow .

To make the same indications in the viewfinder appear on the TV screen:
To clear the indications, press DATA SCREEN again.

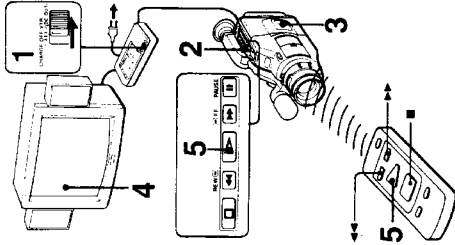
After playing back

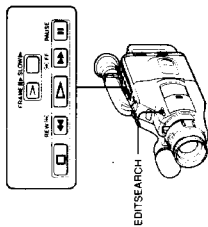
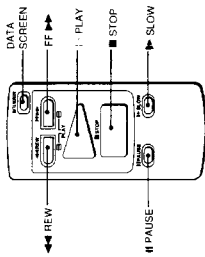
Set the POWER switch on the camcorder and CHARGE VTR selector on the AC power adaptor to OFF.

Notes

- When the still picture lasts for 5 minutes or more, the camcorder automatically enters the stop mode.
- Streaks appear in the still picture. They are wider when playing back an LP-recorded tape.

(R-1)





EDIT/SEARCH

Playing Back a Tape

Various Playback Modes

- To view the still picture (playback pause)**
Press **II PAUSE** during playback.
- To resume normal playback**, press **▶** or **▶▶**.
- To view the picture at 1/5 speed (slow playback)**
Press **▶ SLOW** during playback.
▶ appears in the viewfinder.
When slow playback lasts for 1 minute or more, playback returns to normal speed starts automatically.
- To resume normal playback**, press **▶▶**.
- To view the picture frame-by-frame**
In the still picture mode, press **▶▶** on the camcorder. Each time you press, the picture appears by a frame.
▶▶ appears in the viewfinder.
If you keep pressing **▶▶**, playback at 1/30 Speed starts.
- To resume normal playback**, press **▶▶**.
- To locate the desired scene (picture search)**
Keep pressing **◀▶** or **▶▶** during playback or in the still picture mode, or **▶▶** appears in the viewfinder. To resume normal playback, release the button.
- To locate the desired scene quickly (skip scan)**
Press **◀▶** during rewinding or **▶▶** during advancing the tape rapidly. **▶▶** or **▶▶▶** appears in the viewfinder.
To resume normal playback, press **▶▶**.

Playing Back a Tape

- About the playback sound
In the still picture mode, tracks appear and the sound can be heard during playback in forward direction, but is a little noisy.
- If the still picture frame-by-frame picture or slow playback picture is noisy
Set the camcorder in slow playback mode, and press the **▶** or **▶▶** side of **EDIT/SEARCH** until the last noisy picture appears.

Editing onto Another VCR

You can create your own video program by editing onto a recorded VCR. Record in the normal VCR. Also you can superimpose and record a title.

Before You Begin

- Make connections using the supplied AC power adaptor and a commercially available audio/video cable like Sony VMC-710M/720M for monaural equipment, or VMC-910MS/920MS for stereo equipment.
- Set the input selector of the VCR to LINE. If available.
- Set EDIT on the camcorder to the direction of the arrow.

Operation

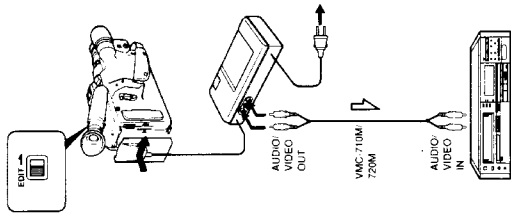
- Insert a tape for recording into the recording VCR.
- Set POWER of the camcorder to VTR and insert the recorded tape.
- Play back the tape on the camcorder and locate the point where you want to start editing and set the camcorder to the playback/pause mode.
- On the recording VCR, locate the recording start point and set the VCR to the recording/pause mode.
- Press II of both units simultaneously to start editing.

To stop editing momentarily, press II on the recording VCR.

To edit more scenes, repeat steps 3 to 5.

To stop editing, press II on both units.

If you use the DATA SCREEN function
The indications displayed on the TV screen will also be recorded.



