

OPERATION MANUAL
nac HIGH SPEED VIDEO SYSTEM
HSV-500

JUN. 1993

nac Incorporated

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PREFACE

This operation manual describes how to make full use of the NAC High Speed System Model HSV-500.

Please read through this manual before using the system to understand the functions of the HSV-500 fully.

SAFETY

Be sure about the following safety precautions when using the system. They are indicated as symbols or warnings where maximum care must be taken in handling the system.

DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. This sign is also placed where the equipment connected to this system would be likely to be damaged.



- o Safety alert symbol
This symbol invites attention to the matter or operation harmful to the user. Be sure about the directions following the symbol when using the system.



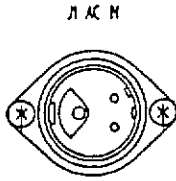
- o High voltage warning symbol
This symbol is placed where no touching is permitted because of the presence of a dangerous high voltage.



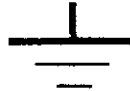
- o Grounding terminal symbol
This symbol indicates grounding terminals for protection. Be sure that these terminals are grounded, or it will be dangerous around this system especially its metallic portions. This grounding is also effective in reducing the noise occurring to the signal lines.

PRECAUTIONS IN OPERATING THE SYSTEM

Input Voltage Check



The input power to the system is to be connected to the J1 AC IN connector on the POWER SUPPLY (PS) panel in the lower part of the VCR rear panel. Before connecting the AC plug, make sure that the wall socket supplies stable voltage which meets J1 AC IN specification.



Be sure to connect the ground wire of the 3P-2P conversion plug, if used, to the external ground terminal.

Warnings about the High Voltage

Do not operate the system with its case open. Do not touch any part of the system with wet hands. The HSV-500 system runs on the specified voltage, 50/60 Hz. While most of its internal circuits operate on low DC voltage, high voltage exceeding the line voltage is generated in some parts.

Environmental Conditions

- o The ambient temperature and humidity should be 0° to +40°C and 30 to 80% RH respectively.
- o Avoid using the system in or near soot, corrosive gas, strong magnetic fields or strong vibrations.
- o Do not place the system in environments exposed to direct sunshine, rain or salt water.
- o Do not use the system in dusty or dirty environment for long time.
- o Do not obstruct the ventilation slots to avoid overheating inside. (Do not place any objects close to the ventilation slots.)

HANDLING OF CAMERA

When the C mount cap is removed, the interior is exposed. Do not place fingers or anything inside, or the optical system place may be damaged or become dirty, in this case the picture would be affected. The camera should be handled with care at all times.



WARNING

CAUTION: The shutter knob on the front panel of the camera rotates at high speed during shuttered recording. Be sure to close the cover for safety during operation.

HANDLING OF VCR

The VCR's stage opens to insert or remove a video cassette.

Do not put your hand deeply into the opening or insert a metallic object into it or bring a magnetic object near it.

Always keep the stage closed except when inserting or removing a cassette.

Remove the cassette before turning off power.

Do not use the VCR in environments exposed to dust, ash, or high humidity for prolonged periods.

If the VCR is moved from a cold to a hot environment, condensation will be produced. Do not use the VCR with condensation. Otherwise, the head and tape may be damaged.

The air filter at the bottom of the VCR will be soiled because it collects dust from around. If it is choked, there will be no filtration, and this will lead to a fault due to poor ventilation. Remove and clean the air filter periodically.

CONDENSATION

When hot moist air touches a cool surface of an object, water vapour condenses upon it. (You can recognize this phenomenon by dew on the surface of window glasses of a warm room in the winter, dew on the outside surface of a glass containing icy water in it, etc.) This phenomenon is termed condensation. Condensation can also generate on the VCR of the HSV-500 system when the environmental condition varies abruptly.

VCR troubles caused by condensation and its prevention

If a video tape cassette is installed while the head drum is wet by condensation, the video tape will adhere to the surface of the drum. If the drum attempts to rotate with the tape adhered to its surface, the tape will be damaged and in the worst case, the video head will be broken. To avoid such troubles, the VCR is equipped with a dew detector which disables the VCR to operate when it detects condensation. The detection of condensation is indicated by a "DEW DETECTED" message on the monitor display and blinking hyphens "-----" on the counter of the operation unit. Note that the dew detector, however, cannot detect an early stage of condensation. In this state, the video tape will adhere to the head drum.

Condensation will generate

When the cold room containing the VCR is warmed up by a heater,
when the VCR is moved from cold outside to warm inside, or
when the VCR is placed in a cool damp room.

If condensing may possibly occur on the VCR, turn on power to the VCR and warm it up fully before installing the video tape cassette.

MOVING AND TRANSPORTATION

If the VCR is being moved with the monitor on, be sure to check that the monitor is secured before moving the cart. Before transportation, be sure to remove the monitor and monitor mount from the VCR and pack them. If the optional container for transportation is used, the monitor and monitor mount can be placed in the container without separating them. For removing the monitor and monitor mount, see page 1-14.

If the system is to be moved on the cart, avoid places which may apply excessive vibration from the floor to the cart. Also avoid moving the system for long distances with cables connected.

When moving the system, remove any cassettes from the VCR.

For moving or transportation, put the camera in the case.

HANDLING OF STROBE



HAZEROUS LIGHT.
DO NOT LOOK
DIRECTLY AT
LIGHT.

Whenever using the strobe, wear the eye protective glasses. Wearing even the eye protective glasses, do not look straight at the strobe light. And note that even the reflected light from the strobe is sometimes too strong for the eyes.

WARNING

Do not look at the strobe light directly since it is quite a strong light source and includes ultraviolet rays harmful to eyes.

A small amount of ozone is produced during strobe lighting. If it is used in a closed or narrow room, always keep the room well ventilated.

Turn off the strobe whenever it is not needed.

Wait at least one minute after turning off the power before disconnecting the strobe connector.

WARNING: Before using the strobe, check if it affects the other equipment. Its light, if directed to the light sensor, can cause the sensor to malfunction and leads to an accident.

RADIO AND TELEVISION INTERFERENCE

NOTE : This equipment complies with the requirements in Part 15 of FCC Rules for a Class A computing device.

Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

HOW TO READ THIS MANUAL

- 1) Following the table of contents, the outline of the system is described.
- 2) To test recording and playback, see "Typical Operation" on the next page.

To try typical operation, the system must have already been set as described in pages 3-4 to 3-6.
- 3) For functions of the switches and lamps, see "Components and Functions". page 2-1
- 4) Details of the recording procedure and recording functions are described in "Recording Operation". page 3-1
- 5) Details of the playback operation and playback functions are described in "Playback Operation". page 4-1

Optional items are described in the latter part of this manual. Operation information of the viewfinder, strobe light system, and parallel interface unit are included in this manual. For the XY coordinator and wave inserter, refer to the individual operation manuals.

TYPICAL OPERATION

The typical operation should be done as follows after setting the system and connecting the cables.

NOTE: Allow the system to warm up at least 3 minutes.

[1] TURN ON POWER.

- (1) Press the | side of the POWER switch in the upper right of the VCR front panel.
- (2) Press the POWER switch of the monitor.

[2] SET THE SWITCH ON THE VCR SUBPANEL.

- | | | | |
|-----|-------------------|-------|---|
| (1) | INPUT | CAM | (Picture from camera) |
| (2) | MODE | COLOR | (Color recording) |
| (3) | START CUE | ON | (Insertion of cue signal at beginning of recording) |
| (4) | STROBE | OFF | (No lighting control from the VCR) |
| (5) | REPEAT REC | OFF | (No repeated recording) |
| (6) | PICTURE SIZE | HALF | (Recording at 500 pictures/sec.) |
| (7) | FREEZE | OFF | (No function in recording) |
| (8) | FREEZE DISPLAY .. | OFF | (No function in recording) |

[3] POINT THE CAMERA AND LIGHTING LAMP AT THE OBJECT.

FOR SHUTTER RECORDING

- (1) Set the SHUTTER/LOCK knob on the camera to LOCK, frame rate knob to 500, and shutter speed knob to a proper speed suitable for the recording condition. Return the SHUTTER/LOCK knob to SHUTTER, then set the SHUTTER ON/OFF switch to ON.
- (2) Set the GAIN switch on the camera to 0 dB, STROBE/TUNGST switch to TUNGST, and AUTO/PRESET switch to PRESET.

- (3) Set the filter knob of the camera to TUNGSTEN. Turn on the lighting lamp, obtain a camera picture on the monitor by adjusting the lens aperture.

FOR STROBE RECORDING

- (1) Turn the camera SHUTTER ON/OFF switch to OFF. Set the SHUTTER/LOCK knob to LOCK. Set the shutter speed knob to OPEN.
- (2) Set the camera GAIN switch to 0 dB. Set the AUTO/PRESET switch of the WHT/BLK BALANCE to PRESET. Set the STROBE/TUNGST switch to STROBE.
- (3) Set the camera filter knob to STROBE. Turn the strobe light head switch to ON to turn the strobe on.
- (4) Adjust the lens iris to make the monitor display the image.

[4] CHECK THE CAMERA PICTURE ON THE MONITOR.

- (1) Determine the visual field and focus the camera on the object to be recorded by operating the zoom ring, focusing ring and lens aperture so that a clear and bright image is obtained.

Note: The above steps are intended to provide the basic information of the high speed recording and playback. Color balance adjustment (for securing color reproduction) is omitted here.

[5] INSERT A S-VHS VIDEO CASSETTE.

- (1) Press the EJECT button of the operation unit.
- (2) Insert a cassette in the stage with the arrow on the cassette pointing down.
- (3) Press to close the stage by hand. (The STOP lamp lights up if the cassette is inserted correctly.)

[6] RECORD AND STOP RECORDING.

- (1) Press two REC buttons on the operation unit simultaneously. The REC lamp lights up, and recording starts.
- (2) To stop recording, press the STOP button.
- (3) Turn off the lighting lamp.

[7] REWIND TAPE.

- (1) Press the REW button on the operation unit.
- (2) To stop the tape partway, press the STOP button.

[8] PLAYBACK TAPE AND STOP PLAYBACK. (Follow the steps below in the order of the numbers here.)

- (1) Press the PLAY button on the operation unit. (Normal playback)
- (2) To display a still picture (still playback), press the STILL/PAUSE button. (The STILL LED above the dial flashes.)
- (3) To display the succeeding or preceding picture (step playback), press the FWD STEP or REV STEP button.
- (4) To display pictures by moving back and forth (jog playback), turn the dial clockwise or counterclockwise quickly or slowly.
- (5) To change the playback speed (search playback), press the SEARCH button, press the STILL/PAUSE button (the STILL LED lights up), then turn the dial clockwise or counterclockwise.
- (6) To stop playback, press the STOP button.

Before switching power off, press the EJECT button to remove the cassette and close the cassette stage. Then, turn off the VCR power.

Table of Contents

PREFACE	a.
SAFETY	a.
PRECAUTIONS IN OPERATING THE SYSTEM	b.
INPUT POWER CHECK	b.
WARNINGS ABOUT THE HIGH VOLTAGE	b.
ENVIRONMENTAL CONDITIONS	b.
HANDLING OF CAMERA	c.
HANDLING OF VCR	c.
CONDENSATION	d.
MOVING AND TRANSPORTATION	e.
HANDLING OF STROBE	e.
HOW TO READ THIS MANUAL	1
TYPICAL OPERATION	2
SECTION I	
GENERAL DESCRIPTION	1-1
OUTLINE OF SYSTEM	1-2
FEATURES OF SYSTEM	1-3
SYSTEM CONFIGURATION	1-6
SPECIFICATIONS OF SYSTEM	1-7
VIDEO CASSETTE	1-11
HEAD CLEANER	1-11
INTERCHANGEABILITY OF VIDEO CASSETTE	1-12
RECORDING AND PLAYBACK FRAMES	1-13
MOUNTING AND DISMOUNTING MONITOR MOUNT	1-14
MOUNTING AND DISMOUNTING MONITOR	1-15
SECTION II	
COMPONENTS AND FUNCTIONS	2-1
COMPONENT NAMES	2-2
COLOR CAMERA	2-3
VIDEO CASSETTE RECORDER (VCR)	2-17
SUBPANEL	2-19
CONNECTOR PANEL	2-24
POWER SUPPLY (PS) PANEL	2-26
OPERATION UNIT	2-28
MONITOR MOUNT	2-35
MONITOR	2-37

SECTION III

RECORDING OPERATION	3-1
RECORDING STEPS	3-2
SETUP IN RECORDING LOCATION	3-4
SWITCH ON	3-7
SUBPANEL SWITCH SETTING	3-8
SETUP FOR STROBE RECORDING	3-10
SETUP FOR SHUTTERED RECORDING	3-13
HOW TO TURN ON STROBE	3-15
CHECKING IMAGE OF OBJECT	3-16
COLOR BALANCING	3-17
INSERTION OF VIDEO CASSETTE	3-20
SELECTION OF COUNTER DISPLAY	3-22
RECORDING AND STOPPING	3-23
FAST FORWARD AND REWIND	3-26
SWITCH OFF	3-29

SECTION IV

PLAYBACK OPERATION	4-1
PREPARATION FOR PLAYBACK	4-2
NORMAL PLAYBACK	4-3
STILL PLAYBACK	4-4
STEP PLAYBACK	4-5
SEARCH PLAYBACK	4-6
JOG PLAYBACK	4-8
FREEZE FUNCTION	4-9
EDIT PLAYBACK	4-10
HIGH SPEED SEARCH PLAYBACK	4-11
ELIMINATION OF NOISE FROM REPRODUCED IMAGE	4-12
PAUSE AND STOP DURING PLAYBACK	4-13
SWITCH OFF	4-14
DUBBING	4-15

SECTION V

OTHER USEFUL FUNCTIONS	5-1
SCENE CODE AND TIME DISPLAY	5-2
REMOTE CONTROL OF SCENE CODE AND TIME DISPLAY	5-4
MEMORY FUNCTION AND COUNTER	5-6
CUE SIGNAL	5-8
REPEAT RECORDING	5-10
SERVICE SWITCHES	5-11
ON-SCREEN MESSAGES	5-13
ALARMS AND COUNTERMEASURES	5-16
SELF TEST	5-17

SECTION VI

ROUTINE MAINTENANCE	6-1
CLEANING OUTER SURFACES	6-2
CLEANING AIR FILTER AND INTAKE	6-2
CLEANING VIDEO HEAD	6-3
REPLACING VIDEO HEAD	6-4

SECTION VII

OPTION	7-1
OPTIONAL ITEMS	7-2
OPERATION FOR STROBE LIGHT SYSTEM	7-4
OPERATION FOR VIEWFINDER	7-12
OPERATION FOR PARALLEL INTERFACE UNIT	7-15
OPERATION FOR ADDITIONAL CAMERA SYSTEM	7-20
OPERATION FOR CAMERA CABLE KITS	7-24

SECTION I
GENERAL DESCRIPTION

OUTLINE OF SYSTEM

FEATURES OF SYSTEM

SYSTEM CONFIGURATION

SPECIFICATIONS OF SYSTEM

VIDEO CASSETTE

HEAD CLEANER

INTERCHANGEABILITY OF VIDEO CASSETTE

RECORDING AND PLAYBACK FRAMES

MOUNTING AND DISMOUNTING MONITOR MOUNT

MOUNTING AND DISMOUNTING MONITOR

OUTLINE OF SYSTEM

The High Speed Video System HSV-500 videotapes a fast moving object at 500 or 250 pictures per second (color or black and white), while displaying it on the monitor simultaneously. The recorded picture can be played back in various ways. Ordinary color video monitors can be used for display, since the VCR outputs color picture signals of the NTSC (60 fields/second) system or PAL (50 fields/second) system.

The system consists of a high-resolution color camera using a solid-state image pickup element (with a mechanical shutter), VCR (video cassette recorder) with a cart, monitor mount for panning and tilting, color monitor (designed to be mounted on the monitor mount), and operation unit for system control. In addition, a variety of options are available such as a viewfinder, strobe light system, wave inserter, XY coordinator, etc.

The system is compactly designed and movable, allowing high-speed motion to be recorded and reproduced instantly for observation and analysis through simple operation.

FEATURES OF SYSTEM

High-Speed Recording and Immediate Playback

The system records 500 (half size) or 250 (full size) color or black and white pictures per second and replays them immediately in the forward or reverse direction in various modes such as search playback, jog playback, etc.

High-Speed Shutter Effect

The strobe (option) for illuminating a subject lights for around 20 μ sec for one picture. This corresponds to exposure time of 10,000 frames/sec of a high-speed film camera. For the reason, it can clearly pick up the subject moving quickly.

High-Quality Color Camera

The color camera uses a solid-state image pickup element. It is small in size and light in weight and provides a sharp picture free from residual image. The rear panel allows basic VCR operations.

Mechanical Shutter

The shutter built in the color camera permits selection of three shutter speeds: 1/2500, 1/5000 and 1/10000 second. The shutter can be positioned open (OFF). This corresponds to shutter speed of 1/500 or 1/250 sec depending on the recording speed.

Picture Adjustment

The sensitivity of the camera can be adjusted by observing an object through the viewfinder (option) or on the monitor before recording it on the VCR.

Scene Code and Time Indication

When recording starts, a three-digit scene code and time (minutes, seconds and 2-milliseconds) are displayed in the picture. Both the scene code and time are recorded and are useful during playback for identification, time-lapse observation and automatic analysis of an object.

Repeat Recording

The HSV-500 has a repeat recording feature as standard feature. This is useful for recording phenomena that do not happen frequently.

Cue Signal Recording

A cue signal can be recorded at any time during recording or edit playback. A picture to be checked can be found immediately since tape stops automatically near the cue signal during fast forward or rewind operation. The VISS (VHS Index Search System) is adopted for cue signal recording and detection.

VHS Video Cassette

This system uses widely-used S-VHS or VHS video cassettes. While the HSV-500 performs high-speed recording, its recording system conforms to the S-VHS (NTSC) or VHS (NTSC) standard. Therefore, tape can be replayed on ordinary S-VHS (NTSC) or VHS (NTSC) video cassette recorders. Tape recorded with the HSV-500 (VHS) is compatible with the HSV-1000 (S-VHS/VHS) and HSV-400 (VHS).

Various Playback Modes

In addition to the normal playback at the speed 0.24 times the recording speed, still playback, search playback and jog playback in forward or reverse direction freely selectable with a dial are available. Single-field feeding is also possible to see pictures one by one.

Operation Unit

Recording and various playback modes are operable on a compact operation unit. The operation unit has a tape and time counter.

Self Diagnostic Feature

Self diagnostic feature of the system displays alarms and warnings on the monitor for preventing misuse and convenience for troubleshooting.

Monitor Mount

The HSV-500 has a high-resolution monitor and a monitor mount having a pan/tilt feature. The monitor mount allows easy direction change of the monitor.

Various Optional Components

An additional camera system, XY coordinator, wave inserter, parallel interface, strobe light system, and other optional components are available for efficient analysis of high-speed motions.

SYSTEM CONFIGURATION

The HSV-500 comprises the following standard components.

(1)	Color camera	1
(2)	Video cassette recorder (VCR)	1
(3)	Operation unit	1
(4)	Color monitor	1
(5)	Monitor mount	1
(6)	Coaxial cable (1 m)	1
(7)	Camera cable (7 m)	1
(8)	Operation cable (1.5 m at max)	1
(9)	Power cable (for VCR, 3 m)	1
(10)	Camera case	1
(11)	Operation manual	1
(12)	Video cassette	1
(13)	Head cleaner	1
(14)	Cover (for VCR)	1
(15)	Cable case	1

Below listed are model numbers of VCR dependent upon the mains voltage and video system.

Model number	Mains voltage	Video system (VCR output)
V-307-A	220: 198-250 V	NTSC
V-307-E	220: 198-250 V	PAL
V-307-J	100: 90-132 V	NTSC

SPECIFICATIONS OF SYSTEM

Recording Format	: S-VHS/VHS video cassette system (NTSC)
Recording Speed	: 500 fields/sec. (half-size picture) : 250 fields/sec. (full-size picture)
Video Signals	
Camera output (VCR input)	: 500 fields/sec; 131.25 lines/field : 250 fields/sec; 262.5 lines/field
VCR Output	: NTSC and its Y/C separate signal (60 field/sec) : PAL and its Y/C separate signal (50 field/sec)
Image Pickup Element	: 2/3" MOS solid-state image pickup element (3 pcs)
Sensitivity	: 12,000 lux at 0 dB (F4, shutter open/stop, 500 fields/sec) : 6,000 lux at 0 dB (F4, shutter open/stop, 250 fields/sec)
Shutter	: 1/2,500, 1/5,000 and 1/10,000 sec. : 1/500 sec. with shutter open/stop at 500 fields/sec. : 1/250 sec. with shutter open/stop at 250 fields/sec.
Lens Mount	: C mount
Cassette Type	: S-VHS or VHS video cassette
Recording Time	: 43 minutes (ST-180) : 43 minutes (SE-260)
Horizontal Resolution (color, at center)	: 350 lines or more (S-VHS, NTSC) : 240 lines or more (VHS, NTSC)
S/N	: More than 40 dB (VCR playback output at 100 kHz to 4 MHz at 50% gray level with aperture turned off)
Monitor	: Color monitor
Playback Mode	: Normal, still, forward/reverse step, forward/reverse jog, forward/reverse search (variable from low to high speed), and freeze by 1 frame memory

Display : Scene code, time, alarm, and warning

Warm-up Time : 3 minutes or more (at 20°C)

Ambient Temperature
and Humidity

Operation : 0 to +40°C, 30 to 80 % RH
Storage : -10 to +60°C, 0 to 80 % RH

Power Source : 90 to 132 VAC, 50/60 Hz (V-307-J)
: 198 to 250 VAC, 50/60 Hz (V-307-A/E)

Power Consumption : Approx. 250 W (Approx. 350 VA)

Weight

VCR body and color
monitor (NTSC) : Approx. 50.5 kg
Color camera : Approx. 4.4 kg
Operation unit : Approx. 0.2 kg.

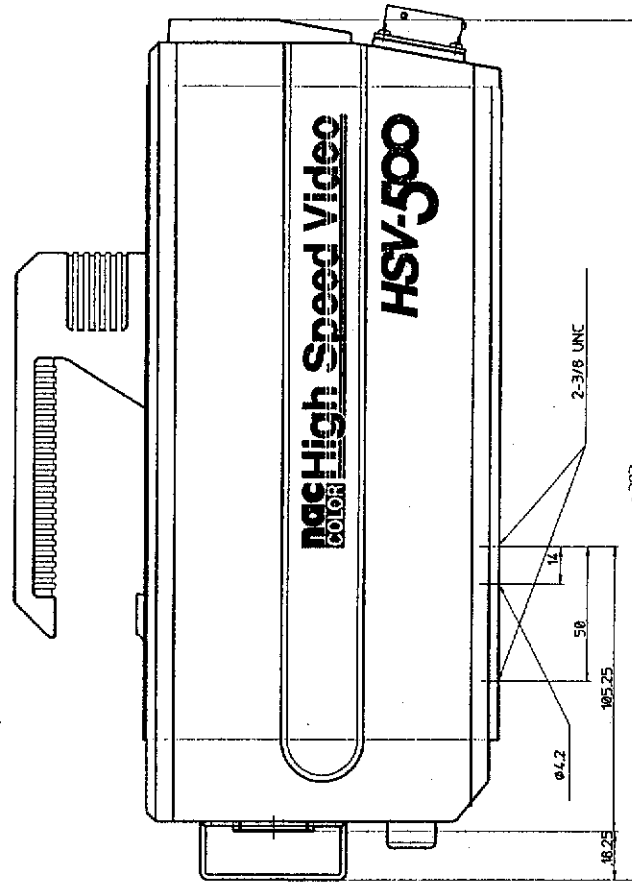
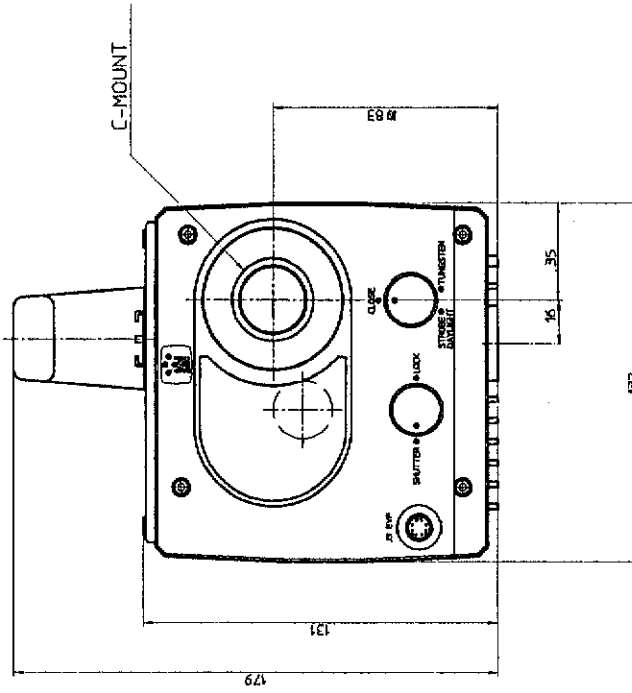
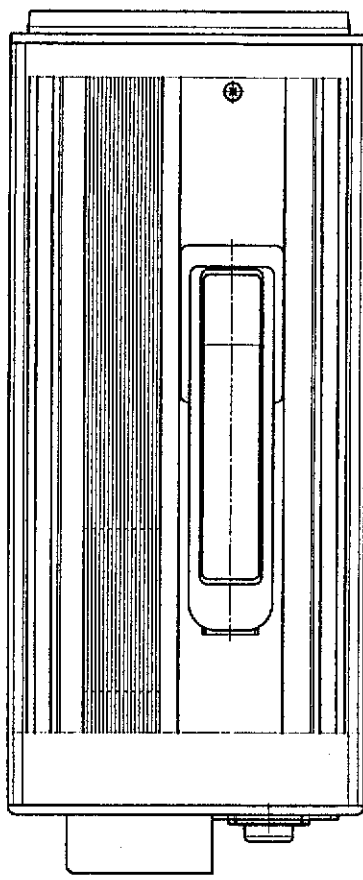


Fig. 1-1 Color Camera

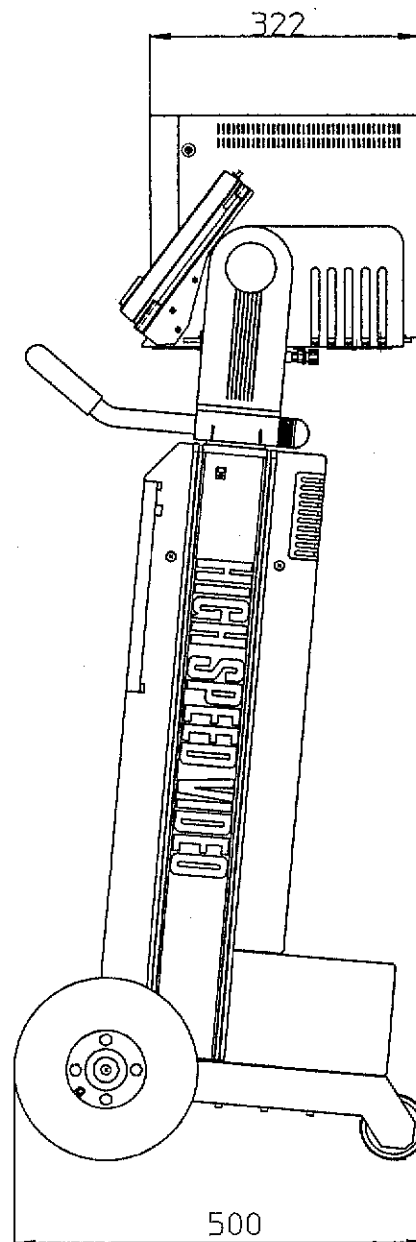
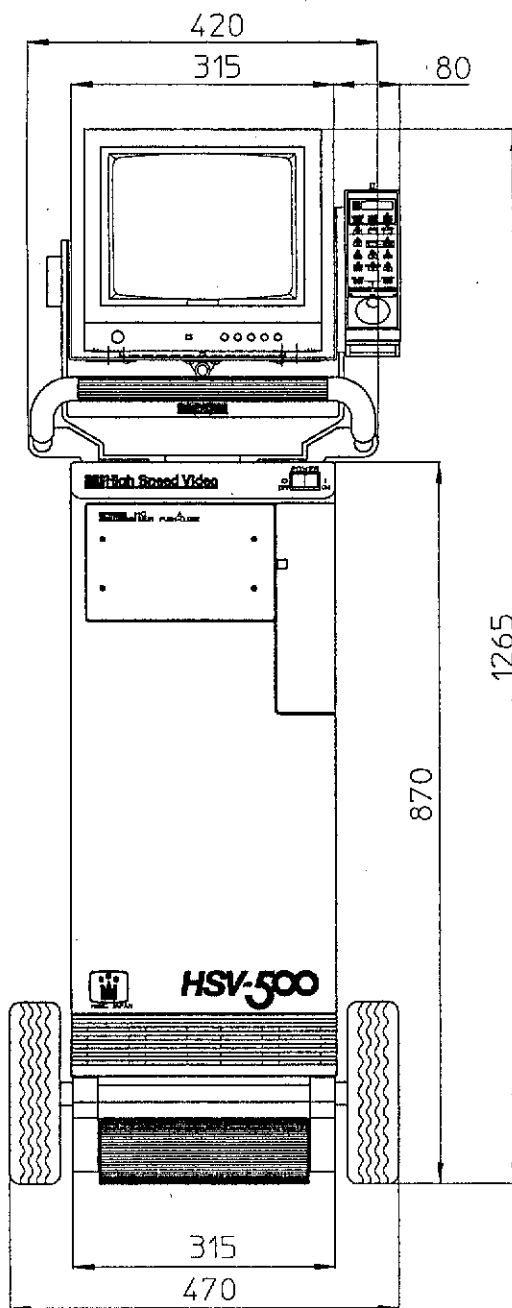


Fig. 1-2 VCR, Monitor Mount and Color Monitor (NTSC)

VIDEO CASSETTE



625



625

The HSV-500 is designed for only video cassettes with the S-VHS or VHS mark shown on the left. The recording time is specified on each video cassette. The figures of ST-60/SE-60, ST-120/SE-120, etc. represent the recording time in minutes. These are the times in the standard mode of an NTSC VHS video deck. For the HSV-500, which performs high-speed recording, the approximate recording time is obtained by dividing the figures by 4.2. For SE-type cassette, divide the figures by 6.0.

