SONY

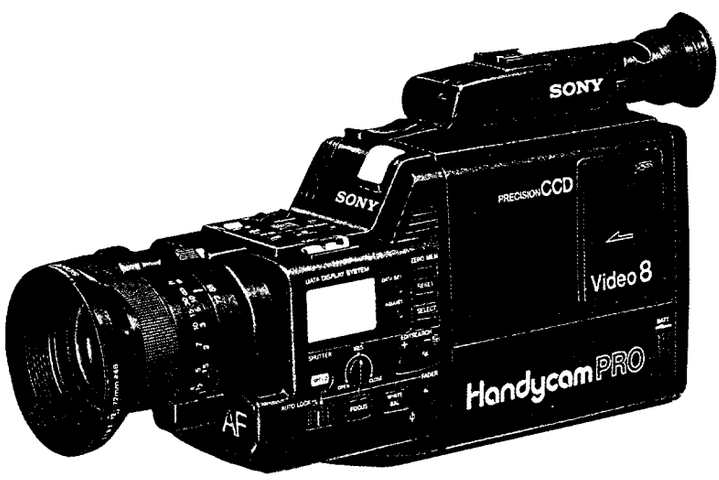
3-769-268-22 (3)

VIDEO CAMERA RECORDER 8

CCD-V9/V90

OPERATING INSTRUCTIONS

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



Video 8 Handycam PRO

©1987 by Sony Corporation

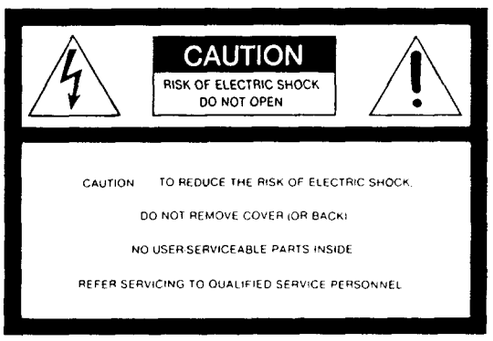
OWNER'S RECORD

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

Model No. _____ Serial No. _____

WARNING

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



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

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.

TABLE OF CONTENTS

This instruction manual covers the CCD-V9 (verified to the FCC rules and available in the U.S.A. and Canada) and the CCD-V90 (models available outside the U.S.A. and Canada). Operations are the same regardless of the difference of the model name.

Location and function of parts and controls 4

POWER SOURCES AND CASSETTE CARE

Power sources 7
- Selection of power sources 7
- Battery pack 8
- House current 9
- Car battery 9

Cassette care 10

CAMERA OPERATION

Preparations for camera recording 11
- Grip strap adjustment 11
- Viewfinder adjustment 11
- Lithium battery 12
- Date/time setting 13

Easy camera recording with automatic adjustment 14
- Camera recording 14
- Caution indicators on the viewfinder screen ... 16
- To record the date or time 17
- Monitoring the playback picture on the viewfinder screen 18
- Smooth recording 18

Manual focusing 19
Manual white balance 21
Manual iris adjustment 22
Shutter speed adjustment 23
Zooming 24
Close-ups 25
Fade-in and fade-out 26

RECORDER OPERATION

Playback of the recorded tape 27
- Connecting a TV 27
- To play back 29
- Variable playback modes 29

Use of the tape counter 31
TV program recording 32
Editing 36
Insert recording 37
Remote control operation 40
Use of an external microphone 41

GENERAL

Notes on moisture condensation 42
Precautions 43
Using your recorder abroad 44
Specifications 45
Troubleshooting 46
Check list before recording 58

HINTS FOR BETTER SHOOTING page 48

The following units are packed with the CCD-V9/V90 video camera recorder.

Battery pack NP-55
AC power adaptor AC-V33
RFU adaptor RFU-89UC/N
Cassette tape
Shoulder strap

For details on these units, please read their instruction manuals.

Please refer to the illustration corresponding to the letter code indicated in the instructions.

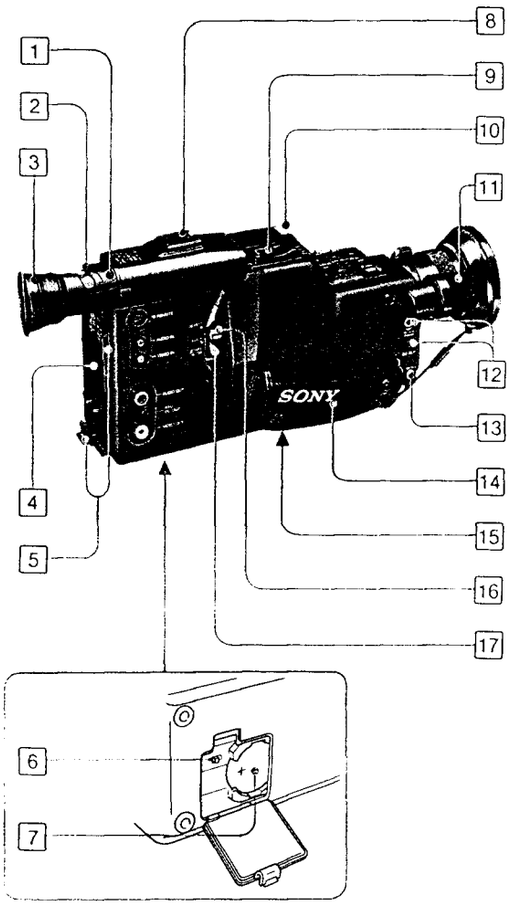
NOTES

- For "once-only" events, it is strongly recommended to have a trial run to check that everything is working perfectly.
- Television programs, films, video tapes and other materials may be copyrighted. Unauthorized recording of such material may be contrary to the provisions of the copyright laws.
- PCM recording/playback is not possible with this unit. The PCM sound recorded or after-recorded with another recorder cannot be played back with this unit.
- For using this unit abroad, see page 44.

This unit uses 8mm video format cassettes.
It records in the SP mode (approximately 1.43cm/second) and can play back in the SP mode and the LP mode (approximately 0.72cm/second).
The quality of the playback picture in the LP mode, however, will not be as good as that in the SP mode.

LOCATION AND FUNCTION OF PARTS AND CONTROLS

A-1



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

Video camera section

A-1

1 **Viewfinder**
The picture being recorded or played back can be monitored in monochrome through this viewfinder. Data such as the function mode, caution indicators, date, time, are also displayed on the viewfinder screen.

2 **Viewfinder lens adjustment lever** ⓫
Adjust to your eyesight to assure good focus. Be sure to adjust this lever when shooting for the first time.

3 **Eyecup** ⓫

4 **Battery mounting surface** ❽

5 **Hooks for shoulder strap**

6 **EDIT switch** ⓯
Normally keep this switch at the opposite position to the arrow direction. When editing a tape, set to EDIT.

7 **Lithium battery compartment** ⓬

8 **Accessory shoe** ⓫
Attach an optional external microphone, video light, etc.

9 **Power zoom button** ㉔
Press for smooth power zooming between wide-angle (W) and telephoto (T) positions.

10 **White balance sensor**
This is the sensor for the auto white balance adjustment. Be careful not to cover it.

11 **Built-in microphone**

12 **MIC jack and DC OUT (microphone power output) jack** ⓫
Connect an external microphone.
The MIC jack accepts Sony "plug-in-power" microphones and supplies power to them.

13 ⓪ **(earphone) jack** (mini)

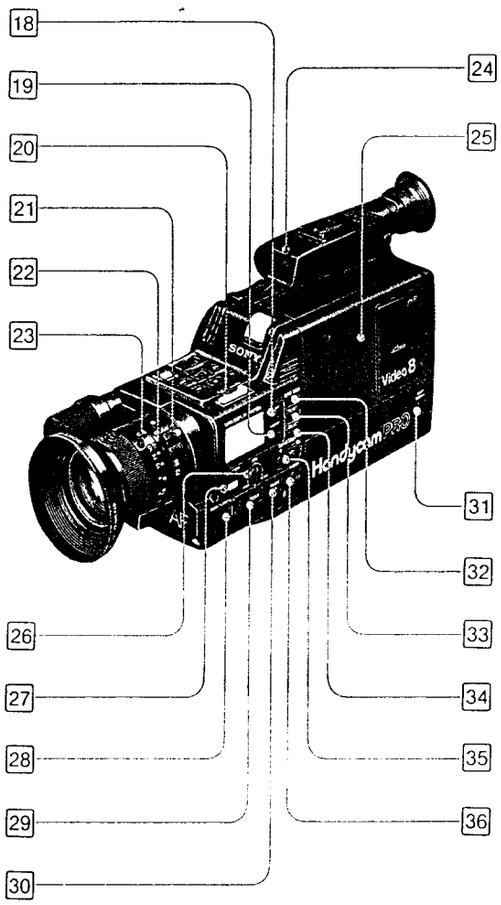
14 **Grip strap** ⓫

15 **Tripod receptacle**
Attach an optional tripod.

16 **STANDBY switch** ⓮
Before recording, slide this switch up.

17 **START/STOP button** ⓮
Press to start or stop camera recording.

A-2



A-2

18 **DATA SET button ⑱**
Used to set the date and time.

19 **ADJUST button ⑱**
Used to set the date and time.

20 **EJECT (cassette eject) switch ⑩**

21 **Macro set button ㉕**
Keeping this button depressed, move the manual zoom lever within the MACRO range for close-ups.

22 **Manual zoom lever ㉔**

23 **Focus ring ⑲**
For manual focusing, turn this ring to focus while looking through the viewfinder.
This ring will be turned automatically during auto focusing.

24 **Camera recording/battery lamp**
Lights during camera recording. It blinks when the battery is exhausted.

25 **Cassette compartment ⑩**

26 **IRIS control ㉒**
Normally set to the center position (green mark).

27 **SHUTTER SPEED button ㉓**
Used to select the shutter speed.

28 **AUTO LOCK switch ⑭**
Normally set to the left AUTO LOCK position (green mark).

29 **FOCUS button ⑲**
Used for manual focusing.

30 **WHITE BAL (white balance) button ㉑**
Used for manual balance adjustment.

31 **BATT (battery eject) switch ❽**

32 **ZERO MEM (zero memory) button ㉛㊸**
Used to memorize the counter zero point.

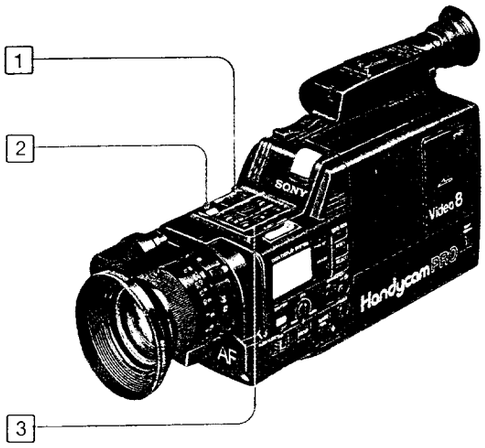
33 **RESET button ㉛**
Pess to reset the counter to zero.

34 **SELECT button ⑬⑰**
Select the counter, date or time display.

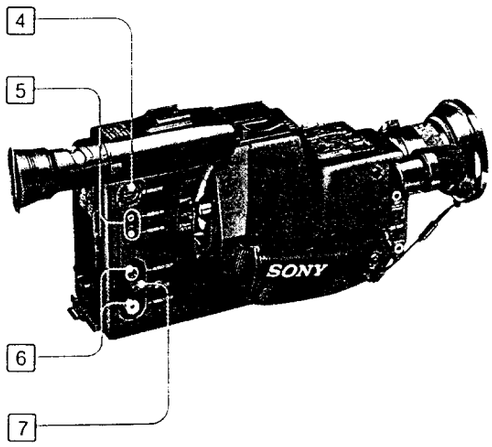
35 **EDITSEARCH button ⑮⑯㉚㊸**

36 **FADER button ㉖**

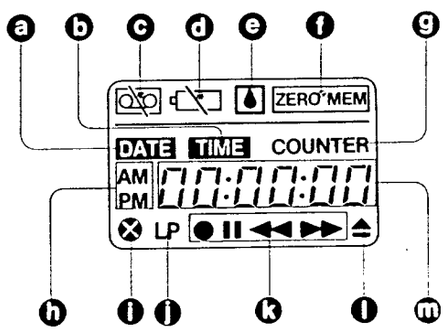
A-3



A-4



A-5



Video cassette recorder section and connectors

A-3

1 **POWER switch**
CAMERA: For camera recording.
VTR: For tape playback, tape editing and recording from the equipment connected to the VIDEO IN/AUDIO IN jacks.
OFF: To turn off the power.

2 **REC ● (recording) button** ㉝

3 **Tape transport buttons** ㉔
◀◀ FF (fast-forward), ◁ (playback), ▶▶ REW (rewind), ◀II (frame-by-frame/slow playback), ■ (stop), II (pause)

A-4

4 **REMOTE connector** (5-pin) ㊵
Connect an optional Remote Commander, editing controller, etc.

5 **AUDIO IN/VIDEO IN jacks** (miniphono) ㉝

6 **AUDIO OUT/VIDEO OUT jacks** (phono) ㉗㉝

7 **RFU DC OUT jack** (special mini) ㉗㉝
Connect the RFU-89UC/N RFU adaptor, etc.

A-5

Display window
ⓐ DATE mode indicator
ⓑ TIME mode indicator
ⓒ Lights steadily when no cassette is inserted. Blinks when the tape reaches its end during camera recording or when a recording is started with a cassette with its safety tab out inserted.
ⓓ Blinks when the battery is weak.
ⓔ Blinks when moisture has condensed inside the unit.
ⓕ Displayed when the ZERO MEM button is pressed.
ⓖ COUNTER mode indicator
ⓗ AM/PM indicator
ⓘ Blinks when the video heads have been contaminated.
ⓙ LP mode indicator
ⓚ Tape operation mode indicators
● (recording), II (pause), ◀◀ (fast-forward), ▶▶ (rewind), ◀ (playback)
ⓛ Blinks when moisture has condensed on the tape, when the tape reaches its end during camera recording, etc. to indicate that the cassette should be removed.
ⓜ Tape counter, date or time indication

POWER SOURCES

SELECTION OF POWER SOURCES

This manual shows the operations on one of the following power sources. For operation on other power sources, see the instruction manual furnished with the equipment to be used.

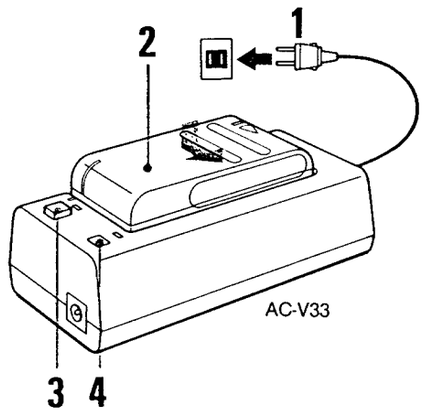
		Power source	Accessory to be used
Place	Indoors	House current	AC power adaptor AC-V33 or AC-V55* (page 9)
	Outdoors	Battery pack	Battery pack NP-55 or NP-77* (page 8)
	In the car	12 V or 24 V car battery	AC power adaptor AC-V55 and car battery cord DCC-16AW (page 9)

* Available in near future.