(8)

Recording from Another VCR or a TV

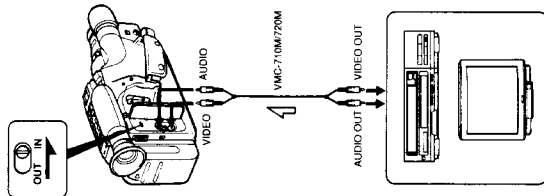
You can record a TV program from the TV or a video program from another VCR equipped with audio/video outputs.

Before You Begin

- Set the IN OUT selector on the camcorder to VTR.
 - Make connections using a commercially available audio video cable (like Sony VMC-710M/720M for monaural equipment, or VMC-910MS/920MS for stereo equipment).
 - Disconnect the RFU adaptor from the AC power adaptor. If it is connected.
- When disconnecting, turn off the power of the adaptor. (OFF)

Operation

- Turn on the TV or VCR.
- Select the TV channel or play back the tape to be recorded.
- Set the POWER of the camcorder to VTR.
- Insert a tape and slide ● REC. Recording will start. You can stop the picture being recorded in the viewfinder screen.



(7)

Insert Recording

You can insert a new scene from a VCR or the TV onto your originally recorded tape. (U)

Before You Begin

- Connection is the same as in "Recording from Another VCR or a TV".
- Set the VCR in the playback pause mode at the beginning of the scene to be recorded.
- Set the POWER of the camcorder to VTR and display the counter in the viewfinder.

Operation

- 1 Locate the end point where the insert should end by pressing ◀ or ▶▶ during playback.
- 2 At the end point, press COUNTER RESET. The counter is reset to "0:00:00".
- 3 Locate the start point where the insert should begin.
- 4 At the start point, set the camcorder into recording pause mode.
- 5 Press ZERO MEM.

The end point of the insert is stored in memory.

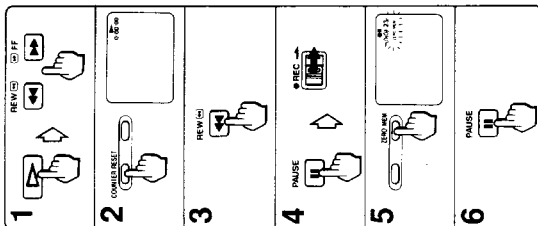
- 6 Press II of both units to start insert recording.

You can monitor the picture being inserted in the viewfinder screen.

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

To change the end point

Press ZERO MEM so that the ZERO MEM indicator disappears, and operate again from step 1.



Using the Tape Counter

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

To Index the Whole Tape

Press COUNTER RESET at the beginning of the tape. The counter will start counting from the point where the counter reading at a particular point so that you can easily find that point later by referring to the tape counter.

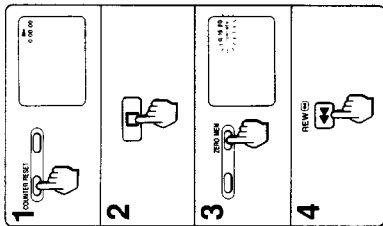
To Return to a Pre-Registered Point (V)

- 1 During playback, press COUNTER RESET at the point you want to locate later.
- 2 Press II when the playback is finished, as usual.
- 3 Press ZERO MEM. The "ZERO MEM" indication blinks in the viewfinder.
- 4 Press ◀ or ▶▶. The tape rewinds or advances and stops automatically when the counter reaches approximately "0:00:00".

Notes on the tape counter and ZERO MEM button

- The counter reading and the point of the tape may be counted exactly as the film counter at a guide. The tape counter will not count accurately when you repeat fast forward running or rewind or when you play back a tape recorded in both LP and SP modes mixed.
- Press ZERO MEM after you stop the tape when the ZERO MEM mode is cancelled automatically. The ZERO MEM mode is cancelled automatically once the tape is rewound or sent forward to the point where you are registered.

(V)



(U)

Hints for Better Shooting

Shooting Stable Pictures

- Assume a good posture for shooting (W-1)**
For hand-held shots, it is important to hold the camera properly.
- Hold the camcorder firmly and secure it with the grip strap so that you can easily manipulate the camcorder with your thumb.
 - Place your right elbow 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.
 - Place your eye firmly against the viewfinder eyepiece.

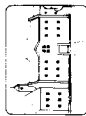
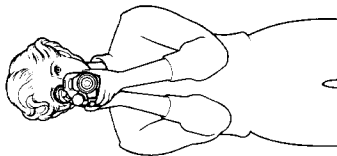
Use a tripod
If you have a tripod for a still camera, it can also be used with the camcorder. If a tripod is not available, try placing the camcorder on a table top or any other flat surface of suitable height.

