OPERATION MANUAL

NAC HIGH SPEED VIDEO SYSTEM

HSV-1000

JUL. 1991

nac Incorporated

PREFACE

This operation manual describes how to make full use of the NAC High Speed System Model HSV-1000.

Please read through this manual before using the system to understand the functions of the HSV-1000 fully.

SAFETY

The HSV-1000 offers safe and trouble-free service if it is used in accordance with the instructions in this manual. Be absolutely sure to observe the following rules.

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

Do not touch any part of the system with wet hands.

The ventilation slots of each unit must not be blocked.

Use care to keep dust out of the system interior.

Avoid using the system under direct sunlight.

The HSV-1000 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. Do not operate the system with its case open.

Input Power Check
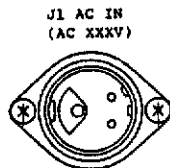
J1 AC IN
(AC XXXV)

The input power to the system is to be connected to the J1 AC IN connector on the connector panel in the upper 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.

SAFETY PRECAUTIONS FOR OPTIONAL STROBE

When disconnecting the strobe cable connector, wait more than one minute after the power switch is turned off.

HANDLING OF STROBE

DANGER: Never direct the strobe toward your eyes.

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.

CAUTION: DO NOT LOOK AT THE STROBE LIGHT DIRECTLY.

It is dangerous to look at the strobe light directly. A closed or narrow room must be well ventilated since this strobe lighting produces some ozone gas.

CAUTIONS FOR SYSTEM OPERATION

o Do not place the system in environments exposed to direct sunlight, rainfall or salt water.

o Avoid using the system for a long time in a dusty environment.

o Do not obstruct the ventilation slots to avoid over-heating inside. (Do not place any objects close to the ventilation slots.)

MOVING AND TRANSPORTATION

If the monitor is placed on the monitor mount, 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, see page 1-10.

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 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.

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

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.

Always wait three minutes applying power before inserting a cassette.

CONDENSATION

When hot moist air touches a cool surface of an object, water vapour condenses upon it. (You can recognize this phenomenon by dews on the surface of window glasses of a warm room in the winter, dews 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-1000 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.
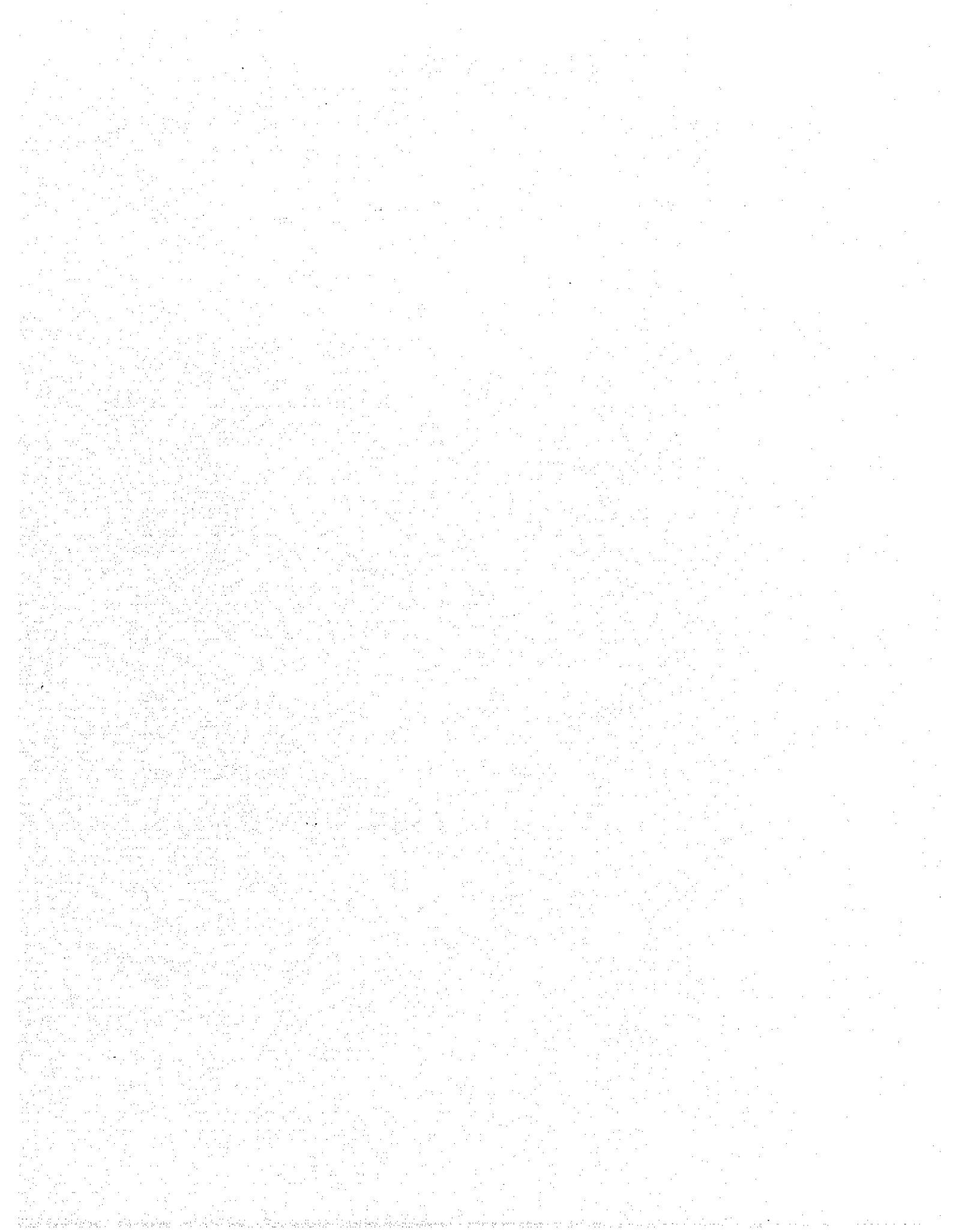
HOW TO READ THIS MANUAL

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 3-7.

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.

In this manual, words: strobe, strobe light, and strobe light system imply the use of optional strobe light system dedicated to the HSV-1000 system.

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] CHECK SWITCH SETTING ON THE VCR SUBPANEL.

(1) INPUT .... CAM (Picture from camera)

(2) B/W MODE .... OFF (Colour recording)

(3) STROBE .... OFF

(4) FREEZE .... OFF (No functioning in recording)

(5) REC .... S-VHS (S-VHS recording mode)

(6) START CUE .... ON (Insertion of cue signal at beginning of recording)

(7) FRAME RATE ...... 1000 (Recording at 1000 pictures/sec.)

(8) FREEZE DISPLAY .. OFF (No function in recording)

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

(1) Set the SHUTTER/LOCK knob on the camera to LOCK, frame rate knob to 1000, 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.

[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.
Colour balance adjustment (for securing
colour reproduction) is not described 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.

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SECTION I

GENERAL DESCRIPTION

OUTLINE OF SYSTEM

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RECORDING AND PLAYBACK FRAMES

MOUNTING AND DISMOUNTING MONITOR MOUNT

MOUNTING AND DISMOUNTING MONITOR

The High Speed Video System HSV-1000 videotapes a fast
moving object at 1000 or 500 pictures per second (colour
or black and white), while displaying it on the monitor
simultaneously. The recorded picture can be played back
in various ways. Ordinary colour video monitors can be
used for display, since the VCR outputs colour picture
signals of the NTSC (60 fields/second) system or PAL (50
fields/second) system.

The system consists of a high-resolution colour camera
using a solid-state image pickup element (with a
high-speed shutter), VCR (video cassette recorder) with a
cart, monitor mount for panning and tilting, colour
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.

High-Speed Recording and Immediate Playback

The system records 1000 (half size) or 500 (full size) colour 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-Quality Colour Camera

The colour 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.

High-Speed Rotary Shutter

The shutter built in the colour camera permits selection of three shutter speeds: 1/2500, 1/5000 and 1/10000 second. If the shutter is set to the OPEN position (i.e., shutter OFF), 1/1000 or 1/500 sec. shutter speed is available according to the recording speed.

Picture Adjustment

The colour balance and sensitivity of the camera can be adjusted while 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 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.

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-1000 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-1000 (VHS) is compatible with the HSV-400.

Various Playback Modes

In addition to the normal playback at the speed 0.12 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.

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.

VIDEO CASSETTE

S[VHS]

S[VHS]
625

The HSV-1000 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, ST-120, etc. represent the recording time in minutes. These are the times in the standard mode of a VHS video deck. For the HSV-1000, which performs high-speed recording, the recording time will be as follows.

This system uses the following three types of video cassettes as standard.
Do not use tape longer than ST-120/SE-180 type.

ST-120/SE-180:   14 minutes
ST-60/SE-90 :   7 minutes
ST-20/SE-30 :   3 minutes

(The tape thickness should be between 17 and 20 microns.)

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-1000 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-1000 and VHS Video Deck

> A video cassette recorded using the HSV-1000 (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 1000 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-1000 offers its various playback functions.

HSV-1000 and HSV-400

> A cassette recorded on the HSV-1000 in the VHS mode can be played back on the HSV-400.

> As well, a cassette recorded on the HSV-400 can be played back on the HSV-1000 in the VHS mode.

RECORDING AND PLAYBACK FRAMES
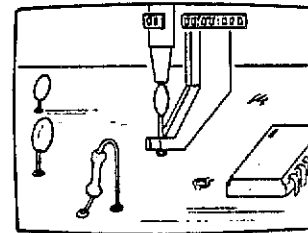
The recording and playback frames are of the same size.

DIFFERENCE IN FRAME SIZES ACCORDING TO RECORDING SPEEDS

The effective size of the screen for 1000 pictures/second recording and playback is equivalent to 50% of the monitor screen in height.
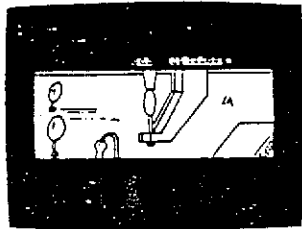
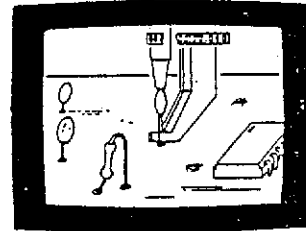NTSC monitor
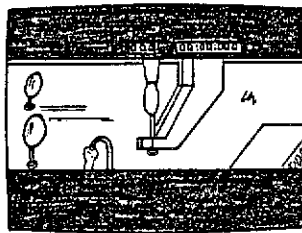
Effective range

Effective range

PAL monitor

Effective range

Effective range

1000 pictures/second recording and playback frame

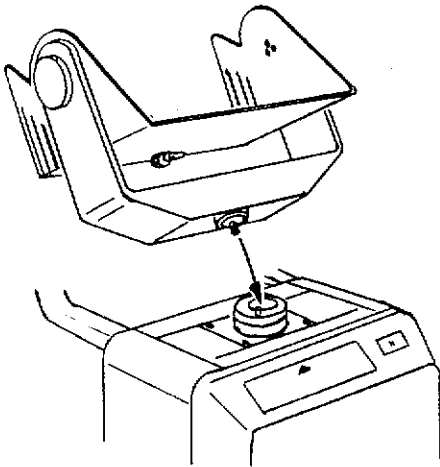500 pictures/second recording and playback frame

Fig. 1-1   Screen Size

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. 1-2

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.

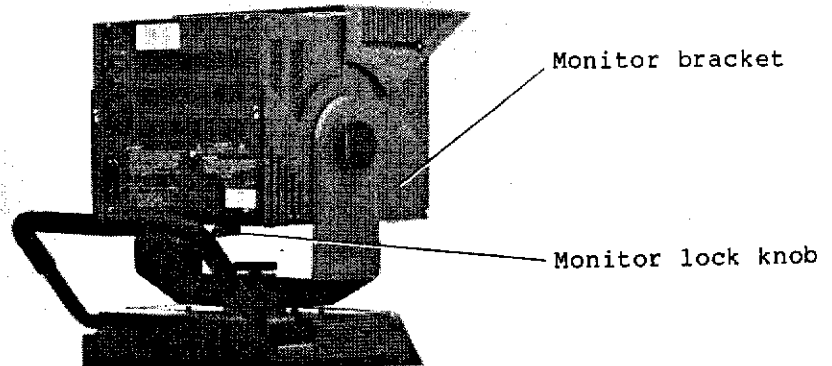Install the monitor onto the monitor mount on the VCR.

Fig. 1-3

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 J12 MONITOR connector on the VCR connector panel.

(7)   Connect the video cable to the VIDEO IN connector on the monitor and the J7 Y/C 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

COLOUR CAMERA

VIDEO CASSETTE RECORDER (VCR)

SUBPANEL

CONNECTOR PANEL

OPERATION UNIT

MONITOR MOUNT

MONITOR

COMPONENTS AND FUNCTIONS

This section describes the names and functions of each unit.

COMPONENT NAMES

Colour monitor

Viewfinder
(Optional)

Colour camera

Monitor
mount

VCR

Camera tripod
(Optional)

Operation
unit
(Inside door)

Fig. 2-1   Component Names

Handle

Shoe

Shutter knobs
(Shutter speed
and frame rate
knobs)

Shutter knob
cover

Lens mount

SHUTTER/LOCK
knob

Filter knob

EVF
connector

Rear panel

Tripod hole (On bottom)

Camera
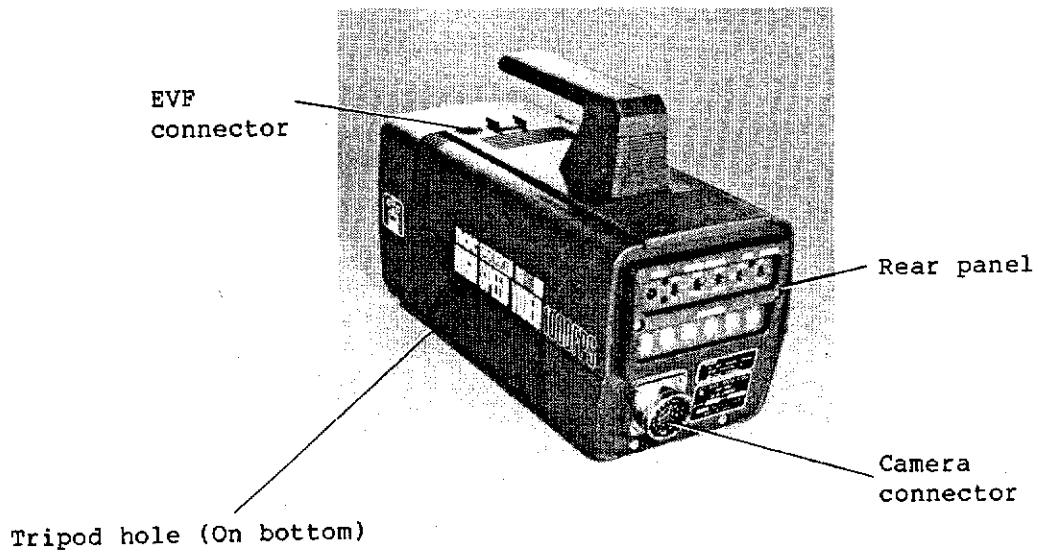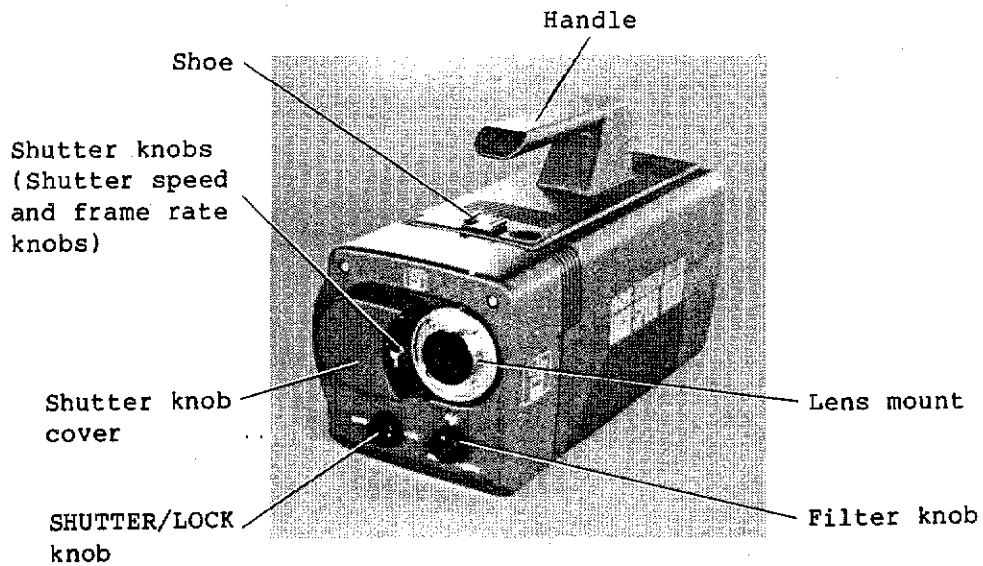connector

Fig. 2-2   Colour 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
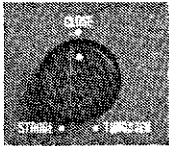
Use this knob to select the filter suitable for illumination. Set the white dot on the knob to any of the three positions.