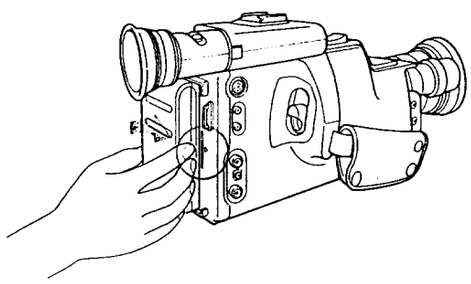
Notes on power source

- Disconnecting the power source or removing the battery pack during recording or playback may damage the inserted cassette tape. If this is done by accident, supply the power again immediately and turn on the power switch.
- If a power source is disconnected or the CHARGE button on the AC power adaptor is pressed in rewind mode, the ⏏ indication may blink in the display window and the tape may not run. In this case, remove the cassette and insert it again.
- Be careful not to let any metal object touched on the metal part on the battery pack or AC power adaptor. When the battery pack is not be used, keep it in its case.

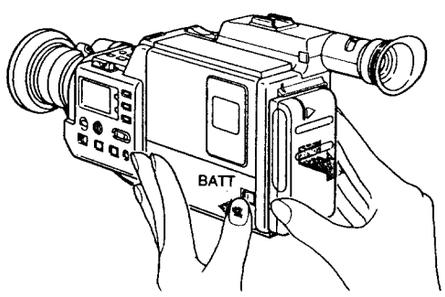
B-1



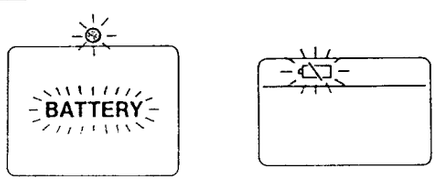
B-2



B-3



B-4



BATTERY PACK — NP-55 OR NP-77

How to charge B-1
Use the AC-V33 AC power adaptor.
The charging time is about 1 hour for an NP-55 battery pack, or about 2 hours for an NP-77 battery pack.

1 Connect the AC-V33 to a wall outlet.
2 Attach the battery pack to the AC-V33. Align the grooves on the battery pack with those on the AC-V33, and while pressing the battery pack, slide it as illustrated.
3 Press the POWER button.
4 Press the CHARGE button.

To attach the batery pack to the video camera recorder B-2
Align the right side of battery pack with the white line on the recorder, and while pressing the battery pack, slide it to the right.
Make sure that the battery is fitted completely to the mounting surface. Imperfect fit may damage the projections on the recorder.

To remove the battery pack B-3
While pressing the BATT switch in the arrow direction, slide and pull out the battery pack as illustrated.

Battery life
A fully-charged NP-55 battery pack provides approximately 45 minutes of continuous camera recording, and an NP-77 provides approximately 90 minutes of continuous camera recording.

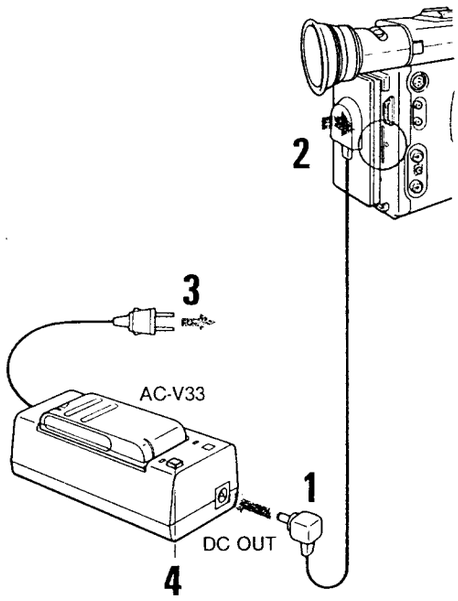
NOTES
- The video camera recorder consumes power even in the recording pause mode. Therefore, turn off the unit by sliding the STANDBY switch when you are not shooting. For every hour's worth of tape you shoot, plan to use 2 to 3 hours' worth of battery power.
  The use of the NP-77 is recommended for an extended use.
- If the battery pack is not fully charged or if it is used in a cold place, its operating time is also shortened.

WHEN THE BATTERY BECOMES WEAK B-4
The BATTERY indication blinks on the viewfinder screen and the indication blinks in the display window. Replace the battery pack with the fully charged one.

USING THE NP-22 BATTERY PACK
A fully-charged NP-22 battery pack can operate this unit for approximately 70 minutes. For using the NP-22, an optional NPA-22 battery adaptor is necessary.

OPTIONAL ACCESSORIES FOR CHARGING
- **AC-V55 AC power adaptor**
  Two battery packs can be charged simultaneously.
- **BCA-70 or BCA-80 battery charge adaptor, ACP-80UC or ACP-88 AC pack and NPA-55 battery adaptor**
  For charging, insert an NP-55 into the NPA-55.

B-5



HOUSE CURRENT — USING AC-V33 AC POWER ADAPTOR B-5

1 Insert the connecting cord supplied with the AC-V33 AC power adaptor into the DC OUT jack on the AC power adaptor.
2 Attach the connecting plate to the battery mounting surface on the video camera recorder.
3 Connect the AC power adaptor to a wall outlet.
4 Press the POWER switch on the adaptor.

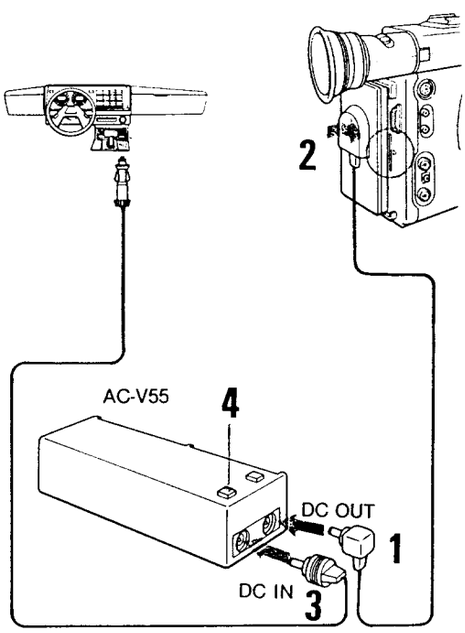
After using, press the POWER switch on the adaptor again.

To remove the connecting plate from the video camera recorder
While pressing the BATT switch on the recorder, slide and pull out the connecting plate.

- The optional AC-V55 AC power adaptor can also be used to operate this recorder on house current.

CAR BATTERY B-6

B-6



Use the DCC-16AW car battery cord and the AC-V55 AC power adaptor.

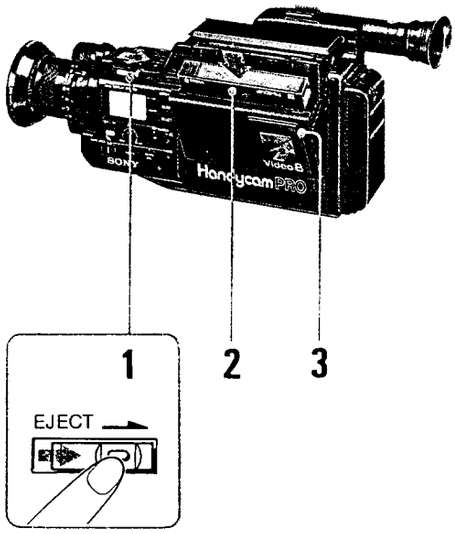
1 Insert the connecting cord supplied with the AC-V55 into the DC OUT jack on the AC-V55.
2 Attach the connecting plate to the video camera recorder.
3 Connect the DCC-16AW car battery cord to the DC IN jack on the AC-V55 and to the cigarette lighter socket of a car (12 V or 24 V).
4 Press the POWER switch on the AC-V55.

After using, press the POWER switch on the adaptor again.

To remove the connecting plate from the video camera recorder
While pressing the BATT switch on the recorder, slide and pull out the connecting plate.

CASSETTE CARE

C-1



CASSETTE INSERTION C-1

Make sure that a power source is connected to the unit.

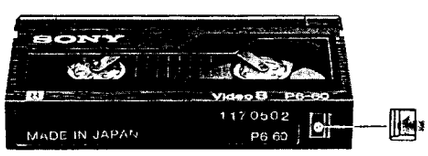
1 Press and slide the EJECT switch.
  The cassette holder will open.
2 Insert a cassette with the window outward and the arrow mark down.
3 Push the PUSH mark to close the cassette holder.

CASSETTE EJECTION

1 Connect a power source.
2 Press and slide the EJECT switch.
3 Take the cassette out and push the PUSH mark to close the cassette holder.

NOTES
- While the cassette holder is rising, never pull or push it forcibly.
- When the cassette holder is pressed to close, the upper lid of the cassette compartment will automatically lower. Be careful not to trap your hand between the cassette holder and the lid. To open the cassette holder, press and slide the EJECT button.
- Never insert anything in the small holes on the rear of the cassette. These holes are used to sense the kind of tape, thickness of tape, if the tab is out or in, etc.
- To record from the beginning of the tape, run the video camera recorder for about 15 seconds at the begining of a cassette before recording. It will avoid missing the starting point during playback on a video cassette recorder.

C-2



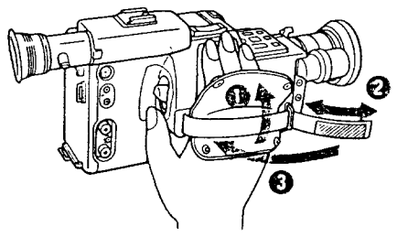
THE TAB ON THE CASSETTE C-2

(The photo is of Sony type.)

When a new recording is made on a previously recorded cassette, the previous recording will be automatically erased. To avoid erasing a recording unintentionally, slide the tab out to cover the opening.
When the tab is out, a recording cannot be made. To re-record on a cassette, slide the tab in.

PREPARATIONS FOR

D-1



GRIP STRAP ADJUSTMENT D-1

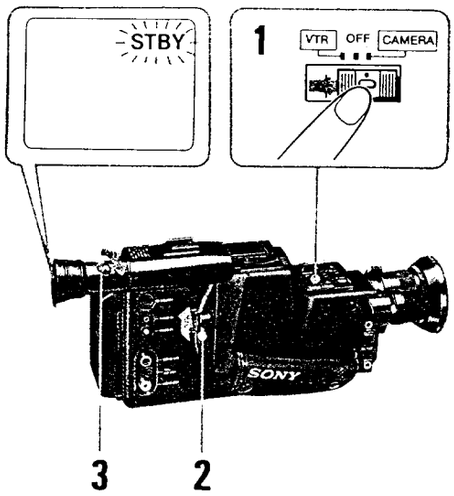
Adjust the length of the grip strap so that your fingers can manipulate the STANDBY switch, START/STOP button and power zoom button.

VIEWFINDER ADJUSTMENT

Viewfinder lens adjustment D-2

This adjustment is necessary only when you use the camera for the first time or after another person has used it, because the distance of optimum vision varies from person to person.

D-2



Make sure that the lens cap is removed.

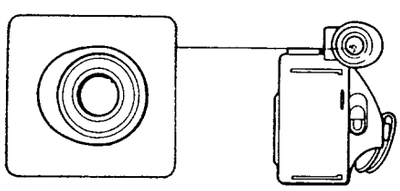
1 Press and slide the POWER switch to CAMERA.
2 Slide the STANDBY switch up.
The unit will be set to recording pause mode and the STBY indication will appear on the viewfinder screen.
3 Adjust the viewfinder lens adjustment lever so that the indication on the viewfinder screen come into sharp focus.

NOTE
When the power is turned on, irregular indications may appear on the viewfinder screen. In this case, set the POWER switch to OFF, and set it to CAMERA again.

To view with your left eye D-3

Pull to detach the rubber eyecup and reattach it as illustrated.

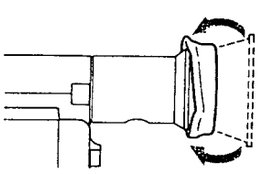
D-3



To view through the glasses D-4

Fold the rubber eyecup outward.

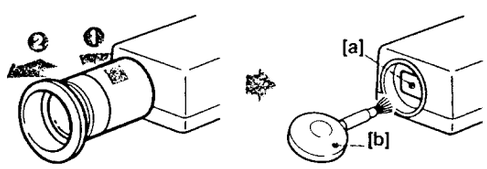
D-4



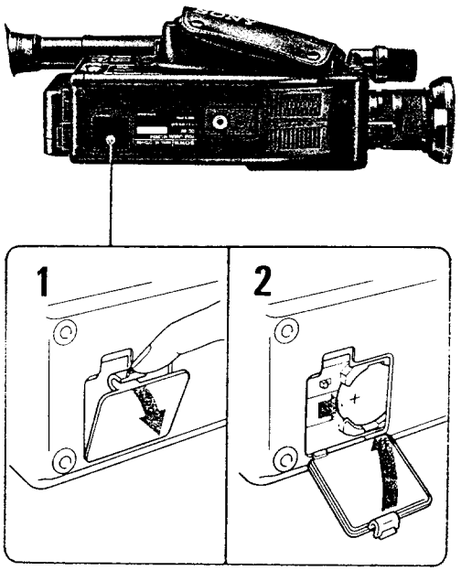
To remove the dust inside the viewfinder D-5

Detach the eyecup and clean the screen surface **[a]** with a camera blower **[b]** (commercially available).

D-5



D-6



LITHIUM BATTERY D-6

Before operating the unit for the first time, install the supplied lithium battery to activate the clock.

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

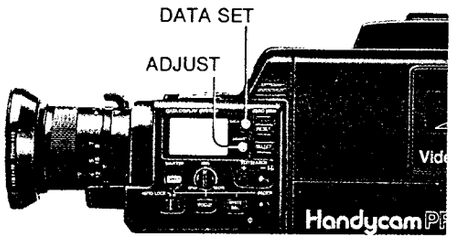
To remove the lithium battery
Press the side of the battery in the direction as indicated for installation.

LITHIUM BATTERY LIFE
Approximately 2 years in normal operation.
When the lithium battery becomes weak, the indication and the DATE or TIME indication will blink in the display window while the date or time is displayed.
In this case, replace the battery with a Sony CR2025 or Duracell DL-2025 lithium battery. Use of another battery may present a risk of fire or explosion.