Keep the horizontal plane level (W-2)
The horizontal plane can be easily determined by using the viewfinder frame as a reference.

Planning Beforehand

If you are going to edit the tape after recording

Shoot the scene a little longer to make the editing easier.



Hints for Better Shooting

Lighting

Shoot with the sun behind you. If 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 light-colored clothing.
- In this case, the face will be recorded too dark.

Use video lights in the dark

To get the best colors, a sufficient light level must be maintained. Photography lamps or halogen lamps are recommended. For best results, use of safety glasses is recommended. Since their light is bright and they heat subject levels allow safe, direct connection to the camcorder.

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

And do not place your face or hair too close to the light during low position shooting (page 23). For proper use of the light, read its instruction manual.

Brightness levels

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

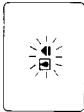
Scene (approximate brightness)	Gain	Gain level	Auto White Balance
Spring field - clear day in summer	100,000	Normal	Yes
Clear day, mid day (100,000 lux)	10,000	Normal	Yes
Clear day, mid afternoon (50,000 lux)	1,000	Normal	Yes
Overcast day, mid day (10,000 lux)	100	Normal	Yes
Overcast day, one hour after sunrise (2,000 lux)	10	Normal	Yes
Office in the afternoon (near fluorescent lights) (1,000 lux)	1	Normal	Yes
Clear day, one hour before sunset (1,000 lux)	1	Normal	Yes
December store counter (500-1,000 lux)	1	Normal	Yes
Office in the afternoon (near fluorescent lights) (400-500 lux)	1	Normal	Yes
Home theater (300 lux)	1	Normal	Yes
Home theater (200 lux)	1	Normal	Yes
Subway station platform (200 lux)	1	Normal	Yes
Accade at night (150-200 lux)	1	Normal	Yes
Underwater (15-25 lux)	1	Normal	Yes
Underwater (10-15 lux)	1	Normal	Yes
Underwater (5-10 lux)	1	Normal	Yes

Notes and Precautions

Notes on 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 condensation under these circumstances, the camcorder is shipped with the lens caps closed. However, take the following precautions.

(X-1)



If moisture condenses inside the unit

- (X1)
Measure is present inside the camcorder.
- When the **■** indication in the viewfinder blinks continuously for about 5 seconds.
 - When the tape is inserted, the **▲** indication also blinks.
 - When the BEEP switch is set to ON and the tape is inserted, several beeps will also sound continuously for about 5 seconds.
- In such cases, no function except for tape ejection will work.

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

(X-2)



If moisture condenses on the surface of the tape

- (X2)
If moisture is present on the surface of the tape:
- When the tape is inserted and the transport button (**▶◀** etc.) is pressed, the **▲** indication blinks inside the viewfinder.
 - When the BEEP switch is set to ON, several beeps will also sound continuously for about 5 seconds.

In such case, no function except for tape ejection will work.

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

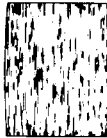
The tape can be used again if the **▲** indication does not appear when the tape is inserted and a tape transport button is pressed.

If moisture condenses on the lens

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

Turn off the power and leave the camcorder unused for at least 1 hour.

(X-3)



Notes and Precautions

Notes on Video Head Cleaning

To ensure clear picture, clean the video heads

When playback pictures are noisy or hardly visible, the video heads may be contaminated. (X-3)

- Slight contamination
- Critical contamination

1. Clean the video heads with the Sony V6-25CLH cleaning cassette (not supplied), referring to its instructions.
2. After cleaning, check if the picture is clear by recording or playing back with 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 V6-25CLH cleaning cassette is not available in your area, consult your Sony service facility.

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 correct power adaptor within 110 V to 240 V AC, 50/60Hz.

Difference in Color Systems

You can view the playback picture in the viewfinder. However, if you want to view the playback picture on a TV, it must be an NTSC system-based TV. Check the following list (in alphabetical order).

- NTSC system countries**
 Barbados, Brazil, Canada, Central America, Chile, Colombia, Ecuador, Jamaica, Japan, Korea, Mexico, Peru, Surinam, Taiwan, The Philippines, U.S.A., Venezuela, etc.
- PAL system countries**
 Argentina, Australia, Austria, Belgium, Brazil, Denmark, Finland, Germany (former West Germany), Greece, Hong Kong, Italy, Korea, Kuwait, New Zealand, Norway, Paraguay, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, Uruguay, etc.
- SECAM system countries**
 Bulgaria, France, Guinea, Hungary, Iran, Iraq, Monaco, Poland, Soviet Union, etc.