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   : Use this filter for recording using the strobe light or under direct sunlight.
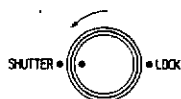
SHUTTER/LOCK Knob
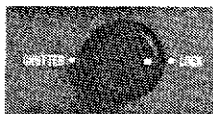
Use this knob to select whether the shutter rotates or is fixed. Turn the knob to set the white mark on the knob to the white mark in the SHUTTER or LOCK position.

CAUTION: o Before setting the knob to LOCK, set the SHUTTER ON/OFF switch to OFF and complete shutter 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.
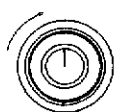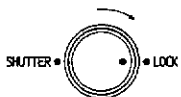
Shutter shaft
lock position

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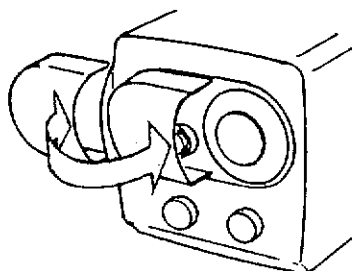
A safety cover is provided for preventing the rotating shutter knob from being touched. When shutter knob operation is completed, close this cover.

Frame rate knob _____ ＿＿＿＿ Shutter speed mark

_____ Shutter shaft index

Shutter speed knob ＿＿＿＿＿＿

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 (500 or 1000 pictures/second).

Both knobs rotate at a high speed during shuttered recording.

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.

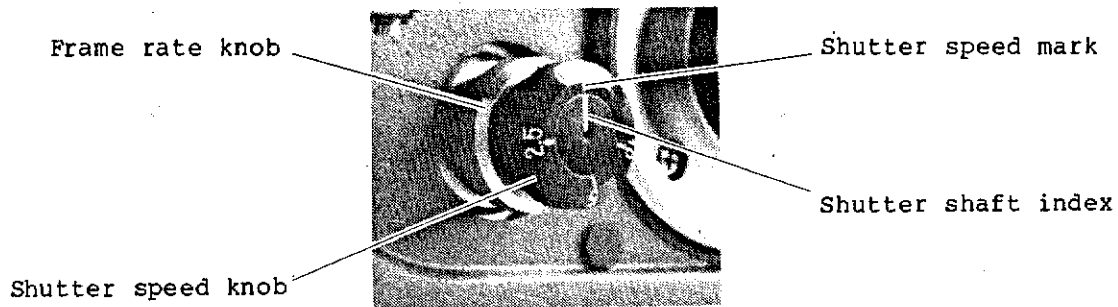_____ Shutter speed mark

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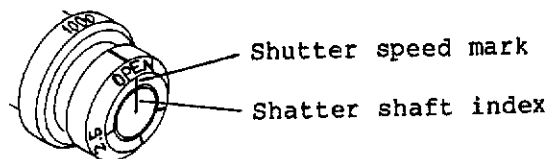
OPEN : Select this position for strobe recording, or when shutter is not used. In this case, the SHUTTER/LOCK knob shall be set to the LOCK position.

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 1000 and 500 on the frame rate knob.

Pull the knob frontward and rotate it clockwise to set 1000 or 500 mark to the frame rate index on the outer circumference of the shutter speed knob (OPEN mark).

Frame rate indication ——— 1000

Frame rate index ——— OPEN
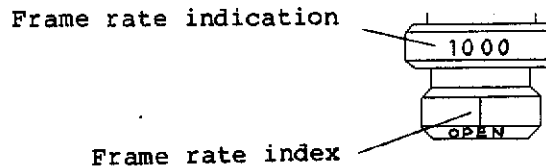
1000 : Use this position for shuttered recording at the frame rate of 1000 pictures/second.

500 : Use this position for shuttered recording at the frame rate of 500 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 :   1000 or 500
3. Shutter speed   :   2.5, 5, or 10

How to Lock Shutter
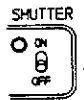
1) Set the SHUTTER switch on the rear panel of the camera to the OFF position.

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.
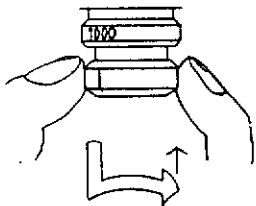
Detailed Procedures:

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, 1000 and 500, 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 1000 or 500 mark to the index on the shutter shaft (i.e., the line outside the OPEN mark).

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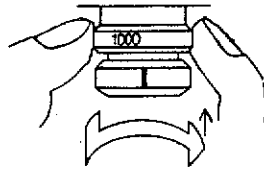
1) As illustrated on the left, hold the frame rate knob with the thumb and index finger, and pull it frontward until it is brought into contact with the shutter speed knobb

   (Hold only the frame rate knob so that the shutter speed knob is not pulled out.)
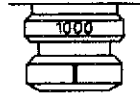
2) Rotate the knob slightly clockwise and release the fingers once. Then, hold and rotate it again until "click" sound is heard and the knob is pulled in.

NOTE: The shutter is not usable for strobe recording. Recording speed for strobe recording depends on the setting of the REC 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:
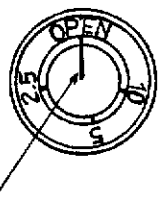
Shutter shaft index

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.
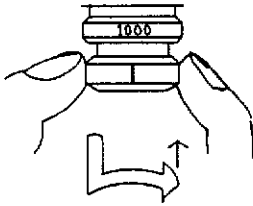
Detailed Procedures:

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.)
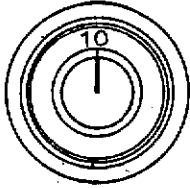
1/10000 sec.
shutter speed
setting
(EXAMPLE)

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.

○

End face of
shutter shaft

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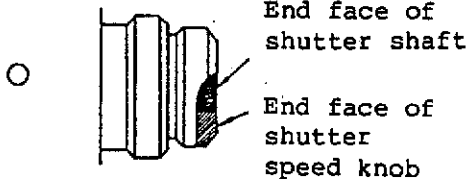
In this normal state, the end face of the shutter speed knob is level with the shutter shaft.

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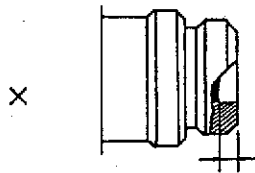
In this state, the end face of the shutter speed knob protrudes from the shutter shaft.

Shutter Rotation

SHUTTER • • • LOCK
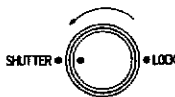
SHUTTER
○ ON
OFF

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
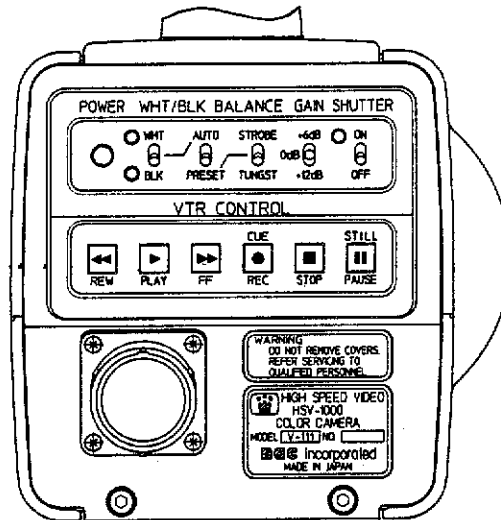
Fig. 2-3   Rear Panel

POWER Lamp

This lamp lights while power is supplied to the camera.

WHT/BLK BALANCE Switches (White/black balance)
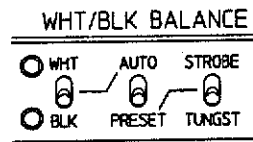
These switches are used to adjust the colour balance automatically in accordance with the lighting conditions in order to record the true colour of an object. The lamps indicate the operating state.

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 colour balance adjustment, and then go out after approx. 10 seconds. If the colour balance is not adjusted properly, either or both lamps flash 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 colour 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 colour balance adjustment. Releasing it returns to the centre position.

(Centre position):
The previous colour 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
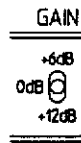
GAIN
+6dB
0dB
+12dB

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 or +12 dB position. Note that, however, noise increase as the gain increases.

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

0 dB :   Normal position.

+12 dB: Increases the sensitivity by two stops of the lens aperture.

SHUTTER Switch
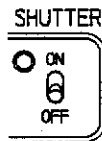
SHUTTER
ON
OFF

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 FRAME RATE switch on the VCR subpanel and the frame rate knob on the camera are not compatible.

```
                    VTR CONTROL
                              CUE        STILL
         ┌──┐  ┌──┐  ┌──┐  ┌──┐  ┌──┐  ┌──┐
         │◄◄│  │ ► │  │►►│  │ ● │  │ ■ │  │ ❚❚│
         └──┘  └──┘  └──┘  └──┘  └──┘  └──┘
         REW   PLAY   FF   REC   STOP  PAUSE
```
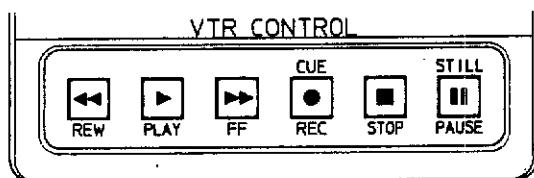
These switches are used for remote control of
basic VCR operations such as recording and
playback.

If any of these switch are pressed, the VCR enters
the mode corresponding to the pressed switch. A
message is displayed in the optional viewfinder
(and in the monitor) to allow the user to check
whether the VCR mode has been changed.

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 (i.e., 0.12 times
the recording 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
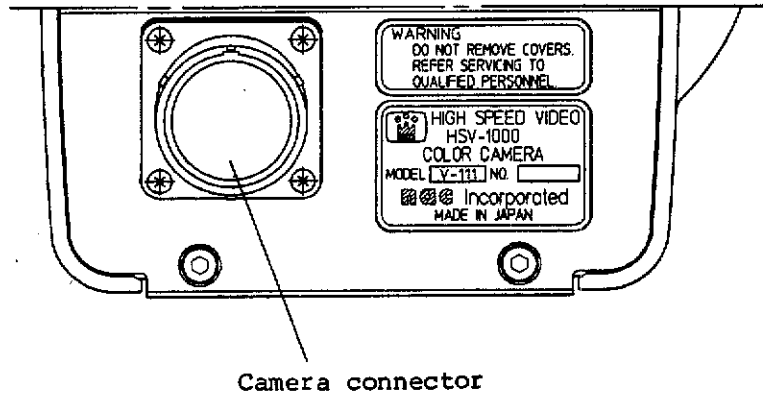
Camera connector

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

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.

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.

(Monitor mount)

Sub panel

Stage

POWER switch

Operation unit

Tyre

(Front view)

Handle

Connector panel

Air filter
(inside)

(Rear view)
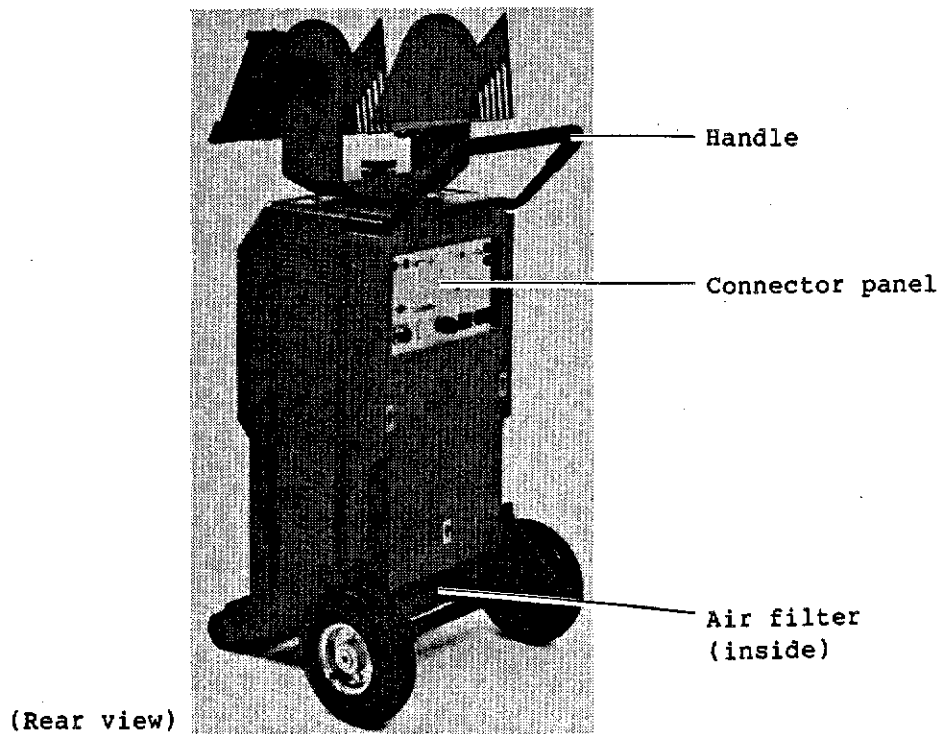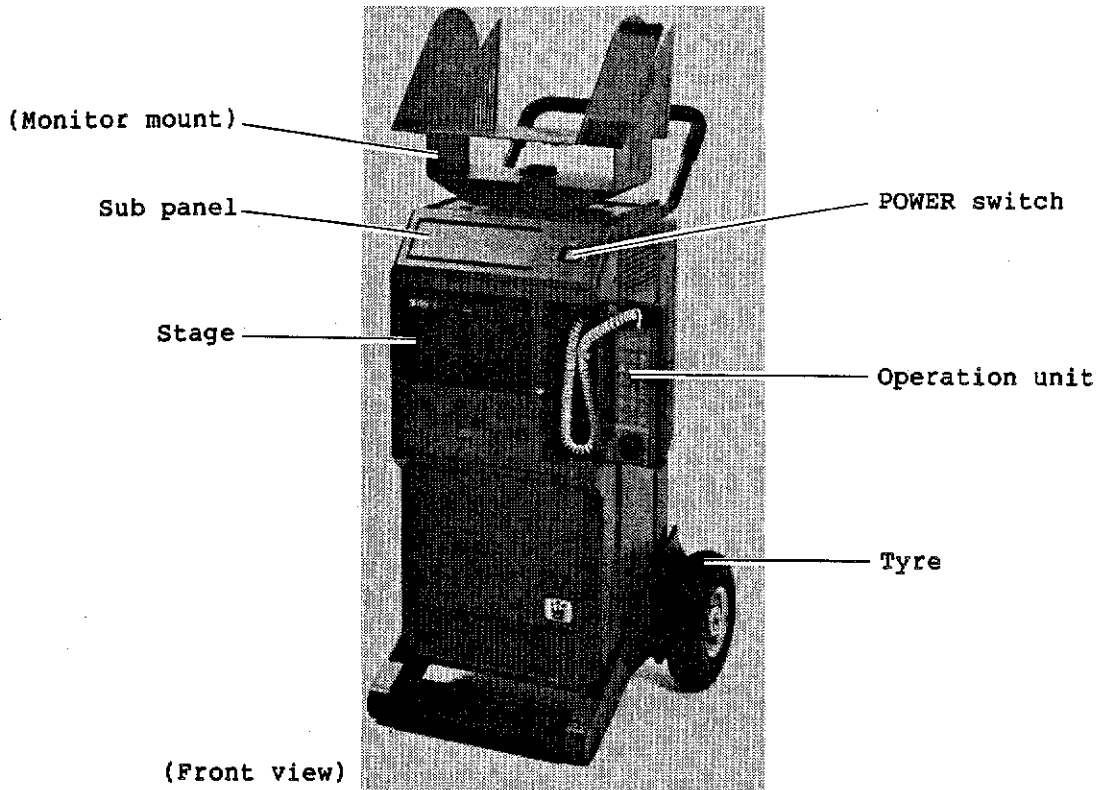
Fig. 2-6 Video Cassette Recorder

POWER Switch

The POWER switch of the VCR.

```
        POWER
      ┌─────────┐
  O   │  │   │  │   I
 OFF  └─────────┘  ON
```
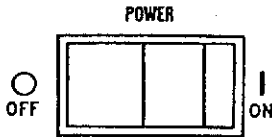
ON : Pressing the "|" side of the switch turns
       on the power; the switch lamp illuminates.