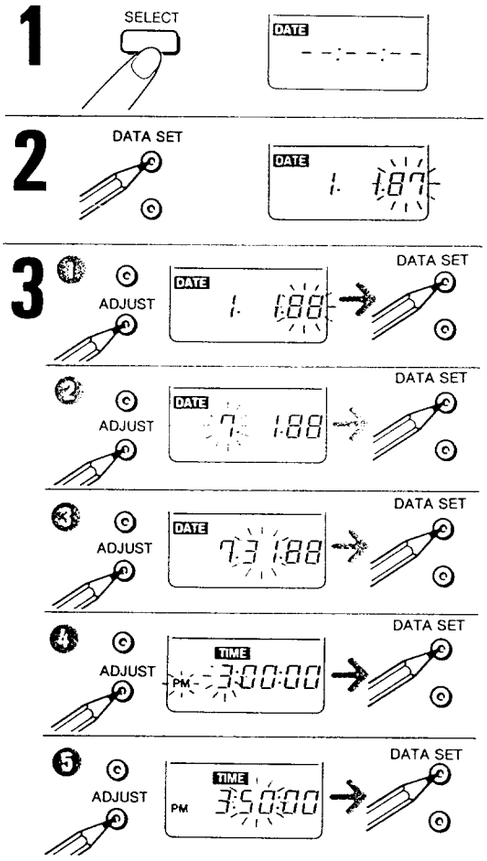
NOTES ON LITHIUM BATTERY
- Keep the lithium battery out of the reach of children. Should the battery be swallowed, immediately consult a doctor.
- Wipe the battery with a dry cloth to assure a good contact.
- Be sure to observe the correct polarity when installing the battery.
- Do not hold the battery with metallic tweezers, otherwise a short-circuit may occur.
- Do not break up the battery nor throw it into a fire, which might cause it to explode. Carefully dispose of the used batteries.

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

D-7



D-8



D-8

DATE/TIME SETTING D-7

Make sure that the lithium battery is installed.

1 Press the SELECT button.
The DATE indication will appear on the viewfinder screen.
2 Press the DATA SET button for 2 or 3 seconds to display the preset date (1.1.87).
3 Adjust the year, month, day, hour and minute in sequence, following the illustration D-8.
First adjust the blinking digits with the ADJUST button, and then press the DATA SET button.
❶ Year: 87 = 1987, 00 = 2000 ❷ Month ❸ Day ❹ Hour: AM12:00 = midnight, PM12:00 = noon ❺ Minute
After adjusting the minute digits, press the DATA SET button at the same time with an announced time signal.
The clock starts operating.
4 To reset to the counter mode, press the SELECT button.

There is no need to readjust the date and time as long as the lithium battery remains.

THE ADJUST BUTTON CAN BE PRESSED IN TWO WAYS:
- When you keep the button pressed, the digits will advance continuously.
- When you press and immediately release the button, the digits will advance by one.

To change the adjusted digits during setting
1 Press the DATA SET button repeatedly until the clock starts operating.
2 Press the DATA SET button for 2 or 3 seconds so that the year digits blink.
3 Press the DATA SET button repeatedly until the digits to be changed blink.
4 Change the digits with the ADJUST button and then press the DATA SET button.

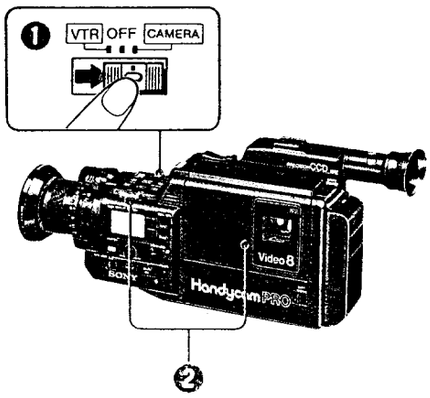
To readjust the date or time after the setting has been completed
1 Press the SELECT button to display the date or time.
2 Press the DATA SET button for 2 or 3 seconds so that the year digits blink.
3 Press the DATA SET button repeatedly until the digits to be changed blink.
4 Change the digits with the ADJUST button and press the DATA SET button repeatedly until the clock starts operating.

To check the date and time D-9
Each time the SELECT button is pressed, the display changes as follows:
Counter → Date → Time → Counter...

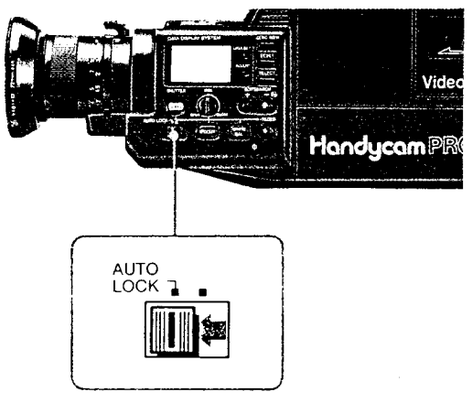
EASY CAMERA RECORDING WITH AUTOMATIC ADJUSTMENT

CAMERA RECORDING

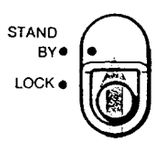
E-1

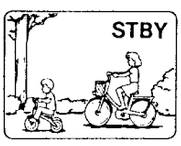


E-2

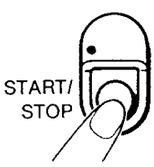


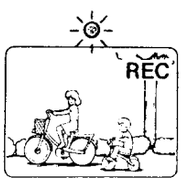
E-3





E-4





1 **Press and slide the POWER switch to CAMERA and insert a cassette.** E-1

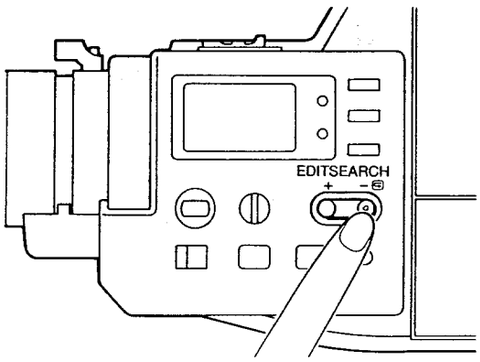
2 **Set the AUTO LOCK switch to the left (green AUTO LOCK position).** E-2
In this position, the focus, white balance and iris will be adjusted automatically.

3 **Slide the STANDBY switch up.** E-3
The unit will be set to recording pause mode.

4 **To start recording, press the START/STOP button.** E-4

5 **To stop recording, press the START/STOP button.**
The unit will be set to recording pause mode.

E-5



To check the last scene of the previous recording

Press the "−" side of the EDITSEARCH button momentarily. E-5

The last few seconds of the recorded scene are played back in reverse, and then played back normally. Then the unit will enter recording pause mode.

After recording

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

NOTES ON RECORDING

- Do not let the sun shine directly into the eyecup of the viewfinder, because the plastic inside the viewfinder may be damaged.
- If you leave the unit in the recording pause mode for 7 minutes or more, the power will be automatically turned off.
  To resume recording pause mode, slide the STANDBY switch down and slide it up again.
- Avoid mechanical shock or shaking of the unit in recording pause mode. Otherwise, smooth recording will not be obtained when recording is resumed.
- When the POWER switch is moved during recording, the tape will stop.
- Should you shoot a subject in bright conditions such as sunlight just after shooting in a dark place, the picture may not appear on the viewfinder screen. In this case, move the camera away from the subject to resume the normal condition.
- A vertical band may appear when a subject such as a candle flame or a light is shot against a dark background.
- When playing back a tape recorded with this unit on a VCR equipped with PCM function, set the audio monitor selector on the VCR to the standard position.
- When a new recording is made with this unit using a tape on which PCM stereo sound has previously been recorded, set the monitor switch of the video cassette recorder for playback to the STD (standard) position. Otherwise, the sound may not be heard or may be distorted.

NOTES ON AUTOMATIC ADJUSTMENT

- During camera recording, do not touch the focus ring or cover the white balance sensor.
- If there is insufficient light, the auto focusing and auto white balance do not operate properly. Add an appropriate light.
- The camera recording with automatic adjustment may not produce optimum results under certain conditions or ambient lighting. In this case, manually adjust the focus, white balance and iris. See pages 19, 21 and 22.
- The shutter speed is fixed at normal and the fader does not function in AUTO LOCK position.

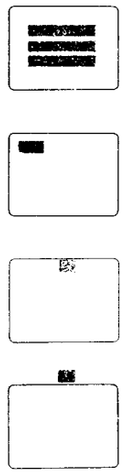
E-6

[a]

[b]

[c]

[d]

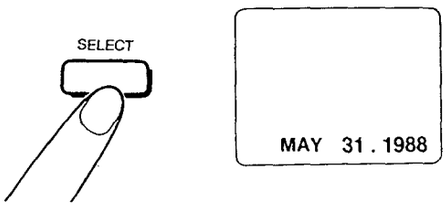


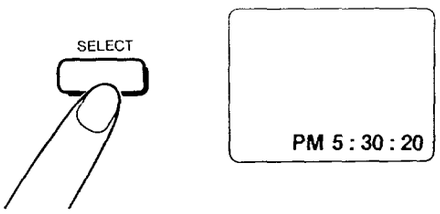
CAUTION INDICATORS ON THE VIEWFINDER SCREEN E-6

A caution indicator will be displayed on the viewfinder screen.

[a]	BATTERY	Blinks, then goes out.	The battery is weak.
	TAPE END	Blinks.	The tape reaches its end.
	CASSETTE	Blinks.	• No cassette inserted. • The safety tab is out. (page 10)
	DEW	Blinks.	Moisture condensation inside the unit. (page 42)
	CAUTION	Blinks.	Moisture condensation on the tape surface, etc. (page 42)
[b]	INDOOR	Lights.	The WHITE BAL button is set for indoor recording. (page 21)
	OUTDOOR	Lights.	The WHITE BAL button is set for outdoor recording. (page 21)
[c]	White mark	Lights.	Manual focusing mode is set. (page 19)
		Blinks.	Auto focusing does not work correctly. (page 19)
[d]	RED lamp	Lights.	During recording.
		Blinks.	Battery is weak.

E-7





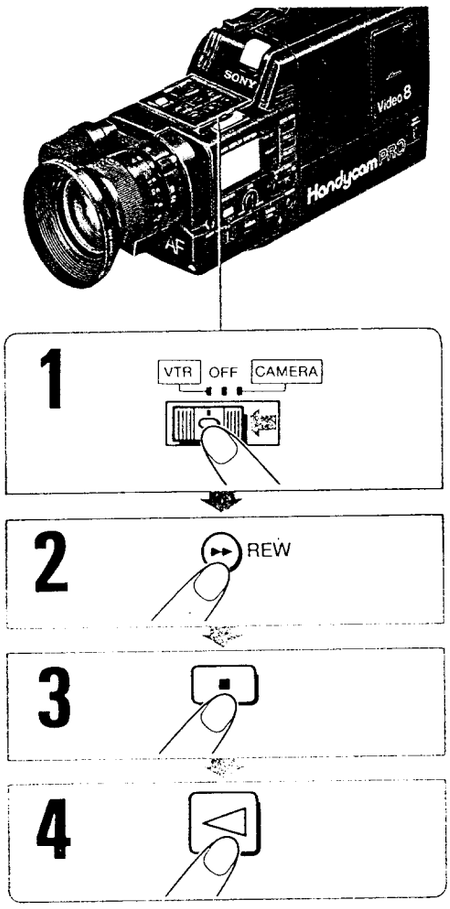
TO RECORD THE DATE OR TIME E-7

During camera recording or in recording pause mode, press the SELECT button once or twice to display the date or time on the viewfinder screen.
If the unit is set to recording mode, the date or time being displayed will be recorded together with the picture.

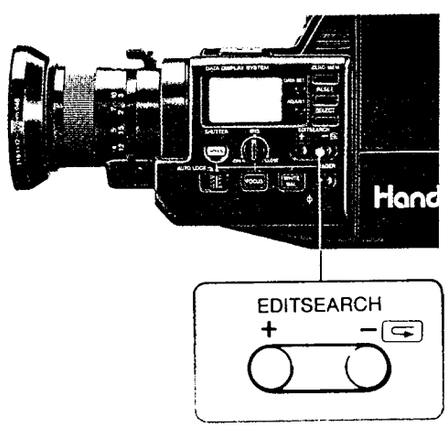
To stop recording the date or time, press the SELECT button twice or once to extinguish the display. The picture recording will continue.

NOTES
- The date or time can be recorded only during a camera recording. To insert the date or time while editing a tape, see "INSERT RECORDING" on page 38.
- To display the time or to extinguish the date during recording, press the SELECT button twice **in succession** to pass over the unnecessary date or time display rapidly. Otherwise, the unnecessary display will be recorded. When the SELECT button is pressed in succession, such a display will appear momentarily but will not be recorded.

E-8



E-9



MONITORING THE PLAYBACK PICTURE ON THE VIEWFINDER SCREEN E-8

1 Set the POWER switch to VTR.
2 Press the ▶▶ button to rewind the tape.
3 Press the ■ button to stop the tape.
4 Press the ◁ button to start playback.
The playback picture will appear on the viewfinder screen.

To stop the playback, press the ■ button.

To monitor the playback sound, connect an earphone to the ◎ jack.

NOTE
The playback picture and sound may be affected in a moving vehicle.

SMOOTH RECORDING

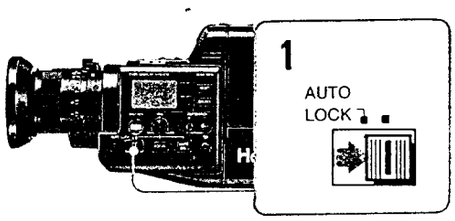
Smooth recording can be made even if the recording is stopped and started again, or even if the power is turned off and on again, provided that the cassette is not removed. But, if the cassette has been removed, proceed as follows.

1 Set the POWER switch to CAMERA.
2 Insert a cassette.
3 Slide the STANDBY switch up.
4 Locate the point from which the recording is to begin again by monitoring the picture on the viewfinder screen. E-9
   ❶ Press the "+" side of the EDITSEARCH button to advance the picture at a normal playback speed, or the "−" side to reverse the picture.
   ❷ At the desired point, release the EDITSEARCH button.
   The unit will be set to recording pause mode after 2 seconds.
5 Press the START/STOP button to start recording.

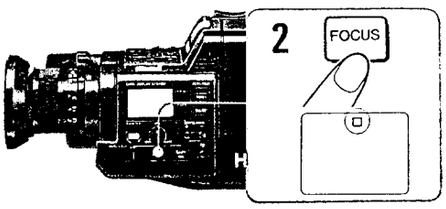
NOTE
Smooth recording cannot be obtained if two recordings are carried out on different VCRs, on this unit and another VCR.