Precautions

On operation

- Operate the camcorder on 6.0 V (battery pack), 7.5 V (AC power adaptor), or 9.0 V (alkaline batteries).
- For DC or AC operation, use the accessories included in the camcorder kit.
- Check any sold object or liquid fall into 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 mechanical shock. Be careful not to touch the lens.
- Keep the lens cap on the lens when not using the camera.
- Do not wrap the camcorder and operate it because heat may build up internally.
- Keep the camcorder away from strong magnetic fields or mechanical vibration.
- Do not put the camcorder on the stand.

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 2 minutes.
- Clean the lens with a soft brush to remove dust. If there are fingerprints on it, wipe them off 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 are copyrighted. The reproduction of such materials may be contrary to the provision of the copyright laws.

System

Video recording system
 Video head: two head, Helical scanning
 FM system

Audio recording system

Rotary head, FM system
 NTSC color, EIA standards
 SP mode: Approx. 143 min
 LP mode: Approx. 143 min
 (1/16 inch/sec)

LP mode: Approx. 0.72 cm
 (1/32 inch/sec)

Recording time
 SP mode: 2 hours (P6-120)
 Playback time
 SP mode: 2 hours (P6-120)
 LP mode: 4 hours (P6-120)

Fast forward/reverse time
 4.5 min. (P6-120)

Image device
 CCD (Charge Coupled Device)

Viewfinder
 Electronic viewfinder

Lens
 8-pole, 8-power zoom lens
 1.8-5.6 mm (1/32-2 1/4 inches), F1.6 with macro

Filter diameter: 46 mm

Auto focus system
 TT¹(1/10 inches)

Color temperature
 Automatic, HLD

Color temperature
 Δ (indoor) 3,200K

Minimum illumination
 • (indoor) 5.800K

Illumination range
 2 lux to 100,000 lux

Recommended illumination
 0.2 to 924 (footcandles)

More than 100 lux
 (More than 10 footcandles)

Aperture connection
 Automatic

With back light adjustment

Input and output connector

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

Audio input/output*
 Stereo jack, 2 x 1.5 ohms

Output: -7.5 dBs, input impedance
 impedance less than
 1 kilohms

RFU/DC OUT
 Stereo jack, 5 V DC

Microphone jack
 Stereo mini-jack

Remote jack
 Stereo mini-jack

- * Video/audio input and output is switched with the IN/OUT selector

General

Power requirements
 On battery: approx. 1.5 A
 6.0 V (AA power adaptor)
 7.5 V (AC power adaptor)
 9.0 V (alkaline batteries)

Power consumption

Approx. 0.8 W (camera recording) including the viewfinder
 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. 111 × 139 × 321 mm
 (width) (4 3/8 × 5 1/2 × 12 7/8 inches)

Weight
 including the lens hood
 including the battery and cassette

Microphone
 Electret condenser microphone

Supplied accessories
 unidirectional microphone type

See page 4.

Wireless Remote Commander RM7-500

Remote control system
 Infrared

Command mode
 VTR 2

Power requirements
 3 V DC, 2 size AA batteries

Dimensions
 Approx. 60 × 25 × 123 mm (width)
 (2 3/8 × 1 1/4 × 4 7/8 inches)

Design and specifications are subject to change without notice

Trouble Check

If any difficulty should arise during operation, go through the following table. Should the difficulty persist, unplug the unit and contact your Sony dealer or local authorized Sony facility.