Handling of Video Cassette

For cassette handling instructions, see the caution label on the cassette.

HEAD CLEANER

The head cleaner, a standard accessory of this system, should be used in accordance with the following instructions.

The playback speed of the HSV-500 must be set to PLAY (normal playback). Up to three cleaning operations may be performed on one occasion. After one cleaning operation (for 10 seconds in the Play mode), check the image quality. If it is satisfactory, discontinue cleaning. Do not perform cleaning for four or more cycles.

For details of using the head cleaner (cleaning cassette), see page 6-3.

INTERCHANGEABILITY OF VIDEO CASSETTE

HSV-500 and VHS Video Deck

A video cassette recorded using the HSV-500 (in the VHS format) can be played back on an ordinary NTSC VHS video deck. In that case, all the playback functions of the video deck can be used. However, if a cassette of 500 pictures/second is played back, the monitor displays a picture of two fields of high-speed recording at the same time.

For a video cassette recorded on an ordinary NTSC VHS video deck, the HSV-500 offers its various playback functions.

HSV-500, HSV-400 and HSV-1000

A cassette recorded on the HSV-500 can be played back on the HSV-1000.

As well, a cassette recorded on the HSV-500 in the VHS mode can be played back on the HSV-400.

When a cassette recorded on the HSV-400 and HSV-1000 is played back on the HSV-500, select the PICTURE SIZE switch as follows:

Recorded Cassette		HSV-500 PICTURE SIZE
HSV-400	200	FULL
	400	HALF
HSV-1000	500	FULL
	1000	HALF

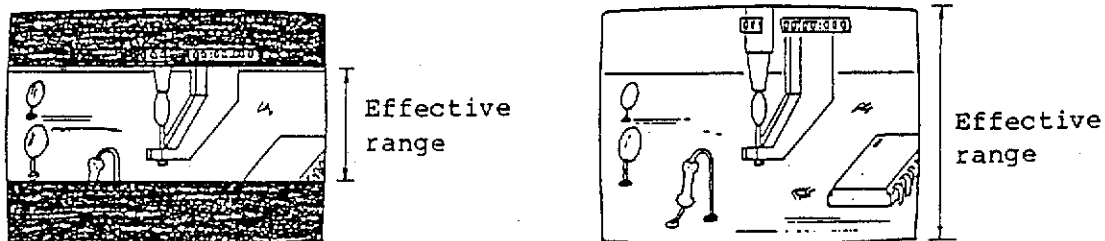
RECORDING AND PLAYBACK FRAMES

The recording and playback frames are of the same size.

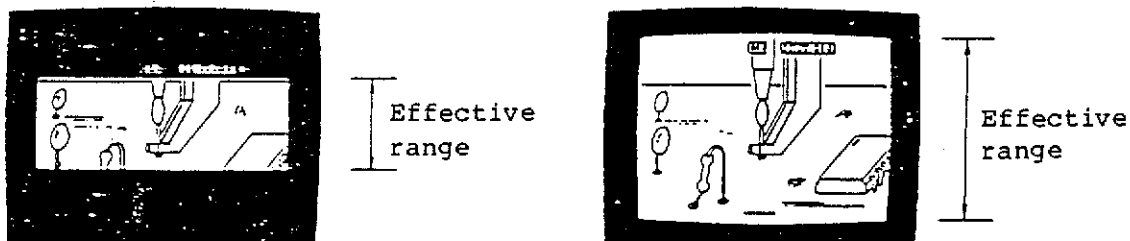
DIFFERENCE IN FRAME SIZES ACCORDING TO RECORDING SPEEDS

The effective size of the screen for 500 pictures/second recording and playback is equivalent to 50% of the monitor screen in height.

NTSC monitor



PAL monitor



500 pictures/second
recording and
playback frame
(PICTURE SIZE: HALF)

250 pictures/second
recording and
playback frame
(PICTURE SIZE: FULL)

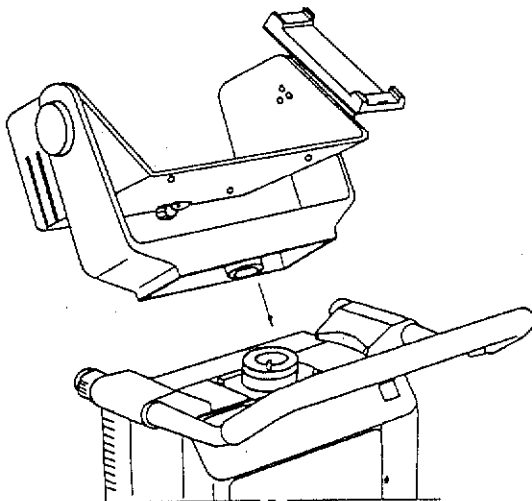
Fig. 1-3 Screen Size

MOUNTING AND DISMOUNTING MONITOR MOUNT

The monitor mount is packaged separately from the VCR. Unpack it, and mount it on the VCR in the following manner.

Mounting

NOTE: Hold the monitor mount securely until it is fixed onto the VCR. Beware not to drop it.



- (1) Place the monitor mount onto the VCR so that the cylindrical portion on the bottom is inserted into the hole at the centre of the top of the VCR.

If the mount is set properly in position, the pin on the black cylindrical part on the VCR top surface fits in the groove on the monitor mount bottom.

- (2) Make sure that the monitor mount rotates horizontally smoothly and fits to the VCR securely.
- (3) Rotate the monitor mount lock knob clockwise to fix the monitor mount firmly.

Fig. 1-4

Dismounting

Remove the monitor from the monitor mount first.

Then, loosen the monitor mount lock knob and remove the monitor mount.

CAUTION: When transporting the system, pack the VCR, monitor and monitor mount separately. If the optional transport container is used, the monitor and monitor mount can be stored in the container without separating them.

MOUNTING AND DISMOUNTING MONITOR

Install the monitor onto the monitor mount on the VCR.

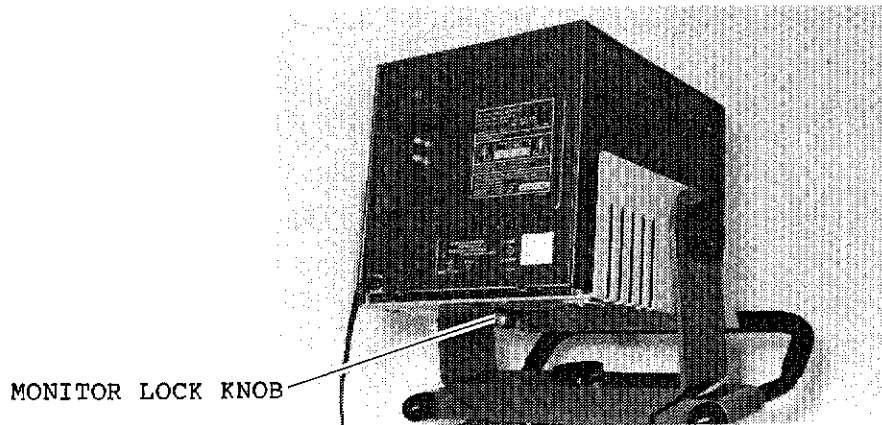


Fig. 1-5

Mounting

Unpack the monitor, then install it in the following manner:

- (1) Rotate to loosen the tilt lock knob, set the monitor bracket level, and tighten the knob.
- (2) Rotate the monitor lock knob below the monitor bracket counterclockwise until the L-shaped hook at the end of the knob turns down on its side.
- (3) Hold the monitor by hand and place it onto the monitor bracket. Insert the four legs of the monitor into the holes on the monitor bracket.
- (4) Push the monitor backward until it stops.
- (5) Rotate the monitor lock knob under the monitor bracket clockwise to tighten it securely. The L-shaped hook is set vertically to fasten the bottom of the monitor.
- (6) Plug the monitor power cable to the J2 MONITOR connector on the VCR connector panel.
- (7) Connect the video cable to the VIDEO IN connector on the monitor and the J9 VIDEO OUT connector on the VCR connector panel.

Dismounting

When transporting the system, remove the monitor from the monitor mount and place them in their packages.

- (1) Remove the monitor power cable and video cable from the VCR connector panel.
- (2) Rotate to loosen the tilt lock knob, set the monitor bracket level, and tighten the knob.
- (3) Rotate the monitor lock knob below the monitor bracket counterclockwise until the L-shaped hook is separated from the bottom of the monitor and turns down on its side.
- (4) Pull the monitor frontward to a position where the legs are easily pulled out of the holes.
- (5) Lift the monitor to dismount it from the monitor bracket.

SECTION II
COMPONENTS AND FUNCTIONS

COMPONENT NAMES

COLOR CAMERA

VIDEO CASSETTE RECORDER (VCR)

SUBPANEL

CONNECTOR PANEL

POWER SUPPLY (PS) PANEL

OPERATION UNIT

MONITOR MOUNT

MONITOR

COMPONENTS AND FUNCTIONS

This section describes the names and functions of each unit.

COMPONENT NAMES

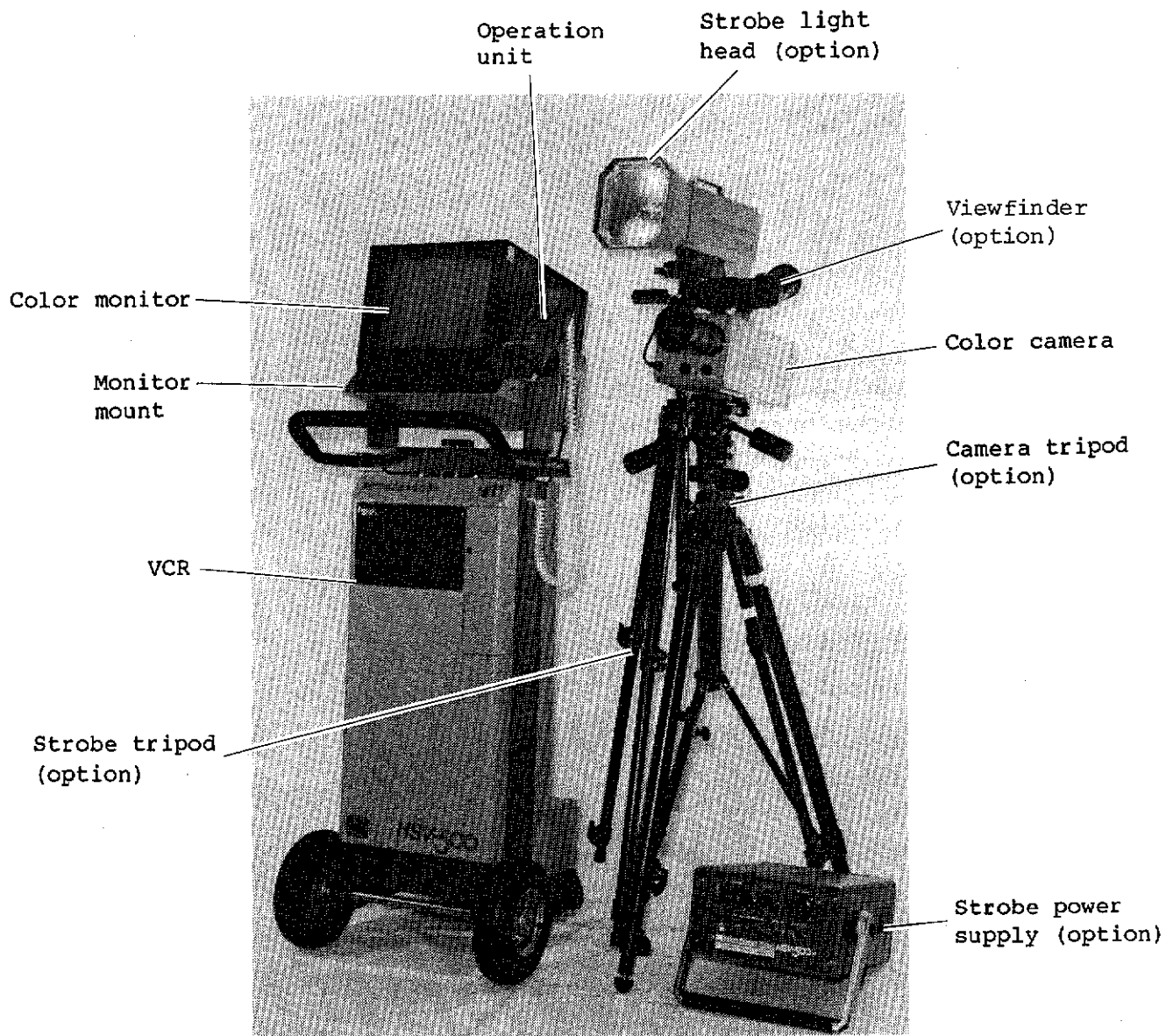


Fig. 2-1 Component Names

COLOR CAMERA

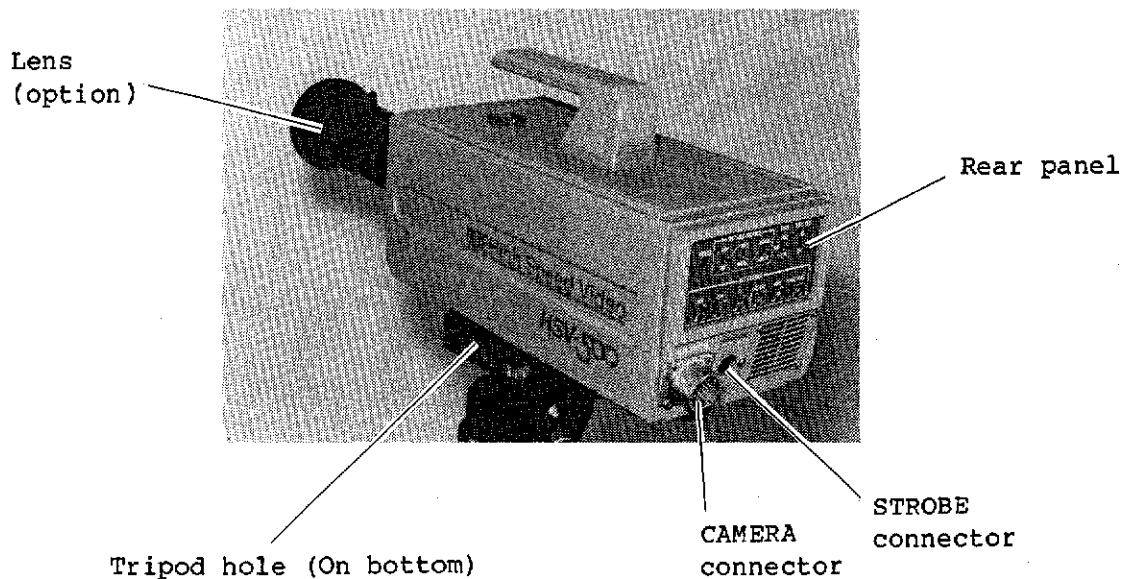
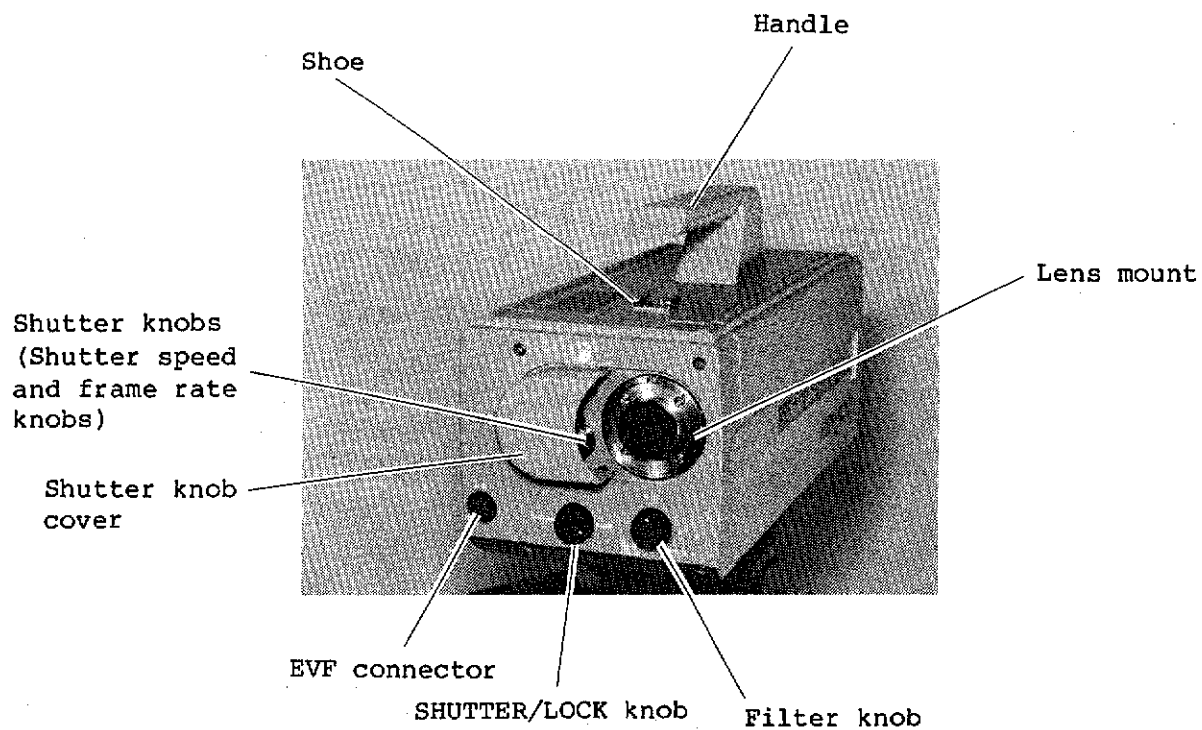


Fig. 2-2 Color Camera

Shoe

The optional viewfinder is mounted on this shoe.

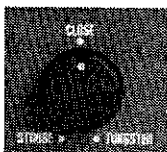
Handle

Hold this handle to carry the camera.

Lens Mount

The lens mount has two threads. The camera lens shall be mounted on the threads of the smaller diameter C mount. Beware not to insert any object through this mount since the optical system, the vital part of the camera, is inside. The larger diameter threads outside the C mount is used to attach the macro close-up device 105.

Filter Knob



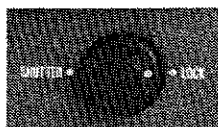
Use this knob to select the filter suitable for illumination. Set the white dot on the knob to any of the three positions.

CLOSE : Screens from external light. Use this position when mounting or dismounting the lens or when the camera is not used.

TUNGSTEN: Use this filter when the tungsten lamp is used for recording.

STROBE DAYLIGHT: Use this filter for recording using the strobe light or under direct sunlight.

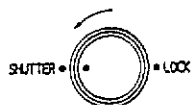
SHUTTER/LOCK Knob



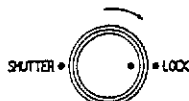
Use this knob to select whether the shutter rotates or is fixed. Turn the knob to set the white mark on the knob to the white mark in the SHUTTER or LOCK position.

- CAUTION:
- o Before setting the knob to LOCK, set the SHUTTER ON/OFF switch to OFF for stopping rotation.
 - o After setting the SHUTTER/LOCK knob to LOCK, rotate the shutter knob clockwise.
 - o The shutter is only locked at the position where the shutter shaft index mark faces up.

SHUTTER : In this position, if the SHUTTER ON/OFF switch on the camera switch panel is set to ON, the shutter rotates.

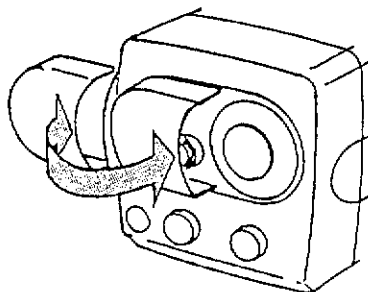


LOCK : In this position, the shutter does not rotate even if the SHUTTER ON/OFF switch is set to ON. Set the SHUTTER/LOCK knob to the LOCK position when changing the shutter speed or when using the strobe.



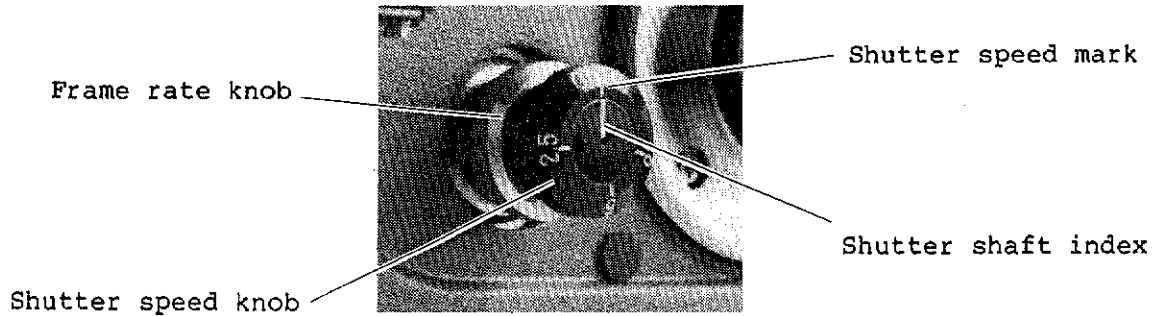
After setting the knob to LOCK, rotate the shutter shaft clockwise. As illustrated on the left, the shutter shaft is always locked in the position where the index mark faces up.

SHUTTER Knob Cover



A safety cover is provided for preventing the rotating shutter knob from being touched. When shutter knob operation is completed, close this cover.

SHUTTER Knobs



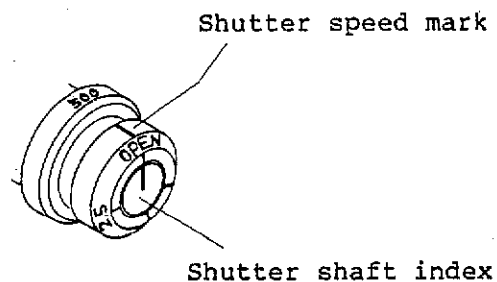
Use these coaxial dual-stage knobs to select the shutter speed and frame rate. The front black knob selects shutter speed (1/2500, 1/5000 or 1/10000 second). The knob behind selects frame rate (250 or 500 pictures/second).

Both knobs rotate at a high speed during shutter on.

Before operating these knobs, set the SHUTTER/LOCK knob to the LOCK position.

Shutter Speed Knob (Black)

Four shutter speeds are available and are indicated as OPEN, 10, 5 and 2.5. To select a shutter speed, pull the shutter speed knob frontward (the frame rate knob is also pulled out) and align a shutter speed mark to the index on the shutter shaft.



OPEN : Select this position for strobe recording, or when shutter is not used. In this case, the SHUTTER/LOCK knob shall be set to the LOCK position.

10 : 1/10000 sec.

5 : 1/5000 sec.

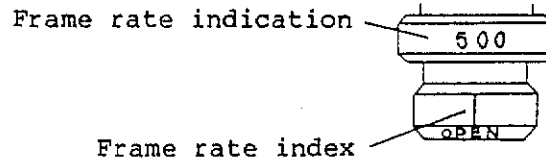
2.5 : 1/2500 sec.

For shuttered recording, select one of these three speeds. Then, set the SHUTTER/LOCK knob to SHUTTER.

Frame Rate Knob

Two frame rates are available and are indicated as 500 and 250 on the frame rate knob.

Pull the knob frontward and rotate it clockwise to set 500 or 250 mark to the frame rate index on the outer circumference of the shutter speed knob (OPEN mark).



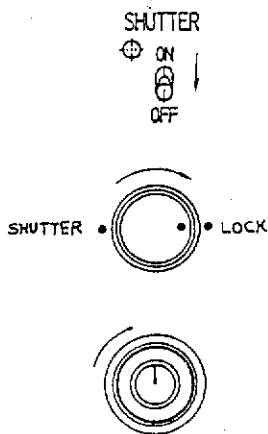
- 500 : Use this position for shuttered recording at the frame rate of 500 pictures/second.
- 250 : Use this position for shuttered recording at the frame rate of 250 pictures/second.