MANUAL FOCUSING

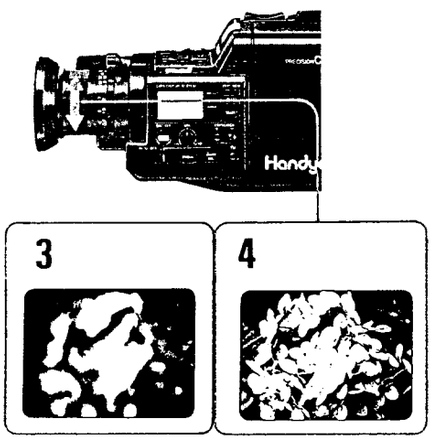
F-1



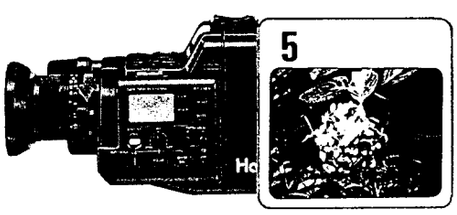
F-2



F-3



F-4



Auto focusing will be activated for almost any subject centered in the viewfinder. However, for some subjects listed on page 20, or when the white mark blinks on the center top of the viewfinder screen, use manual focusing.

1 Set the AUTO LOCK switch to the right position (white mark). F-1
2 Press the FOCUS button so that the white mark appears on the center top of the viewfinder screen. F-2
3 Turn the manual zoom lever to the telephoto position (72) to make the subject as large as possible in the viewfinder. F-3
4 Turn the focus ring to achieve sharp focus. F-3
5 Set the desired shot length using the manual zoom lever. F-4

SOME HELPFUL HINTS

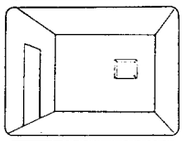
- When shooting a scene with lots of movement in bright light, the subject can be kept in good focus regardless of movement by setting the zoom lever to 12 and the focus ring to 2 m.
- The figures on the focus ring indicate the distance between the subject and the ⌖ mark on the side of the recorder body.
- When shooting in low lights situations, such as indoors, the depth of field for proper focus becomes very shallow. For best results, set the focus in telephoto, and shoot at wide angles.

F-5

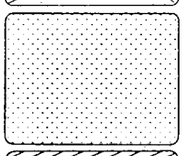
[a]

[b]

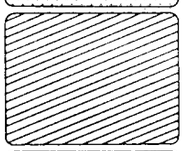
[c]



[d]



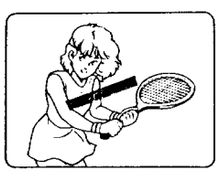
[e]



[f]

[g]

F-6



DIFFICULT CONDITIONS FOR AUTO FOCUSING F-5

[a] Insufficient light
[b] Too much bright light behind the subject
[c] Subjects with flat colors and less contrast—wall, sky, etc.
[d] Finely detailed repetitive patterns
[e] Slant stripes
[f] When the distance between subjects at the center is extreme (e.g. one subject is close, the other is away)
[g] Subjects beyond screens, nets, etc. or when another subject passes across the camera

OTHER USES OF MANUAL FOCUSING

- When using special effects lenses or filters
- When shooting still subjects on a tripod
- To save battery wear
  (When the AUTO LOCK switch is set to the green mark position, the auto focusing operates to move the focus ring automatically even in recording pause mode. This causes the battery to wear continuously.)
- For close-up shooting (See page 25.)
- When shooting in a hot palce.

TCL AUTO FOCUSING SYSTEM
The TCL (Through Camera Lens) auto focusing system incorporated in this unit utilizes high-precision sensors to determine picture contrast at the center of the viewfinder screen (the portion marked with the blue bar in the illustration) and adjust focus accordingly for automatic, highly accurate focusing. F-6

NOTE
It may take several seconds to get focus when the camera is rapidly panned from a near subject to a distant subject with less contrast.

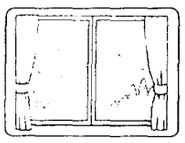
MANUAL WHITE BALANCE

G-1

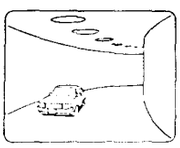
[a]

[b]

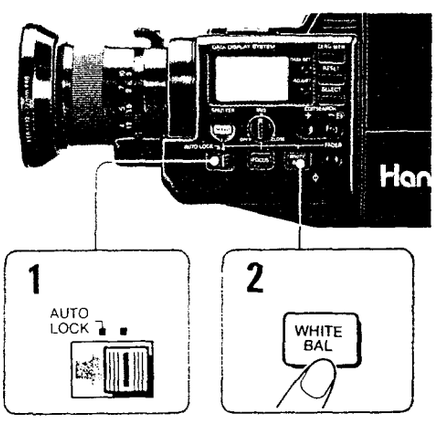
[c]



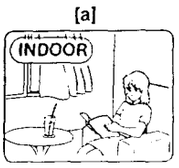
[d]



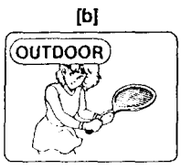
G-2



[a]



[b]



In most cases, the auto white balance function of this unit adjusts the white balance automatically. However, if it does not work correctly in the conditions listed below, adjust the white balance manually.

DIFFICULT CONDITIONS FOR AUTO WHITE BALANCE G-1

[a] Insufficient light
[b] When lighting conditions change quickly
[c] When the light source for the subject is different from that illuminating this unit e.j. when the subject is in a spotlight, or when the subject is outdoors but the camera is indoors, etc.
[d] Special light sources such as natrium lamps, the setting sun, etc.

TO ADJUST THE WHITE BALANCE MANUALLY G-2

1 Set the AUTO LOCK switch to the right position (white mark).
2 Press the WHITE BAL button once or twice so that the appropriate white balance indicator appears on the viewfinder screen.
   [a] To record subjects indoors: **INDOOR** (3,200 K)
   [b] To record subjects outdoors: **OUTDOOR** (5,800 K)

Recommended setting for various subjects

OUTDOOR: sunset, fireworks, subjects in a sunny window, etc.
INDOOR: candle flames in darkness, subjects in the spotlight, scenes before sunrise, subjects in a tunnel (illuminated by natrium lamps), neons, etc.

WHAT IS THE WHITE BALANCE?

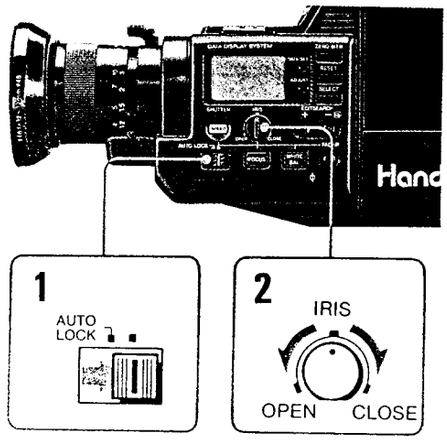
The color of the subject being recorded can be affected by the ambient light. White balance adjustment is necessary for compensating for this color variation, so that a white subject, for example, can be recorded white without reference to the light source.

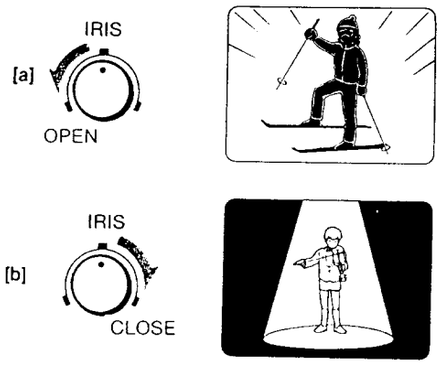
AUTO WHITE BALANCE SYSTEM

The auto white balance system of this unit utilizes the white balance sensor to determine the color temperature of the ambient light and adjust the white balance accordingly. As the ambient lighting condition changes gradually, such as in twilight, the white balance will be readjusted automatically. As the sensor is built in the unit, however, optimum white balance adjustment cannot be obtained if the subject and this unit are under different lighting conditions.

MANUAL IRIS ADJUSTMENT [H]

H





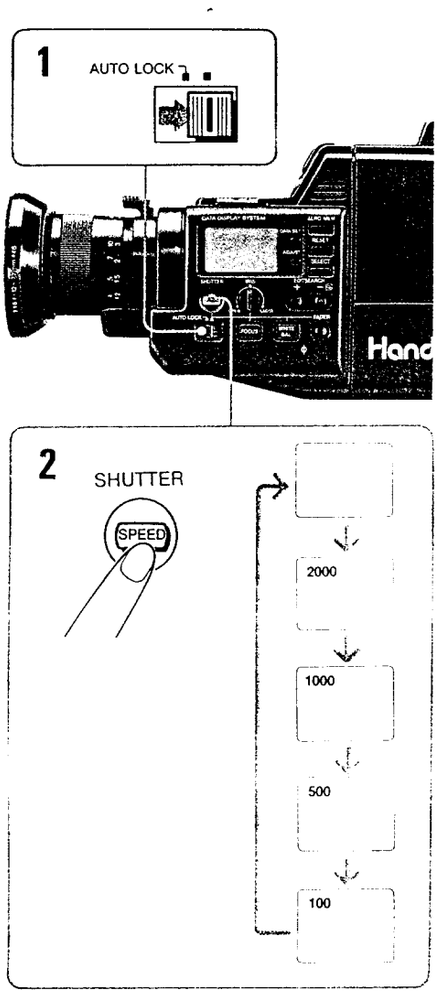
The iris is adjusted automatically when the AUTO LOCK switch is set to AUTO LOCK. When shooting a scene with strong contrast, adjust the iris manually.

1 Set the AUTO LOCK switch to the right position (white mark).
2 Adjust the IRIS control.
   [a] When backlit shot results in the subject being too dark: **Turn IRIS toward OPEN.**
   [b] When a subject is too bright against a dark background: **Turn IRIS toward CLOSE.**

After shooting that particular scene, set the IRIS control to the center position (green mark).

SHUTTER SPEED ADJUSTMENT

I-1



When the shutter speed is fast, subjects moving at high speed, such as a moving golf ball or tennis ball, can be recorded clearly.
Five shutter speeds can be selected on this unit: 1/60 (normal speed), 1/2000, 1/1000, 1/500, 1/100.
Select the appropriate shutter speed according to the subject and the ambient lighting conditions.

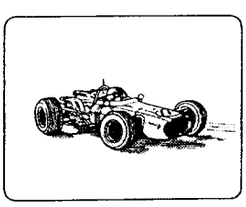
TO SELECT THE SHUTTER SPEED I-1

1 Set the AUTO LOCK switch to the right position (white mark).
2 Press the SHUTTER SPEED button repeatedly until the desired shutter speed indication appears on the viewfinder screen.
Each time the SHUTTER SPEED button is pressed, the indication changes:
No indication → 2000 → 1000 → 500 → 100
(1/60) (1/2000) (1/1000) (1/500) (1/100)

Recommended shutter speed settings
The faster the shutter speed is, the better faster movements of the subjects can be followed but the recorded picture becomes darker. Select the appropriate shutter speed while observing the brightness of the picture on the viewfinder screen.

Location	Recommended shutter speed
• Sunny golf courses and tennis courts • Snow-covered mountains • Beach in summer	1/2000
• Slightly overcast outdoors • Roofed golf practice ground	1/1000
• Cloudy outdoors • Indoor tennis courts	1/500 or 1/100

I-2

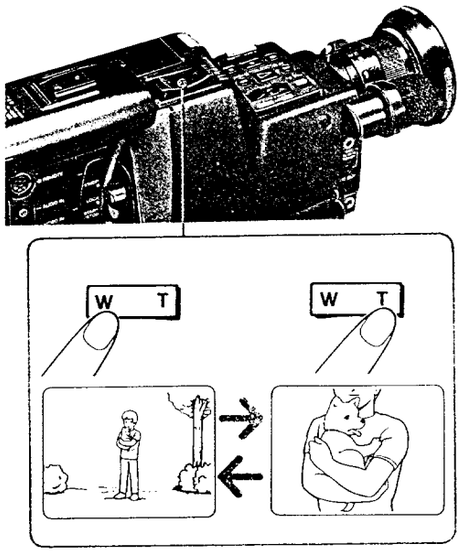


A noiseless still, frame-by-frame and slow pictures are obtained when the picture recorded with the faster shutter speed is played back. This is convenient for checking your golf or tennis form, etc.

NOTES
- When the shutter speed is changed during a camera recording of a TV screen, the brightness of the recorded picture may vary in a single image. I-2
- When a very bright object is shot with a faster shutter speed, a light, vertical, belt-like line ("smear") may appear on the screen. This is not a failure of the unit.
- When shooting under flourescent lamps, mercury lamps or natrium lamps, flickers may occur and the color of the subjects may change.
- If flickers of fluorescent lamps affect the recording in 50 Hz areas, set the shutter speed to 1/100.

ZOOMING

J-1



Either power zoom or manual zoom can be used to change the size of the subject in the scene.

POWER ZOOM J-1

—for smooth and constant zooming

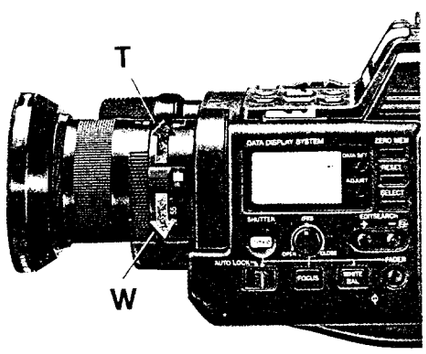
Press the "T" side of the power zoom button for telephoto (T) and the "W" side for wide-angle (W). The zoom ring will move automatically.

MANUAL ZOOM J-2

—to create a dramatic effect

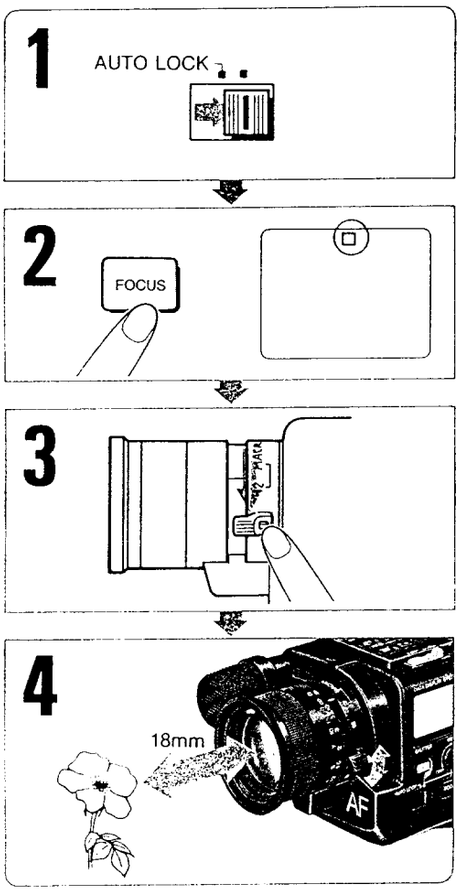
Turn the manual zoom lever upward for telephoto (T) and downward for wide-angle (W).