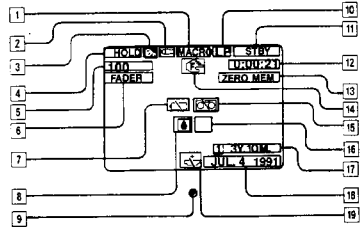
Symptom	Indication in the viewfinder	Warning beep	Cause and corrective actions
The START STOP buttons do not operate	<ul style="list-style-type: none"> WV, \blacktriangle, \blacktriangledown, battery lamp fast blinking 	Bleeps	<ul style="list-style-type: none"> The POWER switch is not set to CAMERA The tape is affixed to the drum. Remove the tape with the cassette ejection button. (page 29) The tape is at its end
	<ul style="list-style-type: none"> WV, \blacktriangle, \blacktriangledown, battery lamp slow blinking 	Bleeps	<ul style="list-style-type: none"> The video head on the cassette is exposed (red). (page 20)
	<ul style="list-style-type: none"> WV, \blacktriangle, \blacktriangledown, battery lamp slow blinking 	Bleeps	<ul style="list-style-type: none"> No cassette \rightarrow insert a cassette. The tape is near its end
	<ul style="list-style-type: none"> blinking 		<ul style="list-style-type: none"> The video head may be contaminated. Clean the heads using the Sony V6 25CLH cleaning cassette. (page 55) The camcorder has been in the recording pause mode for more than 5 minutes. (page 23) The viewfinder lens is not adjusted. (page 21)
The power turns off automatically			<ul style="list-style-type: none"> The AUTO LOCK cover is not closed completely. (page 28) Shooting conditions are not suitable for auto-locking operation. Adjust the focus manually. (page 29)
The image on the viewfinder screen is not clear			<ul style="list-style-type: none"> The lithium battery is not inserted properly. (page 17) The lithium battery is exhausted The lithium battery is weak The POWER switch is not set to VTR
The auto-recording function does not work	<ul style="list-style-type: none"> blinking 		<ul style="list-style-type: none"> The contrast between the subject and background is too high. The camera is not malfunctioning The AUTO LOCK cover is not closed completely. (page 28) Shooting conditions are not suitable for auto white balance operation. Adjust the white balance manually. (page 31)

Others

Symptom	Indication in the viewfinder	Warning beep	Cause and corrective actions
The playback picture is not clear	<ul style="list-style-type: none"> blinking 		<ul style="list-style-type: none"> The channel or mode for the camcorder is not selected on the TV. (page 45) The EBT switch is set in the direction of the arrow. (page 48) The video heads may be contaminated. Clean the heads using the Sony V6 25CLH cleaning cassette. (page 55) The AUTO LOCK selector is set to OFF \rightarrow Set it to ON.
When both the VIDEO/AUDIO jacks and the AC power adaptor are used to connect separate, the TV is not clear or moves vertically.	<ul style="list-style-type: none"> blinking 		<ul style="list-style-type: none"> When both the VIDEO/AUDIO jacks and the AC power adaptor are used to connect separate, the TV is not clear or moves vertically.
The power turns off or does not turn on	<ul style="list-style-type: none"> blinking blinking 		<ul style="list-style-type: none"> The battery is used up The battery is weak The battery is not attached The AC power adaptor is not connected to a wall outlet The CHARGE VTR selection on the AC power adaptor is not set to VTR (DC OUT) The battery is nearing its end The battery pack is not inserted fully The capacity of the battery pack itself is shortened. (page 17) The power is not supplied to the camcorder. The battery is used up
The battery pack is quickly discharged	<ul style="list-style-type: none"> blinking 		<ul style="list-style-type: none"> Reach a charge battery
The tape cannot be removed from the compartment	<ul style="list-style-type: none"> blinking 		<ul style="list-style-type: none"> The tape cannot be removed from the compartment.
No function except for tape ejection works	<ul style="list-style-type: none"> blinking 	Bleeps	<ul style="list-style-type: none"> Mistake conversation has occurred. (page 34) Other trouble may have occurred. Consult your nearest Sony dealer.

Indications Inside the Viewfinder

(Y)



(Y)

- 1 Auto-focusing in macro range
- 2 BUILT-IN MIC SELECT is set to WIND.
- 3 BACK LIGHT is pressed.
- 4 White balance mode (+/-; -HOLD)
- 5 Shutter speed
- 6 FADER is pressed.
- 7 "Exchange battery."
- 8 Moisture has condensed.
- 9 Shows up during recording.
When blinking: "Exchange battery."
- 10 Playback mode (LP)
- 11 Tape transport mode
- 12 Tape counter
- 13 ZERO MEM is pressed.
- 14 Manual focusing
- 15 "Exchange tape."
- 16 "Clean video heads." "Trouble occurred."
- 17 Age or anniversary
- 18 Date or time
- 19 "Replace lithium battery."

List of Beeps

Beep sounds when:	Beep
Camera recording starts.	I 1 beep
Camera recording stops.	II
The tape is at its end	■■■■■■■■■■ (approx. 5 sec.)
The red mark on the cassette is exposed.	■■■■■■■■■■ (approx. 5 sec.)
Moisture condensation has occurred.	■■■■■■■■■■ (approx. 5 sec.)
Other trouble has occurred.	■■■■■■■■■■ (approx. 5 sec.)