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 centre of the
stage firmly by hand.

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

Tyres

To move the VCR, steady the tyre 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 tyre become deflated the cart will
remain stable but will be difficult to move.

NOTE: The normal air pressure is 3.5 kg/cm^2.

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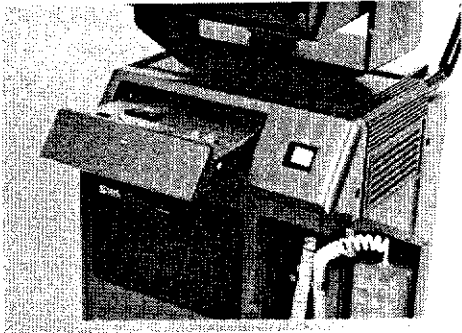
The VCR has a subpanel inside the cover. To open the cover, press the upper part of it (a triangle mark) lightly. Pull the cover, and the subpanel appears. To close the cover, press it.

The subpanel switches should be set before using the system.
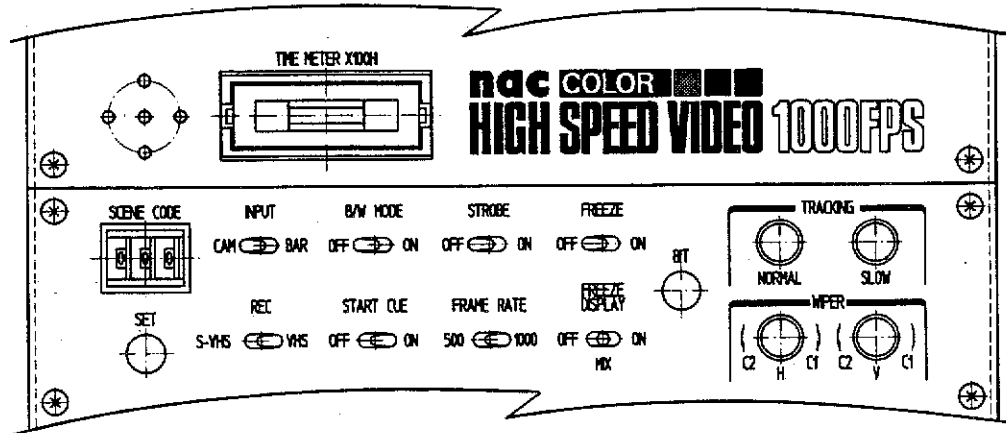
Fig. 2-7

SCENE/CODE SET Switches and Button

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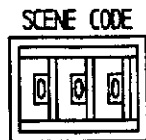
SCENE CODE Switches

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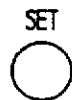
SET Button

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

INPUT Switch

INPUT

CAM ⊂⊃ BAR

Use this switch to select which signal to input to the VCR recording, the image signal from the camera or the colour bar signal (unique to the HSV-1000) generated in the VCR. Usually, the INPUT switch shall be set to the CAM position. This switch functions only in record mode.

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

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

B/W MODE Switch (Black and white mode)

B/W MODE

OFF ⊂⊃ ON

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

OFF : Colour recording

ON : Black and white recording

STROBE Switch

STROBE

OFF ⊂⊃ ON

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

NOTE: Strobe light system is optionally available.

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

ON : The strobe runs continuously.

FREEZE Switch

FREEZE

OFF ⊂⊃ ON

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 1000 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.

REC Switch (Record)

REC

S-VHS ⊂⊃ VHS

This switch selects the recording mode of an S-VHS cassette. If a VHS cassette is used, it is recorded in the VHS mode, regardless of the setting of this switch.

This switch functions only in record mode.

S-VHS: Set the REC switch to this position for recording of an S-VHS cassette in the S-VHS mode. This position offers better picture quality.

VHS : Set the REC switch to this position for recording of an S-VHS cassette in the VHS mode.

START CUE Switch

START CUE

OFF ⊂⊃ ON

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

The HSV-1000 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).

FRAME RATE Switch

FRAME RATE

500 ⊂⊏⊐ 1000

This switch selects the frame rate. In playback, it should be set to the same position as in which the recording was made.
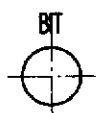
1000 : Pictures are recorded at the rate of 1000 pictures/second. The effective size of the screen is reduced to approx. half the monitor screen in height. (Half size)

500 : Pictures are recorded at the rate of 500 pictures/second. (Full size)

FREEZE DISPLAY Switch

FREEZE DISPLAY

OFF ⊂⊕⊐ ON
MIX

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.

BIT Button (Built-in test)

BIT

⊕

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

Load an S-VHS cassette into the VCR and press this button; test recording is automatically performed for a second, the recorded picture is played back, and a message indicating the result of the diagnosis is displayed on the colour monitor.

TRACKING Knobs
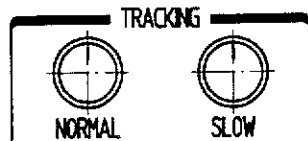
Adjust these knobs to eliminate stripe-shaped noise from the playback pictures.

NORMAL: 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 : 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 NORMAL and SLOW knobs, the "playback rate" is for 1000 pictures/ second recording and playback. For 500 pictures/ second, the above playback rates shall be halved.

WIPER Knobs
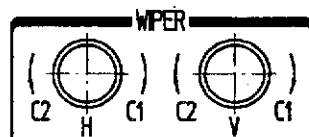
If two cameras are used for recording, the screen can be divided into two parts and the camera images can be displayed in each part of the screen. These knobs controls the rate of dividing the screen. The wiper function is invalid for recording using a single camera.

H Knob: Adjusts the border dividing the screen into the left and right parts.

V Knob: Adjusts the border dividing the screen into the upper and lower parts. (The V knob does not function for recording at the rate of 1000 pictures/second.)

For either knob, rotating the knob toward C1 position increases the rate of the image of camera 1. Rotating the knob toward C2 position increases the rate of the image of camera 2.

TIME METER X100H

This meter indicates the total time of using the video head (up to 1000 hours).

It has ten divisions from 0 to 10. A division represents 100 hours.

Read the division at the gap between the thin silver bars to find the total time of using the video head. This meter counts up to 1000 hours, the approximate service life of the video head.

CONNECTOR PANEL (On VCR Rear Panel)
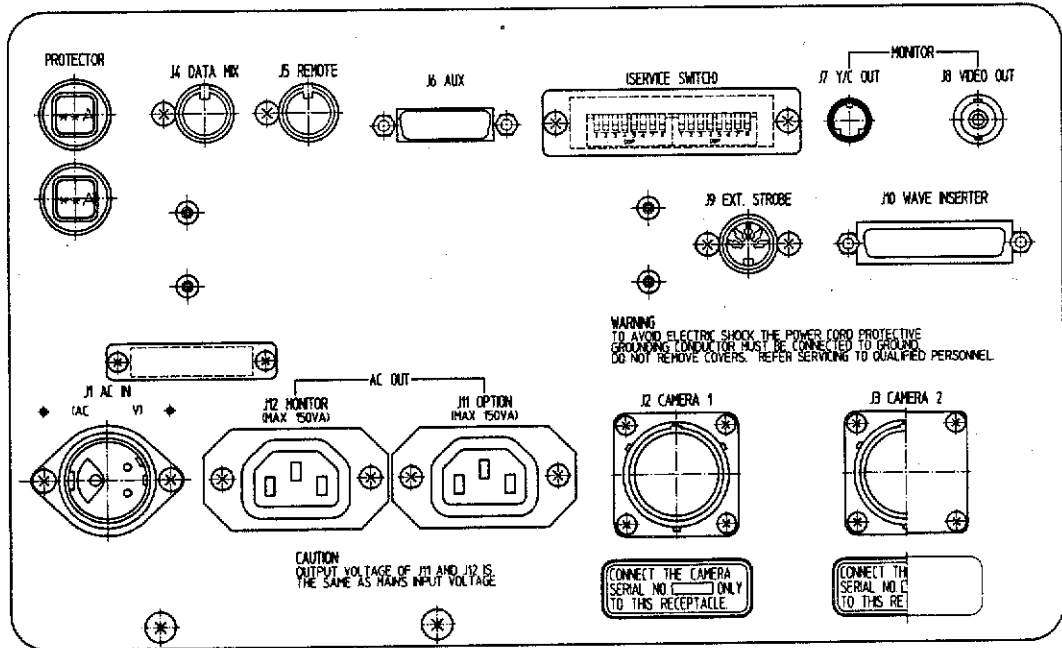
Fig. 2-8   Connector Panel

J4 DATA MIX Connector

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

J5 REMOTE Connector

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

J6 AUX Connector

If the optional XY coordinator is used, connect it to this connector using the control cable.

(SERVICE SWITCHES)

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 5-10.

MONITOR Connectors

These connectors output video signals for the monitor.

```
          ┌────MONITOR────┐
     J7 Y/C OUT      J8 VIDEO OUT
```
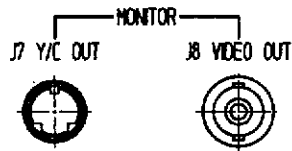
J7 Y/C OUT Connector

Outputs separated Y and C image signals. Connect the video cable to this connector and the VIDEO IN connector of the monitor.

J8 VIDEO OUT Connector

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

PROTECTORS
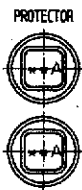
PROTECTOR

These protectors cut off input power supply to protect the internal circuit if excessive current flows in the input power supply. If the protector functions, eliminate the cause, then reset the protector.

J9 EXT STROBE Connector (External strobe)

J9 EXT STROBE

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

J10 WAVE INSERTER Connector
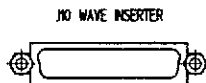
J10 WAVE INSERTER

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

J2 CAMERA 1 Connector
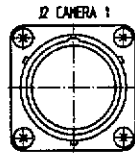
Connect the camera 1 to this connector using the camera cable.

J3 CAMERA 2 Connector

Connect the camera 2 to this connector using the camera cable. The system of the single camera configuration does not have this connector.

NOTE: Always connect the first camera to CAMERA 1 connector, the second camera to CAMERA 2 connector.

J1 AC IN Connector
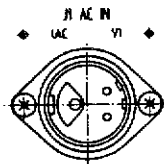
Connect the power cable to this connector and a wall socket to supply power to this system. Make sure that the supply voltage is as specified on this connector.

AC OUT Connectors
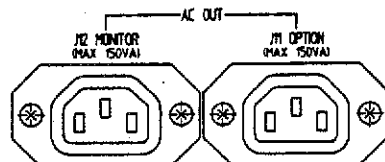
These connectors supply power to the monitor and the optional wave inserter. Output voltage is the same as the supply voltage input to J1.

CAUTION: These connectors have limited current capacity. Do not connect any other electric devices to these connectors.

J11 OPTION Connector

This connector supplies power to the wave inserter.

J12 MONITOR Connector

This connector supplies power to the monitor.

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.
It is located in the door on the right of the VCR stage.

The operation unit is operated with the door opened.
The operation unit can be placed on the bracket at the side of monitor.

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.
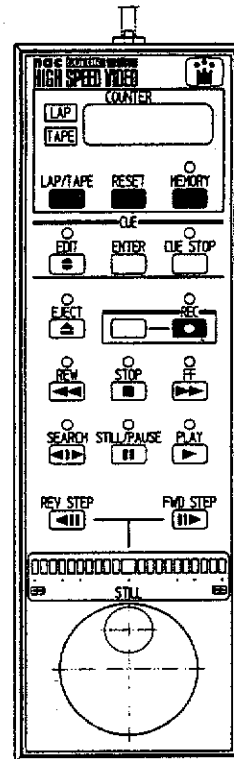
Fig. 2-9

COUNTER LAP/TAPE Indicator
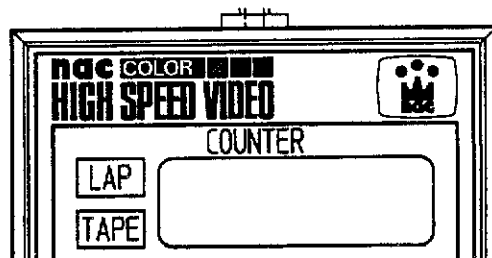
LAP Lamp

> 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.
>
> 5ΓΑrΓ / 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 00_   :   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 centre 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 memory function is activated, the lamp above the
       button is on and the tape stops automatically in
       the fast feed or rewind mode when the counter
       reads zero. The memory function is effective for
       both LAP or TAPE.

CUE
EDIT   ENTER   CUE STOP

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.
       To stop edit playback, press the STOP button.

       In the process of edit playback,
       previously-recorded cue signals are erased.

       The edit playback speed is the same as the normal
       playback speed (0.12 times the recording speed).

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 feed, 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 centre 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.

STOP Button

O
STOP
[■]

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

FF Button (Fast Forward)

O
FF
[►►]

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.

SEARCH Button

O
SEARCH
[◄I►]

Used for search playback. Pressing the button turns on the lamp above the button and the STILL LED at the centre 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 1000 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 in the actual time.

STILL/PAUSE Button

O
STILL/PAUSE
[II]

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 centre 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).

> 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 of 0.12 times the recording 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 centre 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 480 pictures/second. (These values are halved for tape recorded at the rate of 500 pictures/second.)

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

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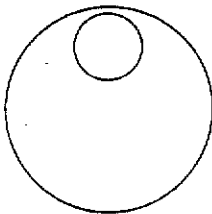
This dial changes the speed and direction of search playback and jog playback. Clockwise rotation enables forward (FWD) playback. Counterclockwise rotation (REV) enables reverse playback.