J-2



CLOSE-UPS (Macro) K

K



Use of the macro function allows the camera to approach the subject almost to the lens, so that even tiny objects can literally fill the screen for dramatic close-up effects.
Remove the lens hood before operation.

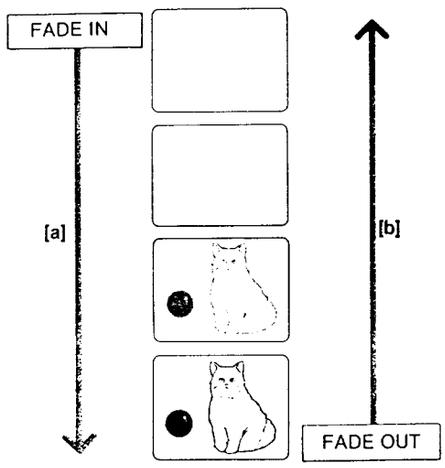
1 Set the AUTO LOCK switch to the right position (white mark).
2 Press the FOCUS button so that the white mark appears on the center top of the viewfinder screen.
3 While keeping the green macro set button pressed, turn the manual zoom lever to the MACRO position.
4 Focus by turning the manual zoom lever within the MACRO range.
The recorder can move to a subject as close as 18 mm (23/32 in.) from the lens surface.

NOTES ON MACRO SHOOTING

- When shooting in macro, the depth of field is very shallow, so pay attention to focus. To keep the subject in focus, use a tripod or monopod.
- Zooming is not possible during macro shooting. To change the size of the subject, move the video camera recorder closer or further away from it.
- Auto focusing does not function during macro shooting.
- When removing and attaching the lens hood, hold the focus ring.

FADE-IN AND FADE-OUT L-1

L-1

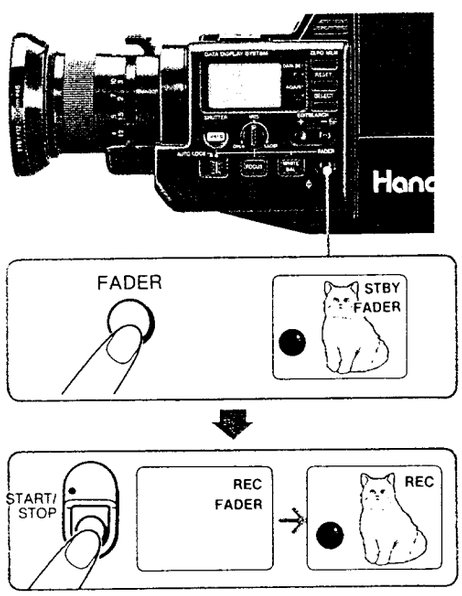


With fade-in, the picture and sound will appear gradually from a white, silent scene. **[a]**
With fade-out, the picture and sound will disappear gradually. **[b]**
Dramatic effects can be added by using fade-in at the beginning of a recording and fade-out at the end.

TO FADE IN L-2

1 Slide the STANDBY switch up to set the unit to recording pause mode.
2 Set the AUTO LOCK switch to the right position (white mark).
3 Press the FADER button.
4 Press the START/STOP button to start camera recording.
Fade-in will be performed.

L-2



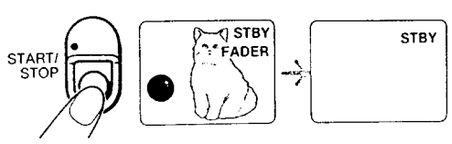
TO FADE OUT L-3

1 Set the AUTO LOCK switch to the right position (white mark).
2 Start camera recording.
3 Press the FADER button.
4 At the point where fade-out is to be started, press the START/STOP button.
Fade-out will be performed and then recording will stop.

To cancel FADER mode before fade-in or fade-out
Press the FADER button so that the FADER indication disappears.

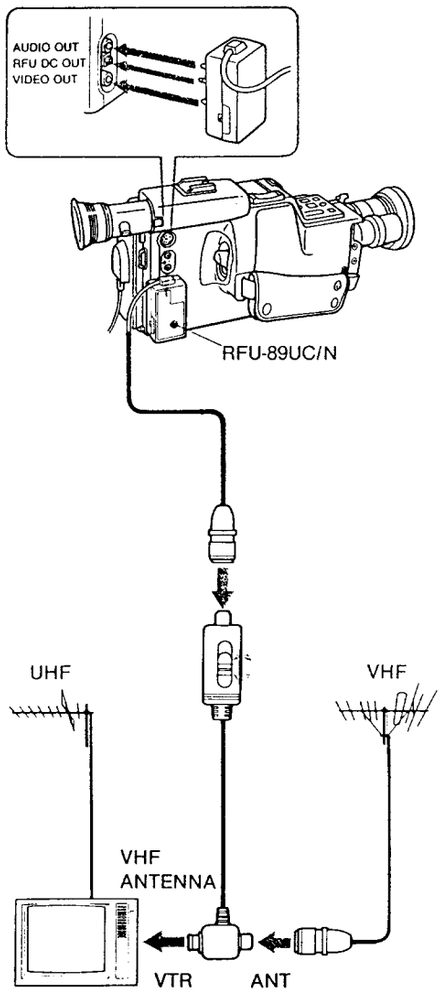
NOTES
- The FADER button does not function while the STBY indicator is blinking on the viewfinder screen immediately after the POWER switch has been set to CAMERA. Wait until the STBY indicator lights.
- The FADER mode is cancelled automatically once fade-in or fade-out has been performed.

L-3



PLAYBACK OF THE RECORDED TAPE

M-1



CONNECTING A TV

Connecting a TV without audio/video input connectors M-1

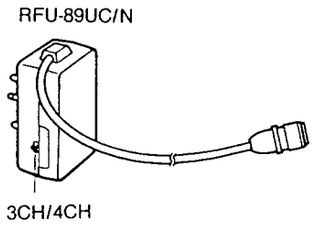
1 Connect the RFU-89UC/N RFU adaptor to the CCD-V9/V90.
2 Connect the VHF antenna, CCD-V9/V90 and TV to the antenna selector (supplied with the RFU-89UC/N).
Use a 75-ohm coaxial cable for antenna connection.
3 Set the selector switch on the antenna selector as follows:

For viewing a playback picture → VTR
For viewing TV programs → ANT

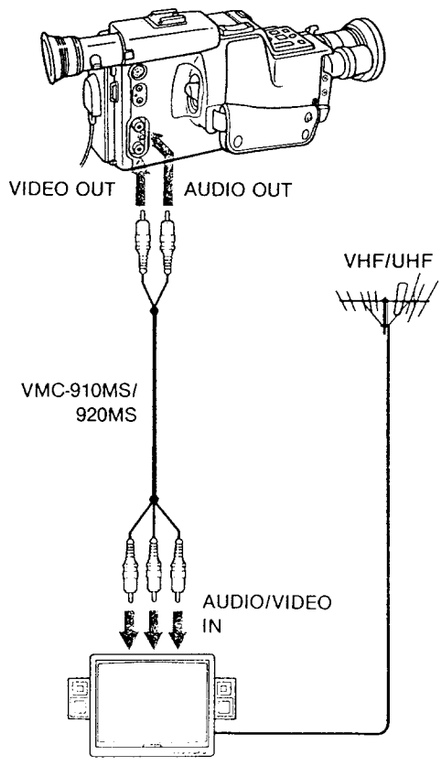
On the TV channel for the video camera recorder M-2

Whenever you view the playback picture, set the channel selector of the RFU-89UC/N to either VHF channel 3 CH or 4 CH and select the same channel on the TV.

M-2



M-3



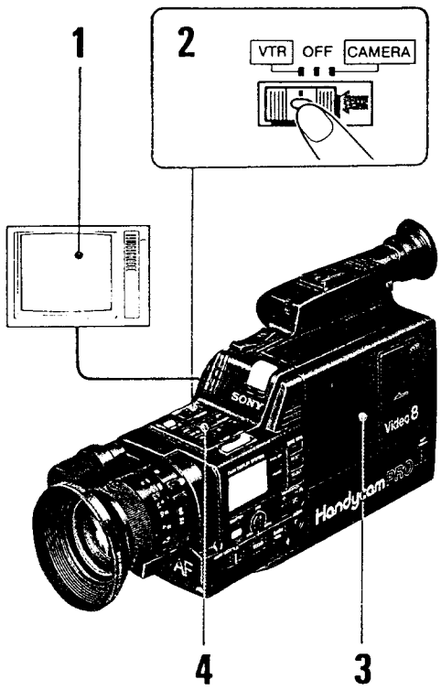
Connecting a TV (or Component TV) equipped with audio/video input connectors M-3

Leave the TV antenna cable connected to the TV.

1 Connect the CCD-V9/V90 to the TV using the optional VMC-910MS/920MS audio/video cable.
2 Set the TV/VIDEO selector button on the TV as follows:

For viewing a playback picture → VIDEO
For viewing TV programs → TV

M-4



TO PLAY BACK M-4

1 Turn on the TV or Component TV, and select the channel for the video camera recorder or set the TV/VIDEO select button to VIDEO.
2 Set the POWER switch to VTR.
3 Insert a cassette.
4 Press the ◁ button. Playback begins.

To stop playback, press the ■ button.

When the tape comes to its end, the unit is automatically set to stop mode.

VARIOUS PLAYBACK MODES

To obtain a still picture
Press the ❚❚ button during playback. To resume normal playback, press the ◁ button or press the ❚❚ button again.

When the pause mode lasts for more than approximately 7 minutes, the pause mode will be automatically released and the unit will be set in the stop mode.

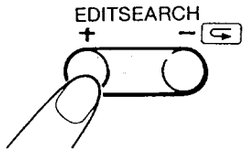
Frame-by-frame playback
Press the ◀❚❚ button in still picture mode.
If the ◀❚❚ button is kept depressed, a slow motion picture at 1/10 normal speed is obtained.
To resume normal playback, press the ◁ button.

To view the picture at high speed
Keep pressing the ◀◀ (fast-forward) or ▶▶ (rewind) button during playback. Release the button for normal playback.

To view the picture in fast-forward or rewind mode
Press the ◀◀ (fast-forward) button in fast-forward mode or press the ▶▶ (rewind) button in rewind mode. The picture is displayed while the button is kept pressed. Release the button to resume normal fast-forward or rewind mode.

NOTES
- Streaks will appear in high-speed playback mode. The sound will be muted in the still picture, frame-by-frame playback and high-speed playback modes.
- The playback picture quality of a tape recorded in LP mode is inferior to that of an SP-recorded tape. Streaks will appear in the still picture, frame-by-frame or slow playback modes for an LP-recorded tape.
- If the position of the POWER switch is changed during playback, the tape will stop.
- If the POWER switch is slid to CAMERA, the unit will be set to recording pause mode.

M-5



To adjust the frame-by-frame and slow playback pictures M-5

In slow playback mode, press the "+" or "–" side of the EDITSEARCH button until a clear picture is obtained.
Repeat adjusting until a still picture is displayed clearest.

To adjust the still picture

If the still picture appears to shake, press the "+" or "–" side of the EDITSEARCH button until the picture stabilizes.

NOTE

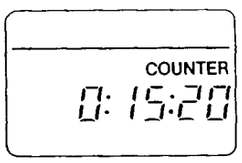
The adjustment is retained in memory as long as the lithium battery is installed. Readjustment is only required when the equipment used for playback is changed or when tapes recorded on other equipment are played back on this unit. The noise may not be eliminated completely when a tape recorded on other equipment is played back in still or slow picture mode.

USE OF THE TAPE COUNTER

During recording or when a tape recorded in the SP mode is played back, the digits on the counter indicate the actual recording or playback time. When a tape recorded in LP mode on another recorder is played back on this unit, the counter counts approximately half the actual playback time.

E.g. When the counter indicates "0:15:20" during playback of an LP-recorded tape, the tape was played back for approximately 30 minutes 40 seconds from the counter zero position. N-1

N-1



The counter reading is the same as above in rewind and fast-forward modes, and also in the display window on the optional RM-94 Remote Commander and RM-E100V editing controller.

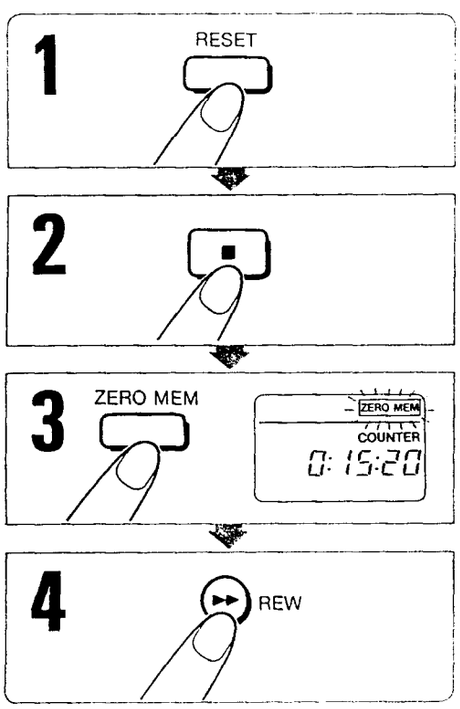
TO INDEX THE WHOLE TAPE

Press the RESET button at the beginning of the tape so that the counter shows "0:00:00". By noting the counter reading at a particular point, you can easily find that point later by referring to the tape counter.

NOTES
- The counter reading and the point of the tape may not correspond exactly.
- The counter also operates for a blank, unrecorded portion of a tape.
- There will be a time lag of several seconds on the counter reading after repeated fast-forward and rewind operations or after playing back in slow mode for a long time.

TO RETURN TO A PRE-REGISTERED POINT N-2

N-2



1 During recording or playback, press the RESET button at the point you later want to locate.
2 Press the ■ button when the recording or playback has finished.
3 Press the ZERO MEM button. The "ZERO MEM" indicator will blink in the display window.
4 Press the ▶▶ or ◀◀ button.
The tape will be rewound or sent forward and stop automatically when the counter reaches approximately zero.

NOTES
- The ZERO MEM button does not function during recording or playback mode.
- Be sure to press the ZERO MEM button when the tape is stopped.
- The ZERO MEM mode is cancelled automatically once the tape is rewound or sent forward to zero.

TV PROGRAM RECORDING

The following connections make both TV program viewing/recording and tape playback possible.