SHUTTER Knob Selection

When switching the shutter knob, the shutter must be locked. Perform shutter knob switching in the following order:

1. Shutter speed : OPEN
2. Recording speed : 500 or 250
3. Shutter speed : 2.5, 5, or 10

How to Lock Shutter

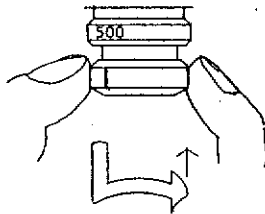


- 1) Set the SHUTTER switch on the rear panel of the camera to the OFF position.
- 2) Set the SHUTTER/LOCK knob on the front panel of the camera to the LOCK position.
- 3) Rotate the shutter speed knob clockwise to lock the shutter.

Setting Shutter Speed To OPEN

While pulling the shutter speed knob, rotate it clockwise to align the OPEN mark to the index on the shutter shaft.

Detailed Procedures:



- 1) As shown in the figure on the left, hold the shutter speed knob with the thumb and index finger, and pull it frontward until it stops.

(At this time, the frame rate knob is also pulled out, which is not malfunctioning.)



- 2) Then, turn the knob clockwise while observing the shutter shaft index, and release your fingers when the OPEN mark gets close to the index. Then, turn it in the same direction with the fingers.

With a click sound, the OPEN mark is aligned to the index, and the knob is pulled in.

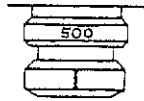
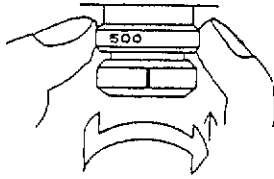
NOTE: For unshuttered recording or strobe recording, be sure to set the knob to the OPEN position.

Recording Speed Selection

The frame rate knob has two indications, 500 and 250, on its outer circumference. Position either indication to the index mark on the outer rim of the shutter speed knob to select a recording speed.

Pull and rotate the frame rate knob clockwise to position 500 or 250 mark to the index on the shutter shaft (i.e., the line outside the OPEN mark).

Detailed Procedures:



- 1) As illustrated on the left, hold the frame rate knob with the thumb and index finger, and pull it frontward until it is brought into contact with the shutter speed knob.

(Hold only the frame rate knob so that the shutter speed knob is not pulled out.)

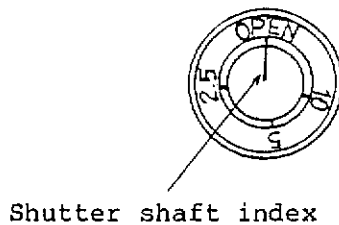
- 2) Rotate the knob slightly clockwise and release the fingers once. Then, hold and rotate it again until "click" sound is heard and the knob is pulled in.

NOTE: The shutter is not usable for strobe recording. Recording speed for strobe recording depends on the setting of the PICTURE SIZE switch on the VCR subpanel, regardless of the setting of the frame rate knob.

Shutter Speed Selection

The shutter speed (exposure time) can be set to any of three speeds, 1/2500, 1/5000 and 1/10000, regardless of recording speed.

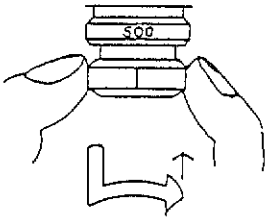
The relationship between the available shutter speeds and their indications is as follows:



Indication	Exposure time
2.5	1/2500 sec.
5	1/5000 sec.
10	1/10000 sec.
OPEN	For unshuttered recording or strobe recording

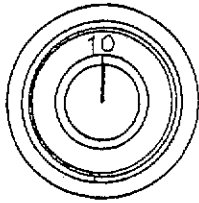
Pull and rotate the shutter speed knob clockwise to position the 2.5, 5 or 10 indication to the index on the shutter shaft.

Detailed Procedures:



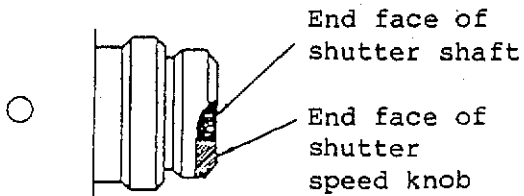
- 1) As shown in the figure on the left, hold the shutter speed knob with the thumb and index finger, and pull it frontward until it stops.

(At this time, the frame rate knob is also pulled out, which is not malfunctioning.)

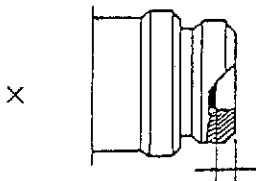


- 2) Then, turn the knob clockwise while observing the shutter shaft index, and release your fingers when the indication to be selected gets close to the index. Then, turn it in the same direction with the fingers.

With a click sound, the indication to be selected is aligned to the index, and the knob is pulled in.

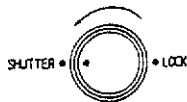


In this normal state, the end face of the shutter speed knob is level with the shutter shaft.

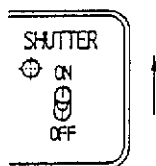


In this state, the end face of the shutter speed knob protrudes from the shutter shaft.

Shutter Rotation



- 1) Set the SHUTTER/LOCK knob on the front panel of the camera to the SHUTTER position.



- 2) Set the SHUTTER switch on the rear panel of the camera to the ON position. The lamp comes on and the shutter rotates.

Rear Panel

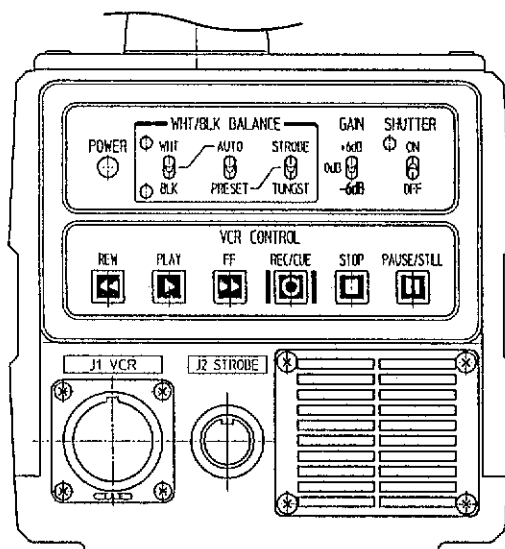


Fig. 2-3 Rear Panel

POWER Lamp

This lamp lights while power is supplied to the camera.

WHT/BLK BALANCE Switches (White/black balance)



These switches are used to adjust the color balance automatically in accordance with the lighting conditions in order to record the true color of an object. The lamps indicate the operating state.

WHT/BLK Switch

- WHT : Set the switch to WHT for automatic white balance adjustment.
- BLK : Set the switch to BLK for automatic black balance adjustment.

WHT/BLK Lamps

Both lamps come on on completion of automatic color balance adjustment, and then go out after about 10 seconds. If the color balance is not adjusted properly, either or both lamps flash for about 1 minute to indicate the lighting conditions. In this case, change the lighting conditions or lens aperture setting in accordance with whichever lamp is flashing, check filter knob setting, then readjust the color balance.

Lamp	Condition
WHT flashes	Too bright
BLK flashes	Too dark
WHT & BLK flash	Erroneous filter selection

AUTO/PRESET Switch

This switch selects whether to use automatic balance adjustment in accordance with illumination or to use the preset value of the camera.

AUTO : Set the switch to AUTO for automatic color balance adjustment. Releasing it returns to the center position.

(Center position):

The previous color balance setting is used.

PRESET: Set the switch to PRESET for recording in accordance with preset white balance.

The STROBE/TUNGST switch and filter knob shall also be set properly if the AUTO/PRESET switch is set to the PRESET position.

STROBE/TUNGST Switch (Strobe/tungsten)

Set this switch to the proper position in accordance with the lighting to be used.

STROBE: Set this switch to STROBE for recording with the strobe light or under sunlight.

TUNGST: Set this switch to TUNGST for recording using a tungsten lamp.

GAIN Switch

GAIN
+6dB
0dB 
-6dB

This switch increases the sensitivity of the camera. It is normally set to 0 dB. If illumination is insufficient; set it to the +6 dB position, however, noise increase. If illumination is sufficient, set it to the -6 dB position to obtain better picture quality.

+6 dB : Increases the sensitivity by one stop of the lens aperture.

0 dB : Normal position.

-6 dB : Decreases the sensitivity by one stop of the lens aperture.

SHUTTER Switch

SHUTTER

ON
OFF

Selects shutter operation.

ON : The shutter rotates. The SHUTTER/LOCK knob should be set to the SHUTTER position in advance for shuttered recording. While the shutter is rotating, the lamp on the left of the switch remains on.

OFF : The shutter does not rotate.

NOTES: If the shutter lamp flashes, any or both of the following settings are considered. (The shutter rotates at low speed in this case.)

- 1) The shutter speed knob is set to the OPEN position.
- 2) Settings of the PICTURE SIZE switch on the VCR subpanel and the frame rate knob on the camera are not compatible.

Picture size	Frame rate knob
FULL	250
HALF	500

VCR CONTROL Switches

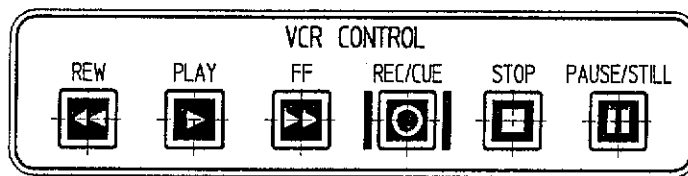


Fig. 2-4

These switches are used for remote control of basic VCR operations such as recording and playback.

Any of these switches, when pressed, can set the VCR to the mode selected. You can check the mode as the lamp of the switch lights.

REW (Rewind)

Press this button to rewind tape at high speed. When tape has been rewound to the beginning, it stops automatically.

PLAY

Press this button to play back tape in the normal mode. Tape is played back in the forward direction at the normal speed.

FF (Fast Forward)

Press this button to feed tape at high speed. When tape has been fed to the end, it stops automatically.

REC/CUE (Record/cue)

Press this button to start recording.

Press this button during recording to insert a cue signal.

A cue signal is recorded, which is convenient for quick searching.

STOP

Press this button to terminate any function. This switch functions in any mode of REW, PLAY, FF, STILL and PAUSE.

PAUSE/STILL

Press this button to pause recording or playback and for still playback (i.e., displaying a still picture). Press again to release.

Camera Connector

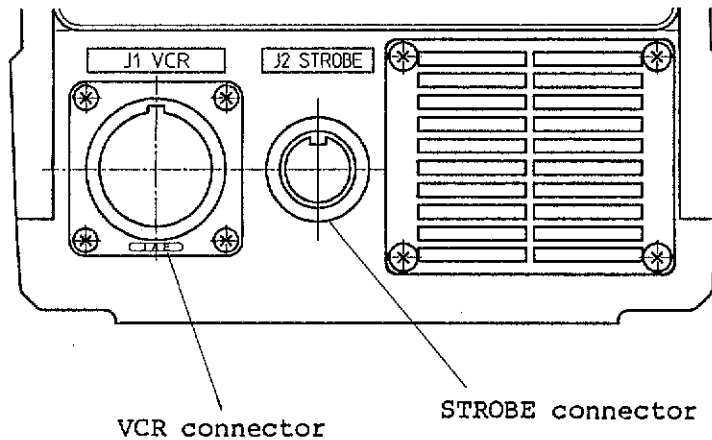


Fig. 2-5

J1 VCR Connector

Connect the camera cable to J1 VCR connector and to J3 CAMERA connector on the VCR connector panel.

Through this connector is sent the control signal and camera power from the VCR. The camera converts the optical signal to electric signal to send to the VCR.

J2 STROBE Connector

This connector is the strobe drive signal output when the strobe (option) is used at the camera side. Use the strobe drive cable to connect this connector to the strobe power supply DRIVE IN connector.

J3 EVF Connector

Connect the EVF cable of the viewfinder (option) to this connector. Through this connector, power and video signals are fed to the viewfinder.

Tripod Mounting Holes

The camera has two threaded holes (3/8-16 UNC) underneath for mounting to a tripod. Using these holes, attach the camera plate of a tripod to the camera, and mount the camera to the tripod.

VIDEO CASSETTE RECORDER (VCR)

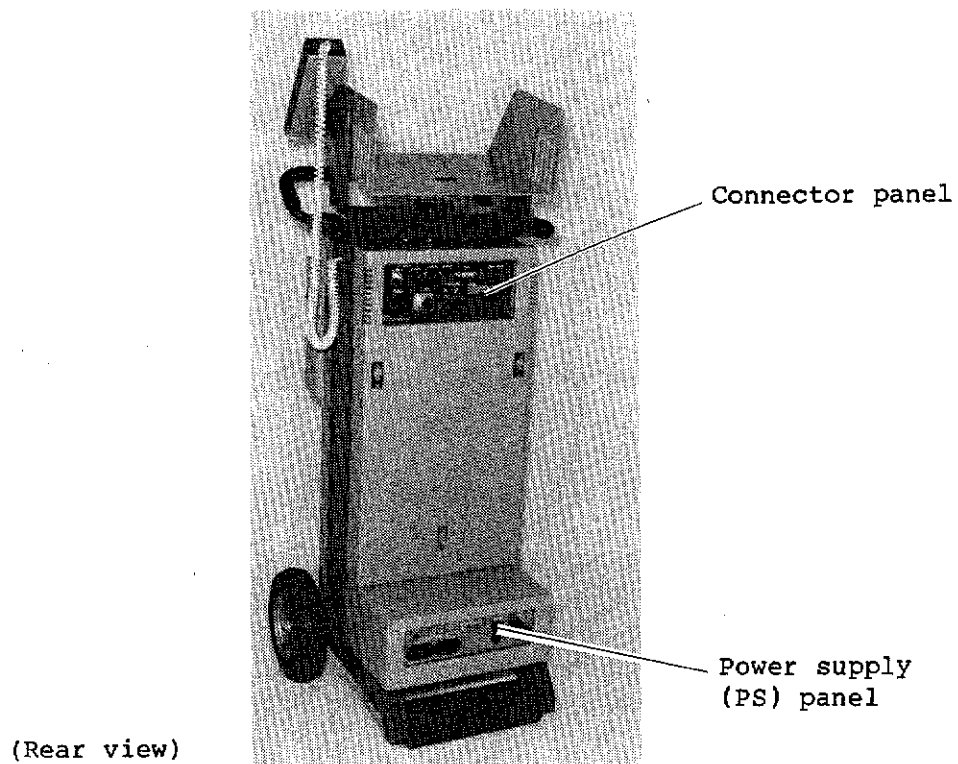
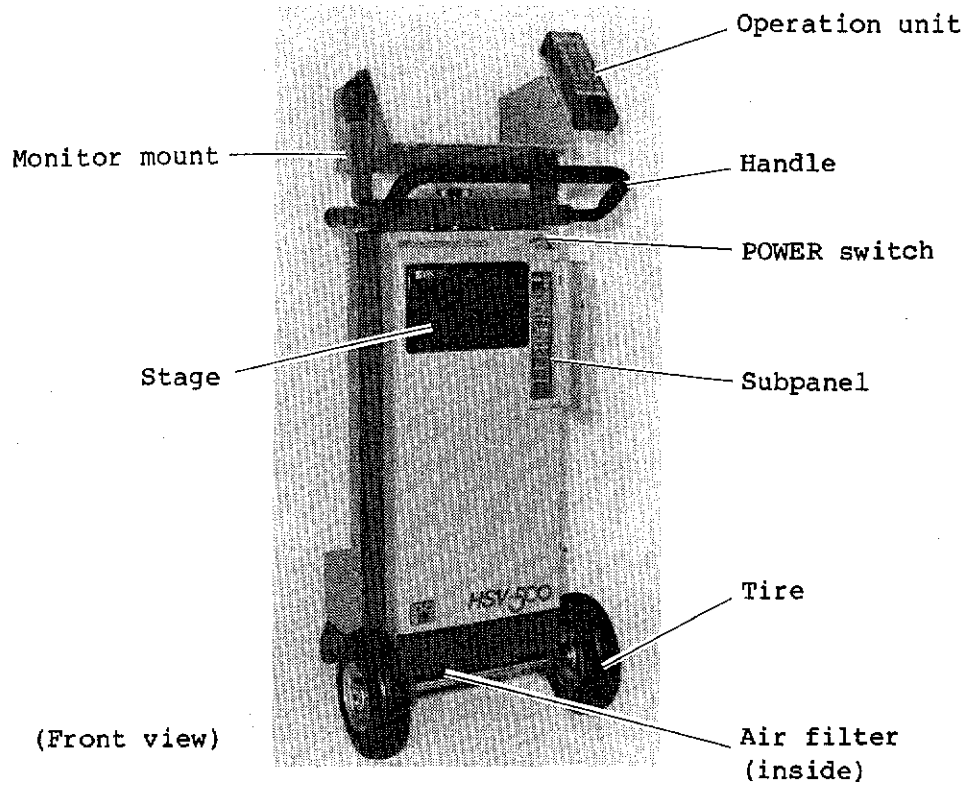
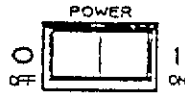


Fig. 2-6 Video Cassette Recorder

POWER Switch



The POWER switch of the VCR.

The switch also should be used as the main power switch for the system. This POWER switch can ordinarily turn on or off the system while the monitor power switch is left on.

- ON : Pressing the "|" side of the switch turns on the power; the switch lamp comes on.
- OFF : Pressing the "o" side of the switch turns off the power; the switch lamp goes out.

Stage

A video cassette is loaded into and unloaded from this stage. Press the EJECT button on the operation unit, and the stage opens to allow loading or unloading of a video cassette. To close the stage, push the upper center of the stage firmly by hand.

Do not leave the stage open in order to keep out dust and dirt.

Tires

To move the VCR, steady the tire with a foot and pull the handle toward you to raise the fixed leg (round bar) off the floor. Then, move the VCR slowly.

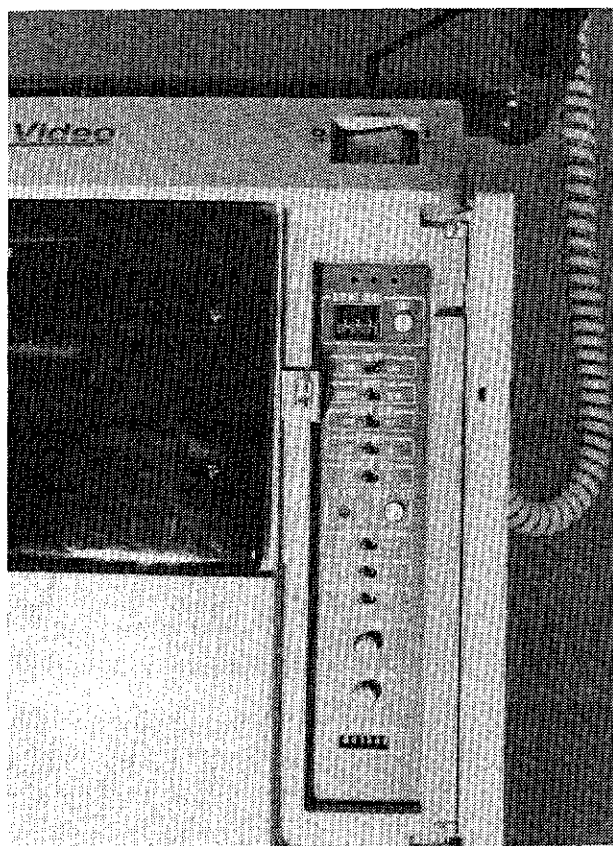
Should the tire become deflated the cart will remain stable but will be difficult to move.

NOTE: The normal air pressure is 3.5 kg/cm².

Air Filter

The VCR is provided with an air filter inside the bottom plate. Clean it in accordance with the instructions in "CLEANING AIR FILTER AND INTAKE" on page 6-2.

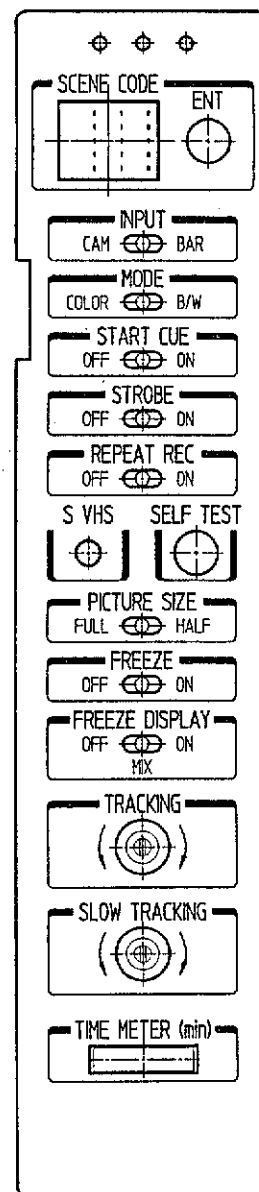
SUBPANEL



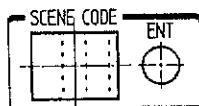
The VCR has a subpanel inside the cover. To open the cover, push the center part of it (a square mark) lightly. Pull the cover, and the subpanel appears. To close the cover, press it.

The subpanel switches should be set before using the system.

Fig. 2-7



SCENE CODE/ENT Switches and Button



Use these switches and button to select an intended scene code. They function only in record mode.

SCENE CODE Switches

Set an intended scene code with these three-digit thumbwheel switches.

ENT (Enter) Button

By pressing this button, the scene code displayed on the monitor screen changes as set with the thumbwheel switches.

INPUT Switch



Use this switch to select which signal to input to the VCR recording, the image signal from the camera or the color bar signal (unique to the HSV-500) generated in the VCR. Usually, the INPUT switch shall be set to the CAM position. This switch functions only in record mode.

NOTE: Unless the camera is connected despite the INPUT switch set to "CAM", the color bar signal generated in the VCR goes.)

CAM : The image signal from the color camera is input to the VCR.

BAR : The color bar signal generated in the VCR is input to the VCR.

MODE (Color/Black and White) Switch



Use this switch to select the recording mode, color or black and white. This switch functions only in record mode.

If the monochrome recording is permissible to an application, use B/W mode as it gives better resolution than color mode.

COLOR: Color recording

B/W : Black and white recording

START CUE Switch



This switch selects whether or not to enter a cue signal automatically when starting recording. It functions only in record mode.

The HSV-500 uses the VISS signal (index code) in compliance with the VHS Index Search System as the cue signal.

OFF : The start cue signal is inoperative.

ON : The cue signal is recorded automatically when starting recording and on release of a pause operation during recording (on each new scene).

STROBE Switch



This switch operates the strobe light. It functions only when the switch on the strobe light head is set to AUTO.

OFF : The strobe does not flash. Usually, the STROBE switch is set to this position.

ON : The strobe runs continuously.

REPEAT REC Switch



Throwing this switch repeats recording. When the tape reaches its end during the recording operation, the tape is automatically rewound, and recording starts again. This is used for recording matters occurring not frequently.

OFF : Ordinary recording mode

ON : Repeat recording mode

S-VHS Lamp



This S-VHS mode indicator lights when S-VHS mode is entered. During the recording operation, when an S-VHS cassette is used, recording is performed in S-VHS mode, and when a VHS cassette is used, it is in VHS mode. During the playback operation, a mode is automatically selected according to the recording already made on tape.

SELF TEST Button



Use this pushbutton for self diagnosis of the recording and playback functions of the VCR.

Load a video cassette into the VCR and press this button; sawtooth signal (generated in the camera) is automatically recorded for two seconds, the recorded picture is played back, and a message indicating the result of the diagnosis is displayed on the color monitor. If the camera is not connected, the color bar signal generated in the VCR is used.

NOTE: Therefore, do not apply the self test to tapes on which recordings have been made and need be stored.

PICTURE SIZE Switch



This switch selects the frame rate. In playback, it should be set to the same position as in which the recording was made.

HALF : Pictures are recorded at the rate of 500 pictures/second. The effective size of the screen is reduced to approx. half the monitor screen in height. (Half size)

FULL : Pictures are recorded at the rate of 250 pictures/second. (Full size)

FREEZE Switch



This switch stores one frame of still picture in the memory during playback. To display the still (stored) picture, set the FREEZE DISPLAY switch to ON or MIX while setting this switch to ON.

OFF : The FREEZE switch is set to the OFF position to erase a previously-stored still picture.

ON : A still picture is stored in the memory at the moment when this switch is set to ON.

If 500 pictures/second tape is played back at low speed with this switch set to ON, image motion may seem unnatural. However, this phenomenon does not mean a failure.

FREEZE DISPLAY Switch



This three-position switch selects the freeze display facility.

OFF : The freeze display facility is inoperative.

ON : Only the still picture stored with the FREEZE switch is displayed on the monitor. In this mode, tape advances without displaying replayed pictures.

MIX : The still picture stored with the FREEZE switch is superimposed on the continuous playback pictures and displayed on the monitor.

TRACKING Knob



Eliminates noise, if any, from pictures at the playback rate of 60, 120 or 240 pictures/second.

This knob shall usually be set to the preset position where the mark on the knob is central.

SLOW TRACKING Knob

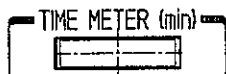


Eliminates noise, if any, from pictures at the playback rate of 2, 4, 8, 16 or 24 pictures/second.

This knob shall usually be set to the preset position where the mark on the knob is central.

- * In the above description on the TRACKING and SLOW TRACKING knobs, the "playback rate" is for 500\pictures/second recording and playback. For 250 pictures/second, the above playback rates shall be halved.

TIME METER



This meter indicates the total time of using the video head (up to 999999 minutes).

The time is indicated by six digits. Service life of the video head is around 60,000 minutes (1,000 hours) as read by the meter. Note that the time in recording will advance at a speed around four times that of playback.

CONNECTOR PANEL (On VCR Rear Panel)

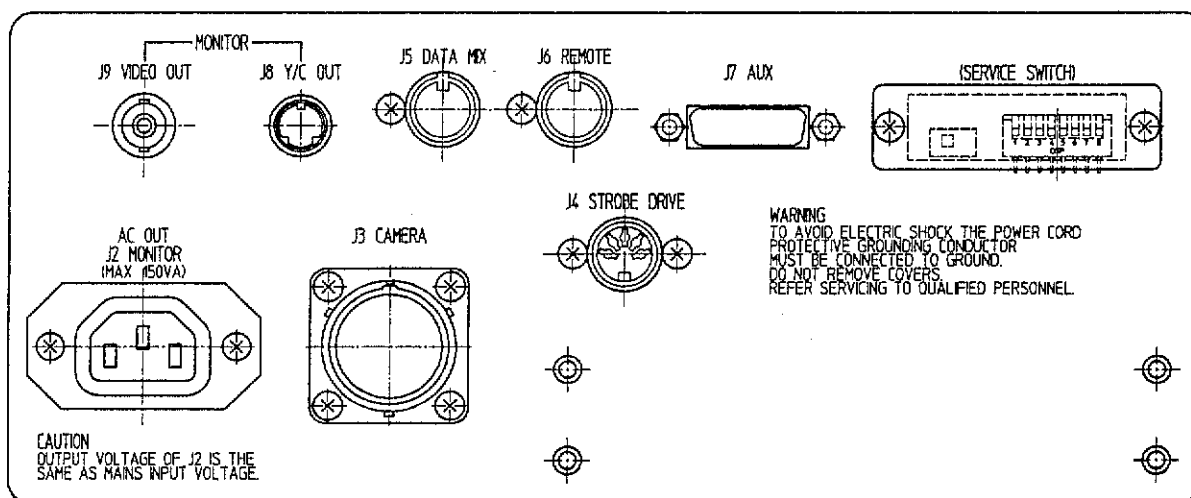
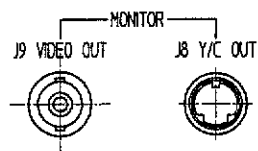


Fig. 2-8 Connector Panel

MONITOR Connectors



These connectors output video signals for the monitor.