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 is released.

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.

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.
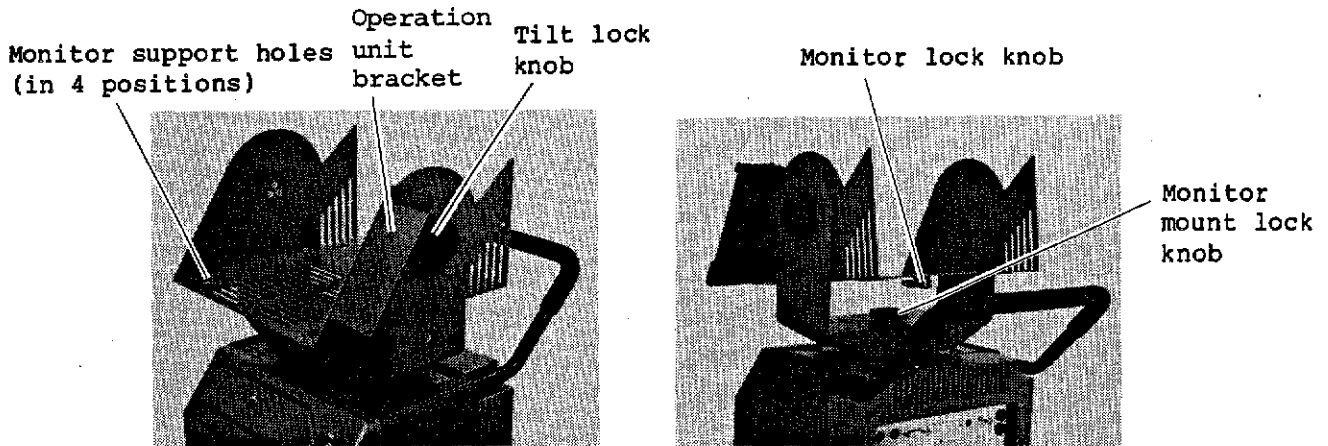
Fig. 2-10

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. To dismount the monitor mount from the VCR, rotate the knob counterclockwise to release the hook.

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. To dismount the monitor, loosen the monitor lock knob fully to release the hook, move the monitor forward, and lift it.

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.

Hood

Panel   POWER switch
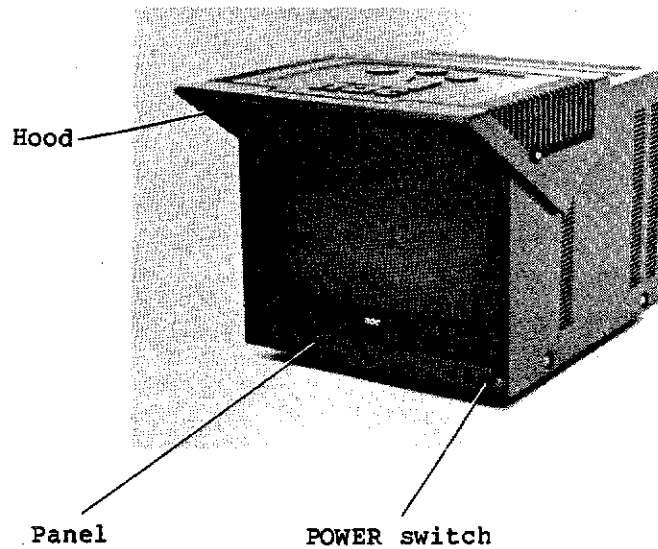
Fig. 2-11

POWER Button   : Press this button to turn on
power. The lamp on the left of
the button comes on, and an
image appears after approx. 30
seconds. The POWER button may
usually be left on and power
controlled from the VCR.

(Front Panel)

The following knobs are installed inside of the
panel. The panel opens by pressing the square
mark.

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 colour 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 switch
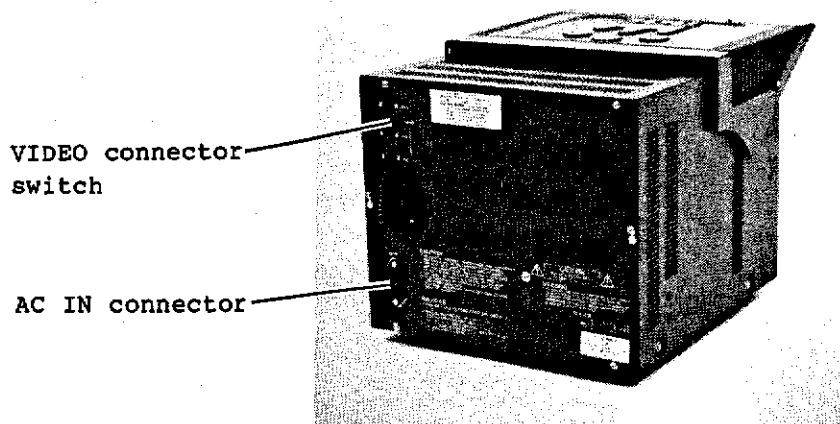
AC IN connector

Fig. 2-12

(Rear Panel)

VIDEO Connectors and switch

IN : Connect the video cable to this
connector and the J7 Y/C OUT connector
on the VCR connector panel.

OUT : This can be used to connect another
monitor, VCR or video equipment.

75 ohm: 75 ohm termination switch.
If VIDEO OUT connector is not used, set
this switch to 75 ohm position. If
video equipment is connected to the
VIDEO OUT connector, set this switch to
OFF position.

AC IN Connector

Connect the supplied power cable to this
connector and the J12 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

CHECKING IMAGE OF OBJECT

COLOUR BALANCING

INSERTION OF VIDEO CASSETTE

SELECTION OF COUNTER DISPLAY

RECORDING AND STOPPING

FAST FORWARD AND REWIND

SWITCH OFF

The operation unit for VCR control is inside the door on right of the stage of the VCR.

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, colour 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.

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

Handling of Tripod

Set level and lock tilting and panning devices.
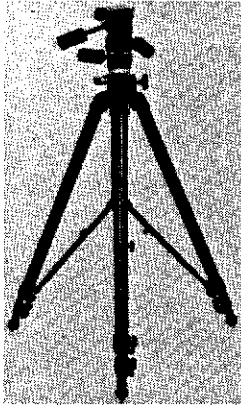
Make elevation relatively firm.

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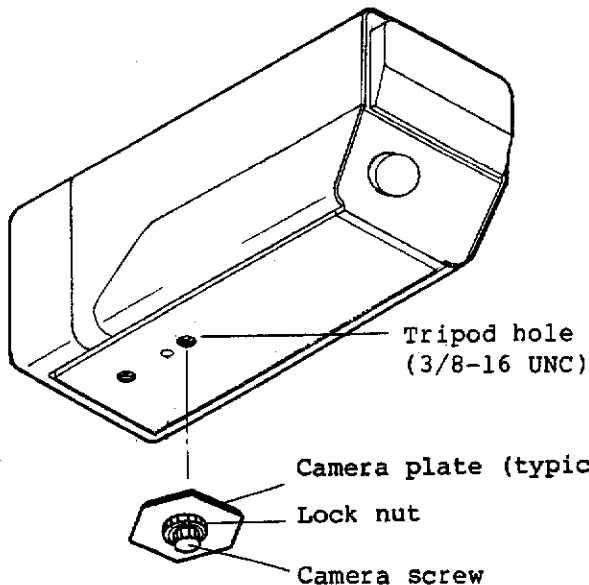
The camera has two tripod threads and a pin hole on the bottom.

It depends on type of tripod used, however fix the camera securely on the tripod.
Figure at left shows an example.

Tripod hole
(3/8-16 UNC)

Camera plate (typical)

Lock nut

Camera screw

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 3-7 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.

Open the Door of Operation Unit.

        The operation unit is inside the door beside the
        VCR stage. Open the door to the right to use the
        operation unit. To remove the operation unit,
        slide it upward and pull.

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

Colour monitor

Colour camera

VCR

MONITOR Y/COUT

AC-IN   AC OUT MONITOR   CAMERA 1

ii

AC power line

i: NTSC monitor is shown
   for example

ii: For Dual Camera system,
   Second camera and its cable must be
   connected to CAMERA 2 connector

NOTE: Keep the combination of camera, camera cable,
       and CAMERA connector on VCR.
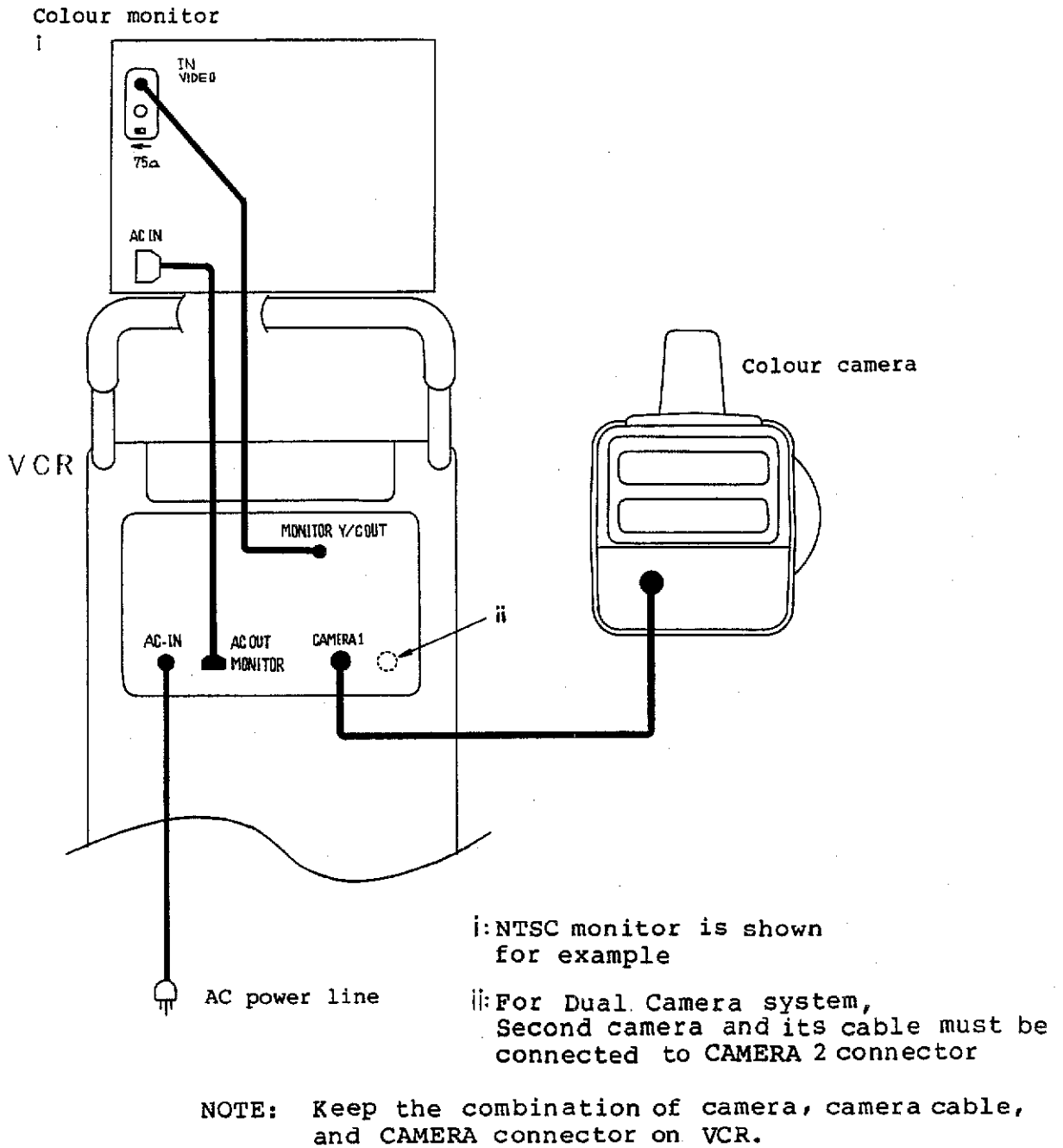
Fig. 3-1 Cable Connection (Standard configuration)

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: Pushbutton in the lower right of the monitor front panel (Press.)

Turn on the VCR. - Set the POWER switch to ON.
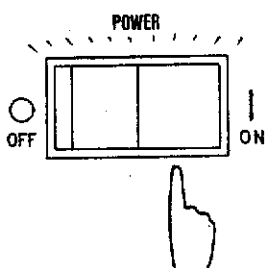
The POWER switch lamp comes on.

In addition, the EJECT and TAPE lamp on the operation unit come on, and the counter indicates 0000.
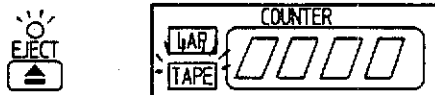
Turn on the Monitor. - Press the POWER switch.
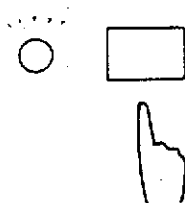
The pilot lamp on the monitor comes on. The monitor screen brightens quickly, and numerals 001 00:00:000 are displayed in the upper centre of the screen.

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.

Press the triangle mark on the subpanel; the
subpanel slides out a little. Draw it out to the
position where it stops with a slight click.
To close it, press the triangle mark again.
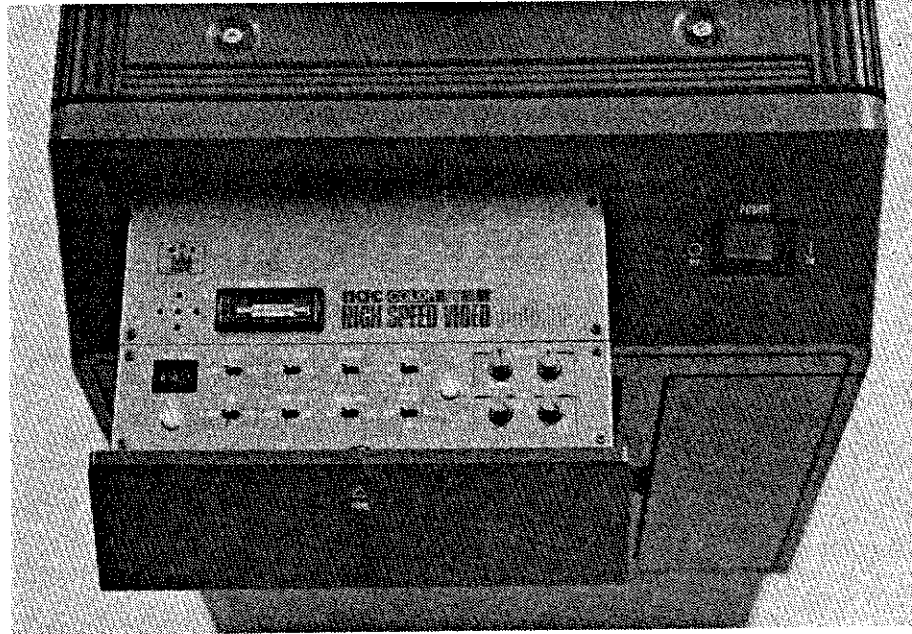
Fig. 3-2   Subpanel

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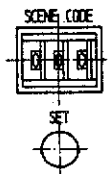
Set an intended scene code with the SCENE
CODE thumbwheel switches. Then, press the
SET button. The code set with the
switches is displayed on the screen.

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

INPUT

CAM ⊂⊃ BAR

Colour or Black and White Recording?
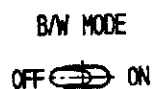
For colour recording, set the B/W MODE
switch to OFF. For black and white
recording, set it to ON.

To Turn On and Off the Strobe from VCR

STROBE

OFF ⬭ ON

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.