COMBINATION OF THE EQUIPMENTS TO BE USED

Connection example 1 (page 33)

VCR without input selector

+

TV without audio/video input jacks

+

CCD-V9/V90

Connection example 2 (page 34)

VCR with an input selector

+

TV without audio/video input jacks

+

CCD-V9/V90

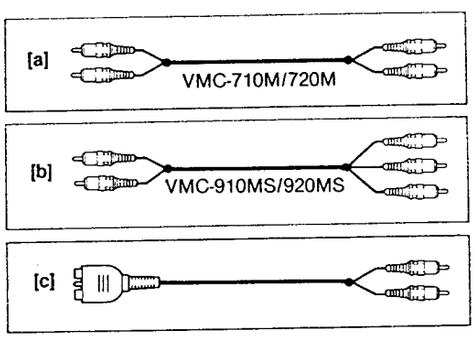
Connection example 3 (page 35)

TV tuner and Component TV or TV with audio/video input and output jacks

+

CCD-V9/V90

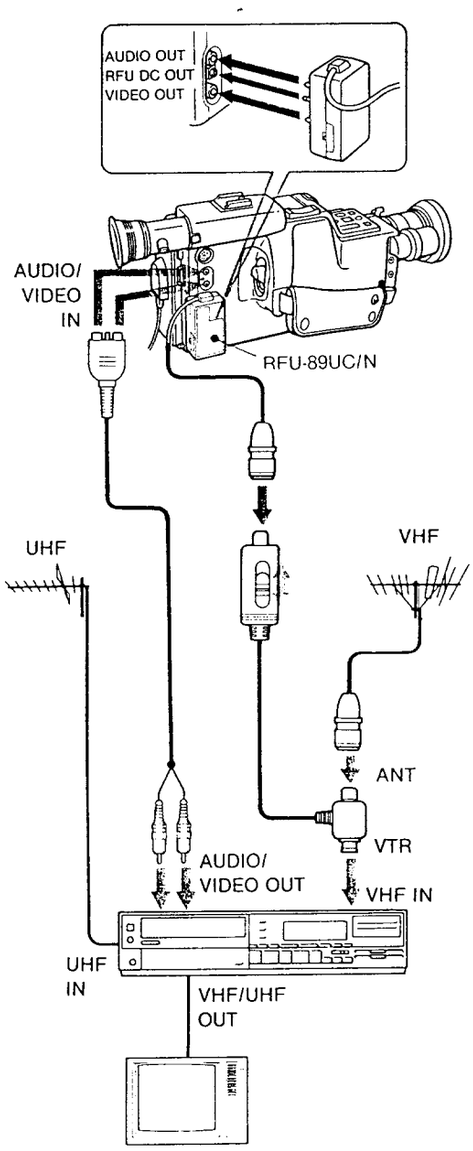
O-1



CONNECTING CABLES O-1

- For antenna cable connections, use 75-ohm coaxial cables.
- For video/audio connection, use the supplied or optional audio/video cable to match the connectors on the equipment to be connected.
  [a] VMC-710M/720M for monaural equipment
  [b] VMC-910MS/920MS for stereo equipment
  [c] Supplied audio/video cable for connection to the miniphono AUDIO IN/VIDEO IN jacks on the CCD-V9/V90

O-2



CONNECTION EXAMPLE 1 O-2

VCR without input selector

+

TV without audio/video input jacks

+

CCD-V9/V90

The RFU-89UC/N RFU adaptor is required.

Connections

1 Connect the equipments as shown in the illustration.
2 Select the channel selector of the RFU-89UC/N to either VHF channel 3 CH or 4 CH which is not active in your area.
3 Set the selector switch on the antenna selector as follows:

For viewing a playback picture or a picture being recorded on the CCD-V9/V90 → VTR For viewing TV programs or playback picture of the VCR → ANT

TV program recording

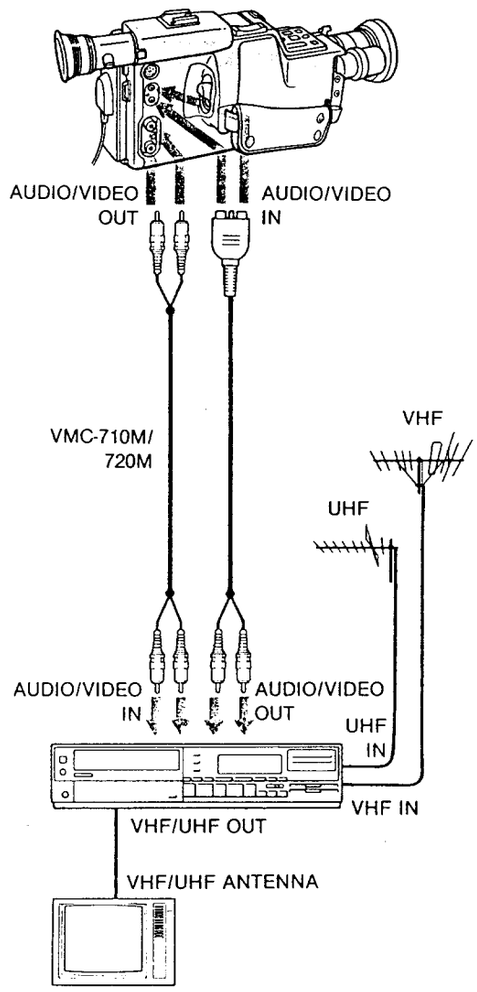
1 Turn on the VCR and TV.
2 Set the POWER switch on the CCD-V9/V90 to VTR.
3 Set the selector switch on the antenna selector to ANT and select the program position for the VCR on the TV.
4 Select the TV channel to be recorded on the VCR.
5 Insert a cassette into the CCD-V9/V90 and slide the REC ● switch.
Recording will start.

Playback

1 Turn on the TV.
2 Set the POWER switch on the CCD-V9/V90 to VTR.
3 Set the selector switch on the antenna selector to VTR and select the channel for the VCR on the TV.
4 Insert a cassette into the CCD-V9/V90 and press the button. Playback will start.

TO VIEW ANOTHER TV PROGRAM WHILE RECORDING
Set the TV/VTR select button on the VCR to TV and the selector switch on the antenna selector to ANT. Select the desired program on the TV.

O-3



CONNECTION EXAMPLE 2 Q-3

VCR with an input selector

+

TV without audio/video input jacks

+

CCD-V9/V90

Connections

Connect the equipments as shown in the illustration.

TV program recording

1 Turn on the VCR and TV.
2 Set the POWER switch on the CCD-V9/V90 to VTR.
3 Select the channel for the VCR on the TV.
4 Set the input selector to TUNER, the TV/VTR select button to VTR and select the TV channel to be recorded on the VCR.
5 Insert a cassette into the CCD-V9/V90 and slide the REC ● switch.
Recording will start.

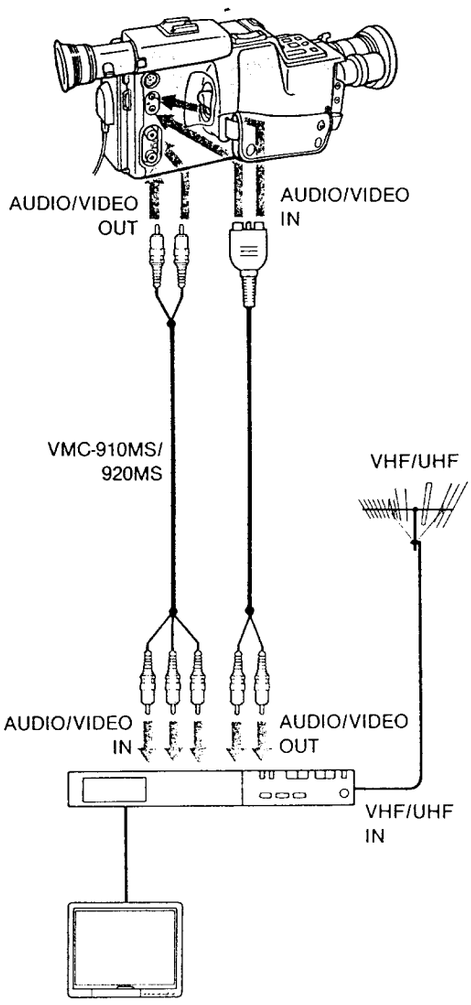
Playback

1 Turn on the VCR and TV.
2 Set the POWER switch on the CCD-V9/V90 to VTR.
3 Set the input selector on the VCR to LINE and select the channel for the VCR on the TV.
4 Insert a cassette into the CCD-V9/V90 and press the ◁ button. Playback will start.

TO VIEW ANOTHER TV PROGRAM WHILE RECORDING

Set the TV/VTR select button on the VCR to TV and select the desired program on the TV.

O-4



CONNECTION EXAMPLE 3 O-4

TV tuner and Component TV or TV with audio/video input and output jacks

+

CCD-V9/V90

Connections
Connect the equipments as shown in the illustration.

TV program recording
1 Turn on the TV tuner or TV.
2 Set the POWER switch on the CCD-V9/V90 to VTR.
3 Set the input selector on the TV tuner or TV to TV and select the TV channel to be recorded.
4 Insert a cassette into the CCD-V9/V90 and slide the REC ● switch.
Recording will start.

Playback
1 Turn on the TV tuner or TV.
2 Set the POWER switch on the CCD-V9/V90 to VTR.
3 Set the input selector on the TV tuner or TV to VIDEO.
4 Insert a cassette into the CCD-V9/V90 and press the ◁ button. Playback will start.

TO STOP THE TAPE MOMENTARILY
Press the ❚❚ button. The TV program can be seen on the TV but the picture will not be recorded.
To resume recording, press the ❚❚ button again.
When the recording pause mode lasts for approximately 7 minutes, the pause mode will be automatically released and the unit will be set in the stop mode.

EDITING

To edit a home movie tape, you will need another VCR or another video camera recorder.

TO EDIT FROM ANOTHER VCR TO THE CCD-V9 P-1

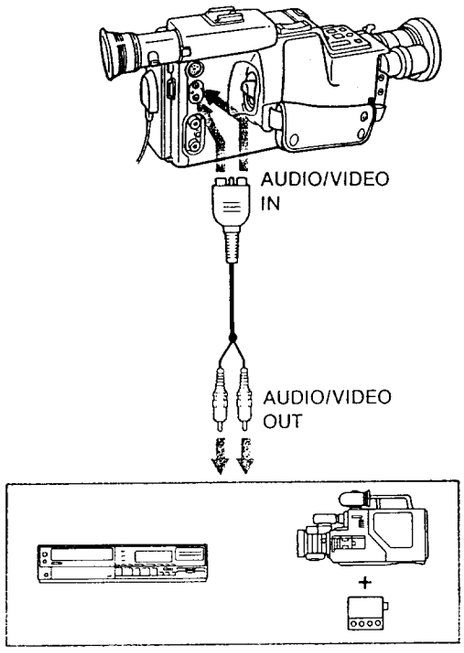
1 Set the POWER switch on the CCD-V9/V90 to VTR.
2 Start playback on another VCR.
3 Start recording on the CCD-V9/V90.

TO EDIT FROM THE CCD-V9 TO ANOTHER VCR P-2

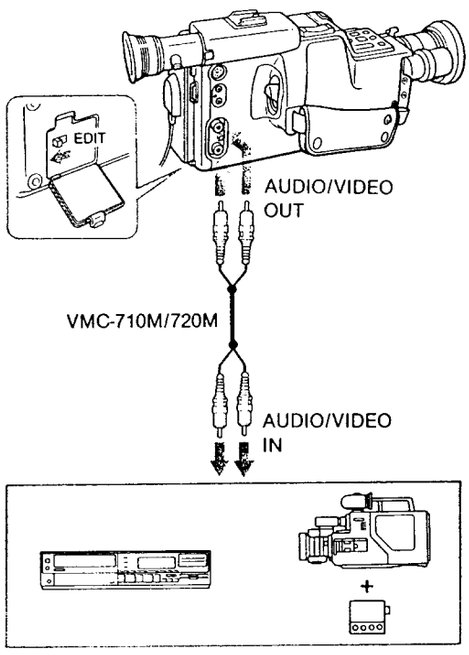
1 Set the POWER switch on the CCD-V9/V90 to VTR.
2 Slide the EDIT switch in the lithium battery compartment in the arrow direction ("EDIT" position).
3 Start playback on the CCD-V9/V90.
4 Start recording on the other VCR.

The optional RM-E100/E100V video editing controller allows easier editing between two VCRs.

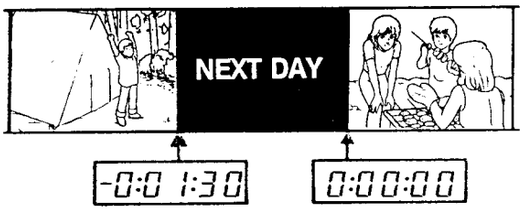
P-1



P-2



Q-1



INSERT RECORDING

You can insert (record) video and audio simultaneously from the camera, a TV or a VCR onto any recorded tape. Q-1

PREPARATION

Connect the necessary equipment and prepare a program source to be inserted. For details, refer to the corresponding page.

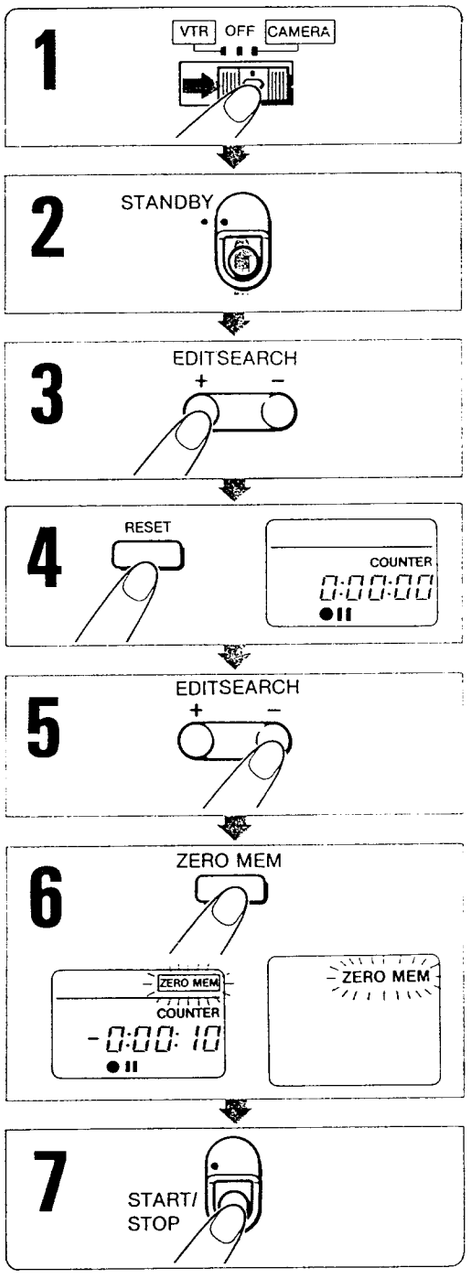
To insert camera recording [page 14]

To insert a TV program [page 32]

To insert a program from another VCR [page 36]

Note
For insert recording, use SP-recorded tapes. LP-recorded tapes cannot be used.

Q-2



TO INSERT CAMERA RECORDING Q-2

Monitor the picture being inserted on the viewfinder screen.