J8 Y/C OUT Connector

Outputs separated Y and C video signals. Use this connector if a monitor provides a separated Y/C video signal input. Connect the video cable to this connector and the VIDEO IN connector of the monitor.

J9 VIDEO OUT Connector

Outputs VBS video signals, which shall be used for a monitor with VBS video signal input.

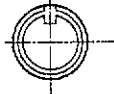
J5 DATA MIX Connector



If the optional wave inserter is used, connect it to this connector using the data mix cable.

J6 REMOTE Connector

J6 REMOTE



If the optional parallel interface is used, connect it to this connector using the P I/F cable.

J7 AUX Connector

J7 AUX



If the optional XY coordinator is used, connect it to this connector using the control cable. The connector is also used to remotely control the scene code and time display.

(SERVICE SWITCHES)

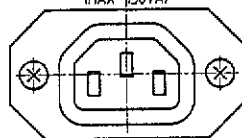
(SERVICE SWITCH)



These switches are used for maintenance service and special applications. They are housed inside the cover since they are not used normally. For switch functions, see page 5-11.

J2 AC OUT Connectors

AC OUT
J2 MONITOR
(MAX 150VA)



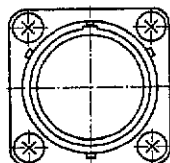
CAUTION
OUTPUT VOLTAGE OF J2 IS THE
SAME AS MAINS INPUT VOLTAGE.

This connector supplies power to the monitor. Output voltage is the same as the supply voltage input to J1.

CAUTION: This connector has limited current capacity. Do not connect any other electric devices to this connector.

J3 CAMERA Connector

J3 CAMERA



Connect the camera to this connector using the camera cable.

J4 STROBE DRIVE Connector

J4 STROBE DRIVE



If the optional strobe is used, connect the strobe power supply to this connector using the strobe drive cable.

POWER SUPPLY (PS) PANEL (VCR Rear)

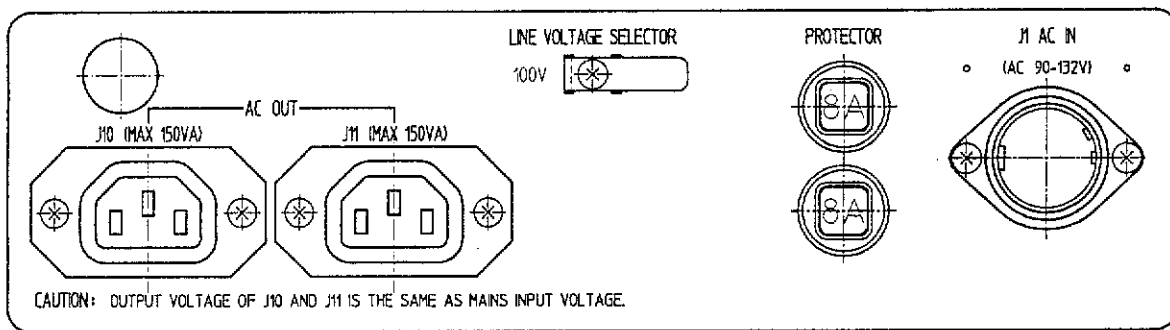
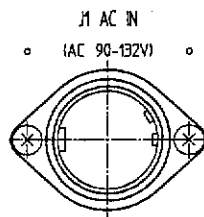


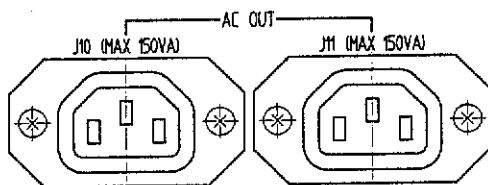
Fig. 2-9 PS Panel

J1 AC IN Connector



Connect the power cable to this connector and a wall socket to supply power to this system. Make sure that the supply voltage is as specified on this connector.

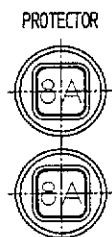
AC OUT Connectors



These connectors supply power to the optional wave inserter, wipe unit and such. Output voltage is the same as the supply voltage input to J1 AC IN.

CAUTION: Do not use the connector for other purpose as the current capacity is limited.

PROTECTORS

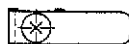


These protectors cut off input power supply to protect the internal circuits if excessive current flows in the input power supply. If the protector functions, eliminate possible causes before resetting.

Line Voltage Selector

LINE VOLTAGE SELECTOR

100V

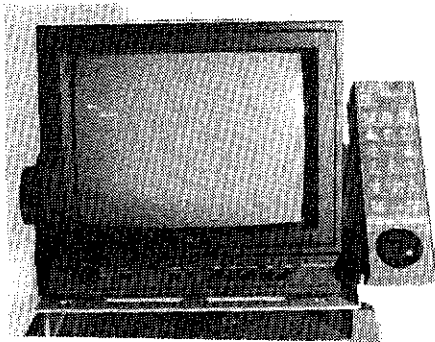


100 V or 220 V are selected from according to the supply voltage input to the J1 AC IN connector.

100 V: 90 - 132 VAC, 50/60 Hz

220 V: 198 - 250 VAC, 50/60 Hz

OPERATION UNIT



The operation unit allows remote control of all the VCR operations, except for turning on and off the power and loading and unloading a video cassette.

The operation unit is placed on the bracket at the side of monitor.

It can be removed and used as a hand-held controller.

To remove the operation unit, slide up and pull the operation unit.

The plug of the operation cable has a self-locking tab. To disconnect it, pull the plug while holding the tab. Beware not to try to disconnect the cable without holding the tab. Otherwise, the plug may be damaged.

CAUTION: Be sure to use the standard operation cable. If an unauthorized cable is used, the circuit may be damaged.

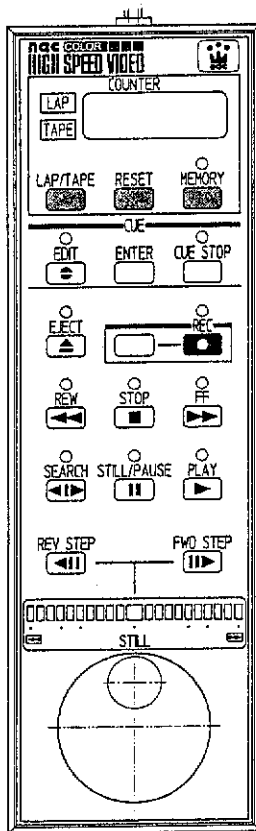
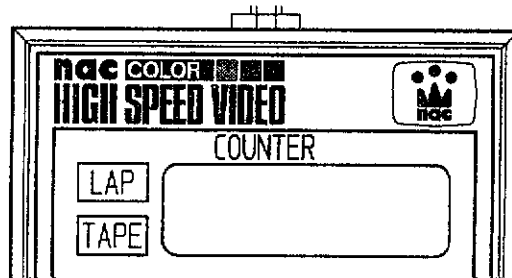


Fig. 2-10

COUNTER LAP/TAPE Indicator



LAP Lamp

While this lamp is on, the counter functions as a lap indicator (counting the elapsed time). It indicates the elapsed time of recording from -59:59 to 59:59 (minutes:seconds).

TAPE Lamp

While this lamp is on, the counter functions as a tape counter. It indicates the tape feeding amount from 0 to 9999.

COUNTER Indicator

This 4-digit LED indicates the elapsed time or tape count. It also indicates a part of tape status and VCR operations.

0000 ~ 9999 : The LED indicator serves as a tape counter.

-59:59 ~ 59:59: The LED indicator serves as a lap counter.

SFAR / XXXX : Indicates that the tape is at the beginning.


This indication is given when a new cassette is loaded or the tape has been rewound.

End / XXXX : Indicates that the tape is at the end.


----- : Indicates that condensation has occurred inside the VCR. In this case, the VCR will not start until condensation is eliminated. Wait until the "-----" indication disappears.

AL XX : Indicates that the VCR malfunctions. If this indication is still displayed by repeating operation, the VCR may be defective. When asking for repair service, inform the service center of the AL number.


LAP/TAPE Button

LAP/TAPE Selects counter indication, lap or tape count.
 Every press of the button alternates LAP and TAPE.

RESET Button

RESET
 Resets the counter to zero.

MEMORY Button

 Turns on and off the memory function. Every press of the button alternates on and off. When the memory function is activated, the lamp above the button is on and the tape stops automatically in the fast forward or rewind mode when the counter reads zero. The memory function is effective for both LAP mode or TAPE mode.



EDIT Button

This button starts edit playback. By pressing this button, the edit playback starts and the lamp above the button comes on. In the edit playback mode, the cue signals can be recorded with the ENTER button while observing replayed pictures. In the process of edit playback, previously-recorded cue signals are erased.

The edit playback speed is the same as the normal playback speed.

To stop edit playback, press the STOP button.

ENTER Button

This button is used to record the cue signals on tape. It is effective during recording or edit playback. Every press of the button records a cue signal.

CUE STOP Button

Turns on and off the cue stop function. Every press of the switch alternates on and off. If the cue stop function is activated, the lamp above the button is on. The cue stop function automatically stops tape when the cue signal is detected in the fast forward, rewind, or high-speed search mode.

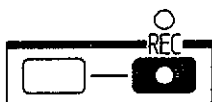
EJECT Button



Opens the stage where a video cassette is loaded. By pressing this button, the stage opens and the lamp above the button comes on. To close the stage, push the triangle mark in the upper center by hand.

The EJECT lamp lights up when the stage is open or no cassette is loaded in the stage. The EJECT button does not function during recording or playback.

REC Buttons (Recording)



These two buttons are used to start recording. Recording starts by pressing the righthand REC button while pressing the lefthand button. (Either button can be pressed first.) During recording, the lamp above the button is lit. To stop recording, press the STOP button.

REW Button (Rewind)



Rewinds tape at high speed. By pressing the button, the lamp above the button comes on and tape begins to be rewound. During rewinding, no image is displayed on the monitor screen. When tape has been rewound to the beginning, rewinding stops and the lamp goes out. To stop rewinding partway, press the STOP button or use the cue stop or memory function.

Pressing the REW button during playback puts the system in the reverse high-speed search mode.

STOP Button



Stops any VCR operation. Also press this button to cancel alarms.

FF Button (Fast Forward)



Feeds tape at high speed. By pressing the button, the lamp above the button comes on and fast forwarding starts. During fast forwarding, no image is displayed on the monitor screen. When tape has been fed to the end, fast forwarding stops and the lamp goes out. To stop fast forwarding partway, press the STOP button or use the cue stop or memory function.

Pressing the FF button during playback puts the system in the forward high-speed search mode.

SEARCH Button



Used for search playback. Pressing the button turns on the lamp above the button and the STILL LED at the center of the speed indicator. (When the button is pressed, a still picture is displayed.) By turning the dial under the STILL LED, search playback (i.e., playback at variable speeds) starts.

In the search playback, playback speed can be changed with the dial in 10 steps from 2 pictures/second to 1000 pictures/second (for the recording speed of 500 pictures/second).

Clockwise rotation of the dial enables forward (FWD) playback. Counterclockwise rotation enables reverse (REV) playback. The speed indicator above the dial indicates the playback speed by illuminating the LED bars.

At the maximum speed, pictures are replayed two times faster than they have been recorded.

STILL/PAUSE Button



This button starts still playback and pauses recording.

If this button is pressed during normal playback or search playback, a still picture is displayed. During still playback, the lamp above the button lights up and the STILL LED at the center of the speed indicator flashes.

If the button is pressed during recording, the lamp above the button lights up and recording is paused.

Another press of the button restores the previous operation (except for search playback).

Pressing the REC button during the STILL operation puts the system in the REC PAUSE status.

NOTE: If the still mode is selected in the search playback and then the search playback is selected again, the image remains still, and pictures are not played back at the former dial position (i.e., speed).

If the STOP button has been pressed (and the STOP lamp is on), pressing this button does not initiate still playback.

PLAY Button



This button is used to start normal playback. If it is pressed, the lamp above the button comes on and pictures are played back in the forward direction at the constant speed.

To stop normal playback, press the STOP button.

REV STEP Button (Reverse step)



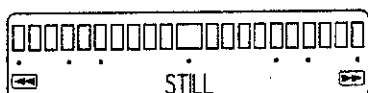
This button replays the previous still picture in the still playback. Every press of the button replays the next still picture in the reverse direction (i.e., traces back pictures one by one).

FWD STEP Button (Forward step)



This button replays the next still picture in the still playback. Every press of the button replays the next still picture in the forward direction.

Speed Indicator



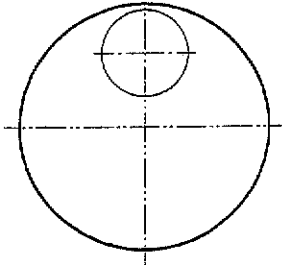
This indicator consists of LEDs, which indicate the playback speed in the search playback.

In the forward (FWD) playback, the LEDs on the right of the STILL LED at the center come on. In the reverse (REV) playback, the LEDs on the left of the STILL LED come on. The number of illuminated LEDs changes in accordance with the playback speed.

The LED next to the STILL LED represent 2 pictures/second, and the rightmost and leftmost LED represent 1000 pictures/second. The LEDs between them indicate 4, 8, 16, 24, 60, 120, 240 and 500 pictures/second. (These values are halved for tape recorded at the rate of 250 pictures/second.)

The speed indicator does not light up in the normal playback and jog playback.

Dial



This dial changes the speed and direction of search playback and jog playback. Clockwise rotation enables forward (FWD) playback. Counterclockwise rotation (REV) enables reverse playback.

In the search playback, the playback speed varies in accordance with the dial position. When the dial is released playback continues at the previously dialed speed.

In the search playback, the playback speed is indicated on the speed indicator.

In the jog playback, the playback speed varies in accordance with the speed of rotating the dial. Playback operation stops and a still picture is displayed when the dial rotation is stopped.

Jog Playback

There is no JOG button. The jog playback is enabled when the STILL LED in the speed indicator flashes. To start jog playback either of following applies.

- 1) Press PLAY button, then press STILL/PAUSE button.
- 2) Press SEARCH button, then press STILL/PAUSE button.

MONITOR MOUNT

This monitor mount is designed to mount the monitor and allows the direction of the monitor to be changed.

Direction of the monitor installed on the monitor mount can be changed within the vertical (tilt) and horizontal (pan) allowable ranges. No knob is provided to fix the monitor mount in the horizontal direction.

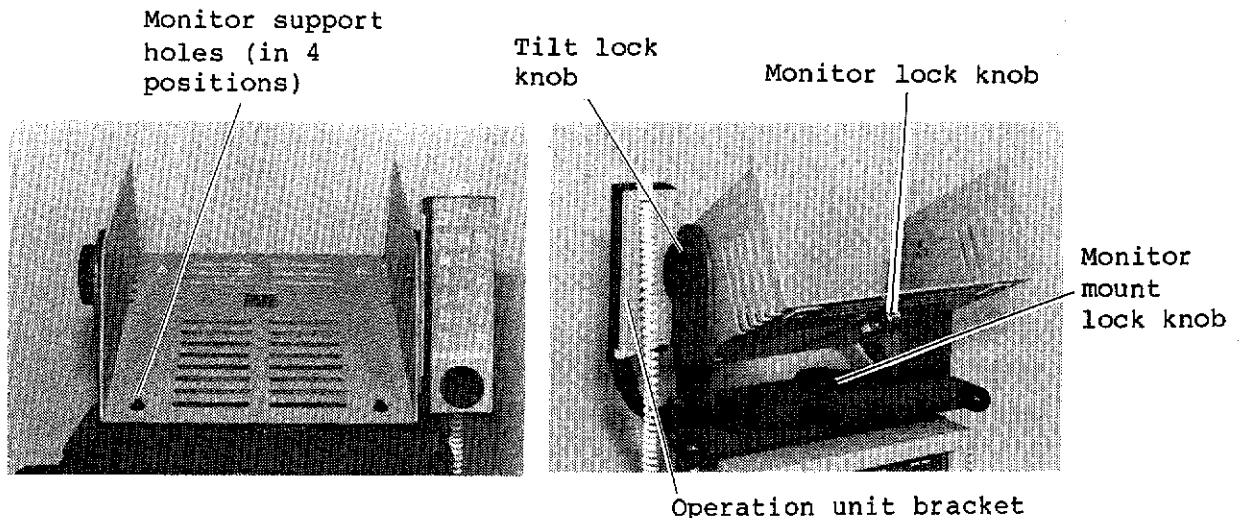


Fig. 2-11

Tilt Lock Knob

Locks the vertical angle of the monitor (i.e., tilt angle) at any position. Rotate the knob counterclockwise to loosen it, change the tilt angle, and rotate the knob clockwise to lock it tightly.

Monitor Mount Lock Knob

Locks the monitor mount to the VCR.

Monitor Support Holes

These holes are used to support four legs of the monitor. Insert the monitor legs into these holes and move the monitor backward; the monitor will be in position. Then, rotate the monitor lock knob fully clockwise to tighten the hook.

Monitor Lock Knob

Fastens the monitor to the monitor mount. The L-shaped hook at the end of the lock knob fastens the bottom of the monitor. Rotating the lock knob counterclockwise loosens it, and rotating clockwise fastens it. Be sure to turn the lock knob fully when fastening or loosening it.

Operation Unit Bracket

The operation unit can be placed on this bracket for easier access to the buttons.

MONITOR

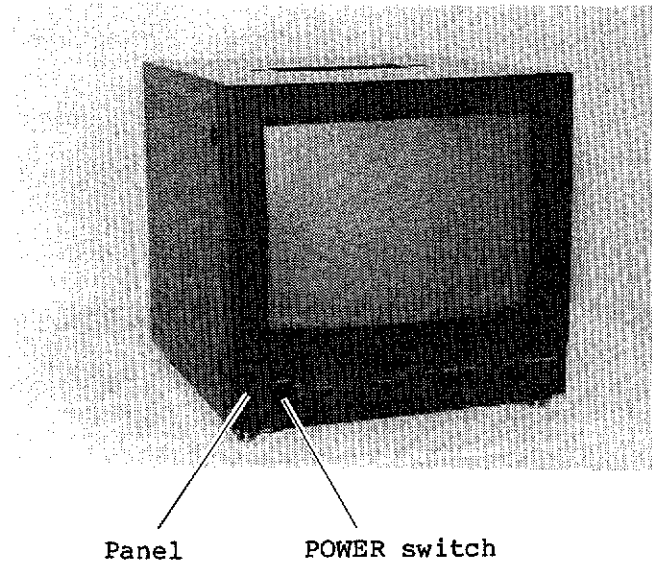


Fig. 2-12

(Front Panel)

POWER Switch : Rotate this switch to ON. The lamp on the left of the switch comes on, and an image appears after approx. 30 seconds. The POWER switch may usually be left on and power controlled from the VCR.

The following knobs are installed on the front panel.

CONTRAST Knob : Controls the contrast of images.

BRIGHTNESS Knob : Controls the brightness of images.

TINT Knob : Controls the tint of images.

COLOR Knob : Controls the color density of images.

NOTE: The monitor shown and explained here is of a typical. Appearance may be different depends on video system; NTSC or PAL.

VIDEO connector

AC IN connector

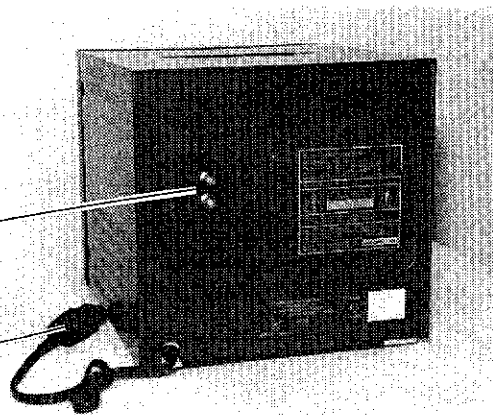


Fig. 2-13

(Rear Panel)

VIDEO Connectors

- IN : Connect the video cable to this connector and the J9 VIDEO OUT connector on the VCR connector panel.
- OUT : This can be used to connect another monitor, VCR or video equipment. If VIDEO OUT connector is not used, it is terminated automatically.

AC IN Connector

Connect this connector to the J2 MONITOR connector on the VCR connector panel.

SECTION III
RECORDING OPERATION

RECORDING STEPS (General)

SETUP IN RECORDING LOCATION

SWITCH ON

SUBPANEL SWITCH SETTING

SETUP FOR SHUTTERED RECORDING

SETUP FOR STROBE RECORDING

HOW TO TURN ON STROBE

CHECKING IMAGE OF OBJECT

COLOR BALANCING

INSERTION OF VIDEO CASSETTE

SELECTION OF COUNTER DISPLAY

RECORDING AND STOPPING

FAST FORWARD AND REWIND

SWITCH OFF

RECORDING STEPS (General)

Preparing Equipment

Prepare the equipment according to the type of object and method of recording.

Lens or Special Optical System

Distance and rate of expansion/reduction

How near or how far to get close to an object, and how large to record

Strobe Recording or Shuttered Recording

For shuttered recording, the shutter speed suitable to the moving speed of an object should be calculated in advance.

Lighting Equipment

Ambient illumination, brightness of an object, shuttered or strobe recording

Tripod or Support

Fixture of the camera and strobe

Moving to Recording Location

Check that the monitor and operation unit are fixed. Hold the handle of the cart securely, and move the equipment slowly.

Setup for Recording

Determine the camera and strobe positions and point them to the object.

Connect the cables and turn on power.

VCR subpanel

Camera input, color or black and white, and recording speed

Adjust the camera picture.

White balance, shutter speed, recording speed, filter, lens aperture, and focusing

Start Recording

Insert a video cassette.

Is there enough tape?

Counter display

LAP or TAPE?

Press the two REC buttons to start recording.

Stop Recording

Press the STOP button.

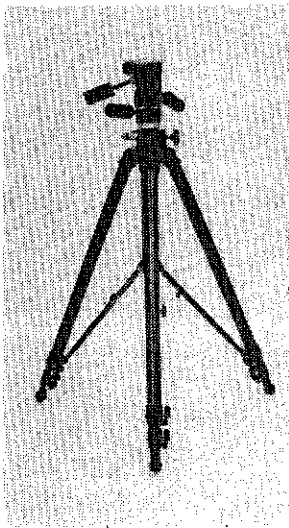
Rewind the tape to the position where recording started using the memory function.

SETUP IN RECORDING LOCATION

Determine the approximate tripod position from the distance to the object, and place the tripod on a stable place on the floor.

Level the camera head of the tripod, and securely lock the pan, tilt and other movable portions before mounting the camera and strobe or illuminating device. In particular, be sure to lock the tilt and make the elevation "rather hard."

Handling of Tripod



Set level and lock tilting and panning devices.

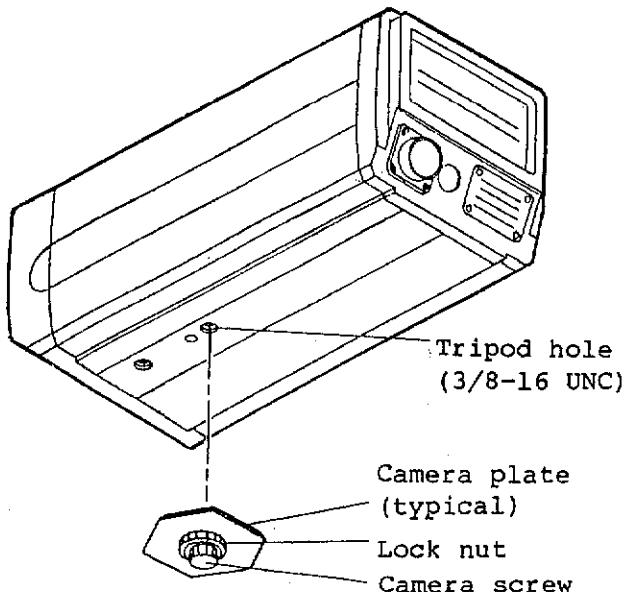
Make elevation relatively firm.

Tighten support lock knob.

CAUTION:

In handling a tripod, it is important to mount a camera and strobe on it stably. In particular, lock the tilt and elevator securely before mounting a camera to avoid unexpected tilting and down motion. When handling these devices, loosen the locks gradually. Figure at left shows an example.

Mount the Camera to the Tripod.



The camera has two tripod threads and a pin hole on the bottom.

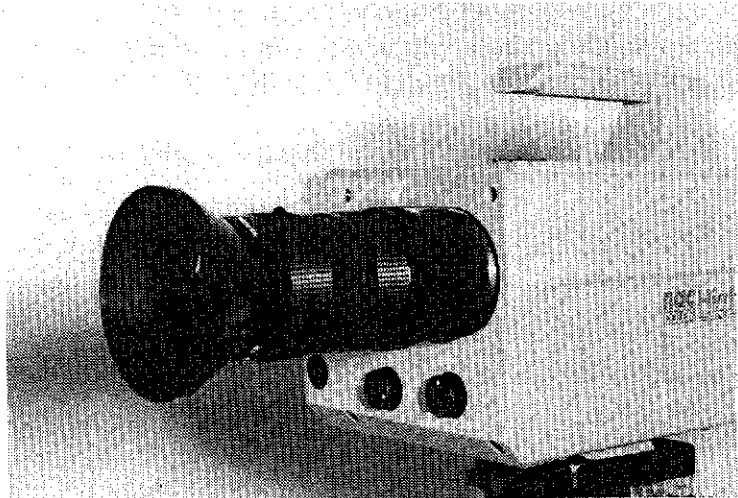
It depends on type of tripod used, however fix the camera securely on the tripod.

Figure at left shows an example.

Set the Lens.

It is recommended to set the lens after mounting the camera on the tripod. Set the filter knob of the camera to the CLOSE position, then remove the C mount cap.

Fit the C mount of the lens to the C mount of the camera, and rotate the lens clockwise to set it.



Prepare the Lighting Lamps.

(For recording using lighting lamps)

Use a proper stand for the lighting lamps.

On completion of the above setting, point the camera and the lightings to the object.

Connect the Cables.

Before connecting the cables, determine the approximate position of each unit in advance considering the cable length. The system may be moved by a short distance with cables connected. However, it is not recommended to move the system a longer distance with cables connected.

Cable connection depends on the system configuration. Fig. 3-1 on page 3-6 show the connection for the standard configuration. For the connection of the optional units such as the XY coordinator and wave inserter, refer to their operation manuals.