Recording Tape Format, S-VHS or VHS?

REC

S-VHS ⬭ VHS

Set the REC switch to S-VHS or VHS.

Either position may be used for an S-VHS cassette.

We recommend the S-VHS position for better picture quality.

If a VHS cassette is used, tape is recorded in the VHS format, regardless of REC switch setting.

To Insert a Cue Signal at Beginning of Each Scene

START CUE

OFF ⬭ ON

Set the START CUE switch to ON.

Frame Rate, 1000 or 500?

FRAME RATE

500 ⬭ 1000

Set the FRAME RATE switch to 1000 for recording at 1000 picture/second. For recording at 500 pictures/second, set it to 500.
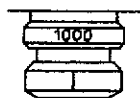
For shutter recording, this switch shall be set to the same frame rate as that of the frame rate knob of the camera.

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
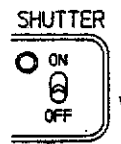
Set the SHUTTER ON/OFF switch to OFF.
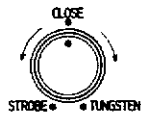
Filter Knob

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

STROBE   :   Recording under the sunlight

TUNGSTEN: Recording with tungsten lamps

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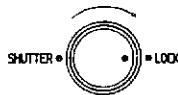
Make sure that the shutter has stopped, then set the SHUTTER/LOCK knob on the front panel to the LOCK position. Turn the shutter speed knob so that the shutter locks.

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 - 1000 or 500
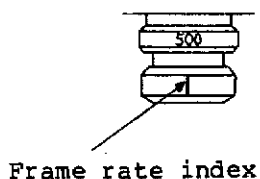
Pull and rotate the frame rate knob behind the shutter speed knob to set the 1000 or 500 mark to the frame rate index on the outer circumference of the shutter speed knob. Make sure that the knob is pulled back at the position where the mark is set to the index.

Frame rate index

1000: Recording at 1000 pictures/second

500 : Recording at 500 pictures/second

NOTE: If the recording is to be made with shutter-opened, following steps should be ignored.
In this case shutter speed will be depends on frame rate selected.

Frame rate	Shutter speed (exposure time)
1000	1/1000 sec.
500	1/500 sec.

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.
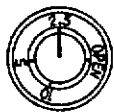
2.5: 1/2500 sec.
5 : 1/5000 sec.
10 : 1/10000 sec.

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 FRAME RATE switch on the VCR subpanel to the same speed as that of the frame rate knob of the camera.

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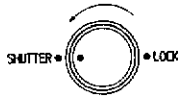
Return the SHUTTER/LOCK knob to the SHUTTER position. By this, the shutter can rotate.

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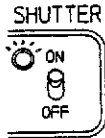
Set the SHUTTER ON/OFF switch to ON; The shutter rotates and the SHUTTER lamp goes on.

NOTE: If the frame rate knob of the camera and the FRAME RATE 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. Check the setting.

Then, as described on the following pages, turn on the lighting lamps, check the image of the camera, and adjust colour balance.

For shuttered recording, rotate the shutter to check the image.

Point and adjust the illumination to the object.

Adjust the lens aperture so that the camera picture is displayed on the screen.

Sensitivity Adjustment of Camera - GAIN Switch

GAIN

+6dB

0dB
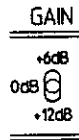
+12dB

The GAIN switch controls the sensitivity of the camera. Set it to the 0 dB position normally. Higher sensitivity is obtained if it is set to the +6 dB or +12 dB position, which should be used if lighting is insufficient. (Higher sensitivity increases noise in the picture.)

Colour balancing is to control the recording conditions of the camera to get as near as possible to the actual colours of the object.
The VCR supports two kinds of colour balancing: Black balancing and White balancing.
If the colour balancing is poor, the colour reproduction becomes poor and the contrast between neighboring scanning lines become obvious.

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

First perform black balancing, then white balancing. Do not reverse this sequence.

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: For recording under sunlight (and strobe recording).

TUNGST: Recording using a lamp of 3200°K colour temperature.

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 keep flashing. In such a case, check filter knob setting and repeat adjustment.

Set the filter knob of the camera to the TUNGSTEN (or STROBE for daylight) position.

For shuttered recording, turn the shutter on.

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

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

(If more than 30% of the monitor screen remains white at the centre of the monitor screen, white balance is obtained. Rough adjustment will do.)

Focus the camera with the lens. (Rough adjustment will do.)

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 keep flashing. 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 opening.

NOTE: Repeat the colour balancing if an illumination and/or GAIN has changed.

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.
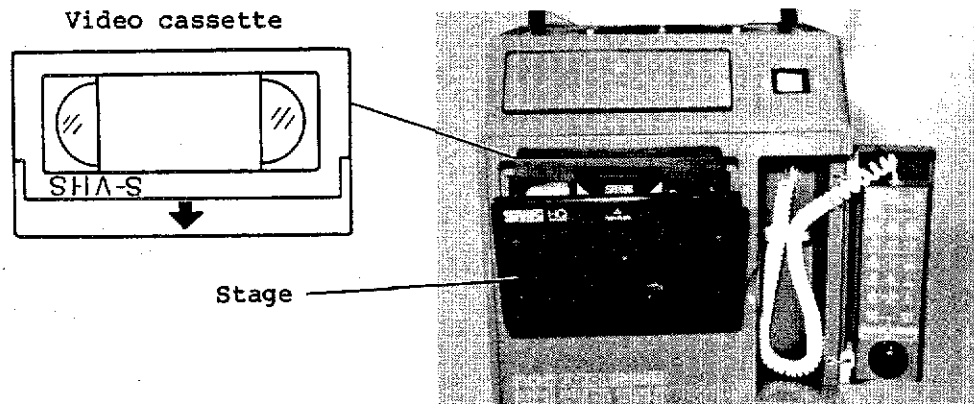
Fig. 3-3

Press to Close the Stage.

After inserting a video cassette, press the upper centre (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: Press the upper centre of the stage firmly. If the stage is not closed and opens again, the tape may be damaged.

Counter Display		Meaning
Displays 5ΓᕼᵣΓ and � ⌐⌐⌐ alternately	:	At the beginning of tape
Displays Ε ⊓ ⎅ and ⌐⌐⌐⌐ alternately	:	At the end of tape
Displays -----	:	Condensation inside prevents VCR from functioning, (for tape protection.) Wait until this display disappears.

SELECTION OF COUNTER DISPLAY

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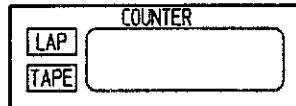
The COUNTER on the operation unit offers two counter functions: LAP counter or TAPE counter. As a LAP counter, it displays elapsed time in seconds up to 59 minutes 59 seconds. As a TAPE counter, it counts tape progress up to 9999.

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.

Starting and stopping of the record function is performed on the operation unit, or on the 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.

If the REC lamp comes on, recording starts. If it does not come on, any of the following failures takes place:

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

```
┌──────────────┐
│              │
│   WARNING    │        Look through the stage window to check
│              │        whether a cassette is loaded or not.
│  NO CASSETTE │
│              │
└──────────────┘
```

Cassette for playback only is loaded. (The stop lamp remains on.)
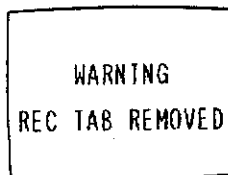
```
┌──────────────────┐
│                  │
│     WARNING      │        It is impossible to record on a cassette
│                  │        with an erasure prevention tab removed.
│ REC TAB REMOVED  │        Open the stage to check whether the
│                  │        cassette has a tab or not.
└──────────────────┘
```

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

```
┌──────────────┐
│              │
│   WARNING    │        The tape has been wound to the end.
│              │        Rewind it or load a new cassette.
│  END OF TAPE │
│              │
└──────────────┘
```

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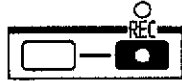
Recording starts when the STILL/PAUSE button is pressed again.

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 illumination.

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.

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

REW

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

FF

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

STOP

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.

Variety of playback operation is explained in the following section.

Others

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

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 colour camera to the CLOSE position, and cap the lens.

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

PLAYBACK OPERATION

PREPARATION FOR PLAYBACK

NORMAL PLAYBACK	[PLAY]	:	Playback time takes 8.3 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 SEARCH PLAYBACK	[PLAY-FWD]	:	Fast forward during 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

FRAME RATE Switch

FRAME RATE   Set the FRAME RATE switch on the subpanel
                  to the recorded speed of the video
500 ⟨⟨⟩⟩ 1000   cassette to be played back.

Recording Format -- S-VHS or VHS

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

Press the PLAY button.

○
PLAY
▶

The PLAY lamp comes on and pictures are played back at the speed of 0.12 times the recording 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.

○
STILL/PAUSE
❚❚

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.

○
STOP
■

Normal playback stops.

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 PLAY   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

II►

Every press of the button displays the next still picture.

Reverse Step Feed - Press the REV STEP button.

REV STEP

◄II

Every press of the button displays the preceding still picture.

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 at the actual
time.

(1) Press the SEARCH button.

○
SEARCH
◀▮▶

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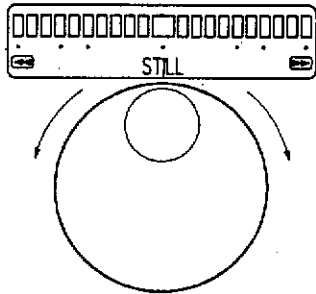
As the dial is rotated, the number
of the illuminated LEDs on the
speed indicator increases in the
dial rotating direction.

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 480 pictures/second.
The outermost LEDs indicate the maximum speed,
1000 pictures/second. These playback speeds are
halved for tape recorded at the rate of 500
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.

○
STILL/PAUSE
[▮▮]

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.

○
STOP
[■]

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.

(2) Rotate the dial in desired direction quickly or slowly.
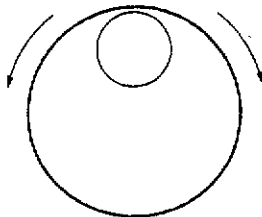
Pictures are played back at the speed (max. 24 pictures/second) corresponding to the dial rotating speed. In the jog playback, the LED on the speed indicator does not come on.

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

(3) Release your hand from the dial. Tape stops and a still picture is displayed. (Still playback)

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.

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

    ○
   STOP
  [■]

Press the STOP button.

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

FREEZE

OFF ⬭ ON

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

FREEZE
DISPLAY

The freeze function is operated from the VCR subpanel.

OFF ⬭ ON

MIX

(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 1000 pictures/second, the motion of continuous images may be unnatural. However, this is not a failure.

Press the EDIT button.

O
EDIT
⟮ ⬦ ⟯

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

ENTER
⟮ ⟯

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.

O
STILL/PAUSE
⟮ ❚❚ ⟯

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.

O
STOP
⟮ ∎ ⟯

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

- 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.

O
CUE STOP

Press the CUE STOP button, and the lamp comes on.

O
PLAY
▶

Press the PLAY button.

O   O
REW   FF
◀◀   ▶▶

Press the FF or REW button.

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.

STOP
AT CUE SIGNAL

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 1000 pictures/second. The playback speed for 500 pictures/second tape is half this speed.

NOTE: Noise bars do not disappear in high-speed playback at 480 or 1000 pictures/second. In reverse playback, they are not eliminated even at the speed of 240 pictures/second.

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

The mark on the NORMAL knob shall usually be set to the centre 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 Knob - Eliminating stripe noises in low-speed playback.

The mark on the SLOW knob shall usually be set to the centre 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.

Following controls are used to adjust the image on
the monitor.
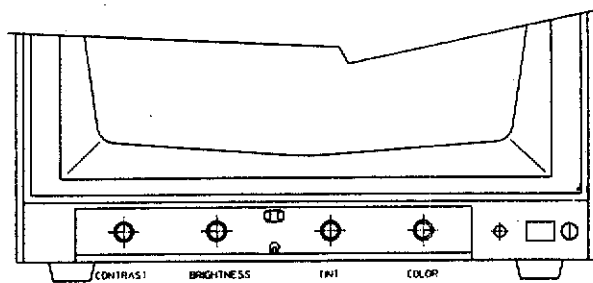
CONTRAST   : Adjust contrast.
BRIGHTNESS: Adjust brightness.
TINT   : Adjust tint.
COLOR   : Adjust color density.

Typical NTSC monitor is shown for example.

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.

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" 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-1000.

Equipment and Parts Required Other Than the HSV-1000

S-VHS video cassette recorder (NTSC)

Video cable (with S plugs at both ends)

S-VHS cassette

Dubbing Procedures

1) Connect the HSV-1000 video out to the S-VHS VCR video in and the S-VHS VCR video out to the monitor video in. Set the 75Ω switch on the monitor remains ON.

2) Turn on the HSV-1000 and S-VHS power.

3) Break off the erase prevention tab of the original cassette, and load it into the HSV-1000. Feed the tape to the beginning of the area to be copied.

4) Load an S-VHS cassette into the S-VHS video cassette recorder.

5) Bring the S-VHS video cassette recorder into the recording mode and the HSV-1000 into the normal playback mode.

When dubbing of the area to be copied is completed, stop operation of the S-VHS video cassette recorder and HSV-1000.

Comment: Dubbing of tape is possible without using the HSV-1000. In such a case, connect two video cassette recorders and make a copy of tape in the same procedures. The cue signals are not recorded on the copy tape.

SECTION V

OTHER USEFUL FUNCTIONS

The HSV-1000 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
>
> BUILT-IN TEST
> - Self diagnosis of VCR

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
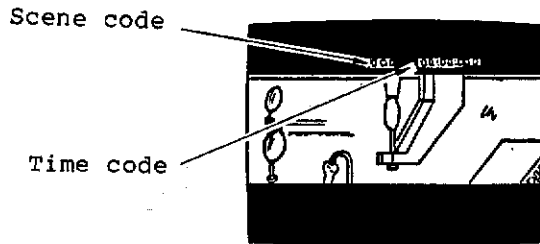
Time code

1000 pictures/sec frame on NTSC monitor is shown for example.

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).

SCENE CODE

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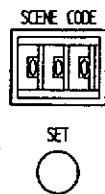
To give an intended number, set it with the SCENE CODE switches on the VCR subpanel before starting recording.

1. Rotate three thumbwheel switches to set an intended number.

2. Press the SET button below 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 SET 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.

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 milliseconds, the minimum unit of counting, when recording is started.

              00 : 00 : 001
              min.   sec. millisecond
                           (incremented every millisecond)

Since 1 msec. = 1/1000 sec., each count corresponds to each picture recorded at the rate of 1000 picture/second. As pictures change, the time counts are incremented by one such as 001, 002, 003 and so on.

For the pictures recorded at the rate of 500 pictures/second, the minimum unit of time counting is 2 milliseconds.

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

Picture (ms)	500 pictures/sec.	1000 pictures/sec.
000	000	000
001	–	001
002	002	002
003	–	003

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

Time Code Signal

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

Scene codes and time display can be remotely
controlled by make-contact signals through the J6
AUX connector on the VCR connector panel.

The optional AUX connector kit (part No. 486417)
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. 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. 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

J6 AUX

```
          ┌─────────────────────────┐
          │ 8  7  6  5  4  3  2  1   │
 ╱◯╲      │ o  o  o  o  o  o  o  o   │      ╱◯╲
 ╲─╱      │  o  o  o  o  o  o  o     │      ╲─╱
          │ 15 14 13 12 11 10 9      │
          └─────────────────────────┘
```
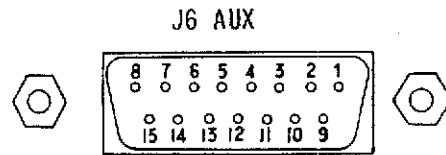
Pin No.	Signal	Function
5	/TIME ON	Time counting starts.
6	/TIME OFF	Time counting stops.
10	DISPLAY	Display ON/OFF
11	GND	Signal ground
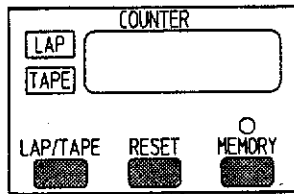
The counter on the operation unit offers two types of counter functions, lap counter and tape counter, and is used to know tape running position and time. It also enables automatic stop of the rewind and fast forward operations by using the memory function together.