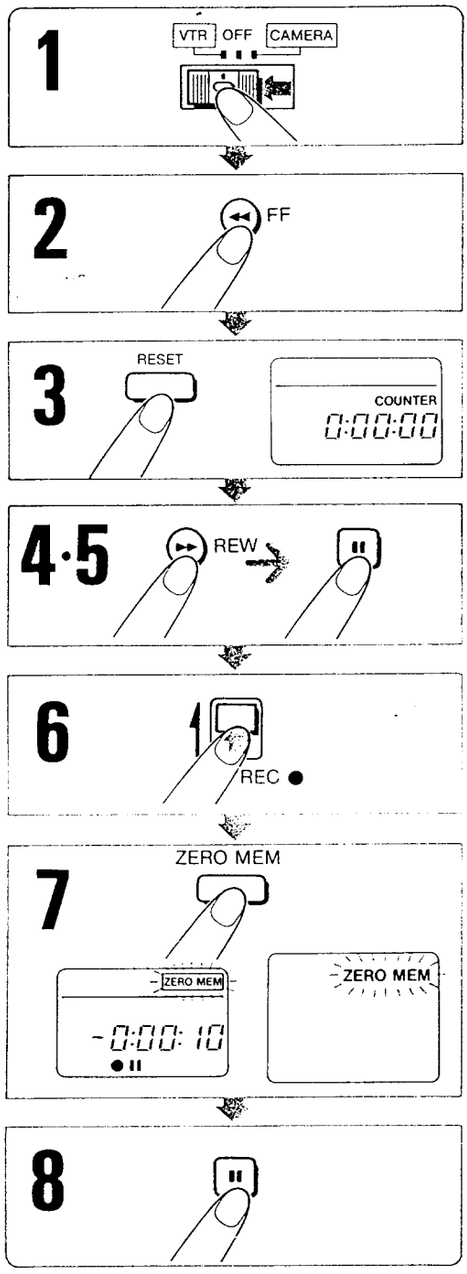
1 Set the POWER switch to CAMERA.
2 Slide the STANDBY switch up to set the unit to recording pause mode.
3 Keep pressing the "+" or "–" side of the EDITSEARCH button and release the button at the point where the insert should end.
The unit will be set to recording pause mode.
4 Display the counter in the display window and press the RESET button.
The counter is reset to zero.
5 Keep pressing the "–" side of the EDITSEARCH button and release the button at the point where the insert should begin.
6 Press the ZERO MEM button.
The insert ending point is stored in memory.
7 Press the START/STOP button.
Insert recording will begin.

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

To cancel ZERO MEM mode, press the ZERO MEM button so that the ZERO MEM indicator disappears.

To insert the date or time
Follow steps 1 through 6 above, press the SELECT button to display the date or time indication on the viewfinder screen and then press the START/STOP button.

Q-3



TO INSERT A TV PROGRAM OR A PROGRAM FROM ANOTHER VCR Q-3

Monitor the picture being inserted on the viewfinder screen.

1 Set the POWER switch to VTR.
2 Locate the point on the tape where the insert should end by pressing the ◀◀ button during playback.
3 Display the counter in the display window and press the RESET button.
The counter is reset to zero.
4 Press the ▶▶ button during playback to rewind the tape a little further than the point where the insert should begin.
5 Release the ▶▶ button to resume playback and press the ❚❚ button at the insert starting point.
6 Slide the REC ● switch in the arrow direction to set the unit to recording pause mode.
7 Press the ZERO MEM button.
The insert ending point is stored in memory.
8 To start recording, press the ❚❚ button.

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

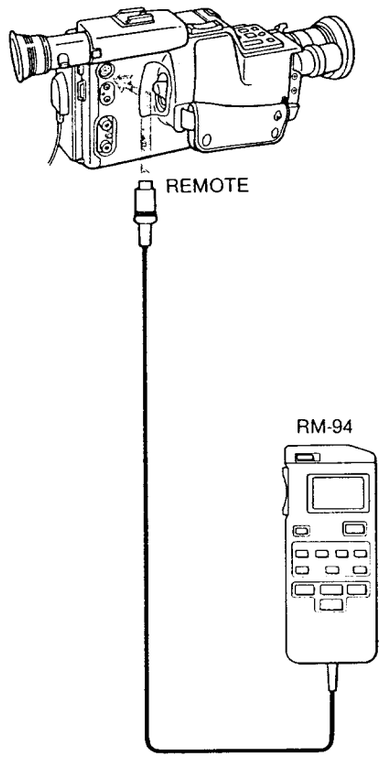
To cancel ZERO MEM mode, press the ZERO MEM button so that the ZERO MEM indicator disappears.

NOTES ON ZERO MEM MODE
ZERO MEM mode is cancelled automatically in the following cases.
- When an insert recording is completed.
- When the ■ or ◁ button is pressed or the tape is sent forward or rewound in fast-forward or rewind mode.
- When the position of the POWER switch is changed.
- When the power is turned off.
- When the cassette is ejected.

To restore it, press the ZERO MEM button again.

NOTES
- When recording pause mode lasts for approximately 7 minutes, pause mode will be automatically released and the unit will be set to stop mode.
- When the inserted tape is played back, the picture may be distorted at the end of the inserted program.

R



With an optional RM-94 Remote Commander*, you can operate the CCD-V9/V90 video camera recorder from a distance.

For details on operation, see the instruction manual provided with the Remote Commander.

NOTES
- To view the last scene of the recording, press either the REC REVIEW or EDITSEARCH button on the RM-94.
- The fade-in and fade-out cannot be operated with the Remote Commander.

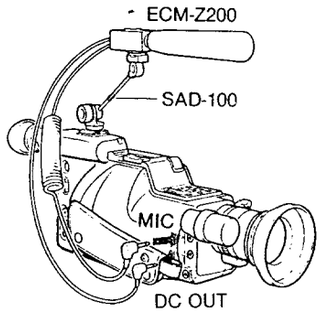
USING THE RM-84

The optional RM-84 Remote Commander can also be used with this unit.
- To turn the CCD-V9/V90 on and off with the RM-84, first set the POWER switch on the CCD-V9/V90 to CAMERA or VTR as required, and press the VTR POWER button on the RM-84.
  The CAMERA POWER button on the RM-84 does not function with the CCD-V9/V90.
- To start and stop camera recording with the RM-84, keep the STANDBY switch on the CCD-V9/V90 in the upper STANDBY position.
- When the POWER switch is set to CAMERA on the CCD-V9/V90, both the CAMERA POWER and VTR POWER lamps light on the RM-84. This is not a problem.

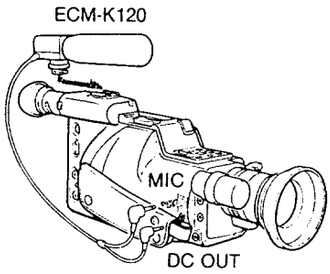
*Available in near future.

USE OF AN EXTERNAL MICROPHONE

S-1



S-2



The built-in microphone picks up sounds equally from all directions (omni-directional, monaural type).
By using an optional microphone ECM-Z200, ECM-K120, etc., you can enjoy more efficient audio recording.

ECM-Z200 S-1
This microphone can zoom the sound as the lever is slid.
For attachment, the optional SAD-100 external microphone shoe is required.

ECM-K120 S-2
This microphone can pick up sound in three zones and switch from zone to zone as the selector is set.
Attach the microphone directly to the CCD-V9/V90.

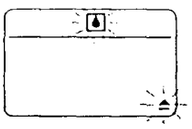
NOTE
The built-in microphone will not operate when an optional microphone is connected to the MIC jack.

NOTES ON MOISTURE CONDENSATION

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

If moisture is present inside the recorder section T-1

T-1



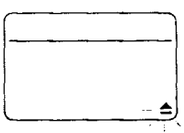
When the power is turned on, the DEW indicator blinks in the viewfinder and the 💧 indicator blinks in the display window. No function button except the EJECT switch will work.

Eject the cassette if present, and turn off the unit and let it sit with the cassette compartment open (at least for one hour).

The unit can be used again if none of the DEW and 💧 indicators appears when the power is turned on again.

If moisture is present on the surface of the tape T-2

T-2



When the tape is inserted and a tape transport button is pressed, the ⏏ indicator blinks in the display window. No function button except the EJECT switch will work.

Eject the cassette and let the unit and the cassette sit at least for one hour.

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

If moisture is present on the lens

There are no caution indicator, but the lens becomes dim. Turn off the power and leave the unit unused at least for one hour.

PRECAUTIONS

OPERATION

- Operate the unit on 6–7.5V DC.
- For DC or AC operation, use the accessories recommended in this manual.
- Should any solid object or liquid fall into the cabinet, unplug the unit and have it checked by qualified personnel before operating it any further.
- Do not hold the unit by the viewfinder.
- Avoid rough handling or mechanical shock to the unit. Be particularly careful of the lens.
- Do not apply excessive force to the microphone.
- Do not let the sun shine directly into the eyecup of the viewfinder, because the plastic inside the viewfinder may be damaged.
- Avoid shooting the same object or a very bright object such as the sun or a light source for a long period of time (for example, as a lookout camera), as this will damage the color filter inside the camera.
- Remove and store video cassettes after recording or playback.
- Do not wrap up the unit and operate it because heat may build up internally.
- Avoid using and storing the recorder in the following locations.
  —Locations susceptible to vibration.
  —Locations exposed to strong magnetic fields.
  —Locations near TV or radio transmitters where strong radio waves are generated.
- Do not put the unit on the sand.

CARE

- Store cassettes in their cases and keep them in an upright position to prevent intrusion of dust and uneven winding.
- When the unit will not be used for a long period of time, periodically turn on the power, operate the camera section and recorder section and play back a tape for about three minutes.
- Clean the lens with a soft brush to remove dust. If there are fingerprints on the lens, remove them with a soft cloth. Clean the recorder 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.
  For protection, keep the lens cap on the lens when not using the camera.

USING YOUR RECORDER ABROAD

Each country has special TV color broadcast and electricity systems. Before using your recorder abroad, check the following points.

Differences in color systems
If you prepare fully charged battery packs and the AC-V33 AC power adaptor which can be used in all areas with the local power supply of 100 V–240 V, you can use your recorder in any country. You can monitor the playback picture on the viewfinder screen. However, to monitor the playback picture on a TV, the TV must be based on the NTSC system and equipped with video/audio inputs.

NTSC system countries
Bahama Islands, Canada, Central America, Japan, Korea, Mexico, Taiwan, the Philippines, U.S.A., etc.

PAL system countries
Australia, Austria, Belgium, China, Denmark, Finland, Great Britain, Holland, Hong Kong, Italy, Kuwait, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, West Germany, etc.

SECAM system countries
Bulgaria, France, Hungary, Iran, Iraq, Monaco, Poland, the Soviet Union, etc.

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
Usable cassette	8 mm video format cassette
Tape speed	SP: Approx. 1.43 cm/sec. LP: Approx. 0.72 cm/sec. (playback only)
Recording or playback time	SP: 2 hours (P6–120) LP: 4 hours (P6–120) (playback only)
Fast forward time	Approx. 6 min. 30 sec. (P6-120)
Image device	CCD (Charge Coupled Device)
Viewfinder	Electric viewfinder (0.7" black and white)
Lens	Combined 6 × power zoom lens f = 12–72 mm, F1.6 with macro Filter diameter: 46 mm
Auto focus system	TCL
Color temperature	Preset values OUTDOOR: 5,800 K INDOOR: 3,200 K Auto: From the light at a tungsten lamp to the light on a slightly overcast day.
Minimum illumination	5 lux
Illumination range	5 lux–100,000 lux (0.46–9,294 footcandles)
Recommended illumination	More than 100 lux (9.3 footcandles)
Aperture correction	Automatic, manual (variable)

Input and output connector

Output jacks	Video output: phono 1 Vp-p, 75 ohms unbalanced, sync negative Audio output: phono −10 dBs, at output impedance less than 2.2 kilohms
Input jacks	Video input: miniphono 1 Vp-p, 75 ohms unbalanced, sync negative Audio input: miniphono −10 dBs, input impedance more than 47 kilohms
Earphone jack	Minijack, 8-ohm impedance
Remote connector	5-pin connector
MIC jack	Minijack, −66 dBs, low impedance With 2.5–3 V DC output, impedance 6.8 kilohms
Microphone power output jack	Special minijack, 5 V DC

Display in the viewfinder

Mode indication	REC/STBY/OUTDOOR/INDOOR/FADER/shutter speed
Caution indication	BATTERY/DEW/TAPE END/CAUTION/CASSETTE
Date or time indication	Small 8 characters Date: From Jan. 1, 1987 to Dec. 31, 2015 Time: 12 hour cycle
Clock	Crystal lock
Memory back-up	Approx. 2 years using the CR2025 lithium battery

General

Power requirements	6 V DC
Power consumption	6.2W (camera recording) including the viewfinder
Installation	Horizontally, vertically
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. 99 × 136 × 330 mm (w/h/d) (4 × 5⅜ × 13 in.)
Weight	Approx. 1.1 kg (2 lb 7 oz) excluding the battery and cassette Approx. 1.3 kg (2 lb 14 oz) including the NP-55 battery and cassette
Microphone	Electret condenser microphone, omni-directional monaural type

Accessories supplied

Lithium battery (1)
Connecting cable (miniphono to 2 phono) (1)
Lens cap (1)

Optional accessories

Battery pack NP-55, NP-77
AC power adaptor AC-V55
Car battery cord DCC-16AW
Battery adaptor NPA-55
RFU adaptor RFU-89UC/N
Connecting cable VMC-910MS/920MS (2 phono to 3 phono), VMC-710M/720M (2 phono to 2 phono)
Microphone ECM-Z200, ECM-K120
External microphone shoe SAD-100
Remote Commander RM-94, RM-84

Design and specifications are subject to change without notice.

TROUBLESHOOTING

If you think you have a problem, double-check before calling the serviceman.
You may have overlooked something relatively simple!

Symptom	Cause	Procedure
The power will not turn on.	The POWER switch on the AC power adaptor is set to OFF.	Depress the POWER switch.
The START/STOP button does not operate.	The tape is affixed to the drum.	Remove the cassette with the EJECT switch.
	The tape is at its end.	Rewind the tape or use a new one.
	The POWER switch is set to VTR or OFF.	Set it to CAMERA.
	The tab on the cassette is out (red).	Use a new cassette or slide the tab.
The tape does not move by pressing a tape transport button.	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.
Recording cannot be done even when the REC ● switch is slid.	The tab on the cassette is out (red).	Use a new cassette or slide the tab in.
Recording stops suddenly.	The ZERO MEM mode is set.	Press the ZERO MEM button.
The power turns off.	While being operated in the CAMERA mode, the recorder has been in the pause mode for more than 7 minutes.	Set the POWER switch to OFF and then to CAMERA.
	The battery is exhausted.	Use a charged battery.
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 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 auto focusing function does not work.	The AUTO LOCK switch is set to the white mark position.	Set it to the green mark position.
	Shooting conditions are not suitable for auto focusing operation.	Focus manually. (See page 19.)
The auto white balance function does not work.	The white balance sensor is covered.	Remove the obstacle.
	Shooting conditions are not suitable for the auto white balance operation.	Adjust the white balance manually. (See page 21.)
The cassette cannot be removed from the compartment.	The battery is exhausted.	Use the charged battery or the AC power adaptor.