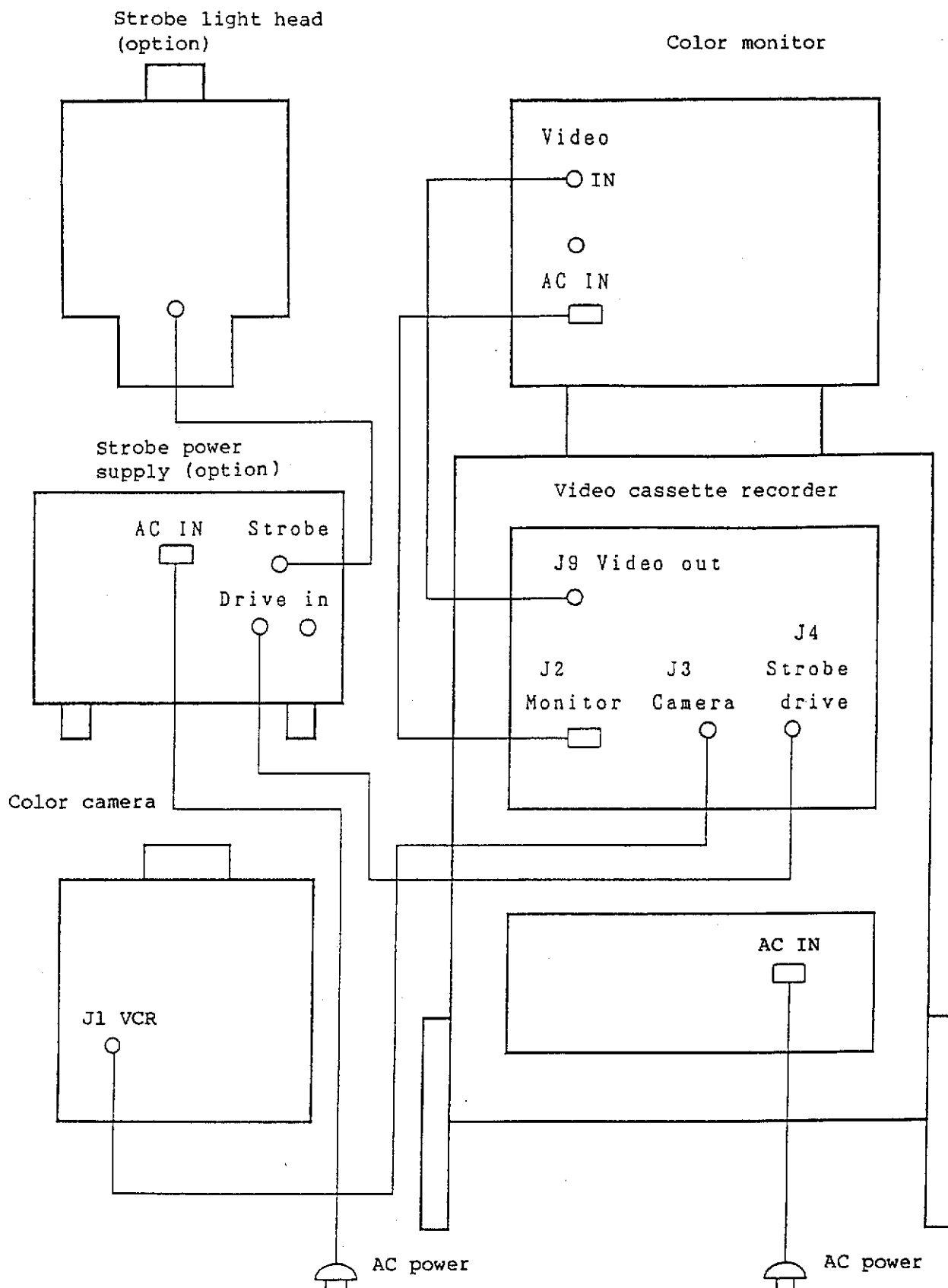


Fig. 3-1 Cable Connection

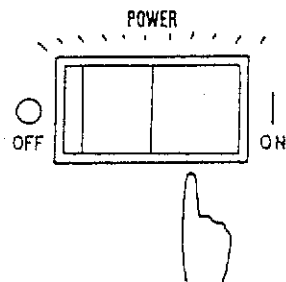
SWITCH ON

Usually, the power switch of the monitor may be set to ON. The system power may be turned on and off with the POWER switch of the VCR.

VCR : A rocker switch in the upper right of the front panel (Press the | side.)

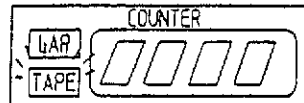
Monitor: A rotary switch in the lower left of the monitor front panel (Set to ON.)

Turn on the VCR. - Set the POWER switch to ON.

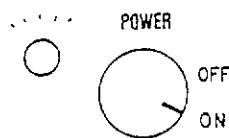


The POWER switch lamp comes on.

In addition, the EJECT and TAPE lamp on the operation unit come on, and the counter indicates 0000.



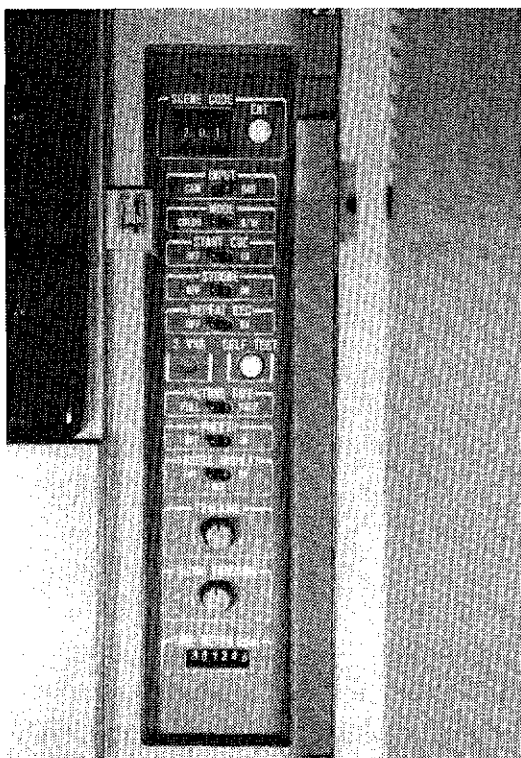
Turn on the Monitor. - Press the POWER switch.



The pilot lamp on the monitor comes on. The monitor screen brightens quickly, and numerals 001 00:00:000 are displayed in the upper center of the screen.

CAUTION: Allow the system to warm up for at least 3\minutes before attempting cassette insertion. The system has condensation detector, however it may take a couple of minutes to detect and prevent further operation. A time for the detection depends on the environments.

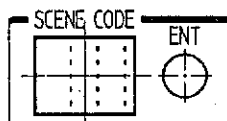
SUBPANEL SWITCH SETTING



Push the square mark on the subpanel door; the subpanel can be seen. To close it, push the square mark again.

Fig. 3-2 Subpanel

Setting Scene Code



Set an intended scene code with the SCENE CODE thumbwheel switches. Then, press the ENT button. The code set with the switches is displayed on the screen.

Set the INPUT switch to the CAM position to record camera images.



Color or Black and White Recording?



For color recording, set the MODE switch to COLOR. For black and white recording, set it to B/W.

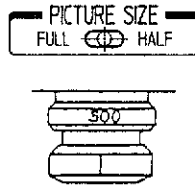
Use B/W mode when the image to be recorded is too dark to use color for its analysis.

To Insert a Cue Signal at Beginning of Each Scene



Set the START CUE switch to ON.

Frame Rate, 500 or 250?



Set the PICTURE SIZE switch to HALF for recording at 500 picture/second. For recording at 250 pictures/second, set it to FULL.

To Turn On and Off the Strobe from VCR



The strobe turns on by setting the STROBE switch to ON. (The switch on the strobe light head shall be set to the AUTO position in advance.)
The strobe light system is optional.

For shutter recording, this switch shall be set to the same frame rate as that of the frame rate knob of the camera.

Repeat Recording?



This switch selects between normal recording and repeat recording. For normal recording, set the switch to OFF. For repeat recording, set the switch to ON.

NOTE:



As for recording format, when an S-VHS cassette is used, recording is automatically set to the S-VHS format, and when a VHS cassette is used, it is to the VHS format.

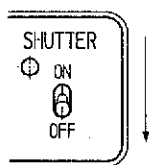
SETUP FOR SHUTTERED RECORDING

This paragraph describes the outline of camera setting for shuttered recording.

The optional strobe light cannot be used for shuttered recording.

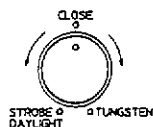
The shutter speed and frame rate shall be determined in advance in accordance with the moving speed of an object.

SHUTTER ON/OFF Switch - OFF



Set the SHUTTER ON/OFF switch to OFF.

Filter Knob



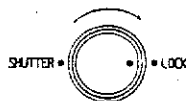
Set the filter knob of the camera in accordance with the lighting condition.

STROBE/

DAYLIGHT: Recording under the sunlight

TUNGSTEN: Recording with tungsten lamps

SHUTTER/LOCK Knob - LOCK



Make sure that the shutter has stopped, then set the SHUTTER/LOCK knob on the front panel to the LOCK position. Turn the shutter speed knob so that the shutter locks.

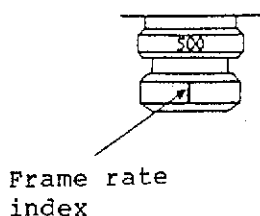
Shutter Speed Knob - OPEN



Pull and rotate the shutter speed knob of the camera to position the OPEN mark to the index on the shutter shaft. When it is set, make sure that the knob is pulled back and its end face is level with the end face of the shutter shaft.

Frame Rate (Recording Speed) Setting

Frame Rate Knob - 500 or 250



Pull and rotate the frame rate knob behind the shutter speed knob to set the 500 or 250 mark to the frame rate index on the outer circumference of the shutter speed knob. Make sure that the knob is pulled back at the position where the mark is set to the index.

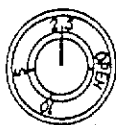
500 : Recording at 500 pictures/second

250 : Recording at 250 pictures/second

Set the Shutter Speed.

Shutter Speed Knob - 2.5, 5 or 10

Pull and rotate the shutter speed knob to set the 2.5, 5 or 10 mark to the index on the shutter shaft.



2.5: 1/2500 sec.

5 : 1/5000 sec.

10 : 1/10000 sec.

Make sure that the knob is pulled back and its end face is level with the end face of the shutter shaft at the point where the mark is set to the index.

In shuttered recording, set the PICTURE SIZE switch on the VCR subpanel to the same speed as that of the frame rate knob of the camera.

FULL: 250 pictures/second

HALF: 500 pictures/second

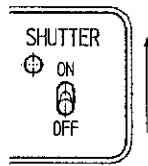
SHUTTER/LOCK Knob - Return to SHUTTER.



Return the SHUTTER/LOCK knob to the SHUTTER position. By this, the shutter can rotate.

NOTE: If the SHUTTER/LOCK knob is set to the LOCK position, the shutter does not rotate and the lamp does not go on even if the SHUTTER ON/OFF switch is set to ON.

SHUTTER ON/OFF Switch - ON



Set the SHUTTER ON/OFF switch to ON; The shutter rotates and the SHUTTER lamp goes on.

NOTE: If the frame rate knob of the camera and the PICTURE SIZE switch on the VCR are set to different values, the SHUTTER lamp flashes. It also flashes if the shutter speed knob is set to OPEN. In both cases, the shutter rotates at low speed. Check the setting.

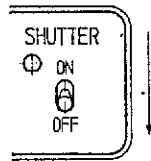
Then, as described on page 3-16 and following pages, turn on the lighting lamps, check the image of the camera, and adjust color balance.

SETUP FOR STROBE RECORDING

This paragraph describes the outline of camera setting for strobe recording.

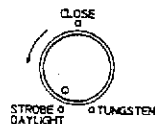
In strobe recording, the shutter shall be set to the OPEN-LOCK position to prevent it from rotating.

SHUTTER ON/OFF Switch - OFF



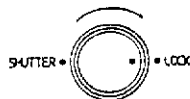
Set the SHUTTER ON/OFF switch to OFF.

Filter Knob - STROBE



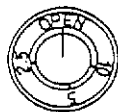
Set the filter knob on the front panel of the camera to the STROBE position.

SHUTTER/LOCK Knob - LOCK



Make sure that the shutter has stopped, then set the SHUTTER/LOCK knob on the front panel to the LOCK position. Turn the shutter speed knob so that the shutter locks.

Shutter Speed Knob - OPEN



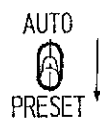
Pull and rotate the shutter speed knob of the camera to position the OPEN mark to the index on the shutter shaft. When it is set, make sure that the knob is pulled back and its end face is level with the end face of the shutter shaft.

Frame Rate (Recording Speed) Knob

The frame rate knob may be set to either position, 500 or 250.

In strobe recording, the recording speed is selected with the PICTURE SIZE switch on the VCR subpanel.

AUTO/PRESET Switch - PRESET



Set the AUTO/PRESET switch to PRESET.

STROBE/TUNGST Switch - STROBE



Set the STROBE/TUNGST switch to STROBE.

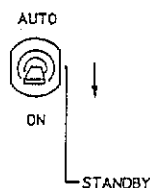
Then, as described on following pages, turn on the strobe, check the image of the camera, and adjust color balance.

HOW TO TURN ON STROBE

The strobe is ready for operation at any time if the POWER switch of the strobe power unit is set to ON. If the POWER switch of the strobe power unit is set to ON, the POWER lamp on the strobe light head goes on. Hereafter, the strobe can be turned on and off by setting the strobe switch or starting recording operation.

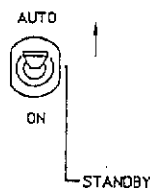
Unless recording is to be started immediately, the strobe switch shall be set to OFF to turn off the strobe. The strobe does not light in the STANDBY position.

Continuous Lighting - ON



The strobe lights up if the strobe switch on the strobe light head is set to ON.

Remote Lighting - AUTO



The strobe lights up synchronously with VCR operation if the strobe switch on the strobe light head is set to AUTO.

Automatic Lighting when Starting Recording

If the strobe switch on the strobe light head is set to AUTO, the strobe lights up simultaneously with starting recording.

Lighting through VCR Operation



If the strobe switch on the strobe light head is set to AUTO, the strobe lights up when the STROBE switch on the VCR subpanel is set to ON. This operation may be used to observe the camera picture without recording.

NOTE: Turn off the strobe when not necessary, to prolong service life of the strobe lamp.

CHECKING IMAGE OF OBJECT


To use the strobe, turn on the strobe light head switch. To use a lamp for illumination, turn on the lamp power switch.

Direct the strobe or illuminating lamp toward the object and adjust the illumination.

For the shutter recording, turn the shutter to see how the image is.

Adjust the lens iris so that the monitor displays the camera picture.

Sensitivity Adjustment of Camera - GAIN Switch

GAIN	The GAIN switch controls the sensitivity of the camera. Set it to the 0 dB position normally.
+6dB	
0dB 	Use +6 dB if lighting is insufficient but increases noise.
-6dB	Use -6 dB if lighting is sufficient and it increases picture quality.

COLOR BALANCING

Color balancing is to control the recording conditions of the camera to get as near as possible to the actual colors of the object.

The system supports two kinds of color balancing: Black balancing and White balancing.

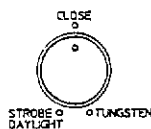
If the color balancing is poor, the color reproduction becomes poor.

It is possible to proceed recording by simply pressing the PRESET button without color balancing but the resulting color reproduction will be poor. Perform color balancing as often as possible.

First, adjust black balance. Regardless of lighting differences, only one operation of this adjustment will do. Then, adjust white balance. White balance should be adjusted every time the lighting differs. This adjustment is stored in memory in the camera. Therefore, even when the power is turned off after white balance is adjusted, for example, with the strobe, balance adjustment is not necessary any more for another strobe recording operation.

PROCEDURE OF COLOR BALANCE ADJUSTMENT

1. Black Balancing



Set the filter knob of the camera to the CLOSE position.

Set the WHT/BLK switch of WHT/BLK BALANCE to the BLK position.

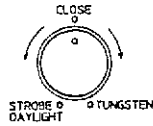


Set the AUTO/PRESET switch to the AUTO position, and release.

When black balancing is completed, both WHT and BLK lamps come on, and then go out after about 10 seconds.

If black balancing is not completed, the WHT and BLK lamps flashing for about 1 minute. In such a case, check filter knob CLOSE setting and repeat adjustment.

2. White Balancing



Set the filter knob of the camera to the TUNGSTEN (or STROBE/DAYLIGHT) position.

For shuttered recording, turn the shutter on.

Open the lens iris for easy observation of the camera picture.

Illuminate a piece of white paper with a illumination to be used, and observe its image obtained through the camera.

(Place the white paper so that the monitor screen will be white all over uniformly. Make sure that there is no difference in whiteness especially vertically and horizontally in the screen.)

Adjust the lens to achieve out of focus (so that the screen will be uniformly white).



Set the WHT/BLK switch of WHT/BLK BALANCE to the WHT position.

Set the AUTO/PRESET switch to the AUTO position, and release.

When white balancing is completed, both WHT and BLK lamps come on, and then go out after about 10 seconds.

If white balancing is not completed, the WHT and BLK lamps flashing for about 1 minute. The relationship between lamp flashing and lighting condition is as follows:

WHT lamp flashes: Too bright

BLK lamp flashes: Too dark

Both WHT & BLK lamps flash:

Filter knob setting is not suitable to the lighting.

In such a case, check filter knob setting and repeat adjustment. White balance cannot be obtained if lighting is too bright or too dark. Also change the lens iris opening.

NOTE: Repeat the color balancing if a lighting (tungsten lamp or strobe/daylight) condition, GAIN or recording speed has changed.

3. How to Use PRESET Position

If white balance cannot be adjusted by repeating the adjustment or there is not enough time, recording may be performed by setting the AUTO/PRESET switch to the PRESET position and setting the STROBE/TUNGST switch in accordance with the lighting to be used. The PRESET position offers the standard white balance in the camera.

NOTE: Black balancing must be performed, first.

STROBE/

DAYLIGHT: For lighting under sunlight or strobe.

TUNGST : Lighting using a lamp of 3200K color temperature.

GAIN : 0 dB

INSERTION OF VIDEO CASSETTE

Press the EJECT Button.



The stage opens, allowing cassette insertion.

Insert a Cassette.

Insert a video cassette with its arrow mark facing down and the tape window facing toward you.

NOTE: Cassettes with the erasure prevention tab removed cannot be used for recording.

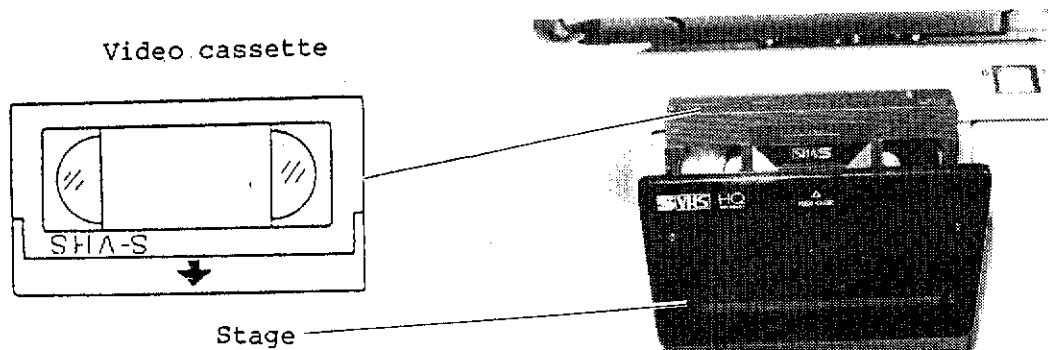


Fig. 3-3

Push to Close the Stage.

After inserting a video cassette, push the upper center (triangle mark) of the stage by hand to close it. The EJECT lamp goes off and the STOP lamp comes on. The counter on the operation unit may indicate the tape condition.

NOTE: Push the upper center of the stage firmly. If the stage is not closed, the tape may be damaged.

Counter Display

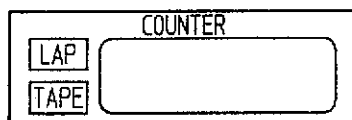
Meaning

Displays $S \overline{A} \overline{r}$ and : At the beginning of tape
 $\overline{0000}$ alternately

Displays $E \cap d$ and : At the end of tape
 $\overline{0000}$ alternately

Displays ----- : Condensation inside
 prevents VCR from
 functioning, (for tape
 protection.) Wait until
 this display disappears.

SELECTION OF COUNTER DISPLAY



The COUNTER on the operation unit offers two counter functions: LAP counter or TAPE counter. As a LAP counter, it displays elapsed time in seconds up to 59 minutes 59 seconds. As a TAPE counter, it counts tape progress up to 9999.

Select Counter Function, TAPE or LAP. -- LAP/TAPE Button

LAP/TAPE



Select LAP or TAPE by pressing the LAP/TAPE button.

Every press of the button alternates LAP and TAPE indications and turns on the LAP or TAPE lamp.

Resetting -- RESET Button

RESET



To reset the counter, press the RESET button.

Pressing the RESET button only resets the LAP or TAPE counter function being displayed.

RECORDING AND STOPPING

Starting and stopping of the record function is performed on the operation unit, or on the VCR CONTROL switches of camera.

In the following description, operation on the operation unit is explained as a typical operation.

If the REC lamp does not come on by pressing the two REC buttons on the operation unit, an on-screen message is displayed on the monitor.

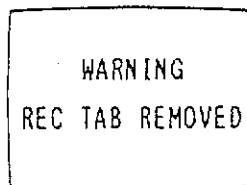
Cassette is not loaded. (The EJECT lamp remains on.)



Look through the stage window to check whether a cassette is loaded or not.

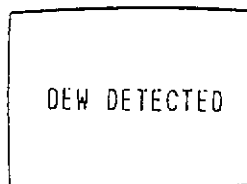
NOTE: When this indication appears despite the presence of a cassette inserted, eject it, make sure that the tape is not loose and insert the cassette into the stage.

Cassette for playback only is loaded. (The stop lamp remains on.)



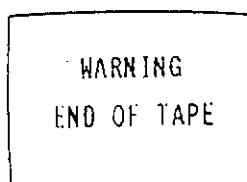
It is impossible to record on a cassette with an erasure prevention tab removed. Open the stage to check whether the cassette has a tab or not.

"END" is displayed on the COUNTER on the operation unit.



The tape has been wound to the end. Rewind it or load a new cassette.

Dew remains inside the VCR



The COUNTER display of the operation unit will have "-----" indicated. Leaving the VCR power on, wait until the indication disappear and it changes to tape counter digits. The indication will ordinarily disappear in around three minutes.

RECORDING -- Immediate Recording



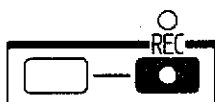
Press the two REC buttons.

The REC lamp comes on, and recording starts as the time display in the picture progresses.

RECORDING -- Standby in Record Mode



Press the STILL/PAUSE button, then press the two REC buttons. The STILL/PAUSE and REC lamps come on.



Recording starts when the STILL/PAUSE button is pressed again.

During recording, the time indication of the monitor and COUNTER on the operation unit advance.

PAUSE AND RESTART -- Press the STILL/PAUSE Button.



If recording is paused, the tape stops in the condition where it is wound around the head drum. If the STILL/PAUSE button is pressed again, recording restarts.

NOTE: If the pause time exceeds 30 seconds, the tape advances a little for video head and tape protection. The tape advances every 30 seconds. Thus, the gap (with no recorded images) is obvious if the tape is paused for a long time.

STOPPING RECORDING -- Press the STOP Button.



If recording stops, time display is reset to zero, scene code is incremented by one, and COUNTER displays a value when recording has stopped.

Turn off the lighting.

Turn off the illumination after recording is stopped. In the strobe recording, the strobe will be automatically turned off when recording is stopped if the strobe switch is in AUTO (if the STROBE switch on the VCR subpanel is off).

Scene code and time display

If recording is stopped or paused with the STOP or STILL/PAUSE switch, the scene code is incremented by one and the time display is reset to zero automatically.

FAST FORWARD AND REWIND

The REW and FF buttons are used for fast forward and rewind operations.

The fast forward and rewind functions are used to search a position to be replayed or an unrecorded position quickly. No picture is displayed during these operations. Automatic stopping using the memory function of the counter or using the cue signal shall be used for quick searching.

(Fast forward or rewind operation while playing back a tape is called "high-speed search", which is described in SECTION VI.)

Memory function : Press the MEMORY button. (The lamp comes on.) The tape stops automatically when the counter reaches zero.



Cue stop function: Press the CUE STOP button. (The lamp comes on.) The tape stops automatically when a cue signal is detected.



If an ST-120 (SE-180) cassette is used, the fast forward or rewind from one end to another end of the tape is completed in approx. 4 minutes. A beep sound is heard where a cue signal is recorded.

NOTE: If the counter serves as a lap counter, counting stops where no signals are recorded on tape.

Rewind -- REW Button



Press the REW button.

The lamp of the REW button comes on. Tape is rewound at a high speed toward the beginning of the tape. When the tape has been rewound to the beginning, the tape stops automatically, the lamp of the REW button goes out, and the STOP lamp comes on.

Whether the tape has been rewound completely can be seen the counter display. If tape has been completely rewound, the counter displays START. If the counter does not display START when tape stops, the memory or cue stop function will have stopped it.

In either case, the reason of stopping is displayed on the monitor.

Fast Forward -- FF Button



Press the FF button.

The lamp of the FF button comes on. Tape is wound at a high speed toward the end of the tape. When the tape has been wound to the end, the tape stops automatically, the lamp of the FF button goes out, and the STOP lamp comes on.

Whether the tape has been wound completely can be seen from the counter display. If tape has been completely wound, the counter displays END. If the counter does not display END when tape stops, the memory or cue stop function will have stopped it.

In either case, the reason of stopping is displayed on the monitor.

Stopping Midway -- STOP Button



Press the STOP button to stop tape.

Changing to Another Mode

Recorded tape can be replayed immediately after recording.

The mode can be changed to playback, for example, by pressing the PLAY or SEARCH button during fast forward or rewind operation. The button corresponding to intended function may be pressed without pressing the STOP button.

Others

For the memory function, repeat recording, or a cue signal, refer to Section V "Other Useful Functions" for more details.

SWITCH OFF

Before turning off power, remove the cassette from the VCR. Close the cassette stage. Then, set the POWER switch of the VCR to OFF.

The POWER switch of the monitor may be left at the ON position.

Set the filter knob of the color camera to the CLOSE position, and cap the lens.

When placing the color camera in the case, remove the lens, and screw the caps into the C mount of the lens and camera.

SECTION IV

PLAYBACK OPERATION

PREPARATION FOR PLAYBACK

NORMAL PLAYBACK	[PLAY]	:	Playback time takes 4.2 times longer than record time.
STILL PLAYBACK	[PLAY-STILL]	:	Still picture
STEP PLAYBACK	[FWD STEP]	:	Forward feed of a single field
	[REV STEP]	:	Reverse feed of a single field
SEARCH PLAYBACK	[SEARCH]	:	From low to high speed in either direction with the dial
JOG PLAYBACK	[SEARCH-STILL]	:	In either direction and speed according to dial turning speed
FREEZE FUNCTION	[FREEZE]	:	Stores any picture in the memory during playback
EDIT PLAYBACK	[EDIT]	:	For inserting a cue signal during normal playback
HIGH SPEED	[PLAY-FWD]	:	Fast forward during playback
SEARCH PLAYBACK	[PLAY-REV]	:	Rewind during playback

ELIMINATION OF NOISE FROM REPRODUCED IMAGE

PAUSE AND STOP DURING PLAYBACK

STOPPING PLAYBACK

SWITCH OFF

DUBBING : Making a copy of tape

CAUTION: If an image (the same position of tape) is replayed repeatedly for a number of times, the image quality is deteriorated. For repeating playback, use a copy of tape. We recommend to keep the original tape.

PREPARATION FOR PLAYBACK

After a video cassette is inserted into the VCR, playback operation is performed on the operation unit. Only freeze operation shall be performed on the VCR subpanel.

Various Playback Modes

To review tape slowly:	
Normal playback	page 4-3
To see a still picture:	
Still playback	page 4-4
To see the preceding or following picture:	
Step playback	page 4-5
To see pictures by changing playback speed:	
Search playback	page 4-6
To search for an intended scene quickly:	
Jog playback	page 4-8
To freeze a certain picture only:	
Freeze function	page 4-9
To insert a cue signal during playback:	
Edit playback	page 4-10
For fast forward or rewind while observing pictures:	
High-speed search playback	page 4-11

PICTURE SIZE Switch



Set the PICTURE SIZE switch on the subpanel to the recorded speed of the video cassette to be played back.

250 pictures/second: FULL
500 pictures/second: HALF

Recording Format -- S-VHS or VHS



The format recorded on tape is detected automatically, and tape is played back correctly.

When the format is S-VHS, the S-VHS lamp on the subpanel turns on.

NORMAL PLAYBACK - PLAY Button

Press the PLAY button.



The PLAY lamp comes on and pictures are played back at the constant speed. This mode is used to review tape through slowly or to search for scenes to be looked at carefully.

Still Playback during Normal Playback

Press the STILL/PAUSE button to change normal playback into still playback.



The PLAY and STILL/PAUSE lamps come on and the STILL LED flashes.

Step playback and jog playback are allowed in this state.

Press the STILL/PAUSE button to return to the normal playback mode.

Stopping Normal Playback

Press the STOP button.



Normal playback stops.

STILL PLAYBACK - STILL/PAUSE Button

Press the STILL/PAUSE button, then press the PLAY button.

A still picture is displayed.



At this time, the STOP lamp goes out, STILL/PAUSE and PLAY lamps come on, and the STILL LED of the speed indicator flashes.

Still playback can also be allowed by pressing the STILL/PAUSE button and then pressing the SEARCH button.

NOTE: If the STILL/PAUSE button is pressed when in stop mode, the lamp of the STILL/PAUSE button comes on, however the VCR remains in the stop mode and the stop lamp stays on.

Operation in Still Playback Mode (PLAY lamp ON)


- o The normal playback mode is restored if the STILL/PAUSE button is pressed again.
- o If the FWD STEP or REV STEP button is pressed, the VCR enters the step playback mode, where pictures can be replayed one by one in the forward and reverse direction.
- o If the dial is rotated, jog playback is enabled.

STEP PLAYBACK (Single field feeding)


If the FWD STEP or REV STEP button is pressed in the still playback mode, the next or preceding still picture is played back. Every press of the FWD STEP or REV STEP button feeds pictures one by one in the forward or reverse direction.

Step playback is enabled if the STILL LED on the speed indicator is alight or flashing.

Forward Step Feed - Press the FWD STEP button.

FWD STEP Every press of the button displays the
 next still picture.

Reverse Step Feed - Press the REV STEP button.

REV STEP Every press of the button displays the
 preceding still picture.

SEARCH PLAYBACK - SEARCH Button and Dial

Use the search playback to observe pictures by changing the playback speed. The playback direction and speed changes in accordance with the dial turning direction and angle. If you release your hand from the dial, playback continues at the speed of the dial position at that time. At the maximum speed, tape is played back twice as fast as it is recorded.

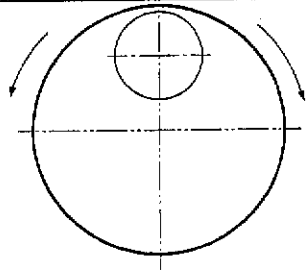
- (1) Press the SEARCH button.



The SEARCH lamp and the STILL LED on the speed indicator come on. (Search mode)

At this time, a still picture is displayed.

- (2) Rotate the dial in desired playback direction.



As the dial is rotated, the number of the illuminated LEDs on the speed indicator increases in the dial rotating direction.

Clockwise rotation of the dial offers forward (FWD) search playback. Counterclockwise rotation offers reverse (REV) search playback.

The LED at the end of the bar indicates the playback speed at that time. If you release your hand from the dial, playback continues at the speed of the dial position.

- (3) Return the dial to STILL. A still picture is displayed.

The LED next to the STILL LED indicates the speed of 2 pictures/second. The LEDs represent 4, 8, 16, 24, 60, 120, 240, and 500 pictures/second. The outermost LEDs indicate the maximum speed, 1000 pictures/second. These playback speeds are halved for tape recorded at the rate of 250 pictures/second.

In This State (where the dial is set to STILL in the search playback mode)

- o Step playback is enabled by pressing the FWD STEP or REV STEP button.

Still Playback during Search Playback (with tape running)

Still playback is enabled by pressing the STILL/PAUSE button.



The SEARCH and STILL/PAUSE lamps come on, and the STILL LED flashes.

In this state, step playback and jog playback are enabled.

Another press of the STILL/PAUSE button restores search playback (i.e., search mode).

However, the picture remains still. The still picture when the STILL/PAUSE button was pressed is displayed at this time.

Stopping Search Playback

Press the STOP button.



The VCR exits the search mode, and goes to stop mode.

JOG PLAYBACK - Rotate the dial when STILL LED is flashing.

Use the jog playback to search for an intended scene containing a series of motion. The playback direction and speed change in accordance with the dial rotating direction and speed. Tape is replayed quickly by rotating the dial quickly and slowly by rotating it slowly.

- (1) Press the SEARCH button, then press the STILL/PAUSE button.

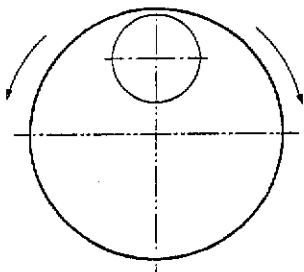


The SEARCH and STILL/PAUSE lamps come on, and the STILL LED on the speed indicator flashes. (Jog playback)

A still picture is displayed in this state.

Jog playback is enabled when still playback is selected during normal playback. In the jog playback mode, the STILL LED on the speed indicator flashes.

- (2) Rotate the dial in desired direction quickly or slowly.



Pictures are played back at the speed (max. 24 pictures/second) corresponding to the dial rotating speed. In the jog playback, the LED on the speed indicator does not come on.

Clockwise rotation of the dial offers forward (FWD) jog playback. Counterclockwise rotation offers reverse (REV) jog playback.

- (3) Stop rotation of the dial. Tape stops and a still picture is displayed. (Still playback)

In this state (where a still picture is displayed in the jog playback)

- o Step playback is enabled by pressing the FWD STEP or REV STEP button.

Stopping Jog Playback



Press the STOP button.

The VCR exits the jog playback mode, and goes to stop mode.

FREEZE FUNCTION - FREEZE Switch (on the subpanel)



The freeze function allows any pictures to be stored as still pictures in the memory during playback process.

The freeze function is operated from the VCR subpanel.

- (1) Set the FREEZE switch to OFF and the FREEZE DISPLAY switch to MIX.
- (2) Play back tape on the operation unit. Images are displayed on the monitor screen in the selected mode.
- (3) Set the FREEZE switch to ON. The picture at the moment the switch is set to ON is displayed still. At this time, replayed images are also displayed continuously. Thus, images are overlapped on the screen.

If the FREEZE DISPLAY switch is set to ON after a still picture is obtained, only the still picture is displayed. The continuously-replayed images are not displayed on the monitor now (though tape advances). If the FREEZE DISPLAY switch is set to OFF, the still picture disappears and only the continuous playback images are displayed.

Images once frozen in the memory, can be reproduced by setting the FREEZE DISPLAY switch to MIX or ON even if it has previously been set to OFF.

- (4) To erase the still picture in the memory, set the FREEZE switch to OFF. The erased picture cannot be reproduced after setting the FREEZE switch to OFF.

- NOTES:
- o The still picture is also erased if the VCR enters a mode other than the playback mode.
 - o If the FREEZE switch is set to ON during slow playback of tape recorded at the rate of 500 pictures/second, the motion of continuous images may be unnatural. However, this is not a failure.

EDIT PLAYBACK - EDIT Button

Press the EDIT button.



The edit mode offers the playback function equivalent to the normal playback, except that new cue signals can be recorded on tape during edit playback.

NOTE: The edit playback records new cue signals. It erases previously-recorded cue signals.

The edit playback is not enabled for cassettes with a broken erasure prevention tab.

Cue Signal Recording



A cue signal can be recorded every time the cue ENTER button is pressed.

Pause and Restart - STILL/PAUSE Button

Press the STILL/PAUSE button.



Edit playback operation is paused.

A still picture is displayed as in the still playback mode.

Edit playback operation restarts if the STILL/PAUSE button is pressed again.



The VCR cannot enter another mode except PLAY from the edit playback mode unless it is first stopped.

HIGH-SPEED SEARCH PLAYBACK

- Fast Forward or Rewind While Observing Images

If the FF or REW button is pressed during normal playback, tape is played back at a high speed. This mode is called high-speed search playback. The high-speed search playback has the advantage of stopping tape at cue signals, different from the search playback.



Press the CUE STOP button, and the lamp comes on, if the cue stop is desired.



Press the PLAY button.

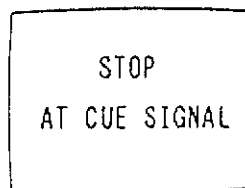


Press the FF or REW button.

NOTE: If the FF or REW button has pressed longer than 1 second, the still playback starts when the button is released. To start the high-speed search playback, press the PLAY button then press FF or REW button.

During the high-speed search playback

- o With the CUE STOP on, when a cue signal is detected, high-speed search playback stops and a still picture is displayed. At this time, the following message is displayed on the screen. The message disappears when next operation is selected.



- o When the PLAY button is pressed the VCR returns to the normal playback.

ELIMINATION OF NOISE FROM REPRODUCED IMAGE - Operation on VCR



As opposed to the recording mode, playback mode depends on the tape speed selected (normal or slow).



Noise may appear in replayed pictures or picture may flicker. This noise can be reduced by adjusting the appropriate tracking knob on the VCR subpanel.

NOTE: The playback speed described in this paragraph applies to tape recorded at the rate of 500 pictures/second. The playback speed for 250 pictures/second tape is half this speed.

NOTE: Noise bars do not disappear in high-speed playback at 500 or 1000 pictures/second. In reverse playback, they are not eliminated even at the speed of 240 pictures/second.

TRACKING Knob - Eliminating stripe noise in middle-speed playback.



The mark on the NORMAL knob shall usually be set to the center preset position. If stripe noise is displayed on the screen during playback at the speed of 60, 120 or 240 pictures/second, control this knob to eliminate them.

SLOW TRACKING Knob - Eliminating stripe noises in low-speed playback.

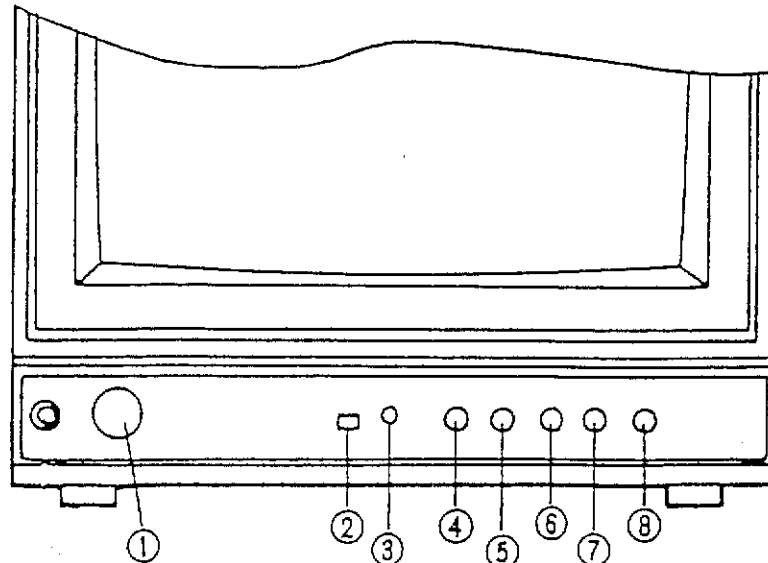


The mark on the SLOW TRACKING knob shall usually be set to the center preset position. If stripe noise is displayed on the screen during playback at the speed of 2, 4, 8, 16 or 24 pictures/second or during step playback, adjust this knob to eliminate it.

Playback Image Adjustment - Operation on Monitor

Following controls are used to adjust the image on the monitor.

Typical NTSC monitor is shown for example.



No.	Switch/Control name
①	Power switch (POWER)
②	COMB/TRAP selection switch
③	Vertical size control (V-SIZE)
④	Vertical hold control (V-HOLD)
⑤	Contrast control (CONTRAST)
⑥	Brightness control (BRIGHT)
⑦	Tint control (TINT)
⑧	Color saturation control (COLOR)

PAUSE AND STOP DURING PLAYBACK

To stop the playback operation, press the STILL/PAUSE or STOP button. Replayed image disappears from the screen only when the STOP button is pressed.

STILL/PAUSE: Pauses normal, search or edit playback. (A still image is displayed.)

STOP : Stops any playback operation.

PAUSE and RESTART - Press the STILL/PAUSE button.



If the STILL/PAUSE button is pressed during normal playback or search playback, the VCR enters the still mode where jog and step playback operations are enabled.

Another press of the STILL/PAUSE button restores the previous playback mode.

If the STILL/PAUSE button is pressed during edit playback, operation is paused. A still image is displayed as in the still playback, which is called edit-pause mode. It is impossible to transfer from the edit-pause mode to another mode. Another press of the STILL/PAUSE button restarts edit playback. The user can restart edit playback or stop it by pressing the STOP button.

STOPPING PLAYBACK - Press the STOP button.



Any playback operation is stopped by pressing the STOP button.

SWITCH OFF

Before turning off the VCR power, remove the video cassette. Then close the cassette stage, and set the POWER switch of the VCR to OFF.

DUBBING

"Dubbing" means making a copy of tape. Tape on which important data is recorded may be played back repeatedly. We recommend to make a copy of tape containing important data, use the copy for repeated playback, and keep the original tape unused.

For dubbing tape, connect an S-VHS video cassette recorder to the HSV-500.

Equipment and Parts Required Other Than the HSV-500

S-VHS or VHS video cassette recorder

Video cable (with S plugs at both ends for S-VHS dubbing)

Video cable (pin at one end, BNC at the other end for VHS dubbing)

S-VHS or VHS cassette

Dubbing Procedures

NOTE: Even when a recording has been made on a tape at the rate of 500 pictures/sec. (HALF), HSV-500 normal playback noted in 5) should be performed with the PICTURE SIZE switch set to FULL.
: Keep the FREEZE switch to OFF during dubbing.

- 1) Connect the HSV-500 connector panel J8 Y/C OUT to the S-VHS VCR video in.
(For VHS mode dubbing, connect the monitor VIDEO OUT to the VHS VCR video in.)
- 2) Turn on the HSV-500 and S-VHS VCR power.
- 3) Break off the erasure prevention tab of the original cassette, and load it into the HSV-500. Feed the tape to the beginning of the area to be copied.
- 4) Load an S-VHS cassette into the S-VHS VCR.
- 5) Set the S-VHS VCR into the recording mode and the HSV-500 into the normal playback mode.

When dubbing of the area to be copied is completed, stop operation of the S-VHS VCR and HSV-500.

- Comment:
- o Dubbing of tape is possible without using the HSV-500. In such a case, connect two video cassette recorders and make a copy of tape in the same manner.
 - o The cue signals are not recorded on the copy tape.

SECTION V

OTHER USEFUL FUNCTIONS

The HSV-500 system has many special functions for enhanced work efficiency and operability for recording and analysis of moving objects at high speed.

These functions and operation procedures are described in this section. Make full use of them in actual recording and analysis (playback).

SCENE CODE AND TIME DISPLAY

- Identifying an object

REMOTE CONTROL OF SCENE CODE AND TIME DISPLAY

MEMORY FUNCTION AND COUNTER

- Helping to find the beginning of a recorded area

CUE SIGNAL

- Helping to find a specific picture

REPEAT RECORDING

SERVICE SWITCHES

ON-SCREEN MESSAGES

- Indicating VCR operating conditions

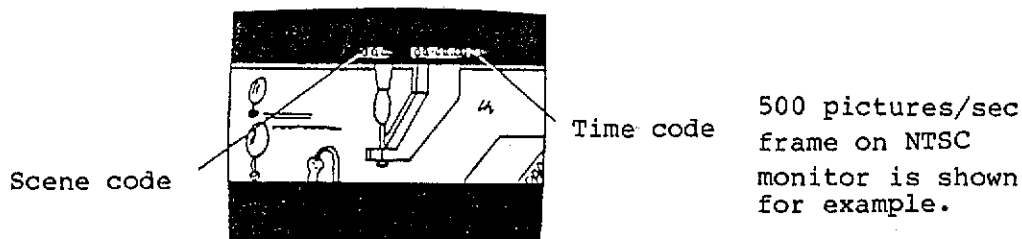
ALARMS AND COUNTERMEASURES

SELF TEST

- Self diagnosis of VCR

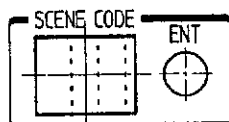
SCENE CODE AND TIME DISPLAY - Identifying an object

A three-digit number displayed with a picture in the upper part of the screen is called a scene code, which can be used to identify a recorded object. The time code indicates the time elapsed in recording.



SCENE CODE

When power is turned on, the scene code is set to "001". It is incremented by one automatically every time recording is stopped (with the STOP button) or paused (with the STILL/PAUSE button).



To give an intended number, set it with the SCENE CODE switches on the VCR subpanel before starting recording.

1. Rotate three thumbwheel switches to set an intended number.
2. Press the ENT button beside the thumbwheel switches.

Through these operations, the number displayed on the monitor changes into the number set above. In this case, the scene code is also incremented by one every time recording is stopped or paused.

The code can be changed during recording. Set a number with the thumbwheel switches and press the ENT button at any time; the new code is displayed at that instant.

The scene code can be erased through remote control using the AUX connector. See page 5-4 for the remote control procedures.

TIME DISPLAY

The time display function does not indicate the time of the day. It indicates the time elapsed in recording.

The displayed time is reset to zero when power is supplied or when recording is stopped or paused. Time counting starts in units of two milliseconds, the minimum unit of counting, when recording is started.

00 : 00 : 002
min. sec. millisecond
(incremented every
2 milliseconds)

Since 2 msec. = $1/500$ sec., each count corresponds to each picture recorded at the rate of 500 picture/second. As pictures change, the time counts are incremented by one such as 000, 002, 004 and so on.

For the pictures recorded at the rate of 250 pictures/second, the minimum unit of time counting is 4 milliseconds.

The time display is useful to calculate the time-lapse change or moving speed of an object.

Picture (ms)	250 pictures/sec.	500 pictures/sec.
000	000	000
002	-	002
004	004	004
006	-	006

Starting and stopping of the time counting can be remote-controlled via the AUX connector. For control procedures, see page 5-4.

Note that time precision is better than 10^{-4} .

Time Code Signal

Scene codes and time counts displayed on the monitor screen are coded and recorded on tape together with video signals. These coded signals can be automatically read using the optional XY coordinator for analysis.

REMOTE CONTROL OF SCENE CODE AND TIME DISPLAY

Scene codes and time display can be remotely controlled by make-contact signals through the J7 AUX connector on the VCR connector panel.

The optional AUX connector kit (part No. 486416) is available for convenience.

Starting Time Counting

- o To start time counting when recording is not performed, connect pin No. 5 to pin No. 11. (This is also possible with the "L" level of the TTL level.) Time counting starts at the moment these pins are connected. While they are being connected, time counting continues, regardless of the VCR operation mode. If the pins are disconnected, the time is reset to zero.
- o If the pins are connected during recording (i.e., time is counted), time counting continues. It continues if recording is stopped with the pins connected.

Stopping Time Counting

- o To stop time counting during recording, connect pin No. 6 to pin No. 11. (This is also possible with the "L" level of the TTL level.) Time is reset to zero at the moment these pins are connected. It is kept reset to zero while the pins are being connected.
- o If they have been connected in advance, time is kept reset to zero even if recording is started.

NOTE: If time counting start and stop operations are performed simultaneously, the start operation has the priority.

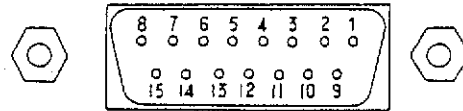
Erasing Scene Code and Time Display

To erase the scene code and time display from the monitor screen, connect pin No. 10 to pin No. 11. While they are being connected, no scene code and time are displayed on the monitor screen. To re-display them, disconnect the pins.

NOTE: If the scene code and time display are erased, the time code (i.e., coded signal for automatic reading) is also erased.

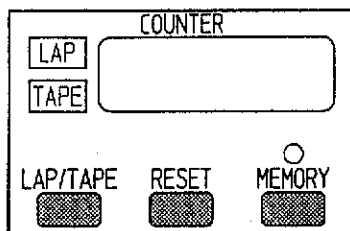
Pin Arrangement of AUX Connector

J7 AUX



<u>Pin No.</u>	<u>Signal</u>	<u>Function</u>
5	/TIME ON	Time counting starts.
6	/TIME OFF	Time counting stops.
10	DISPLAY	Display ON/OFF
11	GND	Signal ground

MEMORY FUNCTION AND COUNTER



The counter on the operation unit offers two types of counter functions, lap counter and tape counter, and is used to know tape running position and time. It also enables automatic stop of the rewind and fast forward operations by using the memory function together.

COUNTER - Two Counter Functions



Every press of the LAP/TAPE button alternates the counter display and lighting of the LAP or TAPE lamp.

TAPE: A 4-digit digital counter indicates the amount of tape fed. It is set to 0000 when power is turned on.

LAP : Indicates the recording time elapsed since starting tape running in seconds. It is set to 00:00 when power is turned on.



By pressing the RESET button, the counter display is reset to zero. If it functions as the LAP counter, the tape counter value is not reset.

Automatic Stopping using Memory Function - MEMORY On

If the MEMORY button is pressed to turn on the MEMORY lamp, tape stops automatically during fast forward or rewind operation when the counter display reaches "0000" or "00:00". However, the actual tape stop position shifts slightly from the zero position since tape runs at high speed. Repeating automatic stopping using the memory function will cause difference little by little between the zero display on the counter and the picture displayed by zero resetting.

1. Press the RESET button in recording or playback at the position which should be searched later. The counter display is reset to zero at this time.





2. Press the MEMORY button. The lamp comes on. (Recording or playback continues hereafter.)



3. Rewind or Fast Forward the tape. It stops automatically near the position where the counter indicates zero.

At this time the MEMORY STOP message is displayed.

CUE SIGNAL

~~CUE~~

The cue signals are recorded in recording or in edit playback. If a cue signal is recorded beforehand, tape stops automatically near the cue signal position in the high-speed search playback, fast forward, or rewind operation, enabling the intended picture to be searched quickly.

Every time the ENTER button is pressed, a cue signal is recorded on tape. Though any number of cue signals can be recorded, it is rather inconvenient if cue signals are recorded at too short intervals since tape stops too often. The interval between cue signals shall desirably be more than 5 seconds, at least.

The cue signal can be recorded during recording or edit playback. The cue signal ENTER button is provided on the operation unit.

NOTE: No cue signal can be recorded on a cassette with broken erasure prevention tab, which cannot be used for recording or edit playback.

Cue Signal Recording - When Starting Recording



If the START CUE switch is set to the ON position, a cue signal is recorded automatically every time recording is started and on release of pause operation during recording (on each new scene).

Cue Signal Recording - During Recording



Press the cue ENTER button and release it during recording. Every press of the button records a cue signal.

Cue Signal Recording - During Edit Playback

The edit playback mode has the advantage of recording cue signals while observing the replayed pictures. Its playback speed is the same as that of the normal playback mode.



1. Press the EDIT button.

As in the normal playback mode, playback starts.



2. Press the cue ENTER button at the position(s) to be searched later.

At this time the RECORDING CUE SIGNAL message is displayed.

Automatic Stop using Cue Signal - CUE STOP On



If the CUE STOP button has been pressed in advance (the lamp is on), tape stops automatically near the cue signal position(s) during high-speed search, fast forward, or rewind operation.

At this time the STOP AT CUE SIGNAL message is displayed.

Ignoring Cue Signal - CUE STOP Off

If the CUE STOP is set to off (the lamp is off), the automatic stop does not function even if cue signals are detected.

Erasing Cue Signal

As mentioned above, cue signals can be ignored. They can be erased as well. To erase cue signals, perform edit playback.

1. Perform the edit playback operation a little before the cue signal to be erased. The CUE STOP button may be activated or deactivated.
2. When approx. 3 seconds have passed from the cue signal position, press the STOP button to stop operation.

REPEAT RECORDING

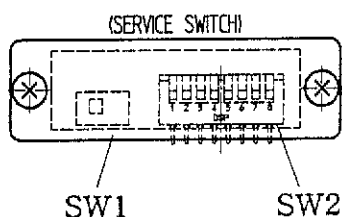


Repeat recording is a function by which if the tape reaches the end during recording, it is immediately rewound, and recording automatically restarts from the tape's beginning, and this process is repeated.

To activate the repeat recording function, set the switch REPEAT REC on the subpanel to ON.

At this time the REPEAT REC message is displayed.

SERVICE SWITCHES



The service switches are located on the VCR connector panel. They are covered normally since they are not used for daily operation.

The service switches are only used to set special VCR operations.

The following describes their functions for reference:

NOTE: If the setting of any service switch is changed, be sure to reset it to the original position after special operations have finished.

SW1

NTS/PAL : If this switch is set to the right-hand position, image signals converted into PAL standard are output at J8 Y/C OUT and J9 VIDEO OUT connectors.

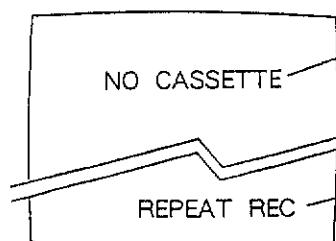
SW2

- 1 EE2 : Two fields' signals are used to generate one field's output luminance signal for the EE mode. Thus, in the EE mode, the luminance signal ranges over two fields in a part where an object is moving. If this switch is set to the Up position, 1 field's signal is output and images with no overlapping can be obtained. In this case, the horizontal resolution is reduced to half.
- 2 MARK : Selects whether or not to display a black square mark when replaying tape recorded on the HSV-400 (at the rate of 400 pictures/second). Turning this switch to the upper position outputs the square mark signal for the video signal.
- 3 SAW : Switches the internal test signal generator between the COLOR BAR signal and the SAWTOOTH signal. Turning this switch to the upper position changes the generator to the SAWTOOTH signal.
- 4 ~ 7 : Not used.

8 BUZZ : If this switch is set to the Up position, no beep sound is generated. Beep sound is generated if this switch is set to the Down position when a button on the operation unit is pressed or a cue signal is detected.

ON-SCREEN MESSAGES

The explanatory messages displayed on the monitor screen are called on-screen messages. The on-screen messages are displayed at the center and in the lower right of the monitor screen.



A message displayed at the screen center calls user's attention.

A message displayed in the lower right of the screen indicates an operation mode.

Alarm No. and description are displayed if any error occurs in VCR operations.

Messages Displayed at Screen Center

<u>Messages</u>	<u>Displayed When</u>	<u>Disappear When</u>
PERFORMING SELF-TEST	During self test	Test completed.
SELF-TEST PASSED	Normal end of self test	Next operation is done.
WARNING REC TAB REMOVED	Attempted to record or edit for a cassette with no erase prevention tab.	Next operation is done.
WARNING END OF TAPE	Attempted to feed tape at the end of tape.	Next operation is done.
WARNING BEGINNING OF TAPE	Attempted to rewind tape at the beginning of tape.	Next operation is done.
WARNING NO CASSETTE	Attempted to feed tape though no cassette is loaded	Next operation is done.
STOP AT CUE SIGNAL	Cue signal is detected and operation stops or changes to STILL playback.	Next operation is done.
MEMORY STOP	Memory function stops operation.	Next operation is done.
STOP AT BEGINNING OF TAPE	Beginning of tape is detected and operation stops.	Next operation is done.

Messages Displayed at Screen Center (cont'd)

<u>Messages</u>	<u>Displayed When</u>	<u>Disappear When</u>
STOP AT END OF TAPE	End of tape is detected and operation stops.	Next operation is done.
NO CASSETTE	Stage is closed with no cassette loaded.	Next operation is done.
RECORD ENABLE S-VHS CASSETTE IS LOADED S-VHS RECORDING ONLY	S-VHS cassette enable for recording is loaded and stage is closed.	Next operation is done.
RECORD ENABLE VHS CASSETTE IS LOADED VHS RECORDING ONLY	VHS cassette enable for recording is loaded and stage is closed.	Next operation is done.
RECORD DISABLE S-VHS CASSETTE IS LOADED	S-VHS cassette with no erase prevention tab is loaded and stage is closed.	Next operation is done.
RECORD DISABLE VHS CASSETTE IS LOADED	VHS cassette with no erase prevention tab is loaded and stage is closed.	Next operation is done.
RECORDING CUE SIGNAL	Cue signal is recorded during recording or edit playback.	Recording is completed.
DEW DETECTED	Dew is detected and no operation is done.	Dew is disappeared.

Messages in Lower Right of Screen

The mode display is displayed in the lower right of the screen.

Mode Display

REPEAT REC:

Displayed if REPEAT REC switch of subpanel is set to ON and recording (automatic repeated recording) is performed.

REPEAT REC PAUSE:

Displayed if the above automatic repeated recording is paused.

These messages disappear if the REPEAT REC switch is deactivated or another mode is established.

REPEAT REW:

Displayed during rewinding in repeat-rec mode and disappears if another mode is established.

ALARMS AND COUNTERMEASURES

If an alarm is given, stop the operation in process. Then, repeat the same operation to check whether the alarm is still given. If the same alarm is given repeatedly, the system may be defective. Contact the service center and inform them of the alarm number. The following shows examples which may occur in daily operations.

Alarm No.	Displayed Messages	Alarm Causes
AL01 / AL07	ALARM 07 SELF-TEST FAIL -ABNORMAL RF LEVEL -COLOR NOT DETECTED -CTL NOT DETECTED	Displayed by any of the following causes when self test is completed: - Improper RF level - Color locking is not performed. - CTL is not detected. (The messages on the left are examples of alarm 07.)

SELF TEST

The self test is used for self diagnosis of the recording and playback functions of the VCR.

It can be activated if the VCR and color monitor are turned on.

Test Procedures:

- 1) Load a cassette which can be used for testing, and close the stage. (Use a cassette with an erasure prevention tab.)
- 2) Press the SELF TEST button on the subpanel. (Other switches on the subpanel may be set to any positions.)

The VCR automatically records the video signal and plays it back, and displays the result of self test on the monitor screen. If "SELF-TEST PASSED" message is displayed, the self test is completed normally.

As long as the camera is connected, even if the INPUT select switch on the subpanel is set to CAM or BAR, a self test is performed automatically by using the SAWTOOTH signal sent from the camera.

SECTION VI
ROUTINE MAINTENANCE

CLEANING OUTER SURFACES

CLEANING AIR FILTER AND INTAKE

CLEANING VIDEO HEAD

REPLACING VIDEO HEAD

CLEANING OUTER SURFACES

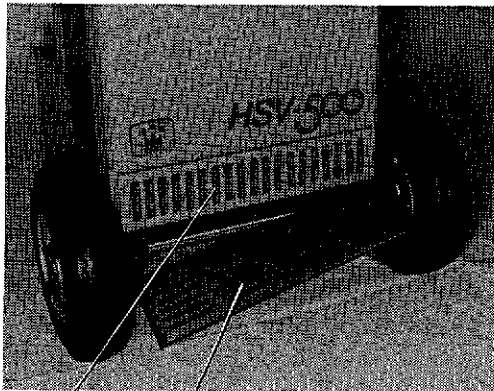
Wipe the outer surfaces with a soft lint-free cloth. To remove stains, wipe off with a cloth soaked with thin neutral detergent and wring thoroughly.

To clean areas involving switches, connectors, etc., use soft cloth, brush or vacuum cleaner.

CAUTION: Never use compressed air for cleaning.

CLEANING AIR FILTER AND INTAKE

The air intake on the bottom of the VCR is provided with an air filter to keep out dust or dirt. Remove dust and dirt adhering to this filter periodically. Cleaning frequency depends on the environmental conditions of the location where this system is used. Check occasionally and determine the cleaning frequency.



Filter cover

Air filter

The filter cover is located in the differently colored lower part of the VCR front.

Hold both sides of the filter cover and pull to remove it.

Suck out dust and dirt in the filter using a vacuum cleaner. The air intake in the filter cover may be stuffed with dust. Soak out dust using a vacuum cleaner.

On completion of cleaning, attach the cover, and press the cover where it was. Pushing lightly both sides of the cover secures the cover.

REPLACING VIDEO HEAD

The video head may be replaced if noise is not eliminated by cleaning. If the time meter on the VCR subpanel indicates more than 1000 hours (60000 minutes), it may be considered that the service life of the video head may have been expired.

How to Judge Replacement from Playback Images

- (1) Use the head cleaner in compliance with the cleaning procedures.
- (2) Play back recorded tape containing noiseless clear images.
- (3) Record camera images or color bar signal on new video cassette tape, and replay it.

A fault may be present, or the video head may need replacement if the cleaning procedure fails to eliminate noise.

Note: Ask the service center for advice if the video head is suspect.

CLEANING VIDEO HEAD

To clean the VCR internal parts in contact with the video tape, especially the video head, the head cleaner (cleaning tape) is supplied as a standard item. Cleaning is necessary when flickering noise is present on the playback pictures.

CAUTION: For proper handling of the head cleaner, follow the instructions and procedures shown below. Misuse of the head cleaner may cause failure of the VCR.

Run only in PLAY for 10 seconds, 3 times maximum.

- (1) Load the head cleaner in the stage, and close the stage.
- (2) Be sure to press the PLAY button to start cleaning.
- (3) Press the STOP button to stop cleaning after 10 seconds.

Do not rewind or fast forward it.

- (4) Press the EJECT button to take out the head cleaner.
- (5) Play back a video cassette containing noiseless clear images to check the picture quality.

If noise is not eliminated by cleaning, repeat the steps (1) to (5) and check picture quality. However, do not repeat cleaning more than 3 times. If noise is not eliminated after 3 cleaning operations, another cause is possible. Contact the service center.

SECTION VII

OPTION

OPTIONAL ITEMS

OPERATION FOR STROBE LIGHT SYSTEM

OPERATION FOR VIEWFINDER

OPERATION FOR PARALLEL INTERFACE UNIT

OPERATION FOR ADDITIONAL CAMERA SYSTEM

OPERATION FOR CAMERA CABLE KITS

OPTIONAL ITEMS

The following options are available for wider applications of the system:

(1) Strobe light system ST-448-E/ST-448-U

This is used for high intensity lighting. Its luminance is high and its light emission time is 1/50,000 seconds, so a quick moving object can be recorded clearly.

(2) Viewfinder V-601 (NTSC), V-602 (PAL)

Used to check and observe camera images (in black and white) near the color camera. It also allows the observation of the images reproduced on the VCR. Since it is of the under-scanning type, it fully covers the visual field of the camera.

(3) Parallel Interface Unit V-813

Used for remote control of the VCR. The parallel interface cable (30 cm), connector kit, and set screws are included.

(4) AUX Connector Kit 486416

A kit which fits to the J7 AUX connector. Used for remote control of the scene codes and time display via the AUX connector.

(5) XY Coordinator ST-446-E (PAL)/ST-446-U (NTSC)

Displays a cursor on a playback image and outputs the coordinates of the cursor position to an external device. Models ST-446-EA/ST-446-UE for VBS only monitor are available.

(6) Wave Inserter V-917-W

Superimposes waveforms of external signals on camera images.

- (7) Synchronous unit V-713-W

This is used for synchronously driving up to five HSV-500 systems.

- (8) Additional camera system ST-449-W
(including the WIPE unit)

This makes it possible to add a camera and use the two cameras simultaneously.

- (9) Camera cable kit
(including the cable compensator)

25 m (V-69)
50 m (V-70)
100 m (V-71)

OPERATION FOR STROBE LIGHT SYSTEM

Use the strobe for recording indoors. Its light emission time is as short as 1/50,000 seconds, so a quick moving object can be recorded without blurs. This system is made up of a strobe light head, strobe power supply and cables.

STROBE LIGHT HEAD

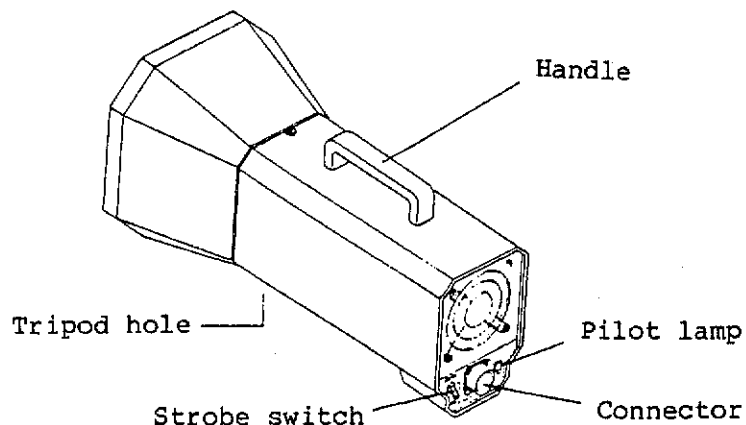


Fig. 7-1 Strobe Light Head

Strobe Switch

Use this three-position switch to set the mode of the strobe light head.

AUTO



ON

STANDBY

AUTO : The strobe light flashes automatically when recording starts. It also flashes when the STROBE switch on the VCR subpanel is set to ON.

STANDBY: In this position, the strobe does not operate but the cooling fan remains on.

ON : The strobe runs continuously.

Connector

Connect the strobe cable to this connector and the strobe power supply unit.

Pilot Lamp

Lights up while power is being supplied to the strobe light head.

Tripod Mounting Hole

A threaded hole (3/8-16 UNC) used to mount the strobe light head to a tripod.

Handle

Hold this handle whenever handling the strobe light head.

STROBE POWER SUPPLY

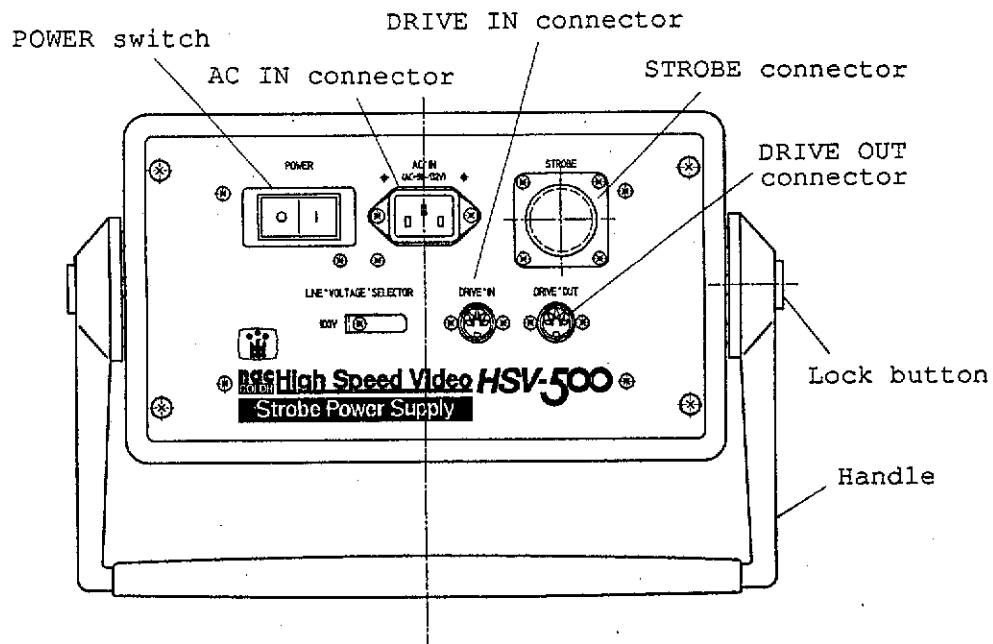


Fig. 7-2 Strobe Power Supply

POWER Switch

Turns on and off the strobe power. Pressing the "I" side of the switch turns on the power, and the switch lamp comes on. Pressing the "o" side turns off the power. (This switch also serves as a circuit breaker.)

AC IN Connector

Supply the specified AC voltage via this connector. The equipment must be earthed.

CAUTION: Do not use the AC OUT connectors (J10, J11) on the PS panel of VCR for supplying AC power to the strobe power supply.

DRIVE IN Connector

Plug the supplied strobe drive cable to the DRIVE IN connector and the J4 STROBE DRIVE connector on the VCR connector panel.

Instead of connecting the cable to VCR, the strobe drive cable can be connected to J2 STROBE connector on the camera.

DRIVE OUT Connector

Use this connector for an additional strobe light system. Plug the strobe drive cable to this DRIVE OUT connector and the DRIVE IN connector of an additional strobe power supply.

LINE VOLTAGE SELECTOR Bar

This is used for switching the principle AC power supply voltage between 100 V and 220 V.

STROBE Connector

Connect the strobe cable to the STROBE connector and strobe light head.

Lock Buttons

These buttons are for the handle.

Handle

Hold this handle to carry the strobe power supply unit. The handle angle can be changed by pressing the lock buttons at the joints of the handle.

NOTE: Press both lock buttons simultaneously to change the handle angle. While pressing the buttons, change the handle angle and release the buttons. The handle moves and is locked at the next locking position. The handle locks at each 30°.

Cautions for Handling Strobe

- (1) Ensure the power supply is earthed.
- (2) Do not look at the flashing strobe lamp directly.
- (3) Wear the eye protective glasses during strobe lighting.
- (4) Before disconnecting the strobe cable, turn off the POWER switch and wait for at least 1 minute.
- (5) For its operation procedure, see HOW TO TURN ON STROBE in SECTION III--RECORDING OPERATION
- (6) For the precautions in using the strobe, see HANDLING OF STROBE in PRECAUTIONS IN OPERATING THE SYSTEM at the beginning of this manual.
- (7) The STROBE DRIVE signal for HSV-400 and HSV-1000 has no compatibility. Do not connect other systems.
- (8) For the strobe drive cable, use a cable whose ends have a white line with "B" indicated on it.

REPLACING STROBE FLASH LAMP

The life of a strobe flash lamp is about 50 hours. If it is reaching the limit of its life, it will not flash regularly, or no flashes occurs even when the switch on the light head is turned on. In this case, replace it with a new one.

CAUTION: When replacing the flash lamp, switch off the strobe and wait 10 minutes to cool off the lamp. In case the strobe cable is disconnected, wait one minute after power off to discharge high voltage of electricity.

Replace the strobe lamp keeping to the following procedures.

- (1) Unscrew two binding head screws (M3 in the figure below) which fix the front cover, then remove the front cover.

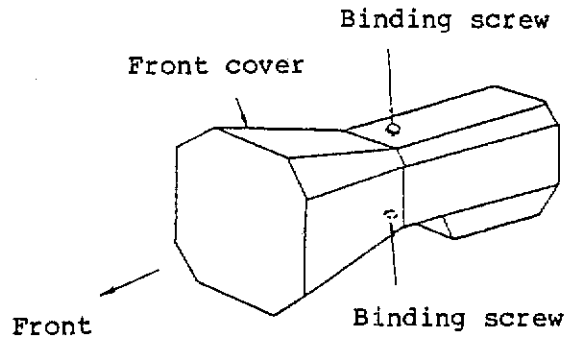


Fig. 7-3 Flash Lamp Replacement

- (2) Pull out the lamp from the socket while holding the lamp by its base (white).
- (3) Insert the new lamp into the socket while holding it by the base portion so that two arrows (on the rear of lamp and on the socket) coincide. When inserting the new lamp, be sure not to touch glass surface of the new lamp. If touched, wipe the finger print with cloth.
- (4) Attach the front cover as it was before.

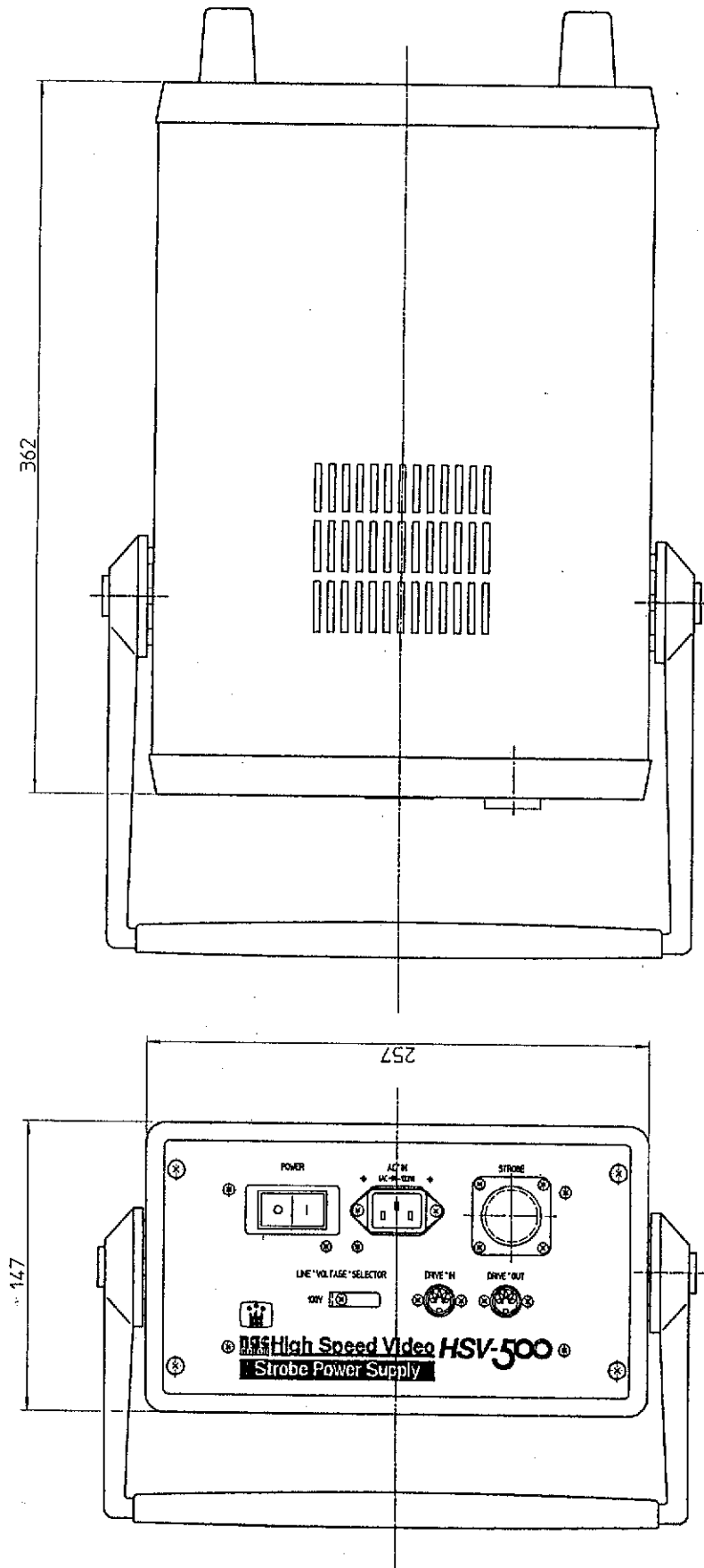


Fig. 7-5 Strobe Power Supply

OPERATION FOR VIEWFINDER

The viewfinder is convenient for checking the camera image, visual field, focus and brightness near the color camera before recording.

It is mounted on the accessory shoe of the color camera. Eyepiece angle is adjustable for easy observation. It allows the observation of the camera image during recording and also playback images from the VCR.

COMPONENTS

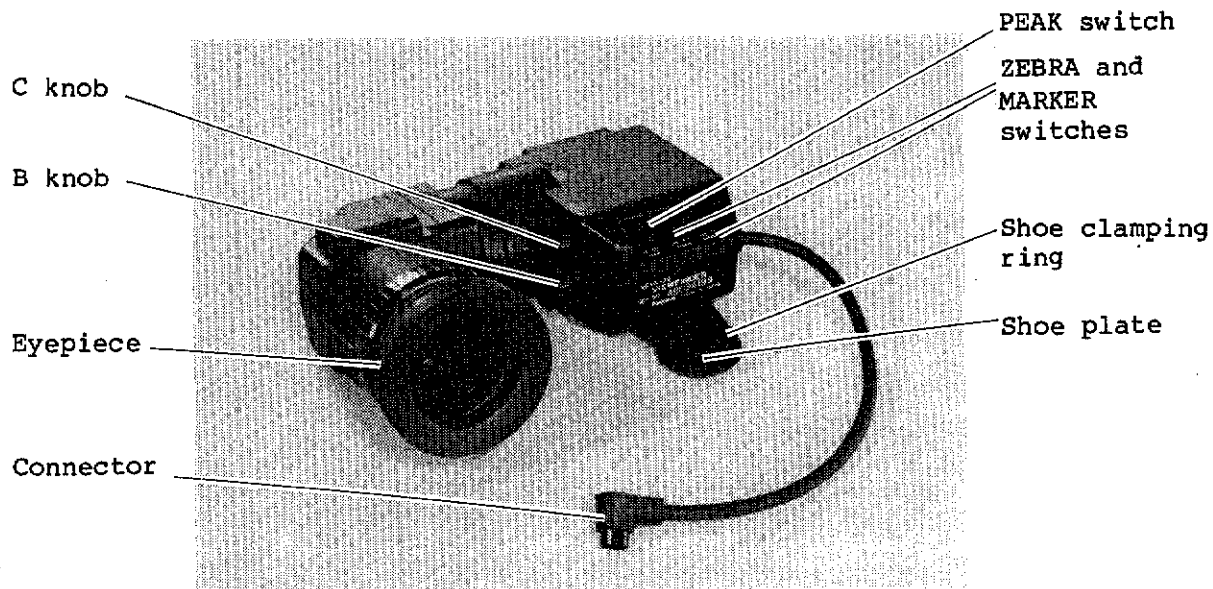


Fig. 1-6

- | | | |
|----------------------------|---|--|
| PEAK switch | : | Set to ON to obtain sharp-edged images for easy focusing. |
| ZEBRA and MARKER switches: | | These switches do not function. |
| C knob | : | Controls the contrast of images. |
| B knob | : | Controls the brightness of images. |
| Eyepiece | : | Observe images through this eyepiece. |
| Connector | : | Connect to the EVF connector on the color camera. |
| Shoe clamping ring | : | After mounting the viewfinder to the color camera, rotate this ring to clamp the viewfinder. |
| Shoe plate | : | Insert this shoe plate into the accessory shoe on the color camera. |

INSTALLATION

- (1) Rotate the shoe clamping ring of the viewfinder to make clearance between it and the shoe plate.
- (2) Insert the shoe plate of the viewfinder into the accessory shoe on the color camera from the front, and slide it to the rear.

Slide the shoe plate of the viewfinder until the pin groove on it is engaged with the pin on the accessory shoe.

- (3) Rotate the shoe clamping ring of the viewfinder to clamp the shoe.
- (4) Plug the connector at the end of the viewfinder cable to the EVF connector of the color camera.

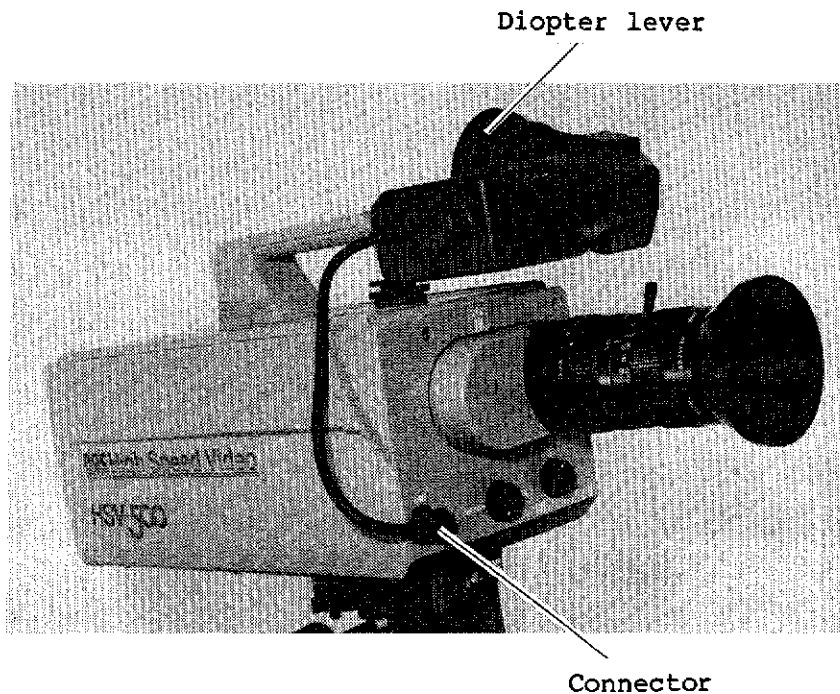


Fig. 7-7 Installation Example

OPERATION

- o The viewfinder has no power switch. It functions if power is supplied to the camera.
- o Look through the eyepiece to check images.
- o The diopter of the viewfinder is adjustable with the small lever below the eyepiece.
- o Control the contrast (with the C knob) and/or brightness (with the B knob) if necessary.
- o The eyepiece can be rotated, and the cylindrical part of it can be turned up by folding it while pressing the lock button. See the following photograph.

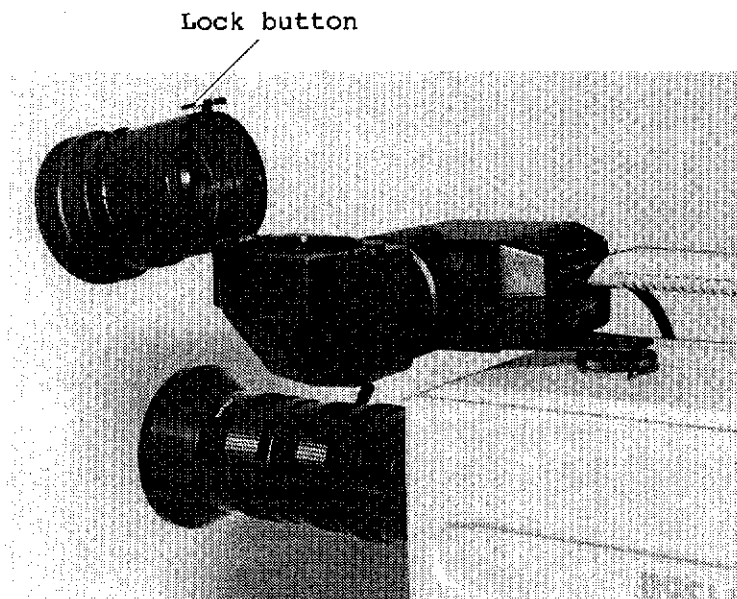


Fig. 7-8

EFFECTIVE DISPLAY AREA

The viewfinder fully covers the recording range of the color camera. The color monitor, standard component, displays approx. 85% of the recording range (both in height and width), narrower than the visual field of the viewfinder.

Thus, some portion of an object at the periphery of the visual field of the viewfinder may not be displayed on the color monitor.

OPERATION FOR PARALLEL INTERFACE UNIT

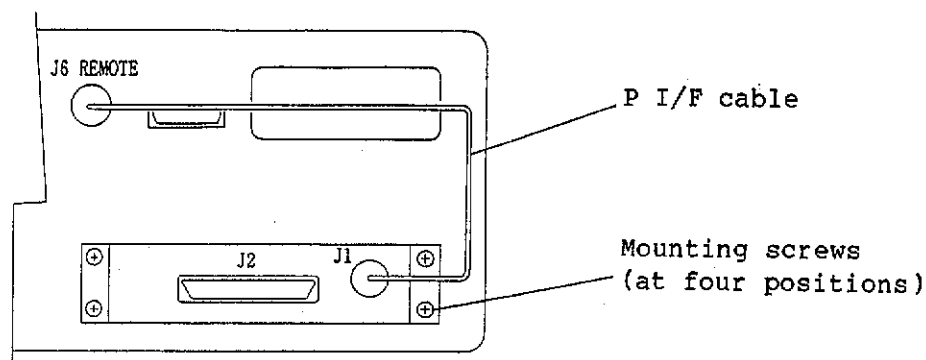
The parallel interface unit V-813 is used for controlling VCR operations using external signals. It offers all the control functions performed on the operation unit.

The J1 connector of the parallel interface unit shall be connected to the J6 REMOTE connector on the VCR connector panel using the parallel interface (P I/F) cable.

The cable to be connected between the J2 connector of this unit and an external controller should be prepared by the user in accordance with the application. A connector kit for the J2 connector is supplied with this unit.

INSTALLATION AND CONNECTION

- (1) The parallel interface unit can be screwed onto the VCR connector panel as illustrated below.



(Part of connector panel)

Fig. 7-9

- (2) Connect the parallel interface (P I/F) cable to the J6 connector on the VCR and the J1 connector on this unit.
- (3) Prepare a cable using the supplied connector kit and connect it to the J2 connector on the parallel interface unit for remote control using external signals.

OPERATIONS

As shown in the example below, a desired function of the VCR is available if the signal line corresponding to the function (indicated as a pin No. of J2 connector) is connected to pin No. 37 (GND) for more than 40 ms via a cable using the supplied connector kit. To observe whether the function is activated or not, check the STATUS signal output from the appropriate signal line.

The following shows some typical applications. Connection should be free from chattering. For other operations, refer to Table 1 Pin Nos., Signal Names and Functions of J2 Connector below.

Starting Recording

The VCR should be in the stop mode. Connect pin 33 (REC CMD, input) to pin 37 (GND). The VCR starts recording, and REC STATUS signal is output from pin 6.

Stopping Recording

Connect pin 12 (STOP CMD, input) to pin 37 (GND). Recording stops.

Pausing and Re-Starting Recording

Connect pin 34 (STILL CMD, input) to pin 37. Recording is paused. Recording restarts by connecting pin 34 to pin 37 again.

Precautions for Connection

- (1) All the signals use negative logic.
- (2) All the input signals are the commands for VCR remote control.
 - o Connected to the TTL level or ground (GND, pin 37 of J2)
 - o Minimum pulse width: 40 ms
- (3) All the output signals indicate the VCR status.
 - o Open collector output
 - o Maximum application voltage: 30 V
 - o Maximum input current: 50 mA
- (4) Three input signals, /V PLAY CMD (14), /D1 (17), and /D2 (36), are necessary for remote control of search or jog playback.

Table 7-1 Pin Nos., Signal Names and Functions of J2 Connector

Pin Nos.	Signal Names	Functions
1	/CUE STATUS	Output signal indicating that the cue stop function is effective (ON)
2	/EJECT STATUS	Output signal indicating that the cassette stage is at the eject position or no cassette is loaded
3	/TAPE STATUS	Output signal indicating that the counter serves as a tape counter
4	/FFWD STATUS	Output signal indicating that the VCR is in the fast forward mode
5	/PLAY STATUS	Output signal indicating that the VCR is in the normal playback mode
6	/REC STATUS	Output signal indicating that the VCR is in the record mode
7	/STL STATUS	Output signal indicating that the VCR is in the still playback or REC pause mode
8	/START STATUS	Output signal indicating that tape is at the beginning
9	/EJECT CMD	Input signal to eject the stage (EJECT)
10	/MEM CMD	Input signal to switch ON and OFF the memory function (MEMORY)
11	/CUE IN	Input signal to record the cue signal (CUE\ENT)
12	/STOP CMD	Input signal to stop the operation currently in process (STOP)
13	/REW CMD	Input signal to start rewinding (REW)
14	/V PLAY CMD	(Input signal required for search or jog playback)
15	/A DUB CMD	Input signal to activate edit playback (EDIT)
16	/F STEP CMD	Input signal to activate forward step playback (FWD STEP)
17	/D1	(Input signal required for search or jog playback)

Table 7-1 Pin Nos., Signal Names and Functions of J2 Connector
(Continued)

Pin Nos.	Signal Names	Functions
18	NC	Not used
19	GND	Signal ground
20	/MEM STATUS	Output signal indicating that the memory function is effective (ON)
21	/LAP STATUS	Output signal indicating that the counter serves as a lap counter
22	/STOP STATUS	Output signal indicating that the VCR is in the stop mode
23	/REW STATUS	Output signal indicating that the VCR is in the rewind mode
24	/V PLAY STATUS	Output signal indicating that the VCR is in the search or jog playback mode
25	/A DUB STATUS	Output signal indicating that the VCR is in the edit playback mode
26	/STEP OK	Output signal indicating that the VCR is ready for step playback operation
27	/END STATUS	Output signal indicating that tape is at the end
28	/LAP CMD	Input signal to switch the counter mode into lap or tape (LAP/TAPE)
29	/CRST	Input signal to reset the counter to zero (RESET)
30	/CUE ON	Input signal to switch ON and OFF of the cue stop function (CUE STOP)
31	/FFWD CMD	Input signal for fast forward operation (FWD)
32	/PLAY CMD	Input signal for normal playback operation (PLAY)
33	/REC CMD	Input signal for recording (REC)
34	/STL CMD	Input signal for still playback or pause during recording (STILL or PAUSE)

Table 1 Pin Nos., Signal Names and Functions of J2 Connector
(Continued)

Pin Nos.	Signal Names	Functions
35	/R STEP CMD	Input signal to activate reverse step playback (REV STEP)
36	/D2	(Input signal required for search or jog playback)
37	GND	Signal ground

Capitalized designations enclosed in parentheses in the column Functions indicate the names of the buttons on the operation unit.

OPERATION FOR ADDITIONAL CAMERA SYSTEM

The additional camera system is used for dual camera operation.

The system includes a wipe unit which wipes 2nd camera image into 1st camera image. The wipe unit has cable compensation functions according to cable length (7 m, 25 m, 50 m 100 m) in use.

COMPONENTS

(1)	Color Camera	V-120	1
(2)	Camera Cable (7 m)		1
(3)	Wipe Unit	V-919	1
(4)	Camera Cable (1 m)		1
(5)	Power Cable (1 m)		1
(6)	Option Holder Kit		1
(7)	Fuse (spare, 1 A 250 V)		1

INSTALLING WIPE UNIT

- (1) Mount the two option holders on the left side of the VCR using four screws.

Left side
of the VCR

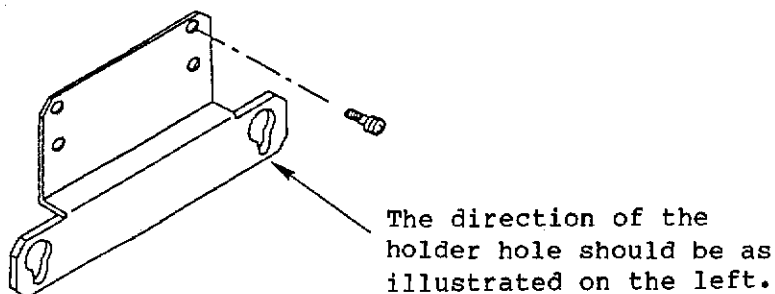


Fig. 7-10 Mounting Option Holders

- (2) Fit the four foot of the wipe unit into the holes of the holders, and lower the wipe unit.

CAUTION: Remove the wipe unit from the VCR when transporting the system.

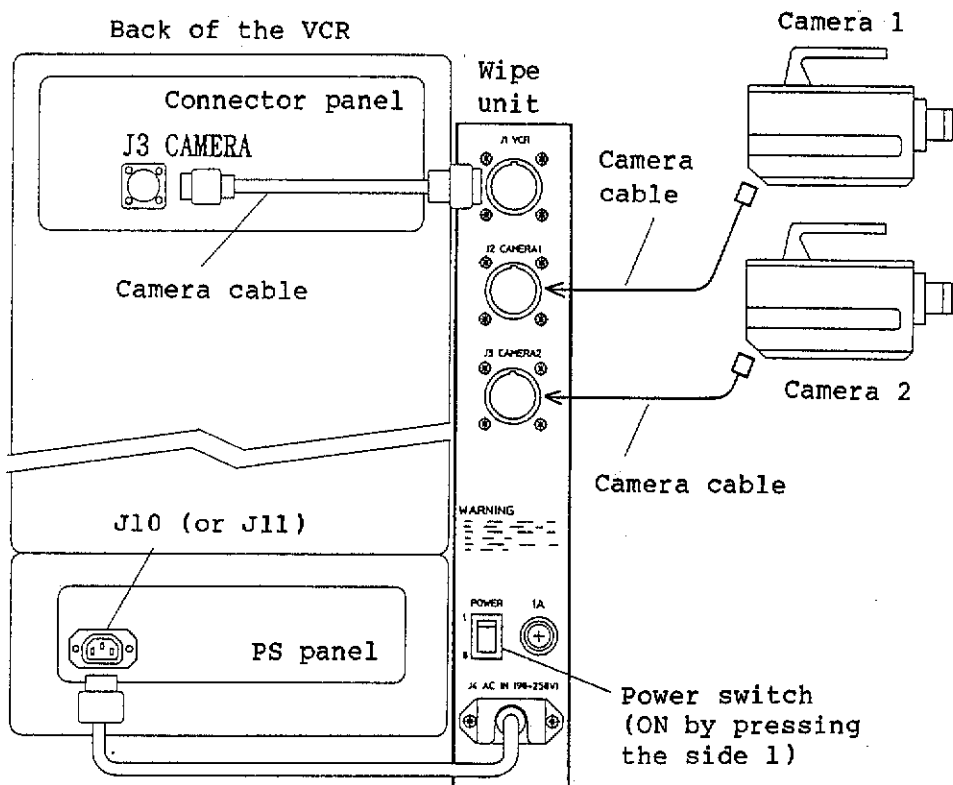
CONNECTING CABLES

CAUTION: Turn OFF the power switches of the wipe unit and the VCR when connecting cables.

- (1) Connect camera cables; one to the J2 CAMERA 1, and other to the J3 CAMERA 2 of the wipe unit.

A camera connected to the J2 CAMERA 1 is called "CAMERA 1" and one connected to J3 CAMERA 2 is called "CAMERA 2" in this explanation.

- (2) Using the attached camera cable, connect the J1 VCR connector of wipe unit and the J3 CAMERA connector of VCR.
- (3) Connect the power inlet of the power cable extended from the J4 AC IN connector of the wipe unit to the J10 or J11 connector of the VCR.



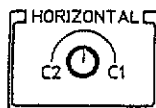
NOTE: Cables except illustrated are not needed to change.

Fig. 7-11 Cable Connection

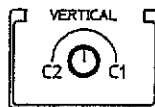
OPERATION

The wipe unit determines the ratio at which image from two cameras are incorporated into one screen.

HORIZONTAL Knob: Adjust the horizontal boundary of two images.



VERTICAL Knob: Adjust the vertical boundary of two images.



Turning knob to C1 give larger area for camera 1 and to C2 give larger area for camera 2.

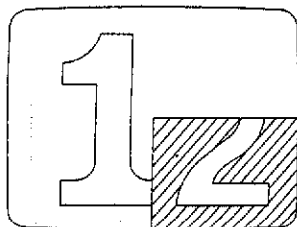
NOTE: If the picture size is HALF, VERTICAL Knob will not functioned.

- (1) Turn on power of the VCR and the wipe unit.

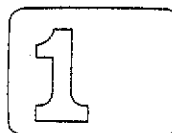
POWER switch of the wipe unit is located at its lower of rear panel. When it is turned on POWER lamp on the front panel comes on.

- (2) Fully rotate both the HORIZONTAL and VERTICAL knobs to the C1 position, and camera 1 image is displayed on entire screen. Then adjust the camera 1 image for recording.
- (3) Fully rotate both the HORIZONTAL and VERTICAL knobs to the C2 position, and camera 2 image is displayed on entire screen. Then adjust the camera 2 image for recording.
- (4) Adjust the HORIZONTAL and VERTICAL knob to determine the ratio for the two camera images.

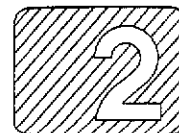
Sample screen image is shown when two knobs have set to the neutral position:



CAMERA1



CAMERA2



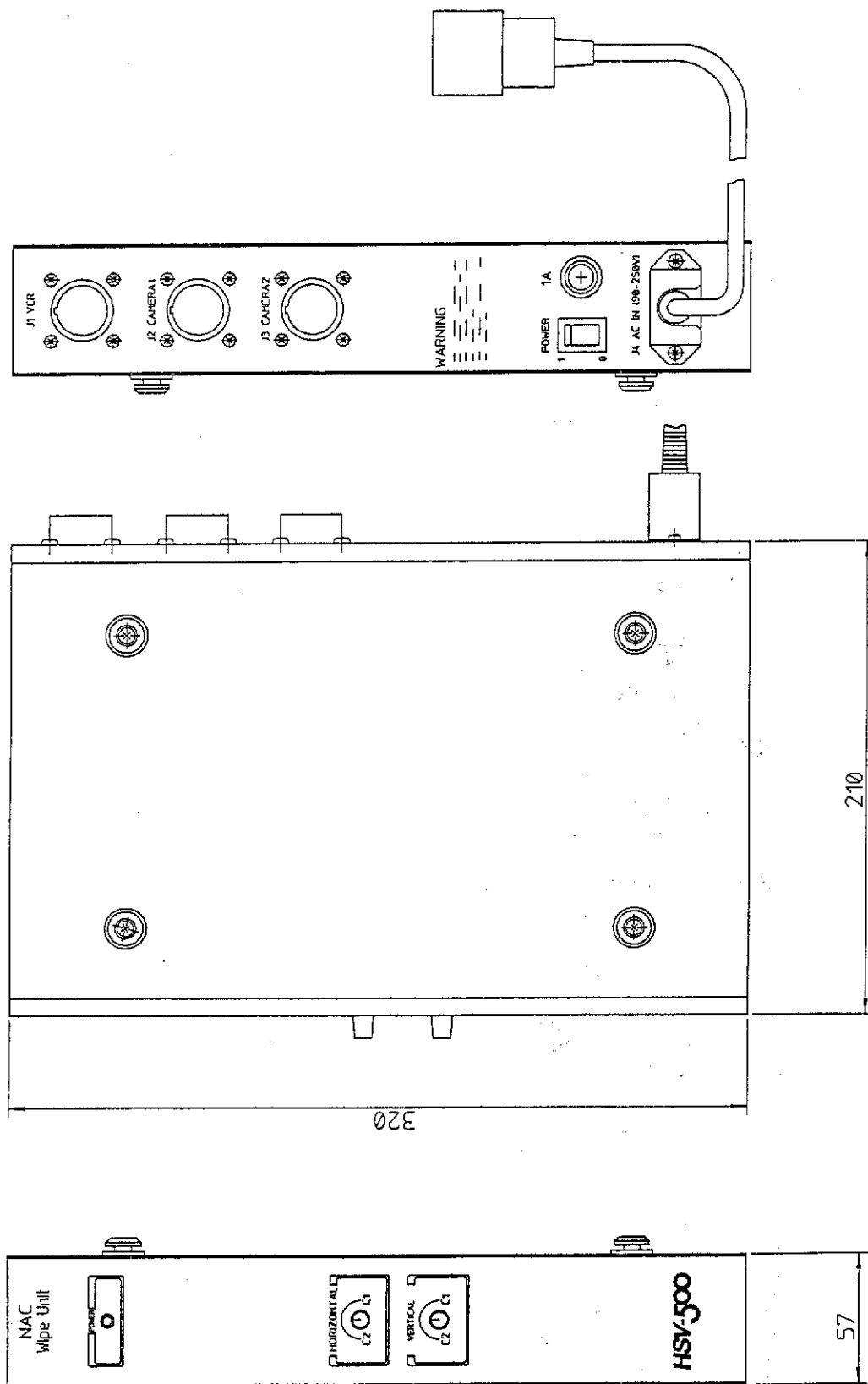


Fig. 7-12 Wipe Unit

OPERATION FOR CAMERA CABLE KITS

REF 2

The camera cable kits are used in place of the standard camera cable. The kits are available in three different camera cable length; 25 m, 50 m, and 100 m. Each kit includes the cable compensator.

- * 25 m Camera Cable Kit V-69
- * 50 m Camera Cable Kit V-70
- * 100 m Camera Cable Kit V-71

The cable compensator compensates signal deterioration due to long cable. Compensation is done automatically according to cable length in use.

The cable compensator has power switch, and has no other user controls.

INSTALLING CABLE COMPENSATOR

- (1) Mount the two option holders on the left side of the VCR using four screws.

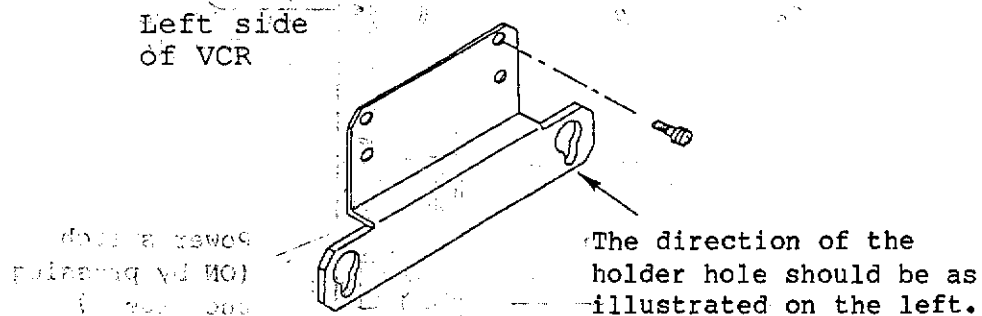


Fig. 7-13 Mounting Option Holders

- (2) Fit the four foot of the cable compensator into the holes of the holders, and lower the cable compensator.

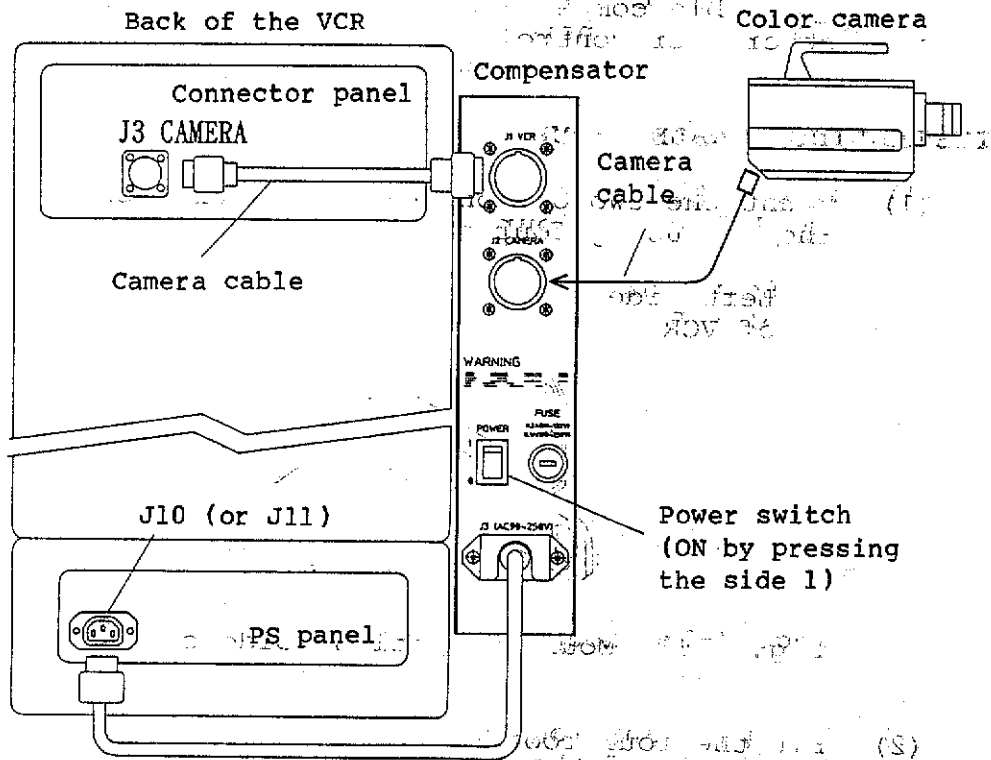
CAUTION: Remove the cable compensator from the VCR when transporting the system.

CONNECTING CABLES

STILL VIDEO FOR MONTAGE

CAUTION: Turn OFF the power switches of the cable compensator and the VCR when connecting cables.

- (1) Using a longer camera cable, connect the J2 CAMERA connector of the cable compensator and the camera.
- (2) Using the attached camera cable, connect the J1 VCR connector of cable compensator and the J3 CAMERA connector of VCR.
- (3) Connect the power inlet of the power cable extended from the J3 (AC90-250V) connector of the cable compensator to the J10 or J11 connector of the VCR.



NOTE: Cables except illustrated are not needed to change.

Fig. 7-14 Cable Connection

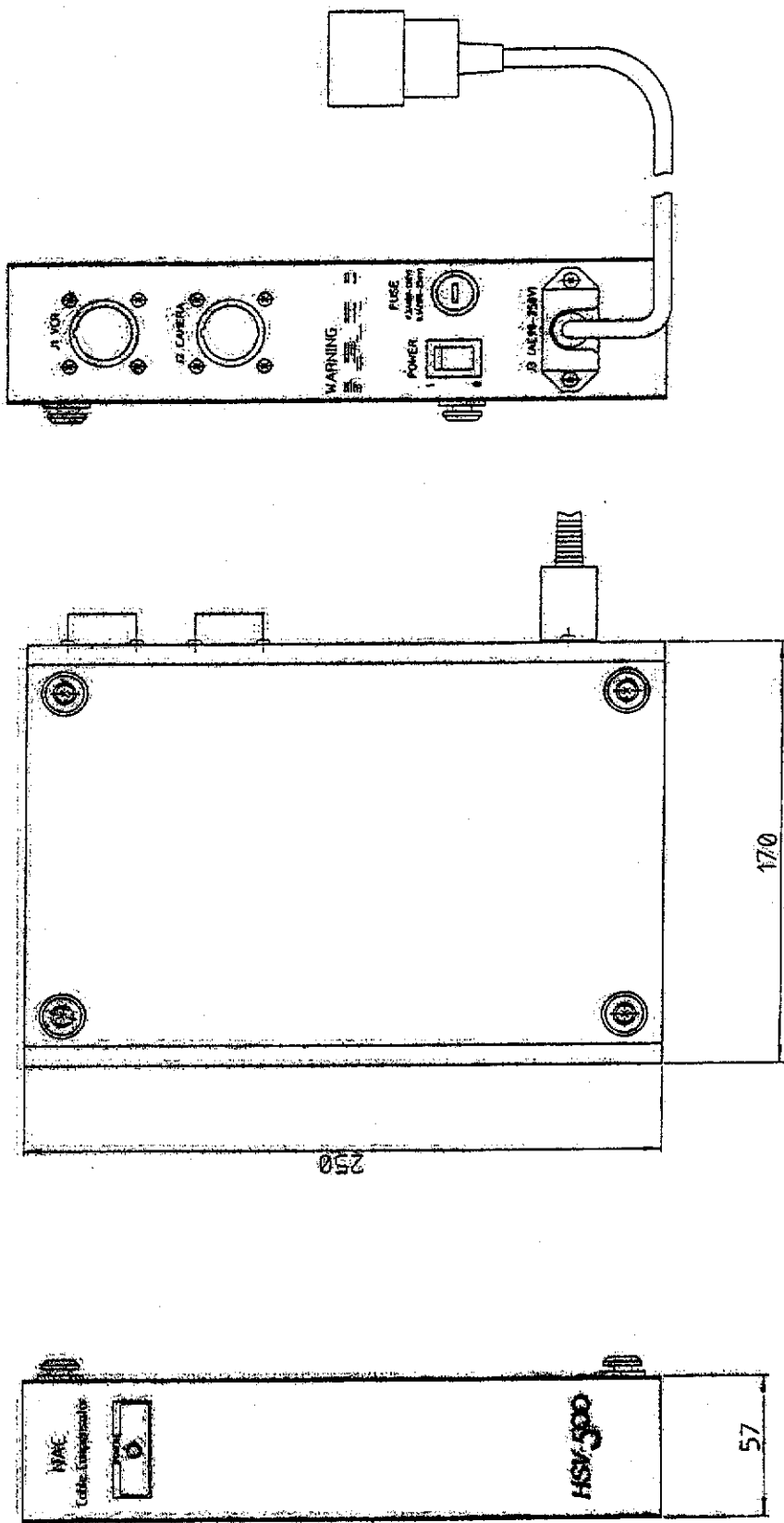


Fig. 7-15 Cable Compensator