COUNTER - Two Counter Functions

LAP/TAPE

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.

RESET

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.

RESET

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.

⛯
MEMORY
▬

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

⛯   ⛯
REW   FF
◄◄   ►►

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

The cue signals are recorded in recording or in edit playback. If a cue signals 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

START CUE

OFF ⊂⊃ ON

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

ENTER

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.

EDIT

1. Press the EDIT button.

    As in the normal playback mode, playback starts.

ENTER

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

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.

Ignoring Cue Signal - CUE STOP Off

If the CUE STOP is not enabled (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 service switch SW1-7 (REP) to up position.

SW1   SW2
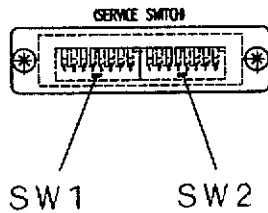
The service switches are located on the VCR connector panel. They are covered normally since they are not used for daily operation.

The service switches are used to set the VCR operations, and are set to the Down positions.

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 operation have finished.

SW1

1 NTS   : If this switch is set to the Up position, image signals converted into PAL standard are output at J7 Y/C OUT and J8 VIDEO OUT connectors.

2 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.

3 ALT   : For service use.

4 CHA   : For service use.

5 V.SIZE: For service use.

6 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).

7 REP   : Automatic repeated recording is enabled by setting this switch to the Up position. If recording advances and end of the tape is detected, the tape is rewound automatically, and recording is repeated from the beginning of the tape. Such operation is repeated.

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.

SW2

1 INT : For service use.

2 ~ 8 : Not used.

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

NO CASSETTE ─────── A message displayed at the screen centre calls user's attention.

STOP ─────── A message displayed in the lower right of the screen indicates an operation mode or lap count.
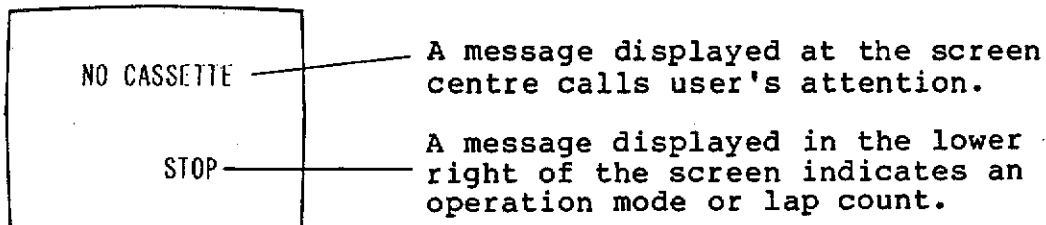
Alarm No. and description are displayed if any error occurs in VCR operations.

Messages Displayed at Screen Centre

Messages	Displayed When	Disappear When
PERFORMING SELF-TEST	During self test (BIT)	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 When	Disappear When
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 MODE IS
   SELECTED
(VHS MODE IS
   SELECTED)
	S-VHS cassette enable for recording is loaded and stage is closed.
	
	Note:
	Message on 3rd line depends on REC switch setting.
		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.

Two types of messages are displayed in the lower right of the screen; Mode display and lap counter display.

Mode Display

EJECT	STOP
STOP PAUSE	FF
REW	PLAY
STILL	FWD SEARCH
BWD SEARCH	REC
REC PAUSE	EDIT
EDIT PAUSE	

These messages indicate the VCR modes when the VTR CONTROL button on the camera is pressed. They disappear if a button on the operation unit is operated.

REPEAT REC:

Displayed if REP (repeat) service switch 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 REP switch is deactivated or another mode is established.

REPEAT REW:

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

Lap Counter Display

-59:59	Displayed together with the mode display if VTR
/	
00:00	CONTROL button on the
/	camera is pressed.
59:59	

Message disappears if any button on the operation unit is operated.

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 centre 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 (BIT) is completed: - Improper RF level - Colour locking is not performed. - CTL is not detected. (The messages on the left are examples of alarm 07.)

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

It can be activated if the VCR and colour 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 erase prevention tab.)

2) Press the BIT button on the subpanel.
(Other switches on the subpanel may be set
to any positions.)

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

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.
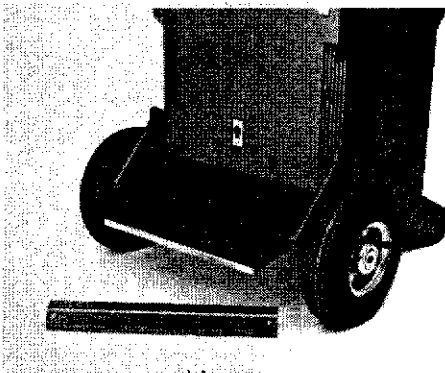
The filter cover is located in the lower part of the VCR rear. Loosen the screws on both sides to remove the cover. Draw out the filter holder (stainless plate) and remove the filter.

Suck out dust and dirt using a vacuum cleaner. On completion of cleaning, attach the filter in the reverse order.

The air intake on the front bottom may be stuffed with dust. Soak out dust using a vacuum cleaner.

Clean intake

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 centre.

The video head may be replaced if noise is not eliminated by cleaning. If the time metre on the VCR subpanel indicates more than 1000 hours, 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 colour 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 centre for advice if the video head is suspect.

SECTION VII

SYSTEM CONFIGURATION AND SPECIFICATIONS

SYSTEM CONFIGURATION

SPECIFICATIONS OF SYSTEM

OPTIONAL ITEMS

SYSTEM CONFIGURATION

The HSV-1000 single camera system consists of the
following components and parts as standard:

(1)	Colour camera	V-111	1
(2)	Video cassette recorder (VCR) (See below for model number)		1
(3)	Operation unit	V-811	1
(4)	Colour monitor		1
(5)	Monitor mount		1
(6)	Video cable (1 m)	VC-S110HF	1
(7)	Camera cables (7 m)	H-5431	1
(8)	Operation cable (max. 1.5 m)	H-5138	1
(9)	Power cable (for VCR, 3 m)		1
(10)	Power cable (for monitor, 1 m)		1
(11)	Camera case	V-054	1
(12)	Operation manual	82H108W	1
(13)	Video cassette		1
(14)	Head cleaner		1
(15)	Cover (for VCR)	392195	1
(16)	Cable case	V-063	1

Below listed are model numbers of VCR dependent upon
the system configuration.

	NTSC 90-132V	PAL 198-250V	NTSC 198-250V
Single Camera	V-306-J	V-306-E	V-306-A
Dual Camera	V-306-JA	V-306-EA	V-306-AA
Single Camera & Wave-inseter	V-306-JB	V-306-EB	V-306-AB
Dual Camera & Wave-inseter	V-306-JC	V-306-EC	V-306-AC

SPECIFICATIONS OF SYSTEM

Recording	:	S-VHS/VHS video cassette system standard (NTSC)
Number of fields	: :	1000 fields/sec. (Half-size) 500 fields/sec. (Full-size)

Video Signal
  Camera output
  (VCR input)
	:
	
	:
		500 fields/sec., 131.25 lines/field, 2 channels
		250 fields/sec., 262.5 lines/field, 2 channels

VCR output	: :	NTSC and Y/C separate signal, 60 fields/sec. PAL and Y/C separate signal, 50 fields/sec.
Image Pickup Element	:	MOS 2/3" solid-state image pickup element
Sensitivity	: :	12000 lux (At F1.4, shutter open/stop, 1000 fields/sec.) 6000 lux (At F1.4, shutter open/stop, 500 fields/sec.)
Shutter	: : :	1/2500, 1/5000, 1/10000 sec. 1/1000 sec. with shutter open/stop at 1000 fields/sec. 1/500 sec. with shutter open/stop at 500 fields/sec.
Lens Mount	:	"C" mount
Cassette Type	:	S-VHS or VHS video cassette (Tape thickness: 17 to 20 microns)
Recording Time	:	14 minutes (ST-120/SE-180 cassette)
Horizontal Resolution (colour, at centre)	: :	350 lines or more (S-VHS, NTSC) 240 lines or more (VHS, NTSC)
Monitor	:	Colour monitor
Playback	:	Normal, still, forward/reverse step, forward/reverse jog, forward/reverse search (variable from low to high speed), and freeze (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-306-J)
                        : 198 to 250 VAC, 50/60 Hz (V-306-E)

Power Consumption (NTSC model)

    1-camera system   : Approx. 390 W (Approx. 540 VA)

    2-camera system   : Approx. 440 W (Approx. 620 VA)

Weight

    VCR body and colour
    monitor (NTSC)   : Approx. 68 kg
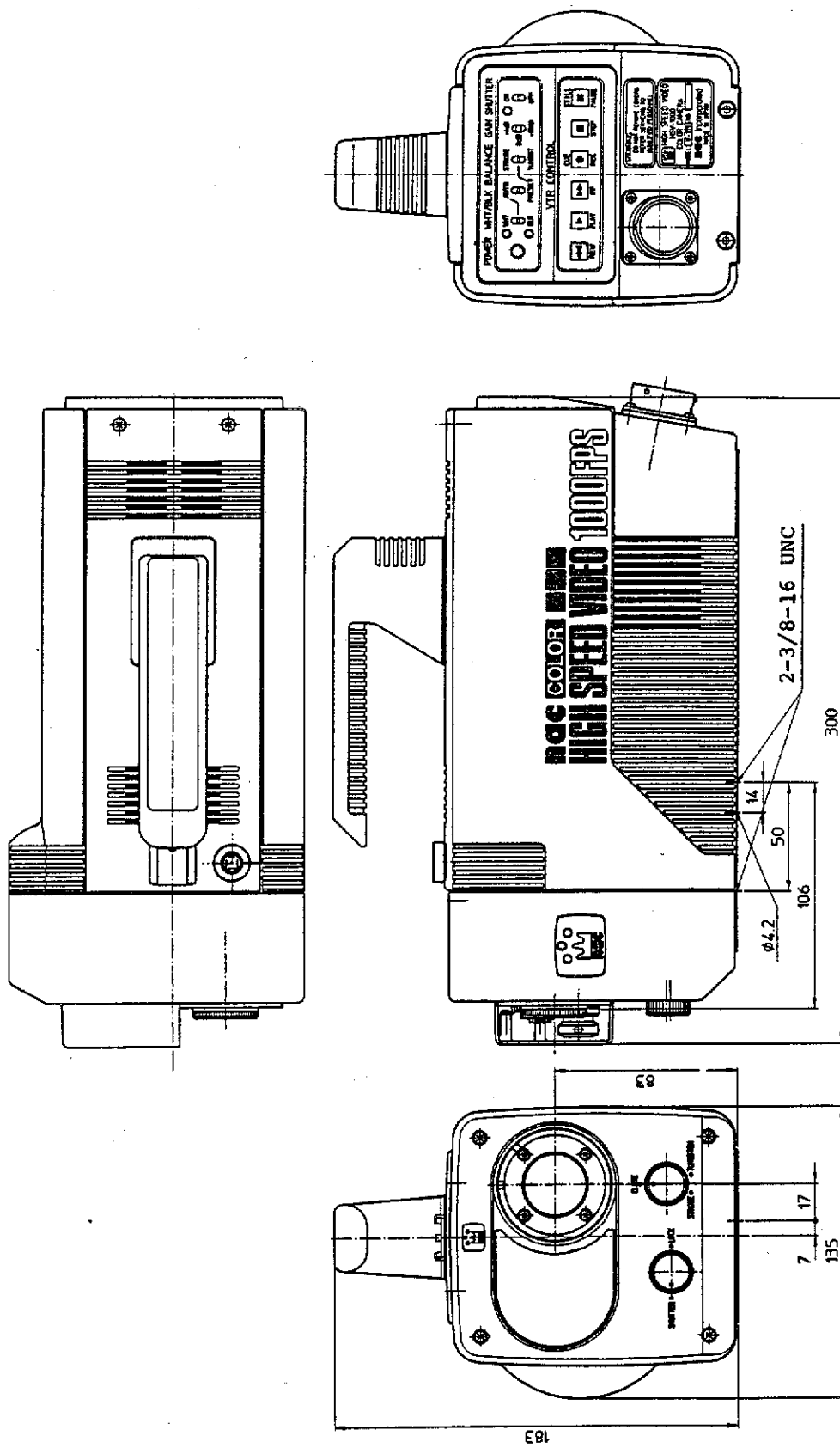
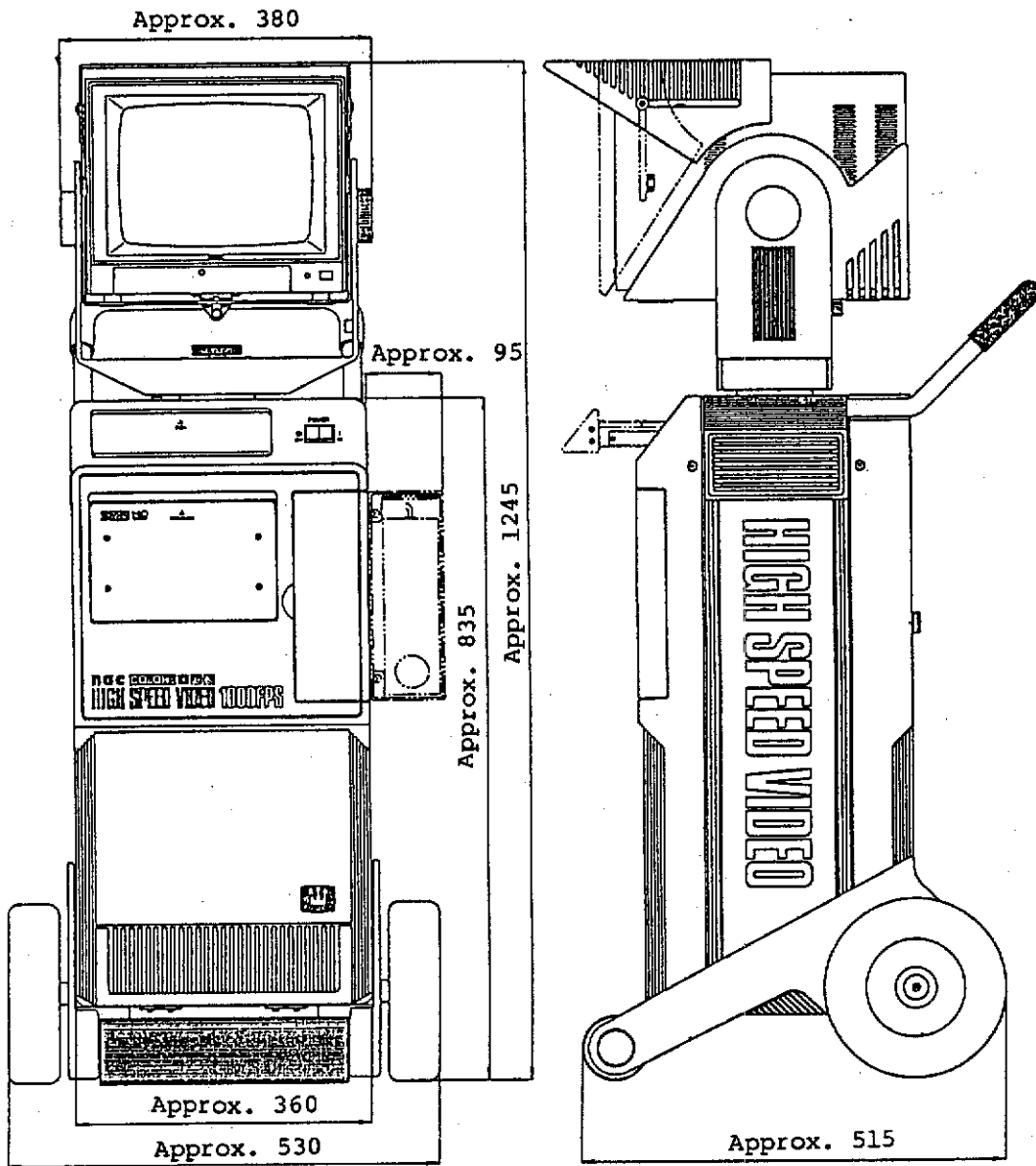   Colour camera   : Approx. 4 kg

Fig. 7-1　Colour Camera

Approx. 380

Approx. 95

Approx. 1245

Approx. 835

HIGH SPEED VIDEO

Approx. 360

Approx. 530

Approx. 515

Fig. 7-2   VCR, Monitor Mount, and Colour Monitor (NTSC)

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

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

Used to check and observe camera images
(in black and white) near the colour
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.