Symptom	Cause	Procedure
The image on the viewfinder screen is not clear.	The viewfinder lens is not adjusted.	Adjust the viewfinder lens. (See page 11.)
The playback picture is not clear.	The EDIT switch is set to the "EDIT" position.	Set the EDIT switch to the opposite position to the arrow direction.
	The channel for the VCR is not adjusted correctly on the TV.	Adjust the TV. (See page 27.)
	The video heads may be contaminated.	Clean the heads using a cleaning cassette.

HINTS FOR BETTER SHOOTING

The key to success—
practice makes perfect!

Record over and over using the same tape...
see what you've recorded on TV as soon as you're finished...
these are just two of the advantages of video recording.
The more you use your recorder, the more professional you'll become.
In this section, we'd like to introduce some basic techniques
to help bring more enjoyment to your video recording.

A

Getting stable pictures — starts with a correct stance

For hand-held shots, shooting position is the key.
Using three basic positions as a reference, practice shooting positions until you find the stance which provides the easiest shooting and best results. A

Basic shooting positions

- When kneeling, placing one knee on the ground provides the best stability.
- Place the eye firmly against the viewfinder eyecup.
- For hand-held shots, support the video camera recorder with your left hand and assume a comfortable, stable position. Make sure the unit does not move.
- Relax your shoulders.
- Put your right elbow firmly against your side to help stabilize the video camera recorder.
- If you are going to move the unit while recording, keep both eyes open as much as possible.
- Stand firmly with your feet comfortably apart. Leaning against something firm such as a wall or tree will also provide extra stability.

Use a tripod or monopod if possible

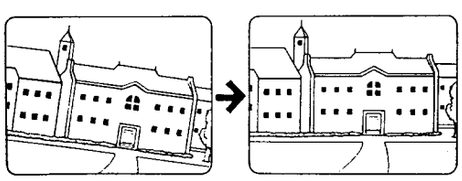
If you have a tripod for your still camera, it can also be used with the video camera recorder. Use a sturdy one.
If a tripod is not available, try placing the camera on a tabletop, wall, or any other flat surface of suitable height.

Keeping the horizontal plane level

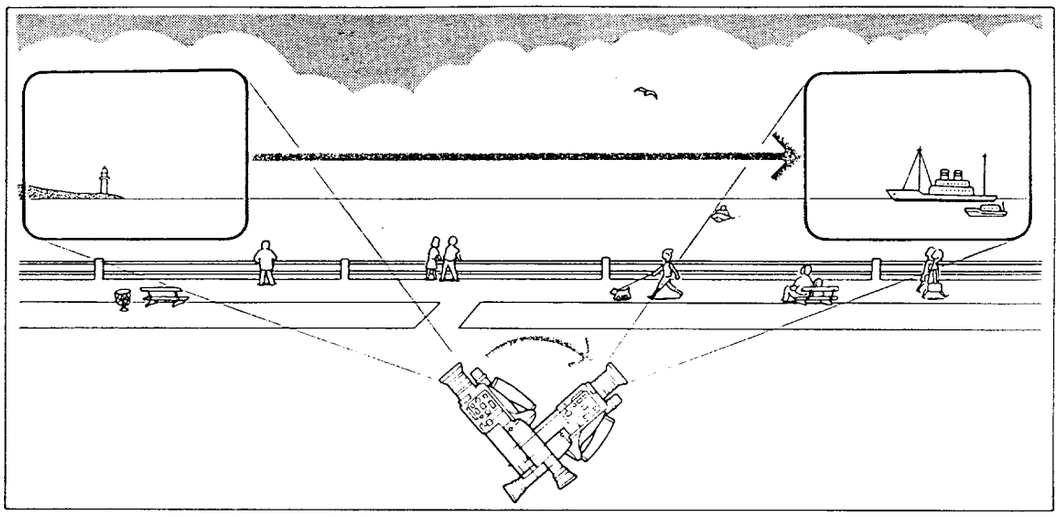
Even if camera work is smooth and stable, shots can be tilted or off axis horizontally.

The horizontal plane can be easily determined by using the viewfinder frame as a reference. B

B



C



Three frequently used shots

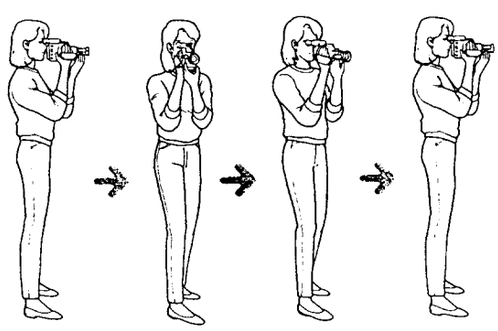
These three types of shots will bring additional action and movement to your scenes when properly used.
For greatest effect, it is advisable that they not be overused.

Panning—moving the camera horizontally C

For emphasizing the grandeur of a scene, and for including all of the scenery in a single continuous shot.

- Hold the recorder on the scene for a few seconds at the beginning and end of the pan.
- Pan slowly across the scene. (Stop at about 90°.)

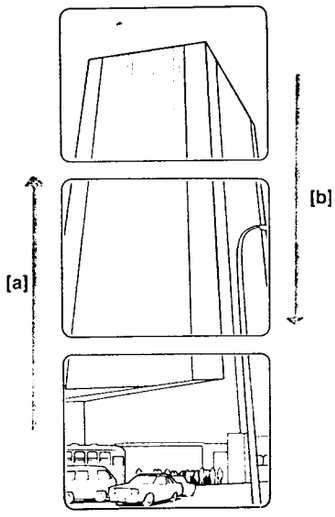
D



For professional-looking pans D

1 First, stand so that you face in the direction where the pan will end.
2 Without moving your feet, rotate your upper body so that your recorder faces the direction where the scene will begin.
3 Start shooting. Rotate your body slowly to the point where the pan will stop.

E



F

G

The best panning speed is one that will allow you to explain the scene during playback.

Repeated pans of the same scene should be avoided.

If you can hold your breath during panning and zooming, camera shake can be minimized, and you can concentrate more easily on the scene.

Tilting—moving the camera vertically E

To emphasize height....tilt up. **[a]**

To emphasize the final part of the scene...tilt down. **[b]**

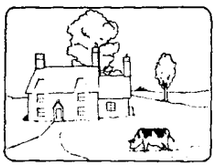
Tilting shots with the video camera recorder should be slightly faster than pans.

Zooming—changing the size of the subject

To draw attention to something specific ...zoom in. F
Because telephoto shots make camera shake more noticeable, the recorder should be as stable as possible.

To end the shot by making the circumstances surrounding the scene understood...zoom out. G

H

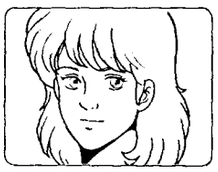


Sizing the scene
—mixing long, medium and close-up shots

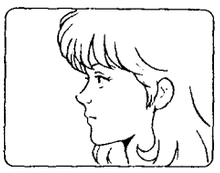
Continuous use of long shots or close-ups will give your productions a monotonous "flat" impression. To avoid this, it is important to consider exactly what it is that you wish to "say" with every shot. Indeed, it is possible to change the impression that any subject makes merely by changing the way it's shot. H
You don't have to change the subject to alter the scene—you can achieve a different effect by changing the size of the subject itself within the scene.

I

[a-1]

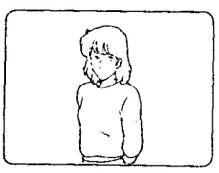


[a-2]

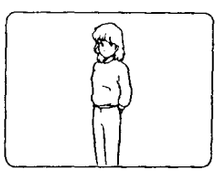


[b]

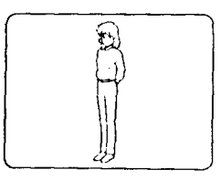
[c]



[d]



[e]



Framing people

Basic shots for properly framing people are shown left. I
Experience has shown that shots that frame people differently than this do not have as pleasant an effect.

[a-1] Face shot
Even if you cut off the hairline, don't cut off the chin.
[a-2] Face shot
When shooting a profile, leave the space in front of the face to create a "sight line."
[b] Bust shot—Chest and above
[c] Waist shot—Upper hips and above
[d] Knee shot—Knees and above
[e] Full shot—Entire body

Scene length
—not too long, not too short

While there's no hard-and-fast rule, it is generally advisable to make each scene 6–7 seconds in length for easier viewing.
A succession of short scenes can tire the viewer, while long, single scenes can become boring.

Cutting according to the narration

Cut the scene when the narration is finished.

Cutting according to the subject

- Make long shots longer...and close-ups shorter.
  Because long shots have more to see in them than close-ups, show them longer so the viewer may understand what's there.
- Make interesting shots and shots in which the subject is constantly moving longer.
- Make static shots shorter

Shoot as if you were watching the playback.
That is, it's helpful to occasionally imagine your commentary of the scene even as you're shooting it!

LIGHTING FOR INDOOR SHOOTING

Lighting—For the sharpest pictures, you need the best light

For the most brilliant color in your scenes, a sufficient light level must be maintained. If shooting is done indoors or under other circumstances where light is insufficient, lights must be used for best results.

What kind of light is best? Choosing the right lights

Photography lamps or halogen lamps are recommended. For best results, use of the Sony HVL-50DA and HVL-150 video lights are recommended as their weight and low heat output levels allow safe, direct connection to the camera.

For lighting of a wide area for easy use—
reflector flood light

To emphasize the subject—use a reflector spotlight.

Lighting the subject

The number of lights and their angle to the subject can make a significant difference in lighting effectiveness.

With a single light:

Locate it above and to one side of the subject. With just one light, contrast is unavoidably enhanced.

To eliminate shadows, another light should be added.

With two lights:

Locate one light above and to one side of the subject, and the second to the side of the subject in such a position that the shadows are eliminated.

If contrast is too strong when lights are used, point a light at the ceiling or reflect it off a sheet of white paper to add soft fill-in light.

Precautions for using lights

- Do not point the light at the recorder body. Instead, make sure that it is pointed parallel to the camera or away from it. Be especially careful with lights attached to the accessory shoe. The high heat from the lights pointed at the camera body can warp the cabinet.
- Lights weighing over 500 g (1 lb.), or floodlights (lights with wide dispersion) must not be attached to the accessory shoe, as the heat from the light will warp the cabinet. Use of a special light stand is recommended.
- Lights become extremely hot during use—do not touch them!
- Do not mix different types of light, as light color temperatures vary and can cause the subject's color to be recorded incorrectly.

For detailed instructions on proper use of lights, carefully read the instruction manuals that accompany them.

J

In video, organization is the key

To make a first-class production, it is important to decide the contents and shooting sequence in advance. The first step is to sketch out a simple outline of the actual production based on the time-tested "five W's of journalism" (who, what, where, when, why, how). This will allow you to efficiently and effectively record the many exciting events that happen around you, such as sports matches, graduations, birthday parties, picnics, camping trips, and other special events.

Write a script of what you want to record

After the theme has been decided, think about the progression of the scenes and write down the major points of the "story flow" on paper. This is called a scenario. When writing the script, it is helpful to scout the location where shooting will take place, and, in the event of school activities or weddings, to obtain a copy of the program in advance, if possible. This will allow you to complete actual recording with a minimum of bother.

Typical scenario J

The following items show the points to be mentioned and some notes for making a scenario.

[a]
- Recording time
- Camerawork
- SE (Sound Effect)—Background music and sound effects

[b] Simple outline sketches in a TV frame

[c] Scene progression and narration

UNDERSTANDING LIGHT AND COLOR

Brightness levels

The single greatest influence on picture quality is the brightness level. Using the following chart as a reference, take a few minutes to familiarize yourself with brightness levels to improve your recording.

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

When to use an ND filter

Exceptionally bright scenes such as sunny days at the beach in summer or on snow fields in winter will look "washed out" when recorded. To make these scenes recorded naturally, an ND filter is required. (Refer to the chart)
Three types are available—ND2, ND4, ND8—which reduce the exposure level to 1/2, 1/4, and 1/8, respectively.
Select filters to match the lens diameter of 46 mm.

Color temperature—how it effects white balance adjustment

If the temperature of an object continues to increase, it will eventually begin giving off light. At this time, there is a fixed relationship between the object's temperature and its "light color." The temperature of the object radiating the light is expressed in absolute temperature (K). This is also known as the color temperature, which in turn stands for "light color." As color temperature increases, the light color changes from red to yellow to white to blue.

Natural light color temperature (K)	Color change	Artificial light color temperature (K)
Clear sky Slightly overcast	10,000(K)	10,000(K)
	8,000	8,000
Cloudy, rainy	7,000 Blue	7,000
	6,000	6,000 Fluorescent lamp (clear)
	5,000	5,000
Direct sunlight 2 hr.		Fluorescent lamp (white)
1 hr.	4,000 White	4,000
	3,500	3,500 Fluorescent lamp (off white) Studio lamp Halogen lamp
40 min.	3,200	3,200
Time after sunrise/ before sunset	3,000	3,000
	Yellow	Tungsten lamp
	2,500	2,500
30 min.		
20 min.		
	2,000 Red	2,000
Sunrise/sunset		Candle light

CHECK LIST BEFORE RECORDING

To make sure you don't miss those "once in a lifetime" scenes, go over the following check list and make the necessary preparations.

Required for recording

CCD-V9/V90

Battery pack NP-55 or NP-77
Is it charged?
Are there enough battery packs to cover the planned recording time?

Cassette tapes
Have you prepared enough tapes to cover the planned recording time?

Convenient accessories

Carrying case LCH-V50

Shoulder strap BLT-30, BLT-50 or BLT-80

Tripod
Required for scenes in which stability of the camera is important. Tripod mount screw must match the receptacle mount.

AC power adaptor AC-V33
Used to operate the video camera recorder on house current and to charge battery packs

RFU adaptor RFU-89UC/N
Adaptor for connection to a TV which is not equipped with video/audio inputs.

External microphone ECM-Z200
Zoom microphone to allow variable recording field according to camera zooming

External microphone shoe SAD-100
Attaches a microphone directly to the unit for trouble-free recording.

Video light HVL-50DA or HVL-150
Required for recording in low light situations.

Earphone (miniplug) Permits monitoring of audio signal during recording.

Viewfinder adaptor VFA-50
Convenient for low-angle shooting

Close-up lens kit VF-150K
Convenient for zooming during macro shooting