(2) 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.

(3) Strobe Light System
ST-444-U (90-132V), ST-444-E (198-250V)

High intensity lighting system provides
one power unit and two strobe light
heads. Light output is approx. 120 W for
each head in duration of approx. 10 ms
which synchronized to the VCR of HSV-1000.

(4) AUX Connector Kit 486417

A kit which fits to the J6 AUX connector.
Used for remote control of the scene codes
and time display via the AUX connector.

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

Displays a cursor on a playback image and
outputs the coordinates of the cursor
position to an external device.

(6) Wave Inserter ST-447-W

Superimposes waveforms of external signals
on camera images.

OPERATION MANUAL FOR VIEWFINDER

INTRODUCTION

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

It is mounted on the accessory shoe of the colour 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
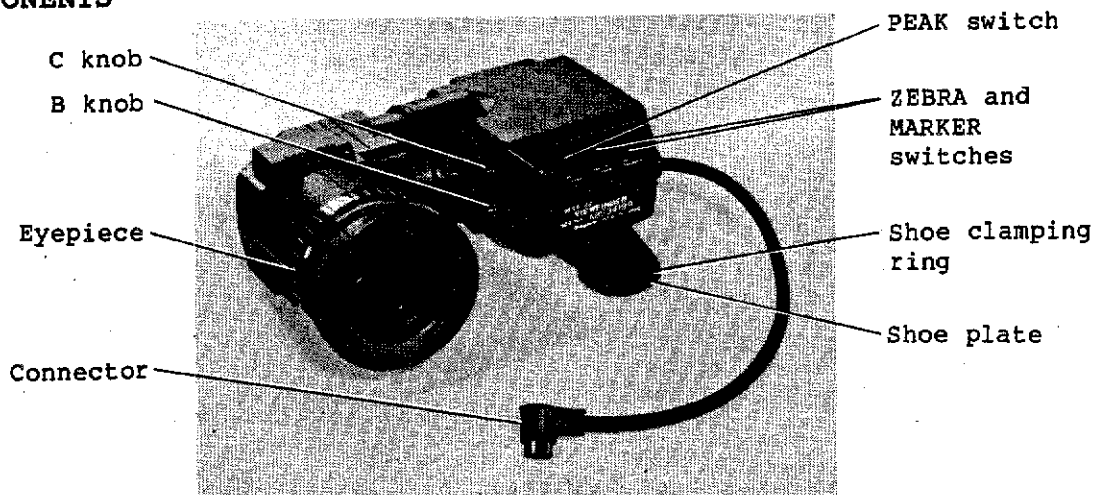
Fig. 1

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 colour camera.
Shoe clamping ring	:	After mounting the viewfinder to the colour camera, rotate this ring to clamp the viewfinder.
Shoe plate	:	Insert this shoe plate into the accessory shoe on the colour camera.

(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 colour 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
     colour camera.
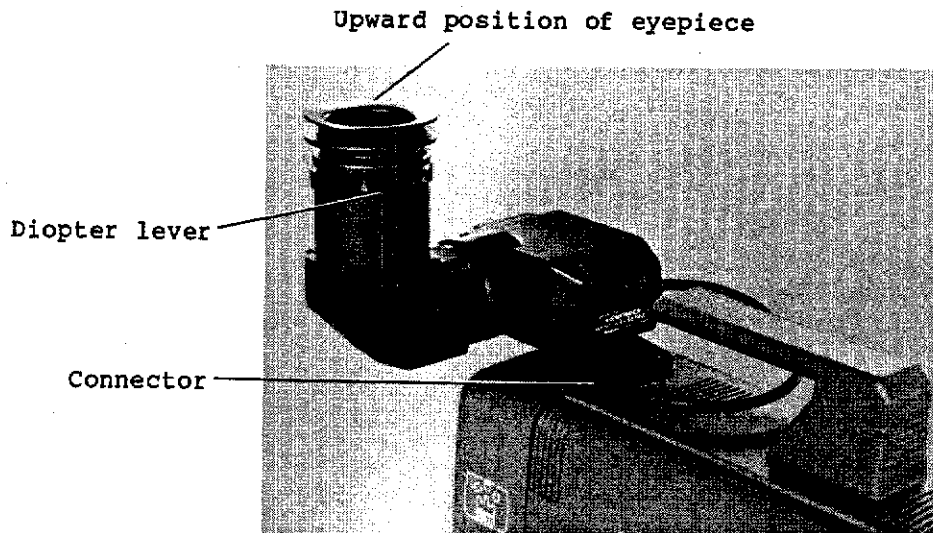
Fig. 2 Installation Example

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.
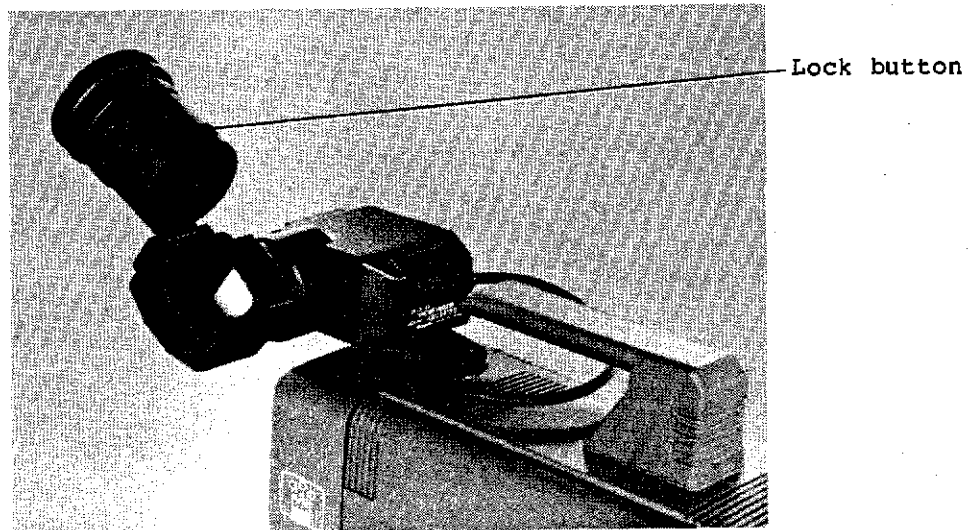
Fig. 3

EFFECTIVE DISPLAY AREA

The viewfinder fully covers the recording range of
the colour camera. The colour 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 colour monitor.

INTRODUCTION

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 J5 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.
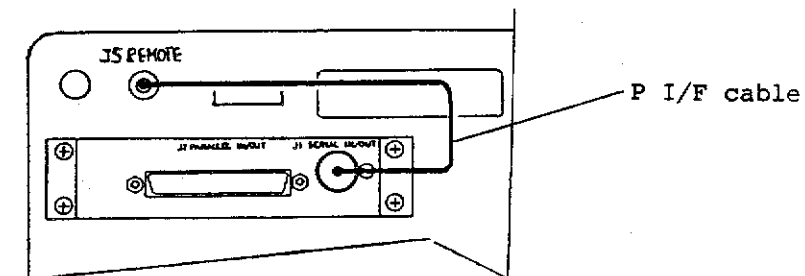
(Part of connector panel)

Fig. 4

(2) Connect the parallel interface (P I/F) cable to the J5 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.

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 10 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: 10 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 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)

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 MANUAL FOR STROBE LIGHT SYSTEM

ST-444-U for 90-132V AC input
ST-444-E for 198-250V AC input

INTRODUCTION

The Strobe Light System is designed for use with the NAC
High Speed Video System HSV-1000.
The strobe light system has two light heads and each head
produce approx. 120 W (lamp input) lighting. Lighting
duration is 10 ms, so it gives high-speed shutter effect
to freeze the fast motion for VCR recording.

COMPONENTS

(1)	Strobe light heads	V-26	2
(2)	Strobe power supply	V-513-J/-E	1
(3)	Strobe cable (9 m)	480902	2
(4)	Strobe drive cable (3 m)	480864	1
(5)	Power cable (3 m)		1
(6)	Strobe light head holder		1
(7)	Strobe head case	V-060	1
(8)	Cover for strobe power supply	392194	1
(9)	Glasses (framed)		1
(10)	Glasses (clip-on)		1

Tripod is optionally available.

SPECIFICATIONS

Flashing frequency	: 500/1000 Hz
Flash lamp input	: Approx. 120 W
Flash pulse duration	: Less than 10 ms
Lighting area	: Approx. 100 mm diameter at optimum lighting distance
Optimum lighting distance	: 1.5 m
Power source ST-444-U	: 90-132V AC, 50/60 Hz
ST-444-E	: 198-250V AC, 50/60 Hz
Power consumption	: Approx. 300 W, Approx. 430 VA

Ambient temperature and humidity
  Operation : 0 to +40°C, 30 to 80%RH
  Storage   : -10 to +60°C, 0 to 80%RH
Dimension and weight (approx.)
  Power supply : 370 W x 150 H x 360 D mm, 9 kg
  Light head   : 170 W x 175 H x 360 D mm, 3 kg
  (one each, excluding connector and handle)

Note: Outline drawings are found in later part of this
manual.

IMPORTANT: PLEASE OBSERVE SAFETY PRECAUTIONS BEFORE TURN
             ON THE STROBE POWER.

SAFETY PRECAUTIONS

    DANGER: Never direct the strobe toward your eyes.

              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.

                  CAUTION: DO NOT LOOK AT THE STROBE LIGHT
                             DIRECTLY.

                  It is dangerous to look at the strobe
                  light directly. A closed or narrow room
                  must be well ventilated since this strobe
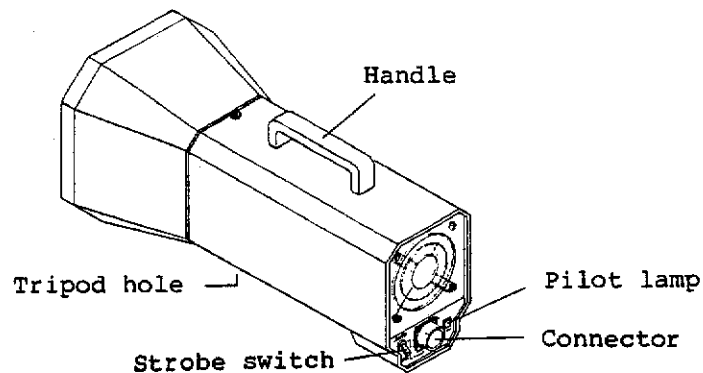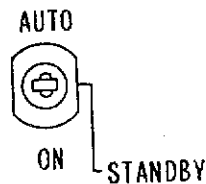   lighting produces some ozone gas.

Fig. 1 Strobe Light Head

Strobe Switch

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

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 (1/4-20 UNC) used to mount the strobe light head to a tripod.

Handle

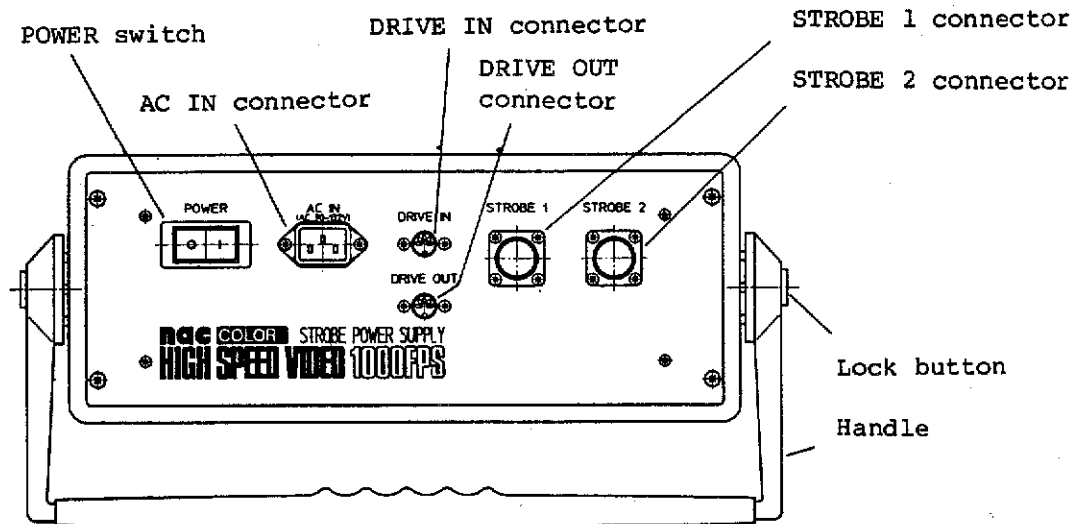Hold this handle whenever handling the strobe light head.

Fig. 2   Strobe Power Supply

POWER Switch

> Turns on and off the strobe power. Pressing the
> " " 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 connector (J11) on
>   the 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 J9 EXT. STROBE connector on
> the VCR connector panel.

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.

STROBE 1/STROBE 2 Connectors

> Connect the strobe cable(s) to the STROBE 1/STROBE
> 2 connector(s) and strobe light head(s).

Lock Buttons

> Press these buttons to change the handle angle.

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) Before disconnecting the strobe cable, turn off
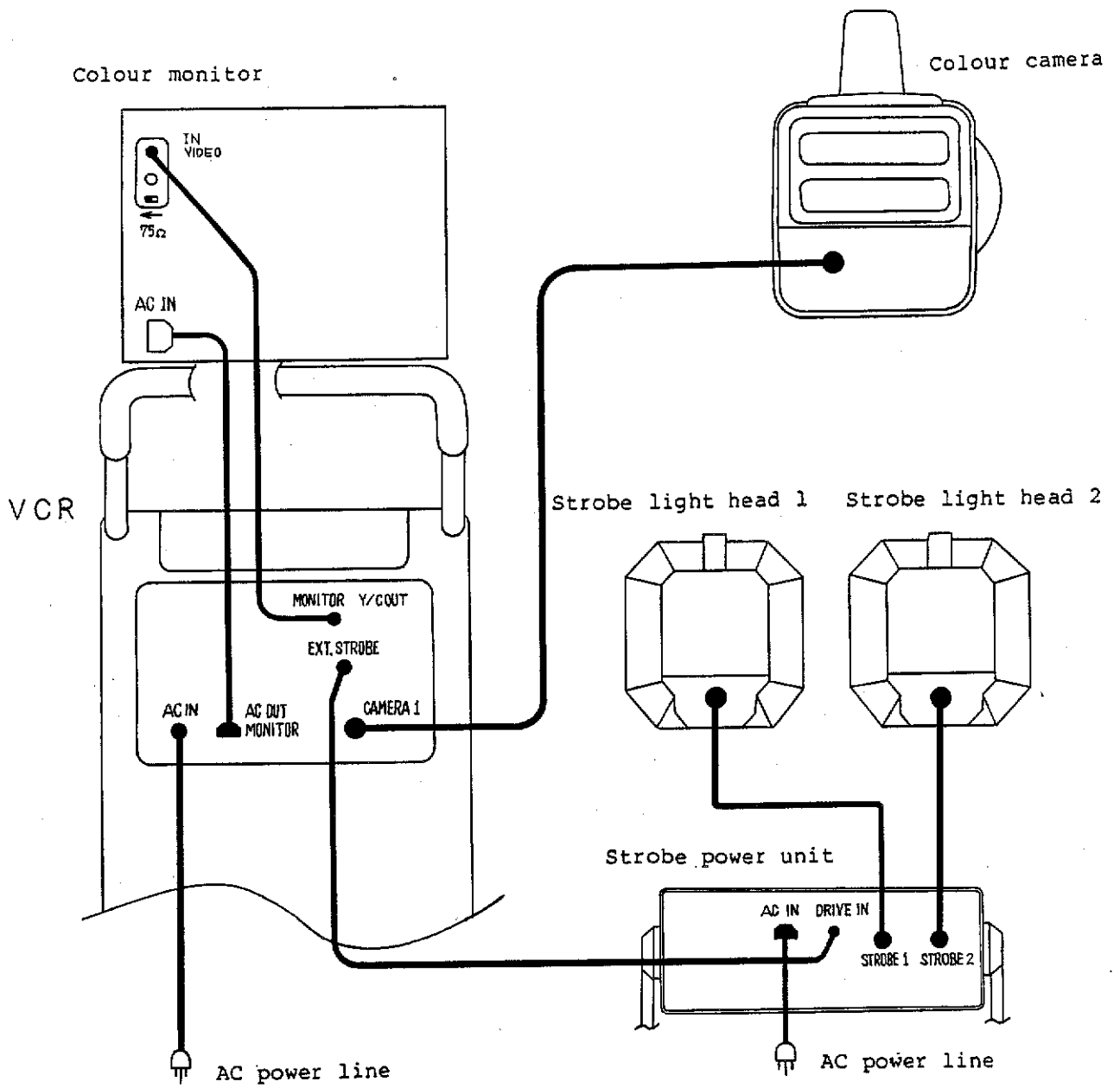> the POWER switch and wait for at least 1 minute.

Colour monitor

IN
VIDEO

75Ω

AC IN

Colour camera

VCR

MONITOR Y/C OUT

EXT. STROBE

AC IN   AC OUT   CAMERA 1
           MONITOR

Strobe light head 1   Strobe light head 2

Strobe power unit

AC IN   DRIVE IN

STROBE 1   STROBE 2

AC power line

AC power line

Fig. 3 Cable Connection, Strobe Recording

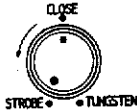This paragraph describes the outline of camera setting for strobe recording.

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

SHUTTER ON/OFF Switch - OFF
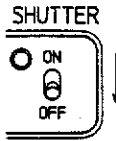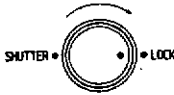
Set the SHUTTER ON/OFF switch to OFF.

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, 1000 or 500.

In strobe recording, the recording speed is selected with the FRAME RATE switch on the VCR subpanel.

AUTO/PRESET Switch - PRESET

3LK BA

AUTO

PRESET

Set the AUTO/PRESET switch to PRESET.

STROBE/TUNGST Switch - STROBE

\LANCE

STROBE

TUNGST

Set the STROBE/TUNGST switch to STROBE.

Then turn on the strobe, check the image of the camera, and adjust colour 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.
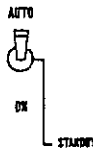
Unless recording is to be started immediately, the strobe switch shall be set to OFF to turn off the strobe. The strobe does not light in the STANDBY position.

Continuous Lighting - ON

AUTO

ON

STANDBY

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

## Remote Lighting - AUTO

AUTO

ON

STANDBY

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

STROBE

OFF ⊂⊃ ON

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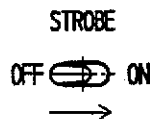
If the strobe switch on the strobe light head is set to AUTO, the strobe lights up when the STROBE switch on the VCR subpanel is set to ON. This operation may be used to observe the camera picture without recording.

NOTE: Turn off the strobe when not necessary, for longer service life.

The strobe provides for optimum lighting at a distance of 1.5 metre from an object. (It illuminates a circle of 10 cm diameter at a distance of 1.5 metre.)

The service life of a strobe flash lamp is more than 50 hours. If a strobe lamp has almost expired its life, it will not flash regularly or will not flash when the switch on the light head is set to ON. In this case, lamp replacement may be considered.

CAUTION: When replacing the flash lamp, switch off the strobe and wait for 10 minutes until it cools. The strobe cable should be disconnected when approx. 1 minute has passed after turning off the power (to discharge high voltage).

Replace the flash lamp in compliance with the following procedures:
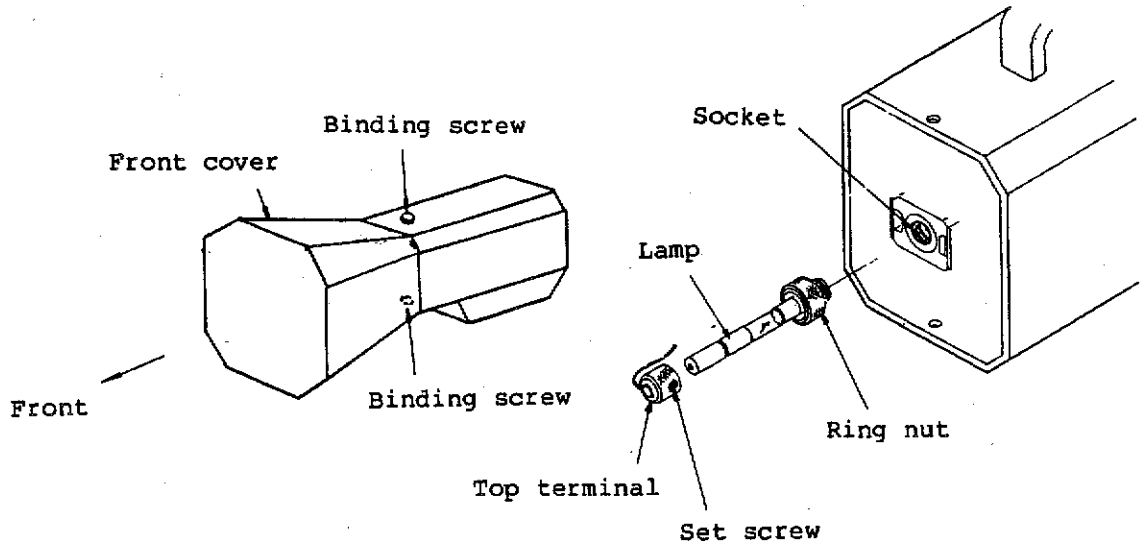
Flash Lamp Replacement Procedures

Fig. 4 Flash Lamp Replacement

(1) Unscrew two binding head screws (M3 screws) fixing the front cover. Then slide the front cover frontward to remove it with care not to bring it into contact with the lamp.

(2) Loosen the set screw (hexagon socket head M3) fixing the terminal at the top of the lamp, and disconnect the terminal.

(3) Rotate to loosen the ring nut securing the lamp bottom, remove it together with the lamp.

CAUTION: Do not touch the lamp with your fingers.

(4) Set a new lamp into the socket and secure it with the ring nut.

(5) Attach the top terminal to the top of the lamp, and secure it with the set screw.

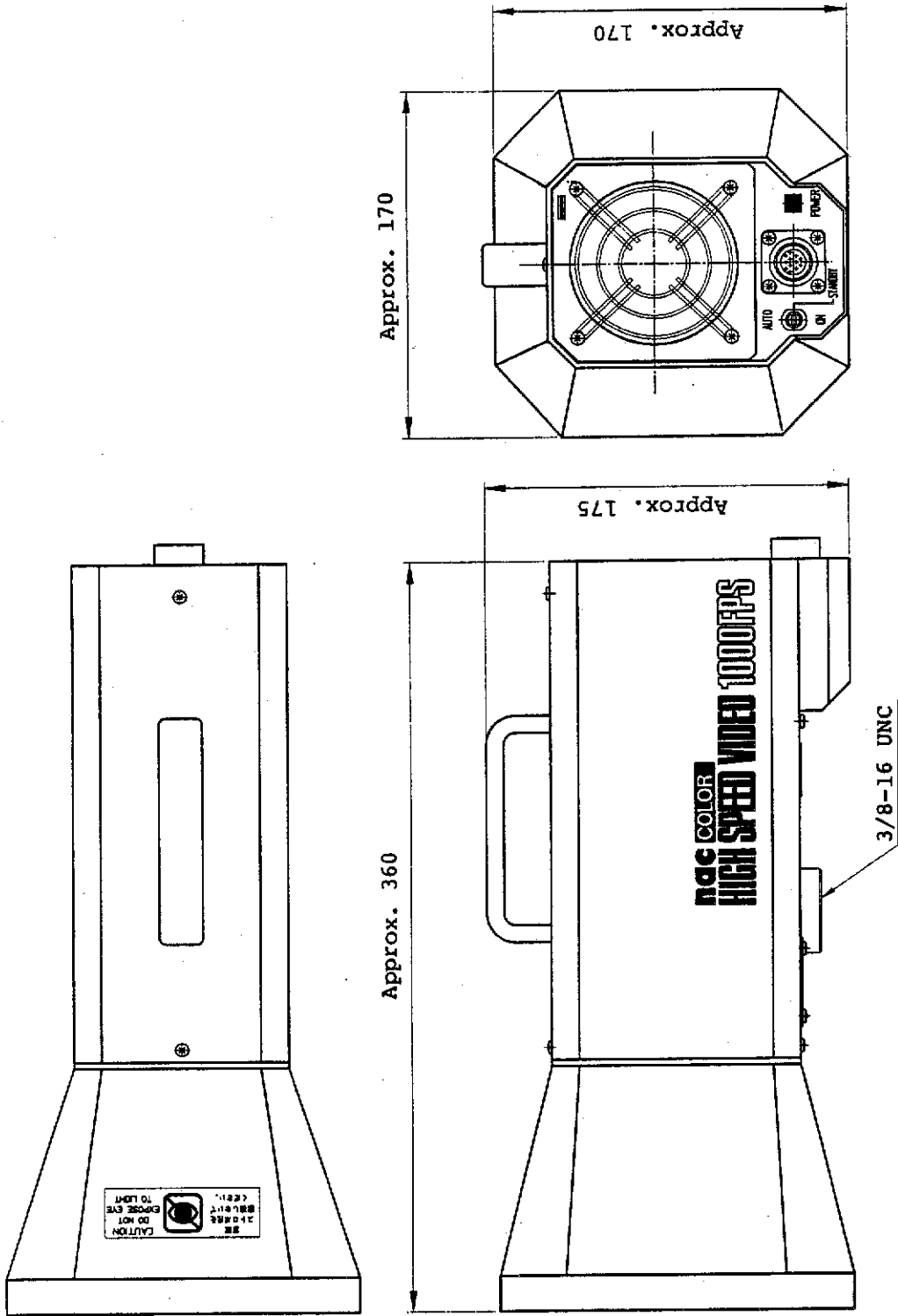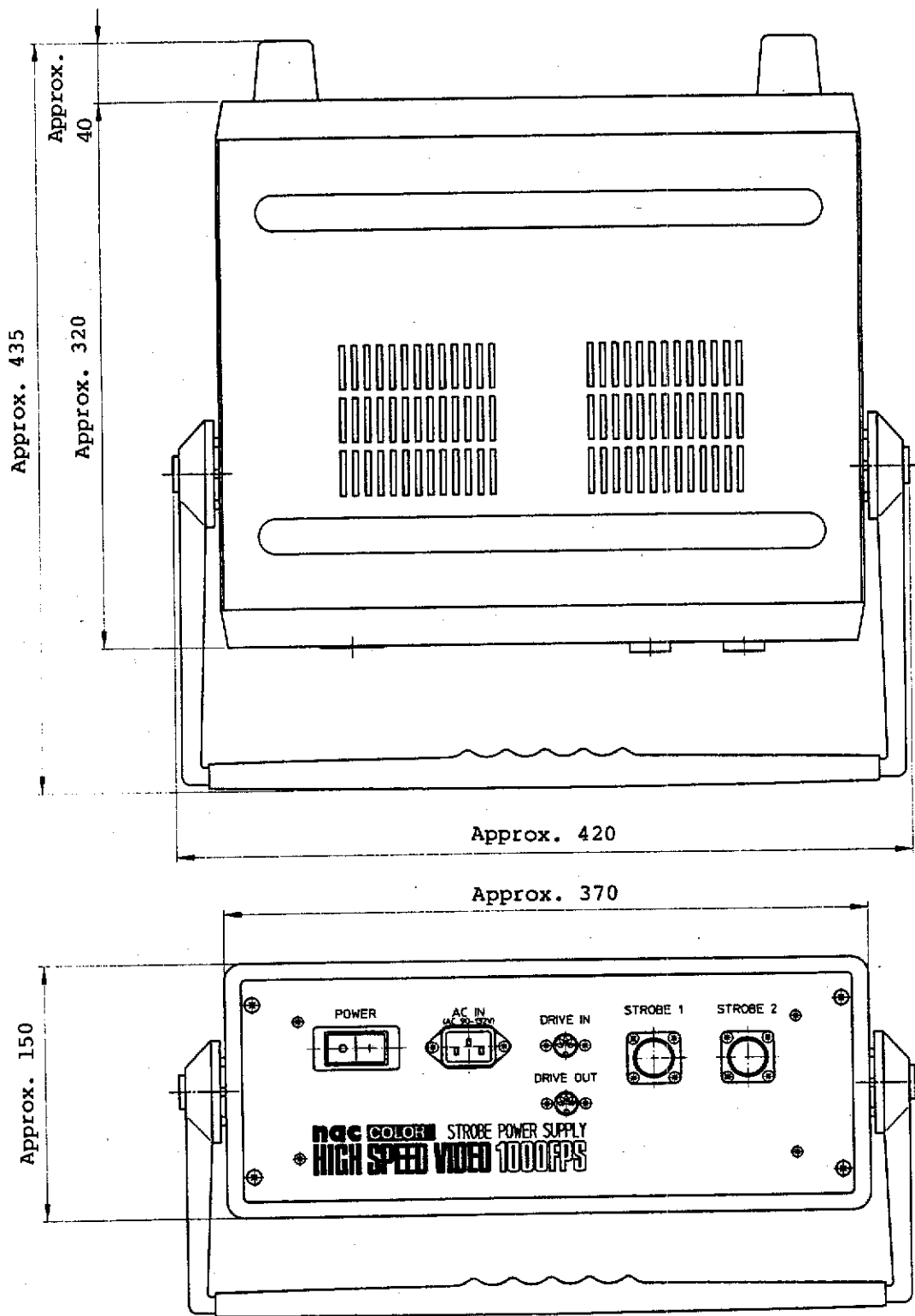(6) Attach the front cover as originally fitted taking care not to trap the cable of the top terminal.

Fig. 5 Strobe Light Head

Fig. 6   Strobe Power